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The College of Surgeons of Sri Lanka
No.6, Independence Avenue
Colombo 07

Phone : 0094- 11 - 2682290
Fax : 0094- 11 - 2695080
Email : collsurgjournal@gmail.com

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The College of Surgeons of Sri Lanka
No.6, Independence Avenue, Colombo 07,

Tel : +94112682290 Fax : +94112695080
Email : cssl@lankasurgeons.org; collsurg@gmail.com

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SCIENTIFIC ARTICLE

Prospective analysis of a radical cystectomy series at a tertiary care center in Sri Lanka – is there room to improve the outcome?

M. A. Willaraarachchi[1], H. D. Perera[1], N. L. Weerasinghe[1], K.M.S.M.Hennayake[1], A. A. Sunethra[2], N. D. Perera[1]

[1]Institute of Urology and Nephrology, The National Hospital of Sri Lanka.

[2]Department of Statistics, University of Colombo, Sri Lanka.

Keywords: Bladder cancer , radical cystectomy, cancer free survival, 90 day mortality

Abstract

Introduction

Bladder cancer (BC) is a common malignancy and ranks tenth globally. Radical cystectomy remains the gold standard for organ confined muscle invasive bladder cancer (MIBC). It has proven efficacy on local disease control and tumour free survival (TFS). Notwithstanding the improvement of techniques and peri-operative care, this procedure is associated with high peri-operative morbidity. Despite the abundance of descriptive studies on demography there are only a few local studies published on the long-term outcome of surgical treatment. Present analysis of radical cystectomy series with minimum 3-year follow up will fill the gap in literature as first reported long-term study in the local setting

Methodology

Twenty-six consecutive cystectomies performed over two years from April 2016 at a single tertiary center were prospectively analysed for demography peri-operative and long-term outcome. Median follow-up was 43.5 months.

Results

Median age was 60 (range 35-74) years. Ninety-two percent were males. Twenty-two out of 26 (85%) were presented with haematuria. Eighty-one percent (21/26) had urothelial bladder cancer (UBC) out of which, 77% (20/26) were males with a mean age of 59.6years. Four out of five who had non-urothelial bladder cancer (NUBC) were males.

Fourty-two percent (11/26) were smokers and death percentage was markedly high among smokers than non-smokers. No other known risk factors were identified among the rest.

Thirty-eight-point five percent (10/26) were pT3b and pT4a, while 53.8% (14/26) were pT3 or above tumours.

Majority (62%) of complications fell into minor category (Clavien-I/II) with an average blood loss of 850 ml and a transfusion rate of 15% (4/26).

Thirty day and 90day mortality rates were 3.8% and 7.7% respectively rising to one-year mortality of 23%. Four out of twenty-six cystectomy operations were done for palliation. Three-year overall survival (OS) was 61% [CI 41.5% - 79.7%]. Out of the 12 deaths, 8 (67%) were due to cancer progression while 4 had local recurrences. Among the patients who were cancer free, three-year survival was at 84% [CI 68.1% - 93.7%], while cancer-specific three-year survival rate was at 72%[CI 54.3% - 87.2%]. With majority of survivors, 57% (8/14) were maintained normal renal functions.

Summary

Despite the fact that radical cystectomy which undoubtedly provide significant improvement in cancer free survival in high-risk MIBC, the present study emphasized relatively inferior outcomes in the developing world due to the delayed presentation.

Fifty-three point eight percent (14/26), pT3 or pT4a tumours which is associated with poor cancer specific survival and partly due to the nativity of the caregivers in offering early radical surgery with acceptable complication rates. It was also evident from this study that not only tobacco smocking seems to be the most prevalent risk factor but also associated with significantly poor long term survival

Introduction

Bladder cancer (BC) ranks as the tenth commonest malignancy among all genders and the seventh common cancer in men worldwide [1]. Age standardized global incidence is 9 per 100,000 persons a year for men and 2.2 for women [2]. According to National Cancer Registry in Sri Lanka reported crude incidence rate was 3.7 per 100,000 male population [3]. Prompt radical cystectomy performed as open, laparoscopic or robotic with pelvic node dissection and urinary diversion as a urostomy or neobladder, remains the gold standard for muscle invasive bladder cancer (MIBC) or recurrent high-grade non-invasive disease [4].

Correspondence: M.A. Willaraarachchi
E-mail: mwillaraarachchi@gmail.com
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Surgical techniques and peri-operative care of radical cystectomy were improved over the years [5]. Despite its proven efficacy on local disease control and long-term cancer free survival, the procedure is associated with a significant peri-operative morbidity [6]. Considering the risk factors, tobacco in addition to its direct oncogenicity leads to higher morbidity and mortality secondary to respiratory and cardiovascular comorbidities [5].

Due to facts such as advanced local staging at presentation and reluctance of the caregivers in offering timely cystectomy it is apparent that a considerable number of patients in the developing world are offered alternative suboptimal therapies such as chemo-radiation. Despite the abundance of descriptive demographic and pathological studies on bladder cancer, there are hardly any local studies of prospective analysis and the long-term outcome of the surgical treatment [8,9,10,11].

Present study analyses twenty-six consecutive cases of newly diagnosed patients with bladder carcinoma who underwent radical cystectomy at a tertiary referral center in Sri Lanka.

Methodology

Twenty-six consecutive patients who underwent cystectomies were included in the study. The procedures were performed over a period of two years from April 2016 to March 2018 at a single unit in the National Hospital of Sri Lanka. Patients' demographic data, clinical presentations, pre-operative staging, pathological staging, peri-operative and follow up details were collected using medical records and telemedicine approach. Informed written consent and ethical committee approval was obtained for compilation and publication of the information. The median follows up period of our study was 43.5 months (36 -61 months). We considered the follow up time duration of 36 months or end point of death in view of calculating overall survival (OS) and the cancer specific survival (CSS) in our study.

Despite current guidelines none of them were offered neo-adjuvant chemotherapy. While one patient received full course of adjuvant chemotherapy, two patients refused post-operative chemo-radiation plans.

Results

In the present cohort the age range was 35 to 74 years with median age of 60 years. Eighty percent of patients were aged above 50 years. Out of a total 26 patients, 92.3% were male with the male to female ratio of 12:1.

Most prevalent symptom was haematuria. Eighty-five percent (22/26) had painless haematuria at initial presentation. Eighteen had visible haematuria, while four had non-visible haematuria. Two out of 26 were presented with lower urinary tract symptoms. Obstructive uropathy and severe backache were other rare presentations, seen among 4% of cases.

The average delay for cystoscopy and diagnostic work up until cystectomy was six weeks in the present study.

Table 1 – Analysis of symptoms at initial presentation

Symptom	Percentage %
Hematuria	84.6
Dysuria	11.5
LUTS	7.7
Metastatic	0
Obstructive Uropathy	3.8

Risk factors

With regard to risk factors, 42% (11/26) were cigarette smokers, one worked in a rubber factory, and another had a large bladder stone. Most prevalent risk factor was cigarette smoking at 42.3%. However, half of the cohort (13/26) had no identifiable risk factors.

Table 2 – Analysis of prevalence of risk factors for bladder cancer.

Risk Factor	Count	Percentage %
Smoking	11	42.3
Industry Hazard	1	3.8
Chronic bladder irritation	1	3.8

As per Table 3 give below, it can be clearly seen that death percentage is markedly high among smokers (73%) than among non-smokers (27%).

Table 3 – Impact of smoking on bladder cancer survivalcancer.

Smoking	Dead		Alive	
	Count	Percentage %	Count	Percentage %
No	4	26.7	11	73.3
Yes	8	72.7	3	27.3

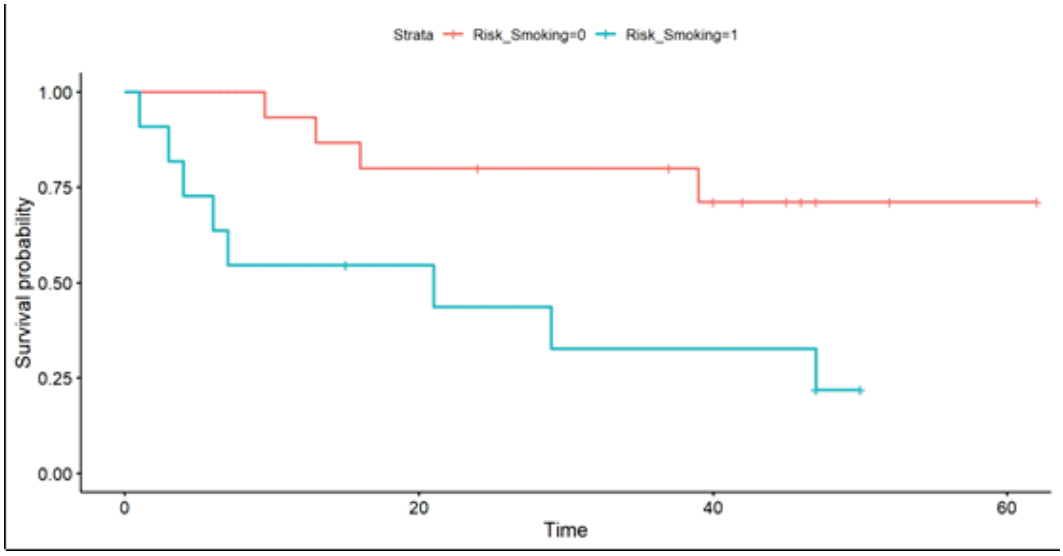

Figure 1 - Comparing Survival rates among smokers and non-smokers.

Table 4 - Kaplan-Meier estimates with respect to smoking status.

Smoking	Time in Months	Survival Probability	95.0% CI	
			Lower	Upper
No	9.5	0.933	0.807	1.000
	13	0.867	0.695	1.000
	16	0.800	0.598	1.000
	39	0.711	0.467	0.955
Yes	1	0.909	0.739	1.000
	3	0.818	0.590	1.000
	4	0.727	0.464	0.990
	6	0.636	0.352	0.921
	7	0.545	0.251	0.840
	21	0.436	0.133	0.740
	29	0.327	0.034	0.621
	47	0.218	0.000	0.480

As displayed in figure 1 and Table 4, a clear distinction of the survival rates can be seen with respect to the smoking status. One- year survival rate is at 87% for non-smokers whereas it is 54.5% for smokers. Two-year survival is at 71% for non-smokers whereas it drops down to 43.6% for smokers. Further, a log-rank test, which performs a hypothesis test to check whether survival rates are significantly different between two groups, was done and results were as follows. .

Table 5 - Log-Rank test for Smoking status

Method	Chi-Square	DF	P-Value
Log-Rank	5.99577	1	0.014
Wilcoxon	6.22486	1	0.013

The p-values of the test is less than 0.05 indicates that there is a significant difference among the survival rates of smokers and non-smokers at 5% level of significance.

Histology types and grading

Twenty-one individuals (80.7%) had urothelial bladder cancer. Twenty of them were males. The mean age of males with urothelial bladder cancer (UBC) and non-urothelial bladder cancer (NUBC) was 59.6 and 59.4 years respectively. Histological types are depicted in table 6.

Table 6 - Prevalence of bladder cancer histology types

Type of cancer	n	Percentage
UBC	25	96.2
Secondary bladder cancer	1	3.8
NUBC	5	19.2
Low Grade UBC	4	15.4
High Grade UBC	17	65.4

A hypothesis test for comparison of survival rates with respect to type of bladder cancer was done since counts of patients are not comparable across the two types (25 patients had Primary Urothelial Bladder Cancer (UBC) and only one patient had secondary Bladder Cancer. With respect to Cancer (CA), the majority (65%) had high grade UBC.

Results of the log-rank test for testing for a significant difference in the survival rates with respect to the type of urothelial cancer are given in the table 7 below.

Table 7 - Log-Rank test for type of urothelial cancer

Method	Chi-Square	DF	P-Value
Log-Rank	1.06606	2	0.587
Wilcoxon	0.96962	2	0.616

Since p-value is above 0.05, it can be concluded that there is no significant difference in the survival rates among three groups of non-UBC low/intermediate grade UBC and High grade UBC at 5% level of significance.

Only one had high-grade pT1, while all others had high-risk carcinoma invading bladder muscle pT2 or above. This male patient with pT1 underwent laparoscopic assisted right nephroureterectomy in addition to radical cystoprostatectomy.

Pathological staging revealed 38.5% (10/26) was pT3b or pT4a, and another 15.4% (4/26) were pT3a indicating the delayed presentations for cystectomy among a significant proportion. Less than half of the cohort, 12 patients presented as pT2 and pT1 disease that were 42.3% (11 /26) and 3.8% (1/26) respectively. Nodal stage of majority 69.2% (18/26) was N0. Only 7.7% (2/26) were in N1 stage. Twenty-three percent (6/26) had reached N2 stage, which would have contributed to the overall poor outcome.

Table 8 - Clinico-pathological characteristics

Characteristics		**Urothelial CA** n = 21	**Non-Urothelial CA** n = 5
Median age	Male Female	59.6 60	59.4 45
Sex	Male Female	20 1(Sarcomatoid CA)	4 (3 Adeno CA + 1 Squamous CC) 1(Adeno CA)
Smoking	Smokers Never smoke	7 14	3 (AdenoCA) 1(Squamous CA) 1
T-Stage	pT1 pT2 pT3 pT4	1 11 2 7	- - 2 3
N-Stage	N0 N1 N2	17 1 4	2 1 2
CSM		5	3

CA: carcinoma CSM: Cancer specific mortality

Surgical Management and complications

Open Radical cystectomy was followed by a standard pelvic lymphadenectomy in all cases (n=26) and the urinary diversion method was ileal conduit urostomy (n=24) and bowel neobladder (n=2). The majority (18/26) were initially managed in the ICU or and HDU. Median ICU-stay was 18 hours. Though, ERAS (Enhanced Recovery After Surgery) protocol was not strictly implemented, optimization of pre-operative comorbidities and nutritional status, early post-operative feeding, and mobilization had been routinely carried out in all patients.

Average blood loss during surgery was 850 ml and 15.4% (4/26) needed peri-operative blood transfusions. Common peri-operative complications included surgical site infections (6/26) and paralytic ileus (5/26). One female patient had post-operative myocardial infarction.

Only one patient had a massive blood transfusion as a consequence of iliac artery invasion, which needed additional vascular grafting. This also accounted for the single death that occurred within 30 days due to iliac artery mycotic aneurysm.

Overall surgical complications emerged in 61.5% of cases according to Clavien-Dindo classification majority being minor (Clavien I/II). The average ICU stays of Clavien IV was 84 hours. [7]. (Table 9)

Table 9 - Post-operative complications following radical cystectomy and urinary diversion

Clavien-Dindo Complication Grade	**Number (percentage)** N=26
None	10(38.46%)
I	4(5.38 %)
II	6(23%)
IIIa	2(7.69%)
IIIb	1(3.85%)
IVa	2(7.69%)
IVb	0
V	1(3.85%)

Thirty and. 90-day mortality rates were 3.8% and 7.7% respectively rising to one-year mortality of 23%. Four out of twenty-six cystectomy operations were done for palliation. Three-year overall survival (OS) was 61% [CI 41.5% – 79.7%]. Out of the 12 deaths occurred, 67% (8/12) were due to cancer progression while 4 had local recurrences. Among the patients who were cancer free, three-year survival was at 84% [CI 68.1% - 93.7%], while cancer-specific three-year survival rate was at 72%[CI 54.3% - 87.2%].

One out of 26 died due to mycotic aneurysm indicating 30-day mortality of 3.8%. Another patient died post operatively after 30th day due to terminal disease leaving 90-day mortality of 7.6% (2/26).

Infections and venous thrombosis were noted as complications within initial post operative 90 days. One patient got deep vein thrombosis of unilateral femoral and popliteal veins. Eight patients out of 26 were re-admitted with urinary tract infections or pyelonephritis within first 90 days. Three patients developed acute kidney injury (AKIN stage 2) as immediate post- operative complication that did not require long-term renal replacement therapy.

Fifty-three point eight percent (14/26) were pT3 and pT4a, extending into peri vesical tissue, adjacent organ or beyond respectively.

Post cystectomy median ICU-stay was 18 hours. Overall surgical complications emerged as 61.5% (16/26) with majority 10/16 (62%) falling into minor category (Clavien-I/II). Average blood loss was 850 ml with a transfusion rate of 15% (4/26). Other complications within 90 days included urinary infections (8/26), surgical site infections (6/26), paralytic ileus (5/26), acute kidney injury (3/26), myocardial infarction (1/26) and venous thrombosis (1/26).

The overall survival and death rates are given in Table 10 below along with 95% confidence intervals.

As given below, one-month survival rate was 96%, while one-year survival rate further dropped up to 76%. The median survival time was approximately 44 months.

Table 10 - Kaplan-Meier Estimates for overall survival and death rates

Time in Months	Survival Probability	95.0% CI		Death Probability	95.0% CI	
		Lower	Upper		Lower	Upper
1	0.962	0.888	1.000	0.038	0.000	0.112
3	0.923	0.821	1.000	0.077	0.000	0.179
4	0.885	0.762	1.000	0.115	0.000	0.238
6	0.846	0.707	0.985	0.154	0.015	0.293
7	0.808	0.656	0.959	0.192	0.041	0.344
9.5	0.769	0.607	0.931	0.231	0.069	0.393
13	0.731	0.560	0.901	0.269	0.099	0.440
16	0.690	0.512	0.869	0.310	0.131	0.488
21	0.650	0.465	0.835	0.350	0.165	0.535
29	0.606	0.415	0.797	0.394	0.203	0.585
39	0.556	0.357	0.755	0.444	0.245	0.643
47	0.463	0.229	0.698	0.537	0.302	0.771

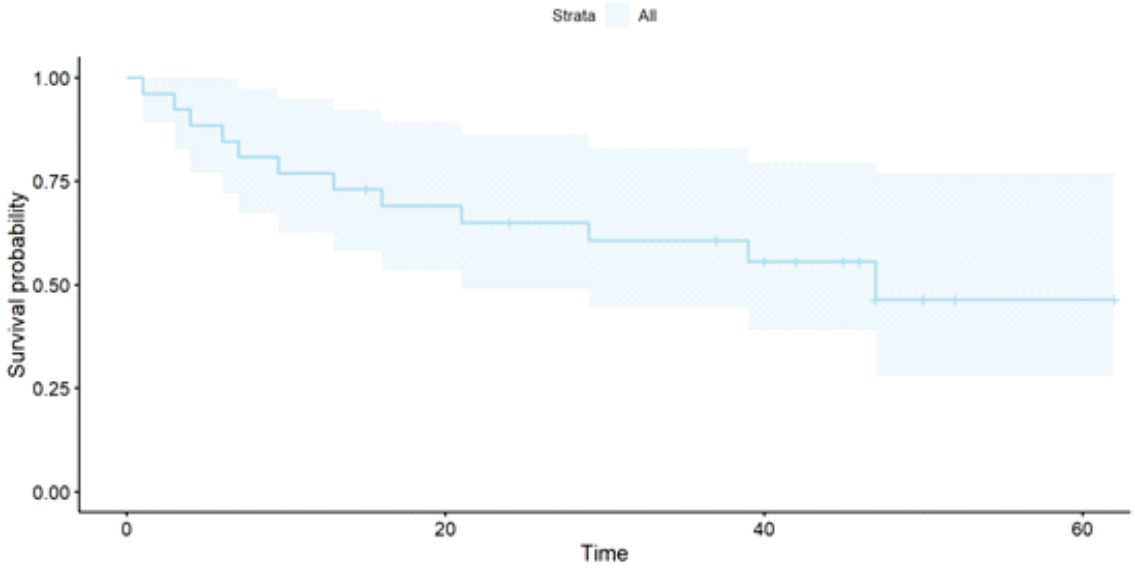

Figure 2 – Kaplan Meier plots showing overall survival following radical cystectomy for high-risk bladder cancer.

Despite post-operative adjuvant therapy, disease progression led to death in five cases, keeping in mind that 4/5 of them was turned in to palliative cystectomies after reviewing the post-operative histology. One patient who had an urachal adenocarcinoma pT3 developed peritoneal and liver metastasis followed by a fatal intestinal obstruction within a year.

Out of 14 survivors at 3 years, 4 (16.67%) developed disease progression and recurrence. Two of them had pelvic lymph node recurrence. One had distal liver metastasis and para-aortic lymph nodes involvement, while another had urethral recurrence.

