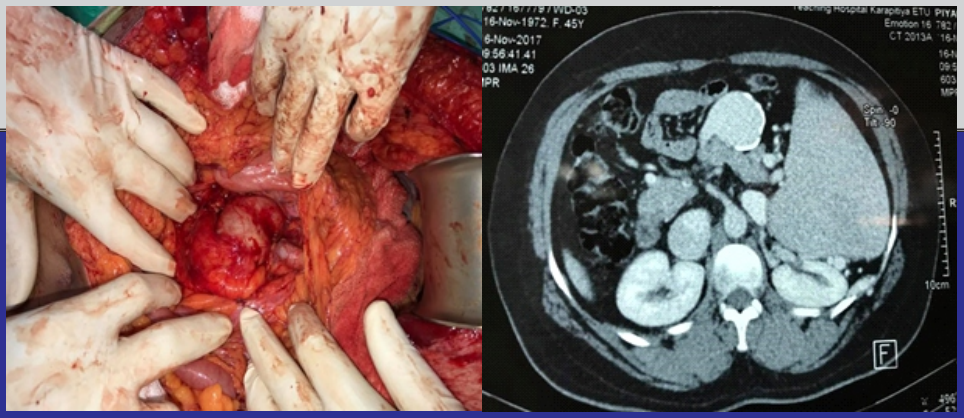
THE SRI LANKA JOURNAL OF SURGERY

April 2020 Volume 38, No.1 ISSN 1391-491X



In this issue

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The Sri Lanka Journal of Surgery

Journal of
The College of Surgeons
of Sri Lanka.

April 2020 Volume 38, No.1 - Quarterly. ISSN 1391-491X e - journal ISSN 2279 2201

Mission: "To reach the highest standard of scientific surgical practice by dissemination of high quality scientific information and to foster and promote the growth of scientific surgery in Sri Lanka and in the region"

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Printed by
Ananda Press
82/5, Sri Ratnajothi Saravanamuttu Mawatha
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THE COLLEGE OF SURGEONS OF SRI LANKA
QUARTERLY ISSN 1391-49X

A centre dedicated for men's health and wellbeing for the first time in Sri Lanka - End your suffering with an effective treatment for Erectile Dysfunction

Lanka Hospitals PLC, a premier health care provider in Sri Lanka, announces its latest addition to the Centres of Excellence- the Male Wellness Centre (MWC) – in a bid to offer services to improve health and wellbeing of men. It's also significant that a fully-fledged wellness centre dedicated solely for men has been established for the first time in Sri Lanka.

The MWC caters to a host of services including Personnel fitness scheduling and programming, Sport health and injury management, Dietary & Nutritional advices, Pre-marital counseling and health screening, Management of premature ejaculation, Management of Erectile dysfunction, Cosmetic surgeries (Bariatric / Ocular / Dental). In addition to the General health screening, patients can obtain screening for Liver, Kidney, Respiratory, Cardiac, Diabetic, Endocrine-Hormonal, Cancer and Sexually Transmitted Diseases in addition to Substances and Alcohol abuses. Furthermore, apart from leading physicians MWC offers the service of competent consultant specialists such as Cardiologist, Endocrinologist, Diabetologist, Venerologist, Urologist, Nephrologist, Oncologist, Surgeon, Vascular Surgeon, Psychiatrist as well as Counsellor.

Erectile Dysfunction (Impotence) is a common health issue suffered by men, defined by the difficulty in achieving and maintaining a penile erection during sexual intercourse. In the Sri Lankan context, the issue is hardly brought into light especially by those who suffer and often show reluctance to seeking proper medical attention. Often, incorrect and misleading advice not only aggravates the issue, but also lead them to face unwanted complications. A special Shock Wave Therapy unit was established within the Male Wellness Centre by the Lanka Hospitals to specifically treat impotence.

The Centre conducts in-depth studies and comprehensive medical analysis to precisely identify the causes for impotence such as Vascular, Psychogenic, Neurological, Hormonal, Structural and others. Being a newer and less invasive way to treat this common sexual challenge shock wave therapy has proven to be effective even when oral medication has failed. Also known as penile extracorporeal low-intensity shockwave therapy, this method involves the use of low intensity acoustic pulse waves that lead to release of factors which promote growth of new blood vessels in the penis Therapy compromises of a handheld device being angled towards the shaft of the penis. One of the main advantages of this treatment method is that it has no clinically relevant side effects. Each treatment session can last approximately 20 minutes.

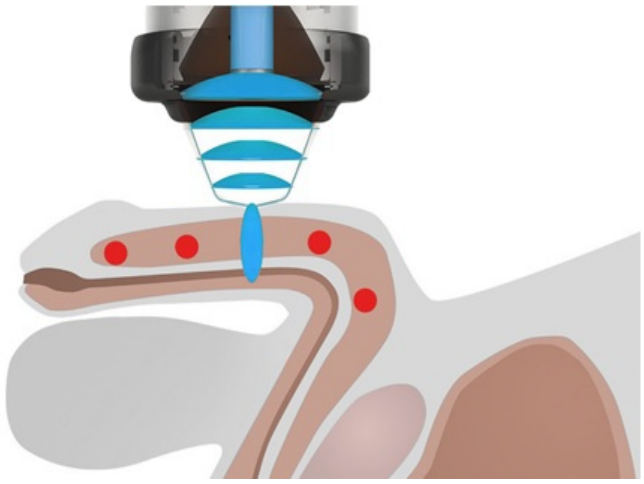

Figure 1. Shock wave therapy

Shock wave treatment is a completely painless way to treat what can be a life altering condition and a regular course of treatment usually comprises of six sessions. The frequency of these session can be tailor made as below and would be decided by the consultant:

1) Every day for 6 days
2) Every second day over an 11 day period
3) Twice a week for 3 weeks

The outcomes include gaining of more frequent erections, more rigid erections, ability to maintain an erection and perform entire act of sexual intercourse and freedom to reduce or omit medication. Therefore the use of a treatment which researchers claim is “really a breakthrough” could be good news for men who have erectile dysfunction.

As a hospital staying abreast with latest medical technology, Lanka Hospitals established Male Wellness Centre in a bid to provide world class health care services to Sri Lankan as well as International patients. Moreover, when catering to health issues and conditions that are highly sensitive and personal, Lanka Hospitals delivers complete confidentiality to its patients with the assistance of its specially trained staff.

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| MEN'S WELLNESS CENTRE |

Erectile Dysfunction Shockwave Therapy (SWT)

This process is designed for the treatment of erectile dysfunction of vasculogenic origin. The treatment is delivered with a first-of-a-kind system called the ED1000.

Advantages of Penile Shockwave Therapy

This procedure is a pain-free, non-invasive and non-pharmacological procedure that triggers a natural mechanism that solves most ED-related problems. There is lot of evidence to show very satisfactory outcomes of this therapy.

Protocol

- Each session duration: 20-30mins
- Usually performed twice a week for 3 weeks
- The sessions can be tailored on patient preference after discussing with the Consultant Genito-Urinary Surgeon or Physician

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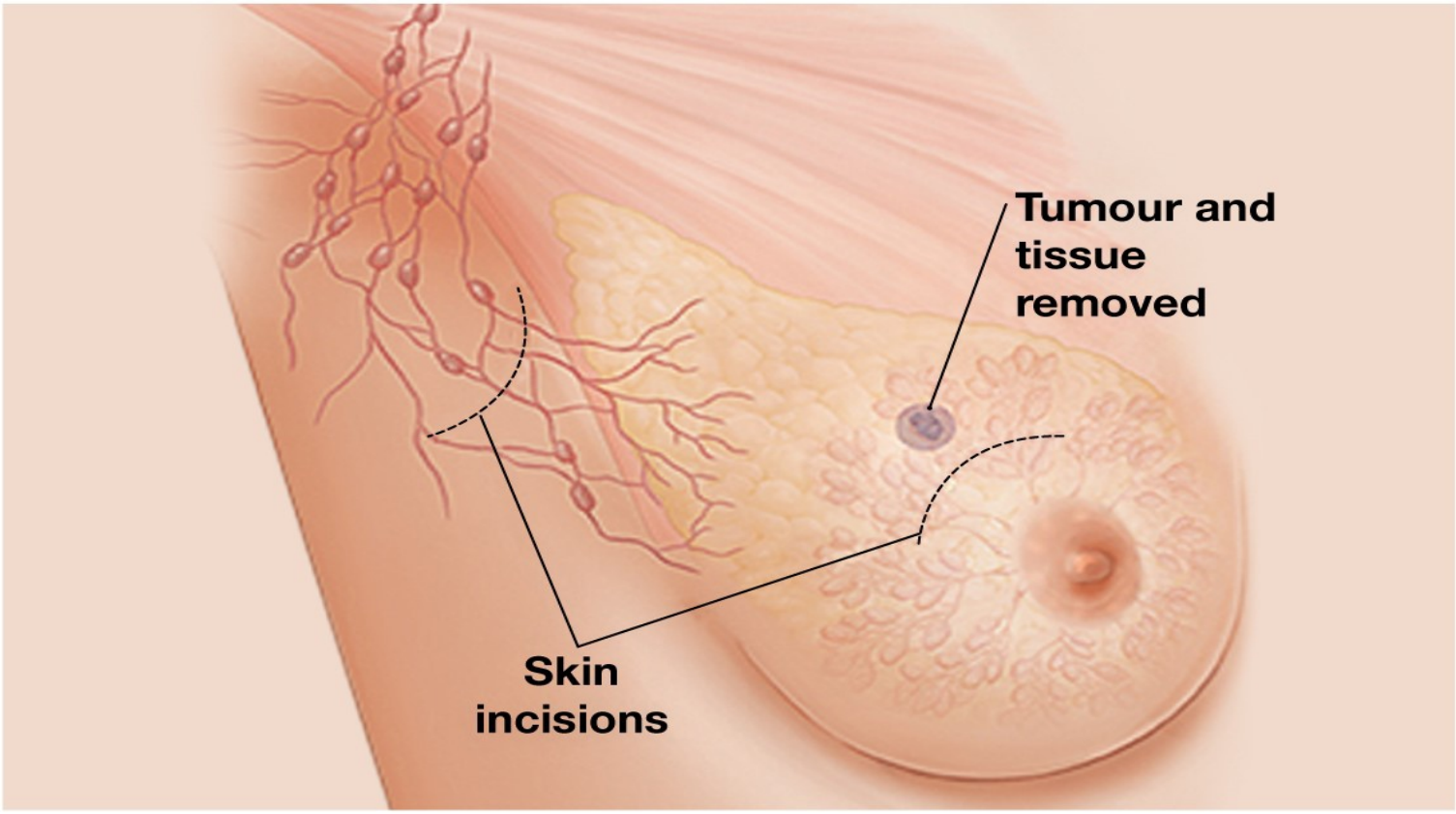

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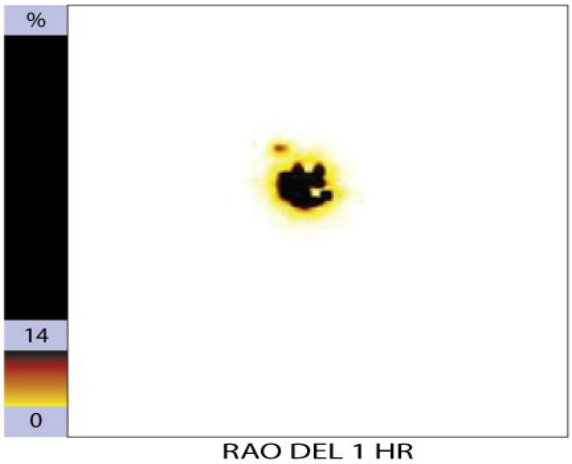

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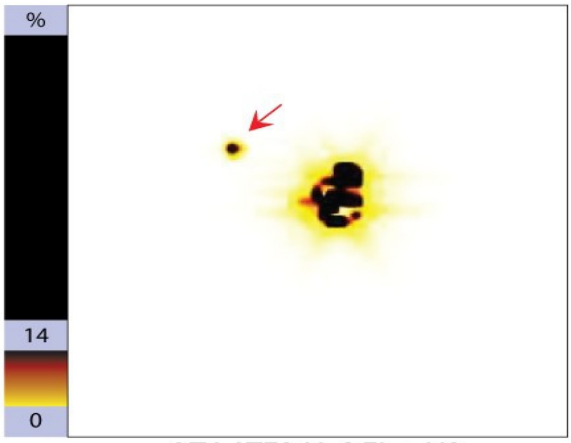

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SCIENTIFIC ARTICLE

Cancer audit of a urology unit from a teaching hospital in Sri Lanka – 2019

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Keywords: Cancer audit; urology; nephrectomy; cystectomy

Abstract

Introduction

Cancer data helps health care systems in many ways as they are imperative to identify true disease burden of a country, identify risk groups and to find the best way of management. More importantly, it helps to observe inter-regional variability of a cancer as genetic and epigenetic factors contributing to such diseases can vary from region to region. Developing nations are plagued with inadequate and poor-quality cancer data because nationwide healthcare data collecting systems are rudimentary. To make the matters worse, there are issues in sustaining these programs such as slowness of health care workers in accepting its importance and inadequate funding. Therefore, institution based surveys are extremely valuable to get a reflection of the real situation in such countries with regard to cancer management [1].

Methods

All the cancers treated in the urology unit of Colombo South Teaching Hospital from 01st of January to 31st of December 2019 were prospectively analysed. Data were entered using a mobile application based on AppSheet© platform. This mobile app was created by one of the authors (MDJ) in 2018, which was made accessible to the Consultant and Senior Registrars of the urology unit. Main aim of this app was to streamline and maximise the data collection of all urological cancer patients treated in the unit. Those who are authorized to access the App through their mobile devices could enter data of the cancer patients at each patient-encounter when appropriate and necessary.

Clinically relevant patient demographic details and disease specific data pertaining to stage, histological type, grade, tumour marker level and management method were recorded. Steps were taken to anonymise patient identification details. Data were uploaded during perioperative period and clinic follow up. Informed written consent for gathering data was taken during consent for surgery. Approval for the cancer database was obtained from the Institutional Ethics Review Committee.

Data were stored in a Google sheet linked to the App via Google cloud service, which is free at present and open source. This could only be accessed by the users who have the access to the App, ensuring data security. Apart from the basic analysis which was possible through the App itself, more advanced analysis was possible by extracting pertinent data.

Results

Commonest cancer treated during 2019 was prostate cancer (Table 1). Comparatively, numbers of penile, testicular, suprarenal and upper tract urothelial cancers were small.

There were 33 patients with histologically confirmed renal carcinoma during the study period. The mean age of renal cancer was 51 years with male to female ratio of 3.1:1. Out of 33 patients, a significant number (n=12, 36.4%) were residing outside the Colombo district, where the hospital was situated. Twenty one patients (63.7%) underwent radical nephrectomy whereas the rest (n=12, 36.3%) had partial nephrectomies. Two patients (9.5%) underwent laparoscopic radical nephrectomy while the rest had open surgery. Only 3 (9.1%) patients had a low complexity RENAL nephrometry score (equal or less than 6) whereas the majority (n=19, 57.6%) had high complexity scores (more than 9). Eleven patients (33.3%) had an intermediate RENAL score (7,8 or 9).

Nearly half of the patients with renal carcinoma (n=15, 45.6%) were primarily detected following an ultrasound scan abdomen done for vague abdominal symptoms or during routine medical check-up. Haematuria was only seen in 10 patients (30.3%) although loin pain was the main complaint in 5 patients (15.1%). Primary presentation with constitutional symptoms such as loss of appetite, loss of weight and body weakness was even rarer (n= 2, 6.1%). One patient (3.0%) presented with bilateral lower limb swelling before being diagnosed with renal cell carcinoma extending to the IVC.

More than half of renal cancer patients (n=21, 63.6%) were diagnosed in AJCC TNM stage group I (Table 2). Only 3 (9.1%) patients were in stage IV and all of them were having metastatic renal cell carcinoma. As expected, clear cell renal

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DOI: http://doi.org/10.4038/sljs.v38i1.8671

carcinoma was the commonest histological variety (n=24, 72.7%). Interestingly, rare histological types such as multi loculated cystic renal neoplasm of low malignant potential, oncocytic papillary renal carcinoma and chromophobe renal cell carcinoma were detected one each (Table 2). A considerable number of patients fell into WHO/ISUP grade 3 (n=7, 21.3%) and 4 (n=8, 24.2%) categories. Although one third of patients (33.3%) had grade 2, only 4 patients (12.1%) had the most favourable grade 1.

Bladder carcinoma was diagnosed in 58 patients. Mean age of bladder cancer was 70.4 years with a male to female ratio of 10.6:1. As expected, overwhelming majority presented with haematuria (n=52, 89.6%). Meanwhile 6 patients (11.4%) with lower urinary tract symptoms were eventually detected having bladder cancer. Four patients (6.9%) had poorly differentiated urothelial carcinoma but only a single patient (1.7%) had primary squamous cell carcinoma. Not surprisingly, papillary urothelial cancer accounted for the greatest number of bladder cancers (n=50, 86.2%) (Table 3). Majority of this type were high grade (n=33, 66%) and only 17 were having low grade cancers (34%).

There was one histologically proven carcinoma in-situ (CIS) of the bladder. Sixteen patients (27.6%) had muscle invasive bladder carcinoma and two had (3.4%) metastatic disease at the time of diagnosis (Table 3). Most of the muscle invasive disease was managed with radical radiotherapy (n=11) and radical cystectomy was done only for one patient.

Prostate carcinoma was the commonest cancer encountered during the one year period. Among the 96 patients with histologically proven prostate cancer, the mean age of presentation was 72.2 years. Most of the patients had PSA levels between 10 to 100 ng/mL (n=68, 70.8%) although one third of the cohort had the range between 50 to 100 ng/mL (Table 4). Histology was mainly obtained by trans rectal ultrasound (TRUS) guided biopsy (n=93, 96.9%) and three patients (3.1%) had the histological diagnosis after trans urethral resection of the prostate (TURP). All the patients had small acinar adenocarcinomas and majority had higher Gleason grades above 7 including poorly differentiated cancers where a Gleason grade has not been assigned (Table 4). Meanwhile there were 18 patients (18.8%) with Gleason 6. Fifty six (58%) patients with prostate carcinoma belonged to ISUP grade 5.

Thirty eight patients (39.6%) had radiologically confirmed metastatic prostate cancer whereas 25 patients (26%) had local or locally advanced (non-metastatic) disease (Table 4). Commonest method of treatment offered was bilateral orchidectomy as 80 patients (83.3%) underwent this surgery alone. During 2019, only three patients underwent radical retropubic prostatectomy. Five patients (5.1%) were offered radical radiotherapy to prostate whereas one patient (1%) underwent active surveillance.

The patient who underwent radical adrenalectomy had a high grade adrenocortical carcinoma. Among the two patients with testicular tumour, one had an undifferentiated pleomorphic sarcoma and the other had a mixed germ cell tumour with predominant embryonal component. Two cases of penile cancer had squamous cell carcinoma with one having a moderately differentiated tumour and the other one, a well differentiated cancer.

Two out of three patients with upper tract urothelial tumours underwent laparoscopic assisted nephroureterectomy whereas the other had open surgery. Two of those were situated in the distal ureter and the remaining in the kidney pelvis. All the cases were organ confined at the time of surgery (pT1 stage).

Discussion

Absence of an effective sustainable method to acquire and store cancer data is a long standing problem Sri Lanka faces along with other developing nations. This has led to scarcity of much needed research and audit pertaining to cancer in this part of the world. This in turn may translate into sub optimal care related to cancer. For an example, there is evidence that renal cell carcinoma in developing countries behave differently than their counterparts in the developed world in terms of risk factors and age of onset [2].

A significant proportion of cancer patients managed in Colombo South Hospital reside outside Colombo district. Although urological services have expanded throughout all the districts in the country, little change is seen in patient behaviour in seeking urological services in the district they reside. This has led to over burdening of long standing units and providing an acceptable urological care for the population living within the jurisdiction even more difficult [3]. Although development of trust among patients as a new unit which can provide safe urological care is a time-honoured endeavour, most such units are hampered by maldistribution of theatre time, shortage of human resources and specialized basic urological armamentarium.

According to a survey concluded in the same unit 4 years ago, mean age of renal cell cancer presentation has been 56.9 years out of which AJCC TNM stage group 1 cancer had represented only about 47.2%. Meanwhile, 38.7% of patients found their cancer as an incidental finding in ultrasound scan of the abdomen [2]. But the current study shows almost a 5-year reduction in the age of its onset and a significant increase in stage 1 presentations; nearly by 15%. Main reason for this

Table 1. Characteristics of urogenital cancers

Organ	Number	M:F	Average age
Suprarenal	1	1:0	45
Kidney	33	25:8	51.0 (34 – 73)
Upper tract urothelial	3	1:2	65.6 (58 – 78)
Bladder	58	53:5	70.4 (51 – 82)
Prostate	96	-	72.2 (51 – 86)
Penis	2	-	65.5 (64 – 67)
Testis	2	-	55.0 (25 – 85)

Table 2. Characteristics of renal cell cancer

Histology type	Number	Percentage
Clear cell	24	72.7%
Papillary type 1	2	6.1%
Papillary type 2	3	9.2%
Papillary type 1 & 2 coexisting	1	3%
Oncocytic Papillary	1	3%
Chromophobe	1	3%
Multilocular cystic renal neoplasm of low malignant potential	1	3%
WHO/ISUP grade		
1	4	12.1%
2	11	33.3%
3	7	21.3%
4	8	24.2%
Not assigned	3	9.1%
AJCC TNM stage group		
1	21	63.6%
2	3	9.1%
3	6	18.2%
4	3	9.1%

Table 3. Characteristics of bladder cancer

Histological type	Number	Percentage
Papillary urothelial cancer	50	86.2%
Poorly differentiated urothelial cancer	4	6.9%
Squamous cell cancer	1	1.7%
Spindle cell lesion (Awaiting immunohistochemistry)	1	1.7%
Papillary urothelial neoplasm of low malignant potential	2	3.4%
Stage		
Carcinoma in-situ	1	1.7%
pTa	6	10.3%
pT1	33	56.9%
pT2	16	27.6%
Metastatic	2	3.4%
Management		
Trans urethral resection of bladder tumour	38	65.5%
Radical radiotherapy	11	19%
Radical cystectomy	1	1.7%
Palliative care	2	3.4%
Yet to be decided / defaulted	6	10.3%

Table 4. Characteristics of prostate cancer

PSA range (ng/ml)		Number	Percentage
<4		3	3.1%
4 – 10		6	6.2%
10 – 20		20	20.8%
20 – 50		17	17.7%
50 – 100		31	32.3%
>100		19	19.8%
Gleason grade			
6	(ISUP 1)	18	18.8%
3+4	(ISUP 2)	10	10.4%
4+3	(ISUP 3)	3	3.1%
8	(ISUP 4)	9	9.4%
9	(ISUP 5)	29	30.2%
10	(ISUP 5)	19	19.8%
Poorly differentiated (ISUP 5))		8	8.4%
Stage			
Not determined		33	34.4%
Local / locally advance		25	26%
Metastatic		38	39.6%
Management			
Active surveillance		1	1%
GnRH analogues + Radical radiotherapy		1	1%
Radical radiotherapy		5	5.1%
Radical prostatectomy		3	3.1%
Bilateral orchidectomy + Radical radiotherapy		6	6.2%
Bilateral orchidectomy		80	83.3%

can be that more and more cancers are detected by ultrasound scan done for non-specific symptoms or routine medical checks.

According to early bladder cancer studies in Sri Lanka, nearly half of the patients had muscle invasive disease [4]. According to the current study, it is around 27% and stays within the range (21.2% to 48.4%) reported before [5]. Primary bladder carcinoma in-situ (CIS) is extremely rare in Sri Lanka [5]. The histology was reconfirmed and the patient underwent check cystoscopy after 6 weeks although no evidence of recurrence observed. Patient is lined up for intravesical therapy after multidisciplinary team meeting. Whether this is a case of a localized form of CIS which behaves less aggressively is a speculation. It may be possible that patients who had BCG vaccination at birth behaving differently in relation to CIS of the bladder [6].

Most of the patients with muscle invasive disease preferred radical radiotherapy over radical cystectomy. The only patient who underwent radical surgery was having primary bladder squamous cell carcinoma, which was locally advanced at the time of diagnosis. Although radical cystectomy is the standard of treatment for muscle invasive disease [7], in our unit majority of patients underwent radical radiotherapy. Advanced stage of the disease with elevated serum creatinine at the time of diagnosis, advanced age, presence of significant comorbidities precluding complex surgery and patients' reluctance to accept urinary diversion are the reasons for using radiotherapy as the commonly used modality of treatment. Some of the patients who had less bulky disease and suitable for radical cystectomy defaulted and sought native treatment and later returned at an advanced stage when cystectomy was not possible.

Mean age of prostate cancer diagnosis is 72.2 years according to current study with nearly 65% presenting with Gleason grade equal or more than 8 (Table 4). Nearly 70% of patients had PSA more than 20 ng/mL. Nearly 40% of the patients were confirmed to have metastatic disease at the time of diagnosis but this figure is likely to be undervalued as some patients had incomplete data (Table 4).

This trend in prostate cancer seems to be similar to what it was in the early part of this decade [8]. Considering above facts, androgen deprivation by means of bilateral orchidectomy is still the most favoured therapy for prostate cancer patients as nearly 90% of them have undergone this alone or in combination with external beam radiotherapy (Table 4).

In countries like USA, the mean age at presentation is around 66 years with a higher proportion of low Gleason grades at the time of diagnosis [9]. Also, nearly 90% of the disease is non metastatic. Reason for this is likely to be the widespread use of serum PSA in asymptomatic men to detect early prostate cancers in the USA whereas in Sri Lanka, only opportunistic detection is practiced. However, without prospective studies to assess the long term outcome of prostate cancer patients in Sri Lanka, it is difficult to conclude whether these negative looking differences affect the longevity of the local population. Presence of more commonly found compounding factors like poorly controlled diabetes mellitus, end stage renal disease and ischaemic heart disease in the population make mere conceptualization of effects of PSA screening to be erroneous.

By introducing the electronic database, our aim was to maximise the data gathering process while making it user friendly so that more units will start collecting data related to cancers managed. So far, the new mobile App has been very efficient, user-friendly and robust. However as this was done using an App which has a server located outside Sri Lanka, there is an issue related to storing data outside the country. Although it has no serious ramifications at present, whether this could be a problem in the future with issues related to data security and protection of personal data, is unpredictable. Therefore, it may be appropriate for academic and health institutions to develop mobile applications devoid of overseas servers so that all urology units and subsequently all surgical units in the country will be empowered to audit and publish their own cancer data with minimal effort and cost. This will help to perform a national audit based on data entered by all urological and surgical units. National Cancer Control Programme can use these data to improve accuracy and completeness of the National Cancer Registry.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Ravikaran A, Jayawickrama B, Arc H, Balagobi B, Sutharshan K, Abeygunasekera AM. Results of a cancer audit in a single urology unit in Sri Lanka – 2016. Sri Lanka Journal of Urology, 2019, 13, 37-40. http://doi.org/10.4038/slju.v13i0.4072
2. Balagobi B, Indika K, Samaraweera WC, Wijayarathna KN, Maddumage HP, Sutharshan K, Suvendran S, Abeygunasekera AM. Risk factors of renal cell carcinoma in a cohort of Sri Lankan patients: A case–control study. Journal of Cancer Research and Therapeutics 2019;15, Suppl S1:91-6 http://10.4103/0973-1482.206867
3. Ambegoda ALAMC, Weligamage WAS, Ishak MCM, Gobi U, Suvendiran S, Mahadeva S, Mahesh PKB, Jayawardene M. Abeygunasekera AM. A prospective study to evaluate access to elective surgical services in a urology unit of Sri Lanka. Sri Lanka Journal of Surgery 2018; 36(1): 5–9. http://doi.org/10.4038/sljs.v36i1.8474
4. Goonewardena SAS, de Silva WAS, de Silva MVC. Bladder cancer in Sri Lanka: Experience from a tertiary referral center. International Journal of Urology 2004; 11: 969 – 972 https://doi.org/10.1111/j.1442-2042.2004.00930.x
5. Sasikumar S, Wijayarathna K S N, Karunaratne KAMS, Gobi U, Pathmeswaran A, Abeygunasekera AM. Pathological Characteristics of Primary Bladder Carcinoma Treated at a Tertiary Care Hospital and Changing Demographics of Bladder Cancer in Sri Lanka. Advances in Urology 2016: DOI: 2016-5751647. https://doi.org/10.1155/2016/5751647
6. Sutharshan K, Balagobi B, Gajasinghe S, Sasikumar S, Weligamage A, Ishak M, Maddumage H, Abeygunasekera AM. Clinocopathological profile of malignancies treated in a urology unit over a period of five years. Sri Lanka Journal of Surgery 2016; 35: 1-5
7. Dall'Era MA, Cheng L, Pan C X. Contemporary management of muscle-invasive bladder cancer. Expert Review of Anticancer Therapy 2012; 12(7), 941–950. https://doi.org/10.1586/era.12.60
8. Abeygunasekera AM, Wijayarathna SN, de Silva K, Gobi U, Swarna S, Sujeeva W. Clinicopathological characteristics and primary treatment of prostate cancer in a urology unit of Sri Lanka. Journal of Cancer Research and Therapeutics 2015; 11:780-5 http://www.cancerjournal.net/text.asp?2015/11/4/780/140839
9. https://www.cancer.net/cancer-types/prostate-cancer/statistics

SCIENTIFIC ARTICLE

D-dimer: a predictor of acute pancreatitis

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Keywords: Acute pancreatitis; D-Dimer; multiple organ dysfunction; pseudo cyst; sensitivity

Abstract

Introduction

Defect in coagulation present even in the early stage of acute pancreatitis. D-dimer is a small protein particle generated during blood clot disintegration due to lysis of fibrin. It is an accurate indicator of lysis of fibrin, so has an association with the severity of pancreatic inflammation. The study was undertaken to know the utility of d-dimer to forecast organ failure or complications in acute pancreatitis.

Methodology

From June 2019 to Jan 2020, 50 patients of acute pancreatitis were enrolled in this prospective study. Patients were subjected to the d-dimer test within 24 hours after admission. The patients were split into two groups; with organ failure (complications) and without any complications. The result of the d-dimer test was correlated with these groups.

Results

50 patients of acute pancreatitis were included in this study. Organ failure or local complications observed included impairment renal in 4 patients (16%), vasopressor requirement in 4(8%), pulmonary dysfunction in 5 (10%) and multiple organ failure syndrome (MODS) in 5 (10%). The sensitivity of d-dimer was 75% and specificity was 90%. Positive predictive value and negative predictive value of d-dimer were 91%, 74% respectively.

Conclusions

D-dimer is an accurate and cost-effective test to predict organ failure or local complications in a patient of acute pancreatitis.

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DOI: http://doi.org/10.4038/sljs.v38i1.8670

Introduction

Acute pancreatitis is a disorder of inflammation of variable severity. It may fluctuate from mild disease to severe even associated with organ failure. Around one-fourth of the patients present as severe acute pancreatitis, with a mortality rate of up to 25%. Death in severe acute pancreatitis can occur in the early phase, secondary to an inflammation and later on, because of infection and major bleeding. Coagulopathy and obstructed microcirculation are common in the early disease and correlate with severity [1]. The diagnosis of acute pancreatitis is based on clinical features, serum amylase level and imaging like ultrasound and or contrast-enhanced computed tomography [2].

Patients with a mild form of pancreatitis need minimal medical attention, but those with moderate or severe forms need intensive care. So, it is vital to know the disease progression at an early phase of pancreatitis to halt it [3].

Acute pancreatitis is not an irreversible disorder. This inflammatory disorder leads to the release of tissue factors (prostaglandins), cytokines and activated complements. They stimulate coagulation and also stop lysis of fibrin, leading to a stage of hypercoagulation. Hence markers of disseminated intravascular coagulation, like d-dimer and antithrombin-III levels, may forecast disease progression. Fibrin disintegration products (d-dimer) have a pro-inflammatory action with leukocytes and can stimulate the vascular endothelial cells to secrete cytokines [4]. D-dimer is an investigation of choice to diagnose thromboembolism and has been found to have the ability to predict the outcome in acute pancreatitis [5]. It can be utilised to predict organ dysfunction or complications in severe acute pancreatitis patients [6].

Previous studies suggest coagulation related factors are potential predictors of severity and outcome of panceatitis [2,3,4]. Kumar MSA et al proved in his study that d-dimer can be used as a single predictor in pancreatitis [7].

Most of the cases of acute pancreatitis usually report to primary health centres, which lack facilities for resuscitation and supportive treatment for patients of severe acute pancreatitis. These patients can develop organ failure. So, their prompt referral to tertiary care centres would save time

Table 1. Demography with clinical details

Gender		Age groups affected in years		
Male	Female	20-40	40-60	60-80
45 (90%)	5 (10%)	38 (56%)	10 (20%)	2 (4%)
Aetiology			Progression of pancreatitis	
Alcohol	Idiopathic	Gall stone	Uncomplicated	Organ failure/ complications
44 (88%)	10 (20%)	1 (2%)	22 (44%)	Renal failure 4 (8%) Need of vasopressor 4 (8%) MODS 5 (10%) ARDS 5 (10%) Pseudocyst 10 (20%)

and reduce mortality and morbidity. Hence early recognition of organ failure at the primary level is beneficial for the patient. Most of the studies done are in favour of d-dimer being an effective predictor for organ failure in acute pancreatitis, but one study still has conflicting results regarding its efficacy [8], also the number of studies favouring d-dimer being an effective predictor of organ failure in severe acute pancreatitis are few [6].

Considering all these factors this study was undertaken to prove its efficacy to predict organ failure or complications in acute pancreatitis.

Aim:

To identify the efficacy of d-dimer to predict the severity of acute pancreatitis.

Materials and methods

It was a prospective study, including 50 participants of acute pancreatitis.

Study setting: Datta Meghe medical college, Nagpur (India) of Datta Meghe institute medical sciences deemed university

Study duration: June 2019- June 2020

Sample size: 50 patients

Inclusion criteria:

All patients of acute pancreatitis (age>18 years)

Exclusion criteria:

1. Recurrent attacks of acute pancreatitis.
2. History of surgery for pancreatitis.
3. Ischaemic heart disease, cerebrovascular accident, history of thromboembolism and history of the anticoagulant.

This study was conducted after approval of the Institutional Ethics Committee, Jawaharlal Nehru Medical College, Sawangi (Meghe).

Baseline data including name, age, sex and other investigations such as ultrasonography of abdomen, contrast-enhanced computed tomography (CECT) of the abdomen, serum amylase/lipase, serum calcium as per the requirement of the patient. D-dimer test was done within 24 hrs of admission.

Statistical analysis:

Statistical analysis of the d-dimer test was done by the software SPSS. Its correlation with organ failure and local complications was determined. Predicting power of d-dimer was determined by estimating true positive, false positive, true negatives and false negative. These were used to calculate the parameters of diagnostic accuracy sensitivity and specificity.

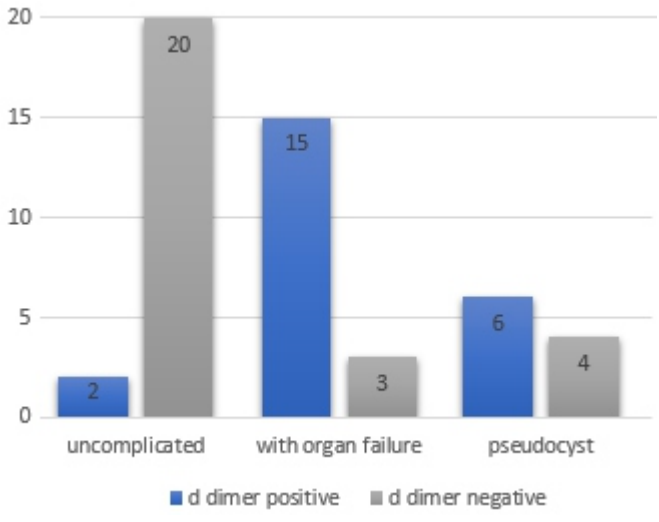

Figure 1. D-dimer test with complications or organ failure.

Results

Table 1 depicts demography with clinical details of patients. Around 50 acute pancreatitis patients participated in the study. Organ dysfunction during the episodes of pancreatitis was high: renal impairment in 4 patients (16%) a vasopressor requirement in 4(8%), pulmonary dysfunction (ARDS) developed in 5 (10%) and multiple organ failure syndrome (MODS) in 5 (10%) patient.

In most patients with organ failure or local complications, the d-dimer test was positive and in uncomplicated pancreatitis d-dimer test was negative (Figure 1). The sensitivity was 75%, and the specificity was 90%. The positive predictive value was 91% and the negative predictive value was 74%.

Discussion

The major difficulty in treating pancreatitis is to predict its severity. The present study has proved that the d-dimer test done on admission or within 24 hours after admission was valuable in the prediction of multiple organ dysfunction or complications (Table 1 and Figure 1).

Pathophysiology of acute pancreatitis has two components; systemic inflam-matory response syndrome and pancreatic necrosis which can be associated with infection and septic shock [9]. Severe acute pancreatitis outcome or prognosis solely depend on the presence of organ failure and infection of pancreatic necrosis. The present study proved the efficacy of the d-dimer test to forecast these two parameters of prognosis. Hence it can be used to select an individual patient for prompt aggressive treatment.

Radenkovic D. et al showed prothrombin time, fibrinogen, and d-dimer levels on admission were notably higher in organ failure and lower in non-organ failure patients. A d-dimer value of 414.00 microgram/L was the best cut off level to forecast organ failure. Sensitivity was 90% and specificity was 89%. The positive predictive value of d-dimer was75% with negative predictive value was 96% [2], suggestive of the d-dimer test's accuracy to identify prognosis of pancreatitis. This study was similar to the present study.

A study done by Salomone T et al showed mildly elevated d-dimer levels in (1.5 times of normal) in patients of pancreatitis without complications. But with organ failure, these levels increased to seven times above the normal. They suggest that d-dimer had definite a role to forecast the prognosis of pancreatitis and the possibility of systemic involvement [5].

Lu Ke et al showed higher levels of d-dimer in patients with multiple-organ failure, need for surgical treatment, and in the presence of pancreatic necrosis. Levels of d dimer were lower in a patient of mild disease. This suggests a positive prediction of d dimer about organ failure or local complications of pancreatitis [6]. Results of this study were similar to the present study,

Maeda K et al [8] showed less favourable results of a d-dimer test than the antithrombin III level [8] in a prediction of prognosis of pancreatitis. This study was not similar to the present study.

Etiopathology of raised levels of d-dimer is difficult to understand. The severity of pancreatitis is depending on the extent of obstruction of pancreatic microcirculation due to microthrombi formation with fibrinolysis. Severe coagulative disorder suggested by a positive d dimer test, usually associated with increase possibility of pancreatic necrosis and organ failure [6]. This could be positively correlated with a d-dimer test.

Conclusion

D-dimer is an accurate and cost-effective test to predict organ failure or local complications due to acute pancreatitis.

Limitation

We didnt have the facility to measure d-dimer levels, hence it was not possible to find out cut off level of d-dimer to forecast prognosis of acute pancreatitis.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Ning Yang, Dong-Lei Zhang and Jian-Yu Hao, Coagulopathy and prognostic potential of d-dimer in hyperlipidaemia-induced acute pancreatitis. Hepatobiliary pancreatic disease international, December 15, 2015, vol 14(6).:633-641. https://doi.org/10.1016/s1499-3872(15)60376-9
2. Radenkovic D, Bajec D, Ivancevic N, Milic N, Bumbasirevic V, Jeremic V, et al. D-dimer in acute pancreatitis: a new approach for an early assessment of organ failure. Pancreas 2009 Aug;3(6):655-60. https://doi:10.1097/MPA.0b013e3181a66860
3. Hanna Sternby, Hannes Hartman, Dorthe Johansen, Henrik Thorlacius, Sara Regnér, Chronological pathophysiological patterns of biomarkers in acute pancreatitis, Pancreatology Jun 2016, 16(3), S52. https://doi.org/10.1016/j.pan.2016.05.179
4. Paulina Dumnicka, DawidMaduzia, PiotrCeranowicz, Rafał Olszanecki, Ryszard Drożdżand Beata Kuśnierz-Cabala. The interplay between inflammation, coagulation and endothelial injury in the early phase of acute pancreatitis: clinical implications.Int. J. Mol. Sci. 2017, 18,354 https://doi.org/10.3390/ijms18020354
5. Salomone T, Tosi P, Palareti G, Tomassetti P, Migliori M,

Guariento A, et al. Coagulative disorders in human acute pancreatitis: role for the D-dimer. Pancreas 2003, 26(2), 111–116 https://doi.org/10.1097/00006676-200303000-00003

6. Lu Ke, Hai-bin Ni, Zhi-hui Tong, Wei-qinLi, Ning Li, Jie-shouLi.D- dimer as a marker of severity in patients with severe acute pancreatitis. Japanese society of hepato-biliary-pancreatic surgery & springer 2011, J HepatobiliaryPancreatSci 2012, 19:259–265. https://doi.org/10.1007/s00534-011-0414-5
7. Anil Kumar, Ranjith Kothagattu, D-dimer levels in predicting the severity of acute pancreatitis. IntSurg J 2017; 4:3993-8. https://doi.org/10.18203/2349-2902.isj20175398
8. Maeda K, Hirota M, Ichihara A, Ohmuraya M, Hashimoto D, Sugita H, et al. Applicability of disseminated intravascular coagulation parameters in the assessment of the severity of acute pancreatitis. Pancreas. 2006;32(1):87-92. https://doi.org/10.1097/01.mpa.0000186248.89081.44
9. Jones AE, Trzeciak S, Kline JA. The sequential organ failure assessment score for predicting outcome in patients with severe sepsis and evidence of hypoperfusion at the time of emergency department presentation. Crit Care Med. 2009;37(5):1649-54. https://doi.org/10.1097/ccm.0b013e31819def97

SCIENTIFIC ARTICLE

Perforation peritonitis: a clinical profile and management

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Keywords: Perforation; peritonitis; peptic ulcer; culture; omental patch

Abstract

Perforative peritonitis is the most common surgical emergency in general surgical practice[2]. The Indian aetiological spectrum of perforation continues to differ from that of the Western world and there is the paucity of data regarding its aetiology, prognostic indicators, morbidity and mortality pattern. In the majority of cases, delayed presentation to the hospital occurs with well-established generalized peritonitis and varying degree of septicaemia.

This descriptive cross-sectional study was conducted at Dr D. Y. Patil Medical College from 2017 to 2019 with a sample size of 30 patients. All details of the patients including clinical history, examination findings, laboratory and radiological investigations, intra-operative findings, and post-operative complications were studied.

Perforation peritonitis had a male: female ratio of 3.29:1; and was more commonly seen between the age group of 21-30 years, whereas peptic ulcer perforation had a bimodal distribution (21-30 years and 51-60 years). Appendicular perforation was seen in the younger age group. Small bowel perforation commonly occured after 3rd decade of life. Descending order of perforation sites: duodenum and stomach, appendix, ileum, jejunum, colon and gall bladder. Commonest aetiology was peptic ulcer perforation, followed by appendicitis and enteric fever. Majority of patients presented after 48 hours, in the stage of established generalised peritonitis.

The diagnosis was possible by pneumoperitoneum on X-ray abdomen standing in 70% and only a few needed CT for diagnosis. Laparotomy followed by primary closure of perforation with or without live omental patch was the commonest procedure. Appendicectomy was done in appendicular perforation whereas occasionally, resection anastomosis of involved small bowel segment was required. Proximal diversion was not routinely necessary; only if there are severe contraindications to a primary RA. E. coli was the most common peritoneal contaminating organism followed by Klebsiella and Proteus mirabilis. The post-operative complication rate was 53.3% (wound infection 30%) and the mortality rate was 3.3%.

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DOI: http://doi.org/10.4038/sljs.v38i1.8649

Introduction

Peritonitis is known from the days of Hippocrates who described the Hippocratic facies that is seen in the terminal stages of diffuse peritonitis, which is even recognised today as a most valuable prognostic sign [1].

Perforative peritonitis is the most common surgical emergency in general surgical practice [2]. The Indian aetiological spectrum of perforation continues to differ from that of the Western world and there is paucity of data regarding its aetiology, prognostic indicators, morbidity and mortality pattern. In the majority of cases, delayed presentation to the hospital occurs with well-established generalized peritonitis and varying degree of septicaemia [3, 4].

Various etiological conditions include peptic perforation, appendicular perforations, typhoid, intestinal tuberculosis, Meckel's diverticulum, diverticulitis, trauma, gastrointestinal carcinomas, foreign body ingestion, gall bladder perforation secondary to gall stones, perforation due to obstruction, iatrogenic perforation.

Perforation of a hollow viscera leads to escape of the visceral contents into the peritoneal cavity. Although the initial content may be sterile, eventually it will be contaminated due to direct bacterial invasion. In elderly women, spontaneous uterine rupture is a rare cause of perforative peritonitis particularly in the absence of a history of abdominal tuberculosis or chronic analgesic intake [4].

The signs and symptoms are typical and therefore a clinical diagnosis of peritonitis is usually possible. The mainstay of treatment is adequate resuscitation, antibiotics and surgical intervention [5,6] to eliminate the source of bacterial contamination by treating the underlying pathologic process, to decrease the degree of bacterial contamination in the peritoneal cavity and to prevent recurrent or residual infection. This is achieved by either repairing the perforated

segment, resecting and anastomosing it or exteriorising it. Both immediate (wound infection/dehiscence, intraperitoneal abscess, paralytic ileus) and late (entero-cutaneous fistula, adhesive intestinal obstruction, incisional hernia) complications can occur.

The mortality of perforation peritonitis is highly dependent on early approach to the hospital, quick diagnosis and prompt surgical treatment as it correlates with the duration and degree of peritoneal contamination, the patient's age, the general health of the patient and the nature of the underlying aetiology. This study was conducted to identify the various clinical presentations, aetiology, management and post-operative complications that can occur in perforative peritonitis.

Materials and methods

Thirty patients of perforative peritonitis were included in this descriptive cross-sectional study conducted at Dr D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune from May 2017 to October 2019.

Inclusion criteria: All patients presenting with perforative peritonitis.

Exclusion criteria:

- Primary peritonitis
- Iatrogenic peritonitis
- Post-operative peritonitis

Approval of the Institute Ethics Committee was obtained before the commencement of the study. Informed written consent was obtained from all patients prior to their enrolment in this study. All these patients were studied with respect to their various clinical presentations at the time of diagnosis, the various causes, radiological correlation, intra-operative findings, management, peritoneal exudate cultures, post-operative prognosis and complications. All patients were taken up for emergency surgery after adequate resuscitation. The peritoneal toilet was performed in all irrespective of site or aetiology, with the mandatory placement of at least one abdominal drain. Post-operatively, the patients were followed up at one month, three months and six months.

Results

The age of patients in this study ranged from 16 to 78 years; the commonest age group was 21-30 years (43.3%). The oldest patient had a sigmoid perforation, whereas the youngest patient had an appendicular perforation. Mean age was 36.6 years. Twenty three patients (76.7%) were male and 7 patients (23.3%) were female with a male to female ratio of 3.29:1.

The commonest site of perforation was peptic perforation accounting for 36.7% of cases, followed by appendicular perforation (23.3%). Other sites included: 10% jejunal, 20% ileal, 6.7% sigmoid and 3.3% gall bladder.

Commonest aetiology was peptic ulcer perforation (36.7%), especially duodenal, followed by appendicular perforation (23.3%). Traumatic (6.7%) jejunal perforation occurred in 2 patients (1 blunt abdominal trauma and 1 penetrating abdominal trauma. There was only 1 case (3.3%) each of perforated gall bladder (empyema), tuberculosis, obstruction due to malignancy (sigmoid adenocarcinoma), obstruction due to stricture, colonic diverticulosis and jejunal diverticulosis.

Both appendicular and peptic perforation are commonest in the age group 21-30 years followed by 51-60 years. Enteric perforation is common in third and fourth decades of life. Tuberculosis is noted in third decade of life. Malignant perforation, stricture perforation and gall bladder perforation are common in the elderly (>60 years).

Thirty percent of patients presented with symptom duration of 2 days. Only 33.3% of patients presented within 24 to 48 hours of onset of symptoms. All patients had abdominal pain as presenting complaint regardless of aetiology, whereas vomiting was present in 70%, fever in 66.7% and abdominal distension in 43.3%. Only 10 patients (33.3%) had complaints of altered bowel habits; out of which, only 3 had complaints of obstipation (two of which had obstruction due to malignancy and stricture).

The majority (56.7%) had localised pain (right iliac fossa pain in 100% of appendicular perforations, right hypochondrial pain in 100% of gall bladder perforation and epigastric pain in 63.6% peptic perforations) vs. generalised pain (43.3%). Vomiting was common (72.7%) in peptic perforation. Fever was present in all cases of appendicular perforation whereas

Table 1. Aetiology of perforation

Aetiology	Number	Percentage
Peptic gastric ulcer	5	16.7%
Peptic duodenal ulcer	6	20%
Appendicitis	7	23.3%
Enteric perforation	4	13.3%
Tuberculosis	1	3.3%
Trauma	2	6.7%
Empyema gallbladder	1	3.3%
Obstruction due to malignancy	1	3.3%
Obstruction due to stricture	1	3.3%
Diverticulosis of Colon	1	3.3%
Diverticulosis of Jejunum	1	3.3%

Table 2. Distribution of cases according to age and aetiology

Aetiology	16-20	21-30	31-40	41-50	51-60	61-70	≥71
Peptic gastric ulcer	2 (40%)	1 (20%)	0	0	1 (20%)	1 (20%)	0
Peptic duodenal ulcer	0	3 (50%)	0	0	2 (33.3%)	1 (16.7%)	0
Appendicitis	2 (28.6%)	4 (57.1%)	0	0	1 (14.3%)	0	0
Enteric perforation	0	2 (50%)	1 (25%)	1 (25%)	0	0	0
Tuberculosis	0	1 (100%)	0	0	0	0	0
Trauma	0	2 (100%)	0	0	0	0	0
Empyema gallbladder	0	0	0	0	0	1 (100%)	0
Obstruction due to malignancy	0	0	0	0	0	0	1 (100%)
Obstruction due to stricture	0	0	0	0	0	1 (100%)	0
Diverticulosis of Colon	0	0	1 (100%)	0	0	0	0
Diverticulosis of Jejunum	0	0	0	1 (100%)	0	0	0

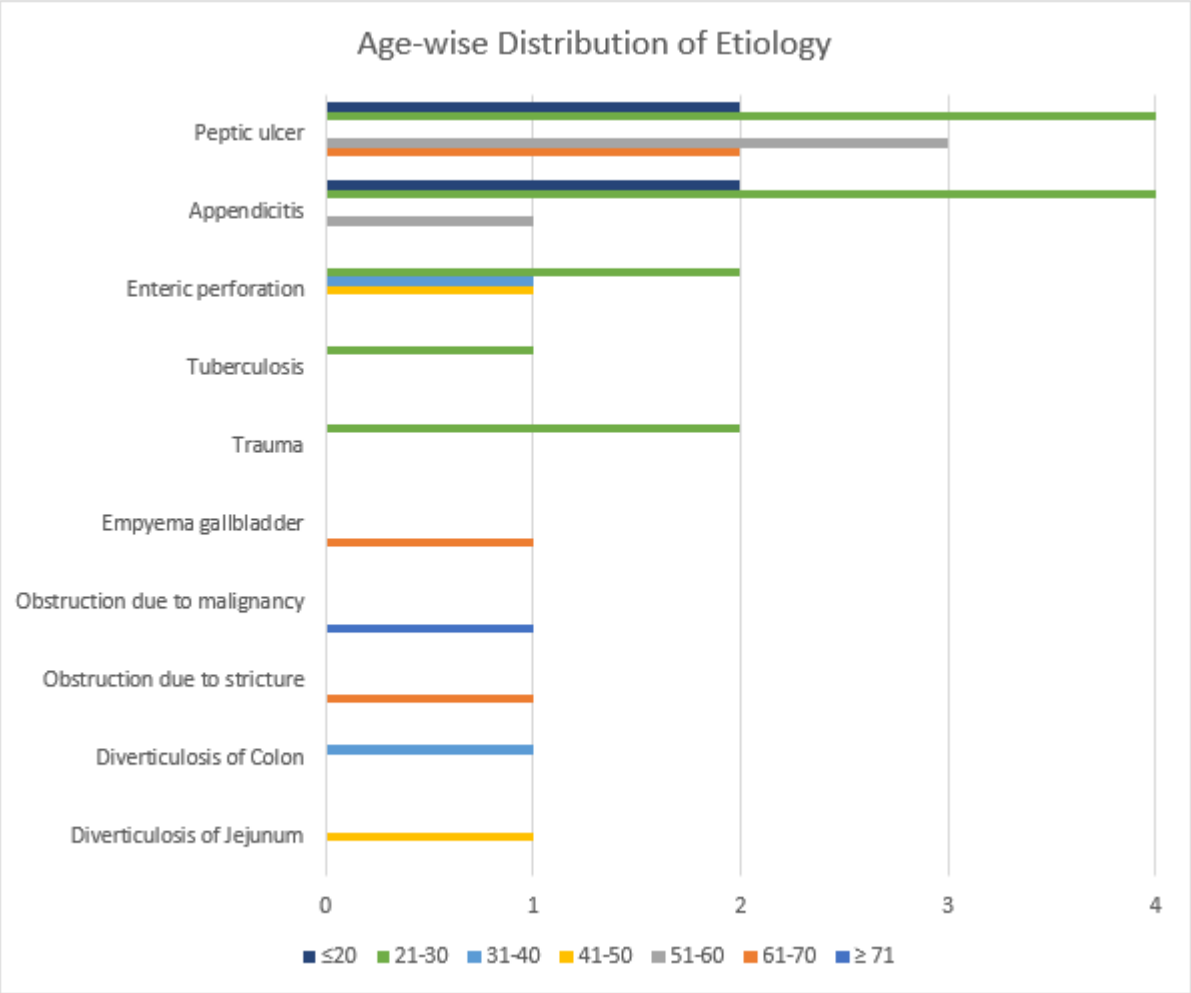

Figure 1. Distribution of cases according to age and aetiology

Table 3. Symptoms in relation to aetiology

Aetiology	Pain	Vomiting	Distension	Fever	Altered bowel habits
Peptic gastric ulcer	5 (100%)	3 (60%)	2 (40%)	3 (60%)	1 (20%)
Peptic duodenal ulcer	6 (100%)	5 (83.3%)	1 (16.7%)	1 (16.7%)	0
Appendicitis	7 (100%)	3 (42.9%)	0	7 (100%)	2 (28.6%)
Enteric perforation	4 (100%)	3 (75%)	3 (75%)	3 (75%)	3 (75%)
Tuberculosis	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Trauma	2 (100%)	1 (50%)	2 (100%)	0	0
Empyema gallbladder	1 (100%)	1 (100%)	0	1 (100%)	0
Obstruction due to malignancy	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Obstruction due to stricture	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Diverticulosis of Colon	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Diverticulosis of Jejunum	1 (100%)	1 (100%)	1 (100%)	1 (100%)	0

Table 4. Various risk factors in peptic ulcer perforations

Risk Factor	Number	Percentage
Smoking	2	18.2%
Medications	3	27.3%
Alcohol and smoking	1	9.1%
Smoking and medications	1	9.1%
Alcohol, smoking and medications	3	27.3%
No risk factors	1	9.1%

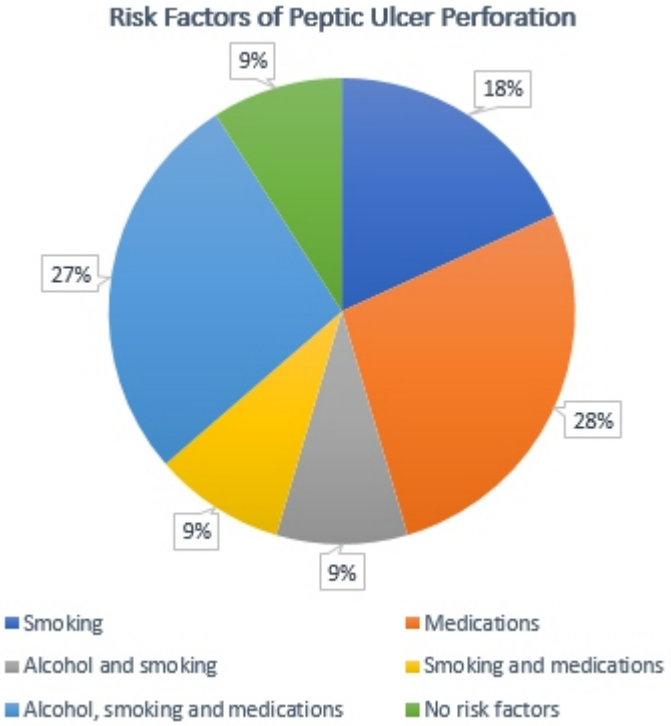

Figure 2. Risk factors of peptic ulcer perforation

Table 5. Abdominal signs in relation to aetiology

Aetiology	Tenderness	Guarding / Rigidity	Distension	Mass palpable	Reduced bowel sounds
Peptic gastric ulcer	5 (100%)	5 (100%)	3 (60%)	0	3 (80%)
Peptic duodenal ulcer	6 (100%)	5 (83.3%)	4 (66.7%)	0	5 (83.3%)
Appendicitis	7 (100%)	4 (57.1%)	3 (42.9%)	3 (42.9%)	4 (57.1%)
Enteric perforation	4 (100%)	4 (100%)	3 (75%)	0	4 (100%)
Tuberculosis	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Trauma	2 (100%)	1 (50%)	2 (100%)	0	1 (100%)
Empyema gallbladder	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Obstruction due to malignancy	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
Obstruction due to stricture	1 (100%)	1 (100%)	1 (100%)	0	1 (100%)
Diverticulosis of Colon	1 (100%)	1 (100%)	1 (100%)	0	1 (100%)
Diverticulosis of Jejunum	1 (100%)	1 (100%)	1 (100%)	0	1 (100%)

vomiting was there in only 42.9%. Vomiting, abdominal distension altered bowel habits and fever were present in 75% of enteric perforations. Empyema perforation and appendicular perforation did not cause any abdominal distension. Similarly, no alteration in bowel habits was noted in peptic duodenal ulcer perforation, trauma, empyema gall bladder and diverticulosis of jejunum.

Chronic abdominal pain was seen in 46.7% cases; of which, 57.1% had peptic perforation; 21.4% had appendicular perforation; 14.3% had enteric perforation and 7.1% had empyema gallbladder. Previous recent history of typhoid fever was found in 75% of enteric perforation.

Smoking, medication and alcohol are the major risk factors in peptic ulcer perforation. Medications (NSAIDs and oral steroids) alone were present in 27.3% of cases of peptic perforation and contributory in another 36.4%. Smoking and medications were present in 9.1%, alcohol and smoking in 9.1%; alcohol, smoking and medications in 27.3%. Other risk factors noted were the previous history of peptic ulcer and intake of spicy food. Positive family history of peptic ulcer was present in 18.2%.

Tachycardia (heart rate >100/min) was present in 70% but only 16.7% had hypotension (systolic blood pressure <100 mm Hg). Four patients (13.3%) had concomitant icterus.

Although tenderness was present in 100% of cases, only 83.3% had guarding or rigidity. Distension was noted in 70% of patients versus 43.3% patients complaining of distension, more commonly observed with more distal sites of perforation. A palpable mass was noted in 20% of patients (3 cases of appendicular perforation, 1 case of tubercular perforation, 1 case of empyema gall bladder and 1 case of perforation in sigmoid malignancy). Reduced bowel sounds were present in 46.7% patients and 30% had absent bowel sounds.

Chest X-ray and erect abdominal X-ray showed pneumoperitoneum in 70% of the cases. False negative X-ray was noted in appendicular perforation and perforated empyema gall bladder. X-ray was not done in 1 patient with an open abdominal wound with bowel extruding. Ultrasound was done in all patients and was positive for features of perforative peritonitis in only 63.3% of patients. CT scan of the abdomen was not done in 63.3% of patients as it was not required for diagnosis. In the remaining 36.7% patients CT was diagnostic.

Majority of cultures from the peritoneal fluid collected intra-operatively yielded no growth of micro-organisms (56.7%). Of the micro-organisms isolated, Escherichia coli was the most common (23.3%). Majority had purulent peritoneal fluid intra-operatively (56.7%) and faecal peritonitis in 10%.

All patients underwent peritoneal toilet regardless of the operative procedure performed, 40% underwent simple closure with omental patch. Proximal diversion was required in 13.3% patients. One case of enteric fever perforation required closure with omental patch and proximal diversion due to severe oedema. Simple closure with proximal diversion (colostomy) was done in 1 case of sigmoid diverticulitis.

Only drainage was done in one case of tubercular perforation

Table 6. Various microorganisms cultured from peritoneal fluid

Microbe Grown	Number	Percentage
No growth	17	56.7%
E. coli	7	23.3%
Klebsiella	4	13.3%
Proteus	2	6.7%

with abscess formation and one appendicular perforation.

53.3% of patients had at least one post-operative complication; commonest complication was wound infection (30%) followed by paralytic ileus (more than 2 days). Mortality was only one patient secondary to sepsis and MODS.

Table 7. Post-operative complications

Complication	Number	Percentage
No complications	14	46.7%
Wound infection	9	30%
Wound dehiscence	4	13.3%
Paralytic ileus (>2 days)	5	16.7%
Intra-peritoneal Abscess	1	3.3%
Pulmonary complication	1	3.3%

Discussion

In our study of 30 cases, the incidence of peptic ulcer perforation was highest constituting 36.7%. This was followed by appendicular perforation (23.3%) and enteric fever (13.3%) perforation. Trauma was a cause of perforation in 6.7%. Tubercular perforation, obstruction secondary to malignancy leading to perforation, perforation due to obstruction caused by stricture and perforation of empyema gall bladder constituted 3.3% each. Diverticulosis was a cause of colonic perforation in 1 (3.3%) case and jejunal perforation in 1 (3.3%) case. Trauma was a cause of perforation in 6.7%.

The maximum incidence of perforation irrespective of pathology was seen between 21-30 years. Other studies observed an age trend between 31-40 years. In this study, peptic ulcer had a bimodal distribution being more common in the third and sixth decades. Sillakivi T et al [7] observed an age trend in the fifth to sixth decades. In this study, most enteric perforations occurred in the third decade of life, as compared to the study of ARK Adesunkunmi et al [8] in which a maximum number of cases occur in the second decade of life. The mean age of 25 years was observed by Dasgupta A et al [9] in his study of 56 cases of abdominal tuberculosis, and our cause of tuberculous perforation was in a 22-year-old.

Male preponderance is seen, with a male to female ratio of 3.29:1. This is consistent with ARK Adesunkunmi et al [8] and Lee FY et al [10] who has ratios of 4:1 and 5.1:1.

Peptic ulcer perforation was predominantly seen in males in this study. A similar observation was noted by W. T. Siu et al [11] in his study of 33 cases. Abdominal pain, vomiting and fever were the predominant symptoms in our study. Abdominal pain was reported by 100% patients and similar findings have been reported by Kachroo et al [12] and J C Baid et al [13]. History of fever in the recent past followed by pain in the abdomen and recent history of typhoid was a clinical diagnostic tool for enteric fever perforation. S. K. Nair1 [14] and M. A. Noorani1 [15] have observed similar history. Vomiting was relatively common in appendicular perforation (42.9% cases). Fever was seen in 100% cases with appendicular perforation like the observations of M. C. Dandpat et al [16].

Non-steroidal anti-inflammatory drugs are known to precipitate peptic ulcer disease and even give rise to complications of peptic ulcer as well such as perforation, bleeding, the mechanism being mediated through inhibition of prostaglandin synthesis. Seven of 11 cases (63.6%) of peptic ulcer perforation revealed the history of NSAIDs intake (oral or injectable).

W T Siu [11] found 6 of 33 patients (18.2%) revealed the same. Smoking, medication, and alcohol are the major risk factors in peptic ulcer perforation. Torab FC [17] in his study of 116 cases has described smoking, history of peptic ulcer and use of NSAIDs as common risk factors for perforation. On examination of the abdomen, tenderness was present in 30 cases (100%), guarding and rigidity in 25 cases (83.3%), distension in 21 cases (70%) and reduced bowel sounds in 23 cases (76.7%). J. C. Baid et al [13] reported in 54 cases: 85.2% having distension, 100% having guarding/ rigidity and 53.7% having absent bowel sounds.

Even though the presence of pneumoperitoneum is a hallmark of perforation of hollow viscera, the absence of this does not exclude the possibility of perforation. This sign is visualised only in about 75% of perforation cases. In our study, we found it in 21 (70%) cases. Our study correlates well with T Kempraj et al [18] (75%) and MC Dandpat et al [16] 72.35%).

Out of 30 cases, in 17 cases (56.7%) there was no growth. In 7 (23.3%) cases cultures were positive for E. coli and 4 (13.3%) for Klebsiella. The present study correlates with V. P. N Ramakrishnaiah et al [19] having 23.01% E. coli and 12.21% Klebsiella.

Gastroduodenal perforation is the commonest perforation (36.7%). This is consistent with other studies by Khan et al [20] (38.8%), Doraraijan et al [21] (32%) and Shreshta et al [22] (32.5%). The small bowel is the second most common site of perforation (30%). This is consistent with studies by Qureshi et al [23] (29.4%) and Nishida et al [24] (31%). Appendicular perforation is 23.3% like Shah et al [25] (28.1%). Colonic perforation is 6.7% like Khan et al [20] (7.4%).

Duodenal perforation was noted in 6 cases (54.5%) of gastroduodenal perforations. This present data is consistent with other studies like Sui et al [11] (68.6%).

In the present study, small bowel perforation occurred in 9 cases of which enteric fever perforation occurred in 4 patients (44.4%), whereas remaining 2 (22.2%) patients had traumatic perforation, 1 (11.1%) had diverticular perforation and 1 (11.1%) had perforation secondary to stricture. This data is consistent with other studies like Khan et al [20] (50% enteric fever) and Sharma et al [26] (67.7%). Tuberculosis causing small bowel perforation was seen in 1 patient (11.1%) consistent with Dorairajan et al [21].

Laparotomy was performed in all 30 cases; the incision was planned according to the site of perforation. Contamination of the peritoneal cavity was noted, and peritoneal fluid sent for culture and viscera inspected and bowel screened for the site of perforation. For all peptic ulcer perforations (5 cases of gastric and 6 cases of duodenal perforation), simple closure of the perforation was performed with live omental patch. Worldwide literature agrees with the same.

M C Dandapat et al [16] in his study of 340 cases did the same. All the gastric ulcers were biopsied, and all turned out to be of benign aetiology. For typhoid perforation, after trimming the edges, simple closure of the perforation was done in 2 cases. Two cases had friable bowel so additional omental patching was done. None required proximal ostomies.

M A Noorani et al [15] have reported simple closure of perforation in 2 layers as the preferred method. For 6 out of 7 cases of appendicular perforation, appendicectomy was done and most literature suggests the same.

M C Dandapat et al [16] also supported appendicectomy in appendicular perforation. However, in 1 of our patient's appendicectomy was not possible due to phlegmon formation with abscess, for which peritoneal toilet was done and a drain kept in situ, followed by interval appendicectomy.

In this study, out of 30 patients, 16 (53.3%) patients developed post-operative complications where wound infection was seen in 9 cases (30%). This is maybe due to contamination of surgical incision occuring during surgery.

M. C. Dandapat et al [16] reported wound sepsis in 13.5% of gastrointestinal perforation. Jhobta et al [4] reported wound infection in 25% of gastrointestinal perforation. One patient had a respiratory infection as a complication (3.3%) which was secondary to MODS. One (3.3%) patient developed an intra-abdominal abscess in the present study which was treated with ultrasound-guided percutaneous extra-peritoneal aspiration. Jhobta et al [4] reported intra-abdominal abscess

Table 8. Mortality rates in various studies

Authors	Total number of patients	Total number of mortalities	Mortality (%)
Chan WH et al[27] (2000)	206	22	10.7
Sillakivi T et al[7] (2000)	394	22	5.6
Lee FY et al[10] (2001)	436	34	7.8
Tonnessen T et al[28] (2001)	84	13	15.5
Nishida et al[24](2002)	229	30	13.1
Quereshi et al[23] (2005)	126	19	15
Jhobta et al[4] (2006)	504	51	10.1
T Kemparaj et al[18] (2012)	369	51	13.8
Present study	30	1	3.3

in 9.1% of gastrointestinal perforation. One (3.3%) patients had features of MODS and septicaemia in the present study.

T Kempraj et al [18] reported this complication in 16% of patients. Jhobta et al [4] reported MODS and septicaemia in 18% of gastrointestinal perforation.

The overall mortality rate in perforation peritonitis is very high ranging from 5.6-15.5% as mentioned in the previous series. In this study, there was only 1 death (3.3%) which is comparatively low in contrast to other series which was due to MODS and septicaemia because of delayed presentation and hence delayed surgical intervention. Poor general condition, anaemia and hypoproteinemia added to the post-operative mortality and morbidity.

Conclusion

Perforation peritonitis had a male: female ratio 3.29:1; and was more commonly seen between the age group of 21-30 years, whereas peptic ulcer perforation had a bimodal distribution (21-30 years and 51-60 years). Appendicular perforation was seen in a younger age group. Small bowel perforation commonly occurs after 3rd decade of life. Descending order of perforation sites: duodenum and stomach, appendix, ileum, jejunum, colon and gall bladder. Commonest aetiology was peptic ulcer perforation, followed by appendicitis and enteric fever. Majority of patients presented after 48 hours, in the stage of established generalised peritonitis. The diagnosis was possible by pneumoperitoneum on X-ray abdomen standing in 70% and only a few needed CT for diagnosis. Laparotomy followed by primary closure of perforation with or without live omental patch was the commonest procedure. Appendicectomy was done in appendicular perforation whereas occasionally, resection anastomosis of involved small bowel segment was required. Proximal diversion is not routinely necessary; only if there are severe contraindications to a primary RA. E. coli

was the most common peritoneal contaminating organism followed by Klebsiella and Proteus mirabilis. The post-operative complication rate was 53.3% (wound infection 30%) and the mortality rate was 3.3%.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Ray MB. The Hippocratic Tradition. Postgrad Med J. March 1934:118 https://doi.org/10.1136/pgmj.10.101.116
2. Ramakrishnan K, Salinas RC (2007). Peptic ulcer disease. Am Fam Physician 1(7697):1005-1012 PMID 17956071
3. Vagholkar KR. Therapeutic options in perforation peritonitis. Hospital Today 2011; 6(5):277-81.
4. Jhobta R J, Attri A K, Kaushik R, Rajeev S. and Aupam J. Spectrum of perforation peritonitis in India-review of 504 consecutive cases. World J Em Sur 2006; 1:26 https://doi.org/10.1186/1749-7922-1-26
5. Abhay YD, Bhakti P, Sangram D, Vishwas DP. Perforative peritonitis - Gastrointestinal tract may not always be the source. Indian J Surg 2017 Apr; 79(2):160-162. https://doi.org/10.1007/s12262-016-1460-7
6. Chouhan MK, Pande SK. Typhoid enteric perforation. Br J Surg 1982; 69:173-5. https://doi.org/10.1002/bjs.1800690321
7. Sillakivi T, Lang A. Evaluation of risk factors for mortality in surgically treated perforated peptic ulcer; Hepatogastrology. 2000;47(36): 1765-8. PMID 11149052
8. A.R.K. Adesunkanmi and O.G. Ajao,1997: The prognostic factors in typhoid ileal perforation: a prospective study of 50 patients. JR. Coll. Surg. Edinb. 42:395-399. PMID 9448395
9. Dasgupta A, Singh N, Bhatia A. Abdominal tuberculosis. A Histopathological study with special reference to intestinal perforation and mesenteric vasculopathy; J Lab Phys; 2009; 1:56-61. https://doi.org/10.4103/0974-2727.59700
10. Lee FY, Leung KI et al, 2001: Predicting mortality and morbidity of patients operated on for perforated peptic ulcers; Arch Surge 136(1):90-4. https://doi.org/10.1001/archsurg.136.1.90
11. Siu W T, H T Leong & M K W Li "Single stitch laparoscopic omental patch repair of perforated peptic ulcer"; Royal col. Sur. Edin; 42; 1997; 92-94. PMID 9114677
12. Kachroo R, Ahmed M N, Zorfer H U, 1984: Peritonitis - An analysis of 90 cases; Indian J Surg, 46:204-209.
13. Baid J C abd T C Jain "Intestinal perforation especially due to blunt injury abdomen"; I J S; 50; 1988; 335-337.
14. Nair S K, V J Sinha, Sudhir Kumari "Nontraumatic intestinal Perforation"; I J S; 1981; 43; 371-377.
15. Noorani M A, "Typhoid perforation of small bowel" 1997; Roy Coll Surg Edin, 42; 274-276. PMID 9276569
16. Dandapat M C, Mukerjee "Gastro-intestinal perforation"; I J S; 1991; 53(5);188-193.
17. Torab FC, Amer M, Abu-Zidan FM Branicki FJ. Perforated peptic ulcer: different ethnic, climatic and fasting risk factors for morbidity in Al-ain medical district, United Arab Emirates; Asian J Surg 2009 Apr;32(2):95-101. https://doi.org/10.1016/S1015-9584(09)60018-X
18. T Kemparaj, S Khadri. Gastrointestinal Perforations - Our Experience. Inter J Sur.2012;28(2). https://doi.org/10.5580/2ab1
19. V P N Ramakrishnaiah et al Community acquired secondary bacterial peritonitis in a tertiary hospital of South India: an audit with special reference to peritoneal fluid culture.: Tropical Gastroenterology 2012;33(4):275-281. https://doi.org/10.7869/tg.2012.70
20. Khan S, Khan I U, Aslam S, Haque A. Retrospective analysis of abdominal surgeries at Nepalgunj Medical College, Nepalgunj, Nepal: 2 years' experience. Kathmandu University Medical Journal. 2004; 2:336-43. PMID 16388246
21. Dorairajan LN, Gupta S, Suryanarayana Deo SV, Chumber S, Sharma LK: Peritonitis in India- A decade's experience. Trop Gastroenterol 1995, 16:33-8. PMID 7645051
22. Shrestha ML, Maskey CP, Khanal M, Bhattarai BK: Retrospective study of generalised perforation peritonitis in TU teaching hospital. Journal of the Nepal Medical Association 1993, 31:62-8.
23. Quereshi AM, Zafar A, Saeed K, Quddus A: Predictive power of Mannheim Peritonitis Index. JCPSP 2005, 15:693-6.
24. Nishida T, Fujita N, Megawa T, Nakahara M, Nakao K: Postoperative hyperbilirubinemia after surgery for gastrointestinal perforation. Surgery Today 2002, 32:679-84. https://doi.org/10.1007/s005950200126
25. Shah HK, Trivedi VD: Peritonitis- a study of 110 cases. Indian Practitioner 1988, 41:855-60.
26. Sharma L, Gupta S, Soin AS, Sikora S, Kapoor V: Generalized peritonitis in India-the tropical spectrum. Jpn J Surg 1991, 21:272-7. https://doi.org/10.1007/BF02470946
27. Chan WH, Wong WK, Khin LW, Soo KC, 2000: Adverse operative risk factors for perforated peptic ulcer. Ann. Acad. Med. Singapore. 29(2):164-7. PMID 10895332
28. Tonnessen T, Carlsen E, 2001: Perforated ulcer; Tidsskr Nor Laegeforen. 121(7): 70-2. PMID 11301699

SCIENTIFIC ARTICLE

An audit on completeness of reporting Whipple's specimens

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Keywords: Whipple's; histopathology; synoptic reporting; pancreatic cancer; survival

Abstract

Introduction

This audit is focused on assessing the completeness of vital information in traditional reports of Whipple's procedure, using the Royal College of Pathologists data sets for pancreatic cancer reporting as the benchmark. We believe a standardized reporting system will take into account significant variables that may impact treatment quality.

Methodology

This is a descriptive cross sectional study. A hundred and forty-three Whipple's histopathological reports were examined and compared to The Royal College of Pathologists data set for reporting of carcinomas of pancreas, ampulla of Vater and common bile duct.

Results

The length of the reports varied markedly with the shortest report having 156 words and the longest report having 1095 words. The median word count was 385 words. The frequency of reporting the variables varied too. Type of tumour was documented in 100% of reports whereas variables such as nodal stage and superior mesenteric artery resection margin were reported in only 76.9% and 35% of reports respectively, both having direct implications on prognosis. Further the frequency of reporting of the background pathology was low as 24.5%.

Conclusions

Due to the descriptive nature of the traditional pathological reporting system, some of the significant variables can be missed while converting what is observed in to a report. This may impact adversely in planning adjuvant treatment and evaluation of prognosis after surgery. Adherence to a standardized synoptic reporting system may help to overcome this drawback.

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http://orcid.org/0000-0002-6477-2072
DOI: http://doi.org/10.4038/sljs.v38i1.8687

Introduction

Pancreatic cancer is one of the leading causes for cancer-related deaths worldwide [1].

Comprehensive and accurate reporting of pathological specimens in pancreatic cancer is important in confirming the diagnosis and predicting the prognosis of the patients. This in turn helps in planning adjuvant therapy and follow up of the patient. It also helps in evaluating quality of services such as surgery and radiology. Accurate pathology reporting also contributes to the development of adjuvant therapy and facilitates high quality research [2, 3].

Whipple specimen is a complex sample that includes multiple margins. The establishment of a general consensus of nomenclature, definitions and standardized protocol of pathological reporting for Whipple specimen is crucial especially considering the complexity and the extent of different variables in the specimen.

In Sri Lanka reporting of Whipple specimen is still performed using traditional descriptive reports. This audit assessed the completeness of vital information in traditional reports against The Royal College of Pathologists data set for pancreatic cancer reporting [4].

Methodology

This is a descriptive cross sectional study. All histopathology reports of Whipple surgery performed from 2011 to 2019 for at Colombo North Teaching Hospital [CNTH] and Colombo South Teaching Hospital [CSTH] were reviewed and reports with malignant disease were selected. There were total of 143 reports. In both centres, standard pylorus resecting Whipple surgery was performed. Uncinated process was completely resected from the superior mesenteric artery and the margins marked. All had standard lymphadenectomy [stations 5, 6, 8a, 12b1, 12b2, 12c, 13a, 13b, 14a, 14b, 17a, and 17b.] [5, 6].

The specimens were fixed in formaldehyde and examined. After identification and measurements of gross anatomical structures, the tumour was identified and the tumour site, size, type, grading, its relationship to the surrounding structures and the transection margins were recorded. Lymph nodes were also sampled.

The Royal College of Pathologists data set for reporting of carcinomas of pancreas, ampulla of Vater and common bile duct, which constitute of macroscopic and microscopic core data sets were used as a guide for reporting. Macroscopic core data set includes six items type of specimen, site of tumour, maximum tumour dimension, resection margins, and presence of a named vessel and background pathology. Microscopic core data includes histological type of tumour, histological differentiation, size and maximum extent of local invasion, peri neural invasion, named vessel involvement, lymph node status, resection margin status, regression following neo adjuvant therapy, background abnormalities, completeness of resection, TNM stage and SONMED CT [Systematized Nomenclature of Medicine Clinical Terms] codes.[7] However, standard unstructured report was produced as the final product after evaluating slides.

All 143 pathology reports were studied by an MBBS qualified doctor. Twenty-two of variables that are in accordance with The Royal College of Pathologists guidelines were looked for in each of the reports using a checklist. Complete pathology report was read minimum of two times and picked up points were highlighted. Subsequently each variable was entered in to a separate SPSS [for WindowsTM Version 16.0, SPSS, Inc., Chicago, IL, USA] database. Each variable was then presented as frequencies indicating whether they reported or unreported and analysed as percentages. The word count of each report was recorded and the median was calculated.

Results

The median age of the group was 56 years [range 17 - 81] and 72% were males. The length of the reports varied markedly with the shortest report having 156 words and the longest report having 1095 words. The median word count was 385 words.

Type of tumour was documented in all the reports [100%] and the site of the tumour was reported in 93.3% of the time. Pancreatic and bile duct transection margins were reported in 94.4% and 89.5% of the reports respectively. Posterior dissection margin was reported in 76.2% and the anterior dissection margin was reported in 71.3% only. The reporting on the SMA dissection margin was even less with only 35% of the reports having the data. Size of the tumour was documented in 90.9 % of the specimens. Tumour type was documented in 100% of the reports. However, the background pathology was only recorded in 24.5% of the specimens. Lymphovascular invasion and perineural invasion was reported in 79.7% and 79% respectively.

Total number of lymph nodes harvested was documented only in 89.5% of the patients. Number of involved lymph nodes was documented in 99.3%. However, the N stage was documented only in 76.9% of the reports. Tumour differentiation was documented only in 62.9% of the reports.

Discussion

The Whipple's specimen is unique and complex sample due to the three dimensional arrangement of the adjacent structures and margins [8]. It has multiple resection margins. Transection margins are those of pancreatic neck, common bile duct, superior mesenteric artery, jejunum and stomach.

Table 1. The number of reported and non-reported variables were tabulated

Variable	Reported percentage (N=143)
1.Site of the tumor	93.7
2.Type of the specimen	100
3.Maximum tumor diameter	90.9
4.Macroscopic margin involvement	81.8
5.Histologic Type	100
6.Tumor differentiation/grading	62.9
7.Maximum extent of invasion (T)	98.4
8.Gastric transection margin	93
9.Duodenal transection margin	93
10.Pancreatic transection margin	94.4
11.Bile duct transection margin	89.5
12.SMV, SMA dissection margin*	35
13.Posterior dissection margin	76.2
14.Anterior dissection margin	71.3
15.Lymphovascular invasion	79.7
16.Perineural invasion	79
17.Total number of nodes	89.5
18.Total number of nodes involved	99.3
19.N stage	76.9
20.Background pathology	24.5
21.Pathological TNM staging	81.8
22.Resection status	1.4

The dissection margins are the superior mesenteric vein margin and the posterior margin overlying the aorto-caval groove. Anterior surface is not a true dissection margin but its involvement is known to increase the local recurrence [9]. Whipple surgery for malignant disease carries a variable prognosis influenced by many factors. Offering adjuvant treatment is an important decision after surgery [3]. For both these, resected specimen holds many answers.

R - 1 resection of the SMA margin is a known risk factor for poor prognosis after pancreatic cancer resection [9, 10]. Reporting of the SMA margin was low as 35% in the reports that were analysed. The reporting on other dissection margins was also less compared to the pancreatic transection margin. Margin status is an important parameter in deciding on adjuvant treatment [3]. Histological grading and the degree of differentiation have shown a clear impact on the prognosis in most studies [11]. The reporting on histological grading was 62.9%, which is less compared to the percentage of reporting on other variables.

Background pancreatic pathology was reported only in 24.5% of cases that we evaluated. Knowing the background status of the pancreas is important in the follow-up after surgery – especially when there is auto immune pancreatitis, atrophy and fibrosis [12]. Adenocarcinomas originating from the ampulla of Vater is known to have either intestinal differentiation or pancreatico biliary type differentiation with latter type having a poorer prognosis [13]. This information was not available in most of the reports.

Intrapancreatic perineural invasion and extra pancreatic neural plexus invasion are correlated. This is identified as a major cause for local recurrence [14] which was not uniformly documented in the reports. Lymph nodes are another important area of assessment. Though the number of nodes positive was stated total number harvested nodes were inconsistent. The rates of reporting on lympho vascular and perineural invasion were less than 80% in the sample. These parameters related to nodes are considered as important prognostic markers [15 - 18].

Value of adjuvant chemotherapy is well recognized in pancreatic cancer [3]. It is recommended in patients with poor prognostic tumours indicated by surrogate markers in the pathology specimen [9]. Missing valuable data in the specimen can sometime affect this important decision-making.

Traditional report has almost 400 words typed as a description. We observed that typing process itself takes significant time of a computer operator. By using synoptic reporting chances of missing variables we observed could be minimized and the time taken to type and read a report can be reduced.

In conclusion, due to the descriptive nature of the traditional pathological reporting system, some of the significant variables can be missed while converting what is observed in to a report. This may impact adversely in planning adjuvant treatment and evaluation of prognosis after surgery. Adherence to a standardized synoptic reporting system may help to overcome this drawback.

Ethical Clearance

The study was conducted in accordance to the Helsinki Declaration of 1975, as revised in 2000.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018 Sep;68:394-424. https://doi.org/10.3322/caac.21492
2. Gill AJ, Johns AL, Eckstein R, et al. Synoptic reporting improves histopathological assessment of pancreatic resection specimens. Pathology. 2009 Feb;41:161-167. https://doi.org/10.1080/00313020802337329
3. Conroy T, Ducreux M. Adjuvant treatment of pancreatic cancer. Curr Opin Oncol. 2019 Jul;31(4):346-353. https://doi.org/10.1097/CCO.0000000000000546
4. Campbell F, Cairns A, Duthie F, Feakins R. Dataset for histo-pathological reporting of carcinomas of the pancreas, [Internet]. London: Royal College of Pathologists; 2019 [cited 2020 Feb 3]. Available from: https://www.rcpath.org/uploads/assets/34910231-c106-4629-a2de9e9ae6f87ac1/G091-Dataset-for-histopathological-reporting-of-carcinomas-of-the-pancreas-ampulla-of-Vater-and-common-bile-duct.pdf
5. Farnell MB, Aranha GV, Nimura Y, Michelassi F. The role of extended lymphadenectomy for adenocarcinoma of the head of the pancreas: Strength of the evidence. J Gastrointest Surg. 2008 Apr;12:651-656. https://doi.org/10.1007/s11605-007-0451-1
6. Kawarada Y, Isaji S. Stage classifications of pancreatic cancer: comparison of the Japanese and UICC classifications and proposal for a new staging system. Union Internationale Contre le Cancer. Pancreas. 1998 Apr;16:255-264. https://doi.org/10.1097/00006676-199804000-00009
7. Carter KJ, Rinehart S, Kessler E, et al. Quality Assurance in Anatomic Pathology: Automated SNOMED Coding. J Am Med Inform Assoc. 1996 Jul-Aug;3:270-272. https://doi.org/10.1136/jamia.1996.96413134

8. Campbell F, Smith RA, Whelan P, et al. Classification of R1 resections for pancreatic cancer: The prognostic relevance of tumour involvement within 1 mm of a resection margin. Histopathology. 2009 Sep;55:277-283. https://doi.org/10.1111/j.1365-2559.2009.03376.x
9. Tempero MA. NCCN Guidelines Updates: Pancreatic Cancer. J Natl Compr Canc Netw. 2019 May;17:603-605. https://doi.org/10.6004/jnccn.2019.0003
10. Delpero JR, Jeune F, Bachellier P, et al. Prognostic Value of Resection Margin Involvement after Pancreaticoduodenectomy for Ductal Adenocarcinoma. Ann Surg. 2017 Nov;266:787-796. https://doi.org/10.1097/SLA.0000000000002432
11 Andrianello S, Paiella S, Allegrini V, et al. Pancreatic-oduodenectomy for distal cholangiocarcinoma: Surgical results, prognostic factors, and long-term follow-up. Langenbeck's Arch Surg. 2015 Jul;400:623-628. https://doi.org/10.1007/s00423-015-1320-0
12. Tanaka M, Fernández-Del Castillo C, Adsay V, et al. International consensus guidelines 2012 for the management of IPMN and MCN of the pancreas. Pancreatology. 2012 May-Jun;12:183-197. https://doi.org/10.1016/j.pan.2012.04.004
13. Tran KTC, Smeenk HG, Van Eijck CHJ, et al. Pylorus preserving pancreaticoduodenectomy versus standard whipple procedure: A prospective, randomized, multicenter analysis of 170 patients with pancreatic and periampullary tumors. Ann Surg. 2004 Nov;240:738-745. https://doi.org/10.1097/01.sla.0000143248.71964.29
14. Kayahara M, Nagakawa T, Konishi I, Ueno K, Ohta T, Miyazaki I. Clinicopathological study of pancreatic carcinoma with particular reference to the invasion of the extrapancreatic neural plexus. Int J Pancreatol. 1991 Oct;10:105-111.
15. Basturk O, Saka B, Balci S, et al. Substaging of Lymph Node Status in Resected Pancreatic Ductal Adenocarcinoma Has Strong Prognostic Correlations: Proposal for a Revised N Classification for TNM Staging. Ann Surg Oncol.2015 Dec; 22:S1187-1195.https://doi.org/10.1245/s10434-015-4861-0
16. Contreras CM, Lin CP, Oster RA, et al. Increased pancreatic cancer survival with greater lymph node retrieval in the National Cancer Data Base. Am J Surg. 2017 Sep ;214:442-449. https://doi.org/10.1016/j.amjsurg.2017.06.036
17. Schwarz RE, Smith DD. Extent of lymph node retrieval and pancreatic cancer survival: Information from a large US population database. Ann Surg Oncol. 2006 Sep;13:1189-1200. https://doi.org/10.1245/s10434-006-9016-x
18. Schwarz L, Lupinacci RM, Svrcek M, et al. Para-aortic lymph node sampling in pancreatic head adenocarcinoma. Br J Surg. 2014 Apr;101:530-538. https://doi.org/10.1002/bjs.94449. Jones AE, Trzeciak S, Kline JA. The sequential organ failure assessment score for predicting outcome in patients with severe sepsis and evidence of hypoperfusion at the time of emergency department presentation. Crit Care Med. 2009;37(5):1649-54. https://doi.org/10.1097/ccm.0b013e31819def97

SCIENTIFIC ARTICLE

Detrusor muscle in the initial TURBT specimen and recurrence rate at first check cystoscopy in non-muscle invasive bladder cancer

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Keywords: Detrusor muscle; transurethral resection of bladder tumour; recurrence rate; non-muscle invasive bladder cancer

Abstract

Introduction

The presence of detrusor muscle (DM) is an essential component in "complete" transurethral resection of bladder tumour (TURBT) specimen. This study analyses patients who were subjected to a "complete" first TURBT to determine the presence/absence of DM in the specimen.

Methodology

Newly diagnosed non-muscle invasive bladder cancer (NMIBC) from 1-April-2007 to 31-March-2017(10-years) were retrospectively analysed at National Hospital of Sri Lanka. All TURBTs performed at initial diagnosis were analysed to determine the presence of DM in the specimen, the recurrence rate at first check cystoscopy (FCC) at 3 months and the association with surgeon's experience.

Results

Of 181 TURBT, 99(54.7%) were done by Consultant Urological Surgeon (CUS) and 82(45.3%) by senior registrars (SR). The overall DM positivity rate was 59.7% (n= 108/181), for CUS: 63.6% (n=63/99) and SRs 54.9% (n=45/82) (p=0.232); for pTa tumours:-CUS: 46.5%vs.SRs:50 %(p=0.751) and for pT1 tumours:-CUS: 76.8%vs.SRs:59.5 %(p=0.067). Analysis of those who were followed up (145/181, 80.1%) showed a positive recurrence at FCC in 27.1 %(23/85) and 30.0 %(18/60) when DM was present and absent in the first TURBT specimen respectively (OR=0.87(95%-CI: 0.41-1.8, p=0.7).

Conclusion

Clinically, DM positivity rate has prognostic significance only in the pT1 category of NMIBC. For pT1 tumours, the positive DM rates for the CUS and SRs were 76.8% and 59.5% respectively. The indifference in the recurrence rate may be due to the considerable proportion of lost to follow up in our study. Nevertheless, measures should be taken to enhance the DM positivity rates among urologists to achieve accurate staging and better prognosis.

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DOI: http://doi.org/10.4038/sljs.v38i1.8653

Introduction

Bladder malignancies are the fourth commonest male cancers worldwide[1]. Furthermore, bladder cancer is common among Sri Lankan males and also seen among females [2,3]. Transurethral resection of bladder tumour (TURBT) is currently the standard of care for the less aggressive papillary bladder cancer with subsequent intravesical mitomycin within 6 hours [4,5]. A complete TURBT in non-muscle invasive bladder cancer (NMIBC) should encompass (i) resection of all visible tumour(s) (ii) resection of apparently normal mucosa (~1cm) on the border of the tumour, and (iii) resection of part of the detrusor muscle (muscularis propria) at the tumour base [6].

The uropathologist should state the stages as pTx in the absence of detrusor muscle (DM) in the TURBT specimen, particularly when there is presence of tumour in the lamina propria (i.e. pT1 or higher), emphasising the requirement to perform a restaging TURBT. NMIBC can quite confidently be reported only when DM present in the specimen is uninvolved by urothelial bladder cancer.

The present study assesses the patients with bladder cancer who underwent a "complete" first TURBT to describe the occurrence of DM in the resection specimen, to predict the risk of tumour recurrence at first check cystoscopy (usually 3 months later) and whether these are dependent on surgeon's experience.

Materials and methods

A retrospective analysis was carried out of newly diagnosed urothelial bladder cancer patients with a final diagnosis of NMIBC from 1 April 2007 to 31 March 2017 in a single urology unit at National Hospital of Sri Lanka. Ethical approval was received from the Ethical review committee of the National Hospital of Sri Lanka (No:AAJ/ETH/COM/2017-13). All TURBTs done at the initial diagnosis by the consultant urological surgeon (CUS) (with more than 15 years of experience) and four consecutive senior registrars (SR) (each

Table 1. Presence of detrusor muscle in the TURBT specimen in small and large bladder tumours dependent on 5 surgeons studied

		pTa (n=83)						P value	pT1 (n=98)						P value
		Small (<3cm)			Large (>3cm)				Small (<3cm)			Large (>3cm)			
		Total	DM positive		Total	DM positive			Total	DM positive		Total	DM positive		
			N	%		N	%			N	%		N	%	
Consultant (n=99)		27	13	48.1	16	7	43.8	0.78	22	17	77.3	34	26	76.5	0.95
Four SRs (n=82)		20	12	60.0	20	8	40.0	0.21	20	13	65.0	22	12	54.5	0.49
SR Subdivision	SR-A	6	2	33.3	9	1	11.1	-	7	4	57.1	10	5	50.0	-
	SR-B	7	4	57.1	5	4	80.0		8	5	62.5	7	4	57.1	
	SR-C	2	2	100	3	2	66.7		3	3	100	1	0	0.0	
	SR-D	5	4	80.0	3	1	33.3		2	1	50.0	4	3	75.0	

with a minimum 6 months training) were analysed to determine the presence of DM in the specimen and the recurrence rate at first check cystoscopy at 3 months. None of the patients received an intravesical mitomycin after TURBT.

The specimen were analysed and the presence of DM was looked at for gender and focality (for all surgeons). Data on clinicopathological characteristics and details about the surgeon were collected from a prospectively maintained database. A large tumour size was defined as tumour diameter equal or greater than 3 cm and a small tumour less than 3 cm. A recurrence of first check cystoscopy was not necessarily a true recurrence at the previous site of resection but may have included new lesions in other sites of the bladder. All senior registrars began resecting bladder tumours under consultant supervision within 3 months of commencement and continued supervised training for at least 1-2 years.

SPSS software version 17.0 was used for statistical analysis and the results were expressed as frequency and percentages. Chi-square test was used to determine statistical significance. A p of 0.05 or less was considered statistically significant.

Results

During the 10-year study period, 191 patients underwent TURBT with a diagnosis of NMIBC. However only 181 patients were relevant to the study (because SR experience of minimum 6 months was considered). Of which 155 (85.6%) were male patients. The majority were pT1 tumours (n=98, 54.1%) and pTa were seen in 83 (45.9%). None of the resected tumours had concomitant carcinoma in situ (CIS). Of 181 TURBT, 99 (54.7%) were done by CUS and 82(45.3%) were performed by the senior registrar with a training period of at least 6 months.

The overall DM positivity rate was 59.7% (n= 108/181), for CUS: 63.6% (n=63/99) and SRs 54.9% (n=45/82) (p=0.232). Of all the pTa tumours (n=83), DM positivity rate was 46.5% (20/43) for the CUS and 50% (20/40) for SRs (p=0.751). However, for pT1 cancers, DM positivity rates were 76.8% (43/56) for CUS and 59.5%(25/42) for SR(p=0.067)(Table 1).

DM positivity rates were higher for females compared with males (pTa:50% vs. 45.3%, p=0.719; pT1: 78.6% vs.70.7%, p=0.651). For pT1 high grade tumours (n=52), the overall detrusor muscle positivity was 65.4% (n=34/52), for CUS: 75% (n=21/28) and Srs: 54.2% (n=13/24) (p=0.115) (Table 2). There was no significant association of size of tumour, sex or focality on presence of DM (Table 3).

Table 2: Presence of detrusor muscle in the TURBT specimen in pT1 high grade tumours

		Small (<3cm)			Large (>3cm)			P value
		Total	DM positive		Total	DM positive		
			N	%		N	%	
Consultant		10	8	80.0	18	13	72.2	0.65
Four SRs		13	7	53.8	11	6	54.5	0.97
SR Sub division	SR-A	4	2	50.0	4	0	0.0	-
	SR-B	1	1	100	0	0	0.0	
	SR-C	6	3	50.0	3	3	100	
	SR-D	2	1	50.0	4	3	75.0	

A significant number of patients were lost to follow-up at 3 months 36/181 (19.9%) for first check cystoscopy. Recurrence rate at the first check cystoscopy was 41/181 (22.7%) with no recurrence observed in 104/181 (57.5%) patients (Table 2).

Analysis of 145/181 (80.1%) followed up patients showed a positive recurrence at first check cystoscopy in 27.1% (23/85) and 30.0% (18/60) when detrusor muscle was present and absent in the first TURBT specimen respectively.

The correlation between early recurrence at the first check cystoscopy (at 3 months) and detrusor muscle status was analysed. We did not find a statistically significant difference (Odds ratio=0.87 (95% Confidence Interval: 0.41-1.8, p=0.7).

Table 3. Presence of detrusor muscle in the TURBT specimen in small and large bladder tumours dependent on sex and focality

		pTa (n=83)						P value	pT1 (n=98)						P value
		Small (<3cm)			Large (>3cm)				Small (<3cm)			Large (>3cm)			
		Total	DM positive		Total	DM positive			Total	DM positive		Total	DM positive		
			N	%		N	%			N	%		N	%	
Sex	Male	37	19	51.4	35	15	42.9	0.47	36	24	66.7	47	33	70.2	0.73
	Female	10	6	60.0	1	0	0.0	0.25	6	6	100	9	5	55.6	0.57
Focality	Solitary	36	19	52.8	18	7	38.9	0.34	26	18	69.2	36	21	58.3	0.38
	Multiple	11	6	54.5	18	8	44.4	0.6	16	12	75.0	20	17	85.0	0.45

Table 4. Recurrence rate at the first check cystoscopy based on stage, presence/ absence of detrusor muscle for CUS and 4 SRs (collectively)

			Total	Recurrence			P value
				Yes	No	Lost to follow up	
				N (%)	No (%)	N (%)	
Consultant	pTa	DM present	20	2 (10.0)	12 (60.0)	6 (30.0)	0.6
		DM absent	23	4 (17.4)	15 (65.2)	4 (17.4)	
	pT1	DM present	43	12 (27.9)	18 (41.9)	13 (30.2)	0.75
		DM absent	13	3 (23.1)	7 (53.8)	3 (23.1)	
Four SRs	pTa	DM present	20	4 (20.0)	13 (65.0)	3 (15.0)	0.73
		DM absent	20	6 (30.0)	12 (60.0)	2 (10.0)	
	pT1	DM present	25	5 (20.0)	19 (76.0)	1 (4.0)	0.09
		DM absent	17	5 (29.4)	8 (47.1)	4 (23.5)	

Discussion

TURBT is the essential surgical procedure used to diagnose, stage and treat primary NMIBC [7]. Ideally the initial TURBT should be thorough and complete. Many factors confound the adequacy of resection such as multiplicity, tumour location, surgeons' skills, quality of specimens and pathological analysis [8]. Herr analysed the results of a second TURBT 2-6 weeks after an initial TURBT in 150 consecutive patients evaluated for localised bladder tumours [7].

There was an initial incomplete TUR in 49% of stage pT1 tumours having no muscle submitted in the first TUR specimen compared with 14% when muscle was identified. The inclusion of DM in the first TURBT specimen is essential for accurate pathological staging for prognostication and further management, particularly when there is tumour in the lamina propria [9]. Dalbagni et al. showed that the DM was absent in 40% of pT1 cancers [10].

In our study, DM in the TURBT specimen for pT1 tumours for the CUS and the four senior registrars were 76.8% and 59.5% respectively. In 75% of patients with pT1 high grade tumours, DM was present in the TURBT specimen by CUS as opposed to 54.2% when performed by SRs. In contrast, it is well known that the DM status in the resected specimen has no prognostic significance in pTa tumours- those with no tumour infiltration of the lamina propria. In a multicentre retrospective study of 2451 patients with T1 HG (1990-2011) initially managed with BCG, 935 (38%) were subjected to a re-TURBT [11]. DM was seen in the initial TURBT in 1768 (72%).

Approximately 71% of 935 patients had residual tumour, with around 31% stage pT1 and 40% stage pTa. Re-TURBT was favourable in terms of recurrence rate, progression, cancer-specific survival and overall survival only when the DM was absent at first TURBT. Therefore, they did not show a benefit of a re-TURBT after the initial TURBT that had DM in the pathological specimen [11]. Similarly, a study by Roupret el al showed a significantly lower rate of DM in junior surgeons compared with senior surgeons (74% vs.61%, p=0.02) [12]. Furthermore, recurrence at first check cystoscopy was low in the DM group (31% vs. 53%, p=0.01) [12].

In a 2-year study in Edinburgh in 241 patients of 356 (67.7%), DM was present [13]. Urologists were grouped into seniors (urology trainees with 5-6 years of experience and

consultants) and juniors (urological trainees of less than 5 years of experience). DM was present in 72.6% and 56.8% of TURBTs performed by senior and junior urologists respectively [13]. Jesuraj and colleagues described a significant surgeon-related variations in the presence of DM particularly in the higher grade cancers [14]. DM was present in around 46% in juniors as opposed to 67% among the seniors [15], with the highest risk being at the initial check cystoscopy done at 3 months after the initial TURBT [16].

In the present study, recurrence rate at the initial first check cystoscopy was 22.7% with no recurrences in 57.5%. Nearly one fifth of patients were lost to follow-up at the first check cystoscopy.

In a European study of patients with NMIBC, Sylvester et al. demonstrated that the recurrence rate at initial check cystoscopy at 3 months was 12.1% with no recurrences in 79.7%. Even in this series, 8.2% of 2,596 patients were lost to follow up at first check cystoscopy at 3 months [17].

In their study, 11% of NMIBC patients developed progression to muscle invasive bladder tumour. They showed the prognostic significance of the recurrence at the initial check cystoscopy on the subsequent progression to muscle invasive disease (at least T2). Progression was noted among 181 (8.7%) of 2070 patients (8.7%) with no recurrence at 3 months as opposed to 80 (25.6%) of 313 patients with a recurrence at 3 months [17].

We did not analyse the progression in our study because of the increasingly higher lost to follow-up with subsequent check cystoscopies. We acknowledge some limitations of the present study. The first is the high rate of drop-outs after the initial TURBT of 19.9%. Secondly, re-staging TUR at 2-6 weeks after initial TURBT was not analysed because it was seldom practised.

TURBT is the initial treatment of choice for NMIBC. Initial TURBT should be an oncologically sound operation (thorough and complete), one difficult to achieve. Detrusor muscle (DM) in the TURBT specimen is an essential prerequisite to define a complete resection.

This applies especially to pT1 bladder tumours with lamina propria infiltration. DM positivity rates for pT1 tumours resected by the experienced specialist and the four trainee surgeons were comparable to those reported in the world literature. However, we cannot be complacent about the high positive DM rates until these figures approach perfection while simultaneously maintaining patient safety (no bladder perforations).

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Chavan S, Bray F, Lortet-Tieulent J, Goodman M, Jemal A. International variations in bladder cancer incidence and mortality. Eur Urol. 2014;66:59-73. https://doi.org/10.1016/j.eururo.2013.10.001
2. Goonewardena S, De Silva W, De Silva M. Bladder cancer in Sri Lanka: experience from a tertiary referral center. International journal of urology. 2004;11:969-72. https://doi.org/10.1111/j.1442-2042.2004.00930.x
3. Goonewardena SA, Jayarajah U, de Silva MC, Kuruppu SN, Fernando DH, Herath KB. Bladder cancer in women: a Sri Lankan study. Ceylon Medical Journal. 2019;64. https://doi.org/10.4038/cmj.v64i3.8952
4. Babjuk M, Böhle A, Burger M, Capoun O, Cohen D, Compérat EM, et al. EAU guidelines on non-muscle-invasive urothelial carcinoma of the bladder: update 2016. Eur Urol. 2017;71:447-61. https://doi.org/10.1016/j.eururo.2016.05.041
5. Jayarajah U, Herath K, Fernando M, Kuruppu S, Wickramanayaka U, Fernando I, et al. A clinico-pathological study of non-urothelial bladder cancers in a cohort of patients from a tertiary care urology unit in Sri Lanka. Ceylon Medical Journal. 2018;63. https://doi.org/10.4038/cmj.v63i2.8680
6. Furuse H, Ozono S. Transurethral resection of the bladder tumour (TURBT) for non-muscle invasive bladder cancer: Basic skills. Int J Urol. 2010;17:698-99. https://doi.org/10.1111/j.1442-2042.2010.02556.x
7. Herr HW. The value of a second transurethral resection in evaluating patients with bladder tumors. The Journal of urology. 1999;162:74-76. https://doi.org/10.1097/00005392-199907000-00018
8. Herr HW, Donat SM. Quality control in transurethral resection of bladder tumours. BJU Int. 2008;102:1242-46. https://doi.org/10.1111/j.1464-410X.2008.07966.x
9. Goonewardena S, Jayarajah U, Kuruppu S, Herath H, Fernando D, Vickneswaran K. Clinical outcomes in a cohort of patients with T1 high grade urothelial bladder cancer not receiving intravesical bacillus Calmette-Guerin: a 15 year experience. Ceylon Medical Journal. 2018;63. https://doi.org/10.4038/cmj.v63i1.8626
10. Dalbagni G, Herr HW, Reuter VE. Impact of a second transurethral resection on the staging of T1 bladder cancer. Urology. 2002;60:822-24. https://doi.org/10.1016/S0090-4295(02)01920-9
11. Gontero P, Sylvester R, Pisano F, Joniau S, Oderda M, Serretta V, et al. The impact of re-transurethral resection on clinical outcomes in a large multicentre cohort of patients with T1 high-grade/Grade 3 bladder cancer treated with bacille Calmette-Guérin. BJU international. 2016;118:44-52. https://doi.org/10.1111/bju.13354

12.Roupret M, Yates DR, Varinot J, Phe V, Chartier-Kastler E, Bitker M-O, et al. The presence of detrusor muscle in the pathological specimen after transurethral resection of primary pT1 bladder tumors and its relationship to operator experience. The Canadian journal of urology. 2012;19:6459-64.

13.Mariappan P, Zachou A, Grigor KM. Detrusor muscle in the first, apparently complete transurethral resection of bladder tumour specimen is a surrogate marker of resection quality, predicts risk of early recurrence, and is dependent on operator experience. Eur Urol. 2010;57:843-49. https://doi.org/10.1016/j.eururo.2009.05.047

14. Jesuraj M, Harris M, Rogers A, Whiteway J. Completeness of first resection of bladder tumour depending on seniority of the surgeon. European Urology Supplements. 2008;7:138. https://doi.org/10.1016/S1569-9056(08)60267-5

15.Millan-Rodriguez F, Chechile-Toniolo G, Salvador-Bayarri J, Palou J, Vicente-Rodriguez J. Multivariate analysis of the prognostic factors of primary superficial bladder cancer. The Journal of urology. 2000;163:73-78. https://doi.org/10.1016/S0022-5347(05)67975-X

16.Mariappan P, Smith G, Lamb AD, Grigor KM, Tolley DA. Pattern of recurrence changes in noninvasive bladder tumors observed during 2 decades. The Journal of urology. 2007;177:867-75. https://doi.org/10.1016/j.juro.2006.10.048

17.Sylvester RJ, van der Meijden AP, Oosterlinck W, Witjes JA, Bouffioux C, Denis L, et al. Predicting recurrence and progression in individual patients with stage Ta T1 bladder cancer using EORTC risk tables: a combined analysis of 2596 patients from seven EORTC trials. Eur Urol. 2006;49:466-77. https://doi.org/10.1016/j.eururo.2005.12.031

SCIENTIFIC ARTICLE

Is there unique difference in the type of renal stones in Northern Sri Lanka? Analysis of chemical composition of renal stones in Jaffna by infrared spectroscopy

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Keywords: Renal stone; chemical composition; Staghorn & Non staghorn calculi

Abstract

Introduction

Renal stone disease is a common clinical problem in surgical practice. Renal stone is a common cause for obstructive uropathy and renal impairment. Because of differing "aetio-pathology", kidney stones are usually mixtures of two or three or more chemical components. Analysis of chemical composition and type of renal stone could aid in the prevention and management of stone formation and its recurrence. The comparison of the prevalence of renal stone types in Northern Sri Lanka with other geographical regions can help in the identification of possible environmental "geo-chemical" factors associated with nephrolithiasis.

Objective

The objective of this study was to analyse the chemical composition of renal stones in Jaffna by infrared spectroscopy. Age and gender of patients who had surgical intervention for renal stones and type and morphology of renal stones were considered for analysis.

Study design

This is an institutional based prospective "cross-sectional" analytic study. Following ethical approval, clinical profiles of patients were recorded. Chemical composition and type of the stones were analysed. Different stone types and stone morphologies were compared with available local and international data.

Results

A total of 104 patients were surgically treated for nephrolithiasis during the study period. Their "ages" ranged from 20-70 years with the mean age of 48.21 years [SD 14.43]. Among them 77 [74%] were males and 27[26%] were females. Calcium oxalate, carbonate apatite, uric acid, cystine, struvite and calcium carbonate types of renal stones were found in 79 [75.9%], 7[6.7%],14[13.5%], 1[1%] 2[1.9%] and 1[1%] patients respectively. 86[83%] patients had pure stones and 18 [17%] had mixed stones. Staghorn calculi were found in 23 [22.1%] patients and non-staghorn calculi were found in 81 [77.9%] patients. Among the staghorn calculi, 16 [69.6%] were calcium oxalate and among the non-staghorn calculi 64 [79%] were calcium oxalate. Among 14 patients who had uric acid stone 10 of them had type II diabetes.

Conclusion

Calcium oxalate is the commonest renal stone type in Jaffna. Prevalence of uric acid type renal stone has increased in Jaffna over three decades.

Introduction

The prevalence of urolithiasis is influenced by dietary pattern, environment, and social factors such as ethnicity and heredity. Those countries that have the stone prevalence between 10-15% lie in the "Stone Belt" extending across the world [1]. Sri Lanka, with its water, diet pattern and social conditions fits into the stone belt in Asia. Renal stone is a common cause for obstructive uropathy and renal impairment in Sri Lanka and it has a significant impact on health care system [2].

The chemical composition of renal stones varies in different countries. Although there is no convincing evidence yet, it is anecdotally considered that the prevalence of renal stones is high in certain parts of dry zones in Sri Lanka. The fluoride content of water in the wells of dry zone may contribute to increased renal stone formation [3].Comparison of chemical composition of kidney stones in Northern Sri Lanka with other geographical regions can identify environmental "geo chemical" factors associated with nephrolithiasis .

Treatment and prevention of stone formation and its recurrence could be based on the results of analysis of chemical composition of kidney stones [4].The aim of the study is to assess the different chemical compositions of renal stones in Jaffna by "Fourier transform" infrared spectroscopy and to compare the renal stone types with national and international data to find out any unique difference in type of renal stones in Northern Sri Lanka.

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DOI: http://doi.org/10.4038/sljs.v38i1.8688

Methodology

This is an institutional based "cross sectional" analytic study carried out on patients treated surgically for renal stones in urology and general surgical wards of Teaching Hospital, Jaffna from July 2016 to June 2018. Patients not residing in Jaffna for more than 10 years were excluded from the study. Approval for this study was obtained from the Ethical Review Committee of Faculty of Medicine, University of Jaffna. Informed written consent was obtained from participants. Analysis of composition of renal stones was performed using "Fourier transform" infrared spectroscopy [FT-IR].

A research grant was obtained from the University of Jaffna to meet the cost of stone analysis. Chi square test was used for statistical analysis and $p < 0.05$ was considered statistically significant.

Results

A total of 104 patients were surgically treated for renal stones during the approved period of study. The surgical treatment included open surgery and endoscopic stone treatment. Mean age of patients was 48.21 [SD 14.43], with the range of 20-75years. 77[74%] were males, 27[26%] were females and the male: female ratio was 2.85:1.

Figure1 shows the distribution of renal stones based on gender and age groups of patients in this study. Different combinations of chemical compositions of renal stones were detected by "Fourier transform" infrared spectroscopy. The details of the chemical composition of renal stones in this study are illustrated in Table (1).

Type of renal stones was identified from the percentage of chemical composition described by Abdel-Halim et al. A renal stone will be classified as "uric acid stone" when it contains more than 20% uric acid as component composition. The stone that contains more than 40% oxalate will be classified as "oxalate stone". The renal stone that is made up of more than 10% phosphate and less than 40% oxalate and less than 20% uric acid will be labelled as "phosphate stone" [5]. A renal stone that has more than 3% magnesium will be classified as "struvite stone" [infection stone or magnesium ammonium phosphate hexa hydrate] [5]. The distribution of type of renal stones among surgically treated patients in Jaffna is illustrated in Figure 2.

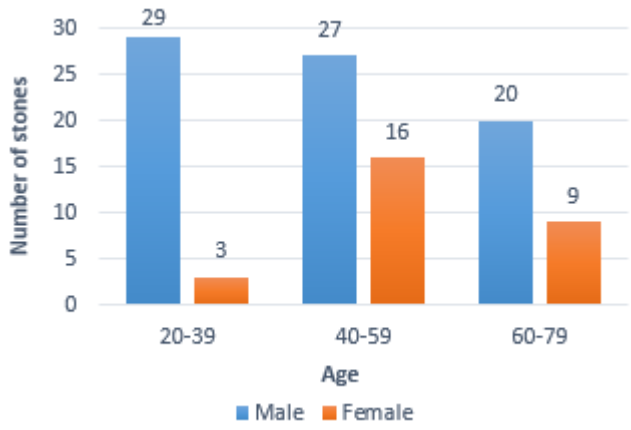

Figure 1. Distribution of renal stones based on gender and age groups

Table 1. Distribution of renal stones based on chemical composition

Compositions	Number
COM+COD	67
COM + COD + CA	10
COM + UA	3
COM + CA	1
COM + CA + MAP	2
AH + CHP + MHP	1
PCHP + AH	1
UA	13
CA	5
Cys	1
Total	**104**

COM - Calcium oxalate monohydrate
COD - Calcium oxalate dihydrate
CA - Carbonate apatite
UA - Uric acid
MAP - Magnesium ammonium phosphate hexahydrate
AH - Ammonium hydrogen urate
CHP - Calcium hydrogen phosphate
MHP - Magnesium hydrogen phosphate
PCHP- Penta calcium hydroxidphosphate
Cys - Cystine

The age and gender distribution of different types of renal stones were analysed (Figure 3 & Figure 4). The association between the type of stone with gender [p = 0.16] or with age group of patients [p = 0.897] were not statistically significant.

Morphology of renal stones was analysed. There were 23 staghorn calculi and 81non staghorn calculi. The association between the morphology of stone with gender or with age group of patients was not statistically significant (Figure 5 & Table 2).

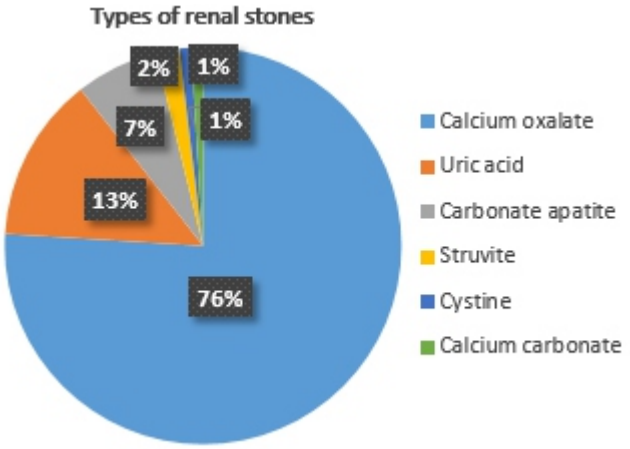

Figure 2. Distribution of renal stone types among surgically treated patients

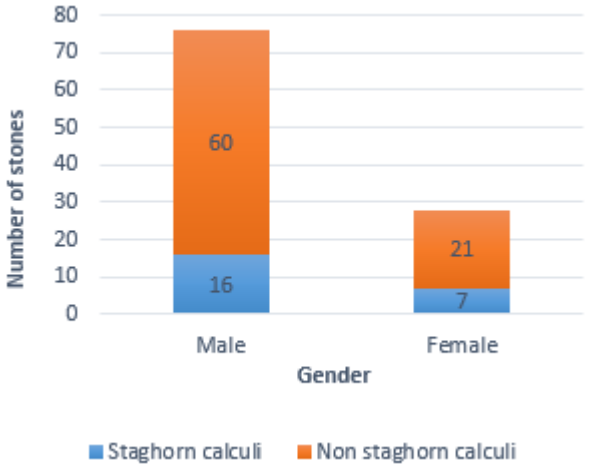

Figure 5. Gender distribution of patients among the staghorn and non-staghorn calculi

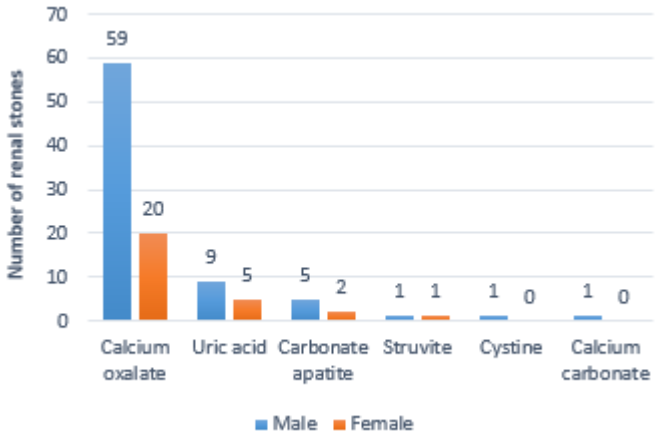

Figure 3. Gender distribution of patients among renal stone types

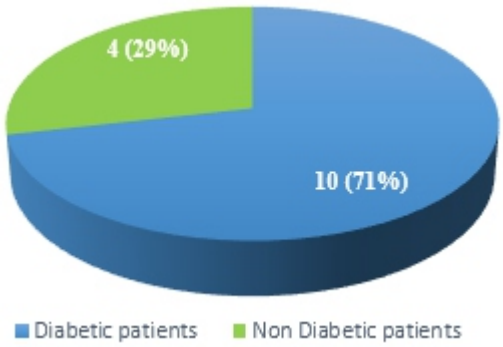

Figure 6. Distribution of uric acid stones among diabetic and non diabetic patients in Jaffna

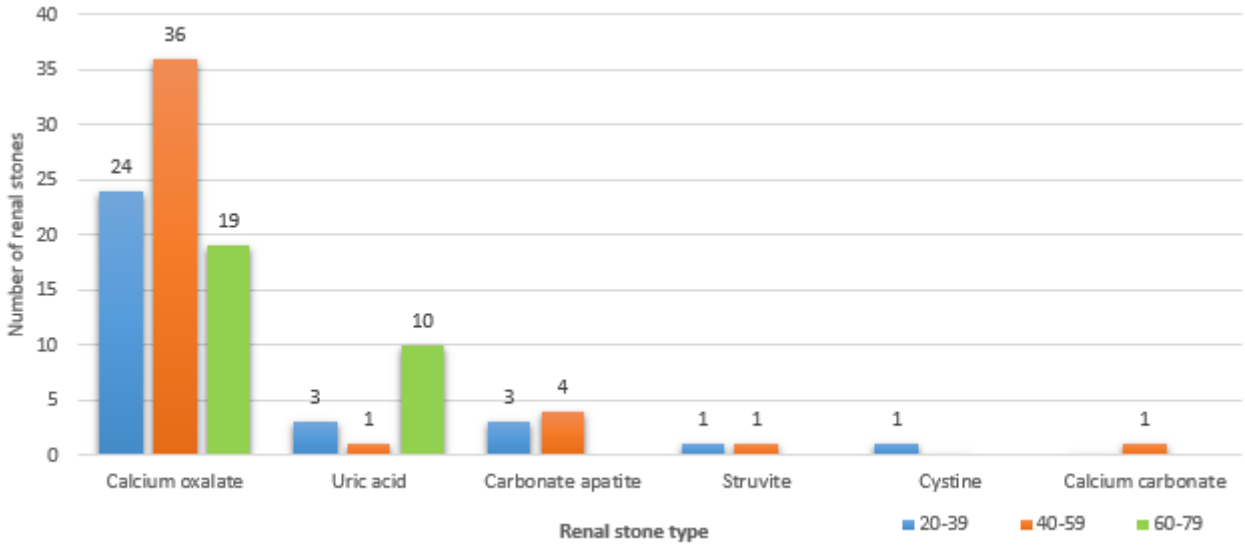

Figure 4. Distribution of renal stone types among age groups of patients

Table 2. Distribution of staghorn and "Non-staghorn" calculi in different age group of patients

Age group	Staghorn calculi	Non staghorn calculi
20-39	4	28
40-59	12	31
60-79	7	22
Total	23	81

Table 3. Distribution of renal stone types among staghorn and non-staghorn calculi

Renal stone type	Staghorn calculi (n=23)		Non staghorn calculi (n=81)	
Calcium oxalate	16	(69.6%)	63	(77.8%)
Uric acid	3	(13.0%)	11	(13.6%)
Struvite			2	(2.5%)
Cystine			1	(1.2%)
Carbonate apatite	3	(13.0%)	4	(4.9%)
Calcium carbonate	1	(4.4%)		

Table 4. metabolic evaluation of patients with uric acid stones

Metabolic parameter	Mean	Reference Range
Uric acid - serum	4.8375	2.6-6.0 mg / dL
Urine volume	1493.75	1100-2050ml
Uric acid – 24hr urine	396.8388	250.0-750.0 mg

Distribution of types of renal stone among staghorn and non-staghorn calculi was analysed. Calcium oxalate was the predominant type of renal stone among both morphological forms. The different renal stone types identified among the two morphological forms are shown in Table (3).

The prevalence of uric acid type of renal stones was found to be relatively high in Jaffna. Thus a metabolic evaluation of patients who had uric acid stones was performed. The results of the metabolic evaluation are given in Table (4). Many patients who had uric acid stones in Jaffna were type II diabetics. Figure 6 shows the distribution of uric acid stones among diabetic and "non diabetic" patients.

Discussion

Epidemiology of renal stone disease

The prevalence of kidney stone disease in developed countries is 4-20% [6]. The prevalence of this condition in adults in Saudi Arabia, North America, Europe, and Asia are 20%, 13%, 5-9% and 1-5% respectively. The incidence of kidney stone disease in males is 2.2 -3.4 times higher than in females. The incidence in females is increasing because of change in food habit, obesity and reduction in fluid intake [7]. 77 men underwent surgical removal of renal stone and the male: female ratio was 2.85:1. More patients in the age group of 40-59 years in this study had surgical intervention for renal stones. In a study done at national level in Colombo in a cohort of 50 patients surgically treated for renal stones, more patients were in the 40-60 years age group and male: female ratio was 2.6:1[8]. So this study in Jaffna has epidemiological resemblance to the study performed at national level.

Chemical composition of renal stones in the management of urolithiasis

Crystallization of chemical components and subsequent kidney stone formation occur in the presence of certain risk factors. Identification of chemical composition of kidney stone would be a "biochemical biopsy" of urinary environment during the event of crystal deposition. So this will allow identification of risk factors. Knowing the risk factors and thus the possible aetiology of renal stone type can aid in the preventive measures for their recurrence [9].

Analysis of chemical composition of renal stones

Wet chemical analysis is a simple lab technique for qualitative or quantitative assessment of renal stone. There are other sophisticated techniques available for renal stone analysis. Their cost will differ. Infrared spectroscopy, X-ray diffraction crystallography, thermogravimetry and polarized microscopy are some of them [9]

Fourier transform infrared spectroscopy [FT-IR] is considered to be the standard technique for chemical analysis of kidney stones. This technique is not only specific, but provides reliable quantitative analysis and thus characterizes any stone sample [7]. FT-IR was used to analyse chemical composition of renal stones in Jaffna in this study.

Prevalence of type of renal stones in Jaffna

Among the 104 patients, 79 patients [75.9%] had calcium oxalate and 14 patients [13.5%] had uric acid type of renal stones. Carbonate apatite, cystine, struvite and calcium carbonate types of renal stones were found in 7[6.7%], 1[1%]

Table 5. Prevalence of renal stone types in different regions

Renal stone type & the analytic method	Jaffna [FT-IR]	Colombo [Chemical method]	India [XRD]	China [FT-IR]	Iraq [XRD]	USA [FT-IR]
Calcium oxalate	77.9%	86%	93%	62.5%	46.1%	26%
Uric acid	15.4%	0	0.93%	12.5%	15.4%	5%
Cystine	1%	0				2%
Struvite	1.9%	2%	1.4%	12.5%	38.4%	22%

Table 6. Comparison of prevalence of chemical composition of renal stone in Jaffna over three decades

Chemical Composition of renal stone	T.Saravanapavananthan [1988] Number of patients	Current study [2018] Number of patients
COM + COD		67
COM + COD + CA		10
COM + UA		3
COM + CA	1	1
COM + CA + MAP	2	2
AH + CHP + MHP		1
PCHP + AH		1
UA		13
CA	2	5
Cys		1
COM	11	
COM + MAP + UA	2	
CC	1	
COM + CA + MAP + UA	1	
Total	**20**	**104**

2[1.9%] and 1[1%] patients respectively. 86[83%] patients had pure stones and 18 [17%] had mixed stones.

When the renal stone composition is identified the possible risk factors could be searched for the aetiology. Low urine volume is a common risk factor for urolithiasis as it increases super saturation and enhances stasis [10]. Patients who have calcium oxalate stones or a combination of calcium oxalate/phosphate stones could be investigated for risk factors such as hypercalciuria, hyperoxaluria, hyperuricosuria and hypocitraturia. Dietary modifications and medical intervention for specific risk factors could then be tailored to individual patients to prevent recurrent stone formation [11]. A low urine pH [< 6], hyperuricosuria /hyperuricaemia and metabolic syndrome are recognized risk factors for uric acid type renal stone formation [11]. Among 14 patients who had uric acid type renal stones in this study, 10 of them had type II diabetes indicating possible role of metabolic syndrome in the aetiopathology of uric acid stones.

Apart from patient related risk factors, collection of epidemiological data about environmental risk factors for renal stones may be useful for the assessment of existing prevalence of renal stone composition in Sri Lanka [3].

Renal stone types -National, regional and international comparison

Table (5) compares the prevalence of renal stone types in different regions. Although different analytical methods were used in the above studies, the calcium oxalate type renal stones were the commonest renal stones in Asian countries [8, 12, 7, 13, 14]. The urinary stones having mixed composition [mixed stones] were not compared in Table (5). A prospective study carried out on 50 stone samples obtained from a cohort of Sri Lankan patients during 2012-13, revealed 86% of renal stones consisted of calcium oxalate [8].

In another study among Sri Lankan population on mineralogical, compositional and isotope characterization of kidney stones, the majority had calcium oxalate type renal stones. This study revealed that the oxalate stones are well crystallized compared to other stones by analysing with scanning electron microscope [SEM] and X-ray diffraction crystallography [XRD]. Depleted values for the carbon isotope in renal stones were observed in Sri Lanka when compared with western world. This could be due to the dietary pattern where rice is a major component of the daily diet [15].

The most common type of renal stone varied between provinces in Iraq. These geographical differences were attributed to the variations in lithogenic and the climatological factors [12]. The composition of renal stones did not vary in different climate zones of Sri Lanka [8].

Morphology of renal stones – Staghorn Vs non- staghorn

A staghorn calculus is a stone that occupies the renal pelvis and extends into at least two major calyceal systems [16]. Staghorn calculi are associated with difficulties in operative removal and post-operative sepsis [8].

In this study, there were 23 staghorn [22.1%] and 81[77.9%] non staghorn type renal stones. The morphology of the renal stone [staghorn and non-staghorn] did not show statistically significant association with gender or with the age group of patients. In a study done at national level in Colombo, there were 21 [42%] staghorn and 29 [52%] non staghorn renal stones [8].

In western countries about 60-75% staghorn calculi are struvite stones ["infective stones"] [17]. In our study 69% of staghorn calculi had calcium oxalate and none of the staghorn calculi had struvite. In the study done at national level in Colombo, 5% staghorn calculi contained struvite and 76% had calcium oxalate [8]. In India 4.02% of staghorn calculi were composed of struvite stone [12]. Since there is a striking difference in the predominant type of renal stones with staghorn morphology in loco-regional and the western world, the aetiology of staghorn calculi must be different in these regions. This has an impact on the management of patients with renal stones. The extent of renal tissue injury by longstanding oxalate stones is minimal when compared to that occurring with struvite stone [8]

In this study [in Jaffna], 64 non-staghorn renal stones [79%] were calcium oxalate type of stones whereas in the study done at national level [in Colombo], 27 non-staghorn renal stones [93%] were calcium oxalate type stones [8].

Renal stone composition in Jaffna – has it changed over three decades [1988 to 2018]

Prevalence of type of renal stones differs between different countries and can change in the same country over time. The prevalence of calcium oxalate stones has increased from 26% to 82% while the prevalence of struvite stones has decreased from 20% to 5% in India over three decades [4].

The first study on chemical composition on renal stones in Sri Lanka was carried out in Northern Sri Lanka during 1983-86 and was published in 1988 [18]. It was carried out in a small sample using a different method to analyse the stones. Twenty renal stones were analysed for chemical composition using wet chemical analysis. In that study the percentage of each component composition in each of the renal stone was not clearly mentioned. Therefore it is difficult to derive the type of renal stone using the guide described by Abdel-Halim et al [5].

The results of that study and the results of chemical composition of renal stones in the current study are given in Table (6) for comparison.

In the study on urinary calculi in Jaffna by T.Saravanapavananthan et al. during 1983-86 [published in 1988], calcium oxalate, calcium phosphate and calcium carbonate were found in 55%, 10% and 5 % of renal stones respectively. Two renal stones were found to be mixed uric acid stones. The current study on chemical composition of renal stones in Jaffna in 2018, demonstrated the presence of calcium oxalate in 77.9% of renal stones and uric acid in 15.4% of renal stones. Among the uric acid stones there were 13 pure uric acid stones and 3 mixed uric acid stones [Uric acid + Calcium Oxalate Mono hydrate].

While the prevalence of calcium oxalate stones remained the predominant renal stone in Jaffna, the prevalence of uric acid stones has shown a steep increase in Jaffna over thirty years. The sensitivity of analysis method, used to detect uric acid stone 30 years ago, might also be responsible for this difference.

Unique difference in composition of renal stone in Northern Sri Lanka

Hareendra et al mention about the hardly observable presence of uric acid stones in the study on chemical composition of kidney stones obtained from a cohort of Sri Lankan patients [8]. Furthermore Chandrajith et al demonstrated 5% uric acid stones in the study on mineralogical, compositional and isotope characterization of human kidney stones in a Sri Lankan population [15]. In this study (in Jaffna) 15.4% of renal stones were uric acid type stones. Since there is relatively higher prevalence of uric acid stones in Jaffna, it is important to perform metabolic evaluation of patients with uric acid stones.

Low urine volume and low pH of urine play major role in the pathogenesis of uric acid stones [11, 19]. Risk of formation of uric acid stone increases when there is underlying metabolic disorders such as metabolic syndrome and diabetes mellitus. Insulin resistance impairs glutamine metabolism and reduces the ammonium excretion by renal tubular cells. So the hydrogen ions in the glomerular filtrate will not be buffered adequately. The resulting low urine pH enhances uric acid nephrolithiasis [20].

Conclusions

Calcium oxalate is the predominant renal stone type in Jaffna and it is the common type of renal stone in both staghorn and non-staghorn morphological forms. Calcium oxalate remained the most prevalent type of renal stone in Jaffna over 30 years. Prevalence of many renal stone types in Jaffna was found to be comparable to the prevalence found in other regions of Sri Lanka.

The uric acid type renal stones have shown increase in prevalence in Jaffna over three decades. The prevalence of uric acid stone in Jaffna is relatively higher than in other regions in Sri Lanka based on the available publications on renal stone disease.

Recommendation

Nationwide large population study is warranted to identify the prevalence of renal stone types in Sri Lanka and the regional variations.

Acknowledgement

I would like to express my sincere thanks to the consultants in charge of General Surgical and Urological Units of Teaching Hospital Jaffna for their support in collecting renal stones after surgery. I also thank Ms.P. Shathana, Research Assistant, for helping to organize the analysis of chemical composition of renal stones.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Fisang C, Anding R, Müller SC, Latz S, Laube N. Urolithiasis-an interdisciplinary diagnostic, therapeutic and secondary preventive challenge. DeutschesÄrzteblatt International. 2015 Feb; 112[6]:83. https://doi.org/10.3238/arztebl.2015.0083
2. Abeygunasekera AM, Nirupika H, Bulegoda H. An observational study of obstructive uropathy with renal impairment. Sri Lanka Journal of Urology. 2001; 2:22-4.
3. Abeygunasekera A M. Urinary stone disease in Sri Lanka. The Ceylon medical journal. 2004 Jun; 49[2]:41-3. https://doi.org/10.4038/cmj.v49i2.3258
4. Singh VK, Rai PK. Kidney stone analysis techniques and the role of major and trace elements on their pathogenesis: a review. Biophysical reviews. 2014 Dec 1;6[3-4]:291-310 https://doi.org/10.1007/s12551-014-0144-4
5. Abdel-Halim RE, Al-Sibaai A, Baghlaf AO. The structure of large lamellar urinary stones: a quantitative chemical analytic study applying a new classification scheme. Scandinavian journal of urology and nephrology. 1993 Sep 1;27[3]:337-41 https://doi.org/10.3109/00365599309180444
6. Trinchieri A. Epidemiology of urolithiasis: an update. Clinical cases in mineral and bone metabolism. 2008 May; 5[2]:101.
7. He Z, Jing Z, Jing Cun Z, Chuan Yi H, Fei G. Compositional analysis of various layers of upper urinary tract stones by infrared spectroscopy. Experimental and therapeutic medicine. 2017 Oct 1;14[4]:3165-9. https://doi.org/10.3892/etm.2017.4864

8. Hareendra PP, Hunais MM, Suvendiran S, Palihakkara SD, Abeygunasekera AM. Chemical composition of kidney stones obtained from a cohort of Sri Lankan patients. Sri Lanka Journal of Surgery. 2015 Sep 8;33[2]. https://doi.org/10.4038/sljs.v33i2.8146
9. Kasidas GP, Samuell CT, Weir TB. Renal stone analysis: why and how?. Annals of clinical biochemistry. 2004 Mar 1;41[2]:91-7. https://doi.org/10.1258/000456304322879962
10. Moe OW. Kidney stones: pathophysiology and medical management. The lancet. 2006 Jan 28;367[9507]:333-44. https://doi.org/10.1016/S0140-6736(06)68071-9
11. Dion M, Ankawi G, Chew B, Paterson R, Sultan N, Hoddinott P, Razvi H. CUA guideline on the evaluation and medical management of the kidney stone patient-2016 update. Canadian Urological Association Journal. 2016 Nov;10[11-12]:E347. https://doi.org/10.5489/cuaj.4218
12. Ansari MS, Gupta NP, Hemal AK, Dogra PN, Seth A, Aron M, Singh TP. Spectrum of stone composition: structural analysis of 1050 upper urinary tract calculi from northern India. International journal of urology. 2005 Jan;12[1]:12-6. https://doi.org/10.1111/j.1442-2042.2004.00990.x
13. Afaj AH, Sultan MA. Mineralogical composition of the urinary stones from different provinces in Iraq. The Scientific World Journal. 2005;5:24-38. https://doi.org/10.1100/tsw.2005.2
14. Larsen PR, Kronenberg HM, Melmed S, Polonsky KS. Williams Textbook of Endocrinology, 10th edn, Elsevier Science, Pennsylvania. 2003: 1412
15. Chandrajith R, Weerasingha A, Premaratne KM, Gamage D, Abeygunasekera AM, Joachimski MM, Senaratne A. Mineralogical, compositional and isotope characterization of human kidney stones [urolithiasis] in a Sri Lankan population. Environmental geochemistry and health. 2019 Jan 22:1-4. https://doi.org/10.1007/s10653-018-0237-2
16. Menon M, Parkulka BG, Dranch GW. Urinarylithiasis: aetiology, diagnosis and management. In:Walsh PC, Renik AB, Vaughan ED, Wein AJ. [eds] Campbell's Urology 7th edition. WB Saunders, London. 2004. p.2661-733
17. Gleeson MJ, Griffith DP. Struvite calculi. British journal of urology. 1993 May;71[5]:503-11. https://doi.org/10.1111/j.1464-410X.1993.tb16015.x
18. Saravanapavanathan T, Magesweran R. Nature andcomposition of urinary calculi:A preliminary study in Northern Sri Lanka. Jaffna Medical Journal 1988;23: 37-42.
19. Cloutier J, Villa L, Traxer O, Daudon M. Kidney stone analysis:"Give me your stone, I will tell you who you are!". World journal of urology. 2015 Feb 1;33[2]:157-69 https://doi.org/10.1007/s00345-014-1444-9
20. Spatola L, Ferraro PM, Gambaro G, Badalamenti S, Dauriz M. Metabolic syndrome and uric acid nephrolithiasis: Insulin resistance in focus. Metabolism. 2018 Jun 1;83:225-33. https://doi.org/10.1016/j.metabol.2018.02.008

SCIENTIFIC ARTICLE

Prediction of mortality and morbidity in patients with secondary peritonitis using POMPP scoring

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Keywords: POMPP; secondary peritonitis; mortality; morbidity

Abstract

Introduction

"POMPP [Practical scoring system of mortality in patients with perforated peptic ulcer] is a simple, clinically applicable scoring system that may allow surgeons to rapidly predict mortality rates in patients based on objective data."

This study was aimed at using the POMPP scoring in secondary peritonitis patients for rapid assessment, to predict the mortality and morbidity and to validate POMPP scoring.

Methodology

This observational study was conducted on patients with suspected secondary peritonitis at the Himalayan Institute of Medical Sciences, Dehradun over a period of 12 months from January 2017 to December 2017.

All patients fulfilling inclusion criteria were included with written informed consent. The parameters under evaluation for each patient under the POMPP scoring were Age [> 65 years], serum albumin [< 1.5gm/dl] and blood urea nitrogen [> 45 mg/dl], with each parameter having a score of 1. Risk of mortality and complications associated with POMPP score were analysed using statistical tests including chi square test, student t test and Fisher exact test. A p value < 0.05 was considered statistically significant.

Results

During the study period a total of 138 patients undergoing laparotomy for peritonitis were enrolled and evaluated. There were 86 [62.3%], 42 [30.4%], 9 [6.5%] and 1 [0.7%] patients with scores of 0, 1, 2 and 3, respectively. Additionally, the postoperative complications were broadly divided into local, respiratory, renal, cardiovascular, systemic and anastomotic complications. Local Complications were found to be most common with 38 [27.5%] patients. Study of mortality associated with each score revealed there was 3.5% mortality with score 0, 16.7% with score 1, 44.4% with score 2, 100% with score 3 thus indicating that the gravest prognosis lies with patients who present with a POMPP score of 3. However, there was only one patient who had POMPP score 3. This observation of increasing POMPP score with relation to mortality was deemed statistically significant [p<0.05] using Fisher's exact test.

Conclusions

Gastrointestinal perforation and secondary peritonitis patients have been shown to have a strong association with advanced age, blood urea nitrogen and serum albumin levels. Analysis of these simple clinical and biochemical parameters in our study has helped in validation of the POMPP scoring system for risk stratification of cases of secondary peritonitis. It has been observed to be a simple, clinically applicable scoring system that may allow surgeons to rapidly predict morbidity and mortality rates in all types of gastrointestinal perforations.

Introduction

Gastrointestinal perforations are a major cause of mortality & morbidity. Peritonitis due to perforation is one of the commonest surgical emergencies attended by a general surgeon. Perforation peritonitis has a varied clinical profile and several scoring systems have been used to predict prognosis of patients with peritonitis.

"Practical scoring system of mortality in patients with perforated peptic ulcer[PPOMPP] is a simple, clinically applicable scoring system that may allow surgeons to rapidly predict mortality rates in patients with perforated peptic ulcers [PPU]" [1].

Table 1. POMPP Score

POMPP variable	Points
Age > 65 years	1
Albumin <1.5 g/dl	1
BUN > 45 mg/dl	1
Total score	0 – 3

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DOI: http://doi.org/10.4038/sljs.v38i1.8565

Table 2. POMPP score assigned to subjects

POMPP Score	N=138	%
0	86	62.3%
1	42	30.4%
2	9	6.5%
3	1	0.7%
Total	138	100.0%

Table 3. POMPP score with Type of Perforation

POMPP Score	Non Peptic n=81		Peptic n=57	
0	49	60.5%	37	64.9%
1	25	30.9%	17	29.8%
2	6	7.4%	3	5.3%
3	1	1.2%	0	0.0%
Total	81	100.0%	57	100.0%

Table 4. POMPP Score with Morbidities

Morbidities	POMPP Score				Total [n=138]	p- value
	0 [n-86]	1 [n-42]	2 [n-9]	3 [n-1]		
Local Complications	20	14	4	0	38	**0.367**
	23.3%	33.3%	44.4%	0.0%	27.5%	
Respiratory Complications	12	8	2	0	22	**0.799**
	14.0%	19.0%	22.2%	0.0%	15.9%	
Renal Complications	2	6	0	0	8	**0.045**
	2.3%	14.3%	0.0%	0.0%	5.8%	
CVS Complications	0	2	2	0	4	**<0.01**
	0.0%	4.8%	22.2%	0.0%	2.9%	
Systemic Complications	3	4	5	0	12	**<0.01**
	3.5%	9.5%	55.6%	0.0%	8.7%	
Anastomotic Complications	6	2	2	0	10	**0.324**
	7.0%	4.8%	22.2%	0.0%	7.2%	

Table 5. POMPP score with Mortality in Comparison with Non Peptic and Peptic

POMPP score	Non peptic n=81		Peptic n=57	
	Mortality		Mortality	
0	2	4.1%	1	2.7%
1	5	20.0%	2	11.8%
2	3	50.0%	1	33.3%
3	1	100.0%	0	0.0%
TOTAL	11	13.6%	4	7.0%

Table 6. POMPP Score with Mortality

Mortality	POMPP Score				Total [n=138]
	0	1	2	3	
Yes	3	7	4	1	15
	3.5%	16.7%	44.4%	100.0%	10.9%
Total	86	42	9	1	138
	100.0%	100.0%	100.0%	100.0%	100.0%
p- value <0.01					

Table 7. . Duration of hospital stay with POMPP score

POMPP Score	N	Mean	SD
0	87	9.34	5.60
1	41	9.76	5.69
2	9	11.67	8.47
3	1	3.00	.
Total	138	9.57	5.83

Table 8. Logistic regression analysis of the POMPP variables with mortality

Logistic Regression: Mortality [Y/N]					
Variables	S.E.	p- value	Odds Ratio	95% CI	
				Lower	Upper
Age	0.02	**0.12**	1.031	0.992	1.072
Albumin	0.716	**<0.01**	0.065	0.016	0.263
BUN	0.013	**0.58**	1.007	0.982	1.033

This study was aimed at using the POMPP scoring in secondary peritonitis patients for rapid assessment, to predict the mortality and morbidity and to validate POMPP scoring.

Materials and methods

The observational study was conducted on patients with suspected perforation peritonitis at the Himalayan Institute of Medical Sciences, Dehradun over a period of 12 months from January 2017 to December 2017. This study was conducted with the ethical approval from the internal ethical committee.

All clinically diagnosed cases of perforation peritonitis with investigatory support and absence of evidence of primary or tertiary aetiology were included in the study with written informed consent.

All patients who fulfilled the inclusion criteria underwent the following

- All the relevant clinical details of history and physical examinations and investigations were recorded as per the pre-set format.
- Patients were investigated accordingly and POMPP variables were taken and POMPP score was calculated
- Operative procedure and site of perforation was recorded.
- All mortalities occurring among the study subjects, irrespective of cause, were noted.
- The patients were followed up by the principle investigator to assess morbidities at 24 hour intervals in the post-operative period till the patient was either discharged or till mortality during the course of the admission. The specific morbidities were assessed using classifications given by Dindo et al [2]
    - Local complications i.e. Surgical Site Infection, Wound Dehiscence, Pelvic Abscess, Prolonged Ileus and Burst Abdomen were assessed clinically
    - CVS complications i.e. Bradycardia and Atrial Fibrillation were assessed clinically and confirmed with electrocardiogram
    - Systemic complications i.e. Altered Sensorium, Thrombocytopenia and Shock with clinical assessment and haematological investigations
    - Renal complications i.e. Acute Renal Failure and haematuria with biochemical derangements, urine output and urine analysis
    - Respiratory complications i.e. URTI, Pleural Effusion and ARDS with clinical assessment , Arterial blood gas analysis and radiological evaluation i.e. X ray chest
    - Gastrointestinal / Anastomotic complications i.e. Ileal leak & Enterocutaneous fistula with clinical assessment , content and output

Data was collected in a specially designed case recording form. The data collected was then transferred into a master chart which was subjected to statistical analysis using SPSS version 22.

The parameters under evaluation for each patient under the POMPP scoring were their age, serum albumin and blood urea nitrogen and a score was awarded as per following [Table 1]:

Data Management and Statistical Analysis:

- Analysis of obtained results was carried out using software [SPSS version 22] by application of descriptive methods [eg. mean, proportion, rate etc].
- For quantitative data or variable, parametric statistical tests of significance were used.
- The data collected from each study subject and tabulated into the master chart was evaluated using standard statistical tests such as chi square test, student t test and Fisher's Exact test. A 5% significance level was considered in all statistical tests.

Results

During the study period a total of 138 patients undergoing laparotomy for peritonitis were enrolled and evaluated. Most patients [n=54, 39.1%] were in the age group 25-45 years. Only 5.8% [n=8] patients were above the age of 65 years,

which was one of the parameters. There was an overwhelming preponderance of males in the study with 89.9%. The second parameter of POMPP score assessed patients with serum albumin level less than 1.5 gm/dl, which were found to be 10.9% [n=15] while final parameter was patients with BUN level more than 45 which were noted to be 16.7% [n=23]. As per these observations, our study showed that among the score that was assigned before undergoing laparotomy following result was noted:

Among all patients with perforation peritonitis, 57 patients [41.3%] had peptic perforations while other 81 [58.7%] were of non-peptic sites while only one patient had a POMPP 3. Of the non-peptic perforations ileal was the commonest site of perforation accounting for 31 cases [38.3%], followed by jejunal which were 11 [13.6%] and appendicular perforation were 10 [12.3%]. There were also caecal [n=7] and Gall Bladder perforations [n=5]. Rest included colonic, ileocecal, rectal perforations and perforations of multiple sites.

In our study the postoperative complications were studied as an indicator of disease associated morbidity. These were broadly divided into local, respiratory, renal, cardiovascular, systemic and anastomotic complications. The following table [Table 4] shows various complications and their significance at different scores. Fisher's exact test was applied to assess the significance of each complication. Local Complications were found to be most common being noted among 27.5% patients. Of the total 138 patients, 42.9% of patients had some disease associated morbidity, out of which non peptic group had 40.7% morbidity while the peptic group had 45.6% morbidity.

Mortality outcomes were calculated separately for peptic and non-peptic groups [Table 5]. There was 13.6 % risk of mortality in non-peptic group while there was 7.0 % risk in peptic group.

An overall of risk of 10.9 % mortality was noted in all gastro-intestinal perforations studied which was significant based on Fisher's exact test [$p<0.01$]. [Table 6]

Table 7 illustrates the mean duration of hospital stay noted amongst patients was 9.57 days with standard deviation of 5.83 days. Hospital stay was found to positively correlating using Spearman correlation [$r=0.0658$] with increasing POMPP score. Non peptic group had an average of 10.51 days while peptic group had 8.25 days.

Further, a logistic regression analysis of the dichotomous POMPP variables was done with respect to mortality. The below stated table 8 shows that Serum Albumin showed to be a significant independent factor affecting mortality [$p <0.01$].

Discussion

This study was conducted in patients admitted as a case of perforation peritonitis in the Himalayan Institute of Medical Sciences, Swami Rama Nagar and Dehradun. A total of 138 patients were recruited for the present study.

There were 8 patients aged over 65 years who had worse prognosis. [3]. In present study, 42.42 +/- 16.9 years was observed as mean age of patients which was less when compared to mean ages of patients as noted in previous studies. Increased age [especially > 65 years] has previously been shown to be associated with significantly higher mortality after perforation [3, 4, 5, 7, and 8].

On evaluation of the other parameters of POMPP score, 10.9% patients had albumin less than 1.5 gm /dl, while 16.7 % patients had BUN level more than 45 mg/dl. The above findings noted in our study were similar to a previous study conducted by Kemparaj [9].

A total of 42.9 % of subjects in our study suffered some form of morbidity, of which non-peptic group had 40.7% morbidity and peptic group had 45.6 % morbidity. Emergency surgery for perforated ulcers was noted to be associated with a higher rate of postoperative complications [between 21% and 43%].

In a review of literature available on the different scoring systems of GI perforations, there is around 20-50 % morbidity reported amongst cases of peptic perforations whereas nearly 30-60% morbidity has been noted amongst patients of intestinal i.e. non-peptic perforations [7, 10, 11, 12]. Complications were influenced by association with emergency surgery, inadequate post-operative care, etc. The study showed similar rates of morbidity in among total study subjects as well as in both subsections hence validating the POMPP scoring as per historic evidence.

Various complications were studied according the score allotted. Local complications that included, surgical site infection, wound dehiscence, burst abdomen were the most common comprising 27.5% which corroborates with findings from past studies by Kempraj and Bali [9, 15].

The number of cases suffering from systemic and respiratory complications increased with increasing score hence indicating the validity of POMPP score in predicting severity of disease. Cardiovascular and renal complications were also higher at a Score of 1 when compared to 0 thus indicating severity. However no cases were recorded to have a score of 2 or 3. There was a notably increasing trend in morbidity with increased score but there were no noted complications at score 3, as there was a only single case with mortality.

In our study, there was a total of 10.8% mortality noted amongst subjects which was statistically significantly associated with POMPP score. This observation was fairly comparable to past study by Shin et al had who noted 12.8% mortality in 117 patients who underwent surgery for an intestinal perforation [13]. Additionally, mortality in study by Kemparaj et al [14%] was higher than our overall mortality whereas that noted in Bali et al was lower [7%]. There was increased risk of mortality with increasing POMPP score like Boey & Pulp [16, 17]. Adequate preoperative resuscitation [with fluids, etc.], correction of electrolyte imbalances followed by an early surgical intervention, to remove the source of infection and stop further contamination, is responsible for good outcomes minimising morbidity and mortality [15, 18]

The mean duration of hospital stay in study was 9.57 days with standard deviation of 5.83 days. Longest duration of stay was seen with POMPP score 2 group with mean of 11.67 days. Qureshi et al had similar post-operative stay of 9.6 days [19] and Chalya et al had mean stay of 8.93± 6.63 days [20]. Patients of non-peptic perforations had a longer stay of 10.51 ± 7.05 days. Patients in the non-peptic group also showed strong positive correlation in mean stay with increasing score [p=0.019].

On logistic regression analysis, albumin was found to have a significant correlation with mortality with Odds ratio 0.065 and was an independent factor influencing mortality like in pervious study by Mekense et al [1] while BUN level was not significant in our study with Odds ratio 1.007 and p value 0.58 while it was affecting mortality in study by Mekense et al [1] and Moller et al [17] Age independently did not have significant effect on the prediction of mortality like in other studies [19].

POMPP scoring system involving only two investigations which is albumin and BUN level and one demographic profile that was of age, is simple tool which can satisfactorily predict mortality and morbidity in the both the group for peptic and non-peptic groups. The study was done on a small sample size which may lead to some degree of selection bias. Another possible limitation of the study may be that the sample population was taken from one part of one city, and thus it may not be representative of the population in the region or the country. Since there was one patient with POMPP score 3 which was an important statistical limitation.

Therefore, to further establish the validity of this scoring system and to make this common practice in the assessment and management of GI perforations, a large multicentre study of all geographical areas of the country is required. Another limitation is that a no standard protocol and grading followed for assessment of specific morbidity so need for further morbidity specific studies should be done.

Conclusion

Morbidity and mortality associated with gastrointestinal perforations have been shown to have a strong association with advanced age, blood urea nitrogen and serum albumin levels. Analysis of these simple clinical and biochemical parameters in the study has helped in establishment of the POMPP scoring system for risk stratification of cases of secondary peritonitis. It has been observed to be a simple, clinically applicable scoring system that may allow surgeons to rapidly predict morbidity and mortality rates in all types of gastrointestinal perforations.

Our institute along with others which are similarly placed high volume tertiary care centres, as well as smaller individual practices could benefit with risk stratification and pre-operative assessment of morbidity and mortality using a simplified scoring system like POMPP score for management of patients with secondary peritonitis.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Menekse E, Kocer B, Topcu R, Olmez A, Tez M, Kayaalp C. A practical scoring system to pre-dict mortality in patients with perforated peptic ulcer. World J Emerg Surg. 2015;16:1-6. https://doi.org/10.1186/s13017-015-0008-7
2. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg. 2004;240(2):205-213. https://doi.org/10.1097/01.sla.0000133083.54934.ae
3. Kujath P, Schwandner O, Bruch H-P. Morbidity and mortality of perforated peptic gastroduo-denal ulcer following emergency surgery. Langenbeck's Arch Surg. 2002;387(7):298-302. https://doi.org/10.1007/s00423-002-0331-9
4. Hermansson M, Von Holstein CS, Zilling T. Peptic Ulcer Perforation before and after the Intro-duction of H2-Receptor Blockers and Proton Pump Inhibitors. Scand J Gastroenterol. Taylor & Francis; 1997 Jan 1;32(6):523-9. https://doi.org/10.3109/00365529709025093
5. Rajesh V, Chandra SS, Smile SR. Risk factors predicting operative mortality in perforated pep-tic ulcer disease. Trop Gastroenterol. 2003; 24(3):148-50.
6. Sillakivi T, Lang A, Tein A, Peetsalu A. Evaluation of risk factors for mortality in surgically treated perforated peptic ulcer. Hepatogastroenterology. Greece; 2000;47(36):1765-8.
7. Kim J, Jeong S, Lee Y. Analysis of risk factors for postoperative morbidity in perforated peptic ulcer. J Gastric. 2012;12(1):26-35. https://doi.org/10.5230/jgc.2012.12.1.26

8. Testini M, Portincasa P, Piccinni G, Lissidini G, Pellegrini F, Greco L. Significant factors asso-ciated with fatal outcome in emergency open surgery for perforated peptic ulcer. World J Gastroenterol. 2003; 9(10):2338-40.
https://doi.org/10.3748/wjg.v9.i10.2338
9. Kemparaj T, Narasimhaiah NK. Our experience in gastrointestinal perforations: a retrospective study. 2017;4(2):593-7.
https://doi.org/10.18203/2349-2902.isj20170198
10. Boey J, Choi SK, Poon A, Alagaratnam TT. Risk stratification in perforated duodenal ulcers. A prospective validation of predictive factors. Ann Surg. 1987; 205(1):22-6.
https://doi.org/10.1097/00000658-198701000-00005
11. Truong A, Hanna MH, Moghadamyeghaneh Z, Stamos MJ. Implications of preoperative hypo-albuminemia in colorectal surgery. World J Gastrointest Surg. 2016;8(5):353.
https://doi.org/10.4240/wjgs.v8.i5.353
12. Han EC, Ryoo S-B, Park BK, Park JW, Lee SY, Oh H-K, et al. Surgical outcomes and prognos-tic factors of emergency surgery for colonic perforation: would fecal contamination increase morbidity and mortality? Int J Colorectal Dis. Germany; 2015 Nov;30(11):1495-504.
https://doi.org/10.1007/s00384-015-2315-6
13. Shin R, Lee SM, Sohn B, Lee DW, Song I, Chai YJ, et al. Predictors of morbidity and mortality after surgery for intestinal perforation. Ann Coloproctol. 2016;32(6):221-7.
https://doi.org/10.3393/ac.2016.32.6.221
14. Thorsen K, Søreide JA, Søreide K. Scoring systems for outcome prediction in patients with per-forated peptic ulcer. Scand J Trauma ResuscEmerg Med 2013;21:25.
https://doi.org/10.1186/1757-7241-21-25
15. Bali RS, Verma S, Agarwal PN, Singh R, Talwar N. Perforation Peritonitis and the developing World. ISRN Surg. Hindawi Publishing Corporation; 2014;2014:1-4.
https://doi.org/10.1155/2014/105492
16. Agarwal A, Jain S, Meena LN, Jain SA, Agarwal L. Validation of Boey's score in predicting morbidity and mortality in peptic perforation peritonitis in Northwestern India. Trop Gastroenterol 2016; 36(4):256-60.
https://doi.org/10.7869/tg.300
17. Møller MH, Engebjerg MC, Adamsen S, Bendix J, Thomsen RW. The Peptic Ulcer Perforation (PULP) score: a predictor of mortality following pepticulcer perforation. A cohort study. ActaAnaesthesiol Scand. 2012;56:655-62.
https://doi.org/10.1111/j.1399-6576.2011.02609.x
18. Nachiappan LM. Scoring Systems for Outcome Prediction of Patients with Perforation Peritoni-tis. J Clin Diagnostic Res. 2016;10(3):1-5.
https://doi.org/10.7860/JCDR/2016/16260.7338
19. Qureshi AM, Zafar A, Saeed K, Quddus A. Predictive power of Mannheim peritonitis index. J Coll Physicians Surg Pakistan. 2005;15(11):693-6.
20. Chalya PL, Mabula JB, Koy M, McHembe MD, Jaka HM, Kabangila R, et al. Clinical profile and outcome of surgical treatment of perforated peptic ulcers in Northwestern Tanzania: A ter-tiary hospital experience. World J Emerg Surg. 2011;6:31-9.
https://doi.org/10.1186/1749-7922-6-31

PERSPECTIVE

Adapting surgical services at a tertiary care unit amidst the COVID19 pandemic: a Sri Lankan perspective

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The World Health Organization [WHO] declared COVID19 [SARS-CoV2] a pandemic on the 11th of March 2020 [1, 2]. In the absence of a vaccine, social distancing and personal hygiene was advised as the preferable mode of preventing its transmission [3, 4]. With the country going in to a strict limitation of social mobility in the form of a police curfew there were severe restrictions to usual lifestyle. Health service was affected in more than one way during this unprecedented situation. While the resources had to be diverted in preparation for community spread of the pandemic the patient care was affected by the island wide curfew. Surgical services were also affected in several fronts due to redistribution of resources and limiting social mobility. North Colombo Teaching Hospital [NCTH] is a tertiary care center catering a population of over half a million in the district of Gampaha, in the Western province of Sri Lanka. The district fell within the initial Red Zone doe COVID19 spread and the hospital was designated a dedicated COVID19 management center. The hospital serves around 3000 daily outpatient visits, 700 inpatient turnovers [data from planning and administrative unit] in a highly compact structural layout. This article outlines the effects and adaptations of a tertiary care surgical unit to the COVID19 pandemic. The adaptive response was based on national guidelines and adapting them to match local resources with weekly process reviews.

Emergency care

All emergency admissions through accident and emergency service were accepted as usual. All admissions were screened for fever, cough, possible contact history and foreign travel history at the entrance by dedicated nursing team in personal protective equipment [PPE]. Attending surgical staff were also provided with PPE following an event where a non-suspecting patient was encountered with staff having to self quarantine for 14 days. Overall lesser admissions were observed with around 60% reduction in trauma. Dividing the team in to groups and assigning duty on a roster basis minimized surgical team attending emergency care and allowed to have a buffer in case of exposure. Staff was educated regarding non-respiratory presentation of COVID19 by sharing existing literature to raise the awareness [5]. Few adaptations were undertaken with regards to the surgical management as well in order to minimize the risk of cross transmission. Acute cholecystitis and uncomplicated acute appendicitis were principally managed with intravenous antibiotics. In those requiring surgery conventional appendicectomy was offered instead of laparoscopy. A unit decision was taken to keep in line with the Intercollegiate surgical guidance recommending a CT scan of the chest for trauma and acute abdomens requiring abdominal CT [6]. Spinal anaesthesia was used more frequently for appropriate procedures to minimize the exposure during intubation.

Routine patient clinics and surgeries

Routine clinics were cancelled from the day of imposition of police curfew in the district. Patients awaiting surgeries were guided over telephone communication and those requiring regular medication were provided with their prescription medication through postal delivery. Post transplant patients were allowed to obtain the special medications through the central hospital pharmacy under special authority in consultation with the physicians. All routine surgeries were postponed indefinitely to preserve resources for the initial two weeks. A policy decision was then taken to proceed with cancer surgeries under specific local guidelines. In a dedicated theatre, each unit in the hospital was allocated a single day of the week in rotation. Personal protective equipment was recommended for all theatre staff. Endotracheal intubation was performed using a video laryngoscope to maintain distance. Preference was given to those patients that had good prognosis, lesser ASA grade and was unlikely to require ICU care for more than 5 days. With time non-malignant diseases that affect quality of life were prioritized according to the effect. Currently both renal and liver transplant surgeries of the unit have been put on hold.

Multi disciplinary team meeting

With social distancing in practice all meetings had to be cancelled. As the quality of cancer care could not be compromised the multi disciplinary team meeting was held using the social media platform Zoom® [San Jose, California]. With all necessary members participating distantly and the relevant images being screen shared the

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DOI: http://doi.org/10.4038/sljs.v38i1.8689

Figure 1. intubation of a patient for extended right hemi colectomy by an anaesthetist in PPE, using a video laryngoscope to minimize the risk of disease transmission.

meetings were as effective as usual. One added advantage was that the participation of the trainees was much higher as the online platform enabled them to participate while they were at their duty stations. It was both effective and efficient.

Endoscopy

All non-essential high-risk procedures such as endoscopies were limited to emergencies to prevent the risk of COVID19 transmission. All upper and lower GI endoscopies were performed with full PPE. It was necessary to perform UGIE in patients requiring dilatation of strictures. Endoscopic release of sigmoid volvulus and assessment of patients with high risk of colorectal cancer were the indications for some of the colonoscopies performed. Initially there were no local guidelines for high-risk procedures although the countries, which experienced the pandemic ahead of us, had published some guidance [7]. The intercollegiate guidelines were also available recommending limiting endoscopies for emergencies.

Academic activities

With the closure of Universities undergraduate academic activities were completely disrupted. As a university unit we had the responsibility to continue both undergraduate and post graduate education activities. As an experimental effort we organized an online discussion forum on Zoom involving the medical students, postgraduate trainees and consultants. A discussion session was organized every week day night with the participation of around 300 participants. The breath of the discussions spanned from surgical anatomy to operative surgery, which enabled both undergraduates and postgraduates to participate. Social media platforms were used to communicate amongst the group and to upload recorded sessions for later reference.

Figure 2. Performing colonoscopy on a patient with suspected exacerbation of ulcerative colitis by a surgeon in PPE.

Change reaction and other challenges

Resistance and agitation is a natural response to change and this was no exception. There were mixed sentiments amongst the staff regarding the response. A fragment was holding the view that it was an over reaction while the others were panicked about encountering unsuspected patients. Staff were not familiar with the use of PPE either. With local guidelines being published and staff training on 'donning and doffing' some of the anxieties were addressed.

With the implementation of curfew, on call and resident staff were faced with meal shortages. Uninterrupted meals were arranged by coordinating with the Sri Lanka Navy.

Two main issues faced during online teaching was the non-familiarity of the senior staff with the software and limited access to broadband Internet by students. With distant training programmes and collaborating with Lanka Education & Research Network [LEARN], access to Zoom has been made available free of charge through the University.

Discussion

At the time of submitting this manuscript an effective vaccine has not been developed [8] and a district wide police curfew is imposed to the Western province of the country. Districts with low incidence of COVID19 have partially returned to function. The global community is still in the process of understanding the full potential of the virus and disease spectrum. Symptoms varying from conjunctivitis to bowel necrosis and swollen toes have emerged as atypical presentations which makes it difficult to clinically screen

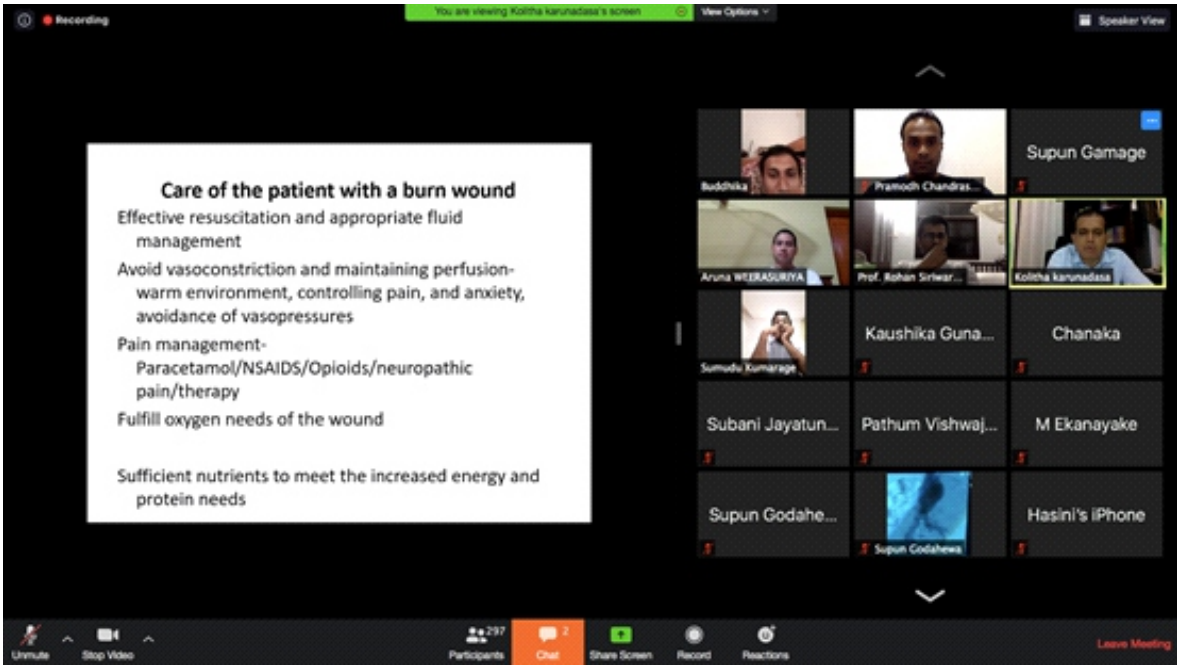

figure 3. Clinical surgery teaching session carried out using Zoom® involving medical students, postgraduate trainees, consultants and an invited lecturer for special topics in the same platform.

those infected [9]. Health care has to return to normalcy in order to prevent a post COVID19 pandemic of non-communicable diseases in the community. The idea of working with COVID19 rather than waiting for it to be eliminated is currently emerging. It will be pertinent to redesign the outpatient clinic setting to meet the requirements of social distancing. Strict practice of personal hygiene will have to be implemented across the site. These behavioural changes will require a significant financial and human resource allocation. Endoscopy and other invasive investigations will have to be restarted in order for the surgical services to be fully effective. Initial reports from China suggested fecal transmission of COVID19 [5, 10]. However, evidence is emerging from Italy, one of the hardest hit European states, that endoscopy can be performed with low risk of infection with PPE [11]. Safety of performing laparoscopic surgery is still not established although there is an absence of reported cases of this highly theoretical possibility of transmission [12]. Both malignant and benign surgical procedures will have to be performed under strict measures with minimal staff involvement and patient contact until further evidence regarding the viral transmission is available [13]. Implementation of efficient theatre turnover to minimize waiting, day surgery and enhanced recovery after surgery [ERAS] protocols will play a key role in returning to full capacity amidst COVID19. This might provide a window of opportunity to implement these, resource and time saving structures in to the local health service. Managing chronic surgical conditions such as inflammatory bowel disease, chronic pancreatitis and occlusive vascular disease will also need special attention. These patients will require multiple hospital admissions and long hospital stays. Dedicating a separate clinic, unit or a ward for the care could compartmentalize the care and prevent cross transmission. In the event of the pandemic remaining for a longer time routine testing prior to admission and preoperatively will have to be adapted [14]. Student and postgraduate teaching will have to continue through alternative methods. Using online platforms for teaching have increased globally and locally [15, 16]. Teaching theory can be continued using distant learning while students can be given an opportunity to be involved in clinical training in rotations to maximize social distancing. The government mechanism will need to subsidize the online infrastructure for undergraduate education.

Returning to 'normalcy' under present conditions will entail adapting the practice to minimize the impact of disease transmission while providing maximum care to patients. It is important to focus on psychological stress that will be experienced by both patients and staff during these testing times [17]. These adaptations will pose new challenges even for the resource rich environments until an effective vaccine is discovered and tested safe for human application [18, 19]. The special requirements will have to be taken in to consideration when allocating resources for health care and higher education.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Cucinotta D, Vanelli M. WHO Declares COVID-19 a Pandemic. Acta Biomed. 2020;91[1]:157-60. 10.23750/abm.v91i1.9397.
2. Mahase E. Covid-19: WHO declares pandemic because of "alarming levels" of spread, severity, and inaction. BMJ. 2020;368:m1036. https://doi.org/10.1136/bmj.m1036.
3. Abel T, McQueen D. The COVID-19 pandemic calls for spatial distancing and social closeness: not for social distancing! Int J Public Health. 2020. https://doi.org/10.1007/s00038-020-01366-7.
4. Lewnard JA, Lo NC. Scientific and ethical basis for social-distancing interventions against COVID-19. Lancet Infect Dis. 2020. 10.1016/S1473-3099[20]30190-0.
5. Gu J, Han B, Wang J. COVID-19: Gastrointestinal Manifestations and Potential Fecal-Oral Transmission. Gastroenterology. 2020. https://doi.org/10.1053/j.gastro.2020.02.054.
6. Li Y, Xia L. Coronavirus Disease 2019 [COVID-19]: Role of Chest CT in Diagnosis and Management. AJR Am J Roentgenol. 2020:1-7. 10.2214/AJR.20.22954.
7. Pellino G, Spinelli A. How COVID-19 Outbreak Is Impacting Colorectal Cancer Patients in Italy: A Long Shadow Beyond Infection. Dis Colon Rectum. 2020. https://doi.org/10.1097/DCR.0000000000001685.
8. Wu SC. Progress and Concept for COVID-19 Vaccine Development. Biotechnol J. 2020:e2000147. https://doi.org/10.1002/biot.202000147.
9. Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, et al. Characteristics of Ocular Findings of Patients With Coronavirus Disease 2019 [COVID-19] in Hubei Province, China. JAMA Ophthalmol. 2020. https://doi.org/10.1001/jamaophthalmol.2020.1291.
10. Nouri-Vaskeh M, Alizadeh L. Fecal transmission in COVID-19: A potential shedding route. J Med Virol. 2020. https://doi.org/10.1002/jmv.25816.
11. Repici A, Aragona G, Cengia G, Cantu P, Spadaccini M, Maselli R, et al. Low risk of covid-19 transmission in GI endoscopy. Gut. 2020. 10.1136/gutjnl-2020-321341.
12. Cohen SL, Liu G, Abrao M, Smart N, Heniford T. Perspectives on Surgery in the time of COVID-19: Safety First. J Minim Invasive Gynecol. 2020. https://doi.org/10.1016/j.jmig.2020.04.003.
13. Spinelli A, Pellino G. COVID-19 pandemic: perspectives on an unfolding crisis. Br J Surg. 2020. https://doi.org/10.1002/bjs.11627.
14. Al-Muharraqi MA. Testing recommendation for COVID-19 [SARS-CoV-2] in patients planned for surgery - continuing the service and 'suppressing' the pandemic. Br J Oral Maxillofac Surg. 2020. https://doi.org/10.1016/j.bjoms.2020.04.014.
15. Gewin V. Five tips for moving teaching online as COVID-19 takes hold. Nature. 2020;580[7802]:295-6. https://doi.org/10.1038/d41586-020-00896-7.
16. Zhou T, Huang S, Cheng J, Xiao Y. The Distance Teaching Practice of Combined Mode of Massive Open Online Course Micro-Video for Interns in Emergency Department During the COVID-19 Epidemic Period. Telemed J E Health. 2020. https://doi.org/10.1089/tmj.2020.0079.
17. Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, et al. Psychological Impact and Coping Strategies of Frontline Medical Staff in Hunan Between January and March 2020 During the Outbreak of Coronavirus Disease 2019 [COVID19] in Hubei, China. Med Sci Monit. 2020;26:e924171. https://doi.org/10.12659/MSM.924171.
18. Rowan NJ, Laffey JG. Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment [PPE] arising from Coronavirus disease [COVID19] pandemic - Case study from the Republic of Ireland. Sci Total Environ. 2020;725:138532. https://doi.org/10.1016/j.scitotenv.2020.138532.
19. Argulian E. Anticipating the 'Second Wave' of Health Care Strain in COVID19 Pandemic. JACC Case Rep. 2020. https://doi.org/10.1016/j.jaccas.2020.04.005.

The response to COVID 19: a journal of the initial institutional experience of general surgical units at the National Hospital of Sri Lanka, Colombo

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Sri Lanka is no stranger to calamities, man-made or otherwise. It has weathered a civil war of thirty years, the Boxing Day tsunami and the Easter Sunday bombings just a year ago. The country has paid a colossal price in human lives, material losses and attendant adverse socio-economic consequences. The COVID 19 pandemic, declared by the World Health Organisation (WHO) 7 weeks ago, is the latest, and probably one of the gravest challenges to the nation in general and the health services in particular.

The National Hospital of Sri Lanka (NHSL), Colombo is the largest tertiary and teaching hospital in the country with a capacity of almost 3300 beds. It comprises of eight general surgical units with 16 wards and a casualty surgical ward. The three general surgical theatre complexes serve 36 elective lists weekly from Monday to Saturday. In addition, the general surgical casualty theatre is available 24 hours and 7 days a week.

This narrative outlines the key events surrounding the re-organisation of general surgical services at the NHSL during this period. It has been a process in evolution with frequent review and re-assessment.

The fundamental principles that determined the decisions and measures taken at the NHSL were as follows:

- In the early days of the shut-down, uncertainty prevailed about the status of the NHSL with regards to care of COVID 19 patients. Rapid de-escalation of routine work provided time and space to plan for an eventual surge of ill COVID 19 patients, if such a situation arose
- This included increasing ICU or HDU capacity by identifying and designating operating theatres and contained ventilators for this purpose
- Designation and organisation of hospital infrastructure and spaces in conformity with safety recommendations and education of all HCWs on enhanced safety precautions to be taken to minimise infection and transmission
- Streamline manpower utilisation to minimise potential infection of HCWs leading to the subsequent shortage or absence of essential personnel
- Conservation and building capacity of personal protective equipment (PPE), essential drugs and surgical consumables to provide continuity of care for critically ill and emergency patients at the very least. With the subsequent designation of the NHSL as a non-COVID 19 hospital, this extended to be able to sustain cancer surgery and procedures to prevent limb or organ compromise or loss
- Institute the above while maintaining essential medical services and emergency care

The initial meeting of surgeons and anaesthetists took place on 20th March 2020. Key recommendations that were instituted in concurrence with the Director, NHSL included:

- All surgical and anaesthetic teams would work on a weekly rota basis to reduce non-essential staff
- The male and female general surgical casualty admissions will continue to ward 33 and the respective unit's female ward as before
- Diagnosed or suspected COVID 19 surgical patients to be managed in ward 31 (Christian priest ward) and ward 24 (Buddhist priest ward)
- Surgery will be restricted to urgent or emergency procedures only
- Theatre sessions to be limited to one per day i.e. from 8 am to 2 pm except under exceptional circumstances
- Only the main table will be used in all surgical theatres
- Theatre designation:
    - Operating theatres A and B (OTA & OTB) will be closed
    - All general and GI surgical units will share operating theatre D (OTD) for emergency procedures
    - Any diagnosed or suspected COVID 19 surgical patient will be operated in OTD
    - Casualty surgical theatre (GCOT) to function as normal

Subsequently, a committee appointed by the Director, NHSL proposed several recommendations with regard to conducting outpatient clinics on the 27th March 2020 (see below).

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DOI: http://doi.org/10.4038/sljs.v38i1.8690

On 3rd April, following a two-week period, surgeons and anaesthetists reviewed the situation, and recommended commencement of limited elective surgery from 6th April 2020. This was for malignancies and other surgical conditions where delay could result in significant morbidity and mortality such as organ dysfunction or limb loss.

The basis for their revised recommendation was:

- The NHSL was designated as an institution that will not cater to diagnosed COVID 19 patients and as such no such elective admissions will take place to the wards or ICUs
- A surge of COVID 19 cases, ICU admissions or resultant mortality had not been observed nationally over the past two weeks
- Anecdotal reports suggested a rise in non-COVID 19 related morbidity and probably mortality in excess of the COVID 19 cohort
- Indefinite delay could result in malignancies becoming inoperable or causing complications, in addition to the untold psychological stress and suffering from uncertainty of future care

The seven General Surgical Units, the Gastrointestinal Surgery Unit, the University Surgical Unit and the University Gynaecological Unit shared 10 theatre sessions on weekdays utilising all three theatre complexes from 8 am to 2 pm. Flexibility between units to share theatre sessions depending on case load enabled maximum utilisation of the available time.

Theatre complexes

In the initial two weeks, two general surgical theatre complexes OTA & OTB were closed. The general surgical casualty theatre (GCOT) continued to function normally. The third general surgical theatre complex (OTD) was reserved for all emergency surgery including surgery on COVID 19 suspected or confirmed patients.

Operating theatres were provided guidelines for ensuring the safety of HCWs in theatre (Supplementary 1).

Following the decision to re-start cancer surgery and other essential elective procedures each general surgical unit was allocated one theatre list per week from 8 am to 2 pm with the facility to extend if necessary. This allowed most postponed cancer procedures to be completed.

Wards & in-patient care

All non-essential admissions were curtailed from the second week of March. Most in-patients were managed and discharged on medication for up to a week, where appropriate. If required, patients were pre-registered in outpatient clinics to prescribe medication for longer periods of up to a month.

With uncertainty around the conduct of clinics, postoperative patients and others who required follow-up including wound dressings were advised to present directly to their respective wards for review.

The nursing staff in surgical wards augmented safety measures, placing hand-sanitisers at the entrance and regular intervals in the wards with clear instructions to remind staff to use them (Fig 1). In some units, nurses replaced their standard uniforms and donned theatre scrubs (Fig 2). Washbasins were placed outside surgical wards for patients and visitors to wash their hands prior to entry.

All elective and emergency admissions to surgical wards were administered a COVID 19 questionnaire (Supplementary 2) to screen for patients at high risk of infection and referral to the Infection Control Unit for a PCR test.

Outpatient clinics

Routine clinics continued to function though with a drastic reduction in patient attendance due to the curfew and the corresponding temporary closure of the VS OPD clinic. Patients who did not require urgent attention and high-risk category patients (Elderly > 60 years, immunosuppressed and those with malignancies) were discouraged from attending clinics. A proposal to issue routine medication directly from OPD pharmacies without clinic attendance was abandoned owing to concerns expressed by the pharmacists. However, arrangements were made to issue patients two months of medication on any day of the week provided it was authorised by the unit doctor. Subsequently, on a Ministry directive, medication was packed and posted to the homes of the patients. Two hotlines with WhatsApp facilities were established in surgical clinics enabling patients to contact staff and send images of their prescription.

A major concern was the lack of access to specialist surgical care for new patients in the community with potential malignant and other surgical disorders that required expedited management. This was compounded by their inherent fear of visiting hospital in the current circumstances.

In an attempt to address this, two telephone hotlines were established in the VS OPD to receive calls from the public. Communiques in all three languages were printed in state media advising those with 'red-flag' symptoms to contact these numbers for advice. Medical officers at VS OPD clinic would then be able direct them directly to the relevant surgical clinic of the day. (Supplementary 3)

Procedural guidelines

Surgery

Following the initial meeting on 20th March, guidelines based on the those advocated by the combined Royal College of Surgeons, the Association of Upper Gastrointestinal Surgeons of the UK (AUGIS) and the American College of Surgeons were adapted for the management of emergency surgery (Supplementary 4).

Based on their risk status, patients were categorised into those whose COVID 19 status was unknown or low-risk and those who were diagnosed with or strongly suspected to have COVID 19 infection. It was recommended that 'full PPE' was used for the latter group which in practice meant use of N95 respirators in addition to the standard protection kit (Fig 3).

Once the decision to re-commence cancer surgery and other essential elective surgery on 6th April 2020 was made, several measures were proposed to minimise inadvertent exposure of HCWs, especially operating theatre staff to infected patients. These included:

- Admission of patients at least 48 hours prior to surgery to observe for pyrexia and respiratory symptoms
- Completing the COVID 19 screening checklist for all surgical ward admissions
- Mandatory chest x-ray for all in-patients
- A chest CT in those obtaining an abdominal CT and those with a suspicion of pulmonary affliction
- Requesting COVID 19 PCR tests at the discretion of the surgeon or anaesthetist based on the planned procedure or patient status
- Designation of the surgical intensive care unit (SICU) for surgical critical care patients only

Endoscopy

Being a high-risk procedure for aerosol generation, routine endoscopy lists were halted. It was continued though for acute gastrointestinal bleeds, suspected malignant lesions and stenting in obstruction. ERCP lists were operated by the Gastroenterology Unit for patients who required urgent or early biliary decompression.

Laparoscopy

In keeping with the guidance issued by the joint Royal Colleges of Surgeons of the UK, AUGIS and the American College of Surgeons, laparoscopic surgery was discouraged in the interim period. Aerosolization of blood borne virus particles by the increased pneumoperitoneal pressure was the concern behind this recommendation.

The debate though on the safety of laparoscopy continues with the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the European Association of Endoscopic Surgery (EAES) endorsing its use provided appropriate safety precautions are followed. These include small port incisions to prevent leakage, minimum CO2 insufflation pressures and safe evacuation of the pneumoperitoneum via a filtration system before closure, trocar removal, specimen extraction or conversion to open.

Personal protective equipment (PPE)

To complement stocks provided by the Ministry of Health, significant quantities of protective equipment were produced on site. Polyethene overalls were sewn by members of the infection control unit, orderlies of surgical wards and theatres working together using raw material available in the hospital and donated by well-wishers (Fig 4). High quality protective visors were made by the infection control unit in addition those donated by well-wishers (Fig 5). Fluid resistant surgical face masks were made available for all hospital staff. However, availability of N 95 respirators was limited and issued to front-line high-risk staff only. Subsequent donations of N 95 respirators contributed significantly towards establishing baseline supply in theatres, casualty wards and endoscopy units to be used in high risk situations.

Prioritisation, pragmatism and education remain the cornerstones of optimal utilisation of the limited supply of PPEs and minimising wastage.

Undergraduate and postgraduate training

The NHSL, Colombo is the biggest medical undergraduate and postgraduate training centre in the country. With the advent of the COVID 19 crisis the Faculty of Medicine, Colombo was closed, and students returned home. Postgraduate surgical training too was severely curtailed with the reduction in patient numbers and the curtailment of elective surgery. However, both undergraduate and postgraduate training continues with online sessions using platforms such as Zoom.

Institutional initiative

The NHSL, Colombo has thus far exemplified a proactive, cohesive and dynamic response at institutional level to a national challenge of yet unknown dimensions within the constraints of the available resources. It has demonstrated that the coordinated efforts of clinicians, nurses, healthcare staff and administrators are capable of developing institutional guidelines and actions prior to Ministry of Health directives. This was borne out by the fact that subsequent Ministry of Health directives mirrored what was already in practice at the NHSL. There are anecdotal reports of surgical units in other hospitals also adopting the NHSL guidelines.

Figure 1. Placing hand-sanitisers at the entrance and wards with clear instructions to remind staff to use them.

Figure 2. Nurses replaced their standard uniforms and donned theatre scrubs.

Figure 3. Full PPE

Figure 4. Polyethene overalls sewn by members of the infection control unit, orderlies of surgical wards and theatres.

Figure 5. High quality protective visors made by the infection control unit

While directives and guidelines from the Ministry of Health are essential for an organised national effort, institutional guidelines facilitate their adaptation to local circumstances. This is because hospitals are heterogenous in terms of geography, accessibility, facilities, manpower, available specialities and the population catered to.

The way ahead and an exit strategy

If global and local trends are anything to go by, the medical profession at large is still struggling to size up this virus and the disease. Many unanswered questions remain with regard to the heterogeneity observed in disease prevalence, demography, presentation, morbidity and mortality. The answers probably lie in the complex interaction between factors both genetic and environmental; viral strains, host innate and adaptive immunity, population density, patterns of mobility, climate and a host of yet undetermined factors.

Nations have employed social distancing, aggressive testing, contact tracing, geospatial technology, enforcement of quarantines and national lockdowns in conjunction with capacity building of health services to tackle the crisis. The image crystallising before us hints that each nation will have to strike its own path through this crisis using these strategies in varying proportions based on their disease burden and economic realities. It is highly likely that in hindsight, the direct medical consequences this virus are likely to be dwarfed by longer lasting and more serious secondary problems.

Seven weeks since the pandemic declaration, tropical nations including Sri Lanka have been fortunate to escape the worst effects of COVID 19 ravaging Europe and the USA. While the reasons for this remain largely unknown, taking advantage of this position, tentative steps are being advanced towards an exit strategy from the lockdown.

A significant concern is the plight of patients with non-COVID surgical disorders. The true impact on this group in terms of morbidity and mortality due to delayed and suboptimal care will probably be only known much later.

With the designation of other institutions to manage COVID 19 patients, the NHSL as the largest multi-specialty tertiary healthcare institution in the country should take a leading role in providing specialist care to patients with non-COVID conditions. The guiding principles of this measured yet steady process should be the safety of HCWs and patients, capacity maintenance and enhancement and most importantly the delivery of quality surgical services expected of this institution.

Paradoxically, the advent of this crisis has also allowed for reflection of the organization and delivery of surgical services at NHSL and promises to be a stimulus for improving efficiency.

Supplementary 1:

National Hospital of Sri Lanka, Colombo
Safe Surgery in COVID – 19
Summary of Theatre Precautions

- Minimum number of staff in theatre
- Take only **one patient at a time** into theatre
- Bring minimum personal belongings into theatre –

  No wallets, watches, books, pens, keys & mobile phones
- For communication of team keep one designated mobile phone in space away from table – **wipe clean** before and after session with 70% alcohol
- Patient notes and documentation to be done in **separate room**, using a **separate pen** after completion of procedure and **cleaning hands with 70% alcohol**
- Surgeons and other HCWs not needed for intubation should remain **outside the OT until anaesthesia induction and intubation** are completed.
- Minimum required protective PPE for HCWs to include the following: **Sterile gown with long sleeves, plastic disposable apron, cap, masks and gloves**.
- Surgeons, anaesthetists and scrub nurse to use **plastic disposable long-sleeved top + apron, double gloves, fluid resistant masks, visors / goggles & boots.**
- Stop positive ventilation in theatre during procedure and for at least 20 minutes after the patient has left theatre.
- Use suction for smoke evacuation for diathermy / other energy sources.
- Patients should be **intubated and extubated within the theatre** – staff immediately present should be at a minimum.
- NG tube placement – by anaesthetists with PPE is needed.

Supplementary 2:

Screening for COVID 19
University Surgical Unit, NHSL, Colombo

Name: **Age:** **Residence:**

A	History of fever or temperature > 100.4 F	Yes	No
B	Presence of cough, breathlessness or sore throat (any one)	Yes	No
C	Returning to SL from any country within last 14 days or history of travel to or residence in a location designated as a high transmission area of COVID 19 within last 14 days of symptom onset.	Yes	No
D	History of close contact with a **confirmed or suspected** COVID 19 patient during last 14 days or prior to symptoms	Yes	No
E	Presence of severe acute pneumonia or presence of fever with respiratory distress (RR > 30/min, Spo2 < 90%), regardless of travel or contact history as decided by treating consultant.	Yes	No

Clinically suspected case:

1. Presence of A + B + C
2. Presence of B + D
3. E (Not explained by any other aetiology*)

Supplementary 3:

Notice to patients

Are you concerned about some new symptoms?

Would you like to contact a doctor?

The doctors at the National Hospital of Sri Lanka (NHSL), Colombo are available to take your call and advise you on what to do next

Are you over 40 years?

and / or

Have you recently noticed one or more of the symptoms below?

- Difficulty in swallowing
- Continuous vomiting
- Loss of appetite
- Weight loss
- Worsening tiredness, lack of energy
- Blood in your stools
- Tarry coloured stools
- Constipation
- Jaundice / yellow discoloration of your eyes
- Worsening abdominal pain
- Swelling of your tummy
- Lump in the breast
- Lump in the neck
- Lumps in the armpit or groin
- A smoker or diabetic with a painful foot or infected wound
- Or another symptom that is worrying you

Call: 011 361 8724 or 076 818 5157

and speak to a doctor between 8.00 am to 1.00 pm from Monday to Saturday.

The Director
NHSL

Supplementary 4:

COVID-19 Guidelines for Surgical Care at NHSL, Colombo

General Principles

1. Emergency surgery

- COVID-19 should be sought in any patient needing emergency surgery by,
  - History – symptoms (fever, cough, sore throat, anosmia) contact, travel
  - Chest X ray (CT chest if possible)
  - Any patient undergoing abdominal CT to also have a chest CT scan
  - Treat all as potential COVID-19 positive

2. **Urgent planned surgery**

- Must be assessed for COVID-19 as above.
- Greater risks of adverse outcomes factored into planning and consent.
- Consider stoma formation rather than anastomosis.
- Maximum protective gear (PPE if available) should be used for laparotomy except when the patient is convincingly negative for COVID-19.
  - Note that current tests include false negatives
  - Full PPE includes visors or eye protection

3. **Laparoscopy**

- Best avoided until further recommendations are issued
- Only in selected cases where clear benefits overide risks in current context (mortality & morbidity)

4. Theatre Precautions

- Minimum number of staff in theatre.
- Bring no / minimum personal belongings into theatre – no wallets, watches, books, pens keys & mobile phones
- For communication of team keep one designated mobile phone in space away from table – wipe clean before and after session with 70% alcohol
- Patient notes and documentation to be done in separate room, using a separate pen after completion of procedure and cleaning hands with 70% alcohol
- Surgeons and other HCWs not needed for intubation should remain outside the OT until anaesthesia induction and intubation are completed.
- Minimum required protective PPE for HCWs to include the following: sterile gown, plastic disposable apron, cap, masks and gloves and covered footwear.
- Surgeons, anaesthetists and scrub nurse to use double gloves and visors.
- Stop positive ventilation in theatre during procedure and for at least 20 minutes after the patient has left theatre.
- Use suction for smoke evacuation for diathermy / other energy sources.
- Patients should be intubated and extubated within the theatre – staff immediately present should be at a minimum.
- Approaching a coughing patient: protection including eye shield is needed.
- NG tube placement – by anaesthetists with PPE.

5. Endoscopy

- Only emergency endoscopic procedures for acute bleeds should be performed.
- Upper GI procedures are high risk and full PPE must be used.

Specific Conditions

1. Acute Haemorrhoidal Thrombosis / Necrosis

- Most can be managed non-operatively.
- Emergency procedures should be reserved for significant bleeding & severe disease or failed non-operative measures.

2. Perianal or Perirectal Abscess

- May be managed with incision and drainage with local anaesthesia (LA)
- Otherwise incision and drainage (I&D) under spinal anaesthesia (SA)

3. Soft Tissue Infections

- Superficial & localized abscess - manage with I&D with LA or wide bore needle aspiration
- Large abscess / intra-muscular extension / necrotizing infection - drainage & debridement in the OT under SA > general anaesthesia (GA).

4. Acute Pancreatitis with Necrosis

- The "step up" approach is recommended which includes:
  - Percutaneous drainage
  - Endoscopic debridement or by interventional radiological techniques
    (note that interventional radiology techniques may be preferred in COVID positive patients due to risk of aerosolization with endoscopy)
  - Open operative drainage if no other option available

5. Pneumoperitoneum, Intestinal Ischemia, Intestinal Obstruction

- Should proceed with emergency open surgery.
- Small bowel obstruction secondary to adhesions: Non-operative management according to the usual practice.

6. Appendicitis, Uncomplicated

- IV antibiotics followed by transition to oral antibiotics.
- Duration of hospital stay should be weighed against the use of OT resources in this circumstance and should be based on surgeon judgment.

7. Appendicitis, Complicated

- Can be managed per usual practice.
- IV antibiotics until clinically improving, followed by transition to PO antibiotics.
- Defined abscess should undergo percutaneous drainage.
- Evidence of perforation may be managed with percutaneous drainage or open surgery based on patient condition.
- Failed non-operative management should proceed to open surgery.

8. Choledocholithiasis

- Without signs of cholangitis may be managed expectantly.
- For those with worsening jaundice who fail to spontaneously pass their stone do endoscopic

retrograde cholangiopancreatography (ERCP) with sphincterotomy.

- Elective cholecystectomy is delayed.

9. Acute Cholecystitis

- Conservative management with antibiotics
- Failure to improve on antibiotics and worsening signs of sepsis should undergo USS guided percutaneous cholecystostomy

10. Cholangitis

- Broad spectrum antibiotics and appropriate resuscitation.
- Those who fail to clinically improve and those with severe sepsis, urgent ERCP and sphincterotomy is indicated
- Elective cholecystectomy is delayed

11. Diverticulitis

- Uncomplicated diverticulitis: IV antibiotics with transition to oral antibiotics.
- Diverticular abscess: IV antibiotics +/- percutaneous drainage depending on response
- Generalised peritonitis with diffuse pneumoperitoneum – open surgery.
- Failed non-operative management – move to open surgery

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Joint guidance issued by the joint Royal Colleges of Surgeons of the UK, AUGIS
https://www.rcseng.ac.uk/coronavirus/joint-guidance-for-surgeons-v2/
4. Guidelines on Surgery during COVID 19 by the American College of Surgeons
https://www.facs.org/covid-19/clinical-guidance

CASE REPORT

A new born with anterior urethral diverticulum and posterior urethral valve

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Keywords: Anterior urethral diverticulum; posterior urethral valve; newborn; ureterostomy; urethrostomy

Introduction

The presentation of posterior urethral valve (PUV) and anterior urethral diverticulum (AUD) or valve (AUV) is rare and few cases reported in current literature. Both congenital anomalies lead to bladder outlet obstruction. Therefore, early surgical interventions to prevent further renal damage and renal failure are needed. The association of the PUV and AUD fits the theory of a wide spectrum of mesenchymal defects including megalourethra.

Case presentation

A newborn baby was transferred from the peripheral hospital for further management of posterior urethral valve and bulge at the penoscrotal junction. Antenatal history revealed that anomaly scan identified bilateral hydronephrosis and hydroureter with suspected PUV. During the neonatal examination, a bulging was noted at the site of the penoscrotal junction with a poor stream of urine and palpable bladder with ballotable kidneys. Consequently, blood examinations revealed high serum creatinine 280-300mg/dl while other blood reports were normal.

Furthermore, the ultrasound scan showed bilateral hydronephrosis and hydroureter with suspected PUV and due to rising serum creatinine with reduced urine output suprapubic cystostomy was performed on 6 days of age. However, reduced urine output was noted from the suprapubic catheter and as a result, bilateral ureterostomy was performed at 14 days of age to relieve the obstructive uropathy. Moreover, antegrade cystourethrogram was arranged after ureterostomy creation. It revealed the AUD at the bulbar urethra, posterior urethral valve and vesicoureteric reflux on both sides (Figure. 1).

Subsequently, the serum creatinine level was reduced to normal and at the same time, there was pus discharge through the urethra from the infected AUD. As a result, urethrostomy was created over the AUD at day 26 of age (Figure. 1). Thereafter, there was no evidence of urinary tract infection and serum creatinine level was normal(48mg/dl) up until the age of one when cystoscopic guided posterior urethral valve ablation (Figure. 2) and ureterostomy closure was done. Excision of the AUD and repair of the urethra will be done later.

Discussion

Lower urinary tract obstruction in children can occur due to AUV or diverticulum or posterior urethral valve. It can be presented an isolated entity or together with a proximal diverticulum; illustrating the spectrum of the disease [1].

AUD may occur without AUV as seen in our case. PUV is the main cause of bladder outlet obstruction in children. The association of PUV with anterior urethral valve (AUV) is uncommon. In this case, the posterior urethral valve and anterior urethral diverticulum were diagnosed/presented at birth.

Various proposed hypotheses have been described which can range from "an abortive attempt at urethral duplication, failure of alignment between the proximal and distal urethra, imbalanced tissue growth in the developing urethra leading to a remnant of excess tissue acting as a valve and congenital cystic dilatation of periurethral glands leading to a flap-like valve (1)". AUVs can occur at the level of the bulbar urethra (40%), pendulous urethra (30%) and penoscrotal junction (30%) [1]. Our patient showed no evidence that AUV is the cause of diverticulum. PUV occurs at the level of the verumontanum (membranous urethra).

The observed clinical manifestation is dependent on the age of the patient and the degree of obstruction, which increases the variability in the manifestation. It may present with bilateral hydronephrosis and hydroureter. Additionally, voiding cystourethrogram (VCUG) can also show a dilated urethra with abrupt calibre change or ending in a smooth bulge [2].

VCUG serves as the diagnostic modality in the diagnosis of AUV. It can reveal a urethral calibre change such as the dilated or elongated posterior urethra, dilatation of the anterior

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https://orcid.org/0000-0003-1657-997X
DOI: http://doi.org/10.4038/sljs.v38i1.8665

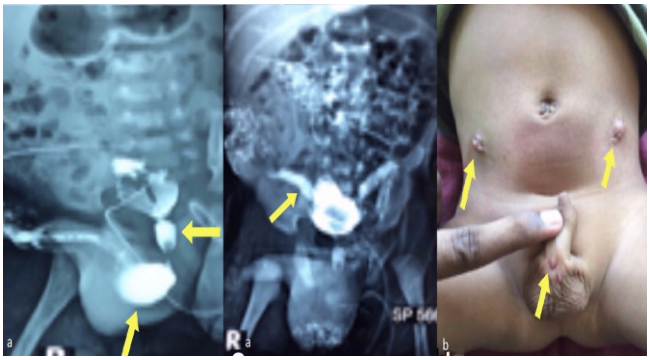

Figure 1 a. Antegrade CUG shows posterior urethral valve and anterior urethral diverticulum and B/L VUR

Figure 1 b. Bilateral ureterostomy and urethrostomy over anterior diverticulum

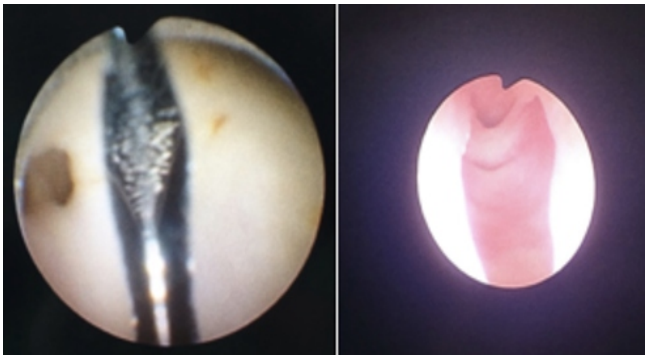

Figure 2. Cystoscopic views of posterior urethral valve and anterior urethral diverticulum

urethra, and urethral diverticulum. Apart from these it shows thickened trabeculated bladder, a hypertrophied bladder neck and vesicoureteric reflux (VUR) [2]. In our case, the patient had bladder outlet obstruction and bilateral reflux with renal impairment. Therefore, the patient had suprapubic cystostomy and bilateral ureterostomy. Cystourethroscopy is beneficial in confirming the diagnosis which would precede the treatment that comprises of the destruction of the AUV and PUV by electrocautery or by a resecting hook [3].

In our case, cystourethrogram and cystourethroscopy led to diagnosis and resection of the posterior urethral valve and urethrostomy was done for anterior urethral diverticulum which needs excision later. To prevent further renal damage, infection and vesicoureteral reflux [4], it is very important to diagnose this rare condition earlier in order to efficiently manage it.

Conclusion

Our baby presented with a bulge at the penoscrotal junction and bladder outlet obstruction at birth with renal impairment. Suprapubic cystostomy was performed to relieve obstruction and antegrade cystourethrogram had confirmed AUD and posterior urethral valve with bilateral reflux. These rare presentations were managed simultaneously. Therefore, VCUG is the diagnostic modality in bladder outlet obstruction in newborn.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Jai Prakash, Divakar Dalela, Apul Goel. Congenital anterior urethral valve with or without diverticulum: A single-centre experience. J Pediatr Urol.2013; 9; 1183–1187. https://doi.org/10.1016/j.jpurol.2013.05.006
2. Jitendra P. Parmar, Chander Mohan, Maulik P. Vora. Anterior Urethral Valve: A Rare But an Important Cause of Infravesical Urinary Tract Obstruction.Polish Journal of Radiology; 2016;81: 209–211. https://doi.org/10.12659/pjr.896230
3. Tran CN, Richard CA, McMahon D, Rhee A. Anterior urethral valve associated with posterior urethral valves: report of 2 cases and review of the literature. Journal of urology; 2014;84(2): 469-71. https://doi.org/10.1016/j.urology.2014.04.034
4. Kajbafzadeh M A, Jangouk P, Ahmadi Yazdi C. Anterior urethral valve associated with posterior urethral valves. Journal of paediatric urology; 2015; 1 (6): 433-435. https://doi.org/10.1016/j.jpurol.2005.05.007

Learning Points:

- There were few reported cases in the literature with posterior urethral valve and congenital anterior urethral valve but there are no reported cases of AUD and PUV in literature.
- Even though it is rare, the possibility of the posterior urethral valve in association with anterior urethral diverticulum should be considered in differential diagnosis whenever a neonate presents with bladder outlet of obstruction.
- In this case, the emergency and subsequent long term management of both pathologies, while safeguarding renal function, is a challenge.

CASE REPORT

Paget's disease of the penis and scrotum mimicking cutaneous metastatic lesion from gastrointestinal or genitourinary tract adenocarcinoma

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Keywords: Extramammary Paget's disease; cutaneous metastasis of adenocarcinoma; penoscrotal

Introduction

Extramammary Paget's disease (EMPD) is an uncommon, slow-growing intra-epithelial adenocarcinoma. It normally occurs at areas rich with apocrine glands of the perineum, vulva, axilla and male genitalia including penis and scrotum.

EMPD of the penis and scrotum was first reported by Crocker Radcliffe in 1889. It is predominantly common amongst elderly individuals but due to its rarity, the incidences are relatively unknown [1]. These lesions are usually presented as non-specific erythematous, eczematous or circular lesions with pruritus and pain.

Here, we present a primary EMPD patient with nodular growth in penis and scrotum, having the background of erythematous lesion of the left penoscrotal region. The initial biopsy suggested an adenocarcinoma of the uncertain primary which warranted further investigations before definitive surgical resection of EMPD.

In this case report, we intend to highlight the importance of early referral for a biopsy and the challenges of management.

Case presentation

A 70-year-old male, presented with an erythematous skin lesion and painless mass over left scrotum and penis for 2 months. He had no history of weight loss or a family history of malignancy. The clinical examination revealed a 4cm x 5cm fungating, exophytic, nodular, yellowish with areas of necrotic patches at the left penoscrotal junction.

The lesion extended to the left foreskin which was reddish and nodular. There was erythematous skin involvement over the left hemi-scrotum (Figure 1). There was no significant palpable inguinal lymphadenopathy and no testicular mass, pleural effusion or abdominal mass.

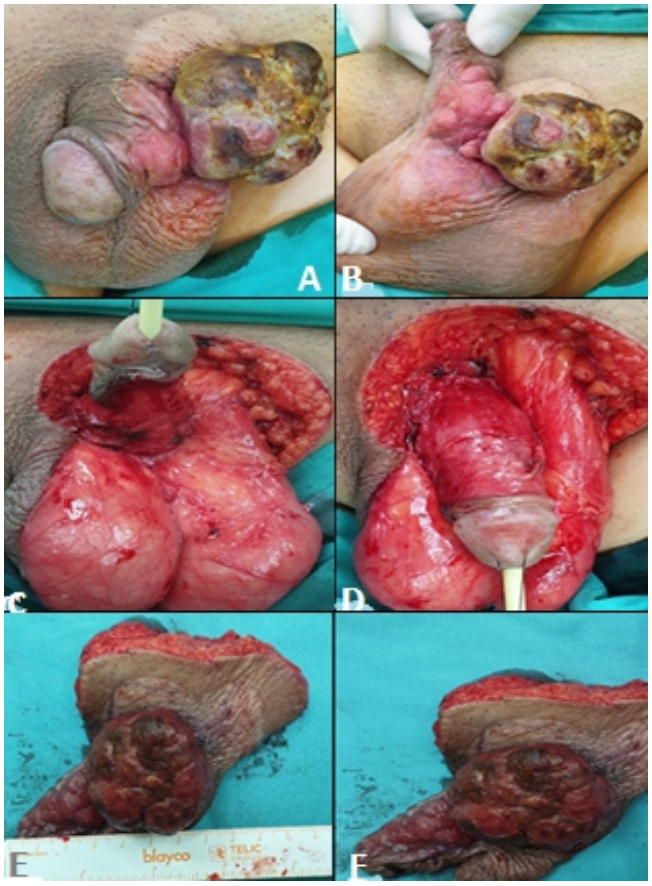

Figure 1A & 1B. Anterior and left lateral aspect of the penoscrotal lesion where there is a fungating, exophytic, nodular, and yellowish with area of necrotic patches with extension of nodular reddish lesion to the left foreskin. There is also erythematous skin involvement of the left hemi-scrotum.

Figure 1C, 1D. Appearance of the genital region after the wide local en-bloc excision.

Figure 1E, 1F. The wide local excision specimen of the left penoscrotal lesion measuring 4cm in length and 5cm in height.

The biopsy from the penile and scrotal lesion revealed, adenocarcinoma of unknown origin with possible primaries of gastrointestinal, genitourinary tract or primary skin adnexal. The atypical cells proliferation within the epidermis and in areas at the dermo-epidermal junction with increased mitosis. The tumour cells displayed moderate pleomorphism

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Figure 2 A, B, C. Post-operative picture at day 5 revealed good graft take for the scrotal advancement flap and split skin grafting.

and abundant pale cytoplasm. The immunohistochemistry stain revealed mucin positive, CK7, EMA and CEA positive, but negative for CK 20.

The contrast-enhanced computed tomography (CECT) of the neck, thorax, abdomen and pelvis revealed no primary lesions or visceral metastasis while the cystoscopic examination revealed no abnormality in the bladder and urethra.

Wide local excision of the left penoscrotal lesion was performed with scrotal advancement flap and split-thickness graft (SSG) (Figure 1). The skin graft healed on subsequent follow up (Figure 2).

The final histopathological report presented, ulcerated surface with areas of malignant epithelial cells involving the dermis with the presence of lymphovascular invasion and skin adnexa. The intracytoplasmic mucin was PAS-positive.

The malignant cells were tested positive for CK7, CEA and focally positive for GCDFP, p63 and p40 and negative for CK20, CDX2 and PSA. The adjacent epidermis showed intraepidermal Paget's disease with prominent nucleoli and pale eosinophilic cytoplasm with clear margins

Discussion

Extramammary Paget's disease usually occurs in the age group of 60-80 years old with the highest incidence at the age of 65 years. The current case fits the age profile similar to other reported publications of cutaneous metastatic adenocarcinoma of unknown primary [2].

EMPD can be either primary or secondary. Primary EMPD is the common form where an intraepithelial neoplasm originates within the epidermis and apocrine glands. It is not associated with a distant malignancy.

However, it progresses slowly to an invasive or metastatic tumour over time [1]. On the other hand, secondary EMPD develops from the epidermotropic spread of malignant cells from an underlying adenocarcinoma from the dermal adnexal glands or nearby organs to the lesions usually the genitourinary or gastrointestinal tract [3].

Although the secondary EMPD in the penoscrotal region is low, most often it arises from genitourinary [4].

This is excluded in our case by cystoscopy examination.

The final histopathological report revealed the lesion stained positive for CK7 and negative for CK20 which concludes that this is a primary EMPD. Usually, secondary EMPD would stain positive for CK7 and CK20 but CK20 positivity is not specific for secondary EMPD [3, 4].

Usually, primary lesions of EMPD presents in a non-specific manner. Its typical presentation is a well-demarcated, erythematous plague lesion with additional features of ulceration or bleeding.

Patients can be completely asymptomatic or may have pruritus, pain or burning [1]. When the perineum lesion is associated with nodular growth, it may mimic cutaneous metastasis from adenocarcinoma of the genitourinary tract or gastrointestinal system [2].

This difficult clinical differentiation was observed in this current case. Hence, appropriate cystoscopy and contrasted computed tomography scan were performed.

Other lesions that may mimic EMPD include various dermatitides. This has caused the delay of diagnosis with a median to the diagnosis of 2 years from the onset of symptoms [5]. Such delay may influence the survival as 10% of primary EMPD may have nodal involvement which had worse survival of 0 to 24% at 5 years [1]. As up to 30% of EMPD associated with an underlying malignancy, identify this tell-tale sign early may potentially cure the underlying adenocarcinoma before it is advanced.

The gold standard treatment of EMPD is wide local excision (WLE). The dilemma faced by many surgeons after WLE is the high recurrence rates which can range from 31% to 61%. The reason behind this is because EMPD usually presents as a multifocal growth with subclinical extension into normal-appearing skin. As a result, the surgical resection margins may be compromised and leading to a higher recurrence rate.

Accepted surgical margin recommendations are about 1 to 5cm which is acceptable in this patient as the deep margin is 1.3cm away from the malignant cells. To overcome the difficulty in obtaining a clear surgical margin, techniques like frozen section analysis and Mohs micrographic surgery (MMS) have been employed.

For frozen section, results are contradicting where studies have shown that there is no association between margin status and recurrence rates. MMS seems to offer the ultimate margin control where it can observe nearly 100% of the margin [1].

Conclusion

EMPD is a rare disease which can be primary or secondary within a wide range of malignancy. When there is atypical growth, it may mimic a cutaneous metastatic lesion from gastrointestinal or genitourinary adenocarcinoma. Early referral for biopsy and workup to exclude secondary EMPD or cutaneous metastasis are essential before advancing to visceral malignancy.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Simonds RM, Segal RJ, Sharma A. Extramammary Paget's disease: a review of the literature. Int J Dermatol. 2019 Aug;58(8):871-9. https://doi.org/10.1111/ijd.14328
2. Junqueira ALA, Corbett AMF, de Oliveira Filho J, Nasser K da R, Haddad NN, Tebet ACF. Cutaneous metastasis from gastrointestinal adenocarcinoma of unknown primary origin. An Bras Dermatol. 2015;90(4):564-6. https://doi.org/10.1590/abd1806-4841.20153175
3. Perrotto J, Abbott JJ, Ceilley RI, Ahmed I. The role of immunohistochemistry in discriminating primary from secondary extramammary Paget disease. Am J Dermatopathol. 2010 Apr;32(2):137-43. https://doi.org/10.1097/DAD.0b013e3181b71481
4. Ekwueme KC, Zakhour HD, Parr NJ. Extramammary Paget's disease of the penis: a case report and review of the literature. J Med Case Reports. 2009 Jan 6;3:4. https://doi.org/10.1186/1752-1947-3-4
5. Isrow D, Oregel KZ, Cortes J, Gomez H, Milikowski C, Feun L, et al. Advanced Extramammary Paget's Disease of the Groin, Penis, and Scrotum. Clin Med Insights Oncol. 2014 Jul 6;8:87-90. https://doi.org/10.4137/CMO.S13107

Learning Points:

- Extramammary Paget's disease may present with erythematous, eczematous skin lesion at the penoscrotal region.
- Any non-healing lesion in this region should warrant early urology referral for biopsy.
- Clinical assessment with appropriate imaging workups such as axial computed tomography or endoscopic examination is essential to exclude primary malignancy from the genitourinary system or anorectum.
- Complete surgical excision with a clear margin and appropriate skin cover with a local flap may achieve cure.

CASE REPORT

Rare presentation of benign idiopathic pneumatosis cystoides intestinalis mimicking colonic polyposis

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Keywords: Pneumatosis; cystoides; intestinalis; endoscopy colectomy

Introduction

Pneumatosis cystoides intestinalis (PCI) refers to the presence of air within the submucosal or the subserosal layers of the intestine. It is an uncommon condition usually secondary to other primary intestinal or extraintestinal pathologies [1].

Primary or idiopathic PCI is a rare condition that accounts for only less than 15% of all the reported cases [2]. Although Idiopathic PCI can present with or without related intestinal symptoms, the literature review showed that most of the reported cases have presented with symptoms [2–5].

Even though there are several Idiopathic PCI cases reported in world literature, we could not find a case originating from Sri Lanka. Here we are reporting a patient with Idiopathic PCI that mimicked colonic polyposis.

Case presentation

A 66-year-old male patient presented to the surgical clinic with a lump at the anus. There were no other Colorectal symptoms and he did not have any family history of colorectal cancer or polyposis syndromes. The patient did not have any co-morbidities and he was not on any long-term drugs. Proctoscopy examination revealed second degree haemorrhoids.

He underwent a screening flexible sigmoidoscopy as per the unit protocol before treatment of the haemorrhoids. Flexible sigmoidoscopy revealed multiple polypoidal lesions situated at the splenic flexure region. Subsequently, he underwent a colonoscopy which revealed multiple polypoidal lesions (>50) ranging from 5mm to 20mm (figure 1) located very close proximity to each other from mid transverse colon up to the proximal descending colon. Rest of the colon up to caecum was unremarkable.

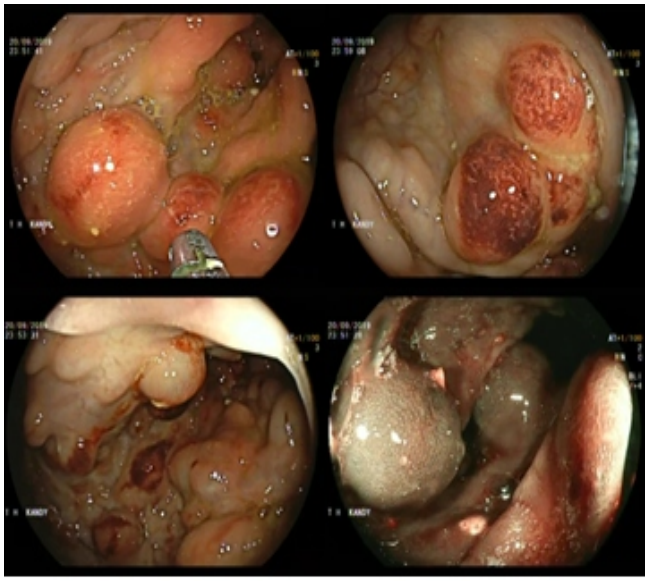

Figure 1. Multiple polypoidal lesions seen in endoscopy. Right lower image is a blue light endoscopy (BLI) image showing normal vascular pattern as the adjacent bowel

Further endoscopic examination of the polyps with Blue Light Endoscopy (BLI) was in favour of benign polyps.

Multiple biopsies were taken and one of the larger polyps were taken for histology by snare polypectomy. Histology reports from endoscopic samples revealed a benign tubular adenoma with low-grade dysplasia. Computed Tomography was not done due to a long waiting list.

As there were concerns of possible sampling error due to a large number of polyps and future risk of malignant transformation, we decided to go ahead with a left side hemicolectomy to remove and assess the affected bowel segment. The patient underwent a laparoscopic assisted left hemicolectomy. Splenic flexure, distal transverse colon and descending colon were mobilized and delivered though a mini laparotomy incision to assess the extent of the resection required. Involved bowel segment was resected completely followed by colo-colic anastomosis. The patient had a smooth post-operative recovery.

On the histological evaluation of the surgical specimen, cut sections showed air filled circumscribed polypoidal lesions ranging from 8mm to 15mm located mainly in the submucosa.

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Figure 2. Surgical specimen opened longitudinally. Arrow at the distal resection margin which is well away from mucosal lesions.

Overlying mucosa showed mild architectural distortion. The lamina propria was seen to be oedematous and containing a chronic inflammatory cellular infiltrate. But there were no granulomata or any evidence of dysplasia or malignancy. The histological appearance was consistent with pneumatosis cystoides intestinalis.

Discussion

The first account of PCI appeared in French literature by Duvernoy in 1754 [6]. A number of reported cases have since then increased owing to increasing numbers of imaging investigations of the abdomen [1].

PCI should be thought of as a sign rather than a disease itself as it can be associated with life threatening causes and the patient should be carefully evaluated to identify the underlying cause. When the cause is apparent on the evaluation of the patient, it is categorized as secondary PCI which accounts for about 85% of the cases [2]. Secondary PCI can be secondary to life threatening conditions such as intestinal ischaemia, bowel obstruction, fulminant colitis, toxic megacolon, immunosuppression following organ transplantation, mesenteric vascular disease and trauma. In these situations, prompt surgical intervention is needed.

Idiopathic PCI accounts for about 10% to 15% of the cases where a cause is not apparent on further evaluation of the patient [1]. It is a benign condition which is not life threatening, thus a more conservative approach is suggested in the initial management of this condition. Even though some authors have suggested that the severity of idiopathic PCI can not be assessed based on the radiological studies, generally extensive bowel involvement, presence of portal venous gas and free peritoneal air suggests severe disease. Literature shows several instances where even pneumoperitoneum due to benign PCI have been treated successfully with conservative measures [4]. But such patients need to be carefully observed for any deterioration that would require prompt surgery.

Conservative methods of treatment include observation, hyperbaric oxygen therapy, endoscopic fine needle aspiration and antibiotic therapy. Some authors have suggested hyperbaric oxygen therapy to be the most effective means of treating benign PCI. It works by increasing the concentration of oxygen in the cyst space allowing other gases to diffuse out of the cyst and eventually collapsing the cystic space. Endoscopic fine needle aspiration aims to puncture the cyst allowing the cyst to collapse [2]. But it is associated with increased risk of infection and occasionally associated with bowel perforation as well [2].

Endoscopic diagnosis of PCI is rare as the polypoidal appearance of the lesions often misleads the endoscopist as in this case. Endoscopic ultrasound is necessary to come to an accurate endoscopic diagnosis. If the suspicion arises during the endoscopy of PCI, a CT (Computed Tomography) scan would be required to confirm the diagnosis.

We failed to come to an accurate pre-operative diagnosis mainly due to being misled by the endoscopic appearance and the initial biopsy report which suggested low grade dysplasia which was suggestive of an adenomatous lesion. Most likely the architectural changes due to inflammatory changes (as seen the final pathology report) may have led to the interpretation of initial biopsy samples as having low grade dysplasia.

Conclusion

This experience highlights the importance of having PCI as a differential diagnosis when assessing polypoidal lesions in endoscopy. It also emphasises the value to endoscopic ultrasound in evaluating such lesions. An accurate pre-operative diagnosis could have been made if the CT scan was available, thereby a less invasive treatment could have been offered to the patient.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Ho LM, Paulson EK, Thompson WM. Pneumatosis Intestinalis in the Adult: Benign to Life-Threatening Causes. Am J Roentgenol [Internet]. 2007 Jun 1 [cited 2020 Jan 11];188(6):1604–13. https://www.ajronline.org/doi/full/10.2214/AJR.06.1309
2. Ling F, Guo D, Zhu L. Pneumatosis cystoides intestinalis: a case report and literature review. BMC Gastroenterol [Internet]. 2019 Nov 6 [cited 2020 Jan 11];19(1):176. https://doi.org/10.1186/s12876-019-1087-9
3. Peter SDS, Abbas MA, Kelly KA. The Spectrum of Pneumatosis Intestinalis. Arch Surg [Internet]. 2003 Jan 1 [cited 2020 Jan 11];138(1):68–75. https://doi.org/10.1001/archsurg.138.1.68

4. Brill SE, Skipworth J, Stoker DL. Conservative Management of Pneumatosis Intestinalis and Massive Pneumoperitoneum in the Acute Abdomen: A Case Report. Ann R Coll Surg Engl [Internet]. 2008 Mar [cited 2020 Jan 11];90(2):W11–3. https://doi.org/10.1308/147870808X257193

5. Jacob T, Paracha M, Penna M, Arul D, Wilson J. Pneumatosis Coli Mimicking Colorectal Cancer. Case Rep Surg [Internet]. 2014 [cited 2020 Jan 11];2014. https://doi.org/10.1155/2014/428989

Learning Points:

- Importance of having pneumatosis cystoides intestinalis as a differential diagnosis when assessing polypoidal lesions in endoscopy.
- Value of multiple modalities of imaging in assessing endoscopically detected lesions when in doubt.
- Feasibility of using conservative methods of treatment including observation, hyperbaric oxygen therapy and endoscopic fine needle aspiration in treating pneumatosis cystoides Intestinalis.

CASE REPORT

Multiple splenic artery aneurysms causing sinistral portal hypertension

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Keywords: Splenic artery aneurysm; portal hypertension; splenectomy

Introduction

Sinistral (left sided) portal hypertension is defined as a syndrome develops from splenic vein thrombosis due to primary pancreatic pathology. Splenic artery aneurysm (SAA) causing this type of portal hypertension is very rare and is due to aneurysm compressing the splenic vein. We present a case of a 58-year-old female with multiple giant splenic artery aneurysms causing left sided portal hypertension. She was successfully treated with aneurysm-ectomy with splenectomy.

Case presentation

A 58-year-old female presented with the history of on and off upper abdominal pain of 3 months duration. This pain was not related to the meal. She didn't have any history of hematemesis or melena. On examination, she had moderate splenomegaly and no evidence of ascites or stigmata of chronic liver cell disease. Complete blood count revealed her platelet count was 60 000 dl and Haemoglobin was 8g/dl. Her liver function test was normal. Ultrasound scan showed normal liver echotexture with cavernous transform-ation in the portal vein with moderate splenomegaly. Contrast-enhanced CT abdomen revealed multiple splenic artery aneurysm involving the mid and distal part of the splenic artery ranging from 3- 7cm with splenic vein thrombosis and moderate splenomegaly. (Figure 1)Her screening test for hepatitis B and C was negative and serum ferritin was within the normal range. Grade I oesophageal varices with evidence of portal gastropathy was found in the upper gastrointestinal endoscopy.

As she was symptomatic and her aneurysms were >2cm, we decided to offer her surgery. Routine vaccination was given 2 weeks prior to the surgery and haematology opinion was sought out regarding the timing of platelet transfusion. We performed laparotomy with left sided L shape incision and

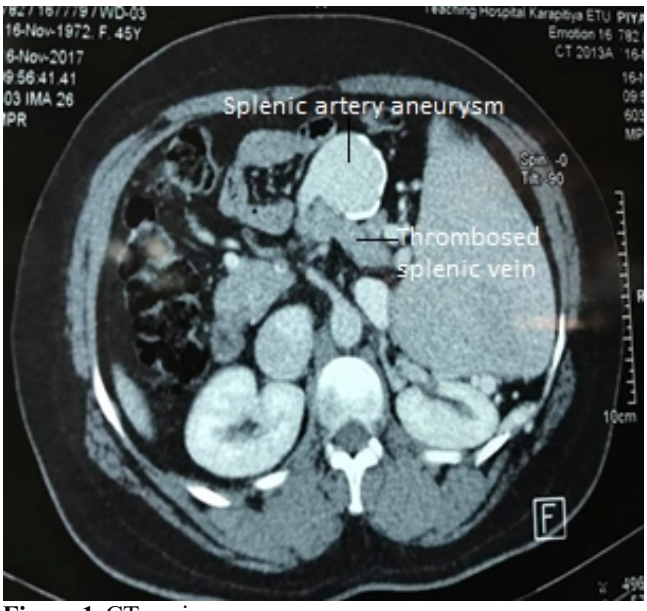

Figure 1. CT angiogram

accessed into the lesser sac. There were multiple SAA found in the mid and distal part of the splenic artery. (Figure 2)In the lesser sac, we ligated the splenic artery proximal to the aneurysms and transfused with 5 units of platelets followed by aneurysmectomy and splenectomy. (Figure 3) The patient had an uneventful recovery and was discharged on day 05.

Figure 1. Intraoperative picture

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Figure 3. Multiple aneurysms

Discussion

Even though the splenic artery aneurysms (SAA) are the most common cause for visceral artery aneurysms the incidence of SAA is rare. The reported annual incidence ranges from 0.01 – 0.2%. It is the third common intra-abdominal aneurysm after aorta and iliac arteries and it affects females commonly. Usually, at presentation SAA measures about 2.1cm and rarely presents with the diameter above 3.1cm. Giant aneurysms are generally defined as the diameter >5cm [1].

About 80% of the SAA presents asymptomatically so detected incidentally in imaging. But some patients might present with upper abdominal pain as in our patient. Sometimes it can present as rupture or erosion into adjacent structures [2]. But SAA causing sinistral portal hypertension is rare. This is due to the aneurysmal mass effect compressing the splenic vein causing stasis and thrombosis. There are only a few case reports reported in the literature. There are case reports of extrahepatic portal hypertension caused by single SAA [3], but multiple giant SAA causing this extrahepatic portal hypertension is very rare. Our case is unique because she had portal hypertension, besides it was caused by multiple giant SAA. We arrived at a diagnosis of extrahepatic portal hypertension because in liver imaging the echotexture of the liver was normal, liver function tests were within normal range and more than this there was evidence for splenic vein thrombosis in the CT images.

The main concern for the surgeons is when to treat the SAA. Rapidly enlarging, symptomatic or ruptured aneurysms require intervention without any doubts. There is no clear guideline for the size for asymptomatic SAA, but the common consensus is >2cm [4]. The lack of consensus in the management of asymptomatic small <2cm aneurysms might be due to the lack of case series due to rarity of this aneurysm. Lakin RO et al in their series recommends serial imaging or even discharge of asymptomatic < 2cm SAA because of negligible risk of rupture [4].

One form of intervention was required for our patient because of the size and symptoms. The options available were either endovascular or open surgery. Endovascular options are transcatheter coil embolization, thrombin injection or covered endovascular stents. Injection methods can be used for narrow neck saccular aneurysms or the distal aneurysms. Stents are useful in the proximal aneurysms with spared distal artery. Even though the mortality rate is less compared to open surgery, the success rate is around 85% [5]. Our case is not suitable for either because it is giant involving proximal and distal part and caused mass effect.

Open surgical procedures may be aneurysm resection and reconstruction or aneurysmectomy combined with splenectomy. We had to do splenectomy because of the same reasons, aneurysms were involved in both proximal and distal arteries.

Conclusion

Even though SAA are the common visceral artery aneurysms, the incidence is rare. Left sided portal hypertension is usually caused by pancreatic pathology, but SAA also can cause it. Timely and planned surgical intervention for SAA with portal hypertension will prevent devastating complications such as rupture and erosion into adjacent structures.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Yusuf Yagmur et al. Giant splenic artery pseudoaneurysm- a case report and literature review: IntSurg 2015;100: 1244- 1248 https://doi.org/10.9738/INTSURG-D-15-00043.1
2. WSL de Silva et al. A splenic artery aneurysm presenting with multiple episode of upper gastrointestinal haemorrhage: a case report: Journal of medical case reports. 2017;11:123 https://dx.doi.org/10.1186%2Fs13256-017-1282-7
3. TP Elamurugan et al. Splenic artery aneurysm presenting as extra hepatic portal venous obstruction: a case report: Case reports in gastrointestinal medicine, vol 2011, article ID 908529, 3pages,2011. https://dx.doi.org/10.1155%2F2011%2F908529
4. Ryan O Lakin et al. The contemporary management of splenic artery aneurysms: Journal of vascular surgery. 2011; 53: 958-965 https://doi.org/10.1016/j.jvs.2010.10.055
5. Adenauer Marinho de Oliveira Góes Junior et al. Endovascular treatment of giant splenic artery aneurysm: Case reports in surgery Vol 2012. https://doi.org/10.1155/2012/964093

Learning Points:

- Splenic artery aneurysmis the third common intra-abdominal aneurysm
- It is the commonest visceral artery aneurysm
- It can be the cause for left sided portal hypertension

CASE REPORT

Overcoming challenges in managing necrotizing fasciitis in an elderly woman with COVID 19 disease

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Keywords: COVID 19; debridement; virus; corona; PPE

Introduction

Necrotizing fasciitis in the elderly is a condition that carries a very high morbidity and mortality [1]. The incidence is on the rise as the patient population with chronic medical comorbidities and immunosuppressives is increasing [2].

There are 3 types of necrotizing fasciitis, polymicrobial type being the commonest [3]. There is evidence that MRSA and facultative anaerobic bacteria can give rise to worse outcome. Increased mortality has also been noted in patients with bacteraemia, peripheral arterial disease and presence of haemorrhagic bullae. Early wound debridement shown to be associated with better survival [4].

Value of a multidisciplinary approach cannot be overemphasized in dealing with this high mortality condition.

Case presentation

An 83 year old woman with markedly limited mobility had been on inhaled steroids for bronchial asthma. She developed generalised weakness, cough and fever and was then rushed to a teaching hospital by her personal carers. Routine throat swab PCR confirmed that she was COVID positive and she was immediately transferred to National Institute of Infectious Diseases [NIID].

On the second day of stay in the NIID, she developed features of cellulitis of the right leg. Routine investigations revealed grossly elevated inflammatory markers with hypo-albuminaemia. Despite being on antibiotic treatment with intravenous meropenem 1g TDS, clindamycin 600mg TDS and flucloxacillin 500mg QDS, her affected leg developed worsening cellulitis with haemorrhagic blistering and necrotic patches. At this point a surgical referral was done and the patient was transferred.

On admission to the COVID unit of our hospital under the surgeons, she was ill looking, febrile [38.3o c] and dehydrated. Her heart rate was 97 beats per minute and the blood pressure was 110/ 70 mm Hg. Respiratory rate was 26 per minute and chest auscultation revealed bilateral rhonchi with scattered crepitations. Urethral catheterization yielded only a few millilitres of concentrated urine. She was administered oxygen via face mask. Initial stabilization included judicious correction of fluids and electrolytes coupled with general nursing care. Antibiotics were changed empirically to intravenous piperazillin tazobactum with clindamycin.

Oral azithromycin was added to the regimen in order to combat the chest pathology. Primary wound debridement was undertaken urgently. Hydrocolloid dressings were applied to the debrided ulcerated tissues and partial thickness ulcers covered with absorbent foam dressings. Tissue cultures were taken.

Blood was drawn for basic haematology and biochemistry. The chest radiograph showed hilar shadowing. Medical input was sought for the symptomatic COVID disease.

She was put on a high protein calorie diet as per clinical nutritionist's advice. However, the patient did not qualify for chest physiotherapy according to world federation of Physical Therapy COVID 19 guidelines.

The patient's family was by then in quarantine. Their anxiety was alleviated and concerns addressed by answering frequent calls and they were kept well informed of the progression.

Intense nursing and supportive care with regular wound debridement and dressings made a significant improvement to the patient's condition. Day 4 throat swab COVID 19 PCR followed by the sputum PCR turned negative. At that point, the patient was considered non infective and hence mobilized out of the COVID unit to the surgical ward isolation room to further facilitate enhanced care.

Dressing change on the day 6 revealed epithelialization of the upper leg ulcers and healthy deep ulcer around the ankle region. Dressings were changed to cotton and gauze over foam dressings. Patient was discharged home accompanied by the hospital staff conforming to the guidelines of the public health authorities. Patient care instructions given to the family

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DOI: http://doi.org/10.4038/sljs.v38i1.8692

and advised to call the surgeon direct as and when the need arose. Subsequent outpatient follow up saw complete recovery of the patient.

Discussion

Management of COVID 19 surgical patient poses several challenges. Surgical stress on top of the stress of this deadly disease was the main concern. The patient's already compromised immune system due to age related disabilities and nutritional setback had to combat bacteraemia of necrotizing fasciitis and viraemia of COVID synchronously. Inhaled steroids for asthma further aggravated the respiratory complications of COVID 19. This and her poor general condition made her a bad candidate for surgery. Therefore, wound debridement had to be performed in the COVID unit itself with limited resources.

As the staff exposure to the COVID 19 had to be kept to a minimum, audio/ video communication systems was used for close monitoring. However, the patient was approached by the front line health staff attired in full personal protective equipment [PPE] frequently for administration of drugs, feeding, wound care, medical and nursing care.

Necrotizing fasciitis is a condition that commonly affects the elderly, debilitated and the immunocompromized [5]. Early diagnosis is lifesaving [4]. Treatment has three main components: surgical debridement, antibiotics and supportive care [5]. Physicians of the NIID made an early referral when the antibiotic treatment failed. As early surgical debridement is the key to the patient outcome [6], wound debridement was performed within a few hours of admission having optimised the patient.

Antibiotics were changed empirically to cover the polymicrobia of the soft tissue sepsis and the secondary chest infection. Tissue cultures had not grown any organism as she was already on broad spectrum antibiotics.

Main challenge was providing intense nursing care to the patient in isolation. This was achieved by adopting measures like nursing on an electrical air mattress and application of hydrocolloid and absorbent foam dressings which could be kept for longer duration.

A point was made to do multiple tasks in any given single bedside visit e.g. nebulization, administration of drugs, performing investigations, general nursing care and feeding etc. Meticulous attention to inward holistic care coupled with streamlined outpatient follow up ensured complete patient recovery. It is noteworthy that dealing with this novel disease entity was facilitated by reassurances by the helpful senior surgical colleagues.

Acknowledgement

All categories of committed staff of Colombo East Base Hospital including:

Medical Officers,
Dr. [Mrs] K.M.H. Perera and Dr.S.P. Randombage

Nursing sisters,
Mrs.N.P. Gamage and Mrs. A.G.W. Hemamala

Nursing officers,
Mrs. M. Ileperuma, Mrs. V.G. Erandi,
Mrs. B.D.N. Sanjeewani.

All authors disclose no conflict of interest. The study was conducted in accordance with the ethical standards of the relevant institutional or national ethics committee and the Helsinki Declaration of 1975, as revised in 2000.

References

1. Hakkarainen, Timo W.; Kopari, Nicole M.; Pham, Tam N.; Evans, Heather L. [2014]. "Necrotizing soft tissue infections: Review and current concepts in treatment, systems of care, and outcomes". Current Problems in Surgery. 51 [8]: 344–62. https://doi.org/10.1067/j.cpsurg.2014.06.001.
2. Hakkarainen, Timo W.; Kopari, Nicole M.; Pham, Tam N.; Evans, Heather L. [2014]. "Necrotizing soft tissue infections: Review and current concepts in treatment, systems of care, and outcomes". Current Problems in Surgery. 51 [8]: 344–62. https://doi.org/10.1067/j.cpsurg.2014.06.001.
3. Paz Maya, S; Dualde Beltrán, D; Lemercier, P; Leiva-Salinas, C [May 2014]. "Necrotizing fasciitis: an urgent diagnosis". Skeletal Radiology. 43 [5]: 577–89. https://doi.org/10.1007/s00256-013-1813-2.
4. "Necrotizing Fasciitis: A Rare Disease, Especially for the Healthy". CDC. June 15, 2016. Archived from the original on 9 August 2016. Retrieved 13 August 2016.
5. Hakkarainen TW, Kopari NM, Pham TN, Evans HL. Necrotizing soft tissue infections: review and current concepts in treatment, systems of care, and outcomes. Curr Probl Surg. 2014 Aug. 51 [8]:344-62.
6. Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the infectious diseases society of America. Clin Infect Dis. 2014 Jul 15. 59[2]:147-59.
7. Physiotherapy Management for COVID-19 in the Acute Hospital Setting: World Confederation for physical therapy http://www.apta.org/uploadedFiles/APTAorg/News_and_Publications/Latest_News/News_Items/2020/Physiotherapy_Guideline_COVID-19.pdf

Learning Points:

- Value of being prepared to deal with surgical emergencies in previously unknown hazardous situations.
- Value of team work institutionally and soliciting opinions and advice of surgical colleagues in challenging unprecedented events.
- To act diligently to yield the maximum productivity of the frontline staff whilst alleviating anxiety and ensuring their personal safety.
- Holistic care in multiple comorbid patients and addressing concerns of their family members to be assured even in a compromised environment.

APPRECIATION

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MBBS (Peradeniya) MS(Col) FRCS (Eng), Dip Urol (Institute of Urology, University of London)

It is with deep sorrow that we remember and celebrate the life of Dr Serozsha A S Goonewardena retired senior consultant urological surgeon, National Hospital of Sri Lanka. He passed away on the 10th of March 2020.

Dr Goonewardena was a pupil of Royal College Colombo. Having entered the University of Peradaniya in 1977 he was awarded the Chalmer's Gold Medal and C.B Dharmasena Gold Medal for Anatomy, and was awarded a Commonwealth Scholarship during his third year when he visited the pioneering urologist the late Mr Joe Smith in Oxford, UK. His visit to Oxford inspired him to embark on a career in urology. He passed out with second-class honours at the final MBBS in 1982. Following completion of the Master of surgery (MS) training programme, he embarked in a career in urological surgery under the tutelage of Dr Lakshman Atygalle, consultant urological surgeon. In the UK he trained with Mr NW Harrison in Brighton, UK and achieved the Fellowship of the Royal College of Surgeons of England. He is the first urological surgeon in Sri Lanka to be board certified as a specialist by the Postgraduate Institute of Medicine, University of Colombo in August 1991.

Upon his arrival in Sri Lanka, he was appointed as the consultant urological surgeon at Karapitiya Teaching Hospital, Galle. He was appointed to the Colombo General Hospital (the current National Hospital of Sri Lanka) as a consultant urological surgeon in 1993 and retired from this post in 2018 as the most senior urological surgeon in the Ministry of Health.

He was a one of the three founders of the Sri Lanka Association of Urological Surgeons (SLAUS) and a council member for many years. He became the President of SLAUS in 2008, and a joint meeting was held with the Royal Society of Medicine during his tenure.

He will be remembered and appreciated for embellishing the surgical sphere with scientific and academic vigour. He was an avid scientific reader, a prolific publisher of scientific papers in national and international journals, and the Editor of the Sri Lanka Journal of Surgery, and the Sri Lanka Journal of Urology for many years. Many urological surgeons, surgical trainees, and medical and allied health students, have benefitted from his incredible mind. He was undoubtedly one of the most academic doctors in this part of the world, and stood shoulder to shoulder with academics of the international community, who respected and admired him. A past president of the British Association of Urological Surgeons mentioned that it is a "very great loss to world and especially Sri Lankan urology. I always felt he was one of the cleverest urologists I had ever met and such a wonderfully modest man". Even up till a few weeks before his untimely death, he could be found immersed in books at the Sri Lanka Medical Library. Such was his thirst to educate himself and to pass this teaching to others.

He was a kind, caring doctor who respected and gave dignity to patients, immaterial of who they were. Many presidents, prime ministers, and other VIPs have been treated in his wards, but they all received the same treatment, as would any other citizen of our country, whoever they were or wherever they came from.

He looked after his team, very caringly and stood by them through thick and thin – through childbirths, weddings, conflicts with other units, deaths etc… he was even better than a best friend or a family member in this regard.

But one of the most important aspects that he was admired for was his honesty, integrity and values. If he believed that something was right, he would fight tenaciously for that, whatever the personal costs to him. His constant battle to challenge the administration against the practice of keeping prisoner patients in his ward shackled to bed railings, and the demand from the government to ensure hospital beds for each and every patient in wards to eliminate floor patients, are some of the many issues he took up.

With regard to his passion and steadfastness in sticking to his guns, he is someone who is difficult to emulate. At least we could aspire to achieving those admirable qualities.

As a trainee of his, along with many other medical students, consultant surgeons and surgical trainees, friends, colleagues, and patients, we remain greatly indebted to this surgical giant.

He is survived by his wife Sandhya and his two daughters Dilhani and Nadeeshani.

May he attain the supreme bliss of Nirvana.

Ajith Malalasekera
Editor in Chief, Sri Lanka Journal of Surgery

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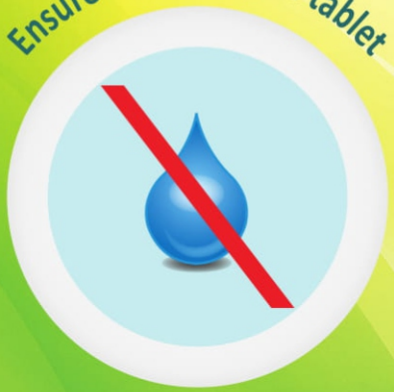

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