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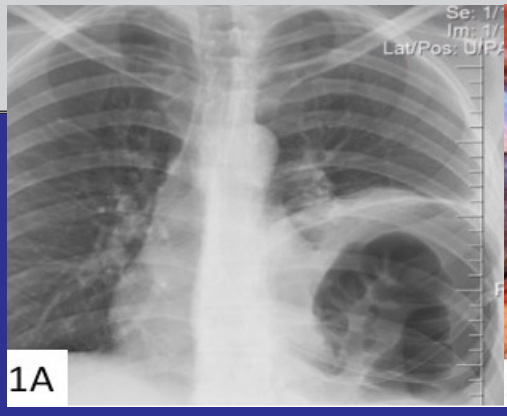
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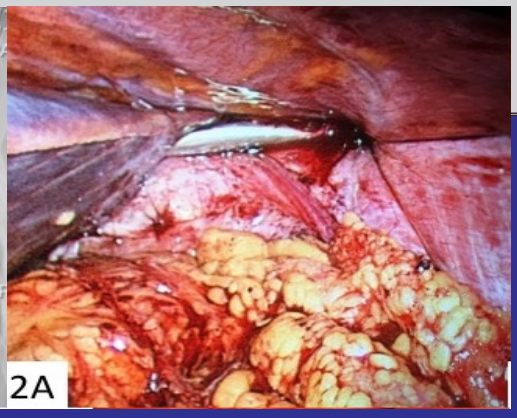
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In this issue

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

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

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

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

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

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

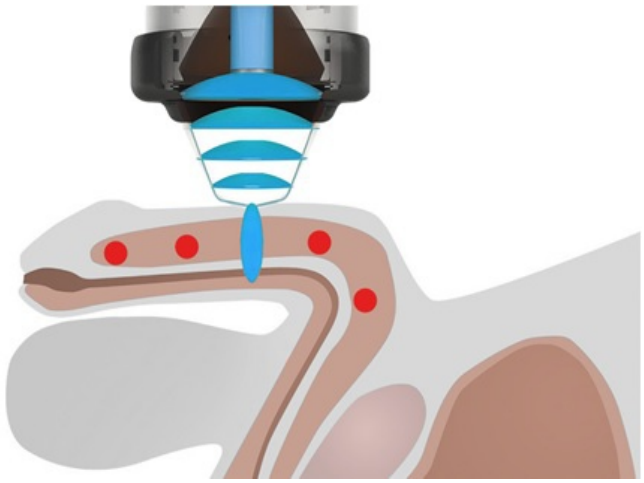

Figure 1. Shock wave therapy

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

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

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

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

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Advantages of Penile Shockwave Therapy

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

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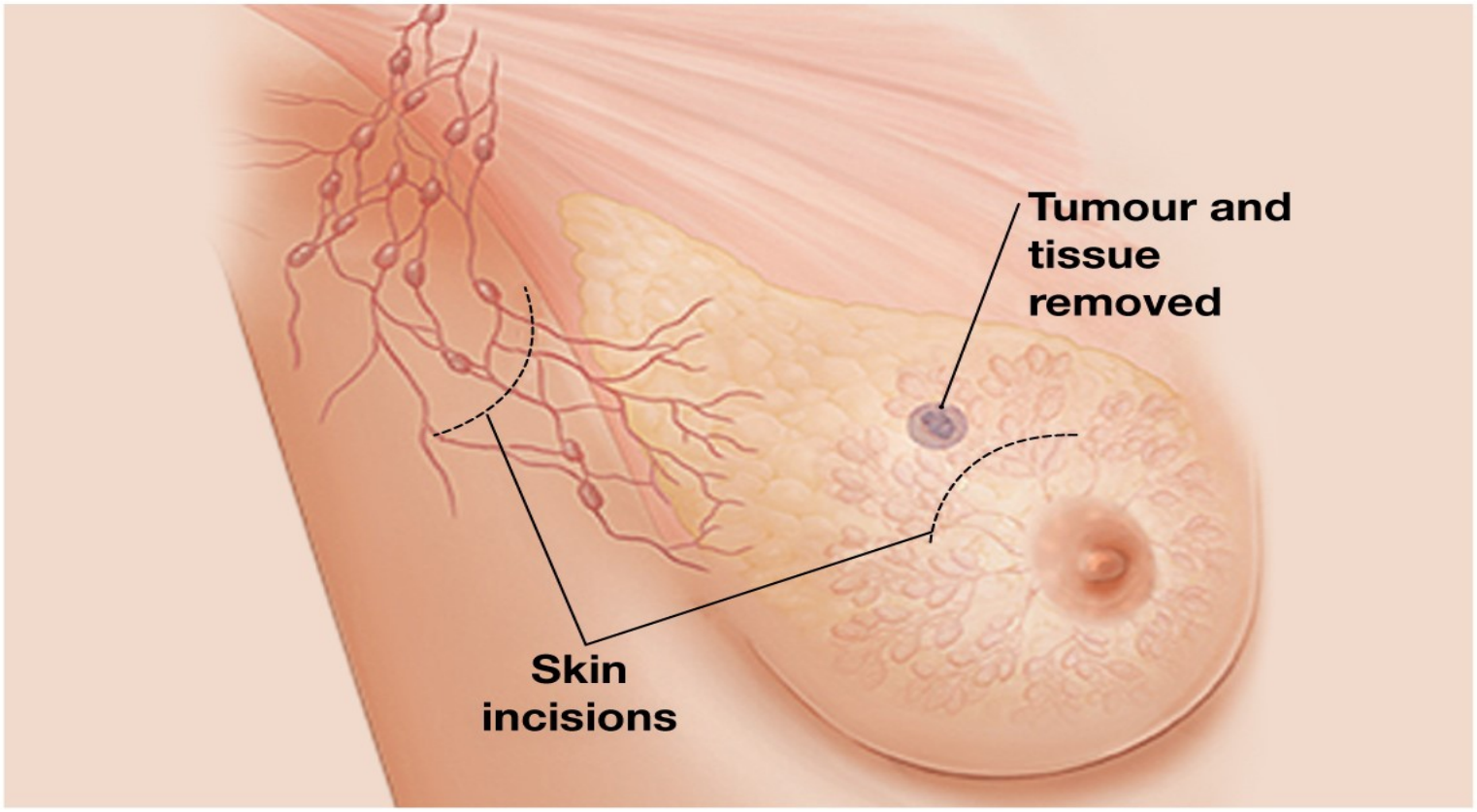

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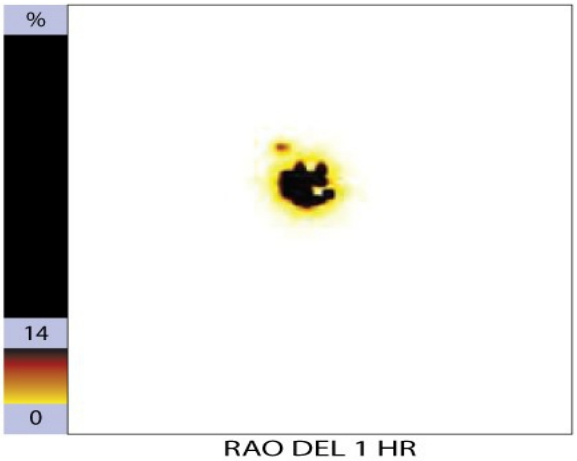

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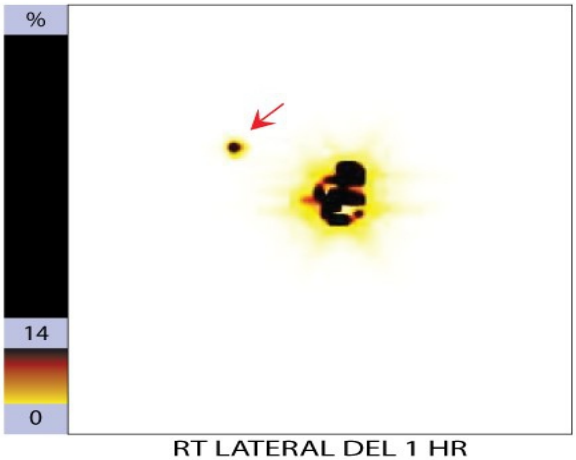

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SCIENTIFIC ARTICLE

Adequacy of equipment available for the insertion of chest drains in tertiary care units in Sri Lanka: a multi center study

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Key words: Chest drain; intercostal tube; adequacy of equipment

Abstract

Introduction

Insertion of a chest drain is a common, potentially life-saving procedure, and most doctors will be required to insert a chest drain at some stage of their career, regardless of their specialty. Complications can occur during this procedure that can be life threatening. Not having the required equipment at the crucial time has been highlighted as an important cause of iatrogenic complications.

Objectives

Our objectives were to formulate a checklist of items required for the safe insertion of chest drains and to assess the adequacy of the equipment available for the procedure within the tertiary care setting of Sri Lanka based on this checklist.

Methods

A checklist was compiled based on the British Thoracic Society guidelines with modifications according to the Sri Lankan setting. This was further modified after a consensus from an expert panel using the Delphi technique. This checklist was used to perform a descriptive cross-sectional study within tertiary care units in Sri Lanka selected using a multi-staged sampling technique.

Results

A checklist was formulated consisting of 10 items in the units and nine items in a chest drain pack. Twenty nine units were assessed from five tertiary care hospitals of five provinces of Sri Lanka: Although 75.9% units had designated "chest drain insertion packs", the mean availability of instruments inside them were 52.5%. Only 73% of units had curved instruments to facilitate safe insertion of a drain. Only 7% of units had more than one pack. The availability of equipment required to be easily available within the unit was 94.8%. However, only 24% units used the safer non-trocar chest drain exclusively.

Conclusions

There is a deficiency of organized instruments and especially non-trocar tubes, even in our tertiary care hospitals. This is likely to make chest drain insertion unsafe in the majority of our units. Availability of a "chest drain checklist" among units could guide the nurses to keep available the required equipment at hand and to set up the trolley at short notice.

Introduction

Insertion of a chest drain is a common lifesaving procedure that is widely used throughout the surgical, medical, trauma and critical care specialties. It is used to drain either actual or potential pleural air or fluid either as an elective or emergency procedure. Most doctors will insert a chest drain at some stage of their career regardless of their specialty. These may cause iatrogenic complications that can be life threatening or severely debilitating. Of a survey of the hospitals in the United Kingdom (UK), 67% reported at least one major incident involving chest drain insertion [1].

As chest drain insertion can be an emergency procedure, the required equipment should be organized well ahead and be readily available in adequate quantities. The equipment required for chest drain insertion is relatively simple and inexpensive. However, non-availability of equipment has been highlighted as a cause of iatrogenic complications in UK [2]. Furthermore, the use of chest drains with sharp trocar tips have been found to cause a 6-14% increase of operator-related complications [3]. British Thoracic Society (BTS) guidelines have listed out the required equipment for the safe insertion of a chest drain and also recommended the use of blunt dissection and the use of chest drains without trocars [4].

It has been our impression that the equipment within hospitals in Sri Lanka too, is less than satisfactory. Often, the proper equipment is not available when it is needed most, leading to unnecessary delays and hassle. In multiple casualties, this situation is worse. For children, often only chest drains of

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adult sizes are available. In most instances sharp-tipped trocars, that can be dangerous in inexperienced hands, are the only chest drains available. Interestingly, chest drains with trocars are more expensive than its safer non-trocar counter-part. Identifying and correcting these inadequacies could ensure a successful outcome of this procedure, preventing unnecessary complications and excessive cost to our health system. Formulating a list of equipment required for chest drain insertion, which to date has not been available in our hospitals, would be useful to guide our staff.

Therefore, the objectives of our study were twofold: i.e. firstly, to formulate a checklist of items for the insertion of chest tubes in the Sri Lankan setting and secondly to assess the adequacy of equipment available for chest drain insertion based on the above checklist in the tertiary care hospitals of Sri Lanka.

Methods

The study received approval from the Ethical Review Committee of the Faculty of Medicine, University of Ruhuna, Sri Lanka.

A checklist was compiled based on the British Thoracic Society (BTS) guidelines with modifications according to the Sri Lankan setting. Views of a panel of experts consisting of cardiothoracic surgeons, general surgeons and nursing officers were obtained via the Delphi technique and a consensus was taken in finalizing the checklist.

Data collectors were trained by the principal investigator on filling the data form in order to minimize inter-observer bias. A pre-test was carried out at the Cardiothoracic Unit (CTU) at Teaching hospital Karapitiya and adjustments were made on the procedure as appropriate.

The target study settings were teaching or provincial hospitals from all nine provinces of Sri Lanka. A multi-staged sampling technique was used to select five hospitals from the list. Written permission to conduct the study was obtained from the directors of the hospitals. Verbal consent was obtained from the sisters-in-charge of each unit at the time of assessment. All the units which were designated to perform chest drain insertion at each of the selected hospitals were included. The CTU at THK that was included in the pre-test was excluded from the main study to minimize information bias as data collectors were from that unit.

The study was performed on the designated days by the trained data collectors. Number and percentage calculations of the equipment available within each unit was done.

Results

Ten surgical instruments were required to be within a unit (table 1) while another nine items were required to be within a sterilized "chest drain pack" (table 2). Twenty nine units were assessed from five tertiary care units in five provinces of Sri Lanka and the availability of each item is indicated in the tables 1 and 2: Although 75.9% units had designated "chest drain insertion packs", the mean availability of instruments inside them were 52.5%. Only 7% of units had more than one pack. A tendency not to keep instruments packed away specifically for chest drain insertion was noted, especially in the high output centres where the nurses felt that they could quickly set up a trolley when needed. However, no clear list was available to guide them to do so and some instruments were given only when specifically requested, often one at a time. Of the equipment that were required to be "easily available" within the unit, the availability was 94.8% units. However, only 24% of units used the safer non-trocar chest drain exclusively. Furthermore, 27% of units did not have the curved instrument required for dissection to facilitate safe insertion of this drain.

Discussion

The first documented description of a closed chest tube drainage system was by Hewett in 1867 for empyema [5]. During the 2nd world war (1939-1945), the experience gained contributed to the development of tube thoracostomy in chest trauma management. By the Vietnam war (1955-1975), chest drains had become the standard of care for management of chest trauma [6]. In 1992, Lilianthal reported the post-operative use of chest tubes following lung resection for suppurative lung diseases [7].

Recently, there has been concern regarding the safety of the insertion of chest drains. Elsayed et al., in their article " Chest drain insertion is not a harmless procedure - are we doing it safely?" concluded that the majority of junior doctors do not have the basic knowledge to insert a chest drain safely and that further training in this procedure is needed for them [8]. In a letter by Hewitt et al. that appeared in the BMJ in 1997, the almost universal lack of standard equipment for chest drain insertion in hospitals was highlighted. The authors suggested that this could be a significant cause of iatrogenic injuries [9].

We found no published guidelines on the equipment requirement for chest drain insertion tailored to the local setting, nor any publications pertaining to the practice of chest drain insertion in Sri Lanka, despite the large number of drains that are inserted throughout the hospitals in our country. This is the first study to address this gap of knowledge in this potentially life-saving procedure.

Table 1. Items required to be kept within a unit

Item	Galle	NHSL	Kandy	A'pura	Jaffna	Total
Sterile gown	6/7	6/7	3/5 60%	1/4 25%	5/6 83.3%	21/29 72.4%
Gloves	7/7 100%	7/7 100%	5/5 100%	4/4 100%	6/6 100%	29/29 100%
Antiseptic solution	7/7 100%	7/7 100%	5/5 100%	4/4 100%	6/6 100%	29/29 100%
Local anesthetic	7/7 100%	7/7 100%	5/5 100%	4/4 100%	5/6 83.3%	28/29 96.6%
Syringe and needle	7/7 100%	7/7 100%	5/5 100%	4/4 100%	6/6 100%	29/29 100%
Blade	7/7 100%	7/7 100%	5/5 100%	4/4 100%	6/6 100%	29/29 100%
Suture (Needle + thread)*	7/7 100%	7/7 100%	4/5 80%	3/4 75%	5/6 83.3%	26/29 89.7%
Chest tube	7/7 100%	7/7 100%	5/5 100%	3/4 75%	5/6 83.3%	27/29 93.1%
Chest tube- non trocar	6/7	7/7 100%	3/5 60%	0/4 0%	1/6 16.7%	7/29 24.1%
Closed drainage system & connecting tubing	7/7 100%	7/7 100%	5/5 100%	4/4 100%	6/6 100%	29/29 100%
Plaster	7/7 100%	7/7 100%	5/5 100%	4/4 100%	5/6 83.3%	28/29 96.6%

**Or available as separate eyed-needle and thread in sterile pack*

Table 2. Items required to be kept inside a sterile pack

Item	Galle	NHSL	Kandy	A'pura	Jaffna	Total
Swabs	5/7 71.4%	2/7 28.6%	5/5 100%	4/4 100%	3/6 50%	19/29 65.5%
Sponge holder	1/7 14.3%	2/7 28.6%	5/5 100%	3/4 75%	3/6 50%	14/19 48.3%
Drapes	3/7 42.9%	3/7 42.9%	4/5 80%	4/4 100%	3/6 50%	17/29 58.6%
Towel clips	1/7 14.3%	1/7 14.3%	0/5 0%	0/4 0%	1/6 16.7%	3/29 10.3%
Scalpel handle	5/7 71.4%	2/7 28.6%	5/5 100%	4/4 100%	2/6 33.3%	18/29 62.1%
Needle Holder + Forceps	2/7 28.6%	2/7 28.6%	3/5 60%	2/4 50%	3/6 50%	12/29 41.4%
Dressing scissors	5/7 71.4%	4/7 57.1%	5/5 100%	4/4 100%	4/6 66.7%	22/29 75.9%
Curved instrument for dissection	4/7 57.1%	2/7 28.6%	4/5 80%	3/4 75%	5/6 83.3%	18/29 62.1%
Tubing clamps	4/7 57.1%	0 0%	4/5 80%	4/4 100%	2/6 33.3%	14/29 48.3%

Table 3. Check list for equipment needed for chest drain insertion

Items required to be kept in the unit	Items required to be kept inside a sterile pack/ to be set up on a sterile trolley on request
Sterile gown	Swabs
Gloves	Sponge holder
Antiseptic solution	Drapes
Local anesthetic	Towel clips
Syringe and needle	Scalpel handle
Blade	Needle holder + forceps
Suture (needle + thread)*	Dressing scissors
Non trocar chest tube	Curved instrument for dissection
Closed drainage system & connecting tubing	Tubing clamps
Plaster	

**Or available as separate eyed-needle and thread in sterile pack*

A sterile "chest drain pack" has been traditionally considered a must, as it is an emergency procedure. The present study revealed that although 75.9% units had so-called chest drain packs, the availability of almost all instruments within them were <65%. Most of the equipment required to be within the unit were available in > 72.4% units except for non-trocar chest drains (further discussed below). These factors may lead to delay in performing the procedure and a higher rate of complications. The situation would be worse in the face of multiple casualties as only 7% had more than one designated pack.

With this back ground, and limited resources, it became evident to the investigators that a reasonable solution to our country would be to make available a list of equipment to be circulated among units so that they may set up a trolley at short notice. In contrast to the costly pre-packed disposable packs used in developed countries, this solution would have the advantage of being more economical.

The situation concerning the actual chest drain itself needs special consideration: In principle, chest drain insertion can be performed by using trocar or non-trocar techniques. In our study 31% of units had only chest tubes with trocars, while 38% of units had both trocar and non-trocar chest tubes. Ortener et al. have shown that chest drain insertion with trocars to be associated with a 6-14 % operator related complication rate [3]. No difference in the average performance time could be found between the two techniques. Misplacement and organ injuries occurred more frequently with sharp-tipped trocars. Despite these set-backs it was not clear from this study why our hospitals had more trocar chest drains, especially as they were more expensive. For example, at the time of writing, a size 32F trocar chest drain costs LKR 366 for the government while its non-trocar equivalent costs LKR 166. A lack of understanding and motivation of those who place the orders may be the cause.

If a trocar is not used, blunt dissection is essential for inserting a chest drain. In 2012, Kesieme et al. of Nigeria, in a literature survey found that complication rates are increased by the trocar technique [10]. Our study showed 27% of units had no curved instruments such as Roberts or Sawtell forceps for blunt dissection. This could explain why the operator had to use a trocar tip to facilitate the insertion of the tube. If this was practiced by junior doctors and remained unchecked by their seniors over the years, it is likely that trocar chest drains would have been provided by the nurses and administrators and thus be ordered in large quantities. Sharp tipped-trocars, however, can easily result in iatrogenic complications such as pneumothoraces and visceral injuries. The reason for the lack of curved instruments and non-trocar chest drains are likely to be due lack of knowledge and motivation among doctors and nurses. Making available the above check-list as a guideline is likely to rectify this situation partially. For better results, it will need to be accompanied by an educational program.

The hospitals selected to sample were those thought to have the best facilities from each province. Therefore, the actual situation is likely to be worse than what is seen in this study.

This is the first study that provides objective evidence of the deficiencies pertaining to safe chest drain insertion in Sri Lanka. This is a pragmatic study in that it identifies key areas which will need corrective measures. These include making available the checklist for chest drain insertion (Table 3) to the College of Surgeons and the Ministry of Health and via the Ministry, to all health institutions in the country. Furthermore, the Ministry will be requested to consider ordering non-trocar chest drains in light of improving safety and reducing costs.

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

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SCIENTIFIC ARTICLE

A prospective study to evaluate access to elective surgical services in a urology unit of Sri Lanka

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Key words: Urological surgery; waiting list; equity; quality of care

Abstract

Introduction

One of the core indicators of monitoring universal access to safe, affordable surgical care is access to timely, essential surgery. Analysing the waiting time for elective operations is one way to determine access to surgical services in a country. Aims of this study were to determine the access to surgical services in a urology unit of Sri Lanka by analysing waiting time for elective surgical operations and to determine whether waiting time is related to income categories and social classes.

Methodology

All patients undergoing surgery (excluding emergency and elective minor surgery) at a urology unit between 01.01.2016 to 30.04.2017 were included in the study. The income groups were categorised according to the household income and receipt of Samurdhi benefit. Waiting time was the period between the day the decision was taken for surgery and the day of surgery.

Results

A total of 1079 patients had complete data and 845 (78.3%) were men. Median waiting time for surgery was 40 days. Eighty nine (8.2%) were Samurdhi beneficiaries and their median waiting time was 48 days. Two hundred and nineteen (20.3%) operations were done for malignancies and the median waiting time was 20 days. Median waiting time for TURP and renal stone surgery were 55 and 125 days respectively. One hundred and seventy (15.8%) patients had their operations postponed at least once. Survival analysis showed that there is no statistically significant difference between the waiting time with income levels (p=0.38) and recipient status of Samurdhi (p=0.29).

Conclusion

Waiting time for elective urological surgery is too long though waiting time for malignancies is satisfactory in the unit. Socioeconomic status of the patient has no statistically significant influence on the waiting time indicating equity in the unit policy.

