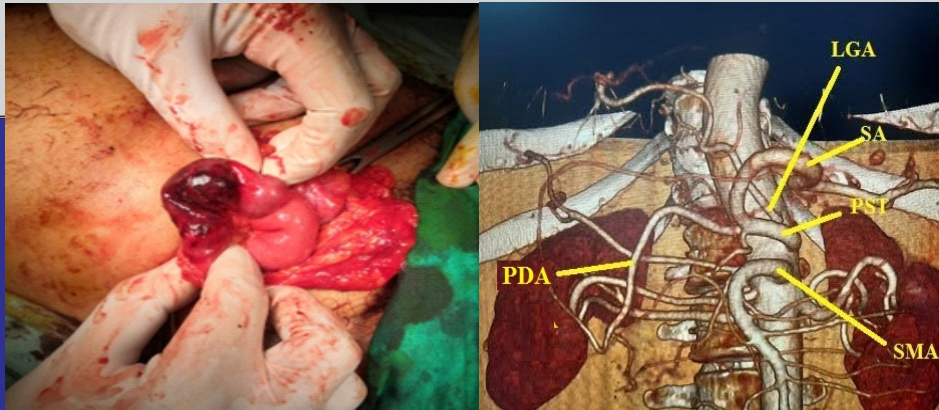




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- Spinal anaesthesia versus peri-prostatic block for TURP
- Prophylactic nurectomy in inguinal hernia repair
- Waiting times in colorectal cancer treatment in Sri Lanka
- Anatomical variation of the middle hepatic vein
- Anatomy of the thoracic duct

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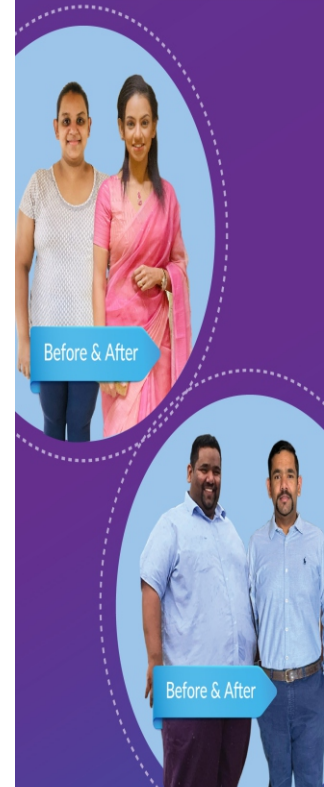
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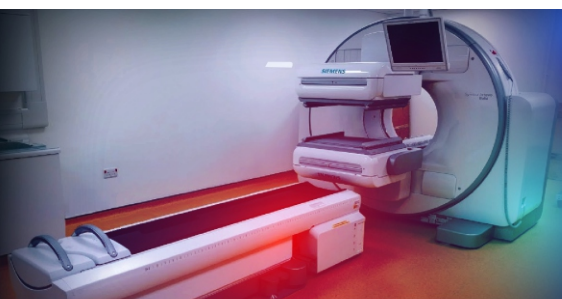
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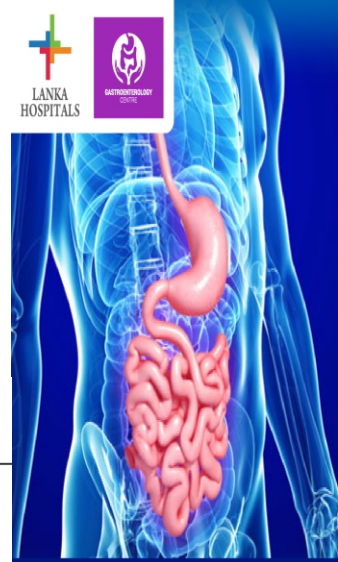


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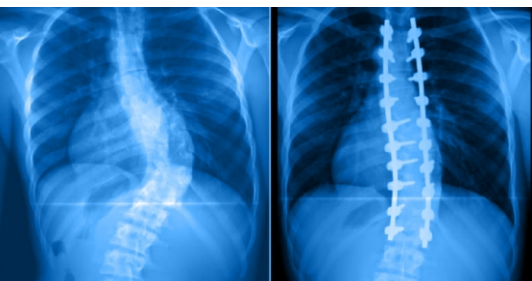


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Comparative evaluation of spinal anaesthesia and transrectal ultrasound guided peri-prostatic block for patients undergoing transurethral resection of the prostate

Hemant Kamal, Yangyasmith Mohanty, Kirti Kamal, Vandna Arora, Renu Bala, Geeta Ahlawat
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Keywords: TURP, spinal, sedoanalgesia

Abstract

Background and Aim: Transurethral resection of the prostate (TURP) is the most common surgery performed in patients with benign prostatic hyperplasia. Patients undergoing TURP are usually elderly with associated co-morbidities, thus sedoanalgesia (local anaesthesia with sedation) can be a suitable alternative with early recovery and shorter hospital stays. Against this background, the present study aimed to compare the safety and efficacy of sedoanalgesia with conventionally used spinal anaesthesia for TURP.

Methods: This prospective randomized study was conducted in 100 patients (aged 50-80 years), with a prostatic volume of 30-70 cc and with duration of surgery less than 60 minutes undergoing TURP. Patients were randomly allocated into two groups: Group S (n=50): received spinal anaesthesia with 2ml of 0.5% hyperbaric bupivacaine; Group B (n=50): received sedatives along with prostatic block under transrectal ultrasound guidance by infiltrating of 20 ml of 1% lignocaine without adrenaline into the prostate and periprostatic area. VAS scores, hemodynamic parameters and patient satisfaction were recorded.

Results: Demographic profile, prostate volume and duration of surgery were comparable between the two groups. VAS scores were significantly lower in Group S as compared to Group B throughout the intraoperative period (p=0.01). The hemodynamic parameters were maintained better in Group B. All 50 patients were satisfied with the anaesthetic technique in Group S while 46 out of 50 patients were satisfied in Group B.

Conclusion: USG guided prostatic block is a promising option in elderly patients especially with various comorbidities and those with contraindications for spinal anaesthesia.

Introduction

Transurethral resection of the prostate (TURP) is the most common surgery performed in patients with benign prostatic hyperplasia (BPH). It involves inserting a resectoscope through the urethra and resecting prostatic tissue with an electrical metal loop using either coagulation or laser-vaporization [1]. Spinal anaesthesia has been the technique of choice in TURP [1]. Level of subarachnoid block up to T10 is sufficient for TURP as it interrupts sensory transmission from the prostate and bladder neck [2]. Also, the capsular sign (i.e., pain on perforation of the prostatic capsule) would be masked in cases of accidental perforation if sensory block level reaches above T9.

Day care procedures are rapidly gaining popularity because of shorter duration of hospital stay, fewer complications, early recovery and reduced costs which makes TURP under local anaesthesia a considerable option. Most of the patients undergoing surgery for BPH are elderly with co-morbidities and many are rendered unfit for general or regional anaesthesia. In those cases, sedoanalgesia (local anaesthesia with sedation) can be a suitable alternative with early recovery and shorter hospital stays [3].


The present study aimed to compare the safety and efficacy of sedoanalgesia with conventionally used spinal anaesthesia for transurethral resection of prostate.

Materials and methods

This prospective randomized study was conducted from february 2019 to march 2020 in the Department of Anaesthesiology and Critical Care in a multispeciality hospital after obtaining institutional ethical clearance and informed written consent. Patients aged 50-80 years, belonging to American Society of Anaesthesiologists (ASA) physical status I-III, with a prostatic volume of 30-70 cc and with duration of surgery less than 60 minutes undergoing TURP were enrolled in the study. Patients having allergy to local anaesthetics or any contraindications to regional anaesthesia, history of prostate/bladder/urethral surgery, active urinary tract infection and neurogenic bladder dysfunction were excluded from the study.

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Detailed history was taken and complete systemic examination was done in all patients before surgery. Demographic parameters and prostate volume were recorded. Patients were explained about Visual Analogue Scale (VAS) where 0 represents no pain while 10 represents worst pain imaginable. In the operating room, routine monitors including non-invasive blood pressure, ECG and pulse oximeter (SpO₂) were attached. Intravenous line was secured with size 18G venous cannula and vital signs were recorded. Patients (n=100) were randomly allocated into two groups (figure 1) using computer generated random number table:

Group S (n=50): Spinal anaesthesia was administered with 2ml of 0.5% hyperbaric bupivacaine via 23 gauge Quincke's needle at L3-L4 intervertebral space. The surgery was started when the height of sensory block reached T10 dermatomal level.

Group B (n=50): Patients received sedatives alongwith prostatic block under transrectal ultrasound guidance by infiltrating of 20 ml of 1% lignocaine without adrenaline into the prostate and periprostatic area. Patients were given intravenous fentanyl (1 mcg/kg) and midazolam 1mg for sedation and anxiolysis. A TRUS guided prostatic block was given to the patients in lithotomy position. Aloka-SSD-1400 ultrasound machine with transvaginal probe (5-10 MHz) was used to administer the block. Aseptic preparation and lubrication of probe with 2% lignocaine jelly was done and probe was inserted transrectally to scan the prostate. Under ultrasound guidance, a 23 gauge, 7-inch spinal needle was placed through the biopsy guide channel into the area where the prostatic innervation enters the gland. To identify the above said area, the probe was angled laterally to visualize the notch between the prostate and the seminal vesicle. The needle was placed in this notch and 4ml of plain 1% lignocaine was injected on each side. Successful placement of the needle was confirmed by observing the injected drug displacing the seminal vesicle and the prostate away from the rectal wall. The rest of the solution was directly injected into the prostate at three locations in each lobe by inserting 23 gauge needle all the way to the anterior capsule at the base, mid-gland and the apex and as the needle was pulled back, 2 ml of anaesthetic was slowly infiltrated in the prostate parenchyma at each location.

Intraoperative pain was monitored using VAS (0-10) every 15 minutes and at the time of bladder catheterisation. If the VAS was >2, intravenous fentanyl (0.5 mcg/kg) was given. If VAS was >4 even after 5 minutes of fentanyl injection, surgery was continued under general anaesthesia and was recorded as a

failure. Any discomfort during instrumentation/cautery and bladder distension were also noted. VAS was also assessed post-operatively at 1, 2, 4 and 6 hours after surgery. Duration of post-operative analgesia was recorded and analgesics were given as per surgical unit protocol when VAS ≥4.

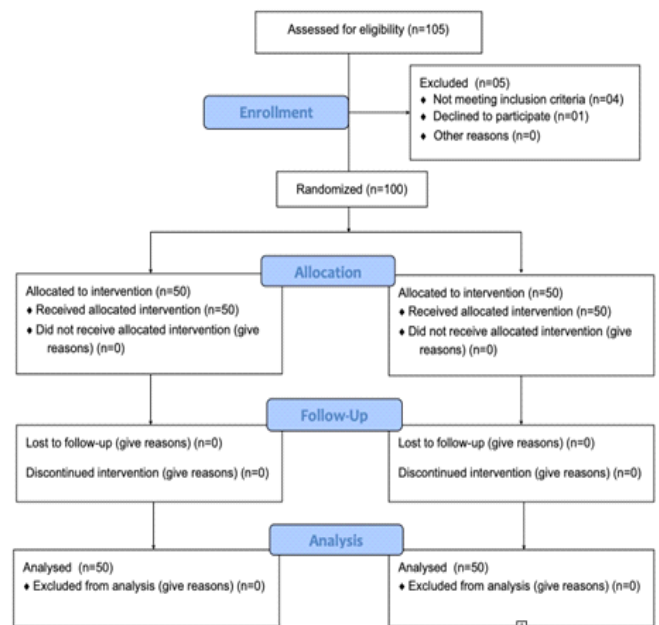


Figure 1: Consort diagram

Hemodynamic parameters were monitored continuously throughout the surgery. Heart Rate (HR) and Systolic blood pressure (SBP) were recorded before and after administration of the drug, every 5 minutes for first 30 minutes and then every 10 minutes for the next hour. Duration of surgery was calculated from the time of insertion of resectoscope till it was taken out at the end of surgery.

Perioperative complications such as hypotension and bradycardia were noted and treated according to the standard protocol. Hypotension (decrease in SBP more than 20% of the baseline value) was managed with 3 mg boluses of i.v. ephedrine. Number of patients having hypotensive episodes were recorded in both the groups. Bradycardia (HR <50 beats minute⁻¹) was managed by inj atropine 0.6 mg i.v.

Patient's satisfaction was assessed subjectively by asking if he experienced any discomfort during the surgery and whether he will accept the same anaesthetic technique in future. Surgeon's satisfaction was based on three criterias i.e. the surgical field bleeding, patient immobility and degree of pelvic muscle relaxation which was assessed at the end of the surgery.

Sample size:

The primary objective of the study was to assess the intra-operative and post-operative pain by Numerical Rating Scale (Visual Analogue Scale) in the two groups. A clinically relevant difference of 1 in mean values of postoperative VAS between the two groups was defined for calculating the sample size. With an effect size of 0.67, power of 80% and type 1 error of 5%, the minimum required sample size was 47 patients in each group [4,5]. However, to compensate for dropouts we enrolled 50 patients in each group.

Statistical analysis:

Data were coded and recorded in MS Excel spreadsheet program. SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program was used for analysis. Descriptive data was expressed as percentages, means and standard deviations. Quantitative data comparison of clinical indicators was done using unpaired t test (for quantitative data to compare two independent two groups) and paired t test (for quantitative data to compare before and after observations). Chi-square test was used for group comparisons for categorical data. A p value <0.05 was considered statistically significant.

Results

Demographic profile, prostate volume and duration of surgery were comparable between the two groups (Table 1). VAS scores were significantly lower in Group S as compared to Group B throughout the intraoperative period (p=0.01) (Table 2). None of the patients in Group S experienced any discomfort on introduction of resectoscope while in Group B, 31 patients experienced mild pain (VAS=1,2) on introduction of resectoscope. In Group B, 9 patients complained of 'moderate pain' at various time intervals intraoperatively and were administered i.v. fentanyl to abate the pain so that surgery could be completed safely. Thus supplemental analgesia was required in 9 patients in Group B and none in in Group S (p value=0.04).

In Group S, the mean VAS score was zero at all time points intraoperatively. In Group B, the mean VAS score was <2 at all intervals during the surgery and the maximum mean VAS score observed was 1.2 at 30 minutes interval after the block. None of the patients in Group S experienced any discomfort on bladder catheterization while in Group B, 28 patients experienced mild pain (VAS=1,2) during the same.

The baseline values of HR were comparable between both groups. In Group B, no significant change in HR values was

noted till 25 minutes after the block after which significant increase in HR was observed, with maximum being at 50 minutes after the block (p=0.001). In Group S, intraoperative HR values were significantly lower as compared with the baseline at all time intervals. However when compared between the two groups, HR values were significantly lower in Group S as compared to Group B intraoperatively. (Figure 2) Bradycardia was observed in 4 patients in Group S while none in Group B (p value=0.04).