At the end of three years, eight patients died due to the malignancy, while two died from unrelated causes, indicating cancer specific mortality (CSM) of 33% [CI 14.7% - 49.8%] at 3 years and other cause mortality of 8.3% at 3 years.

Out of 14 survivors, 57% (8/14) had normal renal functions. Twenty-one-point four percent reached stage I/II chronic kidney disease (CKD). Another 21.4% reached stage III CKD at 3 years. There were none beyond stage IV CKD.

Statistical software 'R-version 4.2.1' was used for performing advanced statistical analysis.

Discussion

Bladder cancer is one of the common urological malignancies occurring worldwide, in less than 1 year of diagnosis, 63% of these patients with MIBC who have not been offered curative treatment would die of the disease. The median overall survival reported is 8 -13 months with a cancer specific survival of 11 months (12 months for men; 9 months for women) in published data.On multivariable analysis, tumour stage at diagnosis, older age, increased comorbidity, delayed diagnosis, and female gender increased the risk of death.

Bladder cancer treatment outcomes in Sri Lanka are sparse. This is the first outcome analysis of patients undergoing radical cystectomy in Sri Lanka up to date.

Median age of our cohort who underwent cystectomy for primary bladder cancers is 60 years. As per previous studies the average age at diagnosis of bladder cancer in Sri Lanka is 65 years [8]. In the present series the youngest was 35 years without identifiable risk factors who required a radical cysto-prostatectomy and orthotopic neo-bladder formation (STUDER's neo-bladder) for muscle invasive urothelial bladder cancer.

In the present study male to female ratio was 12:1 compared to the ratio of 3:1 quoted worldwide [4, 9]. Previous studies published in Sri Lanka demonstrated a diversity of male female ratio ranging from 9:1 [10], 4.1: 1 [8] and 5.7:1 [9] at different centers. In India male to female ratio is 8.6: 1 [9]. However, all the studies agreed upon the male preponderance, which is similar to other South Asian countries. The low female preponderance compared to western countries might be explained by the lower prevalence of smoking among women in South Asian countries.

Painless visible haematuria was the commonest presentation (18/26) in this cohort similar to many other studies [12]. In 7-year study on bladder cancer in Pakistan and Multan showed 88% of female cases (total 44 cases, median age 55 years) presented with haematuria [12].

Another study on bladder cancer in Sri Lanka showed painless visible haematuria encountered in 148 (52%) of cases, while 110 (39%) of patients had haematuria associated with pain. Only 8% of cases (22 patients) denied haematuria [13].

Bladder cancers have been associated with well-known risk factors such as tobacco smoking, occupational exposure to chemicals such as aromatic amines, dyes, paints, and chemicals used in rubber and textiles. Further, schistosomiasis and radiotherapy are important risk factors. In the present cohort, we could not identify any known risk factor among half of cases. Tobacco smoking is the single most significant cause for bladder cancer accounting for 25% - 65% of all cases [13]. Smokers have two-to- four-fold risk of developing bladder cancer when compared to the general population [14].

In the present group 42% were cigarette smokers. The World Health Organization data reveals, Sri Lankan adult daily smoking prevalence of 10% in 2019 [15]. All smokers were male in our cohort, which depicts the typical behaviour pattern seen in South Asian region. It was reiterated the fact that patients with high-risk bladder cancers who did not smoke had better survival rates in present study.

Historically, the rubber industry was considered to increase the risk of bladder cancers due to exposure to a contaminant beta naphthyl-amine. However, more recent studies since 1982 do not show an increased risk. Present cohort had a single rubber factory worker who had Sarcomatoid variant of urothelial cancer, while another diagnosed with squamous cell type bladder cancer, the risk factor was a large bladder calculus in the bladder [14].

Authors offered cystectomy primarily for patients with muscle invasive BC, of which twenty-one individuals (80%) had primary urothelial bladder cancer (UBC). Twenty out of 21 who had primary urological cancers were male which is similar to the published data, which showed higher male preponderance. Mean age of male patients with primary bladder cancers were 59.6 years in our cohort.

Literature revealed a higher proportion of female bladder cancers as more non-urothelial bladder cancer (NUBC), incidentally found, solid and muscle invasive compared to males. Further, NUBC in women constituted 20% whereas in men it represented only 5.5% of patients [12]. In contrast to these findings, four out of five individuals who had NUBC were males in our study with a median age of 59.4 years. However, NUBC is considered a more aggressive form of BC compared with the more common UBC [12]. Histological types of NUBC that we experienced were adenocarcinoma, squamous and squamous papillary.

Pathological staging revealed 38.5% (10/26) were pT4, extending beyond serosa of the bladder, which indicate the delayed presentations for cystectomy among significant proportion.

The gold standard curative option, radical cystectomy is considered as a surgery with high morbidity and mortality [16]. Excluding high volume specialized centers the mortality and morbidity rates are comparable in many parts of the world. Complications related to radical cystectomy are often used as surrogates to indicate surgical competency and quality of care.

According to Clavien-Dindo classification to report surgical complications, 61% of cases had some form of complication. However, out of these two thirds were categorized as Clavien-Dindo grades II or I.

Early complications of radical cystectomy and urinary diversion in the present cohort composed of wound infections (23%), gastro-intestinal (19%), renal (12%) and cardiac (4%). A similar study has reported 29% gastro-intestinal, 25% infections and 15% wound related complications as early post radical cystectomy complications [6]. Infections were most encountered complication among this cohort. Surgical site infections occurred in 23% during the early post-operative period. All were associated with open radical surgery and none of the laparoscopic wounds were infected.

Similar studies support that wound related complications is more common in open cystectomy where a limited laparotomy wound can also become infected. Other less frequently observed wound complications including dehiscence or incisional hernia were not encountered in the present study [18].

Paralytic ileus was the only complication that we encountered as gastro-intestinal complication. Intestinal anastomotic leak has been rarely reported in similar studies [19].

When it came to the two methods of uretero-ileal anastomosis (Wallace and Bricker) authors preference was for Wallace's technique and without experiencing any long-term urinary leakage although it is often described as a complication. Present series followed the widespread practice of anastomotic stenting, which safeguards the anastomosis and lower the rate of urinary leakage (18). Post-operative infections were noted as late complications within 90 days in which 8/26 had clinically symptomatic urinary tract infections needing re-admission and intra-venous antibiotics. Half of them full filled the AKIN criteria of mild to moderate acute kidney injury. All received specialist nephrology care and recovered without need of renal replacement therapy.

Deep vein thrombosis has been recognized as a serious post-operative complication following radical cystectomy affecting up to 4.7% in literature [20]. Despite preventive measures for peri-operative venous thromboembolism such as TED stockings, prophylactic low molecular weight heparin, one patient was diagnosed with thrombosis of unilateral femoral and popliteal veins indicating a rate of 3.8%.

A significant number (43%) developed mild to moderate chronic kidney disease at 3 year follow up. Pyelonephritis, obstructive uropathy and episodes of acute kidney injury are well known to cause negative impact on renal reservoir. Our analysis was not extended to describe the aetiology of chronic kidney disease in the cohort. Renal insufficiency among survivors is a significant challenge in case of long-term dialysis dependence state, in a resource poor setting like ours where maintenance of dialysis is not entirely a free health facility due to unmet needs of chronic kidney disease burden.

In the current series the 90-day mortality rate was 7.6%. According to published data, SEER database reported 90-day mortality as high as 10.75% among 7076 patients [21]. In-hospital mortality rate of 0.54% was reported in a large volume academic referral center in the USA after 6728 cystectomies [18]. In our series, inward mortality was 3.8% (1/26) which is probably attributed to the small sample size.

Present study observed 33% cancer specific 3-year mortality among our cohort. These figures compare well with other

larger studies, which reveal 5-year progression-free survival rate of 51% and an overall survival rate of 50% [22]. Studies have also shown that 3-year survival figures have 80% correlation and predictive value with 5- year survival [23]. Furthermore, a study from the Netherlands has shown that cancer specific survival in 3 years was 67%, which was more closure to our cohort as well [24].

Conclusion

In the present study, pathological staging of pT3b and pT4 in 38.5% indicates delayed presentation for cystectomy among a significant proportion of patients in a developing country. Delay in cystectomy conferred an increased risk of cancer specific mortality among high-risk BC.

Study also emphasises higher vigilance on investigation of haematuria and availability of expertise for radical surgery and routine use of neoadjuvant chemotherapy, which could have improved the overall outcome.

Most importantly the present study has demonstrated a significant difference among the survival rates of smokers and non-smokers. And the fact that a majority of complications falls into minor or intermediate category which should not discourage the surgeon or the patient from going through the radical cystectomy which improves cancer free survival in high risk MIBC even in resource poor setting in the developing world.

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SCIENTIFIC ARTICLE

Stress response in open versus laparoscopic procedures: is laparoscopic surgery truly as beneficial to the patient as it promises to be?

S. Gambhir[1], M. Sukhadia[1], G. Bajpai[1], D. Sethi[1], A. Sethi[2]
[1]R.N.T. Medical College, Udaipur (Rajasthan), India.
[2]Ananta Institute of Medical Sciences, Kaliwas. Rajsamand (Rajasthan), India.

Keywords: Laparoscopic surgery, Open surgery, Stress response

Introduction

In a medical or biological context stress is a physical, mental, or emotional factor that causes bodily or mental tension. Stressors can be external (from the environment, psychological, or social situations) or internal (illness, or from a medical procedure). [1]

Surgical stress is the systemic response to surgical injury and is characterized by activation of the sympathetic nervous system, endocrine responses as well as immunological and haematological changes. The more the external stimuli i.e. incision size and tissue handling in this case, more is the stress response, which leads to delay in recovery of patient post operatively.

Laparoscopy, also called key-hole surgery or minimal access surgery, allows the surgeon to access the abdomen and pelvis without making a large incision in the skin. In conventional open surgical procedure because of larger incision and more handling of internal organs, the patient believed to have increased level of pain and longer recovery time, hence more stress.

Laparoscopic interventions have been increasingly used in surgical practice in recent years. The reported advantages of the laparoscopic approach in adults are: less wound infection, shortened postoperative recovery, less postoperative analgesic requirement and a faster return to normal activities.

In spite of the advancement in minimally invasive surgery, and it becoming standard of care for cholelithiasis and appendicitis, open (tension free mesh) repair for hernia continues to be the gold standard as the beneficial effects of laparoscopic repair must be achieved with better maintenance of cardiorespiratory, metabolic and endocrine homeostasis.

Majority of our patients belonged to tribal population (due to geographical location of Udaipur being in the tribal belt of Rajasthan, India) among whom the concept of laparoscopic surgery is still relatively new and it was difficult to get them to consent to laparoscopic surgery (esp. for hernia repair), as for them and their relatives, the open procedures have stood the test of time.

In an attempt to identify whether laparoscopic surgery is truly beneficial to the patients and thus in turn to understand the rationale behind the view of local population, in this case series of 50 patients we evaluated the difference between the stress response using 11 parameters in conventional open procedure versus laparoscopic surgery for cholelithiasis, appendicitis, hernia repair.

Materials and Methods

This is a prospective, observational and analytical case series study among 50 patients of cholelithiasis, appendicitis and inguinal hernia divided into 2 groups, Group-A (Open Procedures – 27 patients) and Group-B (Laparoscopic Procedures – 23 patients), to determine the less stressful procedure between open and laparoscopic surgery in patients of cholelithiasis, appendicitis and inguinal hernia, conducted in a tertiary care teaching institute at Department of General Surgery, Rabindra Nath Tagore Medical College and Maharana Bhupal Government Hospital, Udaipur. 313001. Rajasthan.

To measure the stress response between the two groups, following parameters were recorded at the time of admission, 6 hours and 24 hours after surgery and were analysed statistically for significant difference and correlation between the groups:

A) Physical parameters - pulse, blood pressure recorded as Mean Arterial Pressure, temperature and respiratory rate
B) Laboratory parameters via blood samples - serum cortisol, serum glucose, C-reactive Protein, interleukin-6,

Correspondence: A. Sethi
E-mail: dranjalisethi2011@gmail.com
https://orcid.org/0009-0009-5044-8253
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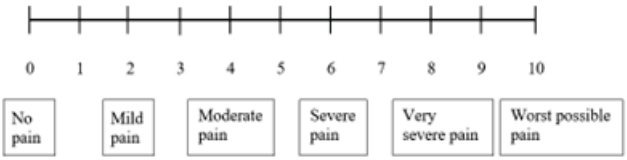
prolactin and total leukocyte count.

C) Psychological Parameter recorded as **pain score** using **Visual Analogue Scale**. Patients were asked to score their pain on a scale of 0 to 10 with 0 being least or no pain while 10 being maximum/unbearable pain.



Statastical Analysis

The presentation of the Categorical variables was done in the form of number. On the other hand, the presentation of the continuous variables was done as mean ± SD and median values. The following statistical tests were applied for the results:

1. The comparison of the variables which were quantitative in nature were analyzed using Independent t test.
2. The comparison of the variables which were qualitative in nature were analyzed using Chi-Square test/Fisher's Exact test.

The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS) software ver. 21.0.

For statistical significance, p-value of less than 0.05 was considered as significant

Results

50 patients were studied in this case series to analyse the stress response between patients undergoing open procedures (Group A) and those undergoing laparoscopic procedures (Group B). The difference between the two groups in context of all the 11 stress parameters taken into account was statistically insignificant in the pre-operative period (p-value > 0.05).

There was no statistically significant difference between the 2 groups in terms of age (p-value=0.779) and sex (p-value=0.615)

The mean operating time in patients undergoing open procedure (55.2±22 minutes) was significantly lower (p-value=0.004) as compared to those undergoing laparoscopic procedures (76.8±28.8minutes) (Table 3).

Among the physical parameters(table 1)Mean ± SD of pulse rate (per minute) at 6 hours post-operative, 24 hours post-operative period in group A was 96.22 ± 7.65, 88 ± 6.2respectively which was significantly higher as compared to group B (82.96 ± 7.83(p-value<0.001), 82 ± 7.63 (p-value=0.003) respectively). It was also observed that 6 hours after surgery Mean Arterial Pressure (in mm Hg) of Group A patients fell while in Group B, the MAP had risen (however the difference was statistically not significant, p-value=0.254)

However at 24 hours after surgery, Mean Arterial Pressure of Group A patients had risen with Mean Arterial Pressure being significantly higher in Group A patients (p-value<0.001). Mean ± SD of the body temperature (ºF) at 6 hours post-operative and 24 hours post-operative period in group A and in group B were compared and no significant difference was found between them (p-value 0.566 and 0.702 respectively).Like the body temperature, the changes in respiratory rate (per minute) were not statistically significant in the post-operative period when compared in both the groups. (p-value 0.501 and 0.677 at 6 hours and 24 hours post-operatively).

When laboratory values (Table 2) were analysed, it was observed that Serum Glucose (mg/dl), C-Reactive protein (mg/l), Interleukin-6 (pg/ml) and Total Leukocyte Count (/mm3) were all significantly higher in Group A as compared to Group B at 6 hours and 24 hours post-operative periods. Though the mean Serum Cortisol (mcg/dl) level was higher in Group A patients throughout the observed post-operative period, the difference was significant only at 24 hours. On the other hand there was no significant difference between the two groups in terms of Prolactin (ng/ml) levels.

Psychological parameter recorded as pain score using Visual Analogue Scale was assessed in both the groups and there was no statistically significant difference in the early post-operative pain between the two groups. (p-value at 6 hours=0.264). However after 24 hours, pain was significantly lower in Group B patients; p-value at 24 hours=0.008) (Table 3).

The incidence of post-operative surgical site infection was significantly lower (p-value=0.024) in Group B patients (2 vs. 10 in Group A; Table 3). Concurring with the above findings of surgical site infection, Group B had significantly shorter post-operative hospital stay (3.48 ± 1.41days) vs. 4.48 ± 1.55 days in Group A (p-value=0.021; Table 3)

Table 4 shows the effect of general anaesthesia and spinal/regional anaesthesia on the variables of cortisol and glucose and shows no significant difference of the effect of anaesthesia on these two variables in the post-operative period. (p-value>0.05)

Table 1

Physical Parameters	Group A	Group B	p-value	Test Performed
Pulse per minute				
pre-operative	79.78 ± 8.62	78.96 ± 9.92	0.755	t test;0.313
6 hours post -operative	96.22 ± 7.65	82.96 ± 7.83	<.0001	t test;6.042
24 hours post -operative	88 ± 6.2	82 ± 7.63	0.003	t test;3.068
Blood Pressure as MAP in mm Hg				
pre-operative	96.2 ± 9.34	96.58 ± 9.96	0.889	t test;0.14
6 hours post-operative	94.42 ± 9.02	97.42 ± 9.35	0.254	t test;1.153
24 hours post -operative	106.07 ± 5.4	93.88 ± 5.79	<0.0001	t test;7.695
Temperature in °F				
pre-operative	98.44 ± 0.5	98.47 ± 0.41	0.851	t test;0.189
6 hours post -operative	98.72 ± 0.29	98.77 ± 0.22	0.566	t test;0.578
24 hours post -operative	98.4 ± 0.43	98.36 ± 0.27	0.702	t test;0.384
Respiratory Rate per minute				
pre-operative	17.48 ± 1.4	17.61 ± 1.12	0.727	t test;0.351
6 hours post -operative	19.26 ± 1.4	19 ± 1.28	0.501	t test;0.678
24 hours post -operative	17.3 ± 0.91	17.43 ± 1.41	0.677	t test;0.418

Table 2

Laboratory Parameters	Group A	Group B	p-value	Test Performed
Serum Cortisol (mcg/dl)				
pre-operative	10.24 ± 4.8	10.71 ± 3.13	0.69	t test;0.4
6 hours post-operative	22.77 ± 12.16	18.65 ± 13.74	0.266	t test;1.124
24 hours post -operative	22.35 ± 21.61	10.43 ± 6.41	0.01	t test;2.73
Serum Glucose (mg/dl)				
pre-operative	106.41 ± 21.8	103.83 ± 18.91	0.659	t test;0.443
6 hours post-operative	144.07 ± 37.98	125.3 ± 25.76	0.049	t test;2.008
24 hours post -operative	147.44 ± 28.22	127.48 ± 14.05	0.002	t test;3.235
C-Reactive protein (mg/l)				
pre-operative	25.08 ± 80.36	6.37 ± 7.04	0.239	t test;1.204
6 hours post-operative	19.17 ± 15.05	11.01 ± 11.38	0.038	t test;2.134
24 hours post -operative	80.38 ± 51.17	49.2 ± 43.65	0.026	t test;2.296
Interleukin -6 (pg/ml)				
pre-operative	14.48 ± 13.73	13.07 ± 9.48	0.68	t test;0.415
6 hours post-operative	92.89 ± 90.1	30.08 ± 16.22	0.001	t test;3.556
24 hours post -operative	57.07 ± 31.12	29.17 ± 26.61	0.001	t test;3.375
Prolactin (ng/ml)				
pre-operative	19.19 ± 10.52	30.03 ± 26.3	0.074	t test;1.855
6 hours post -operative	28.93 ± 19.2	25.5 ± 13.95	0.469	t test;0.73
24 hours post -operative	19.7 ± 11.64	25.35 ± 21.67	0.246	t test;1.172
Total Leukocyte Count (/mm ^{3})				
pre-operative	9922.96 ± 2146.18	9186.96 ± 2442.48	0.262	t test;1.134
6 hours post -operative	14009.63 ± 4285.35	11393.48 ± 2830.85	0.013	t test;2.58
24 hours post -operative	12200 ± 3809.92	9952.61 ± 2056.62	0.015	t test;2.530

Table 3

Parameters	Group A	Group B	p-value	Test Performed
Mean Duration of Surgery (in hours)	0.92 ± 0.37	1.28 ± 0.48	0.004	t test;2.997
Visual Analogue Score				
pre-operative	2.78± 2.94	2.96 ± 2.88	0.829	t test;0.216
6 hours post -operative	4.78± 1.67	4.22 ± 1.83	0.264	t test;1.13
24 hours post -operative	2.22± 1.31	1.35 ± 0.83	0.008	t test;2.759
Surgical Site Infection				
present	10 (37.04 %)	2 (8.70%)	0.024	Fisher Exact test
absent	17 (62.96 %)	21 (91.30 %)		
Post-operative hospital stay (in days)	4.48 ± 1.55	3.48 ± 1.41	0.021	t test;2. 374

Table 4

Parameters		Mean	Std. Deviation	t test	p-value
Serum Cortisol pre-operative	General Anaesthesia	11.00	2.47	0.288	0.775
	Spinal Anaesthesia	10.61	5.18		
Serum Glucose pre-operative	General Anaesthesia	100.82	12.96	1.036	0.307
	Spinal Anaesthesia	107.52	24.17		
Serum Cortisol 6 hours post-operative	General Anaesthesia	22.16	14.65	0.715	0.479
	Spinal Anaesthesia	19.00	13.18		
Serum Glucose 6 hours post -operative	General Anaesthesia	127.35	24.52	0.26	0.796
	Spinal Anaesthesia	125.00	30.78		
Serum Cortisol 24 hours post-operative	General Anaesthesia	13.43	8.11	1.325	0.193
	Spinal Anaesthesia	10.46	6.05		
Serum Glucose 24 hours post -operative	General Anaesthesia	132.82	22.82	0.311	0.758
	Spinal Anaesthesia	130.87	16.96		

Discussion

A surgery is said to be less stressful on the body if the changes produced in the sympathetic nervous system, endocrine responses as well as immunological and haematological systems are minimal. Thus an ideal surgery should also be easier to execute so as to cause less tissue damage and take less operating time, and hence in turn less stress to the patient's body. In that context, open tension free mesh repair proposed by Lichtenstein [2] continues to remain the gold standard till date for hernia repairs in spite of the advancement in minimally access surgery, which has become the standard of care for patients of cholelithiasis and appendicitis world over.