Introduction

Surgery is a fundamental modality of providing health care to people. Conditions that are treated primarily or frequently by surgery, constitute a significant portion of the global burden of disease. However, 5 billion people in the world do not have access to safe, affordable surgical care when needed [1]. Therefore in 2015, World Health Association passed a resolution to strengthen emergency and essential surgical care and anaesthesia as a component of universal health coverage [2]. One of the core indicators of monitoring universal access to safe, affordable surgical care is access to essential surgery [1]. With many competing health priorities and significant financial constraints, surgical services in low and middle income countries (LMIC) are given low priority within national health plans and are allocated few resources from domiciliary accounts or international development programmes [3].

Sri Lankan health care system is considered as a model where low investment has produced remarkable achievements in health indicators related to maternal and child health [4, 5]. However, the quality of surgical services in Sri Lanka has not been evaluated in depth and no data is available in this regard. This is important as researchers lament that there are hiatuses and weak areas in the health system of Sri Lanka [6, 7]. With the expansion of the private health care system in the country, a significant portion of health services is provided by private health institutes. The private out-of-pocket health expenditure of households in 2009 was about 45% of total health expenditure [8]. Although certain health care services in the private sector may be accessible to many Sri Lankans, surgical services are expensive and beyond the means of the majority of Sri Lankan population. The per capita GDP for Sri Lankans in 2014 was only SLR 169 609 and the average monthly household income in 2013 was SLR 45 878, which makes surgical operations in private institutions not afford-

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able to the majority [9]. Furthermore, private institutions which provide major surgical services are confined to major cities of the country making physical access a difficulty [10].

Analysing the waiting time for operations is one way to determine access to surgical services in a health system. Even the political manifesto of one of the candidates of the 2015 presidential elections who was to be the winner subsequently, promised to reduce the waiting period for surgical services in Sri Lanka [11]. In 2017 the Director General of Health Services of Sri Lanka issued a circular announcing the need to audit waiting time for key operations in all state funded hospitals [12]. This clearly illustrates the importance and relevance of this topic though not identified in depth so far in research studies. Another issue that plague the Sri Lankan health system is inappropriate manipulation of the waiting list by influential third parties i.e. staff members of the institute to fast track patients known to them. This leads to repeated cancellation of patients who deserve surgery but who do not have appropriate contacts. This may result in surgical services not being delivered to many of those who need them the most and threatens the equity of health services provision across the country.

The main objective of our study was to determine access to surgical services in a urology unit of Sri Lanka by calculating the average waiting time for different urological operations and to determine whether there is a significant difference in the waiting time between different income categories and social classes. It is also intended to assess if there is a statistical difference in waiting time for cancer patients versus non cancer patients.

Method

This was a prospective exploratory study conducted at the urology unit in Colombo South Teaching Hospital - Kalubowila from 1st of January 2016 to 30th of April 2017. All patients who were admitted to undergo elective urological surgery were recruited for the study. The surgical operations were categorised according to BUPA (British United Provident Association) classification [13].

Patients who underwent emergency surgery and minor surgery according to the BUPA classification were excluded from the study. Number of days between the decision for surgery was taken and day the surgery was performed considered as the waiting time. Transurethral resection of the prostate gland (TURP) and open pyelolithotomy for staghorn calculi were selected respectively as the index operations to calculate the waiting time among endoscopic and open surgical procedures for non-malignant conditions. The waiting time for surgeries performed for all malignant conditions were analysed irrespective of the type and complexity of the operation.

Data collection was done using a pretested data collection sheet which contained patient demographic details, the surgery, waiting time, income category, if they receive Samurdhi allowance or not, number of postponements and the reason for it. The income groups and social classes were categorised using the data available in Household Income and Expenditure Survey 2012/2013 conducted by the Department of Census and Statistics [14]. Data collection was done by trained medical officers attached to the unit during patient's admission to the ward for surgery.

Data analysis was done by SPSS (Statistical Package for the Social Sciences) version 20. Kaplan Meier survival analysis was performed with Log Rank test. Approval for the study was obtained from the Ethics Review Committee of the Institute.

Results

There were 1759 surgical operations performed during the study period of 16 months. One thousand and eighty four patients were admitted to undergo elective major and intermediate surgeries and were eligible to be included in the study sample. Five data sheets were discarded due to incomplete data. Finally, 1079 cases were selected for the analysis.

There were 845 (78.3%) men. The male to female ratio was 3.6:1. Eight hundred and fifty five patients (79.2%) were from the western province, where the hospital was situated (Table 1). The mean age of the study population was 54.4 years (range 10 to 88 years). Eighty nine patients (8.2%) were Samurdhi beneficiaries. Two hundred and nineteen (20.3%) surgeries were performed for malignancies.

Distribution of patients according to the monthly household income is given in Table 2. Majority of patients (42.5%) had a monthly income between SLR 16000 and 30000 while 285 patients (26.4%) had an income below SLR 15000 per month. Most of the operations (n = 909, 84.2%) were performed without any postponement although fifty one (5%) operations were postponed twice or more (Table 3).

Table 1. Distribution of patients according to the province of residence

Province	Number (%)
Western	855 (79.3)
Southern	98 (9.1)
Wayamba	26 (2.4)
Sabaragamuwa	39 (3.6)
Central	13 (1.2)
Uva	15 (1.4)
North Central	15 (1.4)
Northern	10 (0.9)
Eastern	8 (0.7)
Total	1079 (100)

Table 2. Distribution according to the monthly household income

Monthly income (SLR)	Number (%)	Median waiting time (days)
< 15 000	285 (26.4)	40
16 000 - 30 000	457 (42.5)	43
31 000 – 50 000	234 (21.7)	36.5
>51 000	103 (9.4)	30
Total	1079 (100)	40

Table 3. Frequency of cancellation of operations

Number of times	Number (%)
0	909 (84.2)
1	119 (11)
2	37 (3.4)
3	12 (1.2)
4	2 (0.2)
Total	1079 (100)

The median waiting time for all surgeries was 40 days (Table 2). The median waiting time for malignancies was 20 days compared to 48 days for non-malignancies (p=0.0001). The median waiting time for 82 cases of TURP was 55 days. Fifty nine patients who had open surgery for staghorn calculi had a median waiting time of 125 days.

The median waiting time according to the income category varied from 30 days to 43 days (Table 2). There was no statistically significant difference across different income categories, with regard to the waiting time (p = 0.38). The relevant survival curve is shown in figure 1.

The median waiting time for patients receiving Samurdhi beneficiary was 48 days and 40 days for those who do not receiving it. There was no statistically significant difference between these two groups (p = 0.29). The relevant survival curve is shown in figure 2.

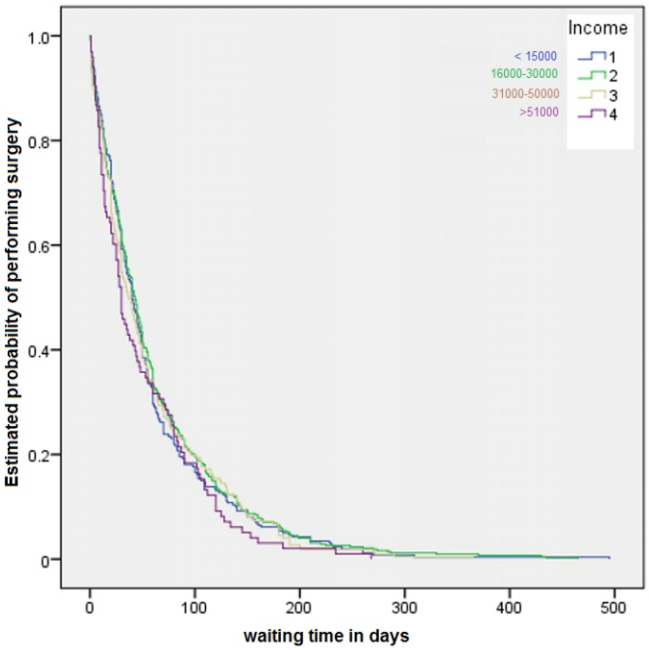

Figure 1. Survival curve showing the estimated probability of performing surgery and the waiting time of the different income groups

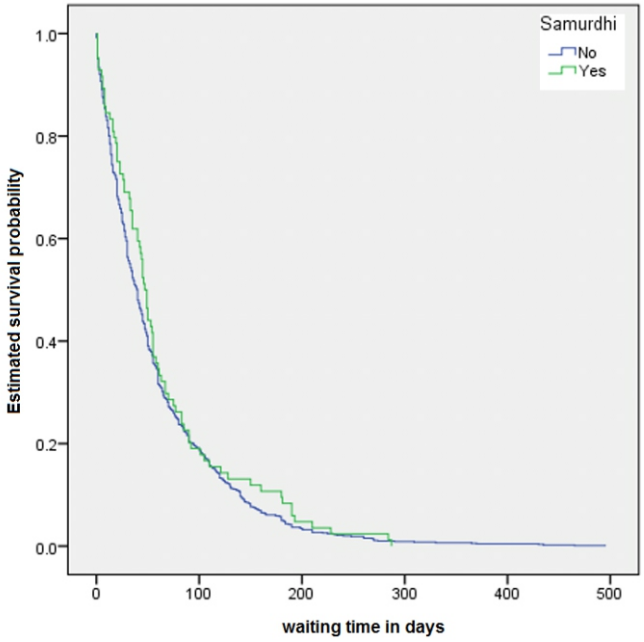

Figure 2. Survival curve showing the estimated survival probability and the waiting time of the recepients and non-recepients of Samurdhi

Discussion

According to the Health Survey 2011 of the Ministry of Health of Sri Lanka, there were 437 operating theatre tables in the country and 933 331 surgical operations were carried out during the year in Sri Lanka [15]. Out of this, 305 573 were major operations. Despite these large numbers, there are long waiting lists for surgical operations in the state funded health care institutes of Sri Lanka. Long waiting times may be due to shortage of resources (surgical beds, lack of medical equipment), lack of operating room time, short staffing or inefficiencies in the organisation of services. Sometimes it may be due to inappropriate overuse of medical services [16]. Excessive waiting times may lead to adverse health effects such as stress, anxiety and morbidity related to the index illness [17]. It may cause patient dissatisfaction and strained patient-doctor relationships and damage the public perception on the health system. The median waiting time for TURP and renal stone surgery were 55 days and 125 days respectively, which could be considered too long and unsatisfactory as most patients who had TURP were having indwelling urethral catheters and patients with staghorn calculi were symptomatic. One way to rectify this would be to build and equip more regional urology units of the country.

In lower income countries and many middle income

countries, access to safe and optimal surgical services for cancer is poor [18]. The median waiting time for malignancies in our study cohort is 20 days. According to the handbook for NHS constitution of UK in 2013, a maximum one month wait is allowed from the date a decision to treat is made to the first definitive treatment for all cancers [19]. We have managed to achieve this target of a developed country despite a heavy case load and limited resources. The bed strength of the male urology ward of Colombo South Teaching Hospital is seven and there is no dedicated female ward for urology.

There is no statistically significant association among different income groups and the waiting time for surgery (p=0.38) (Table 2). Also, the waiting time for surgeries between Samurdhi beneficiaries and those who do not receive Samurdhi remained statistically insignificant (p=0.29). This indicates that the patients' socioeconomic status hasn't had an impact on allocation of dates for surgery, which reflects fair practice appreciating social norms of equity.

The cancellations and postponement rate of elective surgery was 15.8% (approximately 1 in 6 cases). Considering the number of non-minor surgeries performed per day and the number of operating theatre sessions during the study period, it can be assumed that approximately one case is postponed for each list. Although a detailed analysis of reasons for postponement was not done in this study, the causes encountered can be broadly categorised as patient related factors and institute related factors. The common institute related factors were lack of operating time and trade union action by health care workers across all categories. Common patient related factors were inability to turn up on the given date due to various health related and family issues. We need to evaluate this issue in depth and aim at minimising the cancellations further which will enhance the quality of the services in the unit.

Manipulation of waiting periods by patients who are known to staff members of the hospitals and Department of Health is a well-known nuisance in Sri Lankan health care delivery institutes. Even socioeconomic status has been found to induce bias in waiting time [20]. This may result in certain vulnerable and neglected population groups facing the biggest impact posing a threat to the concept of equity in surgical care to all communities. Economically disadvantaged families with a very low income in Sri Lanka are given a monthly stipend called the Samurdhi allowance by the government. According to the results of our study, even the Samurdhi recipients had a waiting time similar to Non-Samurdhi recipients. The percentage of Samurdhi recipients in our study sample (8.2%) was similar to the proportion of Samurdhi recipients in Colombo district (9%), indicating that the urology unit of Colombo South Teaching Hospital caters to a true cross section of the Sri Lankan society while maintaining equity.

In 2007, the Ministry of Health launched a 10 year Health Master Plan. Enhancing quality of service delivery and improving health status of vulnerable populations are two of the eight immediate objectives to be met [9]. It is important to develop models to easily identify deficiencies in the existing system so that corrective measures can be taken to increase the equity of service provision. To achieve optimal resource utilization and enhanced equitable resource distribution for equitable health care service provision, it is essential to identify the existing situation of resource distribution and performance of health system.

Research on health policy and systems such as implementation research is crucial to make what is possible in theory, a reality in practice [21, 22]. Such research studies would describe the real world's context and factors that are either overlooked or not captured by other research disciplines. The results of our study describe the real world scenario in providing uro-surgical services in Sri Lanka. Therefore, Sri Lankan health policy makers should strive to build adequate capacity to meet the current and future needs. This entails significant capital investment in uro-surgical infrastructure and equipment in order to upgrade existing urology units and to establish new units in regional hospitals, which already have trained urological surgeons, whose skills are been underutilised. Furthermore, this model we have used to determine access to uro-surgical services can be used to assess future performance evaluations and determine trend analysis in surgical units throughout the country. Performance evaluation needs to be carried out so that incentives and rewards are attributed accordingly. This would improve the efficiency of the existing health care delivery system using the already available resources.

In this study, the waiting time was calculated among patients who were admitted for surgery. There is a remote possibility that few of the scheduled patients may have undergone surgery elsewhere (drop outs) or may have even died due to their illness or for any other reason. Failure to address this censored data (deaths and drop outs) for the waiting time calculation remains a limitation of this study. However, in real time clinical practice these numbers would be negligible and unlikely to influence findings significantly.

Conclusion

Waiting time for TURP and renal stone surgery in the urology unit of Colombo South Teaching Hospital, Sri Lanka appears to be too long though waiting time for operations for malignancies is on par with the standards and targets in the UK. Socioeconomic status of the patient has no statistically significant influence on the waiting time, indicating equity in the unit policy. The model described in this study can be used by the Department of Health of Sri Lanka to assess access to services in surgical units of the country.

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

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SCIENTIFIC ARTICLE

Surgery for colorectal cancer in Sri Lanka: open to laparoscopy

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Keywords: Colorectal cancer; laparoscopy

Introduction

Colorectal cancer (CRC) is the third commonest cancer and the fourth most common cancer cause of death throughout the world with an estimated 1.2 million new cases and 600,000 deaths every year [1, 2]. In Sri Lanka colorecatal cancer accounts for 7% of all malignancies with about 810 new cases diagnosed annually. It is the fourth commonest malignancy in males and fifth among females [3]

Traditionally, CRC was treated by open (conventional) surgery until Jacobs performed the first laparoscopic assisted colon cancer resection in 1991 [4]. The enthusiasm for laparoscopic colorectal resections for cancer suffered a setback when, in 1993, Alexander et al (4) reported the first case of wound recurrence three months after a right colectomy. Since 2002 four large RCTs have been published confirming the oncologic safety of laparoscopic compared with open colon cancer resection [5-8].

We performed the first laparoscopically assisted (LA) procedure for CRC in 2008 using basic laparoscopy instruments. In the beginning, most laparoscopic procedures that we undertook were laparoscopic assisted. However, as we gained experience and more advanced facilities were introduced, we progressed to perform total laparoscopic procedures (TL) for CRC.

The three main aims of our study were; to analyze the clinico-pathological aspects of CRC in our patients, to assess our overall result of surgical treatment for CRC, and to compare the surgical and oncologic outcomes between open and laparoscopic approaches for CRC in our patients.

Materials and methods

The study population comprised 270 patients managed by a single surgeon from August 1998 up to March 2016 at two tertiary care centers.

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Definitions of access

Open surgery: A procedure that was performed with a formal midline skin incision as planned.

Laparoscopic-assisted resection (LA) involved laparoscopic mobilization of the colon, visualization of critical structures, and standard total mesorectal excision (TME) for rectal cancer. A small transverse abdominal incision was required to complete the procedure for vascular ligation when 'haemolock' or vascular staplers were not available, and to remove the specimen.

Total laparoscopy (TL): For the purpose of this study TL was defined as where the entire procedure, except the intra-corporeal anastomosis, was performed by the laparoscopic method.

Conversion is where the incision used was longer than a planned incision that was used to deliver the specimen in a laparoscopic procedure or where the incision was different to that planned.

Surgical technique

All procedures were performed according to standard techniques and lymph node dissection was carried out according to the "Guidelines and General Rules for Clinical and Pathological Studies on Cancer of the Colon, Rectum and Anus" by the Japanese Research Society for Cancer of the Colon and Rectum [9].

Collection of data

Data was collected from personally kept patient records, and operation records were analysed retrospectively. Pathology data were collected from the operation register maintained in the unit.

Statistical analysis

Categorical data are presented as percentage and compared by the chi-square test. Continuous data are presented as mean (standard deviation) and median (range). All analyses were performed using the SPSS software (SPSS Inc., Chicago, IL, USA).

Results

Of 270 patients, 10 were excluded from the study (not operated= 6, lost after neoadjuvant therapy= 1, inadequate data= 3). Thus, data were analyzed in the remaining 260 patients; 159 male (59 %) and 111 female (41%), median age 59; range 25 to 90 years.

Clinico-pathological features

Aetiology:

First degree relatives with a history of CRC were found among 8 patients (n= 142; 5.6%). In 5 patients (3.5%), CRC developed on a background of familial adenomatous polyposis (FAP) and two other patients (1.4%) developed CRC in long standing ulcerative colitis.

Presentation:

Twenty eight patients (n= 175; 16%) presented with sub-acute intestinal obstruction. The mode of presentation in other patients is shown in Table1.

Duration of symptoms in 132 patients who were analysed varied from 1 to 24 months; median – 3 months.

Pathology:

The site of distribution of cancers in 243 patients is shown in Table 2. Also, the composition in the stage of presentation of CRC over the 15-year period (n= 217) from 2001 is shown in Figure 1. Forty two of 252 (17%) patients analysed had distant metastases at presentation. Histopathology data in 127 patients revealed well differentiated adenocarcinoma in 83 (65 %), moderately differentiated adenocarcinoma in 43 (34 %) and poorly differentiated adenocarcinoma in 1(1%) patient. There were 6 (5%) mucinous carcinomas.

Table 1. Mode of presentation

Presentation	Number	%
Bleeding per rectum	75	42.8%
Change of bowel habits	30	17.1%
Abdominal pain	23	13.1%
Anemia	07	4%
Other	12	6.8%

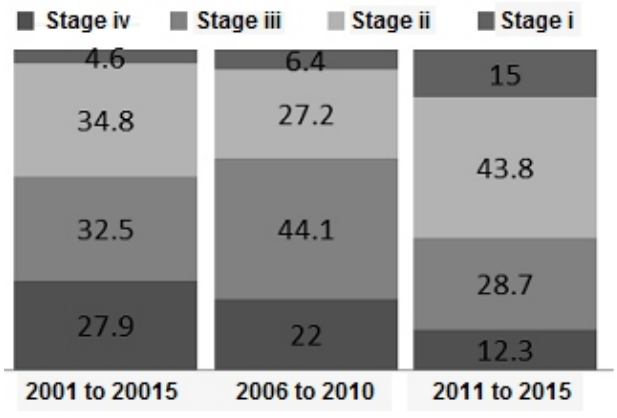

Figure 1. Tumour stage at presentation

Surgical procedure:

Two hundred and sixty patients had surgical intervention during the study period. Furthermore, 25 had only a palliative procedure (resectability 90%), an emergency surgical procedure was required in 26 (10%) patients for intestinal obstruction. In nine patients, tumour was not resectable.

Analysis of data from patients who underwent surgical resection (n= 235) showed that 66 patients were treated with neoadjuvant therapy. This includes 50 of 101 with rectal cancer (49%) who received chemo irradiation, of which eight (16 %) were complete responders.

Surgical access:

One hundred and sixty-eight patients underwent open surgery (O) compared with 67 patients who underwent laparoscopic surgery. The laparoscopy group comprised 43 laparoscopic assisted (LA) and 24 total laparoscopic (TL) procedures. The overall conversion rate for laparoscopic procedures was 16 %.

Surgical technique:

Group I lymph nodes were included in the dissection (D1 dissection) in 32 patients and 143 patients underwent N2 nodal dissection (D2 dissection). Only 2 patients had N3 nodal (D3) dissection. In the remaining patients (n= 58) nodal dissection status could not be determined (Dx).

To achieve tumour clearance combined organ resection was performed in 11 patients. A sutured colorectal anastomosis was performed in 73 patients (51 %) and stapled anastomosis was performed in 71 patients. In 27 (34%) who underwent anterior resection of the rectum, we created a proximal diverting loop ileostomy.

Quality indicators in surgical procedures:

The AR: APR ratio was 1.5:1. The operating time for each procedure is shown in Table 3. Table 4 shows the volume of blood loss during the procedures.

All resected specimens (n= 235) had negative proximal and distal margins. The circumferential resection margin was reported only in later pathology reports and therefore the data were insufficient for analysis. Lymph node (LN) harvest could be determined in 92 patients (36.5 %). Twelve or more LNs were examined in 27 % patients. The node positivity was 15 %. Table 5 indicates the lymph node harvest in 92 procedures. Also, the number of lymph nodes harvested in our unit has been increasing and had almost reached the recommended standard over the last two years (Figure 2)

Post-operative complications:

There were 93 complications (40%), of which, thirteen (5.5%) were major surgical complications. Seven of 185 patients had anastomotic leaks (4%); five followed AR (leak rate following AR is 6.3%). Other major complications were abdominal wound dehiscence (n= 5; 2.1 %) and post operative

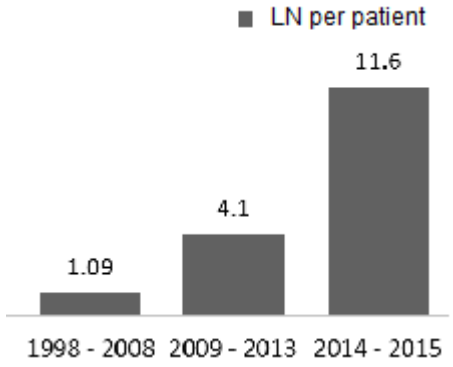

Figure 2. Lymph node harvest-1998 to 2015

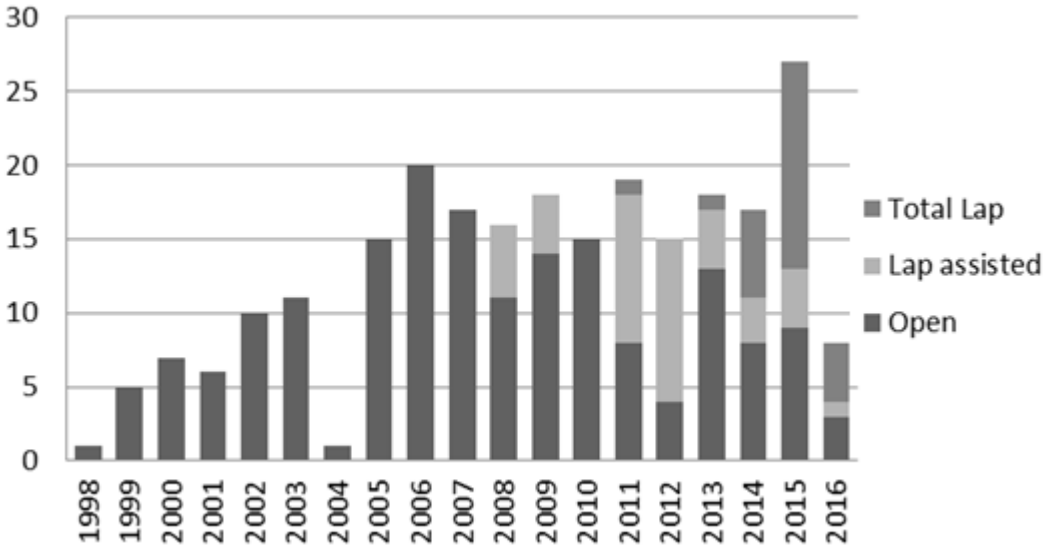

Figure 3. Transition from open to laparoscopic colorectal resection

Table 2. Distribution of Colorectal cancer

Site	Number	%
Caecum	03	1.2 %
Ascending Colon	20	8.2 %
Transverse Colon	18	7.4 %
Descending Colon	09	3.7 %
Sigmoid Colon	63	25.9 %
Recto sigmoid junction (Rs)	24	10.2 %
Upper Rectum (Ra)	32	13.1 %
Lower Rectum (Rb)	66	27.1 %

Table 3. Operating time (overall)

Procedure	Range (Hrs)	Median (Hrs)
Right hemicolectomy (n=11)	1 to 4.5	2.2
Extended right hemicolectomy (n= 11)	1.75 to 6.5	3
Left hemicolectomy (n=8)	2.5 to 4	2.7
Sigmoid colectomy (n= 32)	2 to 4.5	2.7
Anterior resection (AR) (n= 68)	2.5 to 6.5	4
Abdomino perineal resection (APR) (n= 36)	2 to 7	4
Sub-total colectomy (n= 2)	3.5 to 3.7	3.6
Procto-colectomy (n= 4)	3.5 to 9	4
Hartmann's procedure (n= 9)	1.5 to 4.5	2.5

Table 4. Blood loss (overall)

Procedure	Range (ml)	Median (ml)
Right hemicolectomy (n= 18)	50 to 700	275
Extended right hemicolectomy (n= 10)	100 to 700	700
Left hemicolectomy (n= 08)	50 to 500	325
Sigmoid colectomy (n= 46)	100 to 2000	300
Anterior resection (AR) (n= 37)	300 to 3000	450
Abdomino-perineal resection (APR) (n= 37)	300 to 3800	925
Subtotal colectomy (n= 3)	350 to 2000	650
Procto colectomy (n=3)	100 to 950	500
Hartmann's procedure (n =8)	50 to 500	275

Table 5. Operative parameters open vs. laparoscopy

Parameter	Open	Lap assisted (LA)	Total lap (TL)	LA + TL
Median operating time (hours)	3 (1 to 6.5)	4.6 (3 to 9)	4 (2.5 to 5.5)	4 (2.5 to 9)
Median blood loss (ml)	500 (50 to 3800)	461 (100 to 950)	150 (50 to 300)	200 (50 to 950)
LN harvest (median) (range)	8.44 (1 to 28)	7.1 (1 to 15)	10.0 (3 to 16)	8.7 (1 to 16)
Conversion	NA	12 (17.9 %)		
Median Hospital stay(d)	8 (4 to 30)	8.1 (4 to 38)	5 (3 to 12)	5 (3 to 38)

Table 6. Cause of death

Cause of death	Number	%
Sepsis	04	1.7 %
Congestive cardiac failure	02	0.8 %
Deep vein thrombosis / Pulmonary embolism	01	0.4 %
Myocardial infarction	01	0.4 %
Bleeding due to cirrhosis of liver / DIC*	01	0.4 %
Hepato-renal syndrome	01	0.4 %
Total	**10**	**4.2 %**

*Disseminated intravascular coagulation

bleeding (n=1; 0.4%). Wound infection occurred in 31 patients (13.1%) and prolonged ileus was seen in 5 (2.1%). Myocardial infarction (3.4%) was the commonest non-surgical post-operative complication (total 9.7%). Twelve patients underwent re-exploration (5%) and the hospital re-admission rate was 2.5 % (6 patients).

30 Day post-operative mortality

There were ten post-operative deaths (overall mortality of 4.2%). However, procedure related mortality was 1.7% (n= 4). All were due to sepsis following anastomotic leaks. The causes of death are listed in Table 6.

Laparoscopic surgery

Figure 3 illustrates the transition from open to laparoscopic procedures over the study period.

Open vs. laparoscopy:

Comparison of operative parameters between the two groups is shown in table 5. Respective percentages of morbidity, anastomotic leak and mortality for the open and laparoscopy groups were 31.1% versus 30.9%, 3.1% versus 2.9% and 5.5% versus 1.8%.

Intra operative complications:

There were two intra operative complications in the laparoscopy group (3%); inadvertent injury to bowel and injury to the left ureter.

Follow up

Follow up data was available for 121 patients (58 %). The overall follow up period ranged from to 2 months to 15

years (median 1.1 years). An incisional hernia was found in 6 patients who underwent open surgery (4%). Stoma complications were detected in 6 patients who underwent APR (15%).

Oncological outcome (overall)

Local recurrence:

There were 10 patients who developed local recurrences (8 %) from 2 to 49 months (median time to recurrence 1 year); nine followed surgery for rectal cancer (n= 80; 11%). Only one patient (2.4 %) developed local recurrence after colon cancer resection (n= 41). Nine local recurrences were following open (10%) and 2 followed laparoscopic operation (6%).

Distant metastasis:

Distant metastases were detected in 20 patients (17 %) during follow up. The commonest site was the liver. There was one port site (1 %) recurrence following a lap-assisted procedure at 9 months.

Discussion

This is a study of 260 patients with colorectal cancer who underwent either standard open or laparoscopic surgery. The median age of the study group was 59 years (range 25 to 90 years), which is lower than reported in most western literature (70 years, range 28 to 95) [10]. There was no marked difference in male to female ratio, 1.4: 1, in this study compared to other published data [11, 12].

Clinico-pathological parameters

Sixteen percent presented as an emergency. One study reported emergency presentation for CRC in 13.6 % [10] whereas others have reported emergency presentations in up to 30 % [13]. All patients who presented as an emergency had intestinal obstruction. Other larger studies have reported intestinal obstruction as the commonest (78 %) mode of emergency presentation [14, 15]. Bleeding per rectum was the commonest symptom (42.8 %), which was followed by change of bowel habits (17.1 %) in those who presented to the out-patient clinic.

There is a marked variation in the duration of symptoms in developed countries (1 to 10 months; median 3.5 months) [16] and African countries (21 days to 84 months; median 22 months) [11]. In our study, median duration was 3 months (1 to 24 months).

A family history of CRC among first degree relatives was obtained in 8 (5.6 %) patients in this study and compares with the same reported by Phillipo LC (5.4 %) in his study of 332 patients from Tanzania [11]. In another study, a family history of CRC was reported among 20.5 % of patients in Sweden [10]. Pooled data analysis shows a relative risk of 2.24% and 2.93% for patients with a first degree relative affected by CRC and patients with ulcerative colitis respectively [17].

In our study group the proportion of rectal cancer (RC) was higher (40.2%) than reported (15.7 to 38.7%) in other studies [10, 11, 18]. Further, about 80 % of CRC in our patients was located on the left side making it accessible even with a flexible sigmoidoscope. Therefore, stool occult blood combined with flexible sigmoidoscopy would be an attractive option for screening of CRC in our patients. However, the cost effectiveness of this approach has to be determined by further studies.

Distant metastases were present at presentation in 16.6 % of our patients with 80.9 % of them in the liver and 4.6 in the lung. Published data shows 20 to 25 % of colon cancer and 18 % of rectal cancer patients have distant metastases at presentation with liver being the commonest site [13].

Preoperative management

Neoadjuvant therapy has been used in 64 patients out of whom 50 were for patients with RC. The use of neoadjuvant chemo-irradiation for RC became the standard practice after the trial in 2012 [19, 20]. Though 49 % patients with RC received neoadjuvant therapy sub group analysis shows a marked increase in the tendency to use neoadjuvant therapy after the year 2011 (27% before and 80 % after 2011). Simon et. al. in 2012 [22], examined the trend in the use of neoadjuvant radiotherapy among surgeons across the south west region of France and found that 62% of the patients received neoadjuvant radiotherapy for RC. A complete response to neoadjuvant chemo radiation was seen in 16% of our patients. A similar response rate has been observed (17 %) in the landmark paper published in 2004 by Habr-Gama where they adopted a "watch and wait" policy for this group of complete responders [22]. Others have reported complete response rates as high as 25 % [22].

Surgery (overall)

The overall operability among our patients (90 %) was lower than other studies (97 %) [19]. However, the operability among those patients undergoing emergency procedures was only 65 %, a finding that has not been reported earlier.

Post-operative management

The overall postoperative complication rate in this study (39.5 %) was higher than reported (26.2 %) in a similar study [11]. The commonest post-operative complication (13.2%) was wound infection. The reported incidence of wound infection is between 3 to 30% across the literature [23]. Similarly, the overall incidence of anastomotic dehiscence (3.7% in this study) ranged between 1% to 30% in the literature [24, 25]. Higher incidences of anastomotic dehiscence have been reported following rectal cancer resection versus colon resection (5% vs. 10%) [19]. However in the hands of an experienced colorectal surgeon, the reported incidence of

anastomotic dehiscence following AR has been between 3% and 6% [25]*, and it was slightly higher (6.3%) in the present study. Prolonged ileus (2.1%) contributed to longer hospital stay in our patients. One study showed a slight difference in the incidence of ileus following open surgery versus laparoscopic surgery (3.3 % vs. 2.4%) but the difference was not statistically significant [26].

The median hospital stay was 10 days (3 to 38 days) in our patients. Median hospital stay after surgery for CRC was 12 (4 to 72 days) in one study [11]. The difference is probably due to the inclusion of patients who underwent laparoscopic surgery in our study. Our re-operation rate (5.1%) was lower than the reported 12% for LA and 10% for open surgery [27]. The overall readmission rate of 2.5% in our study group is comparable to the reported 2% for LA and 12% for open surgery in the same study.

The overall 30 day mortality in our study was 4.2%. Eighty percent of deaths followed surgery for rectal cancer. Mortality as high as 13% has been reported following emergency procedures while that reported for elective procedures is around 2% [19]. In these studies it is not clear if post-operative mortality was procedure related or due to other co morbid factors. Procedure related mortality in our patients was 1.7%. Also, we observed higher mortality among patients with rectal cancer (6.6% vs.1.7%) than those with colon cancer. Others have reported overall mortality from 8% to 10.5% for CRC [11].

The number of LN examined could be determined in only 36.5 % of patients, far less than reported in other studies [28]. In a large study of 3557 patients mean LN harvest was 13 (1 to 53), (37); in our patients we could harvest only a median of 8 (1 to 41) nodes. Lymph node positive ratio (15.1%) was also lower than reported (49.7 %) [18, 29].

Follow up

Incisional hernias were found in 2.7% of patients followed up, and it was slightly higher than reported in the literature [26]. Port site hernia was observed in 1.4% of the patients by the same group but we have not encountered this complication in our patients undergoing laparoscopy thus far. Port site recurrence was seen in one of our patients (1.4%). In one study port site recurrence following laparoscopic resection of CRC was 1.2 % [30]. Other studies have reported port site recurrences between 0.7 to 1.3% following laparoscopic surgery for CRC [5, 31]. The complications related to stoma in our study (14.6%) was also higher than that reported in a similar study (4.1%) [27].

Oncological outcome

The literature reveals a higher local recurrence rate for RC (10 to 20 %) compared to colon cancer (2 to 10%) [26]. In our patients, local recurrences were seen in 11.2% following RC and 2.4% following colon cancer (overall 8.2%) and was within the reported figures. In a meta-analysis, 40 to 50 % of patients eventually developed liver secondaries following surgery for CRC within 3 years [32]. In our study 10.7% of the patients developed liver secondaries within 2 years. The incidence of brain metastases among our patients (1.6%) was within the reported range of 0.6% to 3.2% [33].

Open surgery vs. Laparoscopy

The operative time in the laparoscopy group (LA + TL) was longer than the open surgery group. In a meta-analysis of 13 trials operating time in laparoscopy was longer (p=0.027) in all but one (32) study. In addition, most of the studies have observed significantly lower mean blood loss following the laparoscopic approach [34]. Though our blood losses in both groups were higher (689 ml vs. 323 ml) laparoscopy group had a lower blood loss). The two intraoperative complications (2.9%) were seen within in the first 10 procedures. In most studies, the incidence of intraoperative complications were similar in laparoscopic (for RC 6.1% to 21.1 %: overall 3.7 %) and open surgery [35].

Conversion rate in our study (17.9 %) was almost equal to that reported from North America (17.5%) although it is higher than the Europe (10.3%) and Asia (13.6%) [36]. However, it is within the reported range (15 to 30 %) [6, 8, 37, 38]. The reported hospital stay after laparoscopic CRC surgery is 5 to 8 days [6, 8]. In a meta-analysis of 7 trials, hospital stay after laparoscopic colon and rectal cancer resection has been analyzed separately and shown to be significantly shorter in both groups [35]. In our study the hospital stay was assessed together in both groups and was found to be lower in laparoscopy group (open 9.4 days vs. laparoscopy 6.1 days).

Postoperative complications in our study were comparable between the two groups (open 31% vs. laparoscopy 30.9%). The literature does not reveal a significant difference in postoperative complications between laparoscopic and open surgery either [35]. Anastomotic leak rate did not differ significantly between the two groups (OR 0.97) in this study. However in most published studies, including a meta-analysis of 7 trials [35], there was no significant difference in the anastomotic leakage between open and laparoscopic approach. There was no significant difference in post-operative mortality between the open and laparoscopic techniques (5.5% vs. 1.8%; OR 0.25). In a meta-analysis of six trials, mortality was below 2% in either group [35]. Though not statistically significant, open surgery group in our study showed a higher mortality (5.5%) probably because of the inclusion of the learning curve. In another randomized trial mortality was 5% for open and 4% for laparoscopic surgery [39].

Higher LN harvest in TL group could be attributed to the difference in pathological reporting rather than the surgical

technique since this group represents the most recently reported group where LN harvesting is highest.

Local recurrence after the resection of colon cancer was 28% vs. 18% in the Barcelona trial [34]. In our study local recurrence following open surgery (10.2%) was lower than Barcelona trial. Though local recurrence following laparoscopic resection was lower in our study (6%) compared with Barcelona trial, comparison cannot be made since ours is not a randomized controlled trial. Multiple factors would have contributed for the higher local recurrence rate in open surgery group. Some of the patients especially in the early part of this study did not receive neoadjuvant therapy as they underwent surgery in an era before the neo adjuvant therapy became the standard practice at least in our practice (use of neoadjuvant therapy for RC was 27% before and 80 % after 2011). Secondly, the learning curve also would have contributed to some extent. Thirdly, patients who underwent laparoscopic surgery have been followed up for a shorter period compared to open surgery group. Many randomized studies have confirmed the non-inferiority of laparoscopic over open surgery with respect to overall survival and disease-free survival [, 3, 14, , 40]. Our experience is similar despite being a non-randomized study.

Conclusion

There are differences in the clinic-pathological aspects of CRC in our patients especially with regard to age and stage at presentation. The overall operative and oncological result of this study shows that we can reach the accepted standards in colorectal surgery. Though laparoscopic surgery for colorectal cancer is more recent, despite the steep learning curve we have reached accepted international standards within a short period of time. Two aspects of our study that need attention are LN retrieval and reporting, and long term follow up. While LN harvest has shown improvement over the years, follow up reporting of patients has to be longer.

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

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REVIEW ARTICLE

Acute mesenteric ischaemia : Part I

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Key words: Acute mesenteric ischaemia; superior mesenteric artery occlusion; superior mesenteric artery thrombosis; bowel ischaemia

Introduction

Acute mesenteric ischaemia (AMI) is a life-threatening emergency. Although uncommon, it remains a highly complex clinical problem with a mortality rate of 30 – 65 percent [1,2]. In under treated patients, the complex and progressive pathophysiology of AMI leads to the inevitable clinical outcome of extensive bowel necrosis, multi-organ failure and death. In spite of numerous advances in imaging modalities and treatment, there have been only modest improvements in mortality rates. Zettervall et al reported a decline in the in-hospital mortality rates (37-21%) of patients undergoing revascularization for AMI during the period 2000-2012 [3]. It has been suggested that while the major advances in imaging technology have resulted in earlier diagnosis, this has been counterbalanced by the contemporary AMI patient presenting at an advanced age with more severe underlying comorbidities [4]. The purpose of this article is to review the current approach to diagnosis and treatment of acute mesenteric ischaemia

Mesenteric vascular anatomy, etiology and pathophysiology of AMI

Vascular Anatomy

The celiac axis with its hepatic, splenic and left gastric arteries perfuse the foregut structures of the esophagus, stomach, and duodenum. The superior mesenteric artery (SMA) perfuses the structures of the mid-gut including the jejunum, ileum, and ascending colon and the first portion of the transverse colon. The inferior mesenteric artery (IMA) perfuses the hindgut structures of the distal transverse colon and descending and sigmoid colon. Gastroduodenal and pancreaticoduodenal arteries provide collateral pathways between the celiac axis and the SMA. The meandering mesenteric artery, sometimes referred to as the arc of Riolan, describes a collateral that forms between the SMA and IMA in the presence of occlusive disease. The marginal artery of Drummond lies along the mesenteric border of the bowel and also provides collateral flow between the SMA and IMA territory. The internal iliac arteries provide a collateral pathway to the IMA via the hemorrhoidal arteries in the setting of IMA occlusive disease [5] (Figure 1).

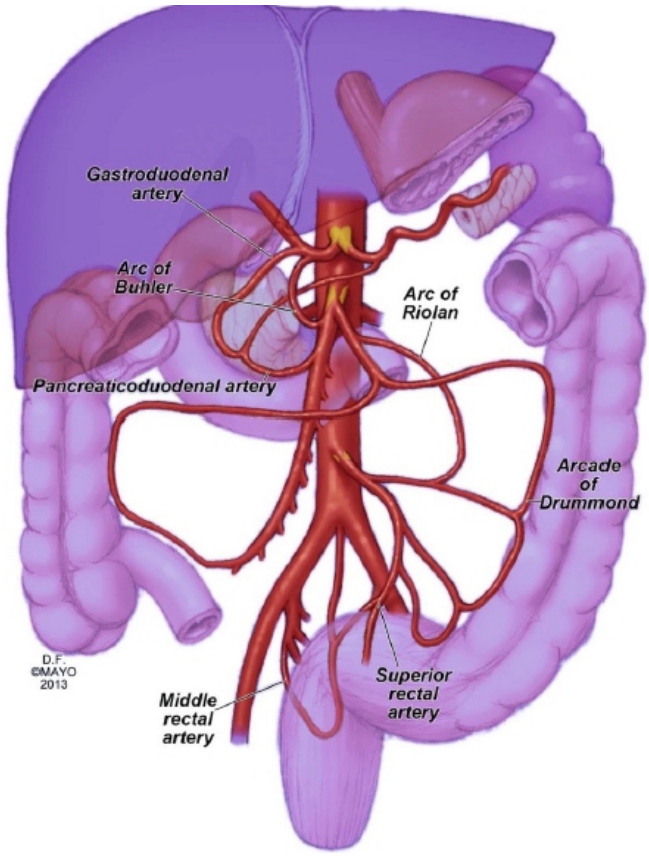

Figure 1. Mesenteric artery circulation and common collateral pathways in patients with occlusive mesenteric artery disease. Common collateral pathways include the pancreaticoduodenal artery between the celiac axis and SMA, and the arc of Riolan between the left colic artey (IMA) and middle colic artery (SMA).

(Courtesy: Rutherford's vascular surgery. 8th ed. Philadelphia: Elsievier Saunders, 2014; with permission)

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Etiology

Historically, superior mesenteric artery embolism has been the most common etiology of AMI, accounting for 40 – 50 % of cases [6] (Table 1). Most emboli are from a cardiac source secondary to atrial fibrillation, low-ejection fraction (congestive heart failure, cardiomyopathy), recent myocardial infarction with mural thrombus, or ventricular aneurysm. The overall incidence of thromboembolism may be declining secondary to improved treatment of atrial fibrillation with anticoagulation. Other embolic sources include arterial to arterial emboli (proximal aortic lesion), valvular heart disease, endocarditis, and complications from recent catheter-based angiography. The superior mesenteric artery (SMA) is the most commonly affected mesenteric vessel because of the oblique origin from the visceral aorta [6]. Emboli commonly lodge distal to the middle colic artery, just beyond the first few jejunal branches, creating a classic pattern of ischaemia that spares the first portion of the small intestine and the transverse colon [7]. Atheroemboli tend to lodge in the more distal mesenteric circulation due to their smaller size.

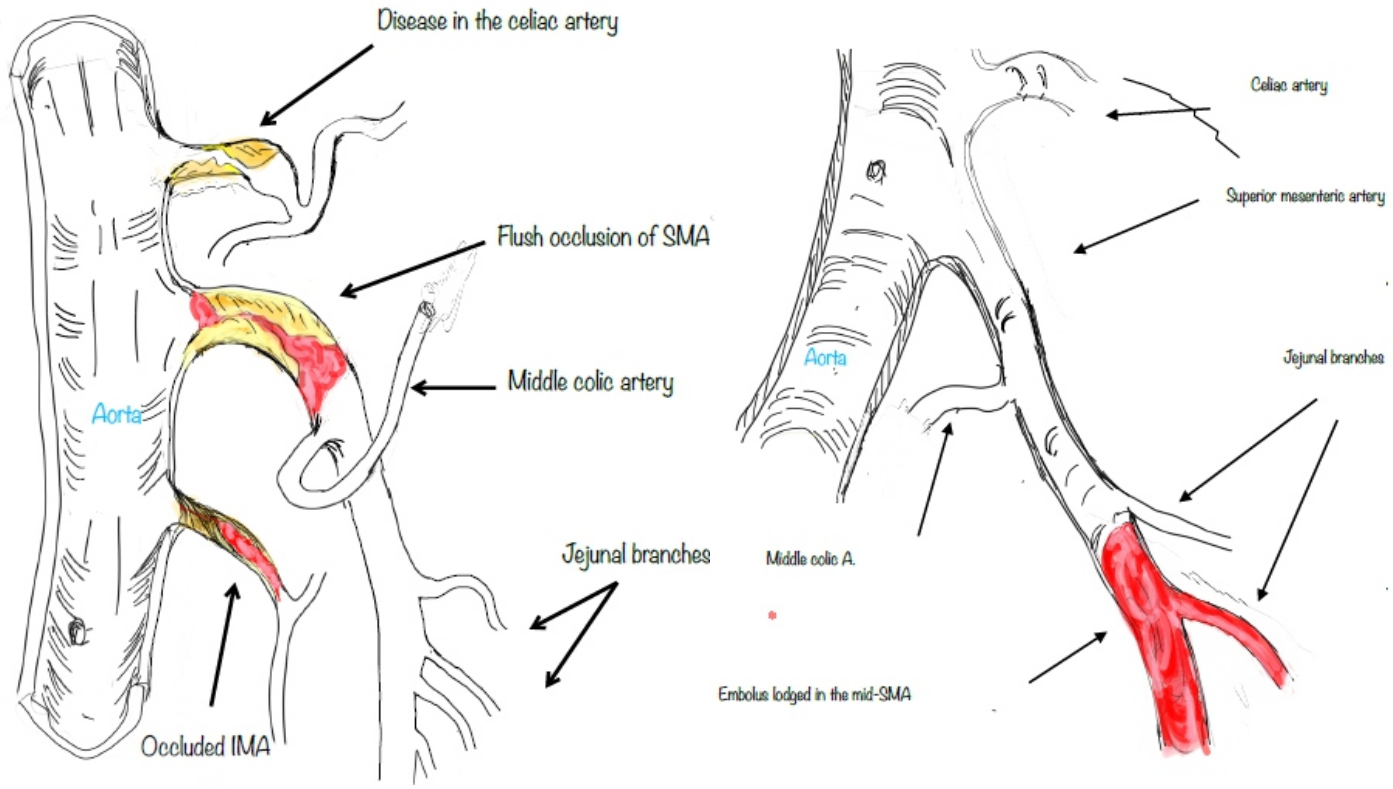
Acute arterial thrombosis, superimposed on pre-existing atherosclerotic disease, typically accounts for 25-30 % of AMI but recent data suggest that this may be the most common cause [1,8]. These patients typically have a history of weight loss and postprandial abdominal pain due to their progressive chronic occlusive disease. Occasionally, the patients may be asymptomatic prior to the development of AMI but present secondary to the acute thrombosis of an important collateral vessel. The onset of symptoms may therefore be insidious due to extensive collaterals maintaining bowel viability until the index event causes thrombotic occlusion of the vessel. The predominant arterial occlusive lesion responsible for AMI is nearly always at the SMA, in addition to accompanying occlusive disease of the celiac axis and IMA. The multi-vessel involvement explains the fact that in the case AMI due to SMA thrombosis, it is often the case that the entire GI tract is involved, in contrast to the sparing of the proximal jejunum and ascending colon seen in the setting of an embolic event (Figures 2A/2B).

Nonocclusive mesenteric ischemia (NOMI) most frequently occurs in the setting of severe systemic illness such as cardiogenic shock and multi-system organ failure and the bowel ischaemia occurs due to mesenteric arterial vasospasm and severe hypoperfusion. It is often under recognized in patients with reduced left-ventricular ejection fraction (LVEF), especially in those who require significant pressor support

Table 1. Etiology of acute mesenteric ischaemia

Causes of AMI		**Incidence**
Arterial embolism	Atrial fibrillation	40% - 50%
	Acute myocardial infarction	
	Ventricular aneurysm	
	Atheroemboli	
	Valvular heart disease/endocarditis	
Arterial thrombosis	Atherosclerotic mesenteric disease	25% - 30%
	Acute sequelae of aortic dissection (malperfusion syndrome)	
	Occlusion of bypass grafts/complications of angioplasty and stenting	
	Spontaneous mesenteric dissection	
Non-occlusive mesenteric ischemia (NOMI)	Multi-system organ failure	20%
	Shock	
Mesenteric venous thrombosis*	Intra-abdominal inflammatory states: pancreatitis, inflammatory bowel disease	10%
	Hypercoagulability	
	Local venous congestion (portal hypertension, congestive heat fail)	
	Direct injury (trauma or post-surgical)	

**mesenteric venous thrombosis will be discussed in detail in a separate article*



Figures 2 A-B. Location of proximal atherosclerotic thrombosis and embolic occlusion in the SMA.and middle colic artery (SMA).

with vasoactive medications such as epinephrine and norepinephrine [9]. It is claimed that NOMI may occur as often as 2.5-5% in a subset of patients with low ejection fraction and pressor support.

Mesenteric venous thrombosis (MVT) can lead to visceral ischaemia secondary to compromise in venous outflow leading to severe bowel congestion compromising arterial inflow. Various etiologies of AMI are compared and contrasted in Table 1.

Pathophysiology

The bowel can tolerate a remarkable degree of ischaemia without permanent cellular damage. Only one fifth of the mesenteric capillaries are open at any given time, and normal oxygen consumption can be maintained with only 20% of maximal blood flow [6, 10]. Below "critical blood flow" of 30mL/min/100g, oxygen delivery is limited leading to tissue injury [9]. Mucosal surfaces are affected first because the metabolic demand in the mucosa is much higher than that of the serosa. Clinically, this is manifested with mucosal infarction leading to bloody diarrhea and malabsorption.

Hagland described four clinical stages in the natural history of AMI [11]. The first stage of AMI, the hyperactive stage, is characterized by reflex intestinal contractions caused by ischaemia resulting in intermittent severe pain, loose stools (sometimes bloody) and vomiting. In the second paralytic stage, pain is more constant and diffuse, and the abdomen is distended and tender. Third stage of disarranged fluid balance occurs when there is leak of protein and electrolyte rich fluid from both the serosal and mucosal side of the gut. As the bowel becomes necrotic, peritonitis develops. In the final (fourth stage) of shock, the patient has frank peritonitis and massive volume loss.

Clinical presentation

The presence of bowel ischaemia causes the onset of severe pain which predates the infarction of the bowel, leading to the classic finding of pain out of proportion to physical examination findings. Until there is transmural necrosis and peritonitis, there is little peritoneal irritation and therefore minimal tenderness to palpation. However, depending on the timing and actual cause of AMI, this classic presentation may be absent in 20 – 25 % cases [6]. In patients with acute SMA embolism, the onset of symptoms is characteristically abrupt. Patients with SMA thrombosis may present with a more insidious onset of symptoms since many of these patients have well developed collaterals, which are more gradually compromised.

Often, the diagnosis is difficult to make on clinical grounds since the symptom complex of abdominal pain, distension, diarrhea, acidosis, sepsis, and gastro-intestinal bleeding may easily be mistaken for other common intra-abdominal pathology. NOMI patients may have an even more subtle

onset and a protracted course in a clinical picture dominated by their cardiac or septic shock. Due to their already critical status, no history is usually available.

Patients with mesenteric venous thrombosis typically have an insidious onset of pain, dissension, and hypovolemia in a setting of predisposing pathology such as portal hypertension or a hypercoagulable state. In general, clinical diagnosis of AMI needs a high-index of clinical suspicion and thorough analysis of all clinical data.

Table 2. Diagnostic criteria for bowel ischaemia: typical imaging findings associated with arterial and venous causes of ischaemia

Arterial embolus	**Arterial thrombosis**	**Non-occlusive mesenteric ischemia**	**Venous thrombosis**
Filling defect with a convex shape distal to the SMA origin.	Occlusive lesion flush with the ostia of the visceral vessels	Vasospasm throughout the mesenteric arterial circulation	Venous filling defect in delayed venous phase
No collaterals seen	Collaterals seen	Segmental or diffuse narrowing of the circulation. "Pruning" of jejunal and ileal branches	Diffuse arterial vasospasm
Bowel wall may be paper thin	Bowel wall may be paper thin	No change in bowel wall thickness	Marked bowel wall thickening
No mucosal enhancement	No mucosal enhancement	Asymmetric bowel perfusion	Increased mucosal enhancement
Bowel wall dilates only with infarction	Bowel wall dilates only with infarction	Bowel wall dilatation not apparent	Bowel wall may dilate without infarction
Little mesenteric stranding, hemorrhage or edema	Little mesenteric stranding, hemorrhage or edema	Not hazy until infarction occurs	Usually significant mesenteric inflammation with fluid and hemorrhage

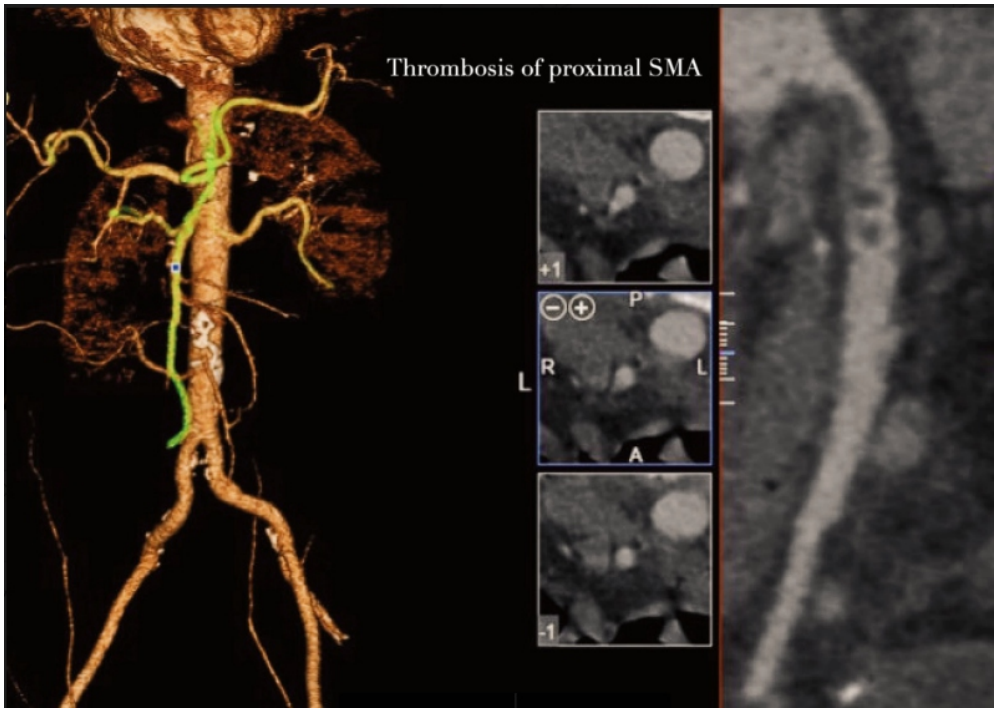


Figure 3. CT findings of thrombosis of SMA near the origin

Diagnostic studies

Leukocytosis and electrolyte abnormalities including high-anion gap are common findings. Lactic acidosis is seen in more advanced cases. High amylase, aspartate aminotransferase and lactate dehydrogenase can also be observed. However, all these serum markers are insensitive and non-specific. In a recent institutional review, most frequent laboratory findings included a leukocytosis (mean 17.9 +/- 7 x 10^9/L) and an elevated lactate (mean 3.4+/- 2 mmol/L) [12].

Plain abdominal radiographs are normal in up to 25% of patients with AMI. Ileus may be an early finding while more advanced cases may show evidence of bowel wall edema ("thumb printing") or pneumatosis.

Although duplex ultrasonography may be highly accurate in diagnosis of celiac and SMA stenosis in an elective setting, its role in AMI is limited because of several important reasons: it is highly operator dependent, accessibility may be poor during off-hours, and presence intestinal gas and abdominal tenderness can compromise the ability to image the relevant anatomy.

CT angiography is widely available and frequently able to provide the key diagnostic information. Using standardized protocols that include accurate timing of contrast and fine slices through the abdomen, CTA provides excellent imaging of the celiac artery, SMA and IMA arterial anatomy. CT imaging can also provide details such as pneumatosis, bowel wall edema and other findings such as solid-organ hypoperfusion. A compilation of CT angiographic features of acute mesenteric ischaemia are presented in Table 2 [13,14,15].

Henes et al, in a retrospective study of 959 patients, found that CT angiography had a sensitivity and specificity of 89.4% and 99.5% respectively for diagnosing AMI [16]. The presence of pneumatosis and portal venous gas is virtually diagnostic for transmural bowel infarction, with specificities approaching 100% for presence of ischaemia [12]. Numerous other studies have also corroborated accuracy of CTA in diagnosis of AMI.

Traditional catheter-based digital subtraction angiography (DSA), has been supplanted by CTA as the definitive study for occlusive forms of AMI because of its availability and non-invasive nature. However, DSA retains an important role in some situations such as in patients with suspected NOMI when catheter angiography may help establish the diagnosis and also allow for endovascular management of atherosclerotic disease of the proximal visceral vessels (Figure 4A-B).

Magnetic resonance angiography (MRA) has not found prominence in establishing the diagnosis of AMI. Its limited availability on emergency basis and slow image acquisition time are all compromises compared to CTA. In addition, secondary signs of AMI such as bowel wall thickening are difficult to assess with MRA.

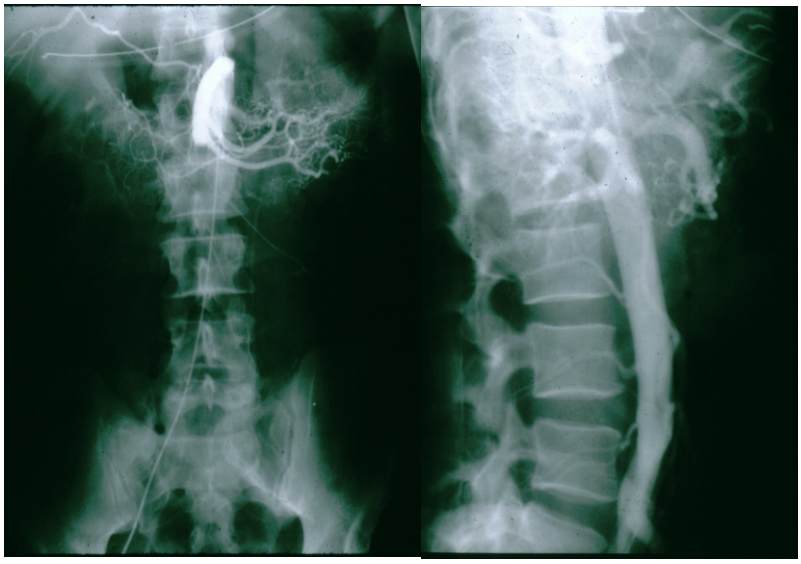


Figure 4 A-B. SMA embolus seen on selective mesenteric arteriogram (AP and lateral projections)

Diagnostic laparoscopy has a limited ability to assess bowel viability in the setting of AMI. Although bowel ischaemia may be inspected visually, there is no ability to manually palpate pulses in the mesentery. Furthermore, the use of intraperi-toneal CO2 insufflation is contraindicated in hypotensive, unstable patients precluding its use in most patients with AMI.

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

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REVIEW ARTICLE

Acute mesenteric ischaemia : Part II

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Editor's note:
This is the second part of a review on acute mesenteric ischaemia. The first part is published in the current issue on pages 18-23 (http://doi.org/10.4038/sljs.v36i1.8476). Readers are strongly recommended to read these two articles in continuity."

Treatment

Some general principles of treatment apply to all cases of acute mesenteric ischaemia: the importance of early diagnosis, prompt exploratory laparotomy, adequate restoration of arterial perfusion, resection of non-viable bowel, second look laparotomy and supportive intensive postoperative care.

A soon as diagnosis of AMI is established or suspected, fluid resuscitation should be begun immediately with isotonic crystalloids, blood and blood products as deemed necessary. Electrolyte imbalances such as hyperkalemia, acidosis and other metabolic abnormalities should be corrected. Invasive arterial and central venous pressure monitoring along with monitoring of urine output are recommended to ensure adequate optimization prior to intervention. Broad-spectrum antibiotics are given to minimize the consequences of bacterial translocation and systemic sepsis. Intravenous heparin should be administered unless there is a specific contraindication. Fluid resuscitation should be adjusted until adequate right-sided filling pressures are achieved. Vasopressors may be needed to maintain systemic blood pressure at physiological levels(>100 mm Hg); however, this should not substituted for inadequate volume resuscitation.

Surgical exploration

Exploratory laparotomy is required in all patients with clinical suspicion of threatened bowel. A midline, vertical incision is preferred given that it is expeditiously performed and allows the flexibility to thoroughly assess the entire GI tract and the vascular territories of interest. Furthermore, this allows great flexibility for the placement intestinal stomas as needed. Lower extremities should be prepped for possible saphenous vein harvest.

Intra-operative evaluation of bowel viability can be difficult in the setting of AMI. Differentiation of irreversible necrosis from potentially salvageable but severely ischemic bowel is often difficult prior to revascularization and therefore best left for re-evaluation following restoration of blood flow. Areas of obvious necrosis or perforation causing spillage should be resected expeditiously without re-anastomosis. Final assessment of bowel viability must be reserved until after completion of revascularization.

There are several ancillary techniques available for assessing viability of bowel. Hand-held Doppler ultrasound probe (continuous wave 9-10 MHz) can be used to detect pulsatile flow signals. Although it is a useful adjunct to clinical evaluation alone, it may lack sensitivity. Other useful adjuncts include photophlethysmography, injection of fluorescein dye and the use of a perfusion fluorometer to detect flow. Whitehill et al, in a study published in 1988, found that thresh-old blood flow detection by any one of these methods, especially fluorescein, occurs at levels inadequate to guarantee tissue viability [1]. This means ischemic tissue damage may occur in spite of detectable blood flow using these adjuncts. The ultimate decision regarding bowel viability therefore lies in the sound clinical judgment of an experienced operating surgeon. Treatment algorithms that include mandatory second-look laparotomy allow re-evaluation of bowel following revascularization and adequate resuscitation, thereby providing the opportunity to re-anastomose the bowel ends that were divided during intestinal resection of the index operation.

An important principle of bowel resection in AMI is to minimize disruption of mesenteric vascular arcades by carrying out segmental resection while sparing as much of the mesentery as possible. This can be accomplished easily by using devices such as LigasureTM (Medtronic Inc., Minneapolis, MS, USA) or with standard ligate and divide technique. This approach should be contrasted with conventional wedge shaped resection undertaken during routine small bowel operations.

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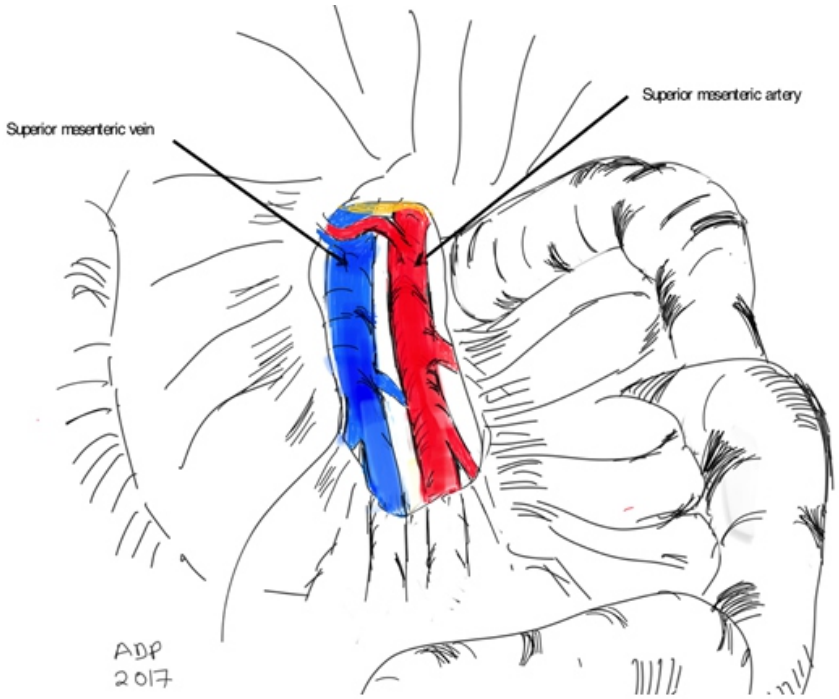

figure 5. Anterior approach to the SMA for SMA embolectomy or bypass from a supraceliac inflow source

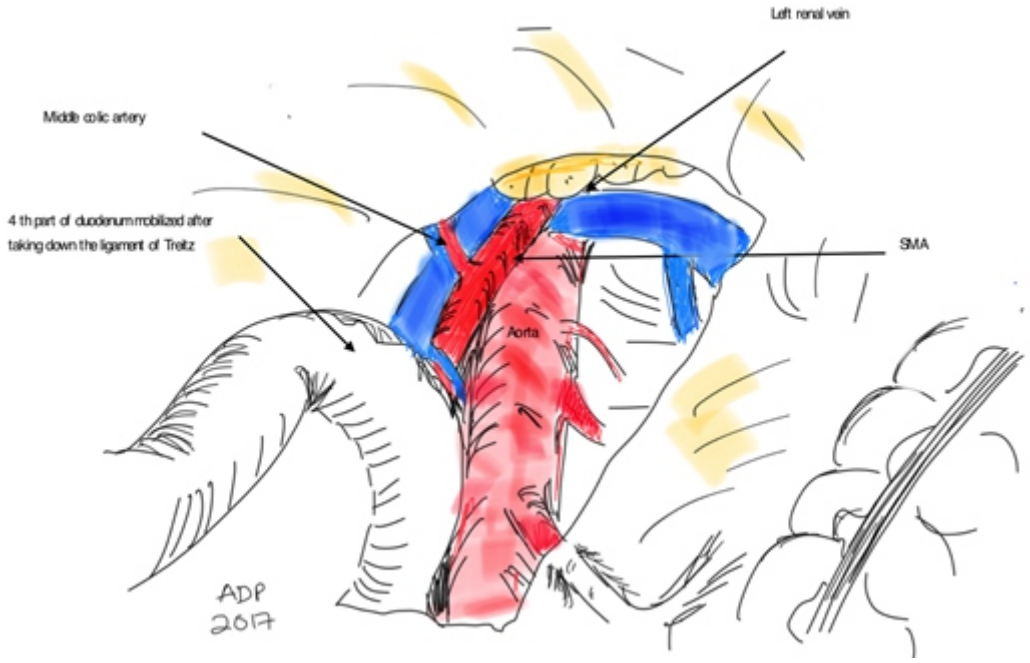

Figure 6. Lateral approach to SMA for bypass

Open surgical revascularization

There are two standard approaches to the surgical exposure of the SMA: anterior and lateral. The anterior approach near the root of the mesentery is most suitable for embolectomy whereas the lateral approach, with mobilization of the fourth part of duodenum and ligament of Treitz, is often preferred for arterial bypass (figures 5, 6). Selection between these two approaches depends on the diagnosis (embolus versus thrombosis) and the need for complex arterial reconstruction.