Table 1: Demographic parameters

	Group B (n=50) Mean ± SD	Group S (n=50) Mean ± SD	p-value
Age (years)	66.98±9.12	66.24±8.82	0.68
Weight (kg)	64.64±6.95	65.78±7.93	0.44
Height (cm)	170.2±2.77	169.76±3.402	0.48
BMI (kgm ⁻²)	22.29±2.19	22.805±2.48	0.28
ASA I/II/III	3/44/3	4/44/2	0.84
Prostate volume (cc)	45.84±8.306	46.20±8.5	0.83
Duration of surgery (minutes)	44.78±9.26	46.32±6.88	0.34

p value <0.05 is considered to be significant

Table 2: Comparison of intra-operative pain score (VAS) between Group B and Group S

Group	At introduction of resectoscope		At 15 minutes		At 30 minutes		At 45 min		At bladder catheterisation	
	B	S	B	S	B	S	B	S	B	S
No pain (VAS=0)	19	-	8	50	7	50	2	42	22	50
Mild pain (VAS=1,2)	31	-	40	-	38	-	26	-	28	-
Moderate pain (VAS=3,4)	-	-	2	-	5	-	2	-	-	-
Severe pain (VAS >4)	-	-	-	-	-	-	-	-	-	-
Total	50	50	50	50	50	50	30	42	50	50
P value	0.001		0.001		0.001		0.001		0.001	

p<0.001 (Chi square test) when both groups were compared with each other at all time frames

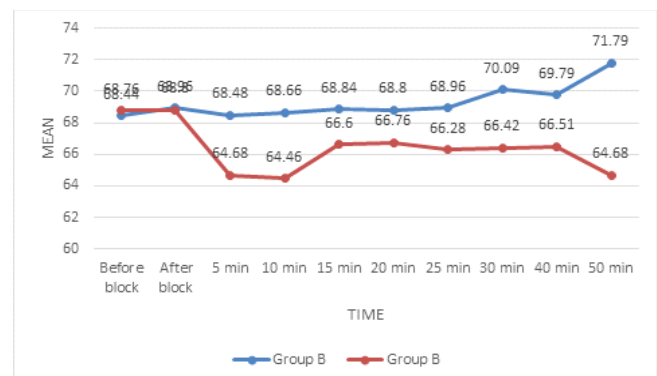


Figure 2: Comparison of HR (bpm) between the groups

The baseline values of SBP were comparable between both the groups. In Group S, a significant decrease in SBP values was noted at all time intervals intraoperatively while no such change was observed in Group B. (Figure 3) SBP values were significantly lower in Group S than Group B intraoperatively ($p < 0.05$). Hypotension requiring ephedrine administration was observed in only 5 patients in Group S and none in Group B ($p = 0.03$). Only one patient in Group S while no patient in Group B had vomiting (p value = 0.31).

The duration of post-operative analgesia was found to be 98.40 ± 38.125 minutes in Group B while it was 112.80 ± 18.52 minutes in Group S (p value = 0.01). VAS scores were lower in Group S as compared to Group B at 1, 2, 4 and 6 hours post-operatively (p value = 0.001) (Table 3).

All 50 patients were satisfied with the anaesthetic technique in Group S while 46 out of 50 patients were satisfied in Group B (p value = 0.04). (Figure 19) Surgeons were satisfied with the anaesthetic technique in all 50 cases of Group S while in Group B, satisfaction was expressed in 48 out of 50 patients (p value = 0.15). The dissatisfaction was mainly due to patient mobility.

Table 3: Comparison of Post-operative pain score (VAS) between Group B and Group S (Chi square test)

Groups	After 1 hour		After 2 hours		After 4 hours		After 6 hours	
	B	S	B	S	B	S	B	S
Mean \pm SD	1.12 \pm 0.898	0.10 \pm 0.303	2.02 \pm 0.86	1.04 \pm 0.807	3.48 \pm 0.76	2.28 \pm 0.64	4.39 \pm 0.75	3.56 \pm 0.61
p value	0.001		0.001		0.001		0.001	

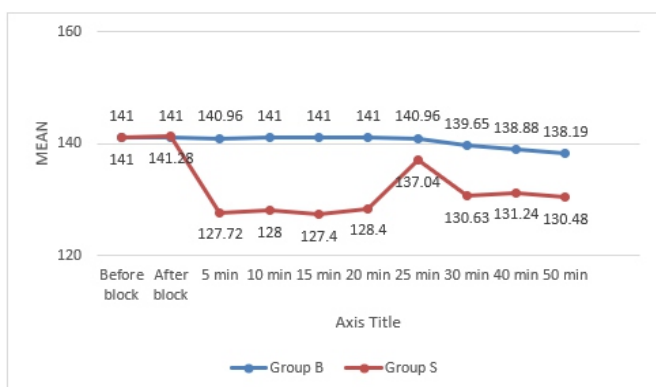


Figure 3: Comparison of SBP (mmHg) between the groups

Discussion

BPH is described as a quality of life disorder which develops with increasing age and hinders the normal activities and reduces the feeling of wellbeing [6]. 40% to 80% men develop moderate to severe symptoms at the age of 60-80.

At the age of 90 years, most of the men develop microscopic BPH [7]. Multiple treatment modalities have been developed for the management, ranging from watchful waiting to open surgery, with TURP being the most common surgical intervention. The quest for ideal anaesthetic technique for TURP is still on as patients are mostly in the geriatric age group with multiple comorbidities.

Over decades, spinal anaesthesia has been the choice of anaesthesia for TURP. Though spinal anaesthesia technique has various advantages but it causes significant hemodynamic perturbations. The hemodynamic changes are gradual and of less magnitude with epidural technique, but there is a chance of sacral sparing which may produce incomplete sacral nerve root block leading to inadequate surgical anaesthesia.

Sedoanalgesia for TURP include analgesia by prostatic block along with sedation and has been successfully used for endourological procedures like TRUS-guided biopsy, flexible cystoscopy, percutaneous nephrostomy, percutaneous cyst aspiration, renal biopsy, optical urethrotomy, rigid cystoscopy, bladder biopsy, ureteroscopy, resection of bladder tumours and various scrotal procedures.⁵ These procedures can be performed under sedoanalgesia on daycare basis and can curtail the cost as well as minimize the burden on the operating and recovery room. It can be considered as better option for elderly patients with comorbidities leading to fewer complications and early recovery [10]. In contrast to spinal anaesthesia, sedoanalgesia preserves detrusor function and sphincter coordination. In comparison with general anaesthesia, it allows immediate ambulation with resumption of a normal fluid and solid diet, thus leading to shorter hospital stay. Though sedoanalgesia may lead to some pain, discomfort and dissatisfaction of the patient intraoperatively, but it is safe, effective and cheaper. Thus sedoanalgesia can be a preferable alternative to general or spinal anaesthesia for daycare urological procedures in elderly patients [8,10].

We came across only one study in literature that compared neuraxial block with local anaesthesia for TURP [9]. Thus, we conducted this study to compare the hemodynamic changes, intra-operative and post-operative pain score, vasopressor requirement and adequate surgical condition between prostatic block and subarachnoid block for TURP.

Our results are similar to Sood et al who evaluated daycare bipolar transurethral resection vs photoselective vaporisation

under sedoanalgesia (prostatic block with sedation) in 78 patients with age >50 years and prostate volume of 20-50 ml [5]. In their study, 11 out of 78 patients had experienced moderate pain and were given supplemental analgesia in the form of i.v promethazine and pentazocine and surgery was completed safely with no discomfort. The mean VAS score during the intraoperative period was less than 2. No significant hemodynamic perturbations were observed in any patient. High satisfaction rate (88.46%) was reported among these patients. However, the duration of post-operative analgesia was little less than 1 hour after prostatic block for TURP. The lesser duration of analgesia as compared to our study may be attributed to the fact that they had given the prostatic block using anatomical landmark technique.

Aghamohammadi et al conducted a prospective randomized trial to compare and evaluate sedoanalgesia vs spinal anesthesia in 60 patients with prostate hypertrophy posted for TURP [9]. Intolerable pain was observed in 23.3% patients in sedoanalgesia group and 13.8% in those who received spinal anesthesia ($p>0.05$). Two patients in spinal group and 5 in local anesthetic group (3 due to severe pain and 2 for unsatisfaction) required conversion to general anesthesia or received additional drugs such as ketamine ($p=0.06$). The results are different from our study maybe because of the fact that the authors used anatomical landmarks for giving local anesthesia as opposed to ultrasound in our study. Also, we used inj fentanyl prior to the procedure while pethidine was used in this study.

Birch et al conducted a study to evaluate sedoanalgesia in 100 patients undergoing TURP [10]. They found that 58 out of 100 patients required supplementation of either fentanyl or ketamine. This may be because of the fact that they administered the block blindly and did not give any analgesic prior to surgery. In contrast, we used ultrasound guided technique which enhanced the success of the prostatic block. The hemodynamic parameters were maintained better in patients who were given ultrasound guided prostatic block for TURP surgery in the present study which is one of the foremost priority in elderly age group who suffered from major cardiovascular comorbidities like hypertension and coronary artery disease.

Recently, Ayoub et al compared 30-day postoperative outcomes of TURP using the three types of anesthesia techniques i.e general (genTURP), spinal (spTURP), and MAC/sedation (macTURP) from the American College of Surgeons National Surgical Quality Improvement Program

(ACS-NSQIP) database [11]. The authors included a total of 53,182 patients who underwent TURP. macTURP was administered frequently in elderly patients (>80 years) with diabetes on insulin (7.9%), leukocytosis (7.4%), chronic obstructive pulmonary disease (7.8%), dyspnea (7.2%), and ASA grade>II (58.8%) as compared with genTURP ($p<0.013$). Postoperative complication rates were similar among the groups. The authors concluded that MAC/sedation is a suitable alternative in elderly patients with comorbidities undergoing TURP with a similar safety profile as compared to spinal or general anesthesia. In our study also, the hemodynamic parameters were maintained better in patients who were given ultrasound guided prostatic block for TURP surgery which is one of the foremost priority in elderly age group who suffered from major cardiovascular comorbidities like hypertension and coronary artery disease.

Our study was limited by the fact that we had a small sample size. Surgeons couldn't be blinded about the anaesthesia technique which would have lead to bias regarding surgeons satisfaction. Further trials with larger sample size are required to validate the findings.

Conclusion

Conventionally, spinal anaesthesia is the technique of choice for conducting TURP surgery but USG guided prostatic block is also a promising option in elderly patients especially with various comorbidities. We recommend large randomized controlled trials to evaluate USG guided prostatic block with further improvisation so that it can be used successfully in patients with various comorbidities and those with contraindications to spinal anaesthesia.

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Exploring the impact of prophylactic ilioinguinal neurectomy on neurosensory outcomes in Lichtenstein repair for inguinal hernia: A prospective investigation.

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Keywords: Neurosensory effect, neurectomy, lichtenstein repair, ilioinguinal hernia, chronic groin pain

Abstract

Introduction: Prolonged inguinodynia is a significant issue that arises following mesh hernioplasty. It appears that scar tissue, adhesion to the implanted mesh covering, or damage from sutures are the mechanisms at work. During a Lichtenstein hernioplasty, ileo-inguinal neurectomy may provide prophylaxis against such excruciating pain. The aim of current study is to assess how the implementation of prophylactic ilioinguinal neurectomy influences both the occurrence and intensity of chronic groin pain following a Lichtenstein tension-free repair. **Material & methods:** The prospective study was undertaken on 50 patients (two groups of 25 each) with inguinal hernia, admitted to the Department of Surgery, Punjab Institute of Medical Sciences, Jalandhar, Punjab. All routine investigations were done. Statistical analysis was done using SPSS software package 25.0 keeping level of significance at $p < 0.05$. **Results:** 36% patients were below 40 years of age while 64% were above 40 years of age. Right sided hernia was more common with R:L ratio of 26:24. 34 cases had indirect and 16 had direct hernia. At baseline and one month follow up none of results were statistically significant while at 6 month follow up results were found significant with respect to development of chronic pain ($p=0.007$), pain after walking 3 flights of stairs ($p=0.02$) and pain after cycling for 10 minutes ($p=0.021$). **Conclusion:** Following Lichtenstein hernia surgery, preventive ilioinguinal neurectomy dramatically reduces the incidence of chronic groin discomfort without causing new morbidities. It ought to be viewed as a standard surgical procedure carried out during the procedure.

Introduction


Groin hernia repair is one of the most frequently performed surgeries by general surgeons. Several methods have been

developed over the years to improve the traditional methods, with the most important innovation being the tension-free mesh repair methods. Relatively few complications are observed with this technique, including local wound complications, recurrent hernias, testicular atrophy, and inguinal neuralgia [1,2]. Until the introduction of mesh-based repairs, the primary concern was preventing recurrences. Since Lichtenstein published one of his first articles on his repair technique, the use of mesh in primary inguinal hernia repair has become popular [3]. This has resulted in an evidence-based reduction in hernia recurrence, with some centers reporting recurrence rates dropping below 1%. With recurrence rates decreased to very low levels, the focus has shifted from preventing recurrence to preventing other complications, such as chronic groin pain [4]. Chronic groin pain emerges as a significant complication post inguinal hernia repair, manifesting with greater frequency than initially anticipated. Several studies, in the last decade, have documented chronic pain incidences ranging from 19% to 62.9% [5]. Diagnosis and definitive treatment constitute a challenging issue for both the surgeon and the patient. Moreover, litigation may occur, especially if the patient is not well informed. Acute pain, effectively addressed with analgesics, typically resolves within a timeframe of 15 to 30 days [6]. Chronic pain seen 3 months after surgery may become a therapeutic challenge. Management may involve analgesia, blocks with local anesthetic drugs, steroids, radiofrequency ablation, or surgery in the form of inguinal neurectomy. Tensionfree mesh repairs are reported to have a lower likelihood of inducing chronic groin pain compared to nonmesh repairs, with no distinguishable distinction between open mesh and laparoscopic mesh repair. Other potential causes contributing to chronic pain after hernia repair include partial division, neuroma formation, injury, or entrapment of the inguinal nerve [7].

The ilioinguinal nerve is highly susceptible to entrapment due to its location beneath the divided external oblique aponeurosis. It can be inadvertently included in the sutures employed for hernia repair or during the reapproximation of the external oblique aponeurosis. The mesh placed atop the

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internal oblique muscle or conjoint tendon can adhere to the ilioinguinal nerve during healing. Nerve excision eliminates post-surgical pain caused by entrapment, inflammation, or fibrotic reaction around the nerve, and there seems to be some theoretical benefit to this practice [8].