In our study, the mean operating time in patients undergoing laparoscopic surgery was significantly higher compared to those undergoing open repair similar to several other studies[3-11]. Contrary to our results, Eklund et al[12] refuted any claims regarding the difference in operating time between the 2 types of repair in cases of hernia, while another study[13] though acknowledging the fact of longer operating time during initial phase of surgical career concluded laparoscopic surgeries took lesser time in case of cholecystectomy. Similarly, certain studies found shorter operating times for laparoscopic appendicectomy even in the cases of complicated/perforated appendix. [14-16]

The analysis of physical parameters between the two groups showed no statistical difference in terms of body temperature and respiratory in the post-operative periods i.e. p-value>0.05 for both. A general trend though was observed in both the groups that the mean body temperature rose slightly within first 6 hours and then returned towards original pre-operative values at 24 hours after surgery.

Difference was noted between the pulse rates of the two groups, with that of Group A being significantly higher than that of Group B in both the post-operative time intervals (p-value <0.001 and 0.003 respectively). There was also difference in the blood pressures recorded as Mean Arterial Pressure (MAP) between the two groups. The MAP fell in Group A patients at 6 hours post-operative period but when compared to Group B - in whom the MAP had risen, this difference was not statistically significant. However at 24 hours after surgery, MAP of Group B patients returned towards pre-operative values, while that of Group A patients had risen with MAP being significantly higher in Group A patients (p-value <0.001). These changes can be probably explained by the effects of spinal anaesthesia in majority of the patients of Group A patients which is known to decrease the blood pressure[17] and produce continued analgesia in the early post-operative period.[18]

Laboratory parameters (Table 2) were significantly higher among the Group A patients with the exception of prolactin, which did not differ significantly between the two groups. The pain (Table 3) was significantly lower in group B patients 24 hours post-surgery. Conforming to our above findings, surgical site infections and post-operative hospital stay (Table 3) was significantly lesser in Group B patients as compared to those in Group A (p-values 0.024 and 0.021 respectively). Previous studies in this field which had observed one or more of the parameters analysed by us concurred with our findings. [7,9-10,13-14,19-26]

However, it is important to bring to notice that the patients of hernia did not comply with above trends of change in laboratory and psychological parameters and surgical site infections between the Group A and Group B patients and the difference between the two groups of inguinal hernia patients was not statistically significant in terms of above mentioned parameters. However, Group B patients of inguinal hernia had a significantly longer hospital as compared to their Group A counterparts (p-value=0.022), probably due to familiarity of the operating surgeons with the open repair, its complications and management. Very similar to the results obtained in our study, a prospective comparison of metabolic and inflammatory responses after laparoscopic and open inguinal hernia operations in 20 patients[27] showed that changes in the plasma levels of cortisol, growth hormone and prolactin - measured preoperatively and at fixed intervals up to 120 hours postoperatively - showed no statistically significant difference between the two groups. No significant changes in IL-6 levels were recorded in any group. Akhtar K et al. [27] however reported that changes in CRP levels were significantly higher (P< 0.006) in open hernia patients. Authors of previous studies have had varied results regarding the post-operative complications between the two groups, some suggesting laparoscopic group faring better[6,12] while others vice-versa[28]. Although some recent studies have shown that Laparoscopic hernioplasty (TAPP) is superior to Lichtenstein tension-free hernioplasty in terms of postoperative pain, hospital stay and return to daily activity[3] and may even be surgery of choice for unilateral inguinal hernia repair[3,29-31].

Since laparoscopic surgeries in our study had longer duration as compared to open surgeries, also to be taken into consideration while comparing the stress response between the two groups should be the effect of anaesthesia as general inhalation anaesthesia used in laparoscopic and open cholecystectomy patients produces a different stress response in body when compared to regional or local anaesthesia that is used during open hernia repair surgeries and appendectomy. Hence, a comparison of the effect of different types of anaesthesia (spinal/regional anaesthesia in open cases with

the exception of cholecystectomy and general anaesthesia in all laparoscopic surgeries) on the two groups was made using the two significantly affected variables of glucose and cortisol, excluding the patients of open cholecystectomy which was the only open surgery performed under general anaesthesia (Table 4). It was observed that these variables did not differ significantly in the post-operative phase at 6 hour and 24 hour intervals between those who underwent surgeries under regional anaesthesia compared to those who underwent surgeries under general anaesthesia.

Another consideration could be given to the fact that clean-contaminated cases are mixed with clean cases in both the groups. We would like to point out that number of clean contaminated cases were same between both the groups, thereby alleviating it as a confounding factor.

Follow up is needed post discharge to document the incidence of long term complications.

Conclusion

To conclude, laparoscopic surgery causes lesser stress compared to open surgery on the human body, and has the calibre to be the gold standard for cholelithiasis and appendicitis. However, further research is required to establish it as the standard of care for hernia repairs, where open hernia surgery based on the principles laid down by Lichtenstein continues to be the corner stone of hernia repair because of the following reasons:

1. Small sample size.
2. Longer duration of surgery in laparoscopic repair as learning curve for the same is longer.
3. Difference in anaesthesia between the two groups: region or local in open group while general anaesthesia in laparoscopic group.

Further detailed studies with greater sample size, taking into account the anaesthetic factors and long-term complications are required in future.

Even though the tribal population of Udaipur is embracing the newer advancements in the field of surgery as the standard of care for cholelithiasis and appendicitis, for the time being, open hernia repair continues to be a more popular option amongst the local population.

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SCIENTIFIC ARTICLE

Abdominal aortic dimensions in Sri Lankan patients: a computed tomography imaging based preliminary study.

J. Arudchelvam
Faculty of Medicine, University of Colombo, Sri Lanka.

Keywords: Aortic diameter, infra renal, abdominal aorta, Sri Lanka, computed tomography imaging, supra coeliac diameter

Abstract

Introduction

The abdominal aorta begins at the aortic hiatus of the diaphragm at the 12th thoracic vertebral level and ends by dividing into common iliac arteries at the fourth lumbar vertebral level. The diameter of the aorta varies according to age, gender, and race. Generally, the diameter of the infrarenal aorta (IRD) in the western and Korean populations is 19.0 to 21.0 mm.

Methodology

In this study, 59 Computed Tomography (CT) images of patients who underwent contrast-enhanced abdominal CT for non-aorta related illness were analyzed.

Results

There were 35 males (59.3%). The mean age was 58.2 years (30-88). The mean Supra Coeliac Aortic Diameter (SCD) was 20.2 mm (16.5-27.0) and the mean Infra Renal Diameter (IRD) was 15.5 mm (11.2-19.3) in all subjects. IRD in males was 16.4 mm and IRD of males from a western study was 19.3 mm and this difference was statistically significant.

Conclusion

Therefore the Sri Lankan males have smaller aortic diameter compared to the western population. This should be taken into consideration when aortic aneurysm diameter is defined and when the threshold diameter for intervention is determined.

Introduction

The abdominal Aorta (AA) begins at the hiatus of the diaphragm at the 12th thoracic vertebral level and ends by dividing into common iliac arteries at the fourth lumbar vertebral level. The diameter of the AA decreases from the origin to the division with a significant reduction inferior to the origin of the visceral branches (infrarenal level). The aortic diameter varies with age, gender, and race [1]. Normal diameters of the infra-renal aorta in Korean and European populations are 19.0 and 21.0 mm respectively [2, 3]. There is a general belief that the aorta and the other arteries are smaller in diameter in South Asian and Sri Lankan populations. In a study done in India, the mean diameter of the infra-renal aorta was 13.8 mm (SD - 1.9) [4]. This aortic diameter is significantly smaller when compared to the aortic diameter of the European population (19.3mm) (P -0001) [5]. In Sri Lanka, no such studies were done on abdominal aortic diameters to date. However, surgeries are frequently performed on the aorta. Knowing the abdominal aortic diameter in the Sri Lankan population will help to define the definition of aortic aneurysms and the threshold for intervention. Also it will help in the selection of suitable grafts for aortic bypass surgeries.

The current study is on the abdominal aortic diameters from the CT images of patients presenting with an illness not related to the aorta in Sri Lanka.

Methods

This is a cross-sectional descriptive study done at the Teaching Hospital Anuradhapura (THA) Sri Lanka, from November 2018 to January 2019. Images of consecutive patients undergoing contrast-enhanced Computed Tomographic scan (CT) for non-aorta related illness were included. Data on age, gender and aortic diameter were collected. All the CT scans were done with Toshiba Aquilion Prime multi detector scan. Omnipaque 300 contrast was used with an injection rate of 4 to 5 ml/sec through 17G or 18 G cannulae. Images were acquired after 25 to 30 sec delay. Aortic diameter was measured as follows, 1 cm above coeliac axis (Supra-Coeliac Diameter- SCD) and just inferior to the renal arteries (IRD). Axial images, coronal images and sagittal images were analysed ( ). On axial imaging the maximum diameter was taken as the final diameter. However in case of tortuous aorta the diameter was measured perpendicular to the axis of the tortuous aorta to avoid getting falsely high value. The patients with incomplete data and

Correspondence: J. Arudchelvam
E-mail: joelaru@yahoo.com
https://orcid.org/0000-0002-4371-4527
Received: 15-09-2022 Accepted: 22-03-2023
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unclear images were excluded. A "p" value of less than 0.05 was considered statistically significant.

Results

Fifty nine patients were included. There were 35 (59.3%) males and 24 females (40.7%). Mean age was 58.2 years (30-88). Mean SCD in all subjects was 20.2 mm (16.5-27.0). The mean SCD in males was 21.1 mm and it was 18.9 mm in females. This difference was statistically significant (p - 0.0002). The mean IRD in all subjects was 15.5 mm (11.2-19.3). The mean IRD in males was 16.4 mm and it was 14.1 mm in females and this difference was statistically significant as well (P- < .00001). Supra Coeliac diameter of 30 -54 year age group was 19.1 mm and that of 55 - 80 year age group was 20.8 mm and this difference was statistically significant (p - 0.0038). Similarly there was an increase in the size of the infra renal aorta (IRD) in the above age groups i.e. in 30 - 54 year group it was 14.9 mm, whereas in 55 to 80 year age group it was 15.8 mm. But this difference was not statistically significant (p- 0.078).

Discussion and Conclusions

This study shows that the IRD of Sri Lankan males is significantly smaller than the western population. The mean diameter of the IRD in males in this study was 16.4 mm. This was compared with the IRD values from other studies. In Framingham Heart Study, there were 1767 males. The mean diameter of the infra renal aorta was 19.3 mm [5]. This difference is statistically significant (p - 0.00001) when compared with the mean IRD of the males in Sri Lankan study. Also in another study done in Korea among 478 males, the mean IRD was 19.0 mm [2] and this difference was also statistically significant (p - 0.00001). These facts indicate that the IR diameter of the study population in Sri Lanka is significantly smaller than the western and the Korean population. This study confirms the common belief that the diameter of the abdominal aorta of the Sri Lankan population is smaller than the western population. This marked difference suggests that the aortic aneurysm size definition and the size threshold for aortic aneurysm repair have to be redefined in Sri Lankan population.

Limitations

The number of subjects included in this study is small compared to other similar studies mentioned above. This is a drawback in this study. Also as mentioned earlier the diameter of the aorta is also known to vary with patients' comorbid conditions (hypertension), height, BMI, etc. [6]. The current study was retrospective study from the records at the radiology department. Therefore the above details cannot be analysed. This is also a drawback in this study. Therefore similar studies are needed in the future with a larger sample size.

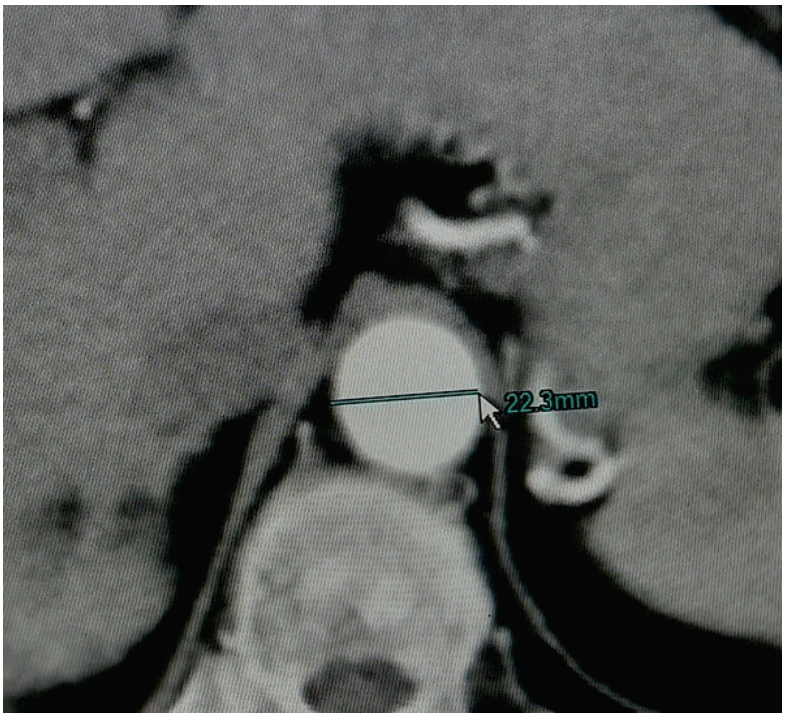

Figure 1. Supra celiac aortic diameter measurement

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SCIENTIFIC ARTICLE

North Colombo diverticular disease snap shot audit (VISTA study): a collaborative research initiative

P.C. Chandrasinghe[1], E.S. Ediriweera[2], M. Niriella[3], C. Ranwaka[4], A. Fernando[4], H. Gunawardena[4], S.K. Kumarage[1] and the North Colombo VISTA study group

[1]Department of Surgery, Faculty of Medicine, University of Kelaniya, Sri Lanka

[2]Department of Medicine, Faculty of Medicine, University of Kelaniya, Sri Lanka

[3]Health Data Science Unit, Faculty of Medicine, University of Kelaniya, Sri Lanka

[4]North Colombo Teaching Hospital, Ragama, Sri Lanaka

Keywords: Diverticular disease, audit, collaborative research, Sri Lanka, North Colombo

Abstract

Introduction

Diverticulosis and diverticular disease (DD) is a common occurrence in clinical practice in the local setting with a lack of documented literature. A snapshot audit was conducted at North Colombo Teaching Hospital (NCTH) to ascertain the disease burden in clinical practice as a pilot study to assess feasibility and response rate for a nation wide snapshot audit.

Methodology

All surgical and gastroenterology units at NCTH were requested to enter the data between 1st January 2022 to 30th of June 2022 on all patients presenting with DD or those detected with diverticulosis during screening colonoscopy. Prospective data collection was done using RedCap© data capturing platform.

Results

Out of the 8 units invited (general surgery – 5, GI surgery – 1, gastroenterology – 2), 5 units participated (general surgery – 2, GI surgery – 1, gastroenterology – 2); response rate is 62%. A total of 46 patient records (median age- 68 years; range 29-86; female 51%) were received within 6 months. Of the total 54.3% had symptomatic uncomplicated diverticular disease (SUDD) while 33% were detected with diverticulosis at screening. Only 13% (n=6) required inward care (bleeding – 3, diverticulitis – 2, perforation – 1) and detected using colonoscopy in 4 and CT scan in 2. In the DD group, 20% (6/31) had complicated DD while 80% had Symptomatic Uncomplicated Diverticular Disease (SUDD).

Conclusion

In this pilot study, a majority of the patients with DD presented with SUDD while around 20% came with complicated DD. The response rate from collaborators was satisfactory. The secure online database usage is feasible and will be used for a national level study in the future to assess the disease burden in the healthcare setting in Sri Lanka.

Introduction

Diverticulosis and diverticular disease (DD) is increasing in prevalence globally and is seen now commonly among the Asian populations as well . The exact pathophysiology of the disease is not well understood, but is believed to be out-pouchings of the colonic mucosa caused by an increased intraluminal pressure . The disease prevalence is known to increase with age where around 60% of individuals above 80 years have been reported in western literature (6). However an increase of diverticula amongst younger population has been reported lately (4).

Nomenclature related to colonic diverticula has caused confusion amongst clinicians for some time. There have ben several recent attempts at consensus on diverticula related conditions . Most patients with diverticula are asymptomatic and are diagnosed at screening colonoscopies. This condition is termed diverticulosis. The term diverticular disease is used to describe symptoms due to diverticula such as abdominal pain, diarrhea or when complications such as bleeding and inflammation occur. Complications occur when a diverticulum gets obstructed with a faecolith and a blood vessel is damaged or bacterial overgrowth occurs . The disease can cause complications varying from lower gastrointestinal bleeding, inflammation leading to perforation and abscess formation or fecal peritonitis . Colovesical or colo-enteric fistula formation is a rare complication. Complicated DD can result in significant morbidity, loss of time from work and multiple surgeries or permanent colostomy due to emergency Hartmann's procedure. The DAMASCUS study was a recently conducted global collaborative to ascertain the prevalence of diverticulitis across continents which is yet to be published .

Correspondence: P.C. Chandrasinghe
E-mail: pramodh@kln.ac.lk
https://orcid.org/0000-0002-3485-961X
Received: 18-11-2022 Accepted: 26-03-2023
DOI: http://doi.org/10.4038/sljs.v41i1.9010

There is a lack of data with regards to the prevalence or complications of diverticulosis and divertulitis in Sri Lanka. Personal communications from practicing clinicians revel an increase of the disease in the clinical setting. DD burden is increasing in the healthcare setting globally. The disease was once regarded as an entity common only in the western populations and at present there is an increasing trend in communities including that of Asians. Traditional belief was that diverticula of the right colon was common in the Asian populations and was of congenital origin as opposed to the left sided diverticula seen in the west acquired due to dietary habits.

DD can cause morbidity due to bleeding, inflammation, perforation, fistulation or stricture (8, 13, 14). The treatment modality will vary based on the severity of illness form oral antibiotic treatment in uncomplicated diverticulitis to colonic resection with stoma formation in complicated acute or chronic diverticulitis (8, 15).

In an Italian study comparing surgical versus conservative strategies the authors reported a better quality of life amongst those who underwent surgery (16). The Dutch DIRECT trial also reported similar result while Justin and colleagues reported better quality of life for patients undergoing surgery for recurrent uncomplicated diverticulitis (17-19). This would indicate that an increase in DD in the population would necessitate more surgical intervention as the disease is progressive in nature and is likely to give rise to recurrent attacks.

Only few isolated reports presented at local forums from Sri Lanka are available and no formal assessment has been done on the prevalence or management strategies. The aim of the study was to assess the burden of all colonic diverticula related events in clinical practice at the North Colombo Teaching Hospital. This study was intended as a pilot study to assess the feasibility and the infrastructure for a much wider nationwide snapshot-audit.

Methodology

VISTA was s a collaborative, prospective observational study (snap-shot audit), recruiting patients from general surgical, gastroenterological and gastrointestinal units at the North Colombo Teaching Hospital over a 6-month period. All encounters with diverticulosis and DD viz; asymptomatic patients with multiple diverticula detected at colonoscopy, symptomatic patients detected at colonoscopy, those presenting with symptoms or complications diagnosed with colonoscopy or imaging (Computer tomography) were included. The secure online platform REDCap was used for data capturing. All 8 units were invited to register for the study via REDCap access links.