Embolectomy

Superior mesenteric artery embolectomy can be accomplished easily through an anterior exposure with elevation of transverse mesocolon superiorly and retraction of small bowel to the patient's right. The pulseless mesenteric vascular bundle can be palpated and exposed by incising the peritoneum at the base of the transverse mesocolon. Multiple venous tributaries, lymphatics and autonomic nerve fibers encase the mesenteric vascular bundle. The SMA lies to the left of the superior mesenteric vein, and careful dissection is

needed for segmental exposure of the SMA from middle colic to right colic branches. Following systemic heparinization, the arteriotomy can be either transverse or longitudinal depending on the vessel diameter but in the case of longitudinal arteriotomy, patch closure (saphenous vein) is required. A transverse arteriotomy is technically easier to perform and may be used if the vessel diameter is at least 6 mm. An interrupted suture technique using non-absorbable, monofilament suture (6-0 Prolene) is recommended for closure to prevent stenosis.

Proximal embolectomy is performed using 3Fr or 4Fr Fogarty catheters. Brisk, pulsatile flow is expected following extraction of embolus. For distal thrombo-embolectomy, 2Fr or 3Fr catheters may be used. Distal passage of catheters must be done with care to minimize damage or rupture of distal mesenteric arteries. It is preferred to use air for Fogarty embolectomy catheter balloon inflation, as opposed to saline, since it allows better tactile sensation regarding pressure applied to the vessel wall. Although the major bulk of embolus can be extracted using this technique, thrombus lodged in smaller branches distal to the embolus cannot always be reliably extracted. Therefore, a recombinant tissue plasminogen activator, 2 – 5 mg (or an equivalent thrombolytic agent), can be administered distally following final passage of embolectomy catheter, and allowed to dwell for few minutes prior to restoring distal flow.

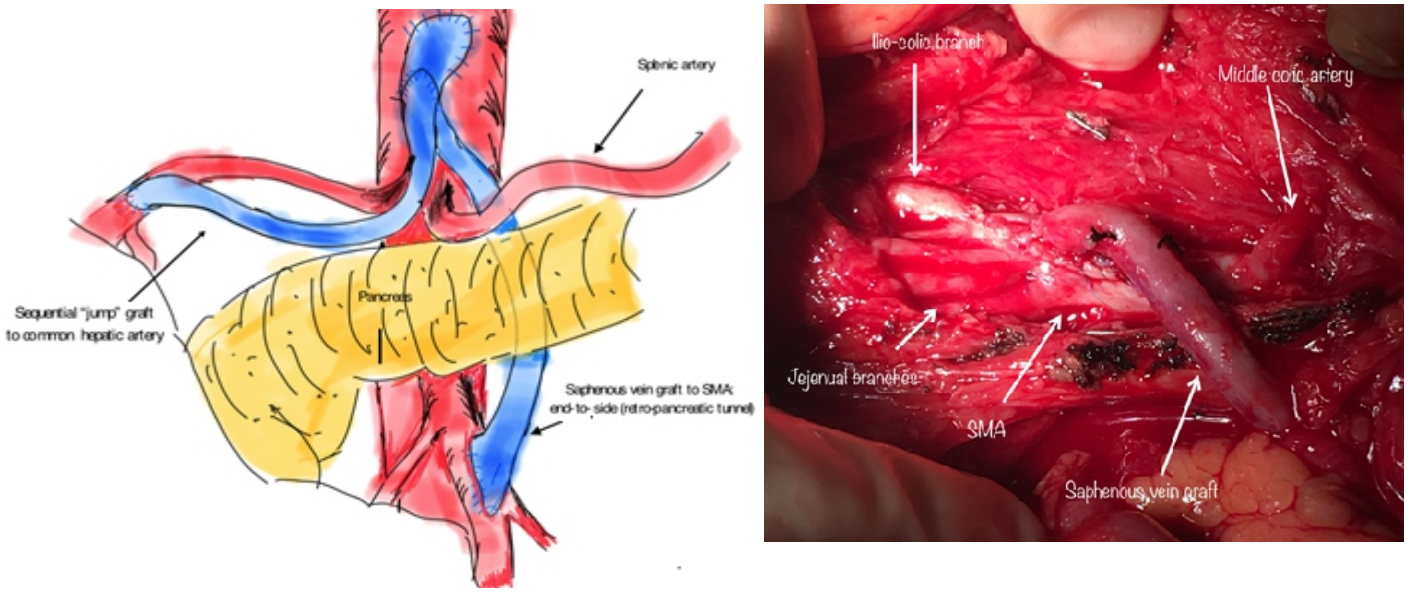

Figure 7 A. Aorto-mesenteric and sequential celiac bypass configuration (retro-pancreatic tunnel for SMA bypass)
B. Distal anastomosis of aorto-superior mesenteric bypass with saphenous vein

Surgical bypass

Options for open reconstruction include a supra celiac aorto-mesenteric, infra-renal aorto-mesenteric and iliac-to-mesenteric artery bypass. If the patient's physiological status permits and adequate conduit is available, aorto-superior mesenteric artery bypass with a sequential celiac branch bypass may be performed in the setting of occlusion of both SMA and celiac trunk (Figures 7A,7B). However, revascularization of both celiac and SMA territories is not mandatory in the emergency setting, and a single bypass to the SMA is all that is required [2].

The supra-celiac aorta is usually spared from calcification and intraluminal plaque formation and can be exposed through the lesser omentum after repositioning retractors. The left triangular ligament of the liver is taken down to the left hepatic vein. The presence of a nasogastric tube allows the esophagus to be palpated and retract out of harm's way. The diaphragmatic crura are divided to expose the supra-celiac aorta. A partially occluding clamp, e.g. Satinsky, is often sufficient for proximal anastomosis thus minimizing the physiological stress of supraceliac aortic cross clamping. An antegrade aorto-mesenteric bypass has the advantage of being less prone to kinking and may be tunneled in either retropancreatic or supra-pancreatic position. The use of a prosthetic graft is often convenient, but should be avoided in the setting of intestinal infarction to avoid graft contamination.

Surgical bypass with infra-renal aorta or iliac artery as inflow is best performed via lateral approach to the SMA as discussed previously. Following mobilization of fourth part of the duodenum, peritoneum is exposed lateral to the duodenum and the retroperitoneal aorta is exposed through the same incision. More proximal dissection with gentle retraction of the pancreas facilitates SMA exposure. Several configurations and approaches are available for mesenteric revascularization. Retrograde graft orientation is commonly performed with inflow from the right common iliac artery, forming a “lazy C” configuration (Figure 8). An alternative configuration is to use the saphenous vein with left common

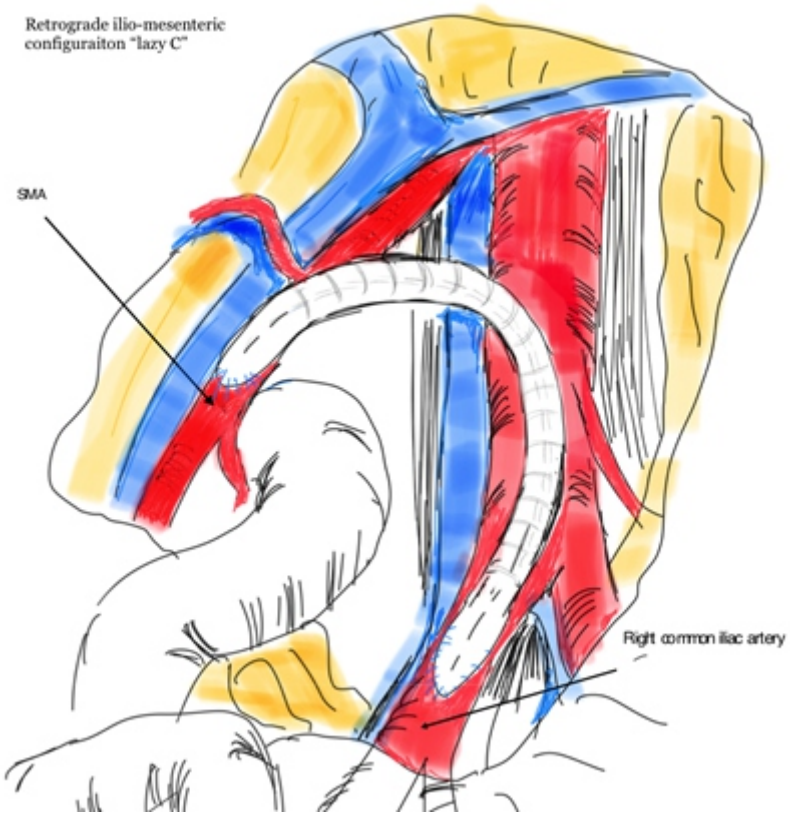

Figure 8. "Lazy C" configuration: ilio-mesenteric bypass with PTFE graft (either right or left iliac artery may be used as inflow)

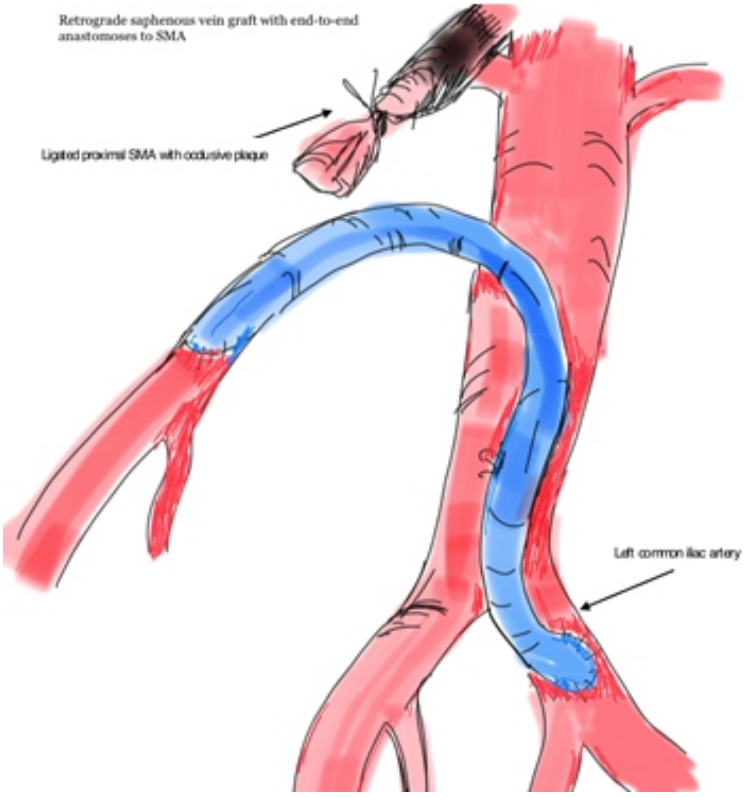

Figure 9. Alternative retrograde bypass with saphenous vein

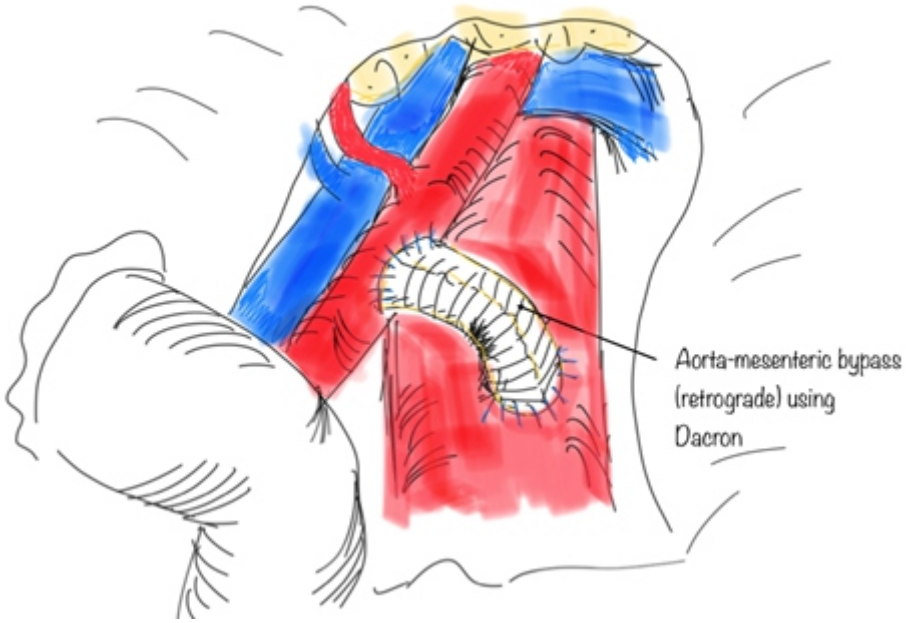

Figure 10. Direct bypass to SMA – may be more prone to kinking

iliac artery or distal infra-renal aorta as inflow vessel (Figure 9). A short aorto-mesenteric bypass configuration can also be used with end-to-side anastomosis to the SMA (Figure 10). In general, the challenge with all retrograde bypass configurations, is to ensure that the graft does not kink when retractors are removed and eviscerated bowel returned to the abdomen. Saphenous vein is the preferred conduit if a good quality vein is available. Alternatively, synthetic grafts such as Dacron or externally supported expanded polytetraflouroethylene (ePTFE) are readily available and provide excellent size choices (6 – 8mm diameter grafts). Prosthetic graft material should be avoided in the setting of intestinal infarction or bowel spillage.

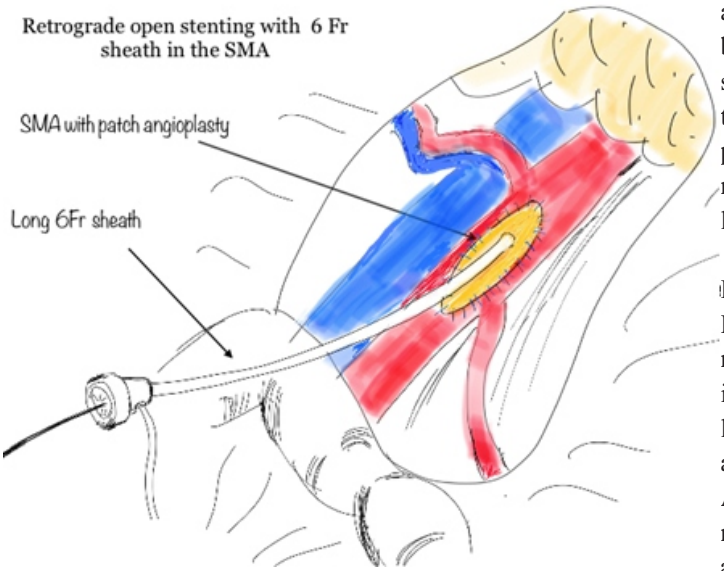

Figure 11. Hybrid open-endovascular intervention of SMA

Completion arteriography

A completion arteriogram may be performed at the surgeon's discretion. Often, this is technically difficult during an open laparotomy and the quality of imaging may be compromised. A completion duplex scan is a valid alternative and is the authors' preferred modality for evaluation of anastomoses.

Hybrid technique

Hybrid open-endovascular approach, described by Wyers et al from Dartmouth[3], combines endovascular techn-ique during open laparotomy. The SMA is approached via anterior approach and a local thromboendarterectomy and patch angioplasty is performed. The SMA is cannulated retrograde and a long, flexible 6 Fr sheath is directed proximally. Sheath access close to the aorta facilitates crossing the lesion and has a high technical success rate. The SMA is treated with a balloon-expandable stent (Figure 11). This technique has some utility if a donor site is not available for open bypass due to intrinsic disease of aorta or iliac arteries, or when the patient is poor candidate for complex open repair. The patient must be placed on a suitable OR table through which AP and lateral imaging is possible.

Endovascular treatment

Percutaneous treatment options for the management of acute mesenteric ischaemia are evolving. However, broad applicability of the technique is limited by difficulties in extracting large embolic fragments in the case of SMA embolization and managing chronic occlusions of the SMA in the setting of AMI due to atherosclerotic occlusive disease. Furthermore, a non-operative approach precludes the ability to directly assess bowel perfusion and viability.

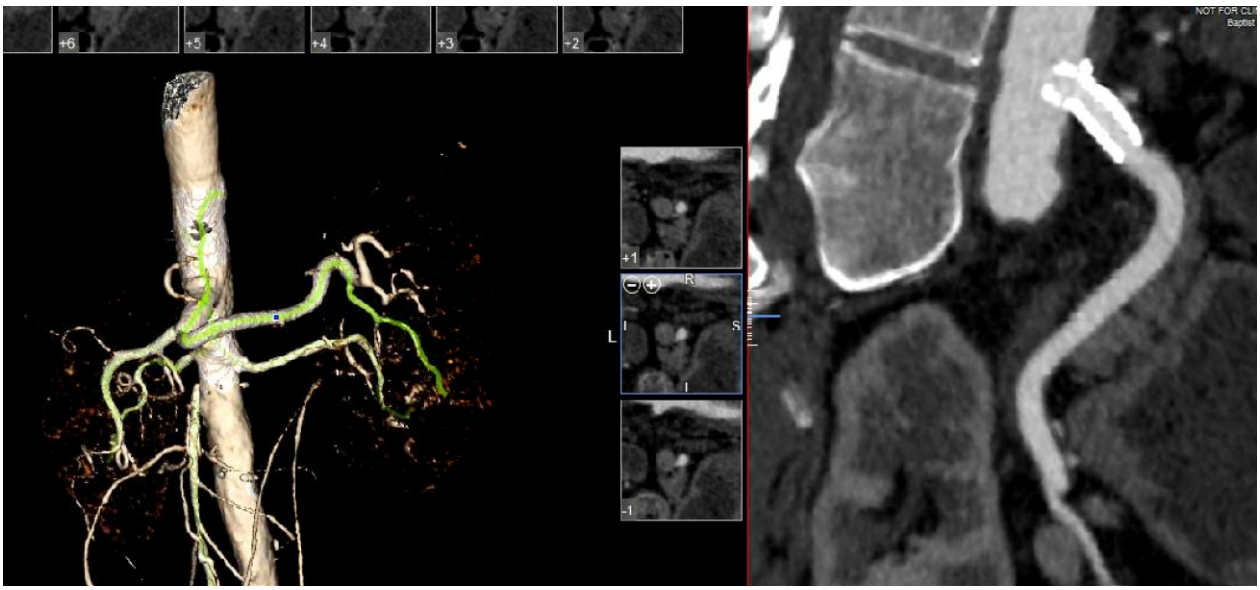

Figure12. Celiac stent in a patient with acute mesenteric ischaemia. Collaterals via the pancreatico-duodenal arcade reconstitute the SMA (arrow)

Endovascular treatment of mesenteric artery embolism may also be constrained by treatment duration required for thrombolysis. Either mechanical or chemical thrombectomy, or a combination of both, have been described using endovascular methods [4,5,6]. Majority of patients treated with endovas-cular method still required exploratory laparotomy, under-scoring the need for direct assessment of bowel viability in these patients. In spite of these shortcomings, there are multiple studies showing acceptable outcomes with endovascular intervention [4,5,6] (Figure 12).

Visceral malperfusion from aortic dissection and spontaneous SMA dissection

Visceral malperfusion is a catastrophic sequelae of both acute Stanford type A and B dissections. A recent study of the IRAD (International Registry of Acute Dissection) database showed that mortality exceeded 95% when treatment of type A dissection is undertaken without initial treatment of visceral malperfusion [7]. Therefore, some authors have recommended performing simultaneous mesenteric revascularization procedure and central aortic repair to prevent intestinal infarction resulting from the long duration of ischaemia incurred while repairing the type A dissection [8]. Type B dissections with visceral malperfusion are treated with repair of entry tear, either surgically or with an endograft. Additional intervention is performed as needed to treat persistent malperfusion. Operative techniques include open aortic fenestration and bypass. Endovascular fenestration and stenting are also increasingly used to treat visceral malperfusion syndrome in the setting of dissection. Intravascular ultrasound (IVUS) is an invaluable tool in treatment of aortic dissection. It provides important imaging cues that enable accurate identification of true and false lumen during endovascular intervention.

Acute mesenteric ischaemia presenting as a complication of spontaneous SMA dissection may be treated initially with anticoagulation and using either open or endovascular techniques already described if the clinical condition requires.

Treatment of non-occlusive mesenteric ischaemia (NOMI)

Prompt mesenteric arteriography is recommended for patients suspected with NOMI. The angiographic appearance is fairly typical with several specific findings: there is narrowing of the origins of multiple branches of the SMA, alternate dilatation and narrowing of intestinal branches – "string of sausages" sign, and severe spasm of mesenteric arcades, "pruning", resulting in impaired filling of intramural vessels. Injection of intra-arterial vasodilator (Papaverine, 60 mg or nitroglycerin, 400 -800 mcg) can be both diagnostic and therapeutic. A vasodilator infusion via an angiographic catheter placed in the proximal SMA can be started. Infusion rate is titrated according systemic blood pressure. An important technical detail is to ensure that the tip of the catheter and the infusion ports are positioned entirely in the SMA to prevent systemic hypotension from vasodilators 'escaping' to the aorta.

Second-look laparotomy

Planning for a second look laparotomy is an essential step in the treatment algorithm of acute mesenteric ischaemia. This approach allows the operating surgeon to minimize bowel resection at initial exploration and avoid bowel anastomosis. During the first operation, the resected bowel ends are expeditiously stapled or sewn shut without anastomosis. The abdominal wall may be closed temporarily with the expectation of returning to the operating room in 24-48 hours.

At the time of second-look laparotomy, viability of the revascularized bowel is re-assessed and resection of nonviable segments performed as needed. Anastomosis can be completed during this time. Bowel perfusion and patency of mesenteric arteries and bypasses(s) may also be re-assessed using manual inspection, hand-held Doppler probe or portable duplex ultra-sound. Occasionally, a third look laparotomy may be required. The guiding principle of treating acute mesenteric ischaemia is to ensure bowel viability before definitive resection and anastomosis.

Post-operative intensive care

Post-operatively, AMI patients require additional volume resuscitation with crystalloids due to third spacing. Twenty-four hour fluid requirement may be as high 10 -15 liters. Serial clinical examinations and trends in leucocyte count and lactate levels are useful to monitor patient's clinical progress. A trend in the wrong direction should prompt further evaluation with an appropriate imaging study (CTA, DSA) and early operative re-exploration.

Outcome

In spite of numerous advances in surgical and general intensive care, acute mesenteric ischaemia continues to have a high mortality rate. A contemporary, single center experience of acute arterial mesenteric ischaemia from Mayo Clinic reported 30-day mortality rates of 19% and 17% for patients presenting with arterial embolism and arterial thrombosis respectively [9]. Early diagnosis, and effective and timely intervention involving excellent surgical and critical care is necessary to achieve survival in an otherwise uniformly fatal diagnosis.

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

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REVIEW ARTICLE

SLHPBA Guidelines for the management of hepatocellular carcinoma in Sri Lanka - consensus statement

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Key words: Hepatocellular carcinoma; carcinoma hepatocellular; therapy; carcinoma hepatocellular; epidemiology

Sri Lanka has a rising population of patients with chronic liver cell disease. Incidence of metabolic liver disease in the country is one of the highest in the world [1]. Over the last 5 years, the number of HCC cases reported has steadily increased. HCC has become a disease of discussion due to rise in the incidence, recent accessibility of all treatment options, and availability of trained clinicians in managing HCC [2].

There are regional guidelines published based on data from Europe, North America and East Asia. Infective hepatitis is rare in Sri Lankan patients. Apart from having a unique etiology, many practical difficulties are faced when directly applying these guidelines in the context of the local setting. In this background, Sri Lanka Hepato Pancreatico Biliary Association (SLHPBA) organized a consensus meeting to modify the already established clinical guidelines in a manner applicable to Sri Lanka.

In formulating the guidelines, feasibility and the local pattern of disease were considered. Overseas experts representing North America, Europe and India participated in the discussions. As local representatives, members representing Society of Gastroenterology, Radiology, Oncology, Pathology and General Surgery, participated in the discussions. Already published European association of study of liver disease guidelines [3], Asia Pacific clinical practice guidelines 2017 [4] and American association of study of liver disease guidelines 2016 [5], were used as a baseline platform. Each point was taken up, discussed and debated prior to an agreement.

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SLHPBA Guidelines for the management of hepatocellular carcinoma in Sri Lanka - consensus statement

1. Prevention of HCC in Sri Lanka

a.Hepatitis B vaccination

Even though incidence of Hepatitis B is extremely low, it is recommended to continue hepatitis B vaccination which is currently included in the national immunization program.

2. Screening for HCC in Sri Lanka

a. Screening for HCC in cirrhotics

i. Six-monthly ultrasound scanning is recommended in screening cirrhotic patients.

- It is recommended to use a specially prepared request form within institutions indicating a clear clinical history.

b. Screening of high risk NASH groups.

i.Diabetics who are older than 40 years with elevated AST/ALT may be subjected to ultrasound scan screening.

- Frequency of screening is to be decided by the clinician as firm data is not yet available.

c.Hepatitis screening in Sri Lankan patients.

- Considering the extremely low incidence, screening for hepatitis B and C is likely to yield negative results. Non-availability or delay in these reports should not delay the management of HCC.

d.Place of alpha feto protein (AFP)

- Alpha feto protein has limited value in screening for HCC.
- Alpha feto protein is useful as an adjunct for imaging.
- Alpha feto protein is an important test in prognostication of HCC.

3. Diagnosis of HCC

a. Cirrhotic patients

i. Lesions over 2cm – Having a typical appearance in 4 phase CT or MRI

ii. Lesions less than 2 cm - Typical appearance in CT and MRI

iii. Lesions over 2 cm – without typical appearance in CT or MRI needs histological assessment.

1. To differentiate well differentiated HCC from regenerating nodules, immunohistochemistry with CK 7 and CK 8 are recommended.

iv. Lesions less than 2 cm without typical CT or/and MRI appearance

1.During follow – up, imaging should be done by a consultant radiologist every three months.
2.If lesion enlarges histological assessment is recommended.
3. After 2 years of follow-up if the lesion does not enlarge routine surveillance is recommended.

v. Any lesion with AFP over 400 ng/ml is diagnostic of HCC.

vi. PET scan has only a limited role in diagnosing HCC.

vii.Patients with portal vein thrombosis may not demonstrate a typical enhancement pattern in CT or MRI

4. Treatment of HCC is best decided in a multi disciplinary meeting with a HPB surgeon, Hepatologist, Radiologist and an Oncologist

a. Non cirrhotic HCC

i. Surgical resection is recommended for any size of tumours that are within limitations of resectabality.
ii.Tumours with more than three nodules – surgery is recommended in selected patients.
iii. Presence of main portal vein invasion is a relative contraindication for surgical resection.
iv. Diffusely infiltrating hepatomas have a poor outcome after resection

b. In cirrhotic HCC – Child - Pugh A

i. Surgical resection / ablation

1. All resectable lesions – Surgical resection is recommended for patients with stable liver functions and adequate residual volume. As a guide to liver function following may be used.

i. Clinical parameters (history of ascites, encephalopathy)
ii. Platelet count (less than 100,000 CC)
iii. Portal venous pressure gradient (over 12 mmHg)
iv. Bilirubin level (above the reference range)

2.In lesions less than 3 cm thermal ablation may be used in selected patients
3.Alcohol ablation is recommended for lesions smaller than 2 cm.
4.When total number of tumour nodules is over 3 surgical resection is best avoided.

ii.Trans arterial therapy (trans arterial chemo embolization/radio-embolization).
1.This is recommended in patients whom surgical and ablative treatment is contra indicated.
It is best avoided in following patients

a.Tumours over 10cm -These have higher complications and poor response to TACE
b.History of encephalopathy
c.History of moderate to gross ascites
d.Raised bilirubin over three times the upper level.

2.Trans arterial chemo infusion or bland embolization is not recommended.

iii. Sorafenib

1.Can be offered to patients with unresectable disease.
2.Has no place as an adjuvant treatment for surgery or ablation
3.Can be used for TACE refractory tumours.

c. Cirrhotic - Child–Pugh B and C

i.Only minor resections are considered in Child – Pugh B stable patients.
ii. There is no place for surgery in Child – Pugh C
iii. Ablation should be considered in Child – Pugh B patients
iv. Patients with Child – Pugh C are candidates for palliative care.
v. There is no place for Sorafenib in Child – Pugh C cases.

d. Liver transplantation

i.Considered for Child Pugh B (or selected C) patients within Milan criteria

Acknowledgment

The primary guideline working group consisted of members of the SLHPBA and the IHPBA (International Hepato - Pancreato – Biliary Association). Individuals from relevant specialties and professional organizations including the College of Surgeons of Sri Lanka, Sri Lanka Society of Gastroenterology, Sri Lanka College of Radiologist, Sri Lanka College of Pathologists and Sri Lanka College of Oncologists were involved in drafting of the guidelines

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TECHNICAL NOTE

Total lower lip reconstruction by the Webster - Bernard type bilateral full thickness triangular cheek advancement flap for a defect created by the excision of a capillary haemangioma

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Key words: Lip reconstruction; Webster Bernard; capillary haemangioma

Introduction

The lips are of great functional importance in day to day activities. The lack of any substantial fibrous framework, unique colour, texture, elasticity and lack of satisfactory prosthesis make reconstruction challenging. Therefore local tissues provide the best results [1].

Case presentation

The patient was a 66 year old male, who had a capillary haemangioma which was growing for 16 years to involve the entire lower lip (figure 1). The flap design was made by marking the length of each cheek limb which was taken as one half of the length of the lower lip lesion.

Adrenaline was injected to the upper and lower flap markings prior to the incision, which was then extended up to the level of the mucosa. Burow's triangles were resected along with the upper skin incision. The mucosal resection margin was placed 2-3mm superior to the skin incision margin. Then the mucosa was sutured to the skin creating the vermilion border.

Discussion

The Webster-Bernard flap is a useful reconstructive option for the lip defects created by surgical procedures involving the lip [1]. Possible complications includes early post operative wound dehiscence, notching of the middle part of the lip and gaping of the gingivobuccal sulcus [2]. Since it is an adynamic reconstruction, care should be taken to keep adequate tension in order to maintain oral competence specially when it used for the lower lip. Wael Hussein Mahmoud M. D. in his retrospective analysis of 15 patients reports that excellent outcome in terms of flap survival and microsomia while 13% of temporary incontinence to oral fluids with full recovery after 8-10 weeks of follow up [3]. Previous surgeries involving head and neck dissections can hamper the micro circulation in the face which needs special attention before planning the surgery [2].

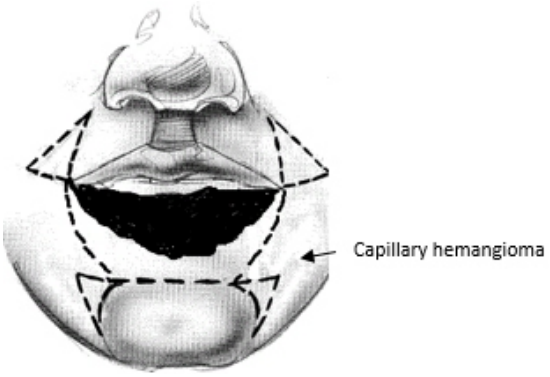

Figure 1. Capillary haemangioma

Figure 2. The medial edges of each flap were inserted with a three-layer closure

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

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BRIEF REPORT

Human subcutaneous dirofilariasis: an increasing phenomenon in Sri Lanka

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Key words: Dirofilariasis; subcutaneous; endemic

Abstract

Dirofilariasis, an emerging zoonosis around the world is endemic in Sri Lanka. Dirofilaria repens, manifesting as subcutaneous and ocular disease is the most commonly reported species. In Sri Lanka, ocular dirofilariasis has been extensively reported. However, literature on subcutaneous dirofilariasis is limited. Here we report a series of cases of subcutaneous dirofilariasis encountered within a period of approximately a year, mainly among the paediatric population in the Matale district. Noting the increasing frequency of reported cases we would like to emphasize on the importance of considering subcutaneous dirofilariasis among the differential diagnosis of subcutaneous lumps and bumps.

Introduction

The dirofilarial zoonosis caused by the nematode is mainly found among domestic dogs, and to some extent among cats and other wild canines which act as the definitive hosts and reservoir of the disease. Humans are inadvertent dead-end hosts, transmitted by the mosquito vectors during a blood meal. The first documented report of human dirofilariasis dates back to the report of Addario in 1885 from Italy. In Sri Lanka, the zoonosis is endemic [1]. And the first human case was reported in 1962 [2]. The emerging zoonosis is being reported in increasing numbers around the world [3]. Among the 40 recognized species, Dirofilaria repens, Dirofilaria ursi, Dirofilaria tenuis and Dirofilaria striata are found in the subcutaneous tissues.

Case presentation

One, 2,8,10 and 32 year old patients presented with subcutaneous lumps in the left forearm, right upper calf, right scalp, left parietal region and right breast respectively for a duration ranging from several days to 4 months. They ranged in size between 8x3mm and 1x1.5cm. There were no associated local inflammatory features or systemic manifestations. Ultrasonography in all cases revealed a hypoechogenic subcutaneous mass with a linear echogenic structure inside, suggestive of a worm granuloma. CBC parameters were within normal limits with a normal eosinophil count. Subsequent surgical excision was done. The histopathological examination of the wall revealed heavy infiltrate of eosinophils, suggestive of a parasitic infestation and parasitological analysis identified dirofilarial species.

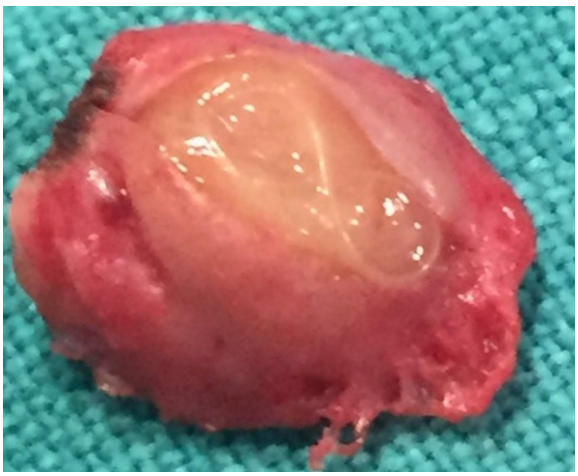

Figure 1. Subcutaneous lump

Discussion

The human dirofilariasis is a parasitic infection caused by the helminth belonging to the genus dirofilaria, with the species D. repens and D. immitis being the most widespread form in the world [4]. Our extensive search of the literature revealed that no cases of D. immitis have been reported in Sri Lanka. It is a common zoonotic disease among canines. The vector born disease is dependent upon arthropods - the intermediate hosts, mainly mosquitoes belonging to the genera Aedes aegypti, Armigeres subalbatus, Mansonia uniformis and Mansonia annulifera in Sri Lanka, but also fleas, lice and ticks to transmit the disease to the definitive hosts [5]. Adult female worms in the definitive hosts produce microfilariae (L1), ingested by the arthropod during a blood meal. It develops through to an infective third stage larva (L3) in the intermediate host, finally reaching the salivary glands, allowing transmission to a new host during a subsequent blood meal.

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Humans, although infected in the same way, are accidental dead-end hosts and the worms do not reach maturity in the subcutaneous tissues and therefore do not become microfilaremic. However one case of circulating microfilaremia has been reported in Corsica [6]. The presence of the nematode in the subcutaneous tissue gives rise to a chronic inflammatory reaction, resulting in the formation of a worm granuloma as evidenced by the histopathologic findings in our cases.

As the parasitic development ceases at temperatures below 14˚ C the disease occurrence is more prominent in countries with warmer climate; this is also a possible reason behind the increasing frequency of cases in keeping with the global climate changes. Several other factors may be responsible for the increasing incidence, including greater access to medical and diagnostic facilities. It is endemic in the Mediterranean basin, with the highest prevalence being reported in Italy among the European countries, and Sri Lanka in Asia. Although the infection with these helminths is independent of dog ownership, residence or travel to areas where canine dirofilariasis is endemic is universal among the reported human cases. The rate of dirofilariasis in dogs in Sri Lanka is said to be as high as 30 - 60% [5]. The mosquito vectors, feeding indiscriminately on different animal species and humans further increases the risk of infection in the endemic areas.

Globally, it is considered to be more common in adults, peaking among the age group of 40 to 49 years, and in the upper body sites (eyes and the face accounting for up to 46%) [3]. However among the Sri Lankan population it is more common in children, under the age of 9 years, in agreement with the findings among our cases [5]. It is also said to be localized to the lower body regions in Sri Lanka.

The usual presentation is with asymptomatic subcutaneous nodules, although rare cases such as meningoencephalitis and aphasia and acute abdomen and peritonitis due to intra-abdominal infection have been reported [7, 8]. Conforming to this our patients did not complain of any pain, itching or redness. Although peripheral eosinophilia is said to be observed in up to 20% cases of human dirofilariasis, none of our cases showed results supportive of this in CBC analysis. Ultrasonography was used to aid in diagnosis, whereas imaging modalities such as computed tomography scan (CT) and Magnetic resonance imaging (MRI) were considered inessential given the nature of presentation. As humans are dead end hosts, surgical excision is considered to be the standard of treatment. The diagnosis of dirofilariasis can then be made largely based on the morphological features of the worm [4]. However, polymerase chain reaction analysis would aid not only in quantification but also precise identification and differentiation of species. Identification based on the morphological features has its pitfalls, considering similarities between species and alterations secondary to inflammatory response or surgical artefact [7, 9].

Conclusion

It is essential to keep in mind human subcutaneous dirofilariasis as a differential for subcutaneous lesions. In the meantime adequate measures for vector control has to be initiated.

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

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CASE REPORT

A life threatening complication of anti reflux surgery: acute gastric volvulus

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Key words: Gastric volvulus; Nissen fundoplication; antireflux surgery

Introduction

Gastric volvulus is divided into two as primary and secondary according to the aetiology. In primary gastric volvulus, the pathology is the relaxation of the support ligaments of stomach. Secondary gastric volvulus develops due to predisposing factors such as hiatus hernia, traumatic diaphragmatic rupture, diaphragm eventration, intrinsic and extrinsic pathologies of stomach, and abdominal adhesions [1].

Case presentation

A 27-year-old male patient was admitted with a sudden onset of chest pain, nausea, and inability to vomit. His medical history revealed that he underwent a laparoscopic Nissen fundoplication operation six months ago. Laboratory results were as follows: aspartate aminotransferase: 45 U/L, alanine aminotransferase: 100 U/L, total bilirubin: 0, 9 mg/dL, amylase: 200 U/L, creatinine: 1, 4 mg/dL, leukocyte count: 12 $10^3/\mu L$. Initially, unstable angina was suspected; however, electrocardiography and troponin I (0.3 mg/L) value of the patient were found to be normal. On the chest X-ray, air-fluid level was detected behind the heart, and it was observed in the computed tomography that the stomach was herniated into the thoracic cavity with organoaxial rotation (Figure 1).

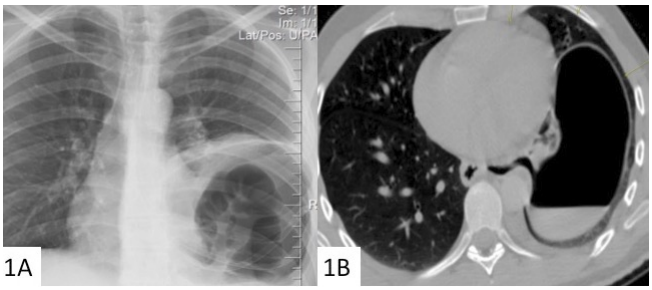

Figure 1A. Chest X-ray showing air fluid level
1B. computed tomography showing acute gastric volvulus

The patient was diagnosed with acute gastric volvulus, since the nasogastric catheter was unable to be inserted, and it was decided to perform endoscopic detorsion. Gastric ischaemia was not observed during the endoscopy, although detorsion failed and the patient underwent emergency surgery. In the laparoscopic exploration, it was observed that along with the stomach, colon was also herniated through the diaphragmatic defect into the thorax. Due to the failure of detorsion of stomach and colon and the difficulty of dissection, it was decided to convert to conventional surgery. The stomach and colon were pulled into the abdomen. After the stomach was detorsioned, the hernia sac was resected. The diaphragmatic defect was closed with primary suturing and repaired with the aid of a mesh. To avoid gastric detorsion, gastropexy was performed fixing the greater curvature of the stomach to the abdominal wall with 2/0 silk (Figure 2). The mesocolon was also fixed to the retrocolic area using primary suturing. On the fourth postoperative day, the patient was uneventfully discharged.

Discussion

Acute gastric volvulus is characterized by Borchardt's triad; severe epigastric abdominal pain, distention and unproductive vomiting [2]. The clinical presentation of chronic gastric volvulus is rather obscure. It is encountered with various findings such as atypical chest pain, anaemia (often related to Cameron's ulcer), weight loss, dysphagia and reflux. If the diagnosis of gastric volvulus is delayed, fatal outcomes may occur such as ulceration, haemorrhage, ischaemia and up to full-thickness necrosis [3].

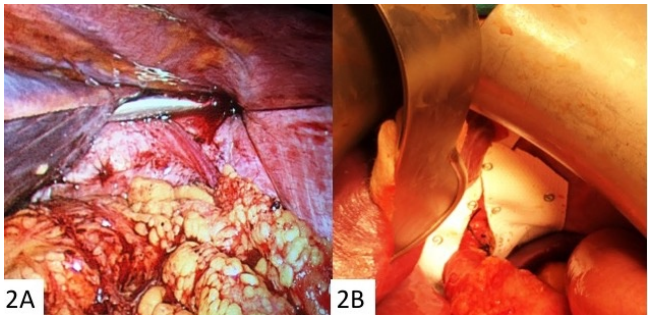

Figure 2 A. Laparoscopic exploration showing thoracic herniation of the stomach and colon **2B.** Reconstruction of large diaphragmatic defect with a mesh is seen.

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The incidence of strangulation in gastric volvulus cases ranges from 5% to 28% [4]. Acute gastric volvulus development after laparoscopic Nissen fundoplication is an extremely rare clinical entity. If there is a delay in diagnosis, strangulation is likely to be detected. The relaxation of gastro splenic, gastro colic and gastro hepatic ligaments which hold the stomach in place and postoperative adhesions are responsible in the pathogenesis [5]. Gastric volvulus is often in the organo-axial type and the stomach takes the shape of hourglass [6]. Diagnosis is made with radiological examinations in accordance with clinical suspicion. In the early period, the increased serum amylase value from laboratory results is particularly indicative of ischaemia. Computed tomography is the gold standard radiological examination [7]. Treatment steps of gastric volvulus include correction of volvulus and prevention of recurrence. Llaneza et al. [8] described that detorsion could be achieved by nasogastric decompression in volvulus cases. However, nasogastric decompression is useful in relieving acute clinical picture rather than a definitive treatment option. Endoscopic evaluation should be performed in these patients without losing time. Thus, by determining the grade of ischaemia, loss of time is prevented. Tsang and Walker have described that endoscopic treatment is possible in acute and chronic gastric volvulus cases. The endoscope is brought to the J-shape manoeuvre in the fundus, pushed forward to the antrum and duodenum clockwise, which is called alpha-loop manoeuvre [9]. Surgical treatment is performed by laparoscopic or conventional methods. The main goals of surgical procedure are correction of volvulus, excision of hernia sac, repair of hiatus hernia and anterior gastropexy [10].

Conclusion

Acute gastric volvulus development after laparoscopic Nissen fundoplication is an extremely rare clinical entity. If the diagnosis of gastric volvulus is delayed, fatal outcomes may occur. Surgical treatment should be performed when acute gastric volvulus is detected in patients who have had previous upper abdominal surgery.

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

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Learning Points:

- Acute gastric volvulus is an extremely rare but known clinical entity following laparoscopic Nissen fundoplication.
- Computed tomography is the gold standard radiological examination.
- In patients who have had previous upper abdominal surgery, surgical treatment should be performed

CASE REPORT

Role of laparoscopy as diagnostic and therapeutic tool in management of omental torsion

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Key words: Omental torsion; primary omental torsion; secondary omental torsion

Introduction

We are presenting two cases of omental torsion. Although it is a clinically rare diagnosis but when present it poses a clinical dilemma by mimicking many other common surgical illnesses presenting as acute abdomen especially acute appendicitis. Preoperative diagnosis is also very difficult because both ultrasonography and CT scan are not very specific for making an accurate diagnosis of omental torsion.

Case 1 is a rarer type of primary omental torsion which presented with symptoms of acute appendicitis albeit of less severity but ultrasound study was suggestive of appendicular mass. Intraoperatively it was found to be omental torsion with a rather normal looking appendix.

Case 2 is a more common type of secondary torsion where omentum got adhered to the site of previous open appendectomy done 30 years ago and got torted. Preoperative CT scan was suggestive of omental mass with decreased vascularity.

Case presentation

Case 1- A 38 year old gentleman presented with history of pain in right iliac fossa (RIF) for 1 day. The patient also complained of nausea. The pain was moderate in severity without any guarding. There was no history of associated fever and vomiting. His TLC and DLC were in normal range. USG study was suggestive of appendicular mass with free fluid in pelvis. Intraoperatively haemorrhagic fluid was seen in pelvis (Fig. 1A) and gangrenous omental mass with cord like torted proximal segment (Fig. 1B) was found lying alongside a normal looking appendix. Gangrenous omental mass was resected and retrieved in endobag from left hypochondrial port. Simultaneous appendicectomy was done to eliminate future diagnostic problem. The patient made uneventful recovery and hence discharged on postoperative day 1.

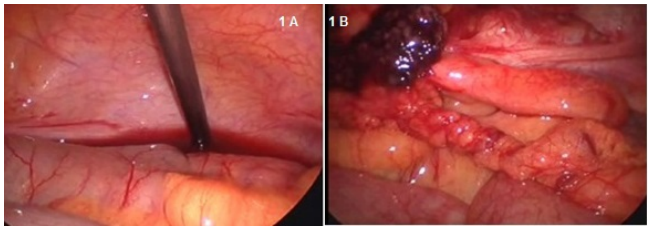

Figure 1A. Intraoperative image showing haemorrhagic fluid in pelvis. **1B.** Intraoperative image showing torsion of proximal omentum and gangrenous distal omentum.

Case 2 - A 45 year old gentleman with a history of open appendicectomy done 30 years ago presented with complaints of severe pain in the RIF lasting for 3 weeks. A soft tender lump was also palpable in the RIF. It was also associated with fever and mildly raised TLC and DLC. There was no history of vomiting. CT scan revealed an omental mass with decreased vascularity adherent to anterior abdominal wall (Figure. 2A). Intraoperatively an omental mass was found in the RIF a part of which had become gangrenous. It was adherent to anterior abdominal wall, caecum and ileum (Figure. 2B). The gangrenous omentum was resected and was retrieved in endobag from left hypochondrial port. The patient made uneventful recovery and hence discharged on POD 1.

Discussion

Eitel, in 1899 first described primary omental torsion as a rare entity as a cause acute abdominal pain [1]. Since then, around 300 cases have been reported worldwide [1]. Omental torsion can be classified as "primary" and "secondary" or as "unipolar" and "bipolar".

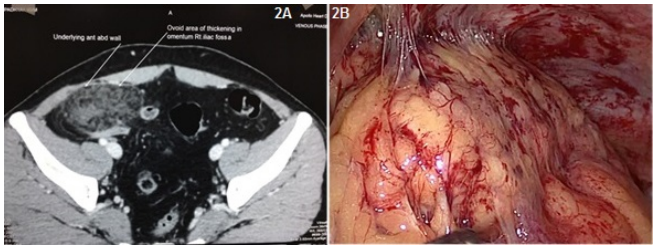

Fig. 2A. CT scan showing an omental mass adherent to anterior abdominal wall. **2B.** Intraoperative image showing omental mass adherent to anterior abdominal wall at the site of previous surgery.

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Primary or idiopathic torsion occurs spontaneously without any underlying pathology and is seen less commonly. The predisposing factors for development of primary omental torsion include anatomic variations of omentum, obesity and variations in arrangement of omental blood vessels. There are conditions which may precipitate primary omental torsion in an otherwise normal omentum. These include trauma, hyperperistalsis and acute changes in body position [1, 2].

Secondary omental torsion is more common and is found to be associated with an underlying abdominal affection. Most commonly it is seen in association with inguinal hernias. Other conditions are omental cysts and tumours, previous abdominal surgeries, inflammatory diseases of abdomen and conditions that increase abdominal pressure [1]. In unipolar omental torsion the proximal end of omentum is fixed but distal end remains free. In bipolar omental torsion both ends of omentum are fixed [2]. Primary or idiopathic omental torsion is always unipolar but secondary omental torsion can develop both as unipolar or bipolar [2].

Clinical presentation of right sided omental torsion mimics acute appendicitis with a similar triad of pain, vomiting and temperature. The patient typically presents with a first time episode of constant, non-radiating pain in right lower quadrant which is gradually increasing in severity. It may be associated nausea and vomiting also [1]. Half of the patients develop low grade fever and leukocytosis [3]. The course of illness is generally prolonged as the patient is systemically less sick as compared to acute appendicitis. In some cases spontaneous resolution takes place and such patients may again present with another episode of torsion at a later date.

Clinical examination shows localized peritonitis. Large omental torsions may present as abdominal lumps as was seen in our patient.

Differential diagnosis in right sided omental torsion includes acute appendicitis, acute cholecystitis and twisted ovarian cyst in females. Left sided omental torsion is very uncommon and differential diagnosis includes sigmoid diverticulitis and epiploic appendagitis [1].

In radiology, ultrasonography shows complex mass with a mixture of solid and hypoechoic zones and free fluid in the peritoneal cavity. Although not very specific but it may help to rule out other more common conditions like acute appendicitis and cholecystitis. In contrast, CT scan has got high sensitivity for detecting an omental mass. The 'whirl' sign is the classical sign of omental torsion. It consists of an ill-defined omental/fatty mass with strands of twisted blood vessels whirling around a central vascular pedicle. The specificity of CT scan is low in detecting omental torsion because similar pattern is also seen in fat containing neoplasm, internal hernia containing omentocoele, epiploic appendagitis and panniculitis [4].

In selected cases, where the patient is stable and willing and diagnosis certain, conservative treatment may be offered and recovery is expected in two weeks [4]. But if the conservative trial fails it may result in formation of intra-abdominal abscess which may increase the abdominal pain, hospital stay and cost of treatment.

The laparoscopy has now become the diagnostic and therapeutic tool of choice in the management of omental torsion because low morbidity, rapid recovery and good aesthetic results that it offers. While doing diagnostic laparoscopy if one comes across a normal looking appendix and gall bladder along with haemorrhagic/serosanguinous free fluid in the peritoneal cavity (Fig. 2a), possibility of omental torsion should also be kept in mind and should be actively looked for. It is suggested that appendectomy should be done in the same sitting to avoid diagnostic dilemma in future.

Conclusion

Omental torsion is a rare entity that mimics other more common causes of acute abdomen, thereby making its primary diagnosis difficult. It should therefore be considered amongst the differential diagnosis when the primary diagnosis is doubtful. It is our suggestion that omentum should routinely be explored during laparoscopy as it provides the dual advantage of being both diagnostic as well as therapeutic tool.

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

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Learning Points:

- Laparoscopy offers a unique advantage of being both diagnostic as well as a therapeutic tool when primary diagnosis is uncertain.
- In a suspected case of acute appendicitis, if a normal looking appendix is found, omental torsion should also be considered as one of the differential diagnoses.

CASE REPORT

Fixation techniques in surgical repositioning of the prognathic pre-maxilla during alveolar bone graft surgery in bi-lateral cleft lip and palate patients

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Keywords: Secondary alveolar bone grafts; bi lateral cleft palate patients; premaxilla fixation; ostoetomy; techniques

Introduction

Patients with bilateral cleft lip and palate (CLP) may present with a prognathic pre-maxilla. Many erroneous surgical practices have been executed in the past for management of pre-maxillary segment such as amputation of pre-maxilla [1]. Dynamics of facial growth were appreciated with the development of new scientific knowledge in anatomy. With better understanding of the vascularity and growth potential of the premaxilla (PM) in the growing child, surgeons revisited previous surgical techniques.

The current surgical practice of alveolar bone grafting promotes mobilization and repositioning of the PM between lateral segments [2]. The firm stabilization of the osteotomized and mobilized prolabium is vital for the success of the alveolar bone graft surgery. Several techniques have been used for fixation of the osteotomized segment, but no single technique is considered the standard [3-5]. We describe different techniques used in a tertiary care facility for fixation of the PM following osteotomy.

Case presentation

The age range for secondary alveolar bone grafting (SABG) was considered to be 8-12 years. In each patient, the osteotomy and ostectomy were performed and the pre-maxilla was repositioned into the upper arch between lateral segments. Autogenous Iliac cancellous bone was used to fill the alveolar cleft. Primary stabilization of fractured pre-maxillae were achieved using different techniques as appropriate for the case (Table1). In all cases, SABG was performed unilaterally.

Case1 - A 10 year old male patient with bilateral alveolar clefts and a severe prognathic PM: During secondary alveolar bone graft surgery (SABGS), 5mm of bone was removed above the root apices of the premaxilla and the was repositioned superiorly and posteriorly. A four-hole titanium straight plate of 1.3 mm thickness with two screws was used to achieve semi-rigid fixation (Figure 1). The pre-maxillary segment was fixed to the ipsilateral segment above the tooth buds labially and a unilateral bone graft surgery was performed. In addition to the bone plate, a composite (resin cement) with stainless steel wire was used for additional stabilization.

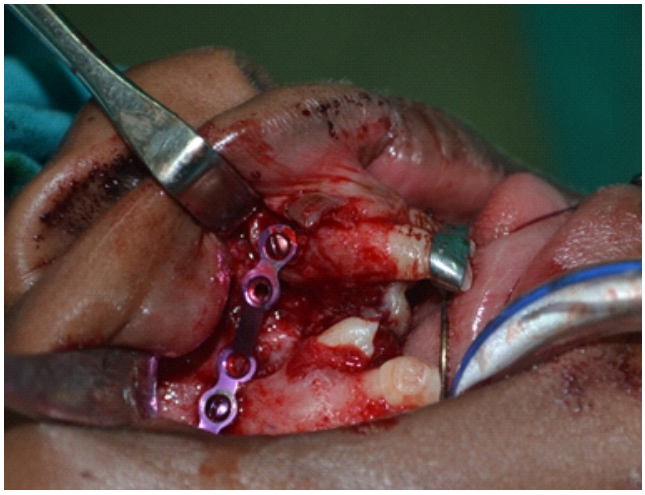

Figure 1. Multi-hole straight 1.3 mm diameter titanium bone plates with screws were used to achieve semi-rigid fixation

Case 2 - A 9 year old female patient with bilateral alveolar cleft had a prognathic PM: Preoperatively, a customized tooth borne appliance was fabricated. The pre-maxillary segment was stabilized using an acrylic bulb, and molar bands to lateral segments which had been connected by a stainless steel bar (Figure 2). After the surgical procedure, the device was cemented to stabilize the fractured segment. The appliance was removed in 3 months due to the unsatisfactory stability of pre-maxilla.

Case 3 - 11 year old female with bilateral alveolar clefts and a prognathic PM: After completion of surgery, the premaxillary segment was fixed by 1.3 mm titanium bone plate and monocortical screws palatally and the arch bar was fixed after completion of bone graft surgery for additional fixation.

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Results

Table 1. Case series and results of techniques adopted for fixation of PM.

Age, Gender	Type Of Fixation Used	Bone Graft	Remarks
10 years, Male	Titanium plate and screws, Resin composite + stainless steel wire.	Succeeded with an adequate union in bony segments	Segments were stable; tooth buds might interfere; needs a second surgery. Difficulty in isolation for composite splint placement. (Figure 1)
9 years, Female	Tooth borne appliance with acrylic bulb	Not acceptable stability	Difficult to stabilize the acrylic bulb; interference to the occlusion; poor patient compliance; Procedure needs prior model surgery in planning which causes additional burden: unpredictable positioning. (Figure 2)
11 years, Female	Titanium plate and screws, Eric arch bar	Succeeded with the adequate union in bony segments	Stable fragments; Prior assessment of site of fixation should have been done; tooth buds might interfere; need second surgery; arch bars cause trauma to soft tissue.
12 years, Female	Eric arch bar	Succeeded with the adequate union in bony segments	In mixed dentition, it interferes tooth buds. Traumatic to soft tissues and teeth. Oral hygiene maintenance is difficult. Need a second procedure for removal. (Figure 3)
11 years, Female	Tooth borne appliance	Acceptable Success	Difficult to exactly fit into the anterior segment. Need prior model surgery to achieve the presumptive position for fabrication of appliance. Stability not adequate,

Case 4 - A 12 year old female patient with a prognathic PM: - A prefabricated Eric arch bar and 26 gauge stainless steel wires for fixation of the pro-labial segment (Figure 3) to the two lateral segments.

Case 5 - An 11 year old female patient with a prognathic PM: We used tooth borne external fixation with a slight modification to the second case. In this case, we used molar bands for lateral segments and customized bands for incisors of PM. Later it was cemented to the teeth using Glass Ionomer cement.

Discussion

In neglected clefts, we occasionally find protruded PM. Osteotomy of PM at secondary alveolar bone grafting is considered ideal [6]. Commonly encountered complications in these types of cases where the loss of alveolar bone graft and mobility of PM due to fibrous union or non-union. This leads to tipping of the segment labially or palatally.

Many techniques have been practiced for stabilizing PM in literature. In 2009 Carlini et al [4] reported fixation of premaxilla using mini-plates and screws in combining with a splint in 50 patients, with 96% success rate. In Case 1 and Case 3, we followed similar methods of fixation using mini plates, as one plate fixation is not rigid enough. All cases required an additional method for stabilization. However, Rahpeyma A et.al. yielded satisfactory results in fixation of PM using a mini plate [7].

Preoperative cone beam computed tomography reduces the risk of damaging tooth buds during plate fixation. Use of resorbable plate and screws eliminate the need for second surgery. As the final position of the premaxilla is decided during the surgery (on the surgical table) ability of surgeons for manipulation and fixation of PM is ample. This technique can be adopted in severely protruded PM. In arch bar fixation, an advantage is good control of osteotomized segments and can be used in severe protruded cases. Disadvantages are that arch bars are more traumatic to soft tissues, and cannot be used in mixed dentition and edentulous cases. It also requires the second stage for removal of an arch bar and maintaining of oral hygiene is difficult so it is our least preferred method of fixation. Alexander et al in 1990 reported a prefabricated appliance aid in stabilization, using that idea we fabricated two different devices, which had been used in second and fifth cases [6]. But challenges faced during surgery were poor control over the osteotomized PM and three-dimensionally inadequate stability of bodily movement of the osteotomized

PM. This technique cannot be used in edentulous PM. Also, maintaining the sterility during the procedure is compro-

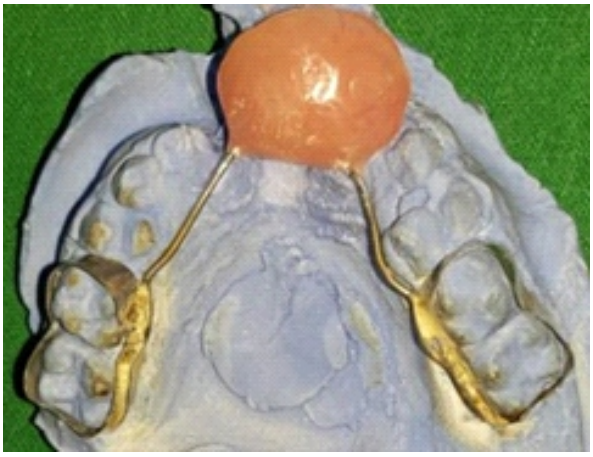

Figure 2. The premaxillary was stabilized using an acrylic bulb, and molar bands to lateral segments which were connected by a stainless steel bar

mised, when achieving dry field for resins. This technique can not be adopted in severely protruded PM.

As appliance construction is done prior to surgery, improper

Figure 3. Pre-fabricated Eric arch bar and 26 gauge stainless steel wires for fixation of the pro-labial segment

planning and inadequate coordination between surgeons and orthodontists will lead to complications. Further, this appliance increases the risk for plaque accumulation and ultimately leads to surgical site infection. After bridging the lateral fragment and PM, alveolar cleft bone graft reinforces stability and vascularity to the repositioned PM [2, 4, 5]. However, some surgeons prefer bilateral alveolar bone grafting [2, 4, 5, 7]. We preferred two-stage surgery as these techniques employed are new to us. In future, we will try to employ simultaneous PM repositioning and graft bilaterally.

Conclusion

Clinical experience suggests that no single fixation method is successful in achieving solid fixation of premaxilla during secondary alveolar bone graft surgery. Therefore, we are in the process of studying the effectiveness of a combination of two methods of fixation in PM. Further, this paper highlights the possibility of carrying out pre maxillary fixation with basic surgical facilities as some techniques do not necessitate sophisticated instruments.

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

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Learning Points:

- In a prognathic premaxilla with bilateral alveolar clefts , fracture and repositioning of the PM segment is necessary
- In such cases, achieving a good stable fixation allows successful take of the bone graft
- Combination of two fixation methods provide better success

CASE REPORT

Appendicitis: a rare cause of intestinal obstruction

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Keywords: Intestinal obstruction; appendix

Introduction

Intestinal obstruction is often regarded as one of the most common surgical emergencies that are well known worldwide [1]. Even though, a wide range of causes of intestinal obstruction is known, there are extremely rare cases of intestinal obstruction due to an appendix acting as a band causing extraluminal compression. Earliest report has been attributed to Lucius Hotchkiss in 1901 when he read it at the meeting of New York surgical society [2]. Sometimes it is difficult to diagnose these conditions and final diagnosis is made during laparotomy. The diagnosis is always made at the time of laparotomy. We are reporting a case of elderly male, who presented with features of intestinal obstruction, the pre-operative CT was of questionable value and intra-operatively appendicular band was found to be the culprit and then appendectomy was done.

Case presentation

A 50-year-old man chronic smoker was admitted to our hospital with acute history of abdominal pain for 4 days associated with episodes of bilious vomiting and not passing stools for 3 days. Physical examination revealed vitals were stable and Abdomen was distended and bowel sounds were absent. There is no previous history of any surgery or any chronic illness with no positive family history. No certain abnormalities in routine blood workup with Haemoglobin being 9.82g/dl, total leukocyte count being 8.77/cumm and the differential leukocyte count as N83L8M9B0. The abdominal CT revealed dilated jejunal, proximal and mid ileal loops with maximum diameter measuring approximately 3.7 cm with transitional point at distal ileal loop, caecum seems collapsed (Figure 1).

Intraoperatively, dilated jejunal loops were seen. A segment of ileum was obstructed by a band formed by inflamed appendix, which was running from the caecum to root of mesentery

Figur 1. The abdominal CT revealed dilated jejunal

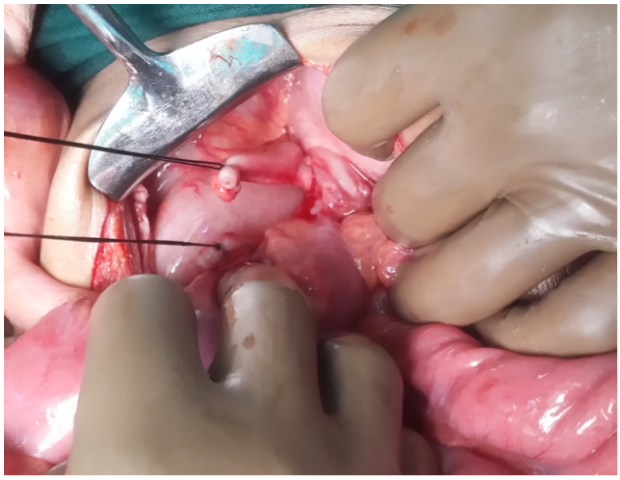

Figure 2. A segment of ileum was obstructed by a band formed by inflamed appendix

of ileum creating a window underneath (Figure 2). The band was released from the ileum and omentum, following which appendectomy was done. The bowel was viable and hence no resection was needed. Post-operative period was uneventful. Histopathology report confirmed acute appendicitis with periappendicular abscess.

Discussion

Mechanical intestinal obstruction occurs as a result of kinking, compression or traction of the small bowel trapped in an appendicular mass or abscess. Appendicitis has a bimodal incidence with one peak in adolescence and another peak in older aged patients [3].

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Intestinal obstruction in elderly secondary to an appendicular pathology is mostly due to appendicitis causing small bowel ileus, or an appendicular mass, appendicular perforation or abscess formation [4] and its diagnosis will not be possible on abdominal X-rays or ultrasound of the abdomen. Computed Tomography (CT) with contrast of the abdomen and pelvis is recommended for the evaluation of patients with suspected bowel obstruction as it might give some clue about the cause for obstruction [5].

Role of CT in detecting appendix as the cause of intestinal obstruction is questionable as in the acute phase of active appendicular inflammation there may be appropriate CT findings but these findings may not be present in patients who develop intestinal obstruction after the resolution of appendicitis. Thus pointing out appendix as the cause would not be possible [6].

Pre-operative diagnosis of intestinal obstruction due to acute appendicitis has been very difficult and quite challenging. Most of the cases reported previously have been diagnosed at operation, similar to the case we are reporting. Acute appendicitis in the elderly may lead to increased morbidity and mortality due atypical presentation which can result in a delayed diagnosis [7]. Presentation with mechanical bowel obstruction may pose further challenges.

The intra-operative treatment of the intestinal obstruction, which is often achieved by immediate appendectomy, is very straight forward once there is no associated strangulation of the loops of bowel [8].

Conclusion

There are numerous mechanisms for acute appendicitis to result in mechanical small bowel obstruction, still it is very rarely considered in the differential diagnosis. Role of CT in detecting appendix as the cause of intestinal obstruction is questionable. Due to the rarity of disease process, the surgeon, gastroenterologist and radiologist should keep a keen observation in elderly population.

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

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Learning Points:

- Intestinal obstruction caused by appendix forming a band is extremely rare with very few cases reported, appendicitis should therefore be considered in cases of mechanical intestinal obstruction of unknown cause, especially in the elderly.
- X-ray, ultrasonography may be not be sufficient for diagnosis and role of CT in detecting appendix as the cause of intestinal obstruction is questionable. However CT is very useful to detect bowel ischaemia, intestinal obstruction and ascites when present.

CASE REPORT

A case of midgut malrotation presenting as subacute intestinal obstruction in an adult

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Keywords: Malrotation; ladd band; intestinal obstruction

Introduction

Midgut malrotation occurs due to variations of rotation and fixation of the intestine during fetal development. Over 90% of cases present during the neonatal period [1]. The reported incidence of adult midgut malrotation is between 0.0001% and 0.2% [1, 2]. Adults with intestinal malrotation present with atypical symptoms [1] requiring a high degree of clinical suspicion in diagnosis.

Case presentation

A 68 year old male presented with nausea and abdominal bloating of three months duration. His bowel habits were normal. Patient was previously well. Clinical examination was unremarkable except for a right sided uncomplicated direct inguinal hernia. Patient underwent upper gastrointestinal endoscopy (UGIE) twice after optimal preparation. Food particles were seen in the pyloric region. Scope could not be negotiated beyond the distal second part of the duodenum. Ultrasound scan demonstrated dilated 1st and 2nd part of the duodenum with to and fro movements. Upper gastrointestinal contrast studies demonstrated midgut malrotation (Figure 1).

Intravenous Iohexol, oral and rectal contrast enhanced Computed Tomography scan showed gross dilatation of 1st and 2nd parts of duodenum with wall thickening (Figure 2). No extrinsic compression was seen. Small intestine was not filled with contrast. A diagnostic laparoscopy was performed. Midgut was found to be malrotated. The 3rd part of the duodenum was atretic with multiple Ladd's bands. Fibrotic bands were noted also around caecum and ascending colon. Adhesions were surgically divided. A side to side diversion gastrojejunostomy was created with 60 mm endoscopic stapler device. Postoperative period was unremarkable. Patient was asymptomatic after 24 months follow up.

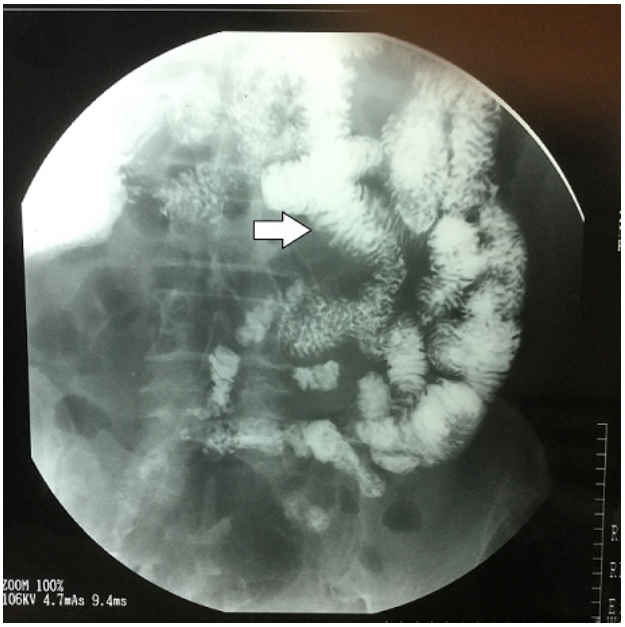

Figure 1. Upper gastrointestinal contrast study shows small intestine with jejunal markings on right (marked in a white arrow) and colon mainly on the left.

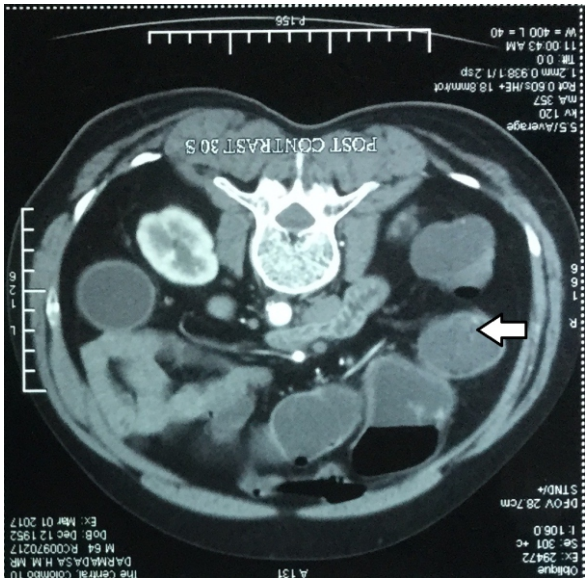

Figure 2. Axial contrast-enhanced Computed Tomography shows small intestines predominantly on right (marked in a white arrow).

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Discussion

The midgut rotates 2700 counter clockwise around the axis of superior mesenteric vascular pedicle during the embryonic life. In midgut malrotation, peritoneal fibrous bands known as Ladd's bands [3] fix the small intestine and undescended caecum to the posterior abdominal wall. These Ladd's bands compress the duodenum and can potentially cause duodenal obstruction [4]. It can present as acute or chronic intestinal obstruction [4]. However, adults commonly present with chronic intestinal obstruction, characterized by intermittent crampy abdominal pain, bloating, nausea and vomiting over several months or years [1, 2, 4].

Plain radiographs may show absence of stool filled colon in right lower quadrant [1, 5]. But plain radiographic evidence is neither specific nor sensitive [5]. Twisting of the intestine and the mesentery around the axis of the superior mesenteric artery may be detected ultrasonically as "whirlpool sign" [5]. Malposition of bowel loops can be accurately diagnosed by CT [1, 4, 5]. Nowadays, UGI contrast studies are increasingly used to diagnose midgut malrotation presenting with chronic intestinal obstruction [5].

Surgical division of these adhesion bands in infants, known as "Ladd's Procedure" was first reported in 1936 [3]. According to the current evidence, elective Ladd's procedure is considered as the gold standard in midgut malrotation presenting with chronic intestinal obstruction in adults [5]. Chronic intestinal obstruction due to intestinal malrotation which required diversion of the intestine as in our case are reported sparsely. Data on long term post-operative outcome between open and laparoscopic approach are limited in adults. However, there is increasing evidence to suggest that the Laparoscopic Ladd's procedure can be performed safely in selected patients without increasing short term complications [5].

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

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Learning Points:

- Midgut malrotation rarely presents in adult life.
- Commonest presentation of midgut malrotation in adults is chronic intestinal obstruction.
- Computed tomography combined with upper gastrointestinal contrast studies can diagnose adult midgut rotation accurately.
- Open and laparoscopic Ladd's procedure is the treatment.

CASE REPORT

Incidental finding of von Meyenburg complexes mimicking liver metastases on routine laparoscopic cholecystectomy

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Keywords: Hepatobiliary surgery; biliary hamartomas

Introduction

First described in 1918, Von Meyenburg complexes (VMC) or bile duct hamartomas, are a rare benign epithelial tumour of liver derived from bile duct cell [1, 2]. They are mostly asymptomatic and found incidentally. Their differential diagnoses include Caroli disease, parasitic liver cysts and rarely metastatic disease [3].

A few case reports were found with patients presenting with nonspecific abdominal pain or as an infective complications of liver parenchyma [3]. This case report outlines an incidental intraoperative finding of von Meyenburg complexes and subsequent management in a 57 year old male which mimicked liver metastases on routine laparoscopic cholecystectomy.

Case presentation

A 57 year old, previously well Caucasian male was planned to have a laparoscopic cholecystectomy following ERCP for choledocholithiasis. A diagnostic laparoscopy and biopsy was performed instead, in view of intraoperative findings of multiple 5mm to 15mm nodular white deposits widespread over liver (figure 1). Concerning for liver metastases, biopsies were taken from Segment IVB of liver as frozen section histopathology facilities were unavailable. The histopathology returned as benign bile duct hamartomas (VMC, von Meyenburg complexes). The microscopic description read "small clusters of benign bile duct glands, glands are variably angulated and lined by cuboidal cells containing inspissated bile within lumen. Glands are surrounded by fibrous stroma. Mild incidental hepatic steatosis".

Given benign nature, a laparoscopic cholecystectomy was started although converted to an open subtotal cholecystectomy due to an abnormal duct from the liver entering the distal Hartmann's pouch, close to his cystic duct. The histopathology from the subtotal cholecystectomy returned as active chronic cholecystitis. He was discharged from hospital with follow up made with tertiary centre gastroenterology and hepatobiliary teams.

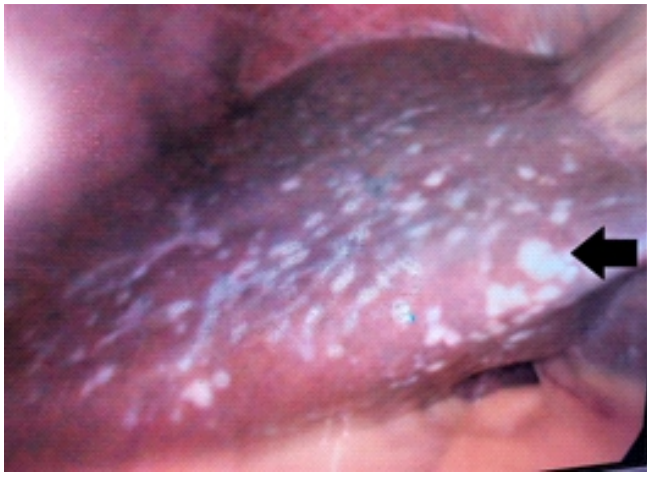

Figure 1. Intraoperative Image: Segment 4B liver anterior surface demonstrating VMC complexes

Conclusion

VMC's are a rare benign epithelial tumor of liver derived from bile duct cell [1, 2]. Macroscopically they are described as multiple small nodular lesions, with a size less than 1.5cm and having a cystic appearance. They are thought to be caused by small intrahepatic bile ducts undergoing ductal plate malformation, secondary to disordered embryonic involution [1, 2, 3]. They can be classed as solid, intermediate or cystic [4].

Diagnostic criteria require histology showing cystic dilation of bile ducts embedded in fibrous stroma with no evidence of malignancy. The differential diagnosis of liver cysts includes Caroli disease, parasitic liver cysts and rarely metastatic disease [3].

Mostly asymptomatic, a few cases report patients presenting with nonspecific abdominal pain or as an infective complications of liver parenchyma and cholangitis [3].

Imaging modalities may identify VMC and they include

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ultrasound with features of numerous hyperechoic or hypoechoic areas with "comet tail echoes" [3]. CT scan may show small hypodense nodules with ring like enhancements [3]. Magnetic Resonance Imaging (MRI) is preferred as it can distinguish saccular dilation of Caroli disease versus peri ductal cystic dilation of polycystic disease [3]. None of above were seen on our patient's ultrasound and CT scan. Literature suggests that in CT or MRI scanning, the lack of enhancement post intravenous contrast and lack of communication with biliary tree, helps distinguish bile duct hamartomas from malignancy [3, 5].

Bile duct hamartomas may coincide with any liver tumor benign or malignant [2]. This necessitates liver biopsies if the diagnosis is in doubt [2, 4]. Incidental finding in laparoscopy and autopsy is 0.7 to 2.8 percent prevalence [3]. In all literature reviewed, frozen section or biopsy were performed by the surgeons to confirm the diagnosis and exclude hepatic metastases.

In conclusion, literature search and review indicate that Von Meyenburg Complexes can be encountered incidentally by surgeons as undifferentiated liver nodules intraoperatively and hence biopsies should be performed to exclude other differentials.

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

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Learning Points:

- Undifferentiated liver nodules can be encountered by surgeons intraoperatively.
- When encountered in an intraoperative setting, undifferentiated liver nodules should be biopsied.
- Von Meyenburg complexes (VMC) or bile duct hamartomas are a rare benign epithelial tumor of the liver, although can still be encountered in an intraoperative setting, biopsies should be performed to differentiate from more sinister pathology.

SELECTED ABSTRACTS

Influence of smoking on aneurysm recurrence after endovascular treatment of cerebrovascular aneurysms

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J Neurosurg. 2018 Apr;128(4):992-998

Abstract

Objective

Smoking is a known risk factor for aneurysm development and aneurysmal subarachnoid hemorrhage, as well as subsequent vasospasm in both untreated individuals and patients who have undergone surgical clipping of cerebrovascular aneurysms. However, there is a lack of data in the current scientific literature about the long-term effects that smoking has on the integrity of endovascular repairs of cerebral aneurysms. This study was designed to determine if any smoking history increased the risk of poorer outcomes and/or aneurysm recurrence in patients who have had endovascular repair of cerebral aneurysms.

Method

The authors retrospectively analyzed the medical records of patients admitted to the University of Michigan Health System from January 1999 to December 2011 with coiled aneurysms and angiography, CT angiography or MR angiography followup. Patients were identified and organized based on many criteria including age, sex, smoking history, aneurysm recurrence, aneurysm location, and Hunt and Hess grade. Analysis was targeted to the patient population with a history of smoking. Bivariate chi-square tests were used to analyze the association between a positive smoking history and documented aneurysm recurrence and were adjusted for potential confounders by fitting multivariate logistic regression models of recurrence.

Result

A total of 247 patients who had undergone endovascular treatment of 296 documented cerebral aneurysms were included in this study. The recurrence rate among all patients treated with endovascular repair was 24.3%, and the average time to the most recent follow-up imaging studies was 1.62 years. Smokers accounted for 232 aneurysms and were followed up for an average of 1.57 years, with a recurrence rate of 26.3%. Never smokers accounted for the remaining 64 aneurysms and were followed up for an average of 1.82 years, with a recurrence rate of 17.2%. Multivariate analysis revealed that, after controlling for potential confounders, a history of smoking - whether current or former - was associated with a significantly increased risk of aneurysm recurrence. The odds ratios for aneurysm recurrence for current and former smokers were 2.739 (95% CI 1.127–7.095, p = 0.0308) and 2.698 (95% CI 1.078–7.212, p = 0.0395), respectively, compared with never smokers.

Conclusions

A positive smoking history is associated with a significantly increased risk of aneurysm recurrence in patients who have undergone endovascular repair of a cerebral aneurysm, compared with the risk in patients who have never smoked

Commentary

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A Subarachnoid hemorrhage is a devastating neurosurgical emergency. The commonest cause is trauma but those caused by the rupture of cerebral aneurysms suffer with the worse prognosis. There are two recognized methods of treating ruptured aneurysms, the traditional way of placing a clip at the neck of the aneurysm occluding it, surgically or by placing a coil or several into the aneurysm thereby packing it via an endovascular technique. This is done by the radiologists under image guidance. Many studies have been carried out but there still isn't conclusive evidence as to which technique is better in the long term. What we do know is that there are several risk factors, which increase the rupture rate of aneurysms and the recurrence of aneurysms after treatment. Being female increase the risk as does smoking, being hypertensive, use of drugs such as methamphetamines and cocaine. There is also a known increased risk in families. This study has looked retrospectively at endovascularly treated aneurysms and the affect of smoking pre coiling and post coiling. This confirmed a significantly increased risk of aneurysm recurrence in smokers. This should be taken into consideration when consenting these patients for the procedure and help offered to those patients to stop smoking. Counseling is essential, due to the significant mortality and morbidity associated to rupture of the aneurysm due to recurrence.

The Surgeon Volume-outcome Relationship: Not Yet Ready for Policy

Modrall J G, Minter RM, Minhajuddin A, Eslava-Schmalbach J, Joshi GP, Patel S, Rosero EB

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Objective
Increasing surgeon volume may improve outcomes for index operations. We hypothesized that there may be surrogate operative experiences that yield similar outcomes for surgeons with a low-volume experience with a specific index operation, such as esophagectomy.

Background: The relationship between surgeon volume and outcomes has potential implications for credentialing of surgeons. Restrictions of privileges based on surgeon volume are only reasonable if there is no substitute for direct experience with the index operation. This study was aimed at determining whether there are valid surrogates for direct experience with a sample index operation - open esophagectomy.

Methods
The Nationwide Inpatient Sample (2003–2009) was utilized. Surgeons were stratified into low and high-volume groups based on annual volume of esophagectomy. Surrogate volume was defined as the aggregate annual volume per surgeon of upper gastrointestinal operations including excision of esophageal diverticulum, gastrectomy, gastroduodenectomy, and repair of diaphragmatic hernia.

Results
In all, 26,795 esophagectomies were performed nationwide (2003–2009), with a crude in-hospital mortality rate of 5.2%. In-hospital mortality decreased with increasing volume of esophagectomies performed annually: 7.7% and 3.8% for low and high-volume surgeons, respectively ($P < 0.0001$). Among surgeons with a low-volume esophagectomy experience, increasing volume of surrogate operations improved the outcomes observed for esophagectomy: 9.7%, 7.1%, and 4.3% for low, medium, and high-surrogate-volume surgeons, respectively ($P = 0.016$).

Conclusions
Both operation-specific volume and surrogate volume are significant predictors of in hospital mortality for esophagectomy. Based on these observations, it would be premature to limit hospital privileges based solely on operation-specific surgeon volume criteria.

Commentary
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The impact of the volume of procedures performed vs surgical outcomes is important in structuring a healthcare system. This article (1) focuses on outcomes after oesophagectomy and found that surgeons who performed over 5 oesophagectomies or 6 surrogate procedures per year had less post-operative mortality compared to surgeons performing fewer cases. Other researchers have identified this extends to length of hospital stay after surgery (2), functional outcomes (2), post-operative complication (3) and 5-year survival (4). Other studies have highlighted that it's the surgeon volume and not the hospital volume that remains the significant predictor of these outcomes (5).

These are important concerns for surgeons managing patients with malignant diseases in Sri Lanka. With the present disparity in the number of surgeons, specialists and resources available, the decision to treat or refer to another centre may be the first crucial decision in managing a patient. This can be further confounded by socio-economic factors of the patients and trends in training surgeons (e.g. selecting a field of "special interest" for general surgeons). The evidence also prejudices against surgeons doing lower volumes at tertiary centres.

Although no Sri Lankan data on volume outcome relationship are available, most surgeons in Sri Lanka perform more than the critical number identified in this study. However, with the increasing number of surgeons and centres, this may soon fall below this value. Therefore, an analysis of local data and evidence based national policies could improve the health care delivery.

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Adoption of Total Neoadjuvant Therapy for Locally Advanced Rectal Cancer

Andrea Cercek et al.
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Published online March 22, 2018.

Abstract

Importance

Treatment of locally advanced rectal (LARC) cancer involves chemoradiation, surgery, and chemotherapy. The concept of total neoadjuvant therapy (TNT), in which chemoradiation and chemotherapy are administered prior to surgery, has been developed to optimize delivery of effective systemic therapy aimed at micrometastases.

Objective

To compare the traditional approach of preoperative chemoradiation (chemoRT) followed by postoperative adjuvant chemotherapy with the more recent TNT approach for LARC.

Design, setting and participants

A retrospective cohort analysis using Memorial Sloan Kettering Cancer Center (MSK) records from 2009 to 2015 was carried out. A total of 811 patients who presented with LARC (T3/4 or node-positive) were identified.

Exposures

Of the 811 patients, 320 received chemoRT with planned adjuvant chemotherapy and 308 received TNT (induction fluorouracil- and oxaliplatin- based chemotherapy followed by chemoRT).

Main outcomes and measures

Treatment and outcome data for the 2 cohorts were compared. Dosing and completion of prescribed chemotherapy were assessed on the subset of patients who received all therapy at MSK.

Results

Of the 628 patients overall, 373 (59%) were men and 255 (41%) were women, with a mean (SD) age of 56.7 (12.9) years. Of the 308 patients in the TNT cohort, 181 (49%) were men and 127 (49%) were women. Of the 320 patients in the chemoRT with planned adjuvant chemotherapy cohort, 192 (60%) were men and 128 (40%) were women. Patients in the TNT cohort received greater percentages of the planned oxaliplatin and fluorouracil prescribed dose than those in the chemo RT with planned adjuvant chemotherapy cohort. The complete response (CR) rate, including both pathologic CR (pCR) in those who underwent surgery and sustained clinical CR (cCR) for at least 12 months posttreatment in those who did not undergo surgery, was 36%in the TNT cohort compared with 21% in the chemoRT with planned adjuvant chemotherapy cohort.

Conclusions and relevance

Our findings provide additional support for the National Comprehensive Cancer Network (NCCN) guidelines that categorize TNT as a viable treatment strategy for rectal cancer. Our data suggest that TNT facilitates delivery of planned systemic therapy. Long-term follow-up will determine if this finding translates into improved survival. In addition, given its high CR rate, TNT may facilitate non-operative treatment strategies aimed at organ preservation.

Commentary

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Concept of total neoadjuvant therapy (TNT) that involves a longer chemotherapy regimen following the chemo-radiation (CRT) has causes much debate amongst the scientific community. Argument for it appears to be scientifically sound as it aligns with the theory of cancer being a systemic disease from early stage . As long as the primary tumour does not cause obstruction of the rectum it is sensible to address the micro-metastasis, which is eventually responsible for cancer specific death. Delaying the chemotherapy due to surgery for a non-obstructing tumour gives time for the micro-metastases to consolidate at the new site. An argument against it is that it delays surgery that may cause the tumour to advance locally and metastasize as well. Both arguments are not yet backed by a survival advantage although oncologists tend to increasingly recommend TNT. This study done at the Memorial Sloan-Kettering Cancer center in New York suggests the possibility of total neoadjuvant therapy being superior to CRT plus adjuvant therapy in locally advanced rectal cancer. Their study revealed that those having TNT had 1) better tolerance and completion rates of chemotherapy, 2) higher complete response rate (clinical and pathological) and 3) higher non-operate rates due to complete pathological response. The study further elaborates on observing the same advantage when the difference in time between chemotherapy and surgery in the two groups was adjusted for. It would be interesting to observe the 5 and 10 year survival data from this cohort and pooled data from other centers in the future. The trend may be shifting towards more comprehensive chemotherapy regimens preoperatively for LARC with increase understanding in cancer biology and improved staging with MRI imaging.

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Effect size, confidence interval and statistical significance: a practical guide for biologists

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https://doi.org/10.1111/j.1469-185X.2007.00027.x

Abstract

Null hypothesis significance testing (NHST) is the dominant statistical approach in biology, although it has many, frequently unappreciated, problems. Most importantly, NHST does not provide us with two crucial pieces of information: 1) the magnitude of an effect of interest, and 2) the precision of the estimate of the magnitude of that effect. All biologists should be ultimately interested in biological importance, which may be assessed using the magnitude of an effect, but not its statistical significance. Therefore, we advocate presentation of measures of the magnitude of effects (i.e. effect size statistics) and their confidence intervals (CIs) in all biological journals.

Combined use of an effect size and its CIs enables one to assess the relationships within data more effectively than the use of p values, regardless of statistical significance. In addition, routine presentation of effect sizes will encourage researchers to view their results in the context of previous research and facilitate the incorporation of results into future meta-analysis, which has been increasingly used as the standard method of quantitative review in biology. In this article, we extensively discuss two dimensionless (and thus standardised) classes of effect size statistics: d statistics (standardised mean difference) and r statistics (correlation coefficient), because these can be calculated from almost all study designs and also because their calculations are essential for meta-analysis. However, our focus on these standardised effect size statistics does not mean unstandardised effect size statistics (e.g. mean difference and regression coefficient) are less important. We provide potential solutions for four main technical problems researchers may encounter when calculating effect size and CIs: (1) when covariates exist, (2) when bias in estimating effect size is possible, (3) when data have non-normal error structure and/or variances, and (4) when data are non-independent. Although interpretations of effect sizes are often difficult, we provide some pointers to help researchers. This paper serves both as a beginner's instruction manual and a stimulus for changing statistical practice for the better in the biological sciences.

Commentary

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This article highlights the importance of reporting the effect size in biological research. Hypothesis testing can be performed either with a significance testing or constructing a confidence interval (CI) for an estimate. Significance testing provides a P value, which is used to reject or retain the null hypothesis. However, significance testing does not provide information on the magnitude of the effect (i.e. effect size) or the precision of the estimate which is obtained in the study. Statistical significance does not reflect clinical relevance of an outcome a study and presenting the effect size with confidence interval assist researchers to assess clinical relevance and conduct future meta-analysis. Confidence interval of an estimate depends on the sample size and smaller sample sizes results wider confidence intervals and enables researchers to compare results between studies. Therefore, it is advisable to present effect size and their confidence intervals in all biological researchers.

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Cipla Pharma Lanka Pvt Ltd
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Urimax

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