Ilioinguinal neurectomy has been extensively documented as an effective intervention for alleviating chronic groin pain post open hernia repair. Numerous studies have discussed the positive outcomes associated with the routine implementation of ilioinguinal neurectomy, highlighting its effectiveness in diminishing chronic pain. A pioneer in this domain, Ravichandran et al. [9], conducted a pilot study in 2000 involving 20 patients with bilateral inguinal hernia. In this study, surgery was performed with the preservation of the ilioinguinal nerve on one side and its division on the other. Additionally, a double-blind randomized clinical trial conducted by Malekpour et al [10], also demonstrated that neurectomy leads to a reduction in chronic post-surgical pain following elective inguinal hernia repair.

The present study was conducted to evaluate the effect of prophylactic ilioinguinal neurectomy on the incidence and severity of chronic groin pain after Lichtenstein tension-free repair. The effects on the incidence of groin numbness and postoperative sensory loss or changes in the groin region were also evaluated..

Methods

The study was conducted on 50 patients diagnosed with inguinal hernia and admitted to the Department of Surgery at Punjab Institute of Medical Sciences, Jalandhar, Punjab. This was a prospective study aimed at investigating the short to midterm neurosensory effects of prophylactic ilioinguinal neurectomy during Lichtenstein repair of inguinal hernia.

A detailed history was obtained, and a thorough clinical examination was performed. Informed consent for the study was obtained. All routine investigations, ECG, and chest X-rays were conducted. Patients were divided into two groups: the study group and the control group, each consisting of 25 cases. All patients underwent standard tension-free mesh repair under spinal anesthesia. Ilioinguinal neurectomy was performed in the study group only. Patients were selected based on the following inclusion and exclusion criteria.

Inclusion criteria

The inclusion criteria for this study encompass individuals aged between 18 and 80 years who have been specifically chosen for elective hernia repair.

Exclusion criteria

The exclusion criteria for this study involve individuals who meet the following conditions: those with bilateral hernia, those experiencing recurrent hernia, those presenting with irreducible hernia, those diagnosed with peripheral neuropathy, and female patients.

Intervention

Study Group: Ilioinguinal nerve was cut sharply with a blade 12 cm lateral to the internal inguinal ring, and 3 to 4 cm of the nerve was excised. After the transection of the nerve, its proximal end was implanted into the internal oblique muscle. Neither electrocautery nor suture material was used in cutting the nerve. To control of bleeding, direct pressure was used when needed. Consent was taken from all patients and they were informed about irreversible nature.

Control Group: The ilioinguinal nerve was carefully preserved throughout the operation. Extreme care was taken during surgery to avoid the inclusion of nerve tissue during suturing and mesh placement. All patients were followed up on outpatient basis. They were advised to visit at 1 month, 3 months, and 6 months postoperatively, or at any time if they experienced pain.

Statistical analysis

Statistical analysis was based on an intention-to-treat analysis and was performed using statistical software, Statistical Package for Social Science (version 25.0 for Windows). Comparisons were carried out using the Pearson chi-square test or Fisher exact test where appropriate for categorical data and the Student t-test for parametric data. A two-sided P-value of less than 0.05 was considered significant.

Results

A total of 50 patients were enrolled in the study. All patients were male, as per the exclusion criteria. 36% of patients were below 40 years of age, while 64% were above 40 years of age. Right-sided hernia was more common, with an R:L ratio of 26:24. 34 cases had indirect hernias, and 16 had direct hernias, as shown in Table 1.

Table 1 : Baseline characteristics of all patients

Variable		Frequency (percentage)
Age	Below 40 years	18 (36)
	Above 40 years	32 (64)
Side of hernia	Right	26 (52)
	Left	24 (48)
Type of hernia	Indirect	34 (68)
	Direct	16 (32)

The two groups were studied regarding various pain parameters at the baseline, and the results indicated that none of them showed statistical significance, as illustrated in Table 2.

Table 2: Showing comparison of two groups at baseline

Variable	Study group N (%)	Control group N (%)	P value
Pain at rest	2 (8)	1 (4)	0.53
Pain after coughing for 10 times	5 (20)	7 (28)	0.64
Pain after walking 3 flights of stairs	5 (20)	4 (16)	0.48
Pain after cycling for 10 min	5 (20)	6 (24)	0.82
Patients with groin numbness	1(10)	1(4)	0.43
Complications			
Wound infection	1 (4)	0 (0)	1.0
Hematoma	2 (8)	3 (12)	1.0
Retention of urine	4 (16)	3 (12)	1.0
Others	1 (4)	0 (0)	1.0

A comparison of the two groups was conducted at the one-month follow-up, and it was found that none of the results showed statistical significance, as illustrated in Table 3.

Table 3: Showing comparison of two groups at one month follow up

Variable	Study group	Control group	P value
Patients developed chronic pain at 6 months	2(8)	7 (28)	0.007*
Pain experienced during normal daily activities	0 (0)	1 (4)	0.23
Pain at rest	0 (0)	2 (8)	0.057
Pain after coughing for 10times	1 (4)	5 (10.2)	0.25
Pain after walking 3 flights of stairs	1 (4)	3 (12)	0.02 *
Pain after cycling for 10 min	1 (4)	4 (16)	0.021 *
Patients with groin numbness	7 (28)	5 (20)	0.363
Patient developed sensation change or loss	11 (44)	11 (44)	0.930

At 6 months follows-up, chronic pain ($p=0.007$), pain after walking 3 flights of stairs ($p=0.02$ and pain after cycling ($P=0.021$) was significantly higher in the control group (table 4).

Table 4: Showing comparison of two groups at six months follow up.

Variable	Study group	Control group	P value
Pain experienced during normal daily activities	16 (64)	15 (60)	0.35
Pain experienced at rest	4 (16)	4 (16)	1.0
Pain experienced after coughing for 10 times	4 (16)	4 (16)	1.0
Pain experienced after walking 3 flights of stairs	2 (8)	5 (20)	0.11
Pain experienced after cycling for 10 min	1 (4)	4 (16)	0.12
Patients with groin numbness	5 (20)	16 (64)	0.13
Patients developed chronic pain at 1 month	19 (76)	19 (76)	1.0
Patients developed sensation changes or loss	13 (52)	14 (56)	0.36

Discussion

Chronic groin discomfort following inguinal hernia surgery is a debilitating complication, with a significant impact on a patient's well-being and quality of life following the procedure [1,2]. Because of the mesh's close proximity to the ilioinguinal nerve, there is a suggestion that inflammation and fibrosis may contribute to the development of chronic groin discomfort after surgery [11]. Additionally, the occurrence may be attributed to inadvertent injury or entrapment of the ilioinguinal nerve during suturing. Accumulating evidence suggests that prophylactic ilioinguinal nerve excision during open hernia repair seems to be linked with minor complications and has the potential to reduce the incidence of chronic groin discomfort after surgery [12-14].

Due to the underpowered nature of the initial randomized study conducted by Ravichandran et al. to address this issue, no definitive conclusions could be reached. Subsequent investigations into chronic groin pain after elective neurectomy have produced conflicting results. Surprisingly, in a retrospective analysis encompassing 191 patients who underwent elective ilioinguinal nerve excision following open hernia repair, none of the individuals reported enduring groin pain, at the 12-month postoperative assessment [9]. Dittrick et al conducted a retrospective analysis and discovered that patients who had elective neurectomy following open inguinal hernia repair experienced a significantly lower incidence of chronic groin discomfort [12]. A recent randomized controlled trial by Picchio et al [15] reported a similar incidence of chronic groin pain in the

the ilioinguinal nerve excision group and the control group, contradicting these findings.

In this study, 36% of patients were below 40 years of age, while 64% were above 40 years of age. The mean age of patients within the prophylactic neurectomy group, as observed in the study conducted by Mui et al., was recorded at 65.1 years [16]. Likewise, in the study by Ravichandran et al. the mean age of participants was slightly higher at 65.2 years [9]. A prevalence of right-sided hernias was noted, with a ratio of 26:24 for right-to-left occurrences. Among the cases examined, 34 were identified as indirect hernias, while 16 presented with direct hernias. In study conducted by Picchio et al, the majority of patients, accounting for 67%, exhibited indirect inguinal hernias, while 30% had direct hernias, and 3.5% displayed a mixed type of inguinal hernia [15]. In study conducted by Malekpour et al, the distribution of hernia types revealed that 84% of patients had indirect inguinal hernias, 9% had direct inguinal hernias, and 7% presented with a mixed type [10].

In line with the findings of Picchio et al, the current study found that the incidence of chronic groin pain during regular daily activities was comparable in the two groups [15]. The current study also discovered that a notably lower proportion of patients in the neurectomy group experienced persistent groin pain after exertion (going up three flights of stairs and cycling for ten minutes). The morbidity linked to sensory loss over the groin area is another possible drawback of ilioinguinal neurectomy. Patients who underwent nerve excision during open hernia surgery had a higher rate of sensory loss to pain and touch in the groin area, according to a prior study by Picchio et al [15].

The present investigation, however, conclusively demonstrated that, at the 6-month follow-up, elective ilioinguinal nerve excision was not associated with any additional morbidities in terms of neurosensory issues, groin numbness, or quality of life. We hypothesized that cross-innervations from contralateral cutaneous nerves could compensate for the sensory loss resulting from neurectomy.

This study is subject to several limitations. The inability to discern significant variations between the two groups concerning the incidence or intensity of persistent groin pain after surgery, during routine daily activities, or subsequent to coughing raises concerns about potential errors or limitations within the study. Another notable limitation is the lack of exploration into the long-term effects of ilioinguinal

neurectomy. It is conceivable that, with an extended follow-up period, disparities in the incidence of chronic pain between the groups and assessments of quality of life might undergo alterations. To comprehensively investigate the enduring impact of prophylactic neurectomy in patients undergoing Lichtenstein repair, larger-scale clinical trials with an expanded patient cohort and prolonged follow-up periods are imperative. Lastly, even if the study successfully demonstrates that preventative neurosurgery diminishes the prevalence of chronic pain, the precise causative factors behind this phenomenon remain unknown. Further investigations, such as histology or nerve conduction studies, are necessary to elucidate the exact processes involved.

Conclusions

The current study concluded that the incidence of exertional chronic groin pain following surgery is reduced when the ilioinguinal nerve is excised prophylactically during Lichtenstein inguinal hernia repair. Additionally, there are no extra morbidities related to local cutaneous neurosensory abnormalities following the treatment. An ilioinguinal neurectomy could be regarded as a standard surgical procedure when repairing an open mesh hernia.

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Waiting times in the colorectal cancer treatment pathway in a Sri Lankan cohort: data from a specialised tertiary care setting

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Keywords: colorectal cancer, treatment, waiting times, specialist referral

Abstract

Introduction

Colorectal cancer (CRC) is the third most prevalent cancer in Sri Lanka, with rising incidence rates over the past decade. Timely intervention is essential for favourable outcomes, but prolonged waiting times remain a significant healthcare challenge globally. This study examines the time intervals between key steps in the CRC diagnostic and treatment pathway to identify potential areas for reducing delays.

Methods

A cohort of 108 patients with suspected CRC symptoms, presenting to the University Surgical Unit at North Colombo Teaching Hospital from 2017 to 2024, was analysed. Data were collected on time intervals between: [1] symptom onset to primary care visit, [2] General Practitioner (GP) referral to specialist consultation, [3] specialist consultation to colonoscopy, [4] colonoscopy to imaging or neoadjuvant chemo-radiotherapy (NCRT), and [5] colonoscopy to surgery. Median times for each interval were calculated.

Results

Of the 108 patients (36.1% male, median age 63), the median time from symptom onset to GP visit was 11 weeks. Patients referred by GPs waited a median of 3 weeks for specialist consultation. Two-thirds underwent colonoscopy within 2 weeks of specialist consultation, with 78% completing it within 4 weeks. For patients not requiring NCRT, the median time from colonoscopy to surgery was 3.86 weeks; for those requiring NCRT, it was 12.86 weeks.

Conclusions

Waiting times for colonoscopy and curative surgery are within the accepted universal standards for colorectal cancer

management, in this cohort. The delay in patient presentation to primary care was notably longer than physician-related delays. Early specialist referral for bowel symptoms may reduce time to diagnosis and treatment, aligning colonoscopy-to-treatment intervals with international standards.

Introduction

Colorectal cancer (CRC) has become the third most common cancer worldwide and in Sri Lanka, with a rise in incidence over the last decade [1]. CRCs show a good overall prognosis with effective treatment, and early recognition and interventions have a significant impact on outcomes [2]. However, delays in treatment due to increased waiting times have become a global issue [2]. Guidelines have been developed, stipulating the time intervals for specialist referral, investigations, and definitive treatment [3]. Nevertheless, most health systems are struggling to meet these goals due to increasing workloads, lack of resources, and the impact of global pandemics. Consequently, the guidelines have been revised.

The COVID-19 pandemic significantly exacerbated these delays, increasing the number of patients on waiting lists, with sustained effects in subsequent years [4]. Critical steps in CRC care, such as completing a full colonoscopy, obtaining histological confirmation, undergoing imaging with computerized tomography (CT) scan or Magnetic resonance imaging (MRI), completing neoadjuvant chemoradiation, and receiving timely surgery, require specialized care. Shortages of human and physical resources in these areas significantly hinder the ability to meet waiting time recommendations [5].

However, the available data on waiting time delays come largely from resource-rich Western healthcare systems. There is a scarcity of audits from developing countries in this area. The current study aims to map the waiting times between key milestones in the management of CRC at a public sector healthcare facility in Sri Lanka that specializes in managing large bowel cancer.

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Materials and methods

All patients presenting with symptoms suspicious of large bowel cancer to the University Surgical Unit of the North Colombo Teaching Hospital are investigated and managed according to current accepted evidence-based practices. Each patient undergoes a complete colonoscopy with full bowel preparation, performed either by a specialist or a specialist trainee under supervision. All mass lesions are confirmed through histological diagnosis, and a baseline CEA level is obtained. Staging imaging is conducted using contrast-enhanced CT scans of the chest, abdomen, and pelvis. Patients with rectal cancers additionally receive rectal staging through MRI imaging. Following discussions at a multidisciplinary team meeting, patients are directed either toward neoadjuvant chemoradiotherapy (NCRT) or curative surgery under an enhanced recovery protocol. All patients are entered into a database and prospectively followed up.

The treatment pathway of 108 consecutive patients undergoing curative treatment for colorectal cancer (CRC) at the unit was analysed retrospectively from March 2024. The median time elapsed in weeks between: [1] onset of bowel symptoms to presentation to a general practitioner (GP), [2] referral from primary care to specialist consultation, [3] specialist consultation to colonoscopy, [4] colonoscopy to contrast-enhanced CT [5] colonoscopy to neoadjuvant treatment or surgery were calculated. Those who underwent neoadjuvant treatment were all offered surgery within 8 to 10 weeks as per unit protocol [6].

Results

A total of 108 patients (36.1% male; median age 63 years) who underwent curative surgery at the University Surgical Unit of the North Colombo Teaching Hospital were included in the analysis. Of these, 31% (n=34) had consulted a GP due to bowel symptoms after a median of 11 weeks (range: 0.26 - 307). The remaining 69%, who sought primary consultation with a specialist, took a median of 21 weeks (range: 0.5 - 416) from the onset of symptoms. The median delay for referral to a specialist among those who first consulted a GP was 3 weeks (range: 0.2 - 73).

Two-thirds (66%) underwent a colonoscopy within 2 weeks of specialist consultation (median – 1.2 weeks; range: 0.14 - 82), and 78% had a colonoscopy within 4 weeks. Among those who did not require NCRT, the median time from colonoscopy to surgery was 3.86 weeks (range: 0.14 - 30). For patients who completed 6 weeks of NCRT, the median time from colonoscopy to surgery was 12.86 weeks (range: 3.14 - 32). The findings of the study are illustrated by Figure 1 & 2.

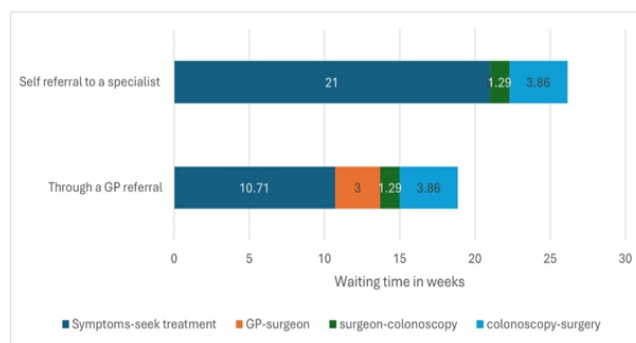


Figure 1: A bar chart indicating the time since the presentation to interventions. Time is indicated in weeks. (a) self-referral to a surgeon or a general practitioner, (b) general practitioner to a surgeon, (c) surgeon to colonoscopy, (d) colonoscopy to surgery.

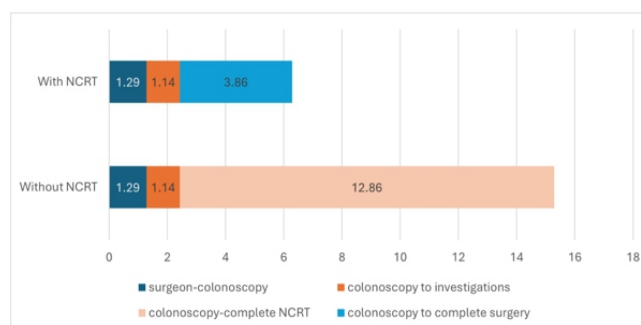


Figure 2: A bar chart indicating the time since the presentation to interventions with or without neoadjuvant chemoradiotherapy (NCRT). Time is indicated in weeks. (a) surgeon to colonoscopy, (b) colonoscopy to contrast enhanced computer tomography scan, (c) diagnosis to NCRT, (d) colonoscopy to surgery.

Discussion

CRCs are slow-growing cancers with a median doubling in size time of 211 days [7]. They have a favourable prognosis with early intervention while the survival outcome has been reported to be poor in those with a treatment delay of more than 45 days from the time of diagnosis [8]. Screening programs available for CRC have significantly improved early cancer detection in countries with a higher human developmental index [9]. Due to economic constraints, a structured mass screening programme and guidelines for early detection are not available in countries of the South Asian region.

In this study, the patient delay in presentation to primary care or a specialist was far greater compared to the delay at the physician level in CRC detection. Delay in the help-seeking attitude could be attributed to the patient sociodemographic factors such as marital status, level of education and clinical characteristics such as tumour location [10]. The delay in GP referral to a colorectal specialist in this study was similar to

that of the West. A qualitative study in the United Kingdom highlighted that poor knowledge in national guidelines for referrals among GPs, resource constraints, and professional norms as main reasons behind the reluctance to refer patient to specialists [11]. Furthermore, anemia was considered a less sinister cause by the GPs resulting in a missed opportunity in diagnosing CRC in many countries [11–13]. A high degree of suspicion in those with alarming symptoms and in-depth investigation of unexplained anaemia with luminal assessment may play a crucial role in early diagnosis. Moreover, the lack of awareness on CRC prevalence, specifically the new trends of young and early onset CRC, may lead to a delay in referral to a specialist for colonoscopy. The stage at the time of diagnosis has a role in the survival outcome of the patient [7]. Similar studies have reported a higher symptom to diagnosis interval in rectal carcinoma with symptoms such as tenesmus (4.4 months) and rectal bleeding (4 months) [14]. This is contrary to the common perception, where a patient is expected to present earlier due to troublesome symptoms. However, a shorter diagnostic interval has also not shown to result in a better survival in advanced CRC [8]. This waiting time paradox is observed in rectal cancers and not in colon cancers [14]. This could stem from confounders such as type of tumour, tumour aggressiveness and biological virulence [14]. Patients above the age of 60 years has shown to have a lesser diagnostic delay compared to the young [15]. A study from Indonesia reported that multiple visits to several health care centers contributed to diagnosis delays and higher incidence of metastatic disease at presentation amongst young patients with CRC [15]. This effect could be attributed to a low level of suspicion amongst primary healthcare providers due to the lack of awareness of the disease pattern and emerging trends.

Colonoscopy and biopsy remain the gold standard diagnostic tool for colorectal cancer. The availability of such facilities is limited in our setting, requiring a referral system. Most of the present cohort underwent colonoscopy within 4 weeks of referral, which was similar to the referral to colonoscopy time interval in the West [15]. Treatment delays were lower compared to the diagnostic delays in this cohort [16]. Diagnostic delay plays a key role, since once it is confirmed, established treatment protocols take effect, which includes referral to chemoradiotherapy or surgery [14,16].

The present study did not consider the effect of patient-related sociodemographic factors on the delays. Data on treatment delays in CRC from the South Asian region is scarce. Therefore, the current study sheds light on this important aspect in managing CRC in this region. Future multicentre studies from the region are required to evaluate sociodemographic factors, health system function affecting

the delays and the impact of treatment delays on overall survival.

Conclusions

Patient presentation to primary care delay is three times higher than the physician delay in this cohort. Those who seek primary care for bowel symptoms had a lesser lag period in receiving specialist care compared to those who did self-specialist referral. The time to colonoscopy after specialist referral and colonoscopy to treatment delays are comparable to the populations with a high human development index. Public education on alarming symptoms of CRC and improvement in primary healthcare infrastructure could further reduce the presentation delay in this population.

Conflicts of interests

The author(s) declare that they have no competing interests.

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There were no funding sources for the study.

Data Availability Statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author. The data, methods used in the analysis, and materials used to conduct the research will be made available to any researcher for the purposes of reproducing the results of replicating the procedure.

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Conquering immunological barrier- part 2: paired kidney exchange transplantation

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Abstract

ABO blood group or human leucocyte antigen (HLA) incompatibility remain major immunological barriers for organ transplantation. One strategic approach to conquer this barrier is desensitize the recipient yet it remains expensive, resource intensive with a higher risk of complications. Paired kidney exchange(PKE) is an alternative strategy, where an exchange of kidneys happens among pairs consisting of a recipient with a willing live donor, yet unmatched for the particular recipient, making transplant unfeasible. PKE has evolved in to many complex types since its introduction of concept in 1986. This review aims at discussing the types, global trends, challenges and ethical aspects of PKE transplantation.

Introduction

Kidney transplantation providing superior survival, better quality of life and lower costs remains the premier form of renal replacement therapy [1]. Yet, the gap between waitlisted patients for kidney transplantation and supply is ever mounting [2]. Therefore, novel innovative solutions are needed to meet the ever rising demand to increase the donor pool.

Living kidney donation compared to deceased donation provides better patient and graft survival, less delayed graft function and short stay in waiting list [3]. Even in the presence of a live donor, a predicted 30% of kidney recipients cannot be transplanted due to ABO blood group or human leucocyte antigen(HLA) incompatibility [4]. One strategic approach to conquer this immunological barrier is to employ de sensitization of the potential recipient. Desensitization protocols targeting depletion of alloantibodies to HLA or ABO blood group antigens include plasmapheresis, intravenous immunoglobulin, pharmacological B lymphocyte depletion or splenectomy. Nonetheless,

desensitizing treatments are expensive, resource intensive, carries a higher risk complications associated with amplified immunosuppression [5].

Felix Rapaport in 1986, first introduced the concept of live donor exchange stating the need of anonymity between donor-recipient pairs, simultaneous surgeries in 2 institutions and transportation of donor kidney to recipient institute for implantation [6]. Yet, the first ever PKE transplants were carried out at a single center in South-Korea in 1991 [7]. Since then living donor paired kidney exchange(PKE) programs have developed and evolved in many countries.

PKE denotes to the exchange of kidneys among pairs consisting of a recipient with a willing live donor, yet HLA or ABO unmatched for the particular recipient, making transplant unfeasible. Hence the exchange will result in receipt of a better compatible kidney [8]. Over the years, PKE has evolved in to many forms. Two way exchanges comprises of two incompatible pairs with reciprocal incompatibilities swapping, while three-way exchanges add another incompatible pair. Saidman et al. depicted that 3 way paired exchange can enhance matching rate up to 66% and regarded the most appropriate length of PKE for a single center initiated program [9,10,11]. This addition of pairs will simultaneously increase the number of donations and the possibility of finding better matches although such exchanges face considerable logistical challenges. Nonetheless, PKE is a better strategy to conquer immunological barrier compared to desensitization as its medically simple, less expensive and reduced risk of infections because of lesser immunosuppressive burden [2].

In this review, we discuss about types, global trends, challenges and ethical aspects of PKE transplantation.


Types of PKE

1. Conventional balanced PKE

In this type, ABO blood group-incompatible two donor-recipient pairs, interchange donors to produce compatible transplants. Conventional paired donations are

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restricted to donors and recipients with blood groups A and B [12]. PKE can commence as a closed loop of 2-way kidney exchange but can be organized as 3-way, or multi-way exchanges[13].

2.Unconventional PKE

An unconventional paired donation is performed when donor–recipient pairs become incompatible as a result of a positive cross-match. This allows donors and recipients with blood type O and AB to participate in the exchange[12].

3.Live donor–deceased donor list exchange.

This PKE type permits the potential recipient of an otherwise incompatible pair to receive priority on the deceased donor waiting list by providing a kidney from his or her intended donor to a recipient in the list. One ethical concern of this type is that the blood group O recipients being potentially disadvantaged, as the most frequent exchange being non-blood type O donor kidneys for blood type O deceased donor kidneys resulting in O recipients to tolerate longer waiting times on the deceased donor waiting list [14].

Commencement of an exchange by an altruistic, non-directed donor can give rise to domino-paired exchange chains and non-simultaneous extended altruistic donor (NEAD) chains.

4.Domino Paired Exchange (DPE)

DPE was initially described by Johns Hopkins Medical School with the objective of maximizing the benefit of altruistic donation [15]. A potential recipient with a willing but incompatible living donor is matched with a compatible altruistic donor. The kidney from the recipient's donor is then matched to the next compatible potential recipient in a deceased donor waiting list. Alternatively, it can be used to add another incompatible pair to the chain.

5.Non-simultaneous Extended Altruistic Donor (NEAD) chains

A NEAD chain modifies the DPE chain structure as the transplants are not executed simultaneously. This differs from the standard PKE practice of performing exchanges concurrently, in order to eliminate risks of defaulting by the donor. In a NEAD chain, the chain progresses similar to a DPE chain, but the last donor becomes a “bridge donor.” The bridge donor waits to enter another PKE when the matches are done, lengthening the chain further. Yet, the potential disadvantages would be ending up with a difficult to match bridge donor waiting longer times for an acceptable match and propensity of donor to default [16].

6.PKE with compatible pair participation

Participation of ABO and HLA compatible pairs can further increase the number of successful paired exchanges. The advantage for the compatible pair linking with the PKE may be to receive a better HLA and size-matched kidney or a younger donor [17].

7.PKE with desensitization

Desensitization has been utilized successfully to transplant ABO and HLA incompatible pairs. The highly sensitized recipients may find a more appropriate donor against whom they have a lower level of sensitization by merging PKE program with desensitization protocols. Montgomery et al. has used this modality successfully at John Hopkins Institute, USA [18].

Figure 1: Conventional balanced PKE

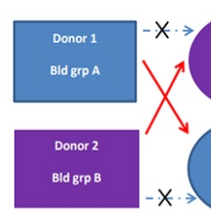


Figure 2: Unconventional PKE

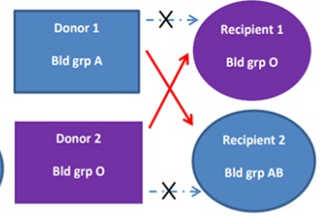


Figure 3: List exchange

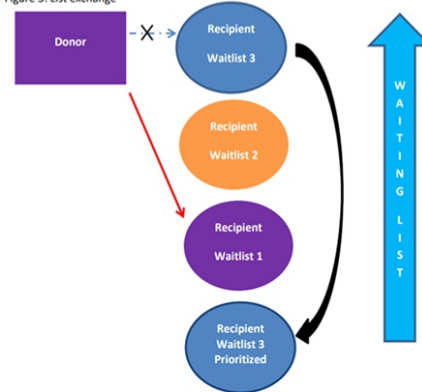


Figure 4: DOMINO PKE

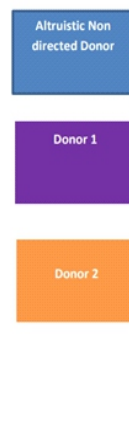
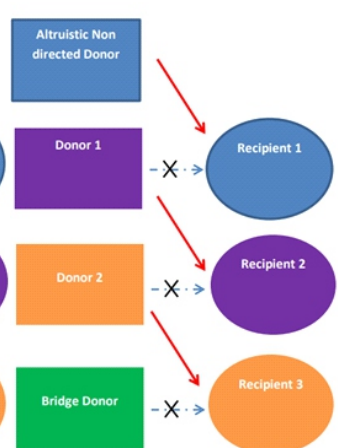


Figure 5 :NEAD PKE



Ethics aspects and challenges of PKD

1. Accumulation of O group recipients

In a PKE program, blood group O recipients tend to accumulate, mainly due to comparative shortage of blood group O deceased donors, blood group incompatibility in living donors and granted priority to HLA matching over ABO blood group matching in PKE allocation algorithms [19,20]. Unconventional PKE can mitigate the issue to a certain extent permitting some exchanges to the benefit of group O recipient [21]. Yet, conventional and list exchange programs disadvantage blood group O recipients. Majority of incompatible recipients being blood group O and their intended non-O donor provides a kidney to the deceased donor pool shortening non-O waiting times. In contrast, it prolongs O waiting times.

One strategy is to register more O donors with incompatible recipients. The other, is to recruit O donors to participate in a PKE despite having a ABO and HLA compatible intended recipient expecting a better allograft for the recipient [17]. Yet, in spite of an early disadvantage for group O recipients, they will eventually benefit through a shorter waiting time once national programs become established, permitting vast numbers of A and B recipients to be removed from the waiting list [20].