All patient contacts were reported from the 1st of January 2022 to 30th June 2022. Demographic data, presentation, method of diagnosis, mode of management and discharge details were captured. All descriptive data are reported in percentages and numbers. Ethical clearance was granted by the ERC at the Faculty of Medicine, University of Kelaniya (P/145/10/2021).

Results

The response rate for the invite was 62% (5 out of 8 units). The 5 units encountered a total of 46 cases of diverticulosis and DD during the 6-month study period. The median age of presentation was 68 years (Range: 27-86) and 51.1% were female (Table 1). Of the total 33 % (n=15) had diverticulosis (asymptomatic individuals detected at screening colonoscopy) and 67% had DD. Of the patients with DD, 54.3% (n=25) were detected at colonoscopy performed due to symptoms and 13% (n=6) were treated as in-ward patients for symptoms or complications. Abdominal pain (40%) and rectal bleeding (24%) were the commonest indications for colonoscopy (Figure 1). Diverticular disease of the right colon was observed in 46%, while 30% had right-sided disease and 24% had a pan-colic distribution. From the patients treated in-ward, 50% (n=3) were admitted with bleeding, 33% (n=2) with uncomplicated diverticulitis and 16.7% (n=1) was due to diverticulitis with perforation. Out of the total cases, the complicated diverticulitis rate was 2.1%. Two out of the three patients with bleeding received blood transfusion while those with diverticulitis were managed with intravenous and oral antibiotics equally. The patient with perforation and abscess formation was managed with open drainage. Stool softeners were used in the management of 25 patients (54%), anti-spasmodics in 6 patients (13%) and probiotics in only 4 patients (8.6%).

Discussion

Diverticulosis and DD is a less well-studied disease entity in Sri Lanka and in the South Asian region. Earlier thought to be a disease of the west, it is now being increasingly encountered in clinical practice both as an incidental finding and symptomatic disease. A study from Italy has reported an increase of hospital admissions due to complicated DD in patients between 18 and 45 years of age (2). Several Asian studies have also reported an increase in the prevalence of DD and diverticulosis in the population during the past decade (10, 11). In the current study, the age range is from 18 to 86 while 10% (n=5) are 50 years or less (Figure 2). Evidence suggest that a majority of the patients with diverticula are

asymptomatic and only about 10-15% will present with symptoms (12).). In the absence of a widespread structured colon cancer-screening programme Sri Lanka, detection of asymptomatic patients will be less. In the current study 25 patients (54 %) out of the 46 were detected due to symptoms that falls under the category of symptomatic uncomplicated diverticular disease (SUDD) . Right-sided diverticula were observed in 46% of this cohort. Similar preponderance for right-sided DD in Asian populations has been reported previously .

Kamalesh et al has reported a 9.9% prevalence of diverticulosis in an Indian cohort based on retrospective analysis of colonoscopic findings (3). Rajendra et al reported a similar prevalence amongst an Indian population from Malaysia . Apart from this, recent data on prevalence of DD in the South Asian region is lacking. However, these figures are derived from cohorts that had colonscopy hence the true prevalence will not be reflected. True prevalence of diverticulosis is unlikely to be ascertained, as it will entail performing colonoscopy or imaging for the general population. A comprehensive snapshot audit would allow recognizing the disease burden in the health care setting. CT imaging is regarded as more sensitive to detect the presence of diverticula in the colon . However CT is performed for patients suspected of diverticulitis and not as routine for symptoms related to diverticula. Both colonsocopically and image detected patients were included in this study in order to capture both diverticulosis and DD.

The VISTA study was conducted as a pilot and an initiative for collaborative research in the local setting. Multi centre collaborative studies have become the trend in producing useful real-life data in the recent past. The large number of observations achieved during a short period of time has lead to producing practice changing evidence at a faster rate. Use of online data capturing platforms such as REDCap has made such studies feasible while ensuring maximum data protection . The response rate of 62% from the participants for this study is high considering the reported response rates for multicenter studies in literature . Based on the feasibility assessment of the current study, a national level snapshot audit has been launched (National VISTA). This stage expects to recruit a majority of surgeons and gastroenterologists from around Sri Lanka to contribute in a multicenter audit. This will enable the investigators to ascertain the disease prevalence, complication rates and management practice at a national level.

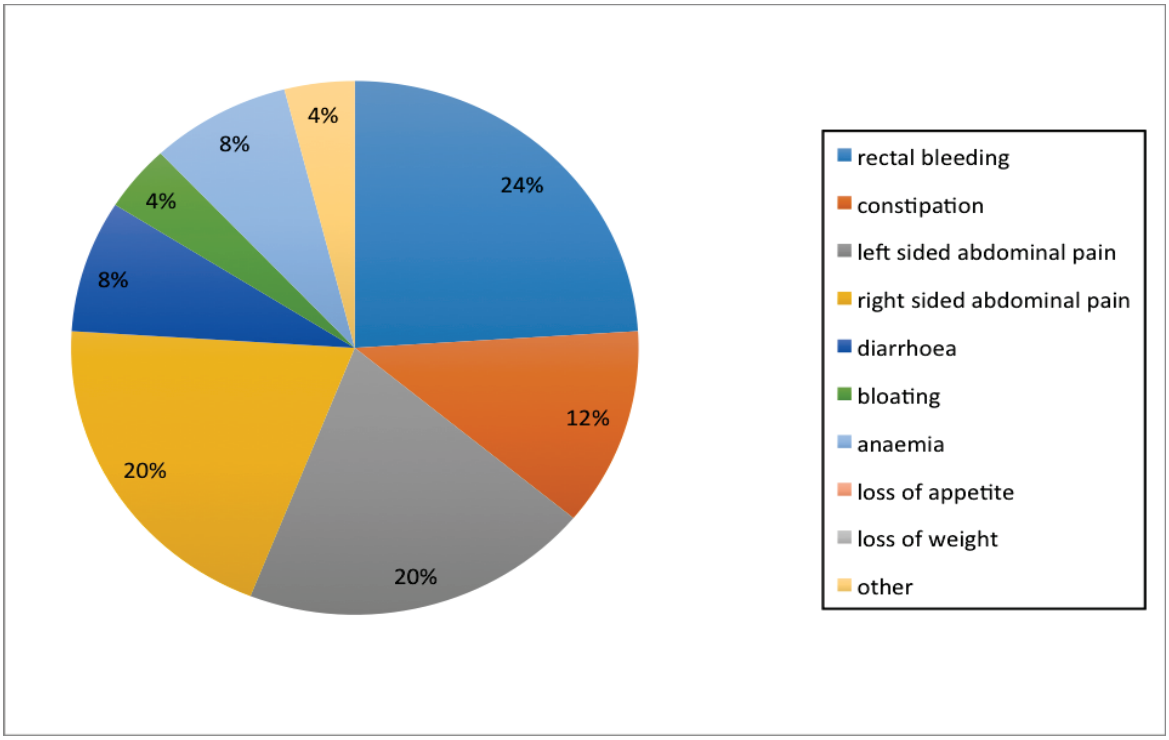

Figure 1. Indications for colonoscopy in those who had symptomatic uncomplicated diverticular disease (SUDD)

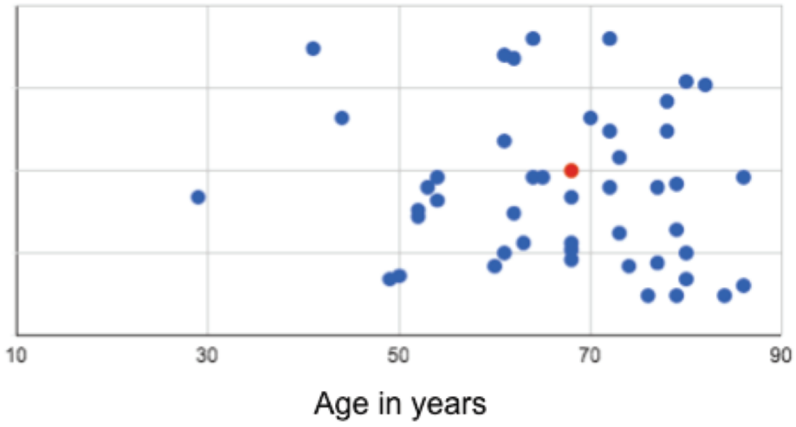

Figure 2. Age distribution of the cohort (median age is marked in red)

Table 1. Demographics of the cohort

	n	%
Total N	46	
Age (years)		
Median a	68	
Rang	18-86	
Sex		
Femal	51%	
Mode of detect		
Diverticulosis (At screening colonoscopy)	15	33%
Diverticular dis at colonoscopy		
symptor	25	54%
symptomati-		
warc	6	13%
Distribution		
right sid	21	40%
left side	14	30%
pan col	11	24%

North Colombo VISTA Study Group

A.S. Wijesundara (North Colombo Teaching Hospital, Ragama, Sri Lanka)

M.K.B.N. Kumara (North Colombo Teaching Hospital, Ragama, Sri Lanka)

N.M.P.G.G. Ganga (North Colombo Teaching Hospital, Ragama, Sri Lanka)

H.P. Mylvaganam (North Colombo Teaching Hospital, Ragama, Sri Lanka)

A.A.N. Nishad (North Colombo Teaching Hospital, Ragama, Sri Lanka)

S. Gishanthan (North Colombo Teaching Hospital, Ragama, Sri Lanka)

V.T. Samarawickrama (North Colombo Teaching Hospital, Ragama, Sri Lanka)

Author contributions

PC was involved in concept development, study design, data collection, data analysis, manuscript writing and critical appraisal. MN and SK were involved in the study design, data collection, data analysis and critically analysing the manuscript. DE was involved in concept building, setting up the data collection platform, data analysis and critically appraising the manuscript. CR, AF and HG were involved in study implementation, data collection and critical appraisal of the manuscript. All collaborators contributed with data collection and entry.

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SCIENTIFIC ARTICLE

A descriptive study on the assessment of fear of surgery in patients in a tertiary care center

S.C. Bandara[1], H.D.S. Niroshan[2], A. Pathirana[2]
[1]Post Graduate Institute of Medicine, Sri Lanka.
[2]University of Sri jayawardenepura, Sri Lanka.

Keywords : fear; surgery; post operative; pre operative; surgical fear questionnaire; quantify

Abstract

Introduction

The psychological aspect of patients awaiting surgery is an area often overlooked by surgical professionals. Fear of surgery is a common yet neglected aspect that is often associated with dire consequences like increased post-operative pain, increased use of analgesia, poor recovery, etc. This study describes the fear amongst surgical patients in a tertiary care unit from 2020 to 2021.

Method

Patients awaiting pre-selected major and minor surgeries were administered an internationally validated standard questionnaire (Eight item instrument of surgical fear: Surgical Fear Questionnaire) on their fear of surgery. The prospective descriptive data on the fear of surgery were analyzed with regard to variables such as demographic data, surgery, type of anesthesia, etc.

Results

130 patients were interviewed. Significant associations were identified between fear of surgery and age, educational level, ASA grading, duration of hospital stay prior to surgery, type of surgery, malignant disease, and type of anesthesia. However, gender, smoking and alcohol use, and history of previous surgery had no significant association. In view of an intervention to alleviate the fear of surgery 64% opted for no intervention/treatment, and 13.8% appreciated some sort of treatment. Strikingly 65% stated more information about the surgery would have been helpful.

Discussion and Conclusion

Fear of surgery in patients is associated with many factors. Preoperative identification of certain factors is helpful to predict and intervene to mitigate them. Informing the patients regarding surgery is important to reduce surgery-related fear.

Correspondence: S.C. Bandara
E-mail: sumedhacb@gmail.com
https://orcid.org/0000-0001-5063-7251?lang=en
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Introduction

According to oxford definition, fear is defined as an emotional state evoked by the threat of danger. Fear of surgery among patients who are awaiting surgery is multifactorial and is associated with dire consequences such as increased use of analgesia, poor post-operative recovery, poor physical function, and also poor mental health(1–3). Previous studies have identified multiple factors which inculcate fear in a patient awaiting surgery such as surgery itself, fear of anesthesia, undergoing blood transfusions, anticipated operative and post-operative pain, previous experience with surgery, age, sex, etc. (4,5).

Quantification of fear has been an issue worldwide. There are only a few validated study instruments available with regard to the assessment of fear and most of them are disease specific such as the Bypass Grafting Fear Scale (BGFS) and Surgery Stress Scale (For knee surgery) (6,7). There are a few nonspecific scales such as Hospital Anxiety and Depression Scale (HADS)(8), and State – trait Anxiety Inventory (STAI)(9). The surgical Fear Questionnaire (SFQ) is a generalized study instrument that is validated and tested in several populations and can be used across all types of surgical patients (10).

Assessment of surgical fear in patients is often an overlooked subsection of patient management worldwide which can be associated with dire consequences. The initial step in the management of surgical fear in an individual is the identification of the modifiable factors which are associated with surgical fear. In this study, we have used the Surgical Fear Questionnaire to assess the surgical fear among individuals awaiting surgery in a tertiary care center in Sri Lanka over 8 months.

Material and Methods

Ethical Approval

Ethical approval was obtained from the Ethics Review Committee of the Colombo South Teaching hospital before

the recruitment of patients for the study

Patient recruitment

Patients who were above 18 years of age and undergoing routine surgery from January to October 2020 in the university surgical unit of Colombo South Teaching hospital were recruited. Patients with known psychiatric disorders and ones who were unable to give a proper history were excluded. Patients who underwent emergency surgery were also excluded.

Study instrument and data collection

An interviewer-administered questionnaire which included demographic data, post-operative data, and surgical fear questionnaire was used for data collection

The surgical fear questionnaire is an eight-item study instrument for the assessment of surgical fear. It contains four short-term items and four long-term items related to surgical fear. All items are scored on an eleven-point numeric scale ranging from 0 (not at all afraid) to 10 (very afraid). This results in a score of 0 to 40 in each subscale and a total of 0 to 80. The items are, being afraid of the operation, anesthesia, postoperative pain, side effects, health deterioration, failed operation, incomplete recovery, and long duration of rehabilitation(11).

Socio-demographic and medical data with regards to sex, marital status, employment status, educational level, smoking, alcohol use, ASA grading, previous illnesses, history of previous surgery, drug history (anxiolytics, sedatives, steroids, anticonvulsants were used in analysis) and data related to pain with regards to the presence of preoperative pain which was assessed with a pain scale, analgesic use was also recorded. Data related to the surgery which the patient underwent, the anesthesia used, duration of hospital stay was also recorded. Personnel who informed the patient about the surgery and the other sources from which the patient gathered information about the surgery is also recorded. Postoperatively patients were questioned on their preference of treatment for surgical fear before surgery.

Statistical analysis

Each patient's total (t-SFQ), short-term (s -SFQ), long term (l -SFQ) were calculated according to the surgical fear questionnaire. Independent-samples t-test, One-way ANOVA test, and linear regression were analyzed with SPSS edition 26.

Results

130 patients were interviewed. The age range was 25 to 74 years with 86 being males. 35.4% had a university education, and 18.5% had education below the ordinary level. 46.1% had education up to an advanced level. 29.2% had either one or multiple co-morbidities of bronchial asthma, diabetes, and hypertension. 13.6% were smokers. 23.1% had had previous surgery. 96 patients had chronic preoperative pain, of which 86% had a pain score of less than 4. 61.5% of the patients used regular analgesics to alleviate pain. Table 1 depicts the patient characteristics of the population.

Table 1. Patient characteristics

n = 130	
Age (mean)	49.62
Male	86 (66.2)
Female	44 (33.8)
Marital status	
Married	118 (90.2)
Unmarried	12 (9.8)
Employment status	
Full time	74 (56.9)
Part time	14 (10.8)
Retired	16 (12.3)
Student	2 (1.5)
Temporary	6 (4.6)
Unemployed	18 (13.8)
Education level	
Below ordinary level	24 (18.5)
Up to ordinary level	32 (24.6)
Up to advanced level	28 (21.5)
University education	46 (35.4)
Smoking	
Yes	18 (13.8)
No	112 (86.2)
Alcohol	
Yes	38 (70.8)
No	92 (29.2)
History of previous surgery	
Yes	30 (23.1)
No	100 (76.9)
Benign	90 (69.2)
Malignant	40 (30.8)

Of 130 patients, the mean Surgical Fear Questionnaire – short term (SFQ-s) score was 15.89 (0-40). the mean surgical fear questionnaire – long term (SFQ-l) was 15.91 (0 – 40) and the mean full surgical fear questionnaire score (SFQ) was 31.80 (0 - 80). The mean SFQ scores for males and females were 30.7 and 33.95 respectively. There was no statistical significance in SFQ scores between males and females. A significant difference in mean SFQ scores was

noted between patients who are above 40 years (33.29) and less than 40 years (26.08). A statistical significance of SFQ scores was noted (p-value < 0.001) between patients with an education level of below ordinary level (mean – 32.17) and patients with university education (mean - 28.38)

When comparing the ASA grading of patients and their SFQ scores, the SFQ of ASA I patients (27.13) was significantly lower than ASA II and III patients. However, there was no statistical significance of SFQ between patients of ASA II and III. A statistical significance was noted between the duration of pre-operative hospital stay (one day – 23.59, more than one day – 34.34) and the SFQ score (p-value < 0.001).

Patients who had preoperative pain (33.76) had a significantly higher SFQ score than the patients who didn't have pre-operative pain (27.05) (p-value < 0.001).

Patients awaiting surgery for malignancies had a statistically significant higher SFQ score than patients awaiting surgery for benign conditions (p-value < 0.001). The individual question which had the highest mean fear score was "I am afraid of the long duration of rehabilitation after the operation" for patients who had both benign and malignant conditions. Patients who were planned for complex surgeries had a statistically higher (p < 0.001) SFQ score than patients who were planned for minor surgeries.

Patients who were planned for general anesthesia had a significantly higher SFQ score (35.56) than patients who were planned to undergo surgery under local or spinal anesthesia. However, there was no statistical significance between patients awaiting surgery under local or spinal anesthesia. No statistical significance was identified between SFQ scores of patients who were non-smokers and smokers and the use of alcohol.

Table 2. Factors which significantly affect surgical fear
Age
Educational level
Duration of hospital stay
Preoperative pain
Malignant disease
Type of surgery
ASA grading
General anesthesia

In view of an intervention to alleviate fear of surgery 64% opted for no intervention/treatment, and 13.8% appreciated some sort of treatment. 65% stated more information about the surgery would be helpful.

Discussion

The objective of this study was to assess the preoperative fear among patients who undergo various surgical procedures. Surgical fear is an often-overlooked area by surgical professionals all over the world. Assessment of surgical fear needs quantification of fear which has been an issue. There have been attempts to quantify surgical fear. The Surgical Fear Questionnaire (SFQ) is a tool that is used to quantify surgical fear and has been validated in many different languages and used in many research publications worldwide (11–14).

The mean surgical fear score in our study was 31.8. In two similar trials in the Czech Republic(13) and Turkey(15), the mean SFQ scores were 35.7 and 37.55 respectively. Even though there is a marked variation of the mean SFQ scores between the studies, whether there is an inter-ethnic variation in fear of surgery needs further evaluation with multiscale studies. A study done on patients who are awaiting cataract surgery showed SFQ of 8.2 (14) which is low compared to the studies which were done on patients who are awaiting general surgical procedures, which implicates patients' fear for surgery depends on the procedure they undergo.

No significant difference was noted between the male and female patients in our study. However other studies have observed an increase in fear associated with the female gender (12). Increasing age was found to be a factor which increases fear of surgery in multiple studies (1,12) including this study.

In our study patients with higher education had lower fear scores than patients with lower education. This has been assessed in two studies and one study showing similar results(1) and another study stating that there's no effect of educational level on the fear of surgery (5).

Statistically significant reduced level of fear was seen in patients with a lower ASA grading than patients with a higher ASA grading which can be because the presence of co-morbidities makes the patients more anxious and prone to develop a fear of surgical procedures.

The duration of hospital stay inversely affected the fear of surgery significantly where the lower the number of days in the hospital, the lower the fear. Hence reducing the number of

preoperative in-hospital days where possible is important in relation to reducing the fear of surgery of patients. Whether the patients who undergo day-case surgeries have the least fear was not evaluated in this study.

Patients who had preoperative pain had a higher fear score than patients who did not have preoperative pain in our study. A similar observation was noted in a study done on patients who were awaiting cataract surgery (1). Hence addressing persistent preoperative pain might be helpful in alleviating the fear of surgery in patients.

Patients who were awaiting surgery for malignant diseases and who were planned for complex major surgeries had a significantly higher fear score than patients who were awaiting benign surgeries. Patients who are awaiting complex surgeries and surgeries for malignant diseases have high anxiety levels which can contribute to the high fear scores (4). This cohort of patients can be considered for preoperative counseling and other interventions which helps to alleviate anxiety and fear for surgery.

Patients who were planned to undergo surgeries under general anesthesia had a higher fear score than patients who were to undergo surgeries under spinal or local anesthesia. This can be due to the anxiety with regard to the recovery from the general anesthesia of the community. However, this fact needs to be evaluated further.

Our study did not find any correlation between smoking and use of alcohol and the fear of surgery. There was no significant correlation between history of previous surgery and fear of surgery. Patients who had previous surgery had a mean SFQ of 33.53 and patients who did not have previous surgery had a SFQ of 31.28. There was no statistical significance between the two groups. However previous studies done on different populations (1, 10) have observed a reduced fear amongst patients who have undergone previous surgery which was attributed to the fact that facing surgery once would reduce the anxiety of a second surgery. Even though there was no statistical difference between the two groups, our study shows a higher mean SFQ in patients who have had previous surgery which is contradictory to the findings of the previous studies. This can be due to the unpleasant experience of the previous surgeries or can be due to the lack of sample size. Hence this fact needs to be evaluated further in forthcoming studies.

When interviewed about whether an intervention would be helpful in alleviating surgical fear in patients, 65% of the patients stated that more information regarding the surgery and the procedure would have been helpful in terms of alleviating the associated fear. Proper comprehensive patient information prior to surgery would reduce the anxiety and fear amongst patients which is often an overlooked area in the Sri Lankan medical setting.

There is no previous literature in the Sri Lankan setting with regard to the patient fear associated with surgery. Hence this study depicts the factors which are associated with fear of surgery amongst the Sri Lankan population. The study instrument was an interviewer-administered questionnaire since the surgical fear questionnaire is not translated and validated into the Sinhala language yet. This study paves the path to further studies that can translate and validate the surgical fear questionnaire into Sinhala language.

Conclusions

Age, educational level, ASA grading, duration of hospital stay, type of surgery, type of anesthesia, malignant or benign disease, and presence of preoperative pain, are associated with significantly higher surgical fear when assessed with the surgical fear questionnaire. Preoperative identification of factors that would increase the surgical fear would be helpful in planning out interventions that would be helpful in alleviating fear prior to surgery. An important aspect that was highlighted by the patients was that preoperative comprehensive patient information might be important in reducing the fear amongst patients awaiting surgical fear.

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SCIENTIFIC ARTICLE

Penetrating abdominal trauma: an experience at tertiary care centres

K. Rampal[1], D. K. Prajapati[2], H. Kaur[1], P. S. Sandhu[1], H. Singh[1], M. Sharma[3]
[1]Guru Gobind Singh Medical College & Hospital, Faridkot, India.
[2]Gajra Raja Medical College Gwalior, India.
[3]Government Medical College, Amritsar, India.

Keywords: PAT, penetrating abdominal trauma, stab injury abdomen; exploratory laparotomy, evisceration abdomen

Introduction

Stab injuries of abdomen are an ever increasing presentation in the emergency department of various hospitals. Abdominal stab wounds may or may not penetrate into the peritoneal cavity and this for long has been the deciding factor while planning the further line of management for the patient. Stabs that penetrate the abdominal cavity may or may not cause the evisceration of omentum or abdominal organs [Figure 1,2,3]. Omental or organ evisceration has been associated with intra abdominal injuries in 68%-75% of the cases (1). This association has been responsible for the formulation of exploratory laparotomy being accepted as the standard line of management for such cases (2). The association is stronger with the evisceration of organs than with omentum alone3. Asymptomatic patients with penetrating stab wounds have been reported to have significant intra abdominal injuries in 36.5% cases (3).

As there has been an advancement in radiological techniques and also the availability of minimal invasive equipment has seen an upward trend, non operative management penetrating abdominal trauma (PAT) has continuously evolved and is gaining wider acceptability(4,5,6)]. Non operative management involves careful clinical examination, judicious use of available radiological investigations and intensive care facilities (7). Organ evisceration is long recognized and accepted indication of exploratory laparotomy while omental evisceration is a relative indication for surgical intervention and often institutional practices vary. Uses of tomographic scans, ultrasound and diagnostic peritoneal lavage have enjoyed success but do have their limitations (8). The use of diagnostic laparoscopy offers advantage of a possible therapeutic intervention besides diagnosis (9). But the use of diagnostic laparoscopy too has been marred by its general unavailability in the emergency department settings, especially in developing country set ups. Also a high rate of missed injuries has been reported in studies on use of diagnostic laparoscopy in penetrating abdominal trauma (10). We have aimed to study the feasibility of conservative management by observing the outcome and findings in patients of penetrating trauma abdomen reporting to us.

Figure 1. omental evisceration

Figure 2. omentum and gut evisceration

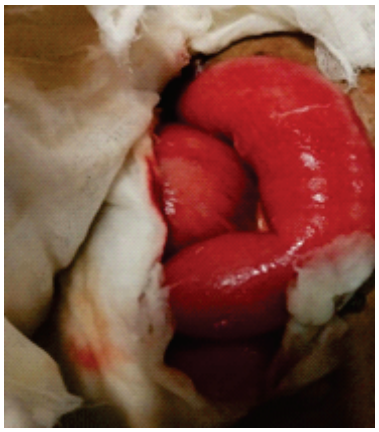

Figure 3. gut evisceration

Correspondence: M. Sharma
E-mail: smeghna2012@gmail.com
https://orcid.org/0000-0002-8134-6008
Received: 24-08-2022 Accepted: 08-03-2023
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Aims and objectives

To observe patient profile, operative findings, clinical course and outcome in patients with penetrating abdominal trauma, with and without evisceration of intra abdominal contents presenting to the emergency department of our institutes.

Materials and Methods

All patients presenting with and without evisceration of intra abdominal contents following penetrating stab injuries were observed from July 2013 to December 2020. All individual patients were followed up for 06 months post discharge through telephonic communication.

Patients with hemodynamic instability, peritonism, solid or hollow viscus evisceration and radiological evidence of bowel perforation were taken up for upfront laparotomy. Hemodynamic instability was labeled when the patient failed to respond to initial fluid challenge. Of these, the patient who were operated with simultaneously ongoing resuscitation were included in emergency laparotomy group, those who were operated after formal resuscitation but within 08 hours of presentation were put in early laparotomy group and those operated after 08 hours of presentation formed the late laparotomy group. Injuries that crossed the posterior fascia of the abdominal wall on local exploration were taken as penetrating abdominal trauma. Both omental and organ evisceration cases were taken up for laparotomy as per our institutional practices. Penetrating stabs with no tissue evisceration (omental or organ), hemodynamically stable, no peritonitis cases and cases with no radiological evidence of hollow viscus perforation formed the conservative management group. Those in conservative management group were subjected to continuous vitals monitoring, two hourly assessments for peritonitis, twice daily basic hematological investigations, Contrast enhanced computer tomogram on arrival, daily urine routine microscopy and daily chest and abdomen X-ray examination for 72 hours. Patients were kept nil per orally in anticipation of a possible surgical intervention for at least 24 hours. Uncooperative patients, pregnant females, non consenting individuals, gunshot abdominal injuries and brought dead cases were excluded from the study.We observed age, sex, site of injury, findings on laparotomy, mortality and morbidity data.

Statistical analysis

Normally distributed continuous variables were recorded as mean and categorical variables were expressed as percentage.

Results

We studied 72 patients with penetrating abdominal trauma (PAT) presenting to our institutes. We observed evisceration to be present in 48 patients forming 66.67% of total patients. Non evisceration PAT was observed in 24 patients forming the remaining 33.3% patients. Males were the predominant victims constituting 84.7% cases while the females accounted for 15.2% cases. PAT injuries were also predominant in the younger age groups lying in the 18-40 years age bracket (55.5% cases). Mean age of the victims is 38.4 years. Youngest patient who reported us aged 16 years while the oldest patient that we had aged 74 years. Amongst the patients having evisceration of abdominal content, 36 patients (75%) had isolated omental contents while 12 patients (25%) had organ evisceration. Two patients had stomach as the eviscerated organ while rest had small bowel as the eviscerated organ. [Table 1]

Twelve patients were haemodynamically unstable and were taken up for emergent laparotomy with simultaneous resuscitation. 32 patients responded to initial resuscitation and were operated within 08 hours of presentation, constituting the early laparotomy group. 08 patients were operated after 08 hours, forming the late laparotomy group. Four of these late operated patients were from non eviscerated PAT category, which were earlier kept under conservative management but had to be operated based upon radiological findings or development of generalized peritonitis. [Table 1]

Per operatively twenty six patients (46.2%) were found to have bowel perforation with fourteen of these patients having multiple perforations. Perforation of bowel was seen in 100% cases with gut evisceration while 38.9% of cases with omental evisceration had associated bowel perforation. Isolated mesenteric injury was seen in ten patients (17.8%) while only four (7.1%) patients had isolated serosal tears without any bowel perforation. [Table 1]

Solid organ injury was detected in twelve patients out whom six (10.7%) patients had isolated solid organ injury. 77.9% injuries were sustained in the upper abdomen (above the level of umbilicus). Epigastrium was the most common region to be involved contributing 25% to the total cases. Multiple PAT injuries involving same region or more than one region of abdomen were seen in 18 cases (25%). Multiple PAT injuries are an indicator of the viciousness of the assailant. [Table 1]

Time of arrival to hospital post injury is often the key factor deciding recovery. We received 77.8% of our patients within six hours of injury. 38.9% out of these, presented in the two to four hours bracket. [Table 1]

Post operative complications were observed in 30 cases accounting for 41.4% of the total cases. Post operative fever was the most common complication seen 26.3% cases. 23.6 % cases had wound site infections. Chest related complications were seen in 8.3% cases. Most complications were self limiting responding to conservative management and only one case required re- exploration for anastomotic complication. We did not observe any mortality. [Table 1]

All conservatively managed cases were discharged within the first week with 37.5% of them getting discharged within three days. Majority of the cases including the operated category were sent home by 10 days and only 4 patients (5.5%) stayed beyond two weeks. Maximum observed stay was of 04 weeks. [Table 1]

Discussion

Penetrating abdominal injuries are a very common presentation in the emergency departments of all tertiary care hospitals. Majority of the cases in the past were subjected to exploratory laparotomies resulting in high rates of negative laparotomy. Leppaniemi et al showed cost effective management in PAT case with observant treatment through a shorter mean hospital stay of 2 days (11). We discharged 37.5% of conservative group patients in 03 days. Shaftan had questioned the routine use of laparotomy in abdominal trauma in his study published in 1960 and used peritonitis, intestinal bleed and paracentesis as indicators for surgery (12). We in our study are in coherence with this approach. M. Ohne Yeboah et al have highlighted high negative laparotomy rates in their country due to continuous practice of laparotomy for every PAT (13). They also found that peak age of presenting cases was 20- 29 years with 39.9% cases belonging to this age group. 33.3% of our cases are in the age of 18-30 years. They subjected 80.5% of their cases to laparotomy while we applied surgical management to 77.8% of our cases. They reported 29% negative laparotomies. We avoided surgery in stable non evisceration PAT, but still highlight the possible avoidance of surgery, in our cases with isolated serosal tears and isolated solid organ that formed 17.8% of our cases.

Clarke et al emphasised need for restricting laparotomies to patients with peritonitis and haemodynamic instabilities (14). They also reported that 20% of conservatively managed cases ultimately require surgery that in our study is only 2.24% (04 cases). M Silva et al 86.4 % cases with evisceration had internal injuries (15). We found bowel perforation in 100% cases with gut evisceration and 38.9% of cases with omental evisceration. Organ evisceration hence is an indication for laparotomy due to the high frequency of intra abdominal injuries associated with it, while omental evisceration cases are increasingly being dealt with local wound management, intensive care protocols and radiological support. Maurice Asuque et al have highlighted gut perforation as the most common injury sustained in PAT, corroborating our results (16). They managed 13.8% cases conservatively where as we had 22.2% patients under conservative management. Shahin Hajibendeh et al have demonstrated the advantage of using laparoscopy as means to reduce hospital stay, reduce post laparotomy complications and in avoiding negative laparotomies too (17). They found laparoscopy to be 100% sensitive in PAT. We like majority of the institutes in developing nations did not have the availability of lapaoscopic set in emergency departments. Wherever available, laparoscopy can go a long way in avoiding negative laparotomies.

Conclusion

We need to curtail laparotomies in penetrating abdominal trauma while still maintaining high levels of vigil for missed intra abdominal trauma. Use of minimal invasive techniques with judicious use of CT scans needs to be encouraged to arrive at desirable outcomes.

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Table1 - Multiple variable analysis

Multiple variable analysis			
Category	Value		Percentage(Total)
Sex			
Male	61		84.7
female	11		15.2
Age in years	Mean – 38.4 years		
Less than 18 years	1		1.4
18-30	24		33.3
31-40	16		22.2
41-50	11		15.3
51-60	11		15.3
61-70	8		11.1
More than 70	1		1.4
Evisceration			
Yes	48		66.7
No	24		33.3
Eviscerated content			
Omentum	36		75
Organ	12		25
Management			
Surgery	56		77.8
Conservative	16		22.2
Hemodynamic instability	12		16.7
Operative findings			
Hollow viscus perforation	26		46.2
Isolated mesenteric injury	10		17.8
Isolated serosal tears	4		7.1
Isolated solid organ injury	6		10.7
Area of Injury			
Epigastrium	18		25
Left hypochondrium	10		13.9
Left lumbar	6		8.3
Left iliac	3		4.1
Hypogastrium	nil		nil
Right iliac	3		4.1
Right lumbar	7		9.7
Umbilical	1		1.4
Multiple	18		25
Time of arrival after injury			
Less than 02 hours	4		5.6
2- 4 Hours	28		38.9
4-6 hours	24		33.3
More than 06 hours	16		22.2
Post operative complications	Operated	Conservative	
Fever	18[32.1%]	1[6.25%]	26.3
Wound infection – Primary stab wound	6[10.7%]	2[2.7%]	11.1
Wound infection – Laparotomy wound	9 [16%]	-	12.5
Multiple transfusions	4[7.1%]	1[6.3%]	6.9
Bowel leak/anastomotic complications	1[1.7%]	-	1.4
Chest or lung complications	6[10.7%]	-	8.3
Hospital stay in days			
0-3	-	6(37.5%)	8.3
4-7	08[14.3%]	10[62.5%]	25
8-10	34[60.7%]	-	47.2
11-14	10[17.9%]	-	13.8
More than 02 weeks	4[7.1%]	-	5.5

Review Article

Prostatitis: current perspective on diagnosis and management

B. Balagobi[1], S.T. Sarma[1], S. Gobishangar[1], T. R. Brammah[2], A.A. Jenil[3], S. Gobinath[3], U. Sankeetha[1], S. Anushika[1]

[1]Deapartment of Surgery, Faculty of Medicine, University of Jaffna, Sri Lanka.

[2]Department of Medicine, Faculty of Medicine, University of Jaffna, Sri Lanaka.

[3]Teaching Hospital, Jaffna, Sri Lanaka.

Keywords: Bacterial prostatitis, Chronic pelvic pain syndrome, Prostate abscess, Granulomatous prostatitis, Prostatic massage

Abstract

Prostatitis is a common and important urological problem which affects men of all ages. It is a challenging condition to be diagnosed and treated. It is classified under four categories according to the National Institute of Health Classification (Category 1 - Acute bacterial prostatitis, Category 2- Chronic bacterial prostatitis, Category 3-Chronic prostatitis / chronic pelvic pain syndrome, Category 4 – Asymptomatic inflammatory prostatitis). The most common causative organism for both acute and chronic prostatitis is Escherichia coli. Investigation and treatment of prostatitis depend on the clinical presentation of the respective clinical category. Antimicrobials are the mainstay of treatment of acute bacterial prostatitis according to the culture and sensitivity pattern. Chronic bacterial prostatitis needs a long duration of treatment depending on clinical conditions and treatment response. Surgery is rarely indicated in bacterial prostatitis except for a prostatic abscess. Granulomatous prostatitis is an uncommon inflammatory condition with different management options for morphologically different entities. This review looks at each category's presentation, aetiology, diagnosis, treatment, and prognosis

Introduction

Prostatitis is an important universal health problem with limited population-based studies and clinical evidence [1]. This results in limitations in clinical evaluation and treatment options in prostatitis.

The prostate gland comprises a basal cell layer and an overlying columnar secretary cell layer. Surrounding stroma contains a mixture of smooth muscle and fibrous tissue involved in infectious, inflammatory, hyperplastic, and neoplastic disorders. The prostate is classified into different zones. Most cancers arise from the peripheral zone, and most benign prostatic hyperplasia (BPH) arises from the transitional and central zones. Prostate-specific antigen (PSA) is a serine protease and a marker of prostatic disease, and its level increase with age, infection, benign prostatic hyperplasia, and prostate cancer [2].

Prostatitis is a combination of four clinical categories as described in the National Institute of Health (NIH) classification; acute bacterial prostatitis, chronic bacterial prostatitis, chronic prostatitis/chronic pelvic pain syndrome, and asymptomatic inflammatory prostatitis [3]. Proper evaluation, categorisation and appropriate management of different clinical syndromes are essential to reduce morbidity and improve the quality of life in patients diagnosed with prostatitis.

This review investigated each NIH prostatitis category's presentation, aetiology, diagnosis, treatment, and prognosis.

Methods

Google Scholar and PubMed literature searches were carried out with the above-mentioned keywords, and only the full-text articles were included.

Epidemiology

The prevalence of prostatitis varies between 2% to 9.7%, confounded by different sampling methods and epidemiological variations [3], and population-based studies needed to precisely identify prevalence are scant. Population-based studies from Europe and Asia show that 3% -14% of men experienced prostatitis-like symptoms in their lifetime. The variation may be due to genetic differences, cultural factors, lifestyle, socioeconomic status, and exposure to various risk factors. The lifetime risk of prostatitis increases with age, and the risk of subsequent episodes and progression to chronic prostatitis is higher in patients who have had a previous episode of prostatitis. [1, 3]. Prostatitis is a common urological problem in older men but is seen in young and middle-aged as well [1].

Correspondence: B. Balagobi
E-mail: b.balagobi@yahoo.com
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Acute bacterial prostatitis

Acute bacterial prostatitis (ABP) is a bacterial infection of the prostate gland caused by an organism that defends the prostate gland's natural immune system. It is rare, accounts for 2-5% of prostatitis cases [4], and occurs in young and older men [1, 5]. Acute bacterial prostatitis can be caused by an organism from the natural flora of bacterial species, inoculated directly following urological procedures like transrectal or transurethral prostate biopsy or urethral instrumentation like cystoscopy. Haematogenous spread and ascending infections are the other modes. The most common causative organism for acute bacterial prostatitis is Escherichia coli, accounting for 50%- 80% of cases [5,6,7,8]. Other gram-negative organisms such as Proteus, Klebsiella, Enterobacter, Serratia and Pseudomonas are often identified. Gram-positive organisms identified are Staphylococcus, Streptococcus and a few other organisms, including Chlamydia trachomatis and Neisseria gonorrhoeae are identified as well [5, 7, 8].

Table 1: NIH Prostatitis Classification System

Category		Types
I		Acute bacterial prostatitis
II		Chronic bacterial prostatitis
III		Chronic prostatitis/Chronic Pelvic Pain Syndrome
	A	Inflammatory
	B	Non inflammatory
IV		Asymptomatic inflammatory prostatitis

(Nickel JC et al, 1999)

Patients with acute bacterial prostatitis often present with sudden onset systemic illness with features like fever and malaise. Lower urinary tract storage symptoms, voiding symptoms and symptoms of urinary tract infection may also be present with or without associated pelvic pain. Often patients have a preceding history of urethral instrumentation [5,8].

The clinical picture varies from abdominal distension due to acute urinary retention to features of sexually transmitted disease. There could be associated suprapubic pain and tenderness. Digital rectal examination (DRE) often reveals an enlarged tender prostate suggestive of acute inflammation. However, prostate massage during DRE should be avoided as it may worsen patients' condition [5,8]. All patients suspected of acute bacterial prostatitis should undergo a full blood count, urine full report and urine culture. Rarely prostate abscess develops as a complication of acute bacterial prostatitis and could be a presenting feature.[4].

A study has shown that 6% of patients develop prostatic abscesses during follow-up after acute bacterial prostatitis. Imaging studies such as ultrasound scan (USS) kidney, ureter, bladder with or without trans-rectal probe and contrast-enhanced computed tomography (CECT) support the diagnosis in patients who are suspected of having prostatic abscess; especially when the duration of symptoms is prolonged or continuous voiding symptoms are present. Figure 1 demonstrates the hypoechoic collection of prostatic abscesses seen in transrectal USS. A prostatic abscess needs surgical drainage when it fails to respond to antibiotic therapy [5, 7, 9,10].

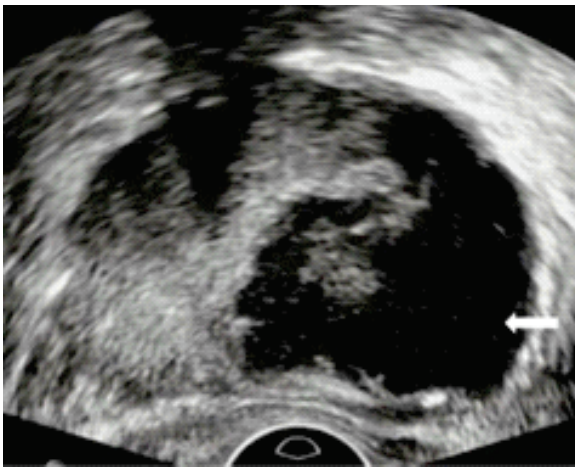

Figure 1 Trans rectal USS shows prostatic abscess.

Antimicrobials are the mainstay of treatment of acute bacterial prostatitis. The selection of appropriate antimicrobial agents depends on the degree of penetration of antibiotics into the infected prostate tissue and the transport mechanism. Non-protein bound and low molecular weight antibiotic molecules enter the prostate tissue through the opening between capillary endothelial cells. The penetration of antimicrobial agents is enhanced by; small molecular size, low protein binding, low degree of ionisation, high lipid solubility, high dissociation constant and high concentration gradient [6,11]. Table 2 depicts the antibiotics with good penetration into prostatic tissue. As bacterial acute prostatitis can be a serious infection, empirical treatment of high doses of parenteral antibiotics is required. According to the recommendations, broad-spectrum penicillin derivatives, fluoroquinolones or third generation cephalosporins are the preferred options.

Figure 2 A - TURP in prostatic abscess. B - Trans rectal drainage of prostatic abscessAs Escherichia coli (E coli) is the commonest causative organism, the selection of empirical antimicrobial agents should be focused on eradicating the above. Culture and antibiotic sensitivity patterns then further guide the treatment. Parenteral antibiotics can be changed to oral once the fever and acute illness are settled. Less severe cases could be treated with oral fluoroquinolones with a minimum duration of 10 days. Acute urinary retention could be treated with suprapubic, intermittent, or indwelling.

catheterisation, however, suprapubic catheterisation is the recommended option [8]. In the absence of the need for drainage of prostatic abscess, surgery should be avoided in bacterial prostatitis [5, 12]. Fig 2 shows transrectal drainage of the prostatic abscess. Trans-urethral resection of prostate (TURP) in such patients reduces the duration of antibiotic therapy and improves voiding symptoms [10]

Chronic bacterial prostatitis

Chronic bacterial prostatitis occurs in 2%-5% of all prostatitis cases [4]. It is defined by identifying an organism in prostatic secretion culture in a patient with symptoms, such as perineal, loin or suprapubic pain associated with recurrent episodes of urinary tract infection. This may or may not be associated with obstructive or voiding symptoms. Typically, the patients are asymptomatic between episodes [7]. Recurrent urinary tract infections occur in 25%-43% of patients with chronic bacterial prostatitis [4]. Patients generally present with insidious onset of progressive symptoms over months. The nonspecific nature of symptoms makes the diagnosis difficult in routine clinical settings [13]. Patients diagnosed with acute bacterial prostatitis have a 10% risk of developing chronic bacterial prostatitis in future, and 10% of such patients develop chronic pelvic pain syndrome [7].

The organism implicated in the aetiology of chronic bacterial prostatitis is E Coli, which accounts for 80% of such cases. Other organisms implicated are gram-negative species of Enterococcus and Pseudomonas [4, 7].

Table 2: Antibiotics with good penetration into prostatic tissue

Antibiotics
Fluoroquinolone
Trimethoprim – sulfamethoxazole
Clindamycin
Doxycycline
Azithromycin
Cephalosporins
Carbapenems
Piperacillin
Other aminoglycosides

Wagenlehner FM et al, 2013

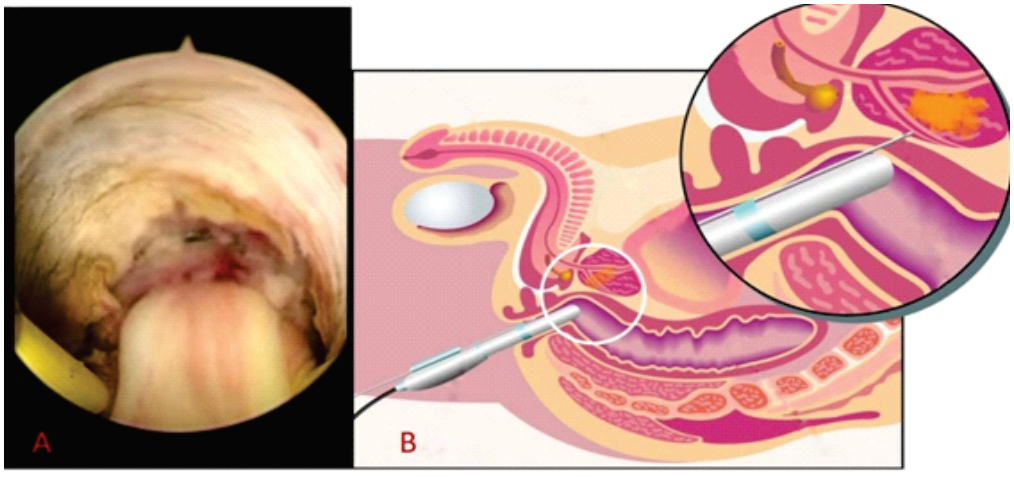

Figure 2 A - TURP in prostatic abscess. **B -** Trans rectal drainage of prostatic abscess

Diagnosis of chronic bacterial prostatitis

The gold standard test for diagnosing chronic bacterial prostatitis is the four-glass test (Fig 3) described by Meares and Stamey. This focuses and identifies the infective focus along the lower urinary tract and prostate. Four samples are tested; first voided, mid-stream, expressed prostatic secretion, and post-prostate massage urine. [7, 13]. Considering the patient's inconvenience, discomfort and cost, the four-glass test is hardly used in clinical practice. A simple and easy two-glass test includes a clean catch urine sample before an examination and another sample of prostatic secretion during or first voided sample following a prostatic examination. A routine urine culture cannot be used alone to diagnose chronic bacterial prostatitis. When considering seminal fluid culture, a negative culture cannot rule out bacterial prostatitis. However, positive seminal fluid culture in a patient with high clinical suspicion of chronic prostatitis confirms the diagnosis and warrants antibiotic treatment [13].

Treatment

Chronic bacterial prostatitis is difficult to treat and needs a long duration of treatment with a fluoroquinolone for at least 3-4 weeks. Depending on the response and clinical condition, this may need to be extended further. In the presence of fluoroquinolone resistance, prolonged treatment of 2 -3 months of trimethoprim or cotrimoxazole is advised [8]. Other than antibiotic treatment, anti-inflammatory drugs such as non-steroidal anti-inflammatory drugs (NSAIDs) can be used in chronic bacterial prostatitis to reduce symptoms and inflammation. Despite the long duration of antibiotic therapy, a 25%-50% recurrence rate can be seen [7]. Alpha-blockers (Tamsulosin) reduce symptoms as well as recurrences [12]. A combination of alpha-blockers and antibiotics has been reported to have an increased cure rate than antibiotics alone [8, 12]. Some treatment-resistant patients managed with an intra-prostatic injection of antibiotics and radical transurethral prostate resection have resulted only in modest outcomes [4]. Generally, surgery should be avoided in chronic prostatitis, except in the case of prostatic abscess [7,12]

Chronic abacterial prostatitis (chronic pelvic pain syndrome)

Chronic abacterial prostatitis (CAP) is described as genitourinary pain without pathogenic bacteria detected by standard microbiological methodology. It is further categorised as inflammatory and non-inflammatory, depending on the presence or absence of white cells in expressed prostatic secretion, ejaculation, post-prostate massage urine, or prostate biopsy [14]. Despite the inadequate understanding of the relevance of white blood cells in a specimen, lack of standardisation of investigation techniques, lack of cut-off value for elevated white blood cells, and lack of understanding regarding the microorganisms that are detected in the specimen in the above-mentioned diagnostic investigation, NIH classification system is still effective and useful in both clinical and in research settings [15].

CAP affects approximately 10%-15% of men of all ages and is more common in 36-50 years [16]. The main symptoms are genitourinary pain and associated voiding and sexual dysfunction. However, pain may be absent in patients who have already been diagnosed with chronic prostatitis, and obstructive or voiding symptoms may predominate at the time of presentation. The NIH Chronic prostatitis symptom Index (NIH – CPSI) is a commonly used questionnaire for assessing symptom severity in patients with chronic prostatitis [15].

The cause of chronic prostatitis remains unclear and may be associated with bacterial pathogens; Viruses and fungi have also been rarely implicated [14]. Non-infectious causes such as inflammation, intra prostatic urinary reflux, hormonal imbalance, pelvic floor tension myalgia and psychological disturbances are considered as well. Patients who are predisposed to chronic prostatitis develop symptoms after being exposed to above mentioned possible risk factors [14,17]. The diagnosis of CAP is difficult in a clinical setting due to unclear aetiological factors and absence of standard diagnostic tools. Therefore, proper clinical evaluation of the patient is important to exclude other diseases that cause urinary tract symptoms. Urinary obstruction and urinary retention warrant thorough evaluation before a diagnosis of chronic prostatitis is considered. Prostatic calcification is common in patients with CPPS, which is associated with the level of inflammation, positive bacterial culture and duration of symptoms [18]. Fig 5.0 shows the prostatic calcification in TRUS.

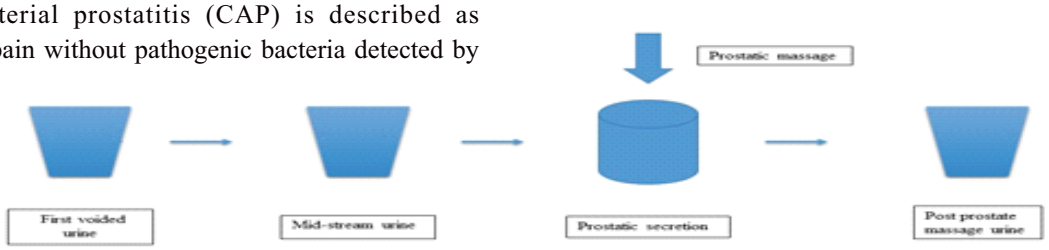

Figure 3.0 Meares and Stamey test

NIH-Chronic Prostatitis Symptom Index (NIH-CPSI)

Pain or Discomfort

1. In the last week, have you experienced any pain or discomfort in the following areas?

a. Area between rectum and testicles (perineum) ☐yes ☐No
b. Testicles ☐yes ☐No
c. Tip of the penis (not related to urination) ☐yes ☐No
d. Below your waist, in your pubic or bladder area ☐yes ☐No

2. In the last week, have you experienced:

a. pain or burning during urination ☐yes ☐No
b. Pain or discomfort during or after sexual climax (ejaculation)? ☐yes ☐No

3. How often have you had pain or discomfort in any of these areas over the last week?

☐ 0 Never
☐ 1 Rarely
☐ 2 Sometimes
☐ 3 Often
☐ 4 Usually
☐ 5 Always

4. Which number best describes your AVERAGE pain or discomfort on the days that you had it, over the last week?

0 1 2 3 4 5 6 7 8 9 10
No pain pain as bad as you can imagine

Urination

5. How often have you had a sensation of not emptying your bladder completely after you finished urinating, over the last week?

☐ 0 Not at all
☐ 1 Less than 1 time in 5
☐ 2 Less than half the time
☐ 3 About half the time
☐ 4 More than half the time
☐ 5 Almost alway

6. How often have you had to urinate again less than two hours after you finished urinating, over the last week?

☐ 0 Not at all
☐ 1 Less than 1 time in 5
☐ 2 Less than half the time
☐ 3 About half the time
☐ 4 More than half the time
☐ 5 Almost always

Impact of Symptoms

7. How much have your symptoms kept you from doing the kinds of things you would usually do0, over the last week?

☐ 0 None
☐ 1 Only a little
☐ 2 Some
☐ 3 A lot

8. How much did you think about your symptoms, over the last Week?

☐ 0 None
☐ 1 Only a little
☐ 2 Some
☐ 3 A lot

Quality of Life

9. If you were to spend the rest of your life with your symptoms just the way they have been during the last week, how would you feel about that?

☐ 0 Delighted
☐ 1 Pleased
☐ 2 Mostly satisfied
☐ 3 Mixed (about equally satisfied and dissatisfied)
☐ 4 Mostly dissatisfied
☐ 5 Unhappy
☐ 6 Terrible

Scoring the NIH-Chronic Prostatitis Symptom Index Domains

Pain: Total of items 1a, 1b, 1c, 1d, 2a, 2b, 3, and 4 = ...
Urinary Symptoms: Total of items 5 and 6= .....
Quality of Life Impact: Total of items 7, 8, and 9=.....

Figure 4 NIH-Chronic prostatitis symptoms index

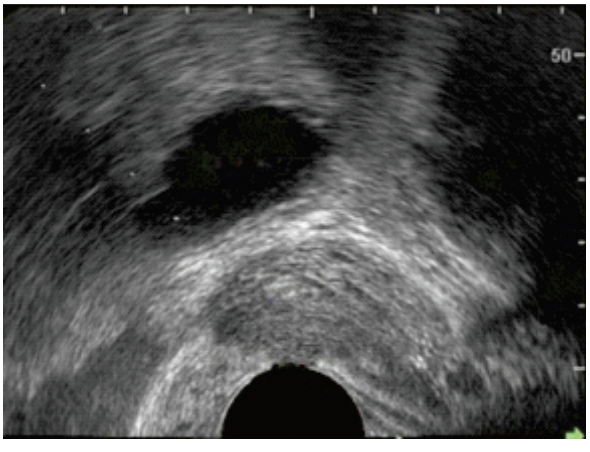

Figure 5.0 Prostatic calcification on TRUS

Treatment of chronic pelvic pain syndrome

Treatment with a combination of ciprofloxacin and doxazosin (an alpha blocker) for 30 days reduces symptoms and discomfort and increases the quality of life [19]. The chronic prostatitis collaboration research network recommends treatment, as shown in Table 3 [4].

Table 3: Treatment option of chronic pelvic pain syndrome

1st line	fluoroquinolone / trimethoprim-sulfamethoxazole
2nd line	tamsulosin, alfuzosin, terazosin
3rd line	finasteride, pentosan polysulfate, phytotherapies
Other	biofeedback, pelvic floor training, thermal treatment

[Habermacher GM *et* al, 2006]

Asymptomatic inflammatory prostatitis

According to the NIH classification, asymptomatic inflammatory prostatitis is defined as the presence of inflammatory cells in prostatic secretion or prostatic tissue histological samples in the absence of symptoms of prostatitis. This is diagnosed incidentally when patients are evaluated for other diseases. It is the common underlying pathology in patients with a benign prostatic enlargement (BPE). An elevated level of PSA correlates with the degree of prostatic inflammation [20]. Asymptomatic prostatic inflammation causes morphological changes in the prostate tissue, resulting in symptomatic BPE. As patients are asymptomatic, treatment is not indicated, except in the following situations: patients with elevated PSA, patients on evaluation for infertility and patients with a confirmed diagnosis with prostate biopsy [21].

Figure 6.0 Contour deformity along the margin of prostate

Granulomatous prostatitis

Granulomatous prostatitis is an uncommon inflammatory condition with a group of morphologically different entities. It is classified as specific (SGP), nonspecific (NSGP), post-surgical and due to systemic granulomatous disease [22]. Digital rectal examination reveals hard fixed nodules in the case of granulomatous prostatitis [23]. Diagnosis of granulomatous prostatitis is based on histopathology, which shows epithelioid granulomas with or without inflammation. Inflammation may spread to peri prostatic tissue and results in the loss of normal anatomical landmarks (fig 6.0) [22]. Specific granulomatous prostatitis commonly occurs due to tuberculosis resulting from systemic genitourinary tuberculosis or BCG instillation given for bladder carcinoma [22]. NSGP is the commonest type and accounts for 60% of cases. NSGP are self-limiting, while SGP needs specific treatment [23].

Conclusion

Prostatitis is a common disease with a worldwide prevalence and a challenge to treat. According to the NIH classification system, it is categorised as acute bacterial prostatitis, chronic bacterial prostatitis, chronic prostatitis or chronic pelvic pain syndrome, and asymptomatic inflammatory prostatitis. Antibiotic treatment is the mainstay of management in prostatitis. Without proper diagnosis and treatment, it leads to morbidity and significant impairment of quality of life. CAP is a diagnosis of exclusion due to its unclear aetiology. Large randomised controlled trials are required in the future for a clear understanding and treatment of CAP. Due to the limited evidence of data on the Asian population, epidemiology-based studies are required in this field in future

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CASE REPORT

Extramammary paget's disease of the axilla

J. Balawardena[1], S. Liyanage[1], S. Rasnayake[1], A.N. Senanayake[1], U. Thilakarathne[1], N.R.P. Perera[1]
[1]General Sir John Kotelawala Defence University. Sri Lanka

Keywords: Extramammary, mammary, Paget's disease, carcinoma, postmenopausal, elderly

Introduction

Paget's disease was first identified and classified by Sir James Paget in 1874 as mammary and extramammary type [1]. The mammary type (MPD) is often (90%) linked to underlying breast carcinoma [1,2]. Extramammary Paget's disease (EMPD) is described in areas consisting of apocrine glands such as the perineal region, scrotum, penis and axillae. It originated from skin or skin appendages, histologically as adenocarcinoma and is rarely linked with cancers originating from other areas such as the vulva, cervix, bladder, ovary, and breast. [3]. It is an erythematous plaque with well-defined edges, scaling and excoriations [3]. Pruritus is the most common symptom in about 70% of cases [4]. Proper histopathological diagnosis is made by skin biopsy of the lesion [4,5]. Surgical resection is the definitive management for EMPD. However, recurrence may be frequent. EMPD arising from a primary intra-epidermal neoplasm of the epidermis is called 'Primary EMPD', whereas it spreads from an underlying malignancy and is called 'Secondary EMPD'[4,5]. MPD was caused by the epidermotropic spread of the underlying tumour cells, while primary type EMPD seemed to rise from intraepithelial cells of sweat gland origin [4,5]. The IHC panel is also critical to determine whether it is a primary or secondary disease of EMPD. The IHC marker GCDFP-15 (or BRST2) is expressed in 50% of cases of primary EMPD, and it is negative in secondary types [3,4].

Case Presentation

An 81-year-old female presented to the surgical clinic with a painful right-sided pruritic rash and axillary erosion for nine months. She has been diagnosed with hypertension and dyslipidaemia for 30 years and had a transient ischemic attack 18 years ago. She had only a second-degree relative with breast cancer. On examination, her WHO performance status was zero, and there was an axillary rash measuring 5.4cm - 6.8cm (Fig.1). There were no palpable breast lumps; however, there were palpable right axillary lymph nodes. A bilateral breast mammogram only showed right axillary lymph nodes without identifiable abnormality and no structural lesions in either breast. Ultrasound scan of bilateral breasts and axilla reported only skin thickening of the right axilla and enlarged, reactive right axillary lymph nodes. The histology of the skin biopsy taken from the axilla was compatible with Paget's disease. After the MDT discussion, she underwent wide local excision of the axillary skin with a clinical 2cm margin and level II axillary clearance. The defect of the axilla was reconstructed with a random local rotational fasciocutaneous flap mobilized from the posterolateral chest wall (Fig.1).

Figure 1. Axillary lesion with preoperative markings for the excision and local rotational flap

The resected specimen measured 9.4cm-9.1cm. The histopathology of the specimen confirmed as Extra-Mammary Paget's disease (EMPD) of the axilla with no evidence of dermal, intravascular or perineural invasion. All surgical margins from the lesion were more than 5mm, and no tumour deposits were identified in the lymph nodes from level II axillary clearance. She recovered completely from the surgery by three weeks after the surgery. Her only postoperative complication was a small (2cm) wound dehiscence (Fig 2), which recovered in 3 weeks. The MDT decision was for active surveillance with clinical assessment,

Correspondence: N.R.P. Perera
E-mail: rangap@kdu.ac.lk
https://orcid.org/0000-0003-0930-8194
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USS abdomen pelvis and chest X-rays with annual bilateral breast mammograms. Currently, she can manage her daily activities at home.

Discussion

EMPD is a rare disease seen among postmenopausal Caucasian women between the ages of 50 and 80, with a peak age of 65. Although uncommon, hereditary cases have been reported [4].

It is essential to investigate to exclude the presence of any occult-primary malignancy before any therapeutic measure is taken [2]. Surgical excision, with adequate resection margins, has proven to be the best treatment option [3,4]. However, local chemotherapy, immunomodulator creams, photodynamic therapy and CO2 laser are known to treat this condition with variable outcomes [4]. Perioperative tumour mapping with fluorescein could minimize the excess tissue excision and better long-term disease-free survival compared with clinical-wide local excision [4]. Wide excision with an adequate margin of (1.5-3 cm) is the recommended method in the absence of fluorescein. The optimal surgical margin in each case is different and challenging to establish due to the irregular shape of the EMPD margins. Mohs Micrographic Surgery (MMS), or frozen intra-operative biopsy, is also performed to determine the surgical excision margins [5]. This patient underwent wide local excision of more than 2cm clinical margin, and histology has confirmed the margins were adequate.

Patients with aggressive, invasive primary and specifically secondary EMPD need to be treated with surgery followed by adjuvant chemotherapy and radiotherapy. Those with non-invasive primary EMPD can be treated conservatively, sustaining maximum tissue and function without a high recurrence risk [4].

Fluorescein visualization and mapping showed high sensitivity and specificity for EMPD cells, leading to successful excision of neoplastic tissue [4]. Other treatment options are multimodal Photodynamic Therapy (PDT), Mohs Micrographic Surgery (MMS), Imiquimod cream at 5% concentration, 5% 5-fluorouracil cream, CO2 laser, systemic chemotherapy, radiotherapy, and the combination of two or more therapeutic approaches may also be used for better results [4,5].

Mammary Paget's disease expresses the immunomarkers CK7, MUC1 and CK8/18 in addition to the routine immunohistochemistry of the underlying breast carcinoma [4]. The immunomarker GCDFP-15 is observed in 50% of primary EMPG in addition to CK7 and is not seen in the secondary type of EMPD [4,5]. However, targeted therapy with antibodies against HER1, HER3 or HER4 was unlikely to prove any clinical value [4,5]. Since the H&E staining was diagnostic, screening investigations had not shown any other malignancy in this patient, and IHC has no added benefit. Immunomarker studies were not done on this patient.

Conclusion

Adequate surgical resection margin is the key to success in treating primary, localized EMPG. Fluorescein visualization mapping and Mohs micrographic surgery are valuable tools to ensure negative margins with minimal tissue distraction. Lifelong follow-up is vital to detect any local recurrences and to identify any metastatic disease even though the primary site tumour has completely responded to the primary treatment.

Figure 2. Post operative day 10 showing the wound gapping at the apex of the flap.

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Learning Points:

- Extramammary Paget's Disease is a condition of the elderly.
- High degree of suspicion and biopsy will lead to diagnosis.
- Need to search for an underlying malignancy.
- Surgical resection is the treatment.

CASE REPORT

Massive spontaneous haematoma of the liver following laparoscopic cholecystectomy

H. Gunathunga[1], P Vishwajith[1], U.A Buddhika[1], S. Tillalakaratne[1], R.C. Siriwardana[1]
[1]Colombo North Teaching Hospital, Sri Lanka

Keywords: Laparascopic cholecystectomy, Intrahepatc subcapsuler haematoma

Introduction

Laparoscopic cholecystectomy (LC) has become a day case surgery owing to low peri-operative complications reported to be around 2-8% [1]. Major complications are rare and occur in approximately 2.6% of cases [1.] These includes common bile duct (CBD) injury, bowel injury and choledocholithiasis [3] while postoperative haemorrhage is rare (0.08–2%)[3,6]. Common bleeding sites include the gallbladder fossa, the abdominal trocar insertion site, the cystic artery, the falciform ligament and liver capsular tear. Intrahepatic subcapsular haematoma(ISH) of the liver without intraabdominal haemorrhage is an extremely rare and potentially life threatening complication of LC [6].

Case Report

A 31 year old female underwent laparoscopic cholecystectomy in a local hospital for recurrent biliary colics with multiple gallstones in the gallbladder. Six hours after the surgery she complained of right hypochondrial pain . Upon examination, her blood pressure was 110/70 mm/Hg with a pulse rate of 90/min and respiratory rate of 40/min.

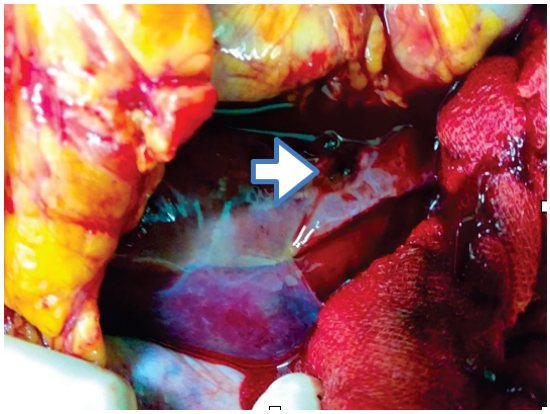

Figure 1. Picture demonstrating subcapsular hepatic haematoma with capsuler rupture-White arrow.

Correspondence: H. Gunathunga
E-mail: hasini.gunathunga@gmail.com
https://orcid.org/0009-0008-0676-4200
Received: 19-02-2021 Accepted: 09-08-2022
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Her Haemoglobin dropped to 6.9 g/dl. Therefore bleeding was suspected and decided to do a urgent exploratory laparatomy

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There was altered blood with clots amounting to 450ml in the right sub hepatic space. The liver appeared congested, hyperaemic and enlarged. Large intrahepatic sub capsular haematoma was noted mainly in the right lobe extending to segment IV with rupture of the capsule .

Due to uncontrollable bleeding from ruptured site of the capsule decided to pack the liver.Per-operative USS showed normal inflow and outflow. Then the patient was transferred to hepatobiliary Centre. Her aspartate aminotransferase (AST), alanine amino transferase (ALT) was 3456 u/l and 4500 u/l. Serum lactate level increased from 3.4 to 10. Patient was started on N-acetylcistine infusion.

Patient started developing a temperature of 101 C after 24hours .Re-laparotomy and removal of packs was done at 48 hours due to increasing bladder pressure with reduced urine output and fever. No active bleeding from the liver was noted this time. However there was large sub capsular haematoma in both left and right lobe. Rest of the liver appeared viable. Due to the suspension of infected clot decided to go ahead with clot evacuation.

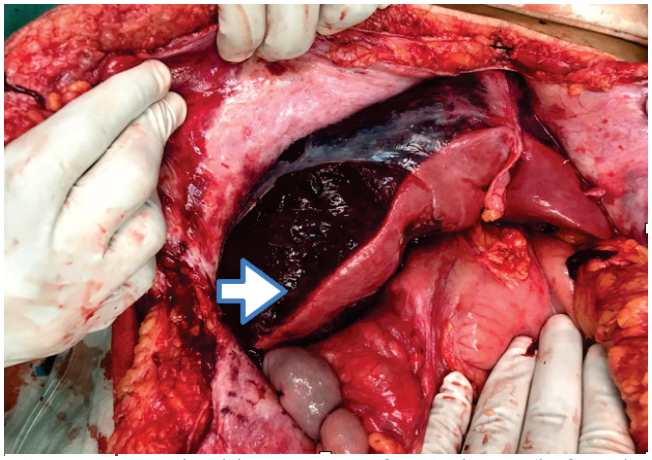

Figure 1. Contained haematoma after 48 hours (before the haematoma evacuation)-White arrow.

Evacuation of the haematoma was done with blunt dissection using the sucker, irrigation and hydrogen peroxide. She was managed in the ICU for liver injury, acute kidney injury, and sepsis with septic shock. After two weeks of ICU care patient recovered from organ failure and transferred to general ward.

Discussion

LC is the gold standard treatment for symptomatic gall stones . However rare fatal complications are known to occur. ISH is such a rare complication. Liu, Q. F et al reported 16 cases from 1994 to 2015, there are other authors reporting similar complications [1,2.]

The probable cause for haematoma is arguable. Use of intraoperative non-steroidal anti-inflammatory drugs (NSAIDs) such as ketorolac and diclofenac/low molecular weight heparin [2], other postulate accidental injury during insertion of the trocar, retraction of the gallbladder which causes the injury of the liver capsule and the manipulation of the liver during the dissection of the gallbladder [1] are some of the possible causes. However, in our patient NSAIDS or heparin had not been used. The liver appeared normal after the primary surgery. One possible explanation for late haematoma is the pressure of the pneumo-peritoneum.

The treatment is variable depending on the extent of haematoma ,the patient's condition, value of the hemoglobin. Treatment is aimed at resuscitation, establishing diagnosis, controlling the expansion of haematoma and prevention of secondary complications of haematoma [1]. Intra abdominal packing or use of selective embolization are common options in the case of active bleeding, [1, 6] .In some cases ultrasound guided percutaneous drainage was opted rather than a surgical intervention.

In our patient it was decided to evacuate the haematoma due to use of packs and the potential onset of sepsis. Our method was an open debridement using sucker and hydrogen peroxide. Previous authors have described clot evacuation by creating an opening in the friable capsule and clot evacuation by suction. Oxidized cellulose and haemostatic matrix had been applied over the decapsulated matrix to achieve haemostasis [3].

Conclusion

LC can rarely lead to life-threatening ISH as seen in our patient. Communication and timely intervention leads to favorable results.

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Learning Points:

- Intrahepatic subcapsular haematoma is a rare complication following laparoscopic cholecystectomy.
- It is potentially life threatening .
- Intraabdominal packing can be life saving.
- Recording of surgical procedure will help in fact finding of this type of complications.

CASE REPORT

Laparoscopic retro peritoneal triple neurectomy for intractable post herniorrhaphy groin pain

C.U.K. Samarajeewa[1], B. Pragalathan[1], A. Herath[1]
[1]Distict General Hospital Trincomalee, Sri Lanka

Keywords: Chronic post herniorrhaphy pain, Triple neurectomy, Ilioinguinal Nerve, Iliohypogastric , Genitofemoral

Introduction

Chronic groin pain following hernia surgery is defined as pain that lasts for more than 3 months and documented among 18% of post herniorrhaphy patients [1]. Severe intractable pain can occur in about 1-5% of patients. The causes of chronic post herniorrhaphy groin pain can be neuropathic or non-neuropathic. Neuropathic pain occurs due to entrapment of nerve by sutures, staplers or mesh and nerve damage due to stretching or thermal injury. Patients mostly present with neuralgic pain in distributions of the Ilioinguinal(IIN), Iliohypogastric(IHG) and Genitofemoral(GF) nerves[2]. Non neuropathic pain occurs due to excessive scar formation, mechanical pressure due to bulky rolled up mesh (Meshoma) and periosteal reaction due to sutures or staplers.

The classical symptoms are burning pain around the surgical scar which radiates to the inner thigh or pubic tubercle and impaired sensory perception in the involved nerve territory.

Post herniorrhaphy groin pain is managed initially with local anesthetic or steroid injections, opiates, tricyclic antidepressants(TCA), radio-frequency ablation and behavioral therapy[2]. Eventually surgical management by neurectomy for chronic groin pain is considered as the last option. Open 2-staged approach has been followed as the standard approach to triple neurectomy, anteriorly through the inguinal region to reach the ilioinguinal and iliohypogastric nerves and from the flank to reach the genitofemoral nerve. However, if the patient has undergone previous operations in the inguinal region, the surgeon is faced with a scarred field, often necessitating multiple incisions. As an alternative a single-stage laparoscopic retro peritoneal approach can be utilized.

Case Presentation

A 54-year-old man presented with a two-and-a-half-year history of intractable left sided groin pain following left recurrent inguinal hernia repair with mesh in 2019. The patient reported experiencing severe pain in his left groin which radiates into scrotum. The pain was exacerbated with activities such as bending forward, standing, or walking. He denied weakness, numbness, tingling in the lower limb and bladder or bowel dysfunction. There was no clinically demonstrable recurrence or radiologically demonstrable meshoma in the ultrasound scan of the groin. He was treated with oral analgesics (NSAID, Opiate & TCA). These medications provided only mild relief to his pain. He was then treated with image guided nerve block, which provided relief only for a short period. So, we planned surgery as a last option and offered a laparoscopic retro-peritoneal triple neurectomy. Laparoscopic triple neurectomy was done with identification and transection of the ilioinguinal, iliohypogastric, and genitofemoral nerves. Operating time was 42 minutes and post-operative period was uneventful. On his first postoperative day, he was able to ambulate without significant pain. Patient was seen two weeks, one month and three months respectively following the operation to assess the efficacy of this procedure. The intractable pain was totally disappeared except for a mild numbness in the groin which the patient was happy to accept.

Discussion

Chronic inguinodynia needs a systematic and thorough preoperative evaluation to identify the potential causes of pain [1,2]. When initial conservative therapy, including a nerve block is not effective, a surgical intervention should be considered. No standardized surgical procedure is applicable to all the patients with chronic inguinodynia. The surgical procedure should be selected according to original repair technique, the patient's condition, and the nature of the pain. In our patient, the chroin groin pain was significantly reduced by the retroperitoneal triple neurectomy. There has been no report regarding this procedure in Sri Lankan literature up to date.

Correspondence: C.U.K. Samarajeewa
E-mail: udayasamarajeewa74@gmail.com
https://orcid.org/0000-0003-1924-9204
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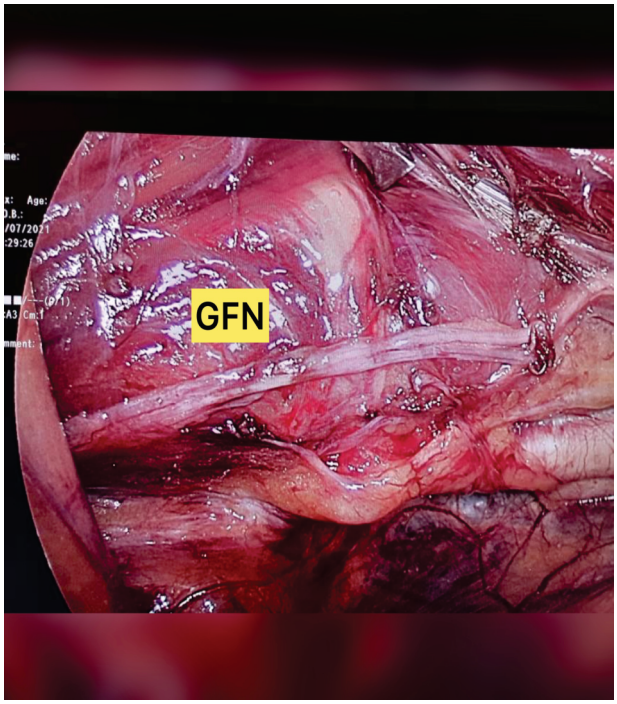
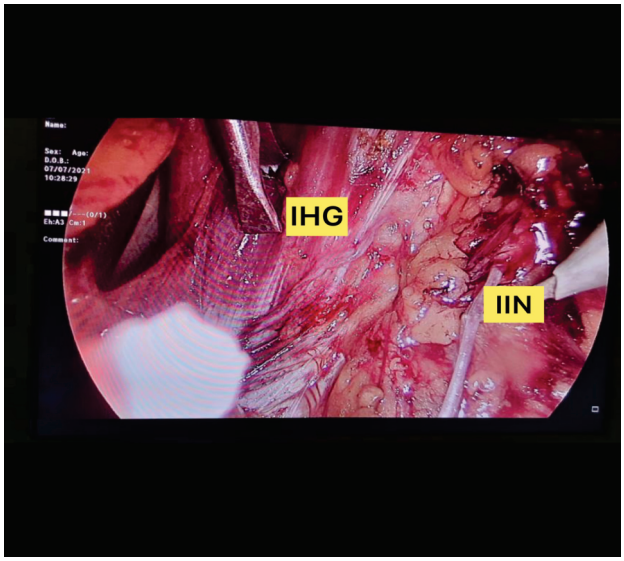
Neurectomy through the anterior approach is a well established procedure for treating chronic inguinodynia because of the added advantage of identifying coexisting problems and removal of mesh and sutures whenever necessary . However, this procedure is somewhat challenging due to the risk of injury to vas deference and the nearby vessels, disruption of the previous hernia repair and also due to poor visualization of the nerves. Exacerbation of the pain by inadequate surgery represent a potential limitation of this procedure [3]. Neurectomy through a laparoscopic retro peritoneal approach offers an advantage in terms of nerve treatment and can be performed proximal to the scarred previous operative field. This procedure is not the ideal approach for patients with meshoma, nociceptive pain, or when having testicular pain. Therefore, the surgical approach and procedure should be selected by taking into account the benefits and the shortcoming.

Before performing the procedure, surgeons should attain a thorough understanding of the retro peritoneal neuroanatomy. The IIN, IHGN, and GF nerves arise from the lumbar plexus. These nerves are distributed to the inguinal region and they pass through the retro peritoneal space[4]. Retro peritoneal fat pad should be dissected sufficiently to expose the quadratus lumborum muscle and the psoas major muscle because the IIN and IHGN run along the anterior surface of the quadratus lumborum muscle and the GFN is always found directly overlying the psoas muscle[4].

Side effects of this procedure include numbness in the groin, abdominal wall laxity, hypersensitivity due to deafferentation, testicular atrophy and numbness in the labia in females that can interfere with sexual sensation [4]. In our patient, numbness and hypersensitivity were observed at the early phase of surgery but gradually diminished over the time. In the treatment of patients with chronic refractory neuropathic pain and chronic inguinodynia, we should let patients know that surgical intervention sometimes does not always result in pain elimination after triple neurectomy as there can be a failure rate up to 17% according to the current available literature [5].

In conclusion, we report a successful case of laparoscopic retro peritoneal triple neurectomy. Detailed understanding of the retroperitoneal neuroanatomy of the inguinal nerves is mandatory to perform safe and effective surgery. Diagnosis of neuropathic pain by thorough preoperative assessment is also vital for the success of this procedure because it is not effective for other types of pain.





Conclusion

Laparoscopic retro peritoneal triple neurectomy is safe and appropriately provides relief to the chronic intractable groin pain. Since there is no available literature regarding this procedure up to now in Sri Lanka, we assume this may be the first reported case in Sri Lankan surgical literature.

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Learning Points:

- Chronic intractable post herniorrhaphy groin pain can be a severely debilitating condition
- Post Herniorrhaphy groin pain needs systematic assessment and an individualised management
- Surgery is the last resort with an effective outcome
- Laparoscopic retro peritoneal triple neurectomy has been shown to have a 90% to 100% success rate in relieving the chronic groin pain.

CASE REPORT

Giant sialolith in submandibular salivary gland

P.D.C. Fernando[1], B.S.M.S. Siriwardana[2], M.A.F. Haneena[1]
[1]District General Hospital Ampara , Sri Lanka.
[2]Faculty of Dental Sciences, University of Peradeniya, Sri Lanka.

Keywords: Giant Sialolith, Submandibular salivary gland, surgical excision

Introduction

Over 50% of major salivary gland disorders are caused by calcified masses called sialoliths[1]. The majority of these calculi (80-90%) occur in the submandibular salivary gland, 5-10% in the parotid and 1-2% in the sublingual or minor salivary glands[1]. Sialoliths typically measure 0.6-1 cm in size and are found within the excretory ductal system. Calculi over 1.5 cm in size, or with a dry weight more than 1g are defined as Giant sialoliths. Exceeding 3.5 cm is very rare and accounts for 7.6%[2]. Here we report an extremely rare case of a giant sialolith measuring 3.5cm x 1.9cm and weighing 2.3g, contained in the parenchyma of the submandibular gland.

Case Presentation

A 39-years-old male presented to the oral and maxillofacial surgical unit complaining of a large swelling under the mandible on the right side of the neck, limiting mouth opening and swallowing along with altered speech and fever for 3 days. For the past 10-12 years, he had been suffering from a gradually increasing neck lump, but neglect prevented him from seeking proper medical investigations.

On admission, the patient had a firm-hard, 6cm x 5cm in size, tender swelling on the right submandibular region. *(Figure: 1)* It seemed likely that the lesion was associated with the right submandibular gland based on bimanual palpation. Multiple septic foci were seen intra-orally in all four quadrants of the oral cavity. The right side floor of the mouth was raised, shifting the tongue to the opposite side with pus draining from the right submandibular duct opening. He had no breathing difficulty.

Right lateral oblique mandibular radiograph revealed a large radio-opaque, oval-shaped mass with well-demarcated corrugated margins *(Figure: 1)*, giving the clinical impression of a sialolith within the right submandibular gland. The ultrasound scan showed a large echogenic mass with dense shadowing and compressed glandular parenchyma confirming the calculi was within the gland.

Initial treatment of acute infection and inflammation included IV antibiotics and IV dexamethasone, preventing the disease from progressing to Ludwig angina. Subsequently, the sialolith and submandibular gland were surgically removed using the Risdon extra oral submandibular approach (*Figure: 2).* Multiple adhesions of the scarred submandibular gland

Figure 1. :- Extra oral view of the patient with a diffused, tender swelling on right side submandibular region measuring 6cm x 5cm in size and right lateral oblique radiograph showing large radio-opeque, oval shape mass with well demarcated corrugated margins

Correspondence: P.D.C. Fernando
E-mail: dilan4fernando@gmail.com
https://orcid.org/0000-0002-2954-6758
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tissues to surrounding vital structures of the neck were noted and carefully separated during the procedure. Lingual, Hypoglossal and Marginal mandibular branch of the Facial nerves were carefully identified and preserved. The main excretory duct was ligated to prevent retrograde intra-oral infections. The sialolith was oval, yellowish to tan-brown with a rough corrugated surface, measuring 3.5cm x 1.9cm in dimension and 2.3g in dry weight (*Figure: 2*). In addition, all un-restorable teeth and intra-oral septic foci were eliminated to improve oral hygiene. No postoperative complications were noted and he was advised to get a partial denture to replace missing teeth.

Discussion

The majority of sialoliths (70% - 90%) form in the submandibular gland ductal system due to the wider and longer tortuous nature of Wharton's duct compared to the Stensen's duct of the Parotid, which facilitates stasis of saliva due to the effect of the gravity. Further, the submandibular secretion is predominantly alkaline and viscous with more calcium and phosphate compared to entirely serous parotid secretions[1, 3]. Ninety-five percent of giant sialoliths are found in the submandibular gland, commonly within the ductal system and hardly within the glandular parenchyma[1,3]. But in this case, the giant sialolith was within the glandular parenchyma which was an extremely rare presentation.

The annual incidence of sialolithiasis is 1.2%, with a 2:1 male predominance. Even though it can occur at any age, the middle age group of the 3rd to 6th decades is usually affected, and it is rare in children[2]. In this case, a 39-year-old male patient, also fits the same demographic.

Several factors predispose to the initiation of calculi, including infection, inflammation, salivary stagnation, physical trauma, foreign bodies and desquamated epithelial cells. Subsequent salivary stagnation due to obstruction of the excretory pathway and precipitation of mineral salt facilitates the gradual progression of the sialolith[4]. Predisposing factors in this case were frequent infections and inflammations of the oral cavity caused by multiple carious dental roots.

The transformation of the average 1 cm sialolith into a giant depends mainly on the secretory duct. If the secretory duct adjacent to the sialolith dilates, it might remain asymptomatic for a longer period and eventually lead to the manifestation of a giant sialolith[4].

Imaging techniques are the fundamental investigation tools in the diagnosis of sialoliths. The lower standard occlusal radiograph is the commonest to view submandibular ductal sialoliths[1, 3]. However, 40% of parotid and 20% of submandibular stones are radiolucent[5]. Conversely, Giant sialoliths are mostly radio-opaque, because their lithogenesis is long enough for calcification to be completed. Panoramic radiograph and lateral oblique view of mandible also used in the diagnosis of sialoliths[5]. We used a lateral oblique mandibular radiograph considering the size and the position of the swelling in this case and the ultrasound scan of the neck confirmed the calcified mass was within the glandular parenchyma.

Salivary gland calculi are treated generally based on the size and location of the sialolith[1, 2]. It is possible to treat small sialoliths without surgery by increasing hydration, increasing salivary flow, and encouraging local massage to help flush them out. In some instances bimanual manipulation following surgical widening of the submandibular duct opening, can allow small stones near the ductal orifice to be milked out. Surgical removal of larger ductal stones is performed using intra-oral sialodochotomy or sialodochoplasty. Sialo-endoscopy and basket retrieval are used for ductal calculi less than 1cm with no surrounding adhesions. Submandibular gland removal is specified when there is a stone within the glandular parenchyma or at the proximal vertical portion of Wharton's duct[1, 2]. However, for giant calculi such as in this case, Risdon submandibular approach is recommended for better access and safety of the surrounding vital structures.

Figure 1. :- intra-operative view of surgical removal of the lesion and the giant sialolith measuring 3.5cm x 1.9cm

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Learning Points:

- .Giant sialoliths within the submandibular glandular parenchyma are extremely rare.
- Risdon's surgical approach to the submandibular region needs to broaden for better surgical access and to preserve the adjacent vital structures.
- Ligation of the submandibular duct is essential to minimize ascending infections from the oral cavity.

CASE REPORT

Death due to retroperitoneal haemorrhage following ureteroscopic intervention: Two case reports

S. A Gunawardena[1,2], H. Senadhipathi[1], P. K. Abeyratne[1], V. Ewaduge, D. Siriwardana[1], D. Peiris[1], R. Samaranayake[1]

[1]Department of Forensic Medicine and Toxicology, Faculty of Medicine, University of Colombo, Sri Lanka.

[2]Department of Pathology, School of Medicine, International Medical University, Kuala Lumpur, Malaysia

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Introduction

The usage of ureteroscopy has been increasing over the years and is considered as a nontraumatic, safe intervention compared to several other urologic procedures.[1][2]

Although there have been occasional life threatening complications reported[3] there were no reported deaths due to retroperitoneal haemorrhage or perinephric haematoma following this procedure. Here we describe two fatalities following ureteroscopy and laser lithotripsy with double-J stent revision.

Case 1

67-year-old male with a past history of ischaemic heart disease (IHD), coronary stenting, hypertension (HTN) and dyslipidaemia presented to a tertiary care unit for ureteroscopic laser lithotripsy and stent revision for urolithiasis involving the right-sided ureter and renal pelvis which was diagnosed 3 months prior to the current admission (Table 1). He was completely asymptomatic, and the physical examination was normal.

Pre-op assessment revealed asymptomatic Klebsiella urinary tract infection (UTI) associated with pyuria. Except for serum creatinine which was elevated, other parameters were normal (Table 1).

Table 1: Timeline of events and pre-op assessment for Case 1

Case 1: Timeline of events	
3 months	Diagnosis of renal calculi
Day 0	Presents to tertiary hospital for elective surgery
Day 1	Omission of Clopidogrel
Day 3	Asymptomatic UTI detected
Day 9	URS + laser lithotripsy and stent revision performed
	Transferred to ward
	Fever with chills
	Death
Day 10	Autopsy

Case 1: Pre-op Assessment		
Investigations	**Results**	**Normal range**
Urine culture	Klebsiella with 10^5 colony forming units	
Urine full report		
Pus cells	40-50/ hpf	< 2-5/ hpf
Red cells	--	≤3/ hpf
Casts	--	≤5 / hpf
Organisms	--	--
Crystals	--	Occasional
Full blood count		
Haemoglobin	12.8 g/dl	11-16 g/dl
Leukocytes	7.44 x 10^3 ul	4-10 g/dl
Platelets	158x10^3 ul	150-450x10^3 ul
Clotting profile		
PT	13s	12 – 14.8s
C- reactive protein	<5 mg/l	<5 mg/l
Serum creatinine	2.47 mg/dl	0.6-1.2 mg/dl
eGFR	26 ml/min/1.73 m^2	85 ml/min/1.73m^2

Correspondence: S. A Gunawardena
E-mail: sameera@fortox.cmb.ac.lk
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A preoperative echocardiogram showed an ejection fraction of 40% and cardiology opinion was that he was sufficiently fit for surgery under spinal anaesthesia. Clopidogrel was omitted pre-operatively while aspirin was continued.

During the ureteroscopic laser lithotripsy and stent revision, multiple renal pelvic calculi were noted. Lithotripsy was performed. A 5Fr double-J stent was inserted into the right ureter and the bladder was catheterized with a 16Fr foley catheter.

Four hours after surgery, the patient developed fever with chills and subsequently became unresponsive. Despite repeated attempts at resuscitation the patient passed away 6 hours into the postoperative period. The death was referred for inquest and autopsy.

At autopsy (Figure 1) the body showed severe pallor in the conjunctiva, oral mucosa and most of the organs including the kidneys. The right and left kidneys weighed 50g and 75g respectively. There was a large retroperitoneal haemorrhage in the right perinephric region. A double-J stent was in situ in the right renal pelvis with multiple fragmented calculi. There was no visible trauma to the renal tract. 2500ml of blood was present in the peritoneal cavity. In the heart there was diffuse fibrosis over the antero-septal region with aneurysm formation. The Left anterior descending artery lumen showed atherosclerotic narrowing >75%. There were no sub-endocardial haemorrhages. Both the lungs showed congestion and pulmonary oedema with no evidence of thromboembolic phenomena. Cause of death was given as haemorrhagic shock due to retroperitoneal haemorrhage as a result of ureteroscopy and double-J stent reversal surgery.

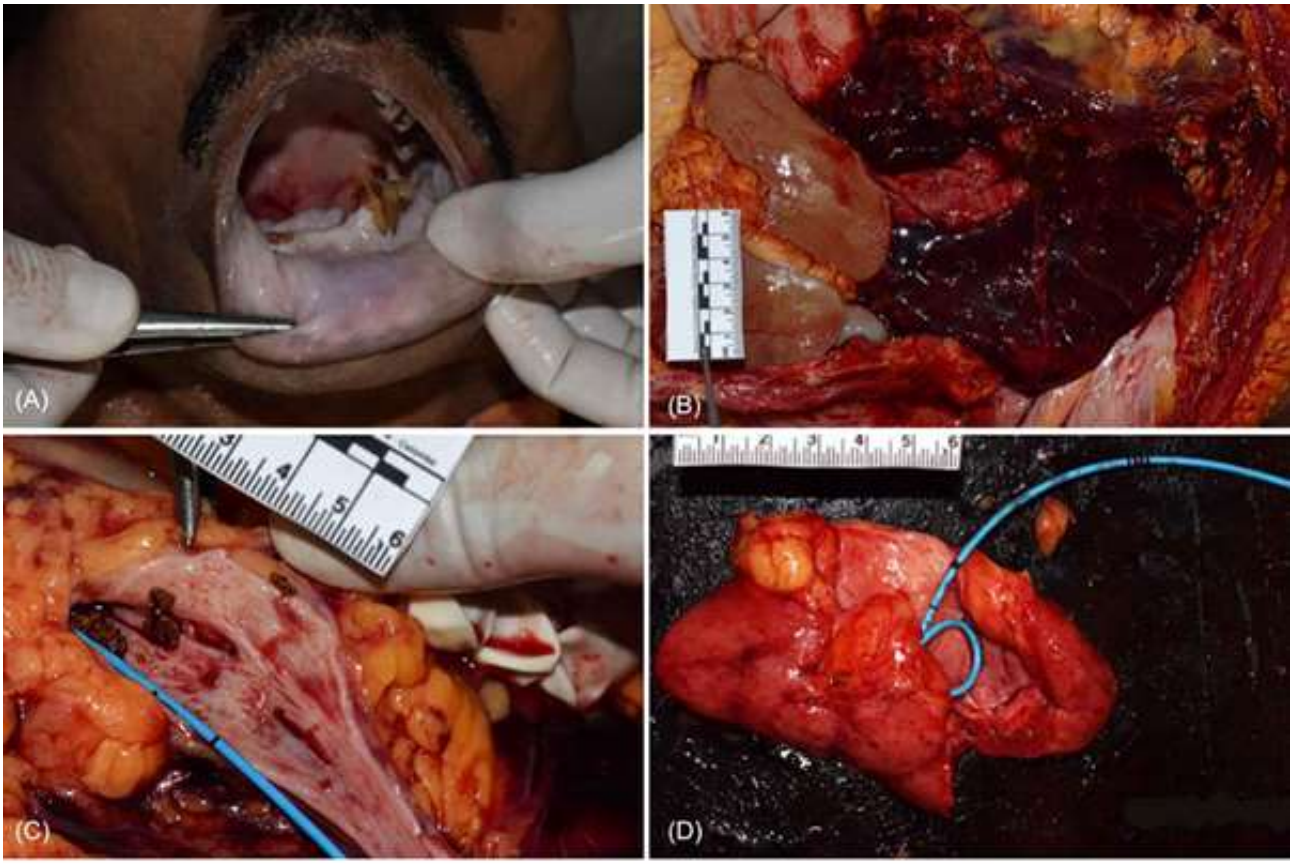

Fig. 1 (A) Pallor of the oral mucosa due to severe bleeding. (B) Haemorrhage involving the peritoneal and retroperitoneal cavities. (C) Incision made in the right ureter shows the double J stent and residual calculi. (D) Right kidney with a pale surface and the double J stent in situ.

Case 2

A 65-year-old man with a history of diabetes, HTN and IHD was admitted to a tertiary care hospital with haematuria and abdominal pain(Table 2). Sonography showed a calculus in the left mid ureter along with grade II hydronephrosis and upper hydroureter. His CRP and white cell count was elevated but there was no evidence of a UTI. The rest of the clinical evaluation was unremarkable. Rigid cystoscopy and bladder wash was performed along with URS laser lithotripsy and double-J stent insertion under spinal anaesthesia. There was severe inflammation of the mid ureter along with pus. The calculus was extracted successfully. 6 hours after surgery he developed chest pain, bi-basal crepitations and fever.

There was a reduction in the haemoglobin count and the ECG showed features of inferior myocardial ischaemia. Thereafter the patient became unresponsive and passed away despite resuscitation attempts.

The autopsy revealed retroperitoneal haemorrhage in the left perinephric region and a double-J stent which was in-situ (Figure 2). There was no perforation or trauma in the urinary tract. Examination of the heart showed sub-endocardial haemorrhages in the left ventricle along with patchy fibrosis suggestive of old infarcts. There was 80% narrowing of the left anterior descending artery. Both lungs were congested due to pulmonary oedema but there was no consolidation or thromboembolic phenomena. Cause of death was given as acute myocardial infarction due to coronary atherosclerosis contributed by post surgical haemorrhage, diabetes and urosepsis.

Information gathered during the pre-autopsy interview with the families and perusal of medical records in both these cases showed that the possibility of retroperitoneal haemorrhage following these procedures were not adequately informed to the deceased and their families which raised allegations of negligence. Post autopsy discussions also revealed that the surgical team did not expect these complications to occur.

Table 1: Timeline and summary of pre-op assessment for Case 2

Case 2: Timeline of events	
Day 1	Haematuria
Day 3	Admission to hospital
Day 4	Diagnosed with ureteric stone complicated with hydronephrosis and hydroureter
Day 6 (12.30pm)	Rigid cystoscopy + bladder wash+ URS + laser lithotripsy and Double J stent insertion
(6.25pm)	Chest pain Myocardial infarction and anaemia detected
Day 7	Death
Day 8	Autopsy

Case 2: Pre-op Assessment		
Investigations	**Results**	**Normal range**
Urine culture	No bacterial growth	
Urine full report		
Pus cells	1-2/ hpf	< 2-5/ hpf
Red cells	Moderately field full	≤3/ hpf
Casts	--	≤5/ hpf
Organisms	--	--
Crystals	--	Occasional
Full blood count		
Haemoglobin	9.8 g/dl → 7.5g/dl (23rd)	11-16 g/dl
Leukocytes	12.93 x10^{3}ul → 33.27x10^{3}ul	4-10 g/dl
Platelets	268x10^3 ul	150-450x10^3 ul
Clotting profile		
PT	13.6s	12 – 14.8s
INR	1.01	
C- reactive protein	181.4 mg/l	<5 mg/l
Serum creatinine	3.1 mg/dl	0.6-1.2 mg/dl
eGFR	20 ml/min/1.73 m^2	85 ml/min/1.73m^2
Troponin I	8.616 ng/ml	0 – 0.04 ng/ml

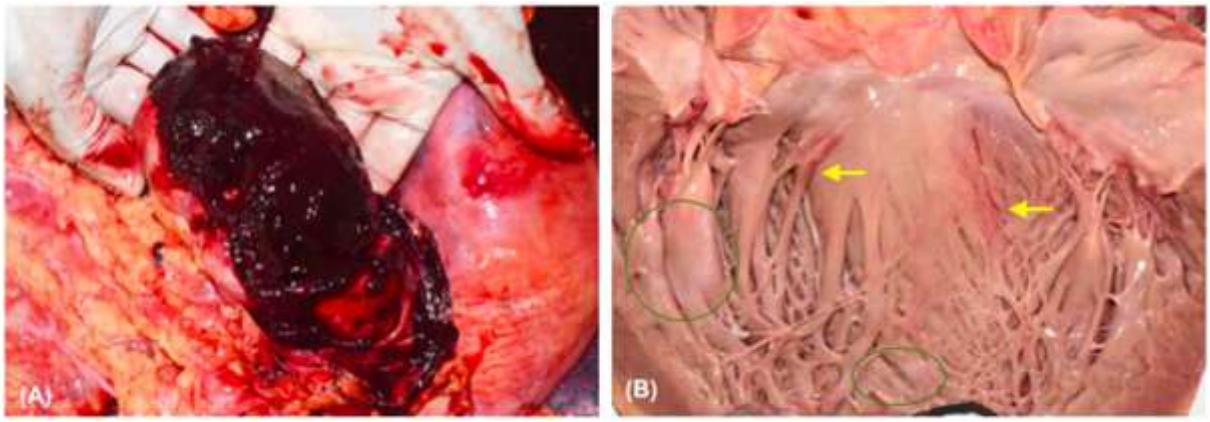

Fig. 2 (A)Retroperitoneal haemorrhage in the left peri-nephric region. (B)Subendocardial haemorrhages(yellow arrows) and few fibrotic patches(green circles) in the heart.

Discussion

Ureteroscopy (URS) is considered as a relatively safer option than interventions such as extracorporeal shockwave lithotripsy (ESWL) and percutaneous nephrolithotomy (PCNL), especially when considering complications such as peri-nephric haematoma and retroperitoneal haemorrhage.[1] URS is the procedure of choice in patients with clotting abnormalities which further highlights its safety.[2]

Retroperitoneal haemorrhage has been previously reported as a rare but life-threatening complication of ureteroscopic interventions due to manipulation of instruments[3] (guidewire, access sheath, ureterorenoscope etc.) or due to forniceal rupture secondary to increased irrigation pressures during the procedure.[4][5]

There are several factors which predispose an individual to develop this complication such as pre-operative UTI, hypertension, moderate to severe hydronephrosis, thin renal cortex, and prolonged operative time.[1]

Deaths due to retroperitoneal haemorrhage following ureteroscopic procedures have not been previously reported. In both these cases high serum creatinine, hypertension and UTIs could have been predisposing factors as even in case 2, although the urinalysis was normal, pus along the ureteric mucosa was detected during surgery. Hydronephrosis is also a possible factor in case 2.

Conclusion

These cases indicate that though ureterorenoscopy is considered to be a safe procedure with a low risk of bleeding, the possibility of fatal retroperitoneal haemorrhage should be expected, especially when predisposing factors such as UTIs, hypertension, high serum creatinine, and cardiac comorbidities exist. Therefore, extra precaution should be taken during manipulation and irrigation when performing such procedures in high-risk patients and it is prudent to mention the possibility of this fatal complication to the patient and family when obtaining informed consent.

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Learning Points:

- Retroperitoneal haemorrhage following ureteroscopy although rare, may result in fatality in the presence of comorbidities
- Extra precaution should be taken during uretroscopic procedures in high-risk patients
- Mentioning this rare possibility to the patient and family when obtaining informed consent can minimize allegations of negligence.