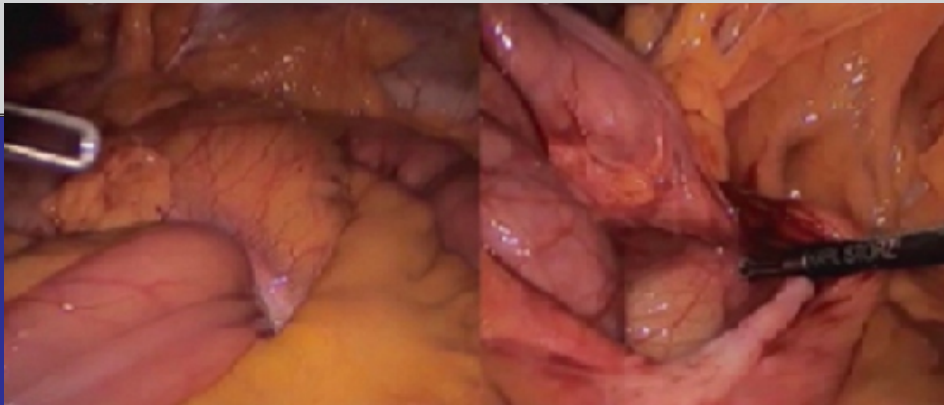




THE SRI LANKA JOURNAL OF SURGERY

July 2022 Volume 40 No.2 ISSN 1391-491X



In this issue

- Intramedullary nail fixation of traumatic diaphyseal fractures of the femur
- Management of foreign bodies in the urinary tract
- Surgical outcome of paediatric thoracoscopic surgery
- Distal pancreatectomy: open and laparoscopic techniques
- Pattern of occlusive disease in lower extremity arteries

The College of Surgeons of Sri Lanka

The Sri Lanka Journal of Surgery

Journal of
The College of Surgeons
of Sri Lanka.



July 2022 Volume 40, No.2 - Quarterly. ISSN 1391-491X

e - journal ISSN 2279 2201

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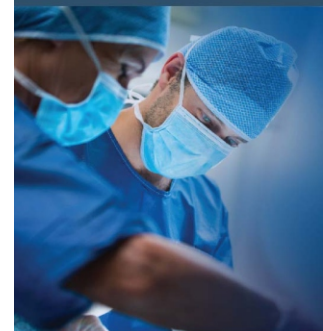
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The outcome of antegrade intramedullary nail fixation of traumatic diaphyseal fractures of the femur in a tertiary care trauma center in Sri Lanka

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Keywords: Femur shaft fracture; intramedullary nail; Harris Hip Score; WOMAC; hip joint

Abstract

Introduction

We evaluated the outcome, functional recovery, and complications of intramedullary nailing for fractures of the femoral shaft fractures.

Methods

A prospective observational study was conducted at the National Hospital of Sri Lanka. Patients with isolated femoral shaft fractures undergoing intramedullary nailing were followed up prospectively to assess the factors associated with better functional recovery (measured by Harris Hip Score (HHS) and Western Ontario and McMaster University osteoarthritis index (WOMAC)).

Results

Of 46 patients, the median age was 40(IQR=26-59) years. Majority had simple (n=34,73.9%), closed (n=39,84.8%) fractures while seven (15.2%) had Gustilo Type I open fractures. Surgery was performed at a median of 9.5(IQR=6-14) days after the injury. Approximately two-thirds of the patients required reamed nailing (n=30,65.2%). Three patients developed surgical site infections. X-rays obtained at four months demonstrated features of non-union in 13(28.3%). Leg length discrepancy (LLD) was present in 16(34.8%), and rotational deformity in one patient. Full and partial weight-bearing at six weeks was achieved in six and 23 patients respectively while 17 patients were unable to bear weight. The median HHS and WOMAC at four months were 66.5 and 36, respectively. Patients with proximal or distal diaphyseal fractures, female patients and those with full weight-bearing six weeks showed the best WOMAC index.

Conclusion

Proximal or distal diaphyseal fractures, female sex and ability to bear weight at six weeks post-surgery were associated with better functional outcomes at four months postoperatively.

Surgeons should be mindful of the limitations of resource-poor settings which could affect the surgical outcomes.


Introduction

Antegrade or retrograde nailing is the gold standard treatment for diaphyseal fractures of the femur [1, 2] which enables the patient to have early active joint mobility, early weight-bearing, excellent union rates and minimal risk of surgical site infections [2]. Locked intramedullary (IM) nailing with reaming provides better healing conditions even in comminuted fractures compared to un-reamed femoral nailing, femur plating or external fixation [3]. However, patients undergoing antegrade IM nail fixation for diaphyseal fractures of the femur show significant negative functional outcomes in a time-dependent manner [4]. Persistent hip pain, joint stiffness, limited walking distance, and difficulty climbing stairs due to pain and limp is often reported [2, 5]. The leg length discrepancy (LLD) is often associated with IM nailing in segmental and comminuted fractures of the femur,[6] which contributes significantly to poor outcomes [7, 8].

Knowledge of surgical outcomes and functional recovery trends is imperative to strategize clinical management and optimize cost-effectiveness [9]. For an instance, decisions on the choice and timing of surgery, rehabilitation protocol, timing of initial weight bearing and nail removal could be made based on functional recovery patterns, which are variable in different populations [10-12]. Given the diverse cultural norms, high patient load and limited facilities in the surgical centres in developing countries [13, 14], there is a necessity for customized feasible and cost-effective management protocols to achieve reasonable clinical outcomes. Nonetheless, prospective studies to examine the clinical outcomes of intramedullary nailing for femur shaft fractures in developing countries are sparse, and the reported prevalence of the said complications is controversial [15]. Moreover, the factors associated with better clinical outcomes are not well established. Therefore, our objective was to determine subjective and objective outcomes, functional recovery patterns, and complications of antegrade intramedullary nailing for femoral shaft fractures at the National Hospital of Sri Lanka.

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Received: 02-04-2022 Accepted: 17-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8953>



Materials and methods

An Institutional Review Board-approved prospective observational study (AAJ/ETH/COM/2021) was conducted in adults (age >18 years) with AO type 31A1, 31A2, 31A3 and 32B2 unilateral single femoral diaphyseal fractures who underwent reamed and unreamed intramedullary nail fixation antegrade in three orthopaedic units at the National Hospital of Sri Lanka (NHSL) from April 2019 to April 2020. Patients with AO type 32B3 and 32C fractures (complex patterns: fragmented wedge fractures and multi-fragmentary), distal diaphyseal fractures with supracondylar extension, proximal diaphyseal fractures with trochanteric extension, ipsilateral neck and shaft fractures, and segmental fractures were excluded from the study. Patients who had open fractures with a Gustilo 1b or higher score, pathological fractures, other associated musculoskeletal or systemic injuries, history of surgical interventions to lower extremities or previous deformity causing functional disability were also excluded.

Fifty-six consecutive patients who met the criteria were invited to the study. Of them, eight were referred to local hospitals for follow-up and two patients defaulted clinic visits, allowing a total of 46 patients to be analyzed in this study. All patients underwent antegrade reamed or unreamed intramedullary nailing through stranded piriformis entry with both dynamic and static proximal locking. Surgeries were performed by second/third-year registrars or senior registrars under the supervision of consultant orthopaedic surgeons. Surgeries performed by medical officers were excluded from the study. The patients were followed up at six weeks, three months and four months post-operatively, and details of hip and knee joint pain thigh/fracture site pain, limp and torsional problems were recorded. The pain was assessed using the 'pain subscale' of the Harris Hip Score (HHS) (see below for details) [16]. The passive range of motion at the hip joint and knee joint were examined, and the limb length discrepancy was determined by measuring the distance between the anterior superior iliac spine and the medial malleolus. Hip and knee joints were placed at 90° flexion and the rotational malalignment was measured by a goniometer. All the above-mentioned measurements were obtained by a single observer (third-year registrar in orthopaedic surgery) three times and the arithmetic mean was calculated. Postoperative radiographs were used to identify evidence of callus formation and possible heterotrophic calcifications at the end of four months. Radiograph assessment was performed by a third-year registrar in orthopaedic surgery under the supervision of a consultant orthopaedic surgeon. The hip function was objectively assessed using HHS four months after surgery. The HHS is a valid and reliable questionnaire [17, 18] which is frequently used to evaluate pain and disability of the hip joint following intramedullary nailing for femoral shaft fractures [5]. HHS is scored from 0 to 100 in

four domains: pain (44 points), level of functioning during daily activities (47 points), presence of deformity (4 points) and range of motion of the joint (5 points). A total HHS below 70 points is considered poor, 70-80 fair, 80-90 good, and 90-100 excellent outcome [19]. Western Ontario and McMaster University osteoarthritis index (WOMAC) was used to assess the postoperative functional outcome four months after the surgery [20]. WOMAC has been used extensively to assess the hip and knee functions in patients with lower limb osteoarthritis, lower limb fractures and joint replacement studies [20]. WOMAC is scored from 0 to 96 in three domains: pain (20 points), stiffness (8 points) and physical function (68 points) where lower scores reflect a better functional outcome.

IBM SPSS version 26 and GraphPad Prism 8 were used for data analysis. Continuous data were presented as the median and interquartile range (IQR) unless specified. Mann-Whitney U and Kruskal Wallis tests were used to compare continuous data between two and multiple groups respectively. $P < 0.05$ was considered significant.

Results

The median age of the patients was 40 (IQR=26-59) years. Male to female ratio was 1.7:1. The majority had sustained simple ($n=34$, 73.9%), closed ($n=39$, 84.8%) fractures while seven (15.2%) had Gustilo type 1 open fractures. Mid-shaft fractures ($n=29$, 63.0%) were found more frequently than distal ($n=13$, 28.3%) and proximal ($n=4$, 8.7%) shaft fractures. The surgery was performed at a median of 9.5 (IQR=6-14) days after the injury. Approximately two-thirds of the patients had reamed nailing ($n=30$, 65.2%). Spinal anaesthesia was the commonest mode of anaesthesia ($n=24$, 52.2%), followed by general ($n=17$, 37.0%) and combined spinal epidural ($n=5$, 10.9%) anaesthesia. The median duration of the surgery was 195 (IQR=140-240) minutes. All the patients received three doses of intravenous Cefuroxime 1.5 g 8 hourly.

Three patients developed surgical site infections; two superficial and one deep tissue infection. The latter healed after two debridements of the wound. At six weeks post-operatively, 18 patients complained of anterior hip and thigh pain whereas 28 patients complained of anterior knee pain in addition to hip and thigh pain. A leg length discrepancy (LLD) was present in 16 (34.8%), with a median value of 1.25 (0.5-1.5) cm. A 360-degree rotational deformity was found in a patient at six weeks postoperatively and revision surgery was performed. X-rays obtained at four months showed evidence of early callus formation in 33 (71.7%) while 13 (28.3%) showed nonunion features. Static screw removal was performed in nine (19.6%) patients. Full and partial weight bearing at six weeks was achieved in six and 23 patients,

respectively, while 17 patients were kept non-weight bearing. At four months of follow-up, 25 (54.3%), 15 (32.6%) and four (8.7%), respectively, complained of pain at the fracture site, hip and knee. Furthermore, knee stiffness was present in three (6.5%) patients. The median HHS and WOMAC at four months were 66.5 (59.0-72.3) and 36 (21-73), respectively.

Mid-shaft fractures were associated with poor WOMAC scores compared to proximal and distal fractures [W=10.763, $p<0.005$]. Patients with full weight bearing at six weeks [W=21.051, $p<0.001$] and female patients [U=350.5, $p<0.05$] showed the best functional outcomes as measured by the WOMAC index. While the site of fracture [W=6.803, $p<0.05$] and the weight-bearing status at 6 weeks [W=23.409, $p<0.05$] were associated with the HHS score at 4 months, the sex of the patient showed no significant associations with the HHS. Furthermore, reamed versus unreamed fixation, closed versus open (Gustilo 1) fractures, the timing of surgery and age of the patients were not associated with HHS or WOMAC scores.

Discussion

Although the incidence of femur shaft fractures in Sri Lanka is unknown, it has become a considerable burden for the young and old. Being a leading tertiary care hospital in the country, the National Hospital of Sri Lanka manages a high patient load with femur fractures every year. In this study, we evaluated the clinical outcomes of IM nailing for fractures of the femur shaft in our unit over a period of one year.

The surgery was performed at a median of 9.5 (IQR=6-14) days after the injury where none of the patients received early fixation (<24h post-injury). Delayed fixation is reported to be associated with high in-hospital morbidity and mortality [21, 22]. However, given the limited resources, it is nearly impossible to offer early fixation for isolated femur shaft fractures in our setting. The median operating time of our study (195 minutes) was also comparatively longer than the reported durations for antegrade nailing (71 to 116 minutes) [2, 23-25] probably due to poor resources such as the limited availability of the C arm for surgeries. However, the rate of surgical site infections (3 out of 46) was comparable to the previous studies [23, 24].

The reported time to the union for antegrade nailing is approximately three months (98 days) [2]. Conceivably, 70% of our cohort showed radiological evidence of healing in four months following surgery. Of 13 patients with X-ray evidence of nonunion at four months, nine underwent dynamization by static screw removal. The majority (12) of the patient with delayed or non-union had reamed nailing while only one patient had un-reamed nailing. He was offered exchange nailing at 4 months, which is an excellent option for

aseptic nonunion [26] due to its higher union rates and better comparable healing times compared to dynamization [27].

LLD is a common complication after IM nail fixation for comminuted fractures [6]. In our study, LLD was only present in 16 patients (34.8%), with a median of 1.25 cm. The majority of them had comminuted fractures (75.0%) resulting in shortening of the affected limb. Braton et al. reported 12 shortenings of more than 1 cm in a review of 203 fractures [28] demonstrating that routine use of static screws can avoid dramatic limb shortening [28]. Herscovici et al. reported that, despite being a common complication, most LLDs are less than 1.5 cm and functionally irrelevant [6]. None of the patients with minor LLD was offered corrective surgery due to the high patient load in our setting; instead, LLD of 15mm to 20mm started weight bearing with a shoe raiser. The rotational deformity occurs frequently after IM nailing, and, fortunately, will not always cause complaints. We report a 360-degree rotational deformity in a patient that was corrected in revision surgery. Braten et al reported an incidence of 20.90% of torsional deformity (>150) in 110 patients who had IM nailing for femur fracture but only 3.3% needed corrective surgery [28].

The study demonstrated a reasonable functional recovery four months after surgery in terms of HHS (a median score of 66.5), which is comparable to the HHS reported in an Indian study (68.67) four months after the antegrade nail standard piriform approach [29]. Many studies suggest early weight bearing can be allowed almost immediately after the surgery in stable fractures [28]. Arazi et al reported that patients with comminuted diaphyseal femur fracture who were treated with statistically locked reamed intramedullary nailing found no major complications following early weight bearing within 1 to 2 weeks after the surgery apart from slight bending of locking screws [30]. Here, we report early weight bearing 6 weeks after the surgery, [W=23.409, $p=.000$] was associated with a better functional outcome with higher HHS at four months after the surgery.

Pain in the hip joint, knee joint or thigh is the commonest complaint after IM nailing, which might result in adverse consequences such as delayed weight bearing, poor fracture healing, joint stiffness and poor compliance in postoperative physiotherapy. Pain could be due to the nail itself, the locking screw, heterotopic bone formation at the entry site or a soft tissue scar [28]. In a study by Braten et al., 30% of the patients reported hip pain and 54% complained of thigh pain at the end of four months of recovery, while twenty-one (45.5%) claimed that pain avoided them from having required weight bearing and joint range of movement [28].

Patients who complained of thigh pain after four months of surgery had radiological evidence of proximal or distal locking screws that impinged on soft tissues or were thin with clinically prominent distal screw heads. Prominent proximal and distal locking screws, especially when they are not fully inserted or when there is little overlying subcutaneous tissue lead to significant distal locking site pain [31, 32]. Therefore the careful selection of the length of the locking screw is essential to avoid protrusion and irritation of soft tissue [31]. Although in the Sri Lankan context it is not routine practice to remove IM nails, current evidence encourages such practice, especially in younger patients with significant pain [28].

In conclusion, proximal or distal diaphyseal fractures, female sex and ability to bear weight at six weeks post-surgery were associated with better functional outcomes four months after intramedullary nailing for femur shaft fractures. However, ante-grade IM nailing of the femur is associated with significant hip and fracture site pain within four months of surgery which can result in unsatisfactory post-operative recovery and rehabilitation. Surgeons should also be aware of the limitations of resource-poor settings that could affect surgical outcomes.

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

References

- Brewster J et al. Long-term Comparison of Retrograde and Antegrade Femoral Nailing. *Orthopedics*, 2020. Doi: 10.3928/01477447-20200415-04
- Tornetta III, Tiburzi D. Antegrade or retrograde reamed femoral nailing: a prospective, randomised trial. *The Journal of Bone and Joint Surgery. British volume*, 2000. 82(5): p. 652-654. Doi: 10.1302/0301-620X.82B5.0820652
- Roberts JB. Management of fractures and fracture complications of femoral shaft using the ASIF compression plate. *The Journal of trauma*, 1977. 17(1): p. 20-28. Doi: 10.1097/00005373-197701000-00003
- Archdeacon M et al. A prospective functional outcome and motion analysis evaluation of the hip abductors after femur fracture and antegrade nailing. *Journal of orthopaedic trauma*, 2008. 22(1): p. 3-9. Doi: 10.1097/bot.0b013e31816073b6
- el Moumni M. et al. Long-term functional outcome following intramedullary nailing of femoral shaft fractures. *Injury*, 2012. 43(7): p. 1154-1158. Doi: 10.1016/j.injury.2012.03.011
- Hercovici D, Scaduto JM. Assessing leg length after fixation of comminuted femur fractures. *Clinical Orthopaedics and Related Research*®, 2014. 472(9): p. 2745-2750. Doi: 10.1007/s11999-013-3292-0
- Gurney B. et al. Effects of limb-length discrepancy on gait economy and lower-extremity muscle activity in older adults. *JBJS*, 2001. 83(6): p. 907-915. Doi: 10.2106/00004623-200106000-00013
- Friberg O. Clinical symptoms and biomechanics of lumbar spine and hip joint in leg length inequality. *Spine*, 1983. 8(6): p. 643-651. Doi: 10.1097/00007632-198309000-00010
- Iorio R. et al. Displaced femoral neck fractures in the elderly: outcomes and cost effectiveness. *Clinical Orthopaedics and Related Research* (1976-2007), 2001. 383: p. 229-242. Doi: 10.1097/00003086-200102000-00027
- Doruk H. et al. The effect of the timing of hip fracture surgery on the activity of daily living and mortality in elderly. *Archives of gerontology and geriatrics*, 2004. 39(2): p. 179-185. Doi: 10.1016/j.archger.2004.03.004
- Paterno MV, Archdeacon MT. Is there a standard rehabilitation protocol after femoral intramedullary nailing? *Journal of orthopaedic trauma*, 2009. 23: p. S39-S46. Doi: 10.1097/bot.0b013e31819f27c2
- Wu, K. et al. The risk factors of nonunion after intramedullary nailing fixation of femur shaft fracture in middle age patients. *Medicine*, 2019. 98(29). Doi: 10.1097/md.00000000000016559
- Samaranayake UMJE, Mathangasinghe Y, Banagala ASK. Are predominantly western standards and expectations of informed consent in surgery applicable to all? A qualitative study in a tertiary care hospital in Sri Lanka. *BMJ open*, 2019. 9(1). Doi: 10.1136/bmjopen-2018-025299
- Ifesanya AO. Orthopaedic care in a southwestern Nigeria secondary level hospital: are patients' needs being met? *African journal of medicine and medical sciences*, 2012. 41(2): p. 153-159.
- Kumar P. et al. Greater trochanteric versus piriformis fossa entry nails for femur shaft fractures: Resolving the controversy. *Injury*, 2019. 50(10): p. 1715-1724. Doi: 10.1016/j.injury.2019.07.011
- Harris W. Traumatic arthritis of the hip after dislocation and acetabular fractures: an end-result study using a new method of result evaluation. *J Bone Joint Surg [Am]*, 1969. 51(4): p. 737-55. Doi: 10.2106/00004623-196951040-00012
- Nilsson A, Bremander A. Measures of hip function and symptoms: Harris hip score (HHS), hip disability and osteoarthritis outcome score (HOOS), Oxford hip score (OHS), Lequesne index of severity for osteoarthritis of the hip (LISOH), and American Academy of orthopedic surgeons (AAOS) hip and knee questionnaire. *Arthritis care & research*, 2011. 63(S11): p. S200-S207. Doi: 10.1002/acr.20549
- Mahomed NN, et al. The Harris hip score: comparison of patient self-report with surgeon assessment. *The Journal of arthroplasty*, 2001. 16(5): p. 575-580. Doi: 10.1054/arth.2001.23716
- Banaszkiewicz PA. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty: an end-result study using a new method of result evaluation, in *Classic Papers in Orthopaedics*. 2014, Springer. p. 13-17. Doi: 10.1007/978-1-4471-5451-8_3
- Fleisher IT et al. Development and Validation of Crosswalks Between the Western Ontario & McMaster Universities Osteoarthritis Index and Hip Disability and Osteoarthritis Outcome Score Joint Replacement/Knee Injury and Osteoarthritis Outcome Score Joint Replacement. *The Journal of Arthroplasty*, 2022. 37(6): p. 1034-1039. e3. Doi: 10.1016/j.arth.2021.11.009

21. Charash WE, Fabian TC, Croce MA. Delayed surgical fixation of femur fractures is a risk factor for pulmonary failure independent of thoracic trauma. *The Journal of trauma*, 1994. 37(4): p. 667-672. Doi: 10.1097/00005373-199410000-00023
22. Cantu RV, Graves SC, Spratt KF. In-hospital mortality from femoral shaft fracture depends on the initial delay to fracture fixation and injury severity score-a retrospective cohort study from the NTDB 2002-2006. *The journal of trauma and acute care surgery*, 2014. 76(6): p. 1433. Doi: 10.1097/ta.0000000000000230
23. Meena KP, Yadav MK, Devatheya D. A prospective randomized comparative study between trochanteric versus piriformis entry portal for intramedullary interlock nailing in the treatment of femoral shaft fracture. *Int J Res Orthop*, 2016. 2(1): p. 18-24. Doi: 10.18203/issn.2455-4510.intjresorthop20160711
24. Stannard JP et al. Functional outcome following intramedullary nailing of the femur: a prospective randomized comparison of piriformis fossa and greater trochanteric entry portals. *JBJS*, 2011. 93(15): p. 1385-1391. Doi: 10.2106/JBJS.J.00760.
25. Ghosh S. et al. Comparative study of treatment of fracture shaft femur by intramedullary interlocking nails through piriform fossa entry and tip of the greater trochanter entry approach. *Saudi Journal of Sports Medicine*, 2015. 15(2): p. 148. Doi: 10.4103/1319-6308.156346
26. Shroeder JE et al. The outcome of closed, intramedullary exchange nailing with reamed insertion in the treatment of femoral shaft nonunions. *Journal of orthopaedic trauma*, 2009. 23(9): p. 653-657. Doi: 10.1097/bot.0b013e3181a2a337
27. Brinker MR, O'Connor DP. Exchange nailing of ununited fractures. *JBJS*, 2007. 89(1): p. 177-188. Doi: 10.2106/jbjs.f.00742
28. Bråten MT, Terjesen, Rossvoll I. Femoral shaft fractures treated by intramedullary nailing. A follow-up study focusing on problems related to the method. *Injury*, 1995. 26(6): p. 379-383. Doi: 10.1016/0020-1383(95)00054-d
29. Kumar AM. Comparative study of outcome of femur nail with entry from piriformis fossa vs greater trochanter. *Glob J Res Anal.*, 2017. 6(11): p. 54-56. Doi: 10.1016/j.injury.2019.07.011
30. Arazi M. et al. Early weight-bearing after statically locked reamed intramedullary nailing of comminuted femoral fractures: is it a safe procedure? *Journal of Trauma and Acute Care Surgery*, 2001. 50(4): p. 711-716. Doi: 10.1097/00005373-200104000-00019
31. Katsoulis E, Court-Brown C, Giannoudis P. Incidence and aetiology of anterior knee pain after intramedullary nailing of the femur and tibia. *The Journal of Bone and Joint Surgery. British volume*, 2006. 88(5): p. 576-580. Doi: 10.1302/0301-620x.88b5.16875
32. Dodenhoff R, Dainton J, Hutchins P. Proximal thigh pain after femoral nailing: causes and treatment. *The Journal of Bone and Joint Surgery. British volume*, 1997. 79(5): p. 738-741. Doi: 10.1302/0301-620x.79b5.0790738

Management of foreign bodies in the urinary tract

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Keywords: Foreign bodies; foreign objects; urinary tract; bladder; urethra

Abstract

Introduction

Foreign bodies in the urinary tract may present in various ways. These require a wide range of interventions for retrieval. In this study, we describe our experience in managing foreign bodies in the urinary tract with emphasis on clinical presentation, mechanism of insertion, investigation and treatment of these patients from a South Asian country.

Methods

A retrospective analysis of 30 foreign bodies treated by a single urological surgeon in two teaching hospitals in Sri Lanka over 20 years was performed. Data were retrieved from clinical records and follow-up visits focussing on clinical presentation, nature of foreign bodies, mechanism of insertion, investigations, management and complications.

Results

The majority were males (73.3%, n=22) with a median age of 34 years (range:14-72). The majority were self-inserted (n=14) or iatrogenic (n=10). X-rays and ultrasound scans were useful in the majority to clinch the diagnosis. The majority were retrieved endoscopically through minimally invasive approaches. Open surgeries were needed for a patient with a large bladder stone associated with a metal chain and retrieval of a retained swab. Common complications associated with foreign bodies included infections (n=9), calcification/ stone formation (n=9) and acute urinary retention (n=4). Among deliberate self-insertions, two had a low intelligent quotient and the majority had no underlying psychiatric condition needing intervention.

Conclusions

Simple investigations such as X-ray and ultrasound scans are sufficient to locate and plan interventions in the majority. Minimally invasive approaches are successful in most. The

vast majority of the patients with self-insertion had no psychiatric conditions needing intervention.

Introduction

Patients presenting to emergency departments of hospitals with foreign bodies that cannot be removed from the body are not that uncommon. However, the male urethra may be considered a more inaccessible and unlikely site for the introduction of foreign bodies. However, the variety of foreign bodies found in the genitourinary tract defies the imagination and includes a wide range of objects [1]. The foreign bodies found in the urinary system include wooden sticks, wires, metal chains, intrauterine contraceptive devices (IUCDs), needles, parts of catheters and even bullets and shrapnel [2-5].

Clinical diagnosis of foreign bodies is often difficult as patients may feel embarrassed to divulge information about the self-insertion of objects for sexual gratification. Such patients may attempt different techniques to remove the foreign bodies causing further trauma, and inward migration of the foreign body and may present late when associated with significant symptoms or complications. Furthermore, patients may not recall previous procedures or intrauterine contraceptive devices inserted many years ago. Similarly, a lack of awareness among clinicians about such a possibility related to previous medical interventions may delay the diagnosis.


The literature related to foreign bodies in the urinary tract is restricted to case reports and few case series [2-5]. Therefore, we describe our experience in the clinical characteristics and management of such foreign bodies in a tertiary care urology unit in Sri Lanka.

Subjects and methods

A retrospective analysis of data was collected from all patients who presented with foreign bodies in the urinary tract to the Urology Units of Karapitiya Teaching Hospital, Galle from 1-January-2001 to 15-December-2009 and Colombo South Teaching Hospital, Kalubowila from 16-December-2009 to 31-December-2021 was performed. Forgotten ureteric double-J stents or parts of retained fragments of double J stents were excluded. The patients underwent an X-

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Received: 20-02-2022 Accepted: 17-06-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8966>



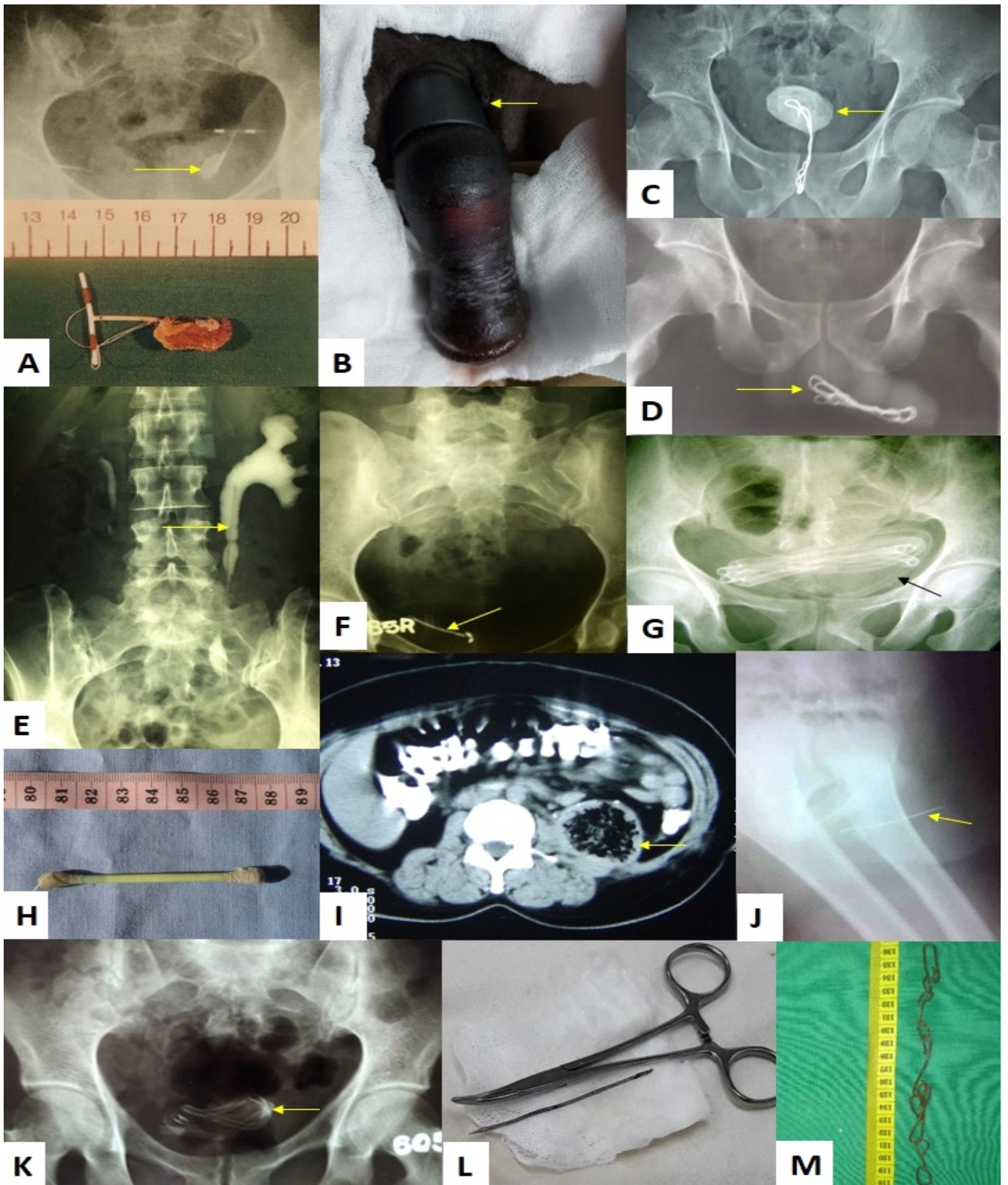


Figure 1. Images of various foreign bodies in the urinary system.

A: IUCD in the bladder with stone formation;
 C: Metal chain in bladder and urethra with large bladder stone;
 E: Ureteric anastomosis performed over a stent pusher instead of a JJ stent;
 G: Coiled plastic tube inside the bladder;
 I: CT image showing a retained swab;
 K: Coiled plastic tube inside the bladder;
 M: Retrieved metal chain

B: Penile ring with superficial gangrene;
 D: Metal chain in the urethra;
 F: IUCD inside the bladder;
 H: Retrieved cotton bud from urethra;
 J: Sewing needle inside the urethra;
 L: Retrieved bicycle spoke;

Table 1. Clinical profile and investigation findings of foreign bodies in the urinary tract

(NA: Not available, IUCD: Intra-uterine contraceptive device, AUR: Acute urinary retention, FB: foreign body, LUTS: lower urinary tract symptoms, USS: ultrasound scan, CT: computed tomography)

Mechanism of insertion/(N)	Type of FB/(N)	Age (year): Median and range /Sex	Marital status	Duration of symptoms due to FB	X-ray	USS/CT	Urine culture
Self-inserted for masturbatory purposes (N=12)	Tip of a pen (N=2), Metal wire (N=2), Elephant's tail hair, Cotton bud, Coiled saline tube, Safety pin, Tube used to transfer petrol, Metal chain, Sewing needle, Nylon threads,	33 (14-51)/ All males	Unmarried: 9, Married: 2 NA: 1	< 1 week: 6 1-4 weeks: 3 1-12 months: 1 >1 year: 2	FB detected: 10 Normal: 2	Not done: 8 FB detected in USS: 3 Normal USS: 1	Coliforms: 6 Pseudomonas: 1 Not done: 3 Negative: 2
Iatrogenic (N=10)	IUCD (N=3), Tip of the cold knife, Tip of Foley catheter, Non-absorbable sutures, Trans-obturator tape, JJ stent pusher, Retained swab, Lippes loop	41 (21-72)/ F=7 M=3	Married: 9 Unmarried: 1	1-12 months: 4 >1 year: 3 Asymptomatic: 3	FB detected: 8 Normal: 1 Not performed: 1	Not done: 3 FB detected in USS: 3 Normal USS: 3 FB detected in CT: 1	Negative: 5 Coliforms: 2 Not done: 3
Violence (N=3)	Bullet (N=2), Shrapnel	17, 19, 21 years/ M=3	Unmarried: 2 Married: 1	Soon after incident: 1 1-4 weeks: 1 1-12 months: 1	FB detected: 3	FB detected in USS: 2 FB detected in CT: 1	Not done: 1 Negative: 2
Accidental self-insertion (N=2)	Bicycle wheel spoke, IUCD	56/M, 21/F	Married: 2	1 day and	Not done: 1 FB detected: 1	Not done: 1 FB detected in USS: 1	Not done: 2
Third party insertion (N=2)	Metal ring (N=2),	45/M,	Married: 2	36 hours and	Not done: 2	Not done: 2	Not done: 2
Third party insertion for sexual gratification (N=1)	Plastic stillete	51/M	Married	2 weeks	Not seen	Foreign body detected	Not done

Table 2. Characteristics, location and complications of foreign bodies in the urinary tract and the treatment

(NA: Not applicable, AUR: Acute urinary retention, UTI: Urinary tract infections, FB: foreign body, USS: ultrasound)

Mechanism of insertion/(N)	Location/(N)	Complication of FB	Treatment	Treatment complication (Clavien-Dindo grade)
Self-inserted for masturbatory purposes (N=12)	Anterior urethra (N=4), Posterior urethra (N=2), Bladder (N=6) with two involved urethra as well	Stones: 4, UTI: 7, AUR: 2, None: 4	Endoscopic removal: 7 Suprapubic catheter and endoscopic removal: 2 Manipulated and removed under anaesthesia: 1 Refused surgery: 1 Open Vesicolithotomy: 1	None
Iatrogenic (N=10)	Bladder (N=4), Bladder neck (N=2), bulbar urethra, Ureter, Peri-nephric space, Retroperitoneal space next to ureter	Stones: 4, None: 3, Calcification: 1, UTI: 2, Intraoperative bleeding: 1, Discharging sinus: 1	Endoscopic removal: 8 Surgical exploration and removal of the retained gauze swab: 1 Exploration and removal of Lippes loop during open pyelolithotomy: 1	None
Violence (N=3)	Kidney (N=2), Bladder	None	Endoscopic removal: 1 Managed conservatively: 2	Repeat cystoscopy excluded a stricture (Grade 1): 1
Accidental self-insertion (N=2)	Urethra, Bladder	None	Endoscopic removal: 1 Manipulated and removed under anaesthesia: 1	None
Third party insertion (N=2)	Penile shaft (N=2)	Gangrenous penile skin and AUR: 1, AUR and superficial skin necrosis and infection: 1	Rings were removed with metal cutter after suprapubic catheterization. Urethral reconstruction and skin graft was required in one patient	None
Third party insertion for sexual gratification (N=1)	Bladder	None	In the morning of the day of surgery, he passed the FB. The repeat USS was normal	None

ray Kidney-Ureter-Bladder (KUB) and ultrasound scan KUB where relevant and Computed Tomography (CT) scans in a few selected patients. The offered treatment modalities such as conservative, minimally invasive and open strategies were recorded and post-procedural complications were classified according to the Clavien and Dindo classification system [7]. Those with a history of deliberate self-insertion were referred to the psychiatrist to look for any underlying psychological conditions. Approval was obtained from the Ethics Review Committee of the Colombo South Teaching Hospital, Dehiwala, Sri Lanka and informed consent were obtained before collecting data. We report our findings under the Declaration of Helsinki and all methods were performed per the relevant guidelines and regulations.

Results

A total of 30 foreign bodies in 28 patients were included in this analysis. The majority of the patients were males (73.3%, n=22) and the median age was 34 years (range: 14-72). The foreign bodies found in our cohort included IUCDs, tips of pens, tubes, bullets, shrapnel, hair from elephant's tails, bicycle wheel spoke, the tip of a cold knife, the tip of Foley catheter, non-absorbable sutures, metal chain, wires and rings, trans-obturator tape, plastic stilette, sewing needle, nylon threads, double J stent pusher, retained swab and Lippes loop (Figure 1). The mechanisms of insertion included self-insertion for sexual gratification (n=12), accidental self-insertion (n=2), iatrogenic (n=10), violence (n=2) and third-party insertions (n=3). The clinical presentation and basic investigations are given in Table 1. The associated common complications related to foreign bodies were infections (n=9), stone formation/ calcifications (n=9) and acute urinary retention (n=4).

The majority were retrieved endoscopically and through minimally invasive approaches (n=23). Two patients were managed conservatively and one patient refused surgery. One patient passed the foreign body on the morning of planned surgery. Open surgeries were needed for a patient with a large bladder stone associated with a metal chain and for retrieval of a retained perinephric swab. Another patient with a renal pelvic stone with an incidentally found Lippes loop in X-ray, underwent exploration and removal of the foreign body during the index surgery (via transcostal approach) for a renal pelvic stone. The types of foreign bodies, mechanisms and treatment in our cohort are given in Table 2. We observed only 1 complication during interventions for foreign bodies which was a suspected injury to the urethra while retrieving a sharp object. The patient was managed with a catheter for 2 weeks and a repeat cystoscopy excluded a stricture. Two patients with deliberate self-insertion had a low intelligent quotient. One patient with an already diagnosed severe schizophrenia and institutionalised had inserted a safety pin. However, the

remaining patients with a history of deliberate self-insertion had no psychiatric conditions needing intervention.

Discussion

In this cohort of 30 foreign bodies in the urinary tract for 2 decades, we found that self-insertion for sexual gratification (n=12) and iatrogenic (n=10) causes were the main mechanisms. Although females with deliberate self-insertions have been reported in the literature [3, 4], all patients with deliberate self-insertions in our cohort were males, which can be explained by the sociocultural differences. Furthermore, all deliberate self-insertions were performed for sexual gratification. Iatrogenic causes were mainly observed in females. Interestingly, we had rare instances of accidental self-insertion which have not been commonly reported in the literature [3].

The clinical presentation varied depending on the mechanism of insertion. Self-insertions or violence may present as emergencies and iatrogenic causes generally present with chronic insidious symptoms. Some may ignore their symptoms as long as their lifestyle is not affected. Those with deliberate/ accidental self-insertion presented after a median duration of 7 days (range: 1 day to 2 years) which indicates a delayed presentation. One patient with a penile ring inserted presented after 36 hours after spending many agonising hours trying to remove it by himself. This led to superficial skin necrosis and a urethral defect. The delayed presentation is mainly due to embarrassment and anxiety with fear of being ridiculed by others including the hospital staff. Sexual education is not given prominence in school education and sexual orientation is not a commonly discussed topic in the community due to sociocultural barriers inherent to most Asian populations [6]. The healthcare staff should be aware of the pain and embarrassment in these patients and should act with empathy.

Attempts at catheterising patients with urethral foreign bodies with obstructive urinary symptoms are likely to fail and applying force may traumatise the urethra. Patients should undergo a preliminary X-ray and ultrasound scan of KUB for confirmation before intervention. CT scans were rarely used in our cohort. Endoscopic evaluation of the lower urinary tract is the ideal investigation which is diagnostic and therapeutic. Catheterisation or retrieval of foreign bodies should be performed after delineating the size, shape, extent and location of the foreign body, although a gentle attempt by an experienced clinician may be justifiable in the absence of imaging [8].

Self-insertion of foreign bodies has been reported to be associated with psychiatric disorders [9]. In our cohort, all patients with a history of deliberate self-insertion were

referred to the psychiatrist for assessment. Of them, two were found to have a low intelligent quotient. One of the two had repeatedly inserted foreign bodies within several years needing multiple interventions. In our cohort of 12 males with deliberate self-insertion, there was only one patient with an already diagnosed psychiatric illness. None of the others was found to be having an underlying psychiatric illness requiring treatment.

The reported cases of iatrogenic foreign bodies in the urinary system seem to be increasing, possibly due to the advancement and increasing number of interventions performed in the urogenital systems [2-5]. This is more common in females due to interventions performed for gynaecological conditions and contraception. In our cohort, 7 females had iatrogenic foreign bodies. Although some gradually migrate into the urinary tract, others are due to wrong techniques and medical errors. We had three patients with IUCDs inserted into the bladder, one patient with a retained swab in the peri-nephric region and one patient who had an unintentional ureteric anastomosing over a stent pusher rather than a JJ stent. These are largely preventable never events in medical practice.

The objective of treatment is to retrieve the foreign object completely while minimising injury to the urinary tract. Some foreign bodies such as bullets or shrapnel in the kidney can be managed conservatively in the absence of recurrent infections, bleeding or stone formation. This is possible if the bullet is in the renal parenchyma rather than in the pelvicalyceal system. The modality of surgery is based on the type, size, location and associated complications of the foreign body [5]. The majority can be managed endoscopically using the retrieval forceps or stone punch forceps. Percutaneous cystoscopy sheaths, percutaneous suprapubic cystolithotripsy (PCCL), rigid nephroscope, laser and pneuovesicoscopy may be used in difficult cases [10].

Conclusions

In our cohort of 30 foreign bodies in the urinary tract, self-insertion and iatrogenic causes were the main mechanisms. Simple investigations such as X-ray and ultrasound scans are sufficient to locate and plan interventions in the majority. Minimally invasive approaches were successful in the majority with minimal long-term complications. The vast majority of patients with self-insertion did not have an underlying psychiatric condition needing intervention.

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

References

1. Van Ophoven A, deKernion JB. Clinical management of foreign bodies of the genitourinary tract. *J Urol* 2000; 164 (2): 274-287. doi: 10.1097/00005392-200008000-00003
2. Kochakarn W, Pummanagura W. Foreign bodies in the female urinary bladder: 20-year experience in Ramathibodi Hospital. *Asian J Surg* 2008; 31(3):130-133. doi: 10.1016/S1015-9584(08)60073-1
3. Eckford SD, Persad RA, Brewster SF, Gingell JC. Intravesical foreign bodies: five-year review. *Br J Urol* 1992; 69(1):41-45. doi: 10.1111/j.1464-410x.1992.tb15456.x
4. Rafique M. Intravesical foreign bodies: review and current management strategies. *Urol J* 2008; 5(4):223-231. PMID: 19101894
5. Bansal A, Yadav P, Kumar M, Sankhwar S, Purkait B, Jhanwar A, Singh S. Foreign Bodies in the Urinary Bladder and Their Management: A Single-Centre Experience From North India. *Int Neurourol J* 2016; 20(3):260-269. doi: 10.5213/inj.1632524.262
6. Jayasinghe R, Jayarajah U, Seneviratne S. Overview of Medical Management of Transgender Men: Perspectives from Sri Lanka. *Sexes* 2021; 2(4):397-405. <https://doi.org/10.3390/sexes2040031>
7. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004; 240(2):205-213. doi: 10.1097/01.sla.0000133083.54934.ae
8. Rahman NU, Elliott SP, McAninch JW. Self-inflicted male urethral foreign body insertion: endoscopic management and complications. *BJU Int* 2004; 94(7):1051-1053. doi: 10.1111/j.1464-410X.2004.05103.x
9. Rada RT, James W. Urethral insertion of foreign bodies. A report of contagious self-mutilation in a maximum-security hospital. *Arch Gen Psychiatry* 1982; 39(4):423-429. doi: 10.1001/archpsyc.1982.04290040033005
10. Kumar Pandey P, Goel A, Kumar Pal D, Kumar Kundu A. Foreign bodies in lower urinary tract: case report and review of literature. *Iran Red Crescent Med J* 2013; 15(7):611-613. doi: 10.5812/ircmj.7074
11. Abeygunasekera AM, Fathiehu F, Weerasiri P. Gossypiboma. *Ceylon Med J*. 2009; 54(3):98-9. doi: 10.4038/cmj.v54i3.1206.

Surgical outcome of pediatric thoracoscopic surgery: retrospective evaluation and literature review

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Keywords: VATS; thoracoscopy; children; thoracic surgery; neonatal surgery

Abstract

Introduction

Minimally invasive thoracoscopic surgical techniques are increasingly being applied in paediatrics for a multiplicity of conditions. It has been shown to minimise thoracic musculoskeletal deformity and to improve pulmonary mechanics compared to open procedures.

Methods

All the children who underwent advanced thoracoscopic procedures from July 2020 up to December 2021 were retrospectively evaluated and reviewed with regard to outcome and complications. Techniques of thoracoscopic diaphragmatic hernia repair and decortication for empyema were standardized in our series.

Results


There were 26 children who underwent thoracoscopic procedures, out of which 14 were neonates having congenital diaphragmatic hernia and eventration. In addition, there were five children having infective pathologies, namely four empyemas and one lung abscess. All of them had successful thoracoscopic interventions. There were five children who had thoracic neoplastic lesions including three neurogenic tumours. Thoracoscopic diaphragmatic hernia repair was showing good post-operative outcome while the repair of congenital eventration was reported to have 75% recurrence following thoracoscopic repair.

Conclusions

Thoracoscopic techniques could be successfully utilized to treat a number of conditions in children. Case selection by predefined criteria and standardized technique in congenital diaphragmatic hernia repair have contributed for improved postoperative outcome. The technique of thoracoscopic repair of diaphragmatic eventration has to be revisited due to

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Received: 01-02-2022 Accepted: 10-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8937>



its higher recurrence rate in our setting probably due to technical difficulty. Thoracoscopic tumour resections have shown promising outcomes in our series.

Introduction

Minimally invasive surgical (MIS) techniques are increasingly being applied in paediatrics for both diagnostic and therapeutic procedures. Minimally invasive thoracoscopic interventions were initially employed as a diagnostic modality but now have become the preferred therapeutic modality for many conditions such as congenital diaphragmatic hernia (CDH), parapneumonic empyema, and congenital pulmonary airway malformations etc. Compared to open surgical interventions, MIS has gained widespread acceptance due to less tissue trauma, less postoperative pain, reduced hospital stay and improved recovery, while thoracoscopy specifically has shown less risk of thoracic musculoskeletal deformities and improved pulmonary mechanics.

In one study, up to 35% of neonates developed significant musculoskeletal deformity after thoracotomy for oesophageal atresia and tracheo-oesophageal fistula repair [1], which could be minimised by thoracoscopic interventions. Precision in the dissection due to magnification and increasing use of a multiplicity of energy devices have improved outcomes after complex thoracoscopic interventions like pulmonary lobectomies. Several thoracoscopic interventions have become standardised and has led to improved postoperative outcomes such as CDH repair and pulmonary lobectomies. Our objective was to assess the outcome and complications of children who underwent advanced thoracoscopic procedures over the last 2 years at Sirimavo Bandaranaike Specialised Children's Hospital (SBSCH), Peradeniya and Teaching Hospital Peradeniya, Sri Lanka.

Patients and methods

We performed a retrospective review of all children who underwent advanced thoracoscopic interventions from July 2019 up to December 2021 in SBSCH Peradeniya and Teaching hospital Peradeniya. The patient information and operative interventions had been collected on an Electronic Medical Record (EMR) database and were reviewed

retrospectively for the study. For the babies with CDH, selection for the thoracoscopic intervention was done according to the institutional criteria for the repair of congenital diaphragmatic hernia. For all other conditions, the selection was based on the technical feasibility to perform the thoracoscopic procedure.

All the neonatal patients were operated on under general anaesthesia with endotracheal intubation. Beyond the neonatal period, mainstem bronchial intubation was done selectively when the requirement and the technical feasibility were met. A standardized operative technique was developed and used in thoracoscopic diaphragmatic hernia repair and decortication of empyema.

In all the thoracoscopic procedures, port placement was by the open Hassan technique. Port placement was done primarily to achieve triangulation, with the camera port changed to achieve optimum visibility during dissection. Intrathoracic insufflation was achieved at a pressure of 4-6mmHg to facilitate lung collapse. For diaphragmatic hernia repair, insufflation was only maintained until the contents were reduced to the peritoneal cavity. End-tidal CO₂ (EtCO₂) concentration was measured during all neonatal thoracoscopic interventions.

Results

In our series, 26 children underwent advanced thoracoscopic procedures. Out of these, 14 patients were neonates who underwent thoracoscopic repair of diaphragmatic hernia and congenital diaphragmatic eventration. The following table shows the spectrum of the thoracoscopic procedures during the study period.

Table 1. Spectrum of thoracoscopic procedures

Intervention	Number
Diaphragmatic hernia repair	10
Congenital eventration repair	04
Decortication for empyema	04
Resection of thoracic neuroblastoma	02
Resection of thoracic neurofibroma	01
Excision of mediastinal lymphangioma	01
Excision of thoracic wall Ewing's Sarcoma	01
Resection of pleuro pulmonary blastoma	01
Drainage of lung abscess	01
Lung lobectomy for congenital pulmonary airway malformation(CPAM)	01

Thoracoscopic diaphragmatic hernia and eventration repair

Thoracoscopic diaphragmatic hernia repair was undertaken in 10 neonates while repair of eventration was undertaken in 4 neonates within the study period. All the babies were selected for repair of hernia according to institutions criteria for selection[Table 2]. Out of these, thoracoscopic repair was undertaken in babies having an intra-abdominal stomach as determined by the chest and abdominal x-ray. All the babies with diaphragmatic eventration who were ventilated on admission due to respiratory distress were selected for repair.

Table 2. Preoperative criteria for surgical intervention in congenital diaphragmatic hernia

Institutional criteria for the repair of congenital diaphragmatic hernia
Preductal oxygen saturation more than 85% with FiO ₂ of 0.5%
Urine output of more than 1.5ml/kg/hour
Only one or no inotrope support
Normal mean arterial pressure for the gestational age

Preoperative findings

Out of all neonates, 9 (64.3%) were males and 5(35.7%) were females. Antenatal diagnosis of diaphragmatic hernia was possible in only 3(21.4%) patients. Ten babies were born at term while 4 babies were premature, with low birth weight noted in 6(42.9%) babies. Ten babies(71.4%) were having more than 93% preductal oxygen saturation and only one patient was on dobutamine support on admission to the surgical intensive care unit. Congenital cardiac anomalies were noted in 7 babies while pulmonary hypertension was noted to be severe in 5 patients. All the babies with diaphragmatic hernias had 48 hours of preoperative stabilisation to optimise the ventilation.

Table 3. Distribution of pulmonary hypertension in congenital diaphragmatic hernia and congenital eventration

Degree of pulmonary hypertension	Frequency	Percentage %
No	6	42
Mild	5	35.7
Moderate	1	7.1
Severe	2	14.3
Total	14	100

Table 4. Age at surgery in congenital diaphragmatic hernia and congenital eventration

Age in days	Frequency	Percentage %
2	1	7.1
3	5	35.7
4	4	28.6
5	1	7.1
6	2	14.3
7	1	7.1
Total	14	100

Intraoperative findings

Out of 10 babies with a diaphragmatic hernia, only one baby had primary repair while all others had patch repair with Prolene mesh. All the babies with eventration had a primary repair. The mean operative time for thoracoscopic repair was 132 minutes with a minimum of 85 and a maximum of 330 min. The first thoracoscopic repair had the longest operative time of 330 min in the series. End-tidal CO₂(EtCO₂) level was monitored every 15 minutes during the procedure to measure the impact of CO₂ pneumothorax on the blood gas and acidosis. Mean EtCO₂ was 34.6mmHG with a minimum of 26.8mmhg and a maximum of 38.14mmhg during the procedure. Only one baby was on Dobutamine support at the time of surgery which was tailed off post-operatively.

Postoperative findings

Intercostal drainage was done in all children, which was kept for a mean of 7.36 days. Inotropic support was given only for one patient which was tailed off post-operatively. Five babies were complicated with neonatal sepsis following the procedure, who were managed with broad-spectrum antibiotics, and recovered. One baby following CDH repair died on day 10 due to sepsis and related complications.

Two babies developed acute renal impairment including the one who died following diaphragmatic hernia repair. Intercostal tube drainage was done for all the neonates and was removed at a mean of 7.36 days following the procedure. Out of the 4 babies following eventration repair, 3 babies represented recurrence and were subjected to redo operation. There were no recurrences following CDH repair. Nearly 43% of babies were extubated 4-5 days after the procedure.

Decortication for empyema and drainage of pulmonary abscess

Thoracoscopic decortication was performed in 4 patients for complicated empyema [Table 5]. In 3 children the empyema was in the fibrinopurulent stage. In two children, preoperative fibrinolytic therapy with Tissue Plasminogen Activator (tPA) was continued for 7 days but there was no demonstrable

improvement and both of them were on a ventilator due to trapped lungs. Both of them were having high fever spikes with elevated inflammatory markers. Due to poor response to fibrinolytic treatment and the complicated nature of empyema, thoracoscopic decortication was done.

Table 5. Details of children who underwent thoracoscopic decortication for empyema

Patient No	Age (years)	Sex	Stage of Empyema	Pre Op tPA therapy	Post Op tPA therapy
1	3	Female	Fibrinopurulent	Given	Given
2	2	Female	Fibrinopurulent	Given	Given
3	3 8/12	Female	Fibrinopurulent	Not given	Given
4	1	Male	Early organising	Not given	Not given

In all patients, a three-port approach was done and the decortication was completed within 90 minutes. The procedure was done under tracheal intubation and two intercostal drainage tubes were inserted for optimum drainage of purulent fluid. Postoperatively three of them were given intrapleural tPA (Tissue Plasminogen Activator) therapy after 48 hours to improve pleural drainage from intercostal tubes. All of them improved dramatically after the decortication with good pulmonary function.

The fourth patient had a complicated parapneumonic effusion secondary to infection of congenital pulmonary airway malformation. He did not require ventilator support and underwent early primary thoracoscopic decortication.

The child with lung abscess presented with high fever, cough and respiratory distress but didn't require ventilation. She was initially treated with broad-spectrum antibiotics for nearly 10 days but did not show evidence of improvement. The abscess was located in the right middle lobe in the subpleural location. During thoracoscopy, the abscess was found to be extending through the visceral pleura and walled off by the parietal pleura without developing into an empyema. The abscess was completely drained and revealed to be a fungal abscess which needed prolonged antifungal treatment.

Table 6. Details of intra thoracic neoplastic lesions

Tumour	Type	Age	Size of tumour	Location of tumour	Type of intubation	Duration of surgery
Neuroblastoma 1	Malignant	8M	3.0X3.0cm	Right apical C2-C3	Left main stem	180 min
Neuroblastoma 2	Malignant	1Y6M	3.0X2.5cm	Right C4-C5	Tracheal (left main stem failed)	90 min
Neurofibroma	Benign	7Y	8.0X6.0cm	Left cervico thoracic	Tracheal	240 min
Ewing's tumour	Malignant	2Y	5.0X4.0cm	Right 8-10 ribs	Tracheal	260 min
Lymphangioma	Benign	2Y7M	7.0X5.0cm	Right paracardiac	Tracheal	320 min
Pleuro Pulmonary Blastoma	Malignant	2Y9M	8.0X7.0cm	Right lung middle lobe	Tracheal	190 min

Resection of intrathoracic tumours

Thoracoscopic interventions were done on six children with intrathoracic neoplastic lesions. Out of these, except for pleuropulmonary blastoma, all others had extrapulmonary lesions. Both children with neuroblastoma attempted to have left main stem bronchial intubation but only one succeeded [table 6]. All the children had lateral positioning with the table tilt to achieve a near prone position depending on the need. The intrathoracic insufflation of gas was limited up to 4-8mmhg pressure during the procedure. Neo-adjuvant chemotherapy was given for the first child with neuroblastoma, and the one with Ewing's sarcoma. Both of them had a remarkable response and the tumours were adequately downstaged.

Other procedures

Thoracoscopy for cystic lung disease

Cystic lung disease was intervened thoracoscopically in a 14 years old girl having congenital pulmonary airway malformation (CPAM) of the right lower lobe. She presented initially with a lower respiratory tract infection and was found to have a right lower lobe CPAM. The resection was accomplished thoracoscopically. Lung collapse was achieved with intrathoracic insufflation up to 8mmhg. There were no untoward effects of thoracic insufflation on the ventilation during the procedure. The major fissure was found to be complete and pulmonary arterial branches were divided before the division of the pulmonary venous branches. Vascular branches were taken up by ultrasonic dissector and endoscopic clips. Bronchial branches were taken up by endoscopic clips and vascular staplers. She had an uneventful recovery postoperatively.

Discussion

Since the first diagnostic thoracoscopy was performed in 1971 by Klimkovitch and coworkers,[2], there had been numerous diagnostic and therapeutic thoracoscopic procedures developed for children. Many advanced thoracoscopic procedures in children were successively introduced after thoracoscopic lobectomy was performed by Rothenberg and oesophageal atresia repair was done in Berlin.[3] Currently, many thoracoscopic procedures are being standardised in children and evidence is emerging on its applicability and improved outcomes compared to open procedures.

The advantages of minimally invasive thoracoscopic surgery compared to open surgery are well substantiated with special emphasis on minimising long-term thoracic deformity associated with open thoracotomy.[1] However, surgeons' learning curve and feasibility of performing advanced thoracoscopic surgery in children have long lagged due to a

lack of training opportunities and unfamiliarity with thoracic and pulmonary anatomy and anatomical variations.[4] In our setup, as an initial step of starting thoracoscopic interventions, empyemas were treated with thoracoscopic decortication successfully. With increasing experience in anaesthesia for thoracoscopy, neonatal thoracoscopic interventions for diaphragmatic hernia were performed with excellent postoperative outcomes. For neonatal procedures, thoracic insufflation was done up to 4mmhg and up to 8-10 mmHg for older children. Tracheal intubation along with insufflation has shown to achieve a similar outcome compared to single lung ventilation in thoracoscopy.[5] In our series, only one procedure was done with selective bronchial intubation and single lung ventilation.

Thoracoscopic congenital diaphragmatic hernia repair

Since the introduction of thoracoscopic CDH repair by Van De Zee.[6] the outcome has been assessed by numerous studies. Even though the technology and experience have improved over the last 2 decades, surgical complications are still not comparable with open surgery. In our series, the selection of neonates for thoracoscopic CDH repair was done with the use of a predefined criterion. Intraoperative hypercapnia and acidosis are well-documented complications of thoracoscopic CDH repair.[7] In our series, intraoperative end-tidal CO₂ concentration was assessed as an indirect measurement of acidosis. Mean EtCO₂ was 34.6mmhg which was acceptable for neonates undergoing thoracoscopic CDH repair.[7] Significant Intraoperative acidosis has been demonstrated in up to 40% of babies during thoracoscopic surgery in neonates.[8]

Institutional preoperative criteria for the surgical intervention have been consistently used to identify the candidates for surgical intervention, and the thoracoscopic intervention was not offered for the babies with CDH having stomach or liver up in the thorax. The presence of the spleen was not a contraindication for thoracoscopic intervention. Recurrence following thoracoscopic CDH repair has been documented to be up to 24% in one review, with a higher recurrence rate noted following primary repair.[9] In our series, up to now, no recurrence has been noted following CDH repair but a 75% recurrence rate has been observed following thoracoscopic eventration repair. Patch repair has been adopted in 95% of patients in our series which has possibly contributed to less recurrence following thoracoscopic diaphragmatic hernia repair. In one series, 33% recurrence has been noted following direct repair and 12% recurrence following patch repair.[10] In our series, patch repair was adopted with a low threshold which resulted in the reconstruction of the dome and minimal tension repair.

The outcome of neonatal thoracoscopic eventration repair has been studied minimally. Even though the initial outcome was satisfactory in our series, late-onset recurrence (after 3 months) was common following eventration repair. The aetiology of recurrence was unclear in our series but was thought to be due to technical difficulty in the repair and non-excision of the thinned dome of the diaphragm during the repair. However, in a recent study, excision of the sac was not practised during the repair but plication only, which has resulted in a 93% success rate.[11]

Thoracoscopy for infective pathology of pleura and lung

Empyema and lung abscess are common infectious pathologies which need surgical intervention when medical management fails. Parapneumonic effusion leading to established empyema needs aggressive treatment to prevent progression to the organising stage of empyema which could cause trapped lung.[12] Primary fibrinolytic treatment versus primary VATS and decortication is still a subject of controversy in view of the outcome. In a meta-analysis comparing primary operative therapy with non-operative therapy for paediatric empyema, a significantly reduced risk of failure has been demonstrated in the operative arm compared to non-operative management.[13] Thoracoscopic decortication as salvage therapy after failure of fibrinolytic treatment was done in two of our patients. In many series, it has been demonstrated that surgical intervention has improved the outcome of children who had a failure of initial medical management.[13] Early decortication after the failure of fibrinolytic treatment could prevent morbidity of thoracoscopic decortication when performed at a later stage of organising empyema. However, the risk of bleeding is higher when VATS was performed after fibrinolytic treatment.[13] There were no hemorrhagic or septic complications following the procedure in all four of our patients. In empyema, decortication is recommended to be completed within 90 min to prevent hypoxemia and septic complications.

Lung abscess is primarily treated with intravenous antibiotics but surgical intervention becomes necessary when there's a poor response to antibiotics.[14] The conventional surgical intervention for failed medical treatment of lung abscess is open pneumonectomy or formal lobectomy.[15, 14] Lung abscesses could occur due to aerobic or anaerobic organisms, while *Staphylococcus aureus* is a common organism. In our patient, purulent fluid yielded fungal organisms hence protracted treatment with antifungals was given.

Thoracoscopic pulmonary lobectomy

Pulmonary lobectomies on children are done for a variety of conditions such as congenital pulmonary airway

malformations, pulmonary sequestrations, bronchogenic cysts, pleuropulmonary blastoma and congenital emphysema.[16] Thoracoscopic lobectomy is one of the most demanding operations due to the complexity of vascular and bronchial anatomy in the lung. Identifying the vascular and bronchial structures with certainty and controlling them with appropriate energy devices and staples are crucial for a successful lobectomy.

Despite the advantages of thoracoscopic procedures, there's a relative lag in the adoption of these procedures due to the complexity of the anatomy of the lung and the inadequate training opportunities on thoracoscopic procedures. However thoracoscopic lobectomy has become a well-accepted procedure, backed by many studies in the literature.[17]

Resection of intrathoracic tumours

In children 60% of the neurogenic tumours of the thorax are malignant, hence thoracoscopic interventions are feared with the risk of recurrence due to inadequate resection and port site seeding. Thoracoscopy is being increasingly applied in the resection of these tumours and the overall outcome has been satisfactory with similar results demonstrated compared to open thoracotomy. But despite the benefits of thoracoscopy, resection of neurogenic tumours is still a subject of controversy.

In a multi-institutional retrospective case analysis, thoracoscopic tumour resection has shown good outcomes without any evidence of port site recurrence.[18] but recurrence at the thoracostomy site has been demonstrated in a few studies.[19] Overall the literature indicates that thoracoscopic interventions are effective for the treatment of thoracic neurogenic tumours in children.[19]

For benign neoplastic conditions like mediastinal lymphangioma, thoracoscopic excision has been accomplished.[20] The risk of recurrence will be high in these lesions if it is closely related to pericardium or great vessels.[20]

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

References

1. Jaureguizar E, Vazquez J, Murcia J, Pardo JD. Morbid musculoskeletal sequelae of thoracotomy for tracheoesophageal fistula. *Journal of pediatric surgery*. 1985 Oct 1;20(5):511-4. [https://doi.org/10.1016/S0022-3468\(85\)80477-2](https://doi.org/10.1016/S0022-3468(85)80477-2)
2. Rodgers BM, Moazam F, Talbert JL. Thoracoscopy: early diagnosis of interstitial pneumonitis in the immunologically

- suppressed child. *Chest*. 1979 Feb 1;75(2):126-30. <https://doi.org/10.1378/chest.75.2.126>
3. Rothenberg SS, Chang JH, Bealer JF. Experience with minimally invasive surgery in infants. *The American journal of surgery*. 1998 Dec 1;176(6):654-8. [https://doi.org/10.1016/S0002-9610\(98\)00278-5](https://doi.org/10.1016/S0002-9610(98)00278-5)
 4. Rothenberg SS, Middlesworth W, Kadennhe-Chiweshe A, Aspelund G, Kuenzler K, Cowles R, Bodenstien L, Kay S, Shipman K, Rothenberg C, Stolar C. Two decades of experience with thoracoscopic lobectomy in infants and children: standardizing techniques for advanced thoracoscopic surgery. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2015 May 1;25(5):423-8. <https://doi.org/10.1089/lap.2014.0350>
 5. Rothenberg SS. Thoracoscopy in infants and children: the state of the art. *Journal of pediatric surgery*. 2005 Feb 1;40(2):303-6. <https://doi.org/10.1016/j.jpedsurg.2004.10.021>
 6. Van der Zee DC, Bax NM. Laparoscopic repair of congenital diaphragmatic hernia in a 6-month-old child. *Surgical endoscopy*. 1995 Sep;9(9):1001-3. <https://doi.org/10.1007/BF00188460>
 7. McHoney M, Giacomello L, Nah SA, De Coppi P, Kiely EM, Curry JI, Drake DP, Eaton S, Pierro A. Thoracoscopic repair of congenital diaphragmatic hernia: intraoperative ventilation and recurrence. *Journal of pediatric surgery*. 2010 Feb 1;45(2):355-9. <https://doi.org/10.1016/j.jpedsurg.2009.10.072>
 8. Bishay M, Giacomello L, Retrosi G, Thyoka M, Garriboli M, Brierley J, Harding L, Scuplak S, Cross KM, Curry JI, Kiely EM. Hypercapnia and acidosis during open and thoracoscopic repair of congenital diaphragmatic hernia and esophageal atresia: results of a pilot randomized controlled trial. *Annals of surgery*. 2013 Dec 1;258(6):895-900. doi: 10.1097/SLA.0b013e31828fab55
 9. Vijfhuize S, Deden AC, Costerus SA, Sloots CE, Wijnen RM. Minimal access surgery for repair of congenital diaphragmatic hernia: is it advantageous?—an open review. *European Journal of Pediatric Surgery*. 2012 Oct;22(05):364-73. doi: 10.1055/s-0032-1329532
 10. Keijzer R, van de Ven C, Vlot J, Sloots C, Madern G, Tibboel D, Bax K. Thoracoscopic repair in congenital diaphragmatic hernia: patching is safe and reduces the recurrence rate. *Journal of pediatric surgery*. 2010 May 1;45(5):953-7. <https://doi.org/10.1016/j.jpedsurg.2010.02.017>
 11. Singh G, Rai RK, Pant N, Wakhlu A. Study of Thoracoscopic Repair of Diaphragmatic Eventration in Children: A Case Series. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2020 Jun 1;30(6):692-4. <https://doi.org/10.1089/lap.2019.0805>
 12. Hettiarachchi, M., Dissanayake, P., Wijeyananda, A. and Faizal, M., 2021. Video assisted thoracoscopic surgery (VATS) for complicated para-pneumonic empyema in two children. *Sri Lanka Journal of Child Health*, 50(2), pp.340–341. doi: <http://doi.org/10.4038/sljch.v50i2.9584>
 13. Avansino JR, Goldman B, Sawin RS, Flum DR. Primary operative versus nonoperative therapy for pediatric empyema: a meta-analysis. *Pediatrics*. 2005 Jun 1;115(6):1652-9. <https://doi.org/10.1542/peds.2004-1405>
 14. Nagasawa KK, Johnson SM. Thoracoscopic treatment of pediatric lung abscesses. *Journal of pediatric surgery*. 2010 Mar 1;45(3):574-8. <https://doi.org/10.1016/j.jpedsurg.2009.10.047>
 15. Cowles RA, Lelli Jr JL, Takayasu J, Coran AG. Lung resection in infants and children with pulmonary infections refractory to medical therapy. *Journal of pediatric surgery*. 2002 Apr 1;37(4):643-7. <https://doi.org/10.1053/jpsu.2002.31629>
 16. Rothenberg S. S. (2021). Thoracoscopic Lobectomy in Infants and Children. *Journal of laparoendoscopic & advanced surgical techniques. Part A*, 31(10), 1157–1161. <https://doi.org/10.1089/lap.2014.0350>
 17. Rothenberg SS. First decade's experience with thoracoscopic lobectomy in infants and children. *Journal of pediatric surgery*. 2008 Jan 1;43(1):40-5. <https://doi.org/10.1016/j.jpedsurg.2007.09.015>
 18. Fraga JC, Rothenberg S, Kiely E, Pierro A. Video-assisted thoracic surgery resection for pediatric mediastinal neurogenic tumors. *Journal of pediatric surgery*. 2012 Jul 1;47(7):1349-53. <https://doi.org/10.1016/j.jpedsurg.2012.01.067>
 19. Hayes-Jordan AA, Daw NC, Furman WL, Hoffer FA, Shochat SJ. Tumor recurrence at thoracostomy tube insertion sites: a report of two pediatric cases. *Journal of pediatric surgery*. 2004 Oct 1;39(10):1565-7. <https://doi.org/10.1016/j.jpedsurg.2004.06.026>
 20. Hettiarachchi M. Thoracoscopic excision of an intrathoracic para-cardiac lymphangioma of a child. *Journal of Pediatric Surgery Case Reports*. 2021 Nov 1;74:102039. <https://doi.org/10.1016/j.epsc.2021.102039>

Distal pancreatectomy: comparison of open and laparoscopic techniques

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Keywords: Distal pancreatectomy; body and tail of pancreas tumour; laparoscopy

Abstract

Introduction

Distal pancreatectomy [DP] is the curative treatment for tumours of the body and tail of the pancreas. It may be with en-bloc splenectomy or spleen preserving. Latter is technically more challenging. The procedure may be performed by open surgery or by laparoscopy. We evaluated the outcomes in a cohort of patients comparing open surgery versus laparoscopy for DP.

Objective

Compare open surgery vs laparoscopy for DP

Method

A retrospective analysis of patients who underwent DP at a single surgical unit was done. The study period was from 2015 January to 2022 January.

Results

Thirteen patients underwent the procedure, eight by laparoscopy and four by open surgery while one had a conversion to open.

Conclusions

Distal pancreatectomy is feasible with laparoscopy and reduces postoperative morbidity. The blood loss is less and has cosmetic advantages, especially in young patients

Introduction

Distal pancreatectomy [DP] is the treatment for benign, premalignant, and malignant tumours in the body and tail of the pancreas. Resection of pancreatic tissue left to the Portomesenteric vein is performed in DP. This is with or without splenectomy.

The laparoscopic approach is used for many abdominal procedures since its initial use for cholecystectomy in 1987. However, laparoscopic pancreatic resections took time to develop due to the relative complexity of pancreatic anatomy, retroperitoneal location and vascular relations [1].

Laparoscopic distal pancreatectomy [LDP] was first described in 1994 and has recently been adopted by many centres. By performing DP laparoscopically morbidity is reduced allowing early discharge from the hospital [3][4][5].

Incidence of pancreatic fistula after distal pancreatectomy remains high. Other complications described are intra-abdominal abscesses, wound infections, problems of gastric emptying, ileus and haemorrhage [6].

A comparison of DP performed in our unit by open and laparoscopic techniques is presented in this article.

Method

A retrospective analysis of patients who underwent DP was done. The study period was from 2015 January to 2022 January.


The open surgeries were performed in the supine position using a subcostal incision. Division of the pancreas was by stapler. Laparoscopic resections were performed in the right lateral position and the head end was raised. Five ports were used. In cases where the spleen was preserved splenic supply was by preserving splenic artery and vein. Division of the pancreas was done using bipolar diathermy and ultrasonic dissector with stump unsutured. The resected specimen was retrieved after placing in a plastic bag.

Results

Thirteen patients underwent the procedure, eight by laparoscopy and four by open surgery. One had laparoscopy converted to open.

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Received: 26-12-2021 Accepted: 22-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8930>



Table 1. Laparoscopic distal pancreatectomy

Gender	Male	Female	Total
Number	6	2	8

Table 2. Open distal pancreatectomy

Gender	Male	Female	Total
Number	2	2	4

One female had a laparoscopy procedure converted to open due to lack of progress.

Eleven patients had a mass in the pancreatic body and/ or tail. In one, the indication was an aneurysm of the splenic artery. The other patient previously underwent excision of a left malignant pheochromocytoma. On follow-up PET-CT scan a possible recurrence of the pancreatic tail was demonstrated and oncologists requested a DP with splenectomy.

All open patients underwent splenectomy. In the laparoscopy group, two had spleen preserving DP.

The following tables show the duration of surgeries.

Table 3. Duration of surgery during open DP

Case no	1	2	3	4	Average
Duration [min]	240	200	180	180	200

Table 4. Duration of surgery during laparoscopic DP

Case no	1	2	3	4	5	6	7	8	Average
Duration [min]	180	160	160	220	180	160	230	150	180

The patient who had the conversion to open took 250 minutes.

The following tables show blood loss during surgery.

Table 5. Blood loss during open DP

Case no	1	2	3	4	Average
Blood loss [ml]	750	400	350	500	500

Table 6. Blood loss during laparoscopic DP

Case no	1	2	3	4	5	6	7	8	Average
Blood loss [ml]	100	150	75	75	100	100	125	75	100

Blood loss in the patient who underwent conversion was 1000ml.

All were managed with epidural and intermittent subcutaneous morphine during the first 24 hours in ICU.

Pain relief for patients who underwent laparoscopic DP after the first twenty-four hours was with diclofenac suppository and oral paracetamol/ codeine.

Pain relief for patients who underwent open DP required subcutaneous morphine for forty-eight to seventy-two hours and subsequently was managed with diclofenac sodium suppositories and oral paracetamol and codeine.

Patients who had laparoscopy converted to open had persistent drainage and the drain was left in situ for five weeks with high amylase levels in the draining fluid. In all others, the drain was removed by the fifth postoperative day. Two in the open surgery group had minor superficial wound infections.

Patients after open surgery were discharged within seven to fourteen days.

Table 7. Histopathology

Histopathology	Number
Adenocarcinoma	3
Solid pseudopapillary neoplasm	4
Mucinous cystic neoplasm	2
Serous cystadenoma	2
Suppurative granulomatous reaction	1
Pseudo-aneurysm of splenic artery	1
Total	13

The suppurative granulomatous reaction was seen in the patient who previously underwent excision of left malignant pheochromocytoma

Discussion

The incidence of malignancies in the body and tail of the pancreas is low compared to that of the head. A 10-year study, from 2001–2010, with data from the National cancer registry in Sri Lanka, records 880 patients with pancreatic cancer.

Out of these patients, for individuals where data was available, the site of malignancy included, 2.7% for the body and 4.0% for the tail of the pancreas [2]. This data explains the low numbers in our study, despite our unit being a referral centre.

The standard treatment of tumours of the body and/ or tail of the pancreas is distal pancreatectomy. This may be with or without splenectomy. Spleen preserving splenectomy may be by preserving the splenic artery and vein or by preserving the short gastric vessels [2]. The technique used in the two patients who had spleen-preserving DP in our study was the former technique.

Distal pancreatectomy [DP] is the curative treatment for benign, premalignant, and malignant tumours located in the body and tail of the pancreas.

In this study group, eleven patients had a mass in the pancreatic body and/ or tail. In one, the indication was an

aneurysm of the splenic artery. The other patient previously underwent excision of a left malignant pheochromocytoma. On a follow-up PET-CT scan a possible recurrence of the pancreatic tail was demonstrated and oncologists requested a DP with splenectomy.

The duration of surgeries is slightly higher in the open group. In the laparoscopy group, one reason for shorter operating time is the time saved for opening and closing. The blood loss was less in the laparoscopy group which was statistically significant according to independent samples t-test.

One patient had a conversion to open surgery due to lack of progress and the tumour infiltrating posteriorly.

In both groups, oral feeding was commenced on the first postoperative day. The analgesic requirement was less in the laparoscopy group.

The standard technique is to use staplers to divide the pancreas. The alternative is to suture the pancreatic stump after division by diathermy [6][7]. These techniques were used in an open surgery group. Patients who underwent laparoscopic resection had a division of the pancreas by bipolar diathermy and ultrasonic dissector. A close magnified look with the camera at the divided stump showed evidence of secure sealing. We decided not to re-inforce with sutures as it may simply cut through. Pancreatic fistula rate is about 4 to 69% after DP according to literature [7].

One patient in this group developed a pancreatic fistula. This was the patient who had a conversion to open surgery in which the pancreatic stump was sutured. The histopathology was adenocarcinoma with a positive resection margin. The fistula healed spontaneously after five weeks.

The analgesic requirement was less in the laparoscopy group and discharged was earlier than open patients. The wound size was significantly smaller in the laparoscopy group.

All the tumours had free resection margins ensuring oncological safety. There is no clear evidence about the cost-effectiveness of LDP compared to open DP for pancreatic tumours [8]. We have not assessed this factor in our study. However other advantages discussed for the patients presented support to pursue on laparoscopic approach for distal pancreatectomy.

Conclusions

Distal pancreatectomy with or without splenectomy can be safely performed by laparoscopy. Division of pancreas by bipolar diathermy and ultrasonic dissector without suturing the stump did not lead to any complications. Per operative blood loss and postoperative morbidity of the laparoscopy group were less. All in the laparoscopy group were discharged by the sixth postoperative day.

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

References

1. Sui CJ, Li B, Yang JM, Wang SJ, Zhou YM. Laparoscopic versus open distal pancreatectomy: A meta-analysis. *Asian J Surg* [Internet]. Elsevier Taiwan LLC; 2012;35[1]:1–8. doi:10.1016/j.asjsur.2012.04.001
2. Umesh Jayarajah, Isuru Almeida, Ashan Fernando, Sanjeewa Seneviratne, Dharmabandu Nandadeva Samarasekera. Incidence and age standardized rates of pancreatic cancer in Sri Lanka from 2001 to 2010: An analysis of National cancer registry data *Indian Journal of Cancer* 2021;58[3]:387-393.
3. Gavriilidis P, Roberts KJ, Sutcliffe RP. Comparison of robotic vs laparoscopic vs open distal pancreatectomy. A systematic review and network meta-analysis. *Hpb* [Internet]. International Hepato-Pancreato-Biliary Association Inc.; 2019;21[10]:1268–76. doi:10.1016/j.hpb.2019.04.010
4. Gurusamy KS. Laparoscopic versus open distal pancreatectomy for pancreatic cancer. *Cochrane Database Syst Rev*. 2014;2014[11]. doi:10.1371/journal.pone.0189631
5. Beard RE, Charpentier KP. Laparoscopic versus open distal pancreatectomy—it's time to shift our focus and randomize our studies. *Laparosc Surg*. AME Publishing Company; 2018 Apr;2:13–13. doi: 10.21037/ls.2018.03.05
6. De Rooij T, Sitarz R, Busch OR, Besselink MG, Abu Hilal M. Technical Aspects of Laparoscopic Distal Pancreatectomy for Benign and Malignant Disease: Review of the Literature. *Gastroenterol Res Pract*. 2015;2015. doi:10.1155/2015/472906
7. Björnsson B, Sandström P, Larsson AL, Hjalmarsson C, Gasslander T. Laparoscopic versus open distal pancreatectomy [LAPOP]: Study protocol for a single center, nonblinded, randomized controlled trial. *Trials*. 2019;20[1]:4–8. doi:10.1186/s13063-019-3460-y
8. Gurusamy K S, Riviere D, van Laarhoven C J H, Besselink M, Abu-hilal M, Davidson BR, et al. Cost-effectiveness of laparoscopic versus open distal pancreatectomy for pancreatic cancer. *PLoS One*. 2017;12[12]:1–14. doi:10.1371/journal.pone.0189631

Pattern of occlusive disease in lower extremity arteries in patients qualifying for revascularization in a North Central Province tertiary care centre in Sri Lanka

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Keywords: Pattern of occlusive arterial disease; arterial segments; risk factors; clinical presentation

Abstract

Introduction

In Sri Lanka many patients with occlusive arterial disease [OAD] undergo revascularization. The patterns of OAD vary with the underlying risk factors, however there is a paucity of data regarding this in Sri Lankan patients. Only one study reported the pattern of OAD among patients undergoing angioplasty in Sri Lanka. This study used conventional or catheter angiograms. There were no studies describing the patterns of OAD based on computerized tomographic angiography [CTA] imaging was reported in Sri Lanka earlier. This study describes the CTA based pattern of OAD among patients admitted for intervention at the Teaching Hospital Anuradhapura [THA].

Methods

This study was done at the vascular and transplant unit of THA. Patients with critical limb ischemia [ulcer, gangrene, rest pain] and disabling claudication were included. Data on patient demography, comorbid diseases, and the pattern of arterial occlusion were analysed.

Results

100 patients with 81 [81%] males were included. The mean age was 67.6 years [53-83]. 60 had ulcers, 25 gangrene, 10 rest pain and 5 had disabling claudication. 63 [63%] were smokers. diabetes mellitus, hypertension, ischemic heart disease, heart failure and chronic kidney disease were present in 65 [65%], 47, 25, 11 and 13 respectively.

Distal vascular disease [anterior tibial- AT - 55 and posterior tibial - PT - 44] was present in 65 [65%]. Iliac, Femoral [common femoral – CFA and superficial femoral - SFA] disease were present in 15 [15%] and 57 [57%] respectively. 28 [28%] had isolated distal arterial disease. The distal disease was not significantly associated with diabetes mellitus [p - 0.39].

Conclusion

Distal occlusive arterial disease is the commonest followed by femoral disease. This study does not show an association between diabetes mellitus and distal disease, contrary to the popular belief. Further countrywide studies with larger study populations are needed to come to a final conclusion.