2. Coercion of the donor

The potential kidney donor can refute donation due to medical reasons like ABO or HLA incompatibility. Yet, PKE could add pressure on the donor as alternative options to donate are opened. Therefore, a thorough psychological evaluation is needed to make sure that donor is motivated without undue pressure or coercion [20].

3. Discrepancy of quality in PKE organs

PKE may result in inequities to recipient- donor pairs. For example, one donor may offer a better-quality kidney by being younger or by presenting a better HLA match hence, one party getting a greater benefit. However, it could be argued that it's a better comprise for parties as the recipients can avoid ongoing dialysis or an unknown waiting time on the deceased donor waiting list [22,23].

4. Simultaneous donor nephrectomy requirements

Rapaport et al. suggested that the PKE operations should be performed simultaneously with the notion that both procedures could be terminated if a complication happened in

one surgery [6]. Understandably, division of the renal vessels would be the the point of no return. This approach would provide the best opportunity for both couples of an impartial and unbiased exchange of organs.

Yet the practicality of simultaneous operations is questioned due to limitations in the human resources, infrastructure, travel, cold storage of organs etc. NEAD is an option yet; the long chain could break if donor defaults or recipient becomes medically unfit [24]. Further, there is no consensus within national PKE programs regarding when to halt the synchronous procedures in case of a donor complication or how to allocate the non-transplant organ in a recipient complication precluding transplant [20].

5. Balkanization of Patient Pools

Another challenge to PKE's triumph is the balkanization of patient pools. Potential matches that could exist between patient pools are prevented when transplant centers and pairing organizations operate independently of one another. The obvious solution is to amalgamate regional and national pairing organizations. Segev et al. projected a single national program would produce more transplants, better HLA matching, superior allograft survival rates, a decrease in the number of pairs necessary to travel, and robust benefits to highly sensitized patients [25]. The other strategy is to add a compatible pairs to the PKE. Gentry et al. demonstrated that expanding the patient pool by incorporating compatible pairs approximately doubles the pool's match rate in either in a single-center program or a national program [26].

Another strategy is to expand the PKE beyond country's border by making international collaborations. A 10-way exchange was originated in 2009 by a non directed donor with inclusion of a patient-donor couple from Canada [27]. Increasing the length of PKE was also discussed as a solution. Ashlagi and colleagues in 2012 demonstrated that the in-cooperation of longer chains (mainly NEAD chains) significantly increase the match rates, especially among highly sensitized patients [28]. Yet increasing length adds significant logistical complexities.

6. Positive Cross Match Complications

The most frequent interference to a KPD exchange remains positive cross matches [29]. Historically, a positive cross match has barred a donation within an exchange disrupting the entire chain.

One option is to employ desensitization protocols to reduce the number of highly sensitized patients. Merging

desensitization with PKE permits a recipient to find a better matched donor needing lesser desensitization relative to the intended donor.

Inclusion of high definition virtual cross matches into matching algorithm has ensued high match rates, even in small patient pools [30]. Further, having a single reference HLA laboratory or laboratories with uniform standards rather than multiple conflicting standards has shown to reduce number of positive cross matches [31].

Global experience of PKE

PKE programs have emerged in many countries, since the world's first PKE program was organized at Yonsei University College of Medicine in Seoul, South Korea [32]. It's becoming popular in developed as well as developing countries due to the admirable outcomes compared to deceased donation alone [2]. The successful programs are well established in Netherlands(2004), United Kingdom (2006), Australia (2007), Spain (2009), Canada (2009), India (2000) and United states(2010). Yet, the design and developments of PKE programs show significant variation across the world. The differences are usually generated due to the country specific challenges and differences in legislations. Further, international paired kidney exchanges are emerging in number of counties [27]. European Network for Collaboration on Kidney Exchange Programs (ENCKEP) is such a program started in 2016 which is operational in European countries [33]. The geography, close collaboration, language similarity and philosophical understandings have helped to build international PKE programs.

Application of PKE developing world

PKE is ideal to conquer the hurdle of immunologically incompatible transplants in developing countries due to multiple reasons. Firstly, it reduces the waiting time for transplantation as well as the individual and national costs associated with maintenance haemodialysis [34]. Secondly, it is an ideal strategy to increase the donor pool in countries where deceased donor program and ABO incompatible transplants are not well established [19]. Moreover, KPE transplants require lesser immunosuppression, fewer infective complications and reduced costs coupled with greater patient and graft survival compared to transplantation after desensitization, making it ideal to low income countries [35]. Further, it will be a partial solution for organ trafficking seen in these countries [36].

Shrestha et al reported excellent results of Nepal's PKE

program from 2016 to 2021 comparable to live donor program, demonstrating the feasibility of such a program in a developing country [35]. The Dutch experience highlighted the importance an independent organization for fair and impartial allocation and matching of kidneys, a good relationship and trust between different transplant teams and a central histocompatibility laboratory in establishing a national PKE program [10]. Kute et al. from India suggested that for a PKE program to be successful, it entails strong mixture of mathematical modeling, enthusiasm, patience and team work [13]. A PKE program can be formed in a developing country based on lessons learnt from the established centers, yet could be merged with the individual ethical and infrastructure concerns of their transplant community.

Newer trends in PKE

1. Trans-organ paired exchange

This novel concept describes a donor who is barred to donate one organ due to certain reason, is allowed to another organ for exchange. For example, a donor from pair one who's unable to donate kidney, donates liver to the recipient of pair two needing a liver. Donor of pair two donates kidney to recipient in pair one who needs a kidney [37]. However, there is a concern regarding the huge discrepancy of mortality risk in donating different organs. Hence, trans-organ paired exchange is an attractive yet a difficult proposition. Further, it will be an additional pressure on donor to engage in transplantation [2].

2. The advanced donation program (ADP)

ADP is a new initiative to overcome "chronological incompatibility" of organ donation. A donor opts to donate his kidney at his convenience, as he or she won't be available for the scheduled date for synchronous transplantation with other pairs. Consequently, his recipient receives the kidney from the intended donor after activating the chain in the due date.

Another modification is the voucher system. Here, a donor provides his organ in a non-directed manner, activating a PKE chain. His or her coupled recipient gets a voucher to be used in future as the recipient doesn't need a kidney transplant at present. A classic example is a grandfather donating a kidney to get a voucher for his granddaughter with chronic kidney disease potentially needing a transplant in the future. National kidney registry, USA introduced a family voucher program in 2019 [2].

3. Global kidney exchange (GKE)

GKE is another new strategy proposed to increase number of transplants through PKE. It encompasses PKE between pair resident in a high-income (HIC) country with another pair from low- and middle-income country (LMIC). The pair from LMIC being immunologically compatible is financially incompatible as a result of deprived socioeconomic status. The pair from HIC is immunologically incompatible. The cost of dialysis saved for patient from HIC is used to fund the transplant related expense of the pair from LMIC. The first experience of GKE was reported by Rees et al. in 2017, where a pair from Philippines initiated the PKE chain in USA [38]. Although appealing, the ethical dilemmas such as higher financial gain by HIC by getting more transplants, non-assurance of continued transplant care for the pair from LMIC and the negative impact on national PKE program in LMIC has been highlighted [2].

Conclusion

PKE is an excellent strategy to expand the donor pool for patients with end stage renal disease awaiting transplantation. It's a better strategy to conquer immunologically incompatible transplants compared to desensitization. Although appealing, PKE is allied with numerous ethical dilemmas and challenges needing innovation. Finally, global utilization of PKE has grown steadily and evolved exponentially proving to be an ideal strategy to developing world to put emphasis on.

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Anatomy of the thoracic duct: a cadaveric study.

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Keywords: Thoracic duct, Oesophagectomy, Thorax, Mediastinum, Cisterna chyli

Introduction

The thoracic duct is the main collecting vessel of the lymphatic system. It drains 75% of the lymph in the body into the venous system. The cisterna chyli receives the lymph from bilateral lumbar and the intestinal trunks, forming the origin of the thoracic duct. The thoracic duct commonly drains into the junction of the left jugular and subclavian veins. The objective of this study was to assess the normal anatomy of the thoracic duct and the cisterna chyli.

Methodology


Ten (5; males and 5; females) fresh intact adult cadavers were dissected. Following the initial dissection, all of them were further sectioned sagittal in the midline and separated into the half thoracic cavities, and the right thoracic cavities were assessed. The study was carried out in the department Anatomy, Faculty of medicine, Ragama, Sri Lanka from 2022 to 2024. The ethical clearance was obtained. No conflict of interest. In this study, the thoracic duct was divided into three anatomical segments: Lower segment: this ascends along the right side of the oesophagus, from the level of the aortic hiatus of the diaphragm to the level of the 5th thoracic vertebra where the thoracic duct turning to the left side of the oesophagus; The middle segment: the level where the thoracic duct ascends to the left side from the right side of the oesophagus to the level of the aortic arch; and the superior segment: this segment is above the level of the aortic arch. The cisterna chyli was identified as a tubular structure between the abdominal aorta and the right crus of the diaphragm.

Statistical Analysis

Social Science Statistical Package (SPSS Inc., Chicago, IL, USA) computer software was used for the statistical analysis. The descriptive data were presented as mean, standard deviation and range.

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Results

In all specimens, the cisterna chyli was located in the retro-crural space. 6 of the cadavers it was at the level of the lower border of the 12th thoracic vertebral body and in 4 it was at the level of L1–2 vertebrae. All were right to the abdominal aorta and tubular structures in morphology. And they traversed through the aortic hiatus of the diaphragm and entered the posterior mediastinum, right of the vertebral column and ascended in the posterior mediastinum, between the descending thoracic aorta on the left and the azygous vein on the right. Thoracic duct traversed posterior to the esophagus at the T7 level and crossed over the midline to the left side of the thorax around the T5 vertebral level. When it reached the level of the fifth thoracic vertebral body, it gradually inclined to the left side and enters the superior mediastinum. It first crossed anteriorly by the aortic arch, and it ran posterior to the left subclavian artery, and formed an arch. Finally, in all specimens the ducts terminated into the junction of the left subclavian and jugular veins. The length of the thoracic duct ranged from 39 to 44 cm. Its mean transverse diameter was 2.8 mm (range, 2.1–3.8 mm) at the upper segment, 1.8 mm (range, 1.4–2.1 mm) at the middle segment and 3.7 mm (range, 3.4–4.5 mm) at the lower segment. Therefore, it is wider in diameter at its commencement, but diminishes in caliber at the mid-thoracic level and then slightly dilates before its termination. The mean maximum transverse diameter and length of the cisterna chyli were 4.2 mm and 14.5 mm. (Figure A & B)

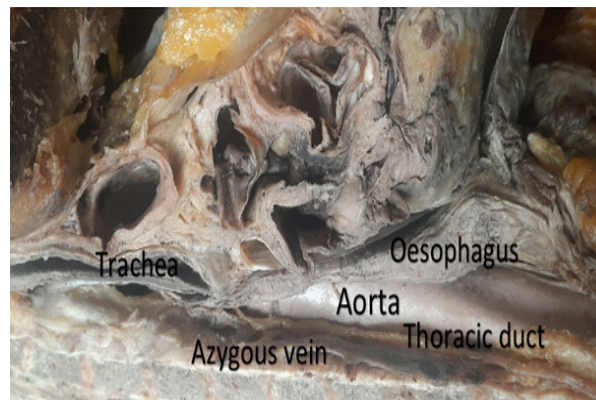


Figure A: cadaveric image of dissected right thorax.

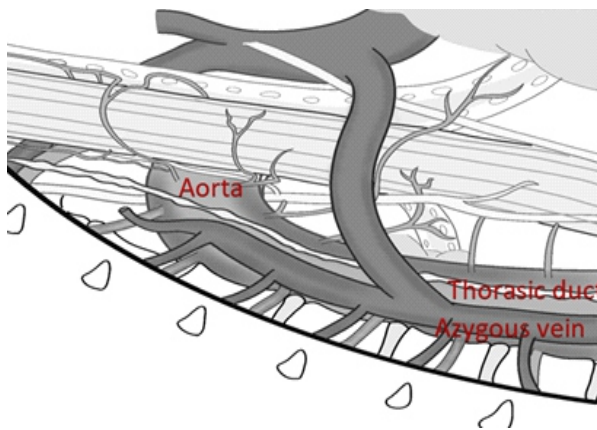


Figure B: shows the pictorial drawing of its anatomical arrangement

Discussion

To our knowledge recent comprehensive human cadaveric morphological and morphometric studies on cisterna chyli and thoracic duct were not numerous. Most of the studies were done were based on radiological imaging. [7-11] According to the available literature in radiology imaging the mean diameter and length of the cisterna chyli were 6.2 and 13.1 mm, respectively which is slightly lower in our cadaveric dissections. [5] But in some literature the mean diameter of cisterna chyli were lower compared to our study. [6] The most common location was at the level of T12/L1 which is similar to our study. [5] Even though there are very few descriptions on different types of configurations of cisterna chyli such as parallel or converging tube, tortuous tube, focal collection and focal plexus [4-7], in our study it was only a thin tubular structure that we found in all cadavers. According to studies [9-11] the thoracic duct was classified into nine types based on its position on the right or left side of the descending aorta and its outflow to the right or left venous angles. Among these, the most commonly recognized was the right thoracic duct with left outflow. To our knowledge, we haven't come across comprehensive study depicting percentages of the variations. In our study, variations, except for this common type, were not observed most likely because of our small study samples. It has been reported that chylothorax occurs by laceration of the thoracic duct following surgeries such as oesophagectomy, pneumonectomy and spine surgery; the prevalence of laceration ranges from 0.5% to as high as 2.0%. [9-11] Therefore, knowledge, recognition of the precise localization of the thoracic duct in surgery is important to avoid iatrogenic complications.

Conclusion

In our study, variations of cisterna chyli and thoracic duct except for this common type, were not observed such as flared

configuration and fusiform configuration in thoracic duct, tortuous, sausage shaped, focal collection, focal plexus configuration of cisterna chyli. [2,7] Our data show similar results to the available literature. We have observed that thoracic duct was wider in diameter at its commencement, diminishes in caliber at the mid-thorax and dilates near to its termination. Further large sample size studies are recommended.

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Anatomy of the middle hepatic vein in a Sri Lankan cohort

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Keywords: Anatomy, liver transplantation, middle hepatic vein, living donor liver transplantation

Abstract

Understanding the middle hepatic vein (MHV) anatomy and its drainage is vital for liver surgery. This study looks at Contrast enhanced CT scans of 65 Sri Lankan patients. The MHV drainages were classified in to three types measuring, the MHV diameter, common trunk length and tributaries. There were 58.46% males. 61.53% Had Type B drainage. Median common trunk length was 1.29cm and MHV diameter at IVC was 5.96mm. Findings show that MHV anatomy varies greatly emphasizing the importance of prior detailed surgical planning due to MHV branching variations.

Introduction

Liver, the largest organ in the body is divided into right and left lobes by the imaginary Cantlie's line (Middle hepatic fissure) which is drawn along the middle hepatic vein. There are two other main hepatic veins, right and left with multiple small branches known as short hepatic veins. The middle hepatic vein (MHV) drains segment IVa, IVb, V and VIII. Anatomical variations of the MHV are decisive in planning a hepatectomy, particularly living donor liver transplantation (LDLT).

Anatomical understanding of liver surgery has advanced along with LDLT. In split liver transplantation, the MHV is included in to the right or left hemi - liver. Thus the options vary from, right liver graft with or without MHV or left liver graft with or without MHV. When the MHV is included in to the left liver graft, the area drained by tributaries of the MHV in the right paramedian sector is impaired, as the MHV is known to be the major drainage vein for this sector. This can cause congestion of the liver parenchyma drained by it and liver dysfunction in the donor [1]. If the MHV is left in the donor congested area in the right liver graft is reported to

result in poor liver function. If the anticipated graft congestion is more that 10% it is recommended to reconstruct significant tributaries. Hence, understanding the venous drainage of the middle hepatic vein and its variations in a population is a key in liver surgery.

Methodology

Computed tomographic (CT) scans of 65 patients who came to the Colombo North Center for Liver Diseases were evaluated. CT scans of cirrhotics, post operative patients and having liver lesions over 2 cm, CT images with artifacts and films with inadequate enhancement were excluded. 70 Second venous phase images were revived for the study.

Types of MHV drainages were classified according to previous classification [2,3], Figure 1 and 2

Type A -Independent drainage of RHV and drainage of LHV & MHV via a common trunk

Type B - Independent drainage of RHV, MHV and LHV to the IVC

Type C - Independent drainage of LHV and drainage of RHV & MHV via a common trunk

Type D - All other branching patterns


The diameter of the MHV was measured at the start of the trunk at the IVC. The length of the common trunk was measured from the draining point of the common trunk into the IVC to the ending point of the division of the common trunk as MHV and LHV/RHV. Significant tributaries draining to MHV was defined as a branch with a diameter more than 40% of the MHV. These were classified as right and left side tributaries.

Results

There were 58.46% (n=38) males in the cohort. The Median age was 60 (80-20) years. There were 30.77% (n=20) Type A, 61.53% (n=40) Type B, 1.53% (n=1) Type C venous drainages. Only 6.17% showed a deviation from the above classification (Type D). The median length of the common trunk in Type A or Type C was 1.29cm (range 0.59cm-1.78cm). The median diameter of the middle hepatic vein at the IVC was is 5.96mm (range 3.66mm- 8.91mm).

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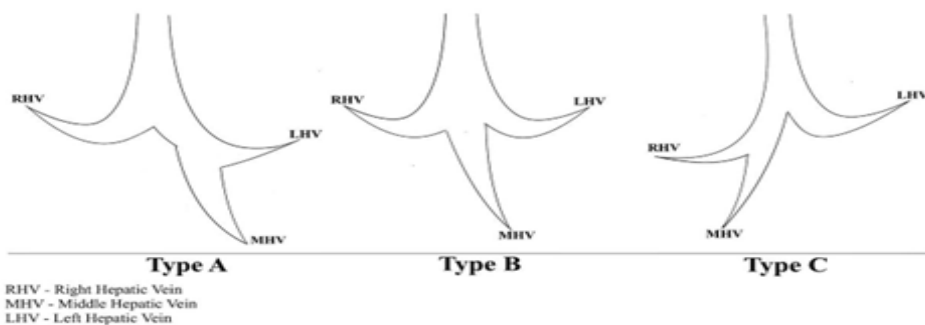


Figure 1: Type of middle hepatic vein drainage

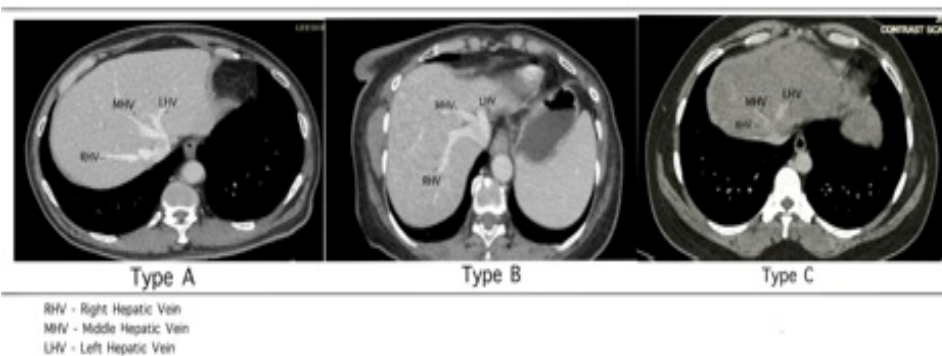


Figure 2: Images of CT scans of different MHV drainage

29.23% of patients had 2 branches and 63.07% of patients had 1 branch, 7.7% patients did not have any significant branch draining on to the left side of MHV from segment IV. 52.30% of patients had 2 branches, 46.16% patients had 1 branch, one (1.54%) patient did not have any significant branch draining to right side of the MHV.

Discussion

Middle hepatic vein anatomy is highly variable. In this cohort Type B drainage with independent drainage to IVC was the commonest draining method. In a previous study of a Caucasian cohort, 84% of the CT scans had a common MHV and LHV trunk before opening in to the IVC [4,5]. This is a favorable variation for left lobe grafts with the MHV. However in this cohort a common trunk was seen in 30% of the CT scans. Larger majority had three independent veins. Having three independent veins makes donors more versatile for left lateral grafts and right lobe graft with the MHV. In this cohort apart from one patient all the others had one or two branches draining the segment IV in to the middle hepatic vein. In these patients incorporating the MHV with the right lobe during hepatectomy can lead to segment IV congestion. Over 60% of the urban population has fatty liver in Sri Lanka [5]. In these patients taking the MHV during right hepatectomy may affect the actual functional residual volume and liver dysfunction.

Knowledge on the existence of MHV branching variation is essential to plan surgeries and radiological interventions and also to prevent complications.

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Replaced right hepatic artery and abnormal left gastric artery giving origin to left hepatic artery in an individual; a rare pattern of hepatic arteries.

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Keywords: Hepatic artery variations, Sri Lanka, replaced right hepatic artery, left gastric artery from aorta

A Computed Tomographic angiogram (CTA) of the visceral arteries was done in a 58 year old male with multi-detector (640 slices) Cannon-Aquilion one CT machine at Department of Radiology, National Hospital Colombo. The angiogram showed the following variations.

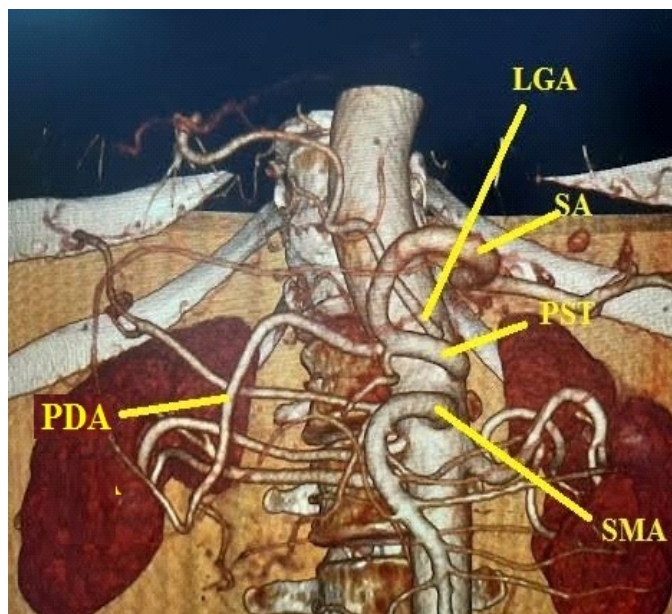


Figure 1: Image showing the visceral arteries [left gastric artery (LGA), superior mesenteric artery (SMA), Pancreatico-splenic trunk (PST), splenic artery (SA), and pancreaticoduodenal (PDA)]

Questions

1. What are the variations seen in the coeliac and mesenteric arterial system in the image?
2. What is the surgical significance of the above variations?

Answers

1. What are the variations seen in the coeliac and mesenteric arterial system in the image?

Celiac axis is the first ventral branch of the abdominal aorta. It usually gives rise to the common hepatic, splenic and the left gastric artery. Common hepatic artery bifurcates into left and right hepatic arteries. This standard hepatic arterial anatomy is seen only in 55-80 % of the population where as in others normal anatomical variants are encountered [1, 2].

The following variations were observed in the image above.

- a) The left hepatic artery (LHA) is originating from the left gastric artery (LGA).
- b) The LGA had an abnormal origin as a direct branch from the abdominal aorta proximal to the origin of the abnormal celiac axis.
- c) The right hepatic artery (RHA) is originating from the superior mesenteric artery (SMA).
- d) The celiac axis (CA) shows an abnormal branching pattern. CA divides into the splenic artery (SA) and the pancreaticoduodenal (PDA) artery i.e. “Pancreatico-splenic trunk” (PST). Thus, CA does not contribute to the hepatic arterial supply of this patient.
- e) The PDA which shows very tortuous course gave origin to the right gastric artery (RGA) as its terminal branch.


2. What is the surgical significance of the above variations?

A replaced RHA is seen in 5-21% of the population [1,2]. A replaced LHA is seen in 2- 10% of the population [1,3]. Having knowledge about these anatomical variations is important when making clinical decisions and during interventions because missing to recognize above variations can result in disasters.

For example in the case described above, accidental ligation of the LGA results in ischemia of the left lobe of the liver because the LHA originates from the LGA. Similarly during liver resections difficulty in identifying the variations can result in difficulties and accidental injuries to the hepatic

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arteries. Similar difficulties can occur in endovascular procedures and following hepatic vascular trauma. Therefore awareness of such variations is necessary to prevent complications.

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Strangulated inguinal hernia of Richter's type: a case report and review of literature

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Keywords: Richter's hernia

Introduction

Richter's hernia is an abdominal hernia hallmarked by entrapment and strangulation of only part of the circumference of bowel at the hernial orifice [1]. It can involve any part of the bowel from stomach to colon, appendix, but almost always includes the distal ileum [2]. Anatomically it is facilitated by a small enough, yet firm hernial orifice that acts as a constricting ring, to allow only part of the bowel to be snared.

It can occur in any usual hernia site but commonly occurs in the femoral and inguinal canals [3]. It was first described in 1606 by Fabricius Hildanaus, but in 1785 August Gottlob Richter gave the first comprehensive description of it and called it "the small ruptures" [4].

Case Report

A 54-year-old previously well man presented to the emergency ward with a symptomatic right inguinal hernia of 3 days' duration. He complained of progressively worsening pain in the right inguinal region associated with nausea and non-bilious vomiting. He also complained of mild abdominal distension without constipation.

On examination, he was afebrile, dehydrated and tachycardic with normal blood pressure. Abdominal examination revealed mild abdominal distension with a non-tender, irreducible right inguinal hernia without overlying erythema.

He was managed initially with analgesics, fluid replacement and planned for early surgery. However, there was worsening inguinal pain with evidence of small bowel dilatation in subsequent abdominal radiographs and ultrasonography. As a result, strangulation was suspected and emergency surgery was done.



Figure 1. Supine abdominal radiograph showing evidence of small bowel dilatation




Figure 2. The diaphragmatic defect after reduction of hernia defects (White arrow)

Inguinal exploration revealed evidence of a Richter's hernia with gangrene of more than 2/3rd of the wall of the herniated distal ileum. The segment of necrosed bowel was excised and side to side ileal anastomosis with a mesh repair was performed as there was no evidence of perforation or

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peritoneal contamination. The patient made an uneventful recovery and was discharged on the 4th post-operative day.

Discussion

Richter's hernia is a lesser known, rare type of hernia characterized by herniation of the antimesenteric portion of the bowel through a small yet firm fascial defect [3]. Its incidence has recently increased with the advent of minimally invasive surgery. The commonest locations are the femoral canal (36-88%), inguinal canal (12-36%) and abdominal wall incisional hernias (4-25%). It commonly occurs between the ages of 60-80 years. However, it has been described even in the paediatric populations [1,4].

It was first reported by Fabricius Hildenus in 1598, followed by a few reports by Alexis Littre in 1700, but Richter formally described it as a "partial enterocoele" in 1785 [3].

The fascial defect is large enough for a part of the bowel wall to herniate through, but not so large as to accommodate its entire circumference. Its tightness leads to strangulation, with oedema, venous congestion, and haemorrhagic infarction with segmental gangrene. It commonly involves less than 2/3rd of the bowel wall, hence causes strangulation without obstruction. Complete obstruction is seen only in 11% of Richter's hernias.

Owing to its anatomy and pathophysiology, diagnosis of Richter's hernia maybe difficult because of the apparently nonspecific initial findings [6]. Patients commonly present with features of an incarcerated hernia, abdominal discomfort, distention, nausea and vomiting. Localised tenderness and swelling over a hernial orifice has been described as the most constant finding while overlying skin erythema should raise clinical suspicion of strangulation. Due to the lack of complete obstruction in most cases, patients present late when symptoms intensify, further along in the strangulation process. Radiological signs of ileus may be seen in 10% [1].

Depending on the location of the hernia and degree of entrapment, the clinical presentation and response may vary considerably and has been divided into 4 main groups. The obstructive group has clinical features of intestinal obstruction resulting in early diagnosis, therapy and henceforth an excellent prognosis. However, the danger group with vague nonspecific symptoms leads to a delayed diagnosis and high rates of complications and even death. The post-necrotic group with localized strangulation and perforation may present with the development of an enterocutaneous fistula. However, perforation with a post-

necrotic abscess may find its way to another compartment leading to peritonitis and even septic shock. [1,7]

The mainstay of management of Richter's hernia is surgery. The surgical approach will vary depending on the location of the hernia, clinical status, surgeon's preference etc. Minimally invasive surgery may pose difficulties in safe access due to dilated bowel loops and cardiorespiratory effects of creation of the pneumoperitoneum.

Regardless of the approach, assessment of bowel viability is crucial. The bowel may be assessed for its colour and peristalsis but it does not correlate with viability. Use of standard and modern methods such as intravenous fluorescein and Wood's lamp or intravenous indocyanine green and infrared angiography or assessment of arterial flow using Doppler is preferred. Questionable bowel must be resected and anastomosed [3].

In a Richter's hernia in which strangulated bowel has been resected and anastomosed, placement of a mesh is controversial and relies on the surgeon's clinical judgement [3].

The above case describes a patient with initially nonspecific symptoms, presenting late with features of an incarcerated hernia. Although managed conservatively initially, worsening intensity of pain and evidence of small bowel dilatation raised clinical suspicion of an obstructed and strangulated hernia. Thus, he was in the danger category with possibly dangerous sequelae had prompt action not been taken. Urgent inguinal exploration revealed a Richter's hernia with gangrene of 2/3rd of the antimesenteric ileal wall. Necrosed segment of ileum was resected and anastomosed and the fascial defect closed with a mesh based on surgical judgement.

Informed consent: Written informed consent was obtained from the patient for publication inclusive of images.

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Learning Points:

- Richter's hernia is a rare type of hernia with grave sequelae if detected late.
- High degree of suspicion and low threshold for urgent surgery must be present for a patient with an incarcerated hernia without obstruction but with symptoms suggestive of strangulation.

Laparoscopic repair of two incidentally detected cholecysto-enteric fistula during laparoscopic cholecystectomy: a case report

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Keywords: Difficult cholecystectomy, Cholecysto-enteric fistula, Laparoscopic fistula repair

Introduction

Laparoscopic cholecystectomy has become the preferred treatment for symptomatic gallstone disease due to its quicker recovery and similar complication rates compared to open cholecystectomy.[1] Cholecysto-enteric fistula (CEF) is a rare but recognized complication, defined as a spontaneous connection between an inflamed gallbladder and nearby bowel segments.[2] The incidence of CEF among cholecystectomy patients ranges from 0.5% to 0.9%. The most common type is cholecysto-duodenal fistula (CDF) comprising 75% to 80% followed by cholecysto-colic fistula (CCF)³. This report describes a case where both cholecysto-colic and cholecysto-duodenal fistulae were incidentally discovered during laparoscopic cholecystectomy and successfully managed using laparoscopic techniques. This case represents, to the best of our knowledge, the first report of its kind in Sri Lankan literature.

Presentation of Case

A 61-year-old otherwise healthy male was admitted to the ward for an interval laparoscopic cholecystectomy. He had initially presented to the emergency department few months earlier with symptoms consistent with acute cholangitis, along with ultrasound evidence of distal common bile duct sludge, concurrent chronic cholecystitis, and had undergone urgent Endoscopic Retrograde Cholangio Pancreatography (ERCP) balloon sweeping and bile duct stenting eight weeks prior. Subsequently, he underwent ERCP and stent removal a few weeks later and was scheduled for interval cholecystectomy. During the laparoscopic cholecystectomy, a contracted Gall Bladder (GB) was observed, along with multiple dense omental adhesions to the GB fundus, attributed to chronic cholecystitis, cholangitis, and prior ERCP. These adhesions were carefully divided using a combination of blunt and sharp dissection. Following extensive adhesiolysis, it was noted

that the proximal transverse colon was inseparable from the GB fundus, and two gallstones were found embedded within the colonic wall, raising a suspicion of a CCF. A decision was made to laparoscopically disconnect GB fundus from adherent Colon with sharp dissection which revealed an epithelial lined fistula tract and two gall stones embedded and merged in to the colon wall forming part of the fistula tract on the colon side (Figure 1&2) which later confirmed by the post operative histology.


After disconnecting the fistula and excising the colonic wall containing stones, a colonic defect measuring 2-2.5 cm with vascularized edges was identified and repaired laparoscopically using intracorporeal suturing. Further mobilization of the GB revealed dense adhesions between the GB neck and duodenum. After narrowing down the dense connective tissue between GB and Duodenum authors noted the narrow tract between these organs which raised suspicion of CDF. Given its narrow and short nature, it was decided to divide this tract between laparoscopic clips (Hem-O-Lok) closer to the duodenal wall which confirmed it to be an epithelial lining fistulous tract containing biliary sludge with in the lumen confirming the presence of CDF (Figure 3).

Surprisingly, dissection of the tissue planes below this in Calot's triangle was found to be easy. The cystic artery and cystic duct were divided between clips after demonstrating the critical view of safety. After cholecystectomy, both fistula repair sites were reassessed for any leaks. Port sites were closed after inserting an abdominal drain with the plan of administering three doses of postoperative antibiotics.

The patient and family were informed about the unexpected intraoperative findings and additional procedures the following day, with anticipation of a prolonged postoperative stay and possible complications. On the second postoperative day, the patient developed two spikes of mild fever along with an elevation of inflammatory markers (CRP 40), without any abdominal symptoms or signs. The output from the abdominal drain was consistently less than 50ml of serous fluid per day throughout and was removed on the fourth postoperative day. The patient was discharged on the eighth postoperative day after ensuring safety.

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At the two-week postoperative review, the patient was noted to have recovered well and was planning to return to work in a few days.

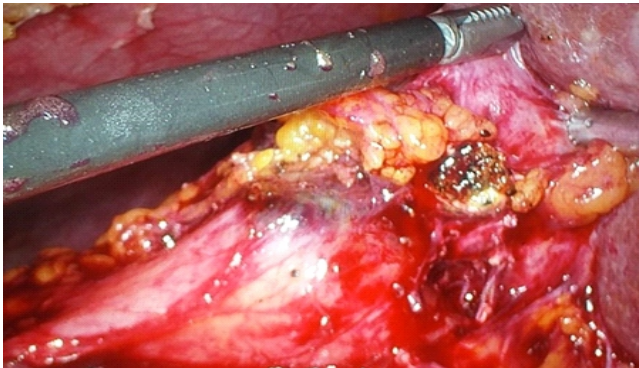


Figure 1. Cholecysto-colic fistula with an embedded gall stone within the colonic wall

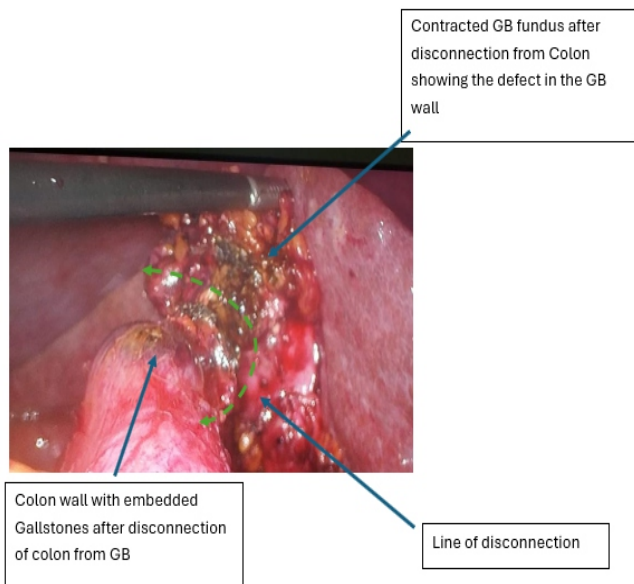


Figure 2.

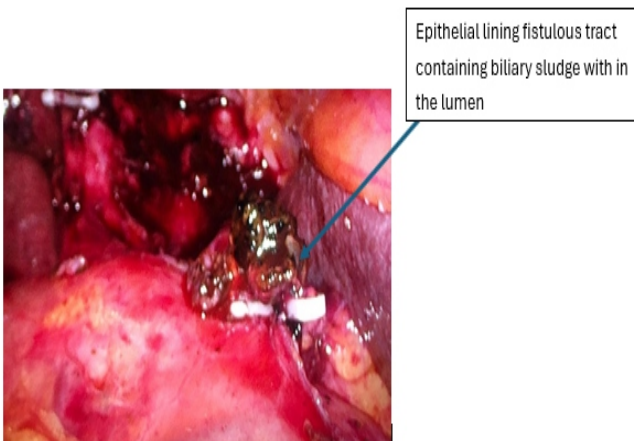


Figure 3. First part of the Duodenum with Cholecysto-duodenal fistula tract

Discussion

Cholecysto-enteric fistula (CEF) represents a rare complication of gallstones, with reported incidence rates ranging from 3-5% among patients with cholelithiasis and 0.15-4.8% among those who undergo cholecystectomy.[2] Patients with CEF often present with nonspecific symptoms, posing a challenge in preoperative differentiation from cholecystitis.[4] Some authors have noted specific characteristics in CEF patients, such as repeated episodes of cholecystitis (over a 5-year history of cholelithiasis), thickened gallbladder walls, and atrophic cholecystitis observed on ultrasound.[3]

Notably, our patient initially presented with cholangitis secondary to choledocholithiasis, a presentation not commonly reported in the literature. While a CT scan may aid in cases where diagnosis is uncertain, our patient underwent urgent ERCP to visualize the biliary tree and achieve ductal clearance to address the acute cholangitis. Although CT findings, such as an ill-defined border between the gallbladder and neighboring bowel wall, are observed in a significant proportion of patients with eventual CEF diagnosis[3], this sign lacks specificity but should prompt suspicion of CEF. Previous studies have highlighted the diagnostic utility of ERCP in identifying CEF, particularly cholecysto-duodenal fistula (CDF)[5]. However, in current practice, diagnostic ERCP is less frequently employed due to associated complications and is typically reserved for patients with concurrent jaundice or choledocholithiasis. Unfortunately, our patient's ERCP did not raise suspicion of CEF.

Despite advancements in imaging techniques, preoperative diagnosis of CEF remains challenging, achieved in only a third of patients in high-volume centers[4]. Consequently, CEF often presents as an unexpected finding during laparoscopic cholecystectomy[2,4]. Given the increasing availability of laparoscopic cholecystectomy in Sri Lanka, surgeons and trainees must be prepared to manage the challenge of intraoperative CEF detection.

Treatment for CEF involves cholecystectomy and closure of the fistula tract, feasible through laparoscopic or open surgical approaches. In recent years, laparoscopic techniques have gained prominence, offering advantages of minimal invasiveness. Various options exist for laparoscopic repair of CEF, including intracorporeal or extracorporeal sutures, endo-loop sutures, or laparoscopic staplers, selected based on surgeon experience and preference. In our case, we successfully managed two incidentally detected cholecysto-enteric fistulae laparoscopically without conversion. Resection of a cuff of colon was necessary due to impacted stones, with subsequent repair of the cholecysto-colic fistula

using laparoscopic suturing, while the cholecysto-duodenal fistula was managed with laparoscopic clips.

Conclusion

The laparoscopic approach proves to be both safe and feasible for managing cholecysto-enteric fistulae (CEF), even when multiple, provided that appropriate facilities and expertise are available accessible. Individualized decision-making based on patient characteristics, available surgical resources, and the surgeon's experience is paramount in selecting the optimal approach.

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Learning Points:

- Cholecysto-enteric fistulae, though rare, should be considered in patients with longstanding symptoms.
- CEF may present as an unexpected finding during laparoscopic cholecystectomy.
- Laparoscopic management of CEF can be safely performed in settings where expertise and facilities are available.

An unusual case of a mixed germ cell tumour presenting with complete blindness

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Keywords: Non-germinomatous germ cell tumours, intracranial germ cell tumours, mixed germ cell tumours, Neuro-oncology, Case Report

Introduction

Primary intracranial germ cell tumours (IGCTs) comprise of 0.43% to 0.54% of all CNS tumours with an incidence of 0.10 per 100,000 person years and broadly classified as pure germinomatous (PG) (70-80%) and non-germinomatous germ cell tumours (NGGCTs)(20-30%).^[1,2] This study reports the first known case in Sri Lankan literature of a paediatric patient with a mixed germ cell tumour(MGCT), a type of NGGCT, with an unusual presentation of complete vision loss.

Case study

A 15-year-old female presented with a 2-week history of sudden onset of bilateral loss of vision associated with a diffuse bilateral headache in the background of low mood, irritability, and anhedonia and anergia for 3 months managed as depression with oral antidepressants. On admission, she was drowsy with a GCS of 13/15 (E1, V5, M6) and a neurological examination demonstrated complete visual blindness. A NCCT brain that followed demonstrated a sella-suprasellar lesion causing hydrocephalus. Blood investigations revealed normal serum electrolytes, FSH, LH, cortisol levels but an elevated prolactin level of 1172 mIU/L.

MRI scan of the brain showed a large supra sellar lesion suggestive of an optic chiasmatic glioma (volume of 22.457 cm³), displaying heterogenous high signal intensity on DW and T2 weighted images and high signal intensity on FLAIR images with strong contrast enhancement suggestive of a glial tumour. The tumour was seen extending anteriorly to the optic chiasm and posteriorly along the 3rd ventricle and towards the mid brain. (Figure 1)

She was initially stabilized using Levitiracetam, mannitol

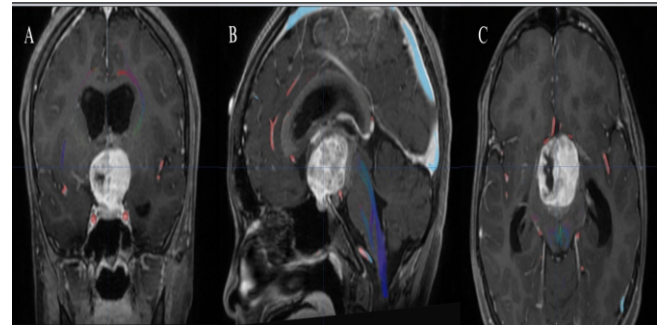


Figure 1. (a) Coronal; (b) Sagittal; (c) Axial Neuro-navigation MRI demonstrating a large mass lesion in the suprasellar region with contrast enhancement extending posteriorly to the mid-brain and anteriorly to the optic chiasm. (Volume 22.437 cm³) (Overlays demonstrate arteries (red), veins (blue) and tracts/fibres (colour spectra))

and methyl prednisolone and underwent neuro-navigation guided total excision using a pterional approach and placement of a right sided medium pressure ventriculoperitoneal shunt, where total excision was achieved while preserving the optic nerves and the carotid arteries.

Histology revealed tumour sections with mixed morphological patterns of teratoma, yolk sac and germinomas. Immunohistochemistry showed positivity for CD 117 (40% in germinomatous areas), alpha-feto protein (AFP) (40% in yolk sac elements), CD 30 and EMA (occasional staining). Accordingly, an immunomorphological diagnosis of a mixed germ cell tumour (germinoma, yolk sac and immature teratomatous components) was made.


At 1 month of follow-up the patient had acquired complete back and white vision in both eyes and at three months recovered complete colour vision in the left eye and partial vision in the right eye. However, she did not undergo chemoradiotherapy postoperatively due to refusal from the guardian in fear of side effects.

Discussion

MGCTs, a rare entity accounting for 1.69-10.83% of ICGSTs and classified under NGGCTs are defined according to the

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2021 WHO Classification of CNS Tumours as malignant GCTs harbouring at least two GCT subtypes in any combination. [1,2] Accounting for a male preponderance like other GCTs, MCGTs are broadly classified into three types; (1) mixed germinoma and teratoma, (2) mixed tumours comprising mainly of predominant germinoma or teratoma and (3) tumours consisting of purely malignant components, out of which the current case belonged to type 1. [2] This type is considered under the intermediate prognostic group based on the therapeutic classification of IGCTs with overall 3- and 5-year OS of 94.1% and 84.7% respectively. [2,3]

While the lesion in the present case was in the suprasellar area which is also the second commonest site of IGCTs (22%) surpassed only by the pineal region accounting for 53%, serum markers of β hCG and AFP were not carried out due to the presumptive radiological diagnosis of a glioma.[2] This was further justified by the atypical presentation of the current patient, unlike the usual presenting complaints of headache, vomiting or features of diabetes insipidus which are commonly associated with IGCTs. [3-5] This is in keeping with current literature, where imaging and clinical characteristics of MGCTs can vary widely pertaining to the mixed components of the tumour.[4]

Management of MGCTs are still without consensus owing to its rarity and different studies have depicted the utilization of different treatment strategies. However, it is in agreement that aggressive treatment with biopsy or surgical resection in combination with adjuvant chemoradiotherapy can be utilized in various combinations in its management since all IGCTs except mature teratomas are considered malignant and neither surgery alone nor chemoradiotherapy alone is sufficient to achieve complete cure.[4] Nevertheless, it is important to understand that the best treatment regimen is still debatable with some large scale studies such as those based on the SEER database demonstrate improved survival in addition of chemotherapy to resection (over resection alone) which is in contrast to the 2013 CNS GCT Symposium recommendations of chemoradiotherapy followed by resection for residual disease, hence necessitating clinical trials to further elucidate on it.[1] On the other hand certain other studies advice 25 Gy ventricular/whole brain and 25 Gy tumour boost for localized MGCTs following biopsy or resection, with chemotherapy pre- and post-radiotherapy only

if disseminated or at recurrence.[4] Hence, this lack of consensus illustrates the dire requirement of clinical trials to standardize treatment protocols.

Even though extensive resection is mainly advocated towards management of mature teratomas, surgery in NGGCTs is commonly limited to a biopsy for acquiring a histological diagnosis and in limited cases to achieve partial resection.[3] However, we believe that open surgery with an attempt to obtain maximal debulking in the hands of an experienced surgeon far outweighs the utilization of stereotactic biopsies in the suprasellar and pineal regions with its anatomically critical neurovascular neighbours particularly in instances such as the current case where there are imminent pressure effects on vital structures such as the optic chiasm causing vision abnormalities.

Conclusions

In conclusion, this is an interesting case of a paediatric MGCT presenting with complete visual loss and suggests the possible role of surgery in the management of NGGCTs. Moreover, it is an excellent example of the high degree of suspicion that ought to be present regarding intracranial space occupying lesions in the paediatric population and the importance of accurate histological diagnosis in planning postoperative oncological management.

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Learning Points:

- Clinicians should evaluate intracranial SOLs of paediatric patients with a higher degree of suspicion towards germ cell tumours.
- Histopathological diagnosis in the form of a surgical biopsy is essential in the management of intracranial germ cell tumours.
- Carefully planned large-scale studies are needed to evaluate the potential of surgery in surpassing a mere diagnostic role in the management of malignant germ cell tumours.

Non hodgkin lymphoma presenting as acute abdomen: perforation peritonitis : a rare case report and literature review

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Keywords: Gastrointestinal tract ,T-cell lymphomas, Hodgkin lymphoma, Gastrointestinal lymphoma

Abstract


Introduction: Primary gastric lymphoma with spontaneous perforation is rare. **Case presentation:** We present a case involving a 62-year-old woman who was admitted to the emergency department due to widespread abdominal discomfort, ongoing vomiting, and constipation.. Based on investigations, a diagnosis of peritonitis due to a viscous perforation was made. Patient was operated on and intraoperatively around 1x1 cm perforation surrounded by induration of around 3x3 cm (resembling punched out ulcer) was found on the anterior surface of the body of stomach 7 cm from the pyloric sphincter. Wide local excision of the perforation with its surrounding indurated area was done followed by primary repair of the stomach defect. A Witzel's feeding jejunostomy was created omental and D10 LN biopsy was done. On histopathology of specimens , the gastric wall showed diffuse infiltration involving its full thickness; a group of sizable, unusual lymphoid cells was observed. At the location of the perforation, tumor cells accompanied by necrotic material were detected in conjunction with the base of the ulcer, findings consistent with non-Hodgkin's lymphoma. Immunohistochemical staining were positive for CD20,LCA ,BCL6&2 and negative for Cd3, Cd 10,Cd23, the Ki67 index was- 60_70%. **Conclusion:** A case report detailing a spontaneous perforation resulting from primary gastric malignant lymphoma has been presented, along with a review of pertinent literature. This case underscores the need for further studies to better understand the association between surgical indications and pathological findings in such scenarios. Additionally, more research is essential to evaluate the clinical implications and management strategies for spontaneous perforation in primary gastric lymphoma.

Introduction

The gastrointestinal (GI) tract is the most commonly affected extranodal site in lymphoma, representing around 5% to 20%

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of all lymphomas. Primary lymphoma of the stomach is an extremely rare condition, constituting merely 1% to 5% of all gastrointestinal cancers[6,7].Gastrointestinal lymphoma most often occurs as a secondary manifestation of widespread nodal disease. The stomach is the most commonly affected organ, although the condition can arise from any location within the gastrointestinal tract, with the small intestine and ileocecal region being the next commonest site. [1] Histopathological analysis reveals that approximately 90%, are derived from B-cell lineage, while T-cell lymphomas and Hodgkin lymphoma are rare.[8]

Case presentation

We present a 62-year-old woman who came to the emergency department, with a one-day history of generalized abdominal pain, accompanied by vomiting and constipation. Upon examination, the patient appeared unwell, exhibiting signs of sepsis. Her pulse rate was 112 beats per minute, blood pressure was 98/64 mm Hg, respiratory rate was 20 breaths per minute, with a temperature of 101 degrees Fahrenheit. There was no lymphadenopathy. Chest examination was normal. Abdominal examination revealed generalised abdominal distension and tenderness, along with generalised guarding. There was no palpable lump in the abdomen. Bowel sounds were not heard. On per rectal examination, rectum was found to be collapsed with fecal staining of the gloved finger. Her laboratory investigations showed Hb-12.5 g/dL; TLC-3300; DLC-neutrophils:74, lymphocytes:16, monocytes:01, eosinophil:09, basophil:00;Blood urea level is 29 mg/dL, and serum creatinine level is 1.0 mg/dL; prothrombin time-12.9; INR-0.96; RBS-124. Plain X Ray of the abdomen shows free air under the right dome of the diaphragm and some dilated bowel loops(figure 1&2). Ultrasonography of the abdomen revealed free fluid with internal echoes and specks of air seen in the pelvis , few enlarged mesenteric lymph nodes, the largest measuring 1.7x1 cm.,a diagnosis of Perforation Peritonitis was made.

At emergency laparotomy, around 1 litre of bilio-purulent fluid was found in the peritoneal cavity. Thorough warm saline lavage was done. A perforation of about 1cm surrounded by a 3cm indurated area (resembling punched out ulcer) was found on the anterior surface of the body of the

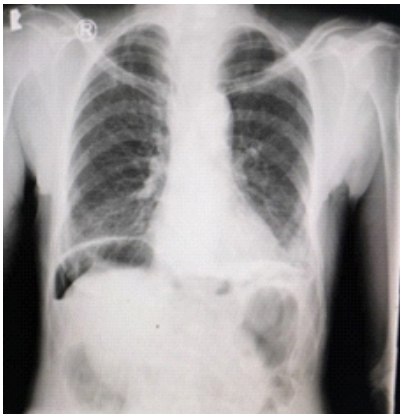


Figure 1



Figure 2

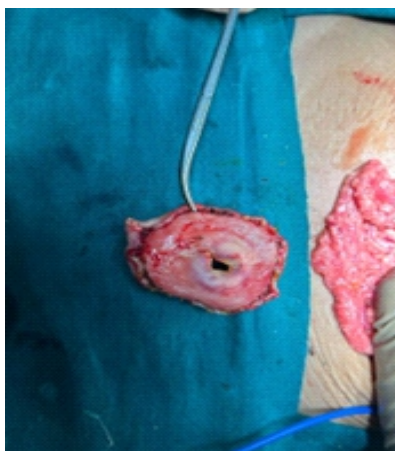


Figure 3



Figure 4



Figure 5

Histopathology reports: Perforated segment of stomach tumor infiltrating muscle layer with ulceration of overlying mucosa reaching upto serosa.

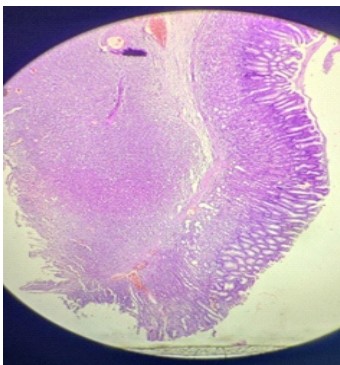


Figure 6

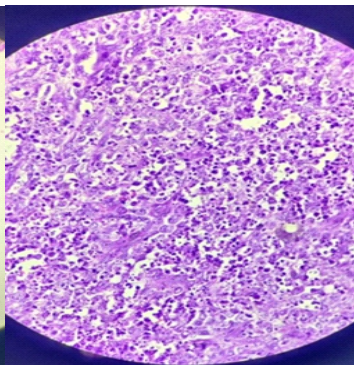


Figure 7

Histological specimen. The gastric wall showed diffuse infiltration through its full thickness by large, atypical lymphoid cells. Surrounding the site of perforation and the ulcer base, tumor cells and necrotic material were observed, indicative of aggressive pathological involvement. (hematoxylin & eosin staining; $\times 1.25$, $\times 60$). Figure 6&7)

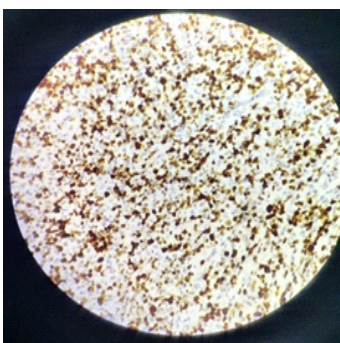


Figure 8

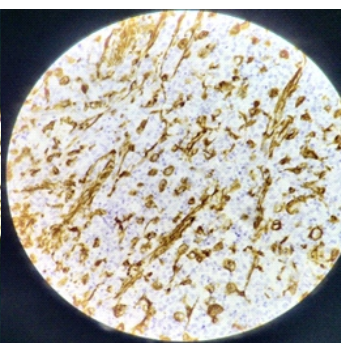


Figure 9

Immunohistochemical staining. The lymphoid nature of the cells was confirmed through strong positive immunohistochemical staining for CD20, LCA, and BCL-6, alongside BCL-2, indicating a B-cell origin. Additionally, the cells showed negative staining for CD3, CD10, and CD23. The Ki-67 index was between 60% and 70% (Figure 8&9).

stomach located 7 cm from pyloric sphincter(Figure 3,4 &5). Wide local excision of the perforation with its surrounding indurated area was done. The defect was primarily repaired with a Witzel's feeding jejunostomy. Omental and D10 lymph node biopsy was also performed.

Discussion

Gastrointestinal non-Hodgkin lymphoma represents the predominant type of extranodal lymphoma, with a significant proportion of gastric lymphomas classified as extranodal marginal zone B-cell lymphomas (MALT lymphoma) and diffuse large B-cell lymphoma (DLBCL). Gastric lymphomas are typically categorized into low-grade and high-grade types. Primary gastric lymphoma is considered uncommon, representing 1% to 5% of all gastric tumors. Gastric lymphomas are strongly associated with *Helicobacter pylori* infection and is typically considered a low-grade lymphoma, while DLBCL tends to be more aggressive and requires more intensive treatment . [6] Malignant lymphoma of the gastrointestinal tract can be categorized into two main types: nodal and extra nodal. Nodal lymphomas originate in the lymphatic tissues near the gastrointestinal tract and subsequently spread to the gastrointestinal system. In contrast, extranodal lymphomas, which are more prevalent, originate directly within the gastrointestinal tract. [2]. Dawson and colleagues identified five essential criteria for the diagnosis of primary malignant lymphoma of the intestinal tract: 1) the absence of palpable superficial lymphadenopathy, 2) no enlargement of mediastinal lymph nodes detectable on chest radiographs, 3) normal total and differential white blood cell counts, 4) significant bowel lesions noted during laparotomy, and 5) no signs of tumors in the liver or spleen.[3] . The present case, which involved a large gastric ulcer without infiltration of other organs, met all these criteria and was thus classified as primary gastric lymphoma. Primary gastric lymphoma frequently manifests with vague symptoms, including abdominal pain in approximately 50% of cases and dyspepsia in around 30%. The occurrence of B symptoms—such as fever, night sweats, and weight loss—is less prevalent than in nodal lymphomas, which may contribute to a delayed diagnosis. Gastric perforation during chemotherapy for malignant lymphoma is a recognized but rare complication, with an incidence reported to be between 0.9% and 1.1%. [9,10] . Spontaneous gastric perforation occurring without the influence of chemotherapy is an exceedingly uncommon occurrence. As treatment approaches for aggressive gastric lymphoma have transitioned from surgical intervention to chemotherapy, the frequency of primary surgical resections has significantly diminished. However, diagnosing spontaneous perforation of primary gastric lymphoma preoperatively remains challenging. The causes of gastric lymphoma perforation

differ significantly between cases receiving chemotherapy and those not treated with chemotherapy. Ono et al. [4] observed that the perforation caused by chemotherapy is mainly due to the deterioration of gastric tissue resulting from swift tumor necrosis, tumor lysis, and excessive granulation. In contrast, Shiomi et al. [5] recognized two distinct patterns of spontaneous perforation in instances where chemotherapy was not administered: the first pattern arises from an ulcer and tumor necrosis extending to the subserosa, while the second pattern occurs due to an ulcer characterized by thin connective tissue, without any tumor involvement. In the current situation, microscopic analysis identified the presence of tumor cells and necrotic tissue surrounding the ulcer and perforation area, thereby corroborating the theory that the perforation was caused by ulceration and tumor necrosis that extended into the subserosa. Gastrectomy should be contemplated in cases where a large ulcer exhibiting necrotic tissue on its floor is identified during upper gastrointestinal endoscopy, owing to the possible risk of gastric perforation.. This is particularly relevant when the endoscopic findings are similar to those observed in primary gastric lymphoma or when complications arise during chemotherapy. If such findings occur during chemotherapy, dose reduction or even gastrectomy may be warranted to prevent perforation and further complications. [11]

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Compliance with ethical standards

All components of the research presented in this manuscript have been carried out with the ethical approval of all pertinent organizations, and these approvals are duly recognized within the manuscript.

Conflict of interest disclosure

There are no identified conflicts of interest associated with the publication of this article. All authors have reviewed and approved the manuscript.

Consent for publication

The manuscript received approval from all authors after being reviewed.

Data with material transparency :yes

Informed consent

was obtained from the patient included in the study.

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Learning Points:

- Primary gastric lymphoma presenting with spontaneous perforation is rare.
- Delayed diagnosis due to less prevalence of B symptoms than other nodal lymphomas.
- Histopathology and immunohistochemistry aids in the diagnosis.
- Gastrectomy should be contemplated in cases which show large ulcer with necrotic base on endoscopy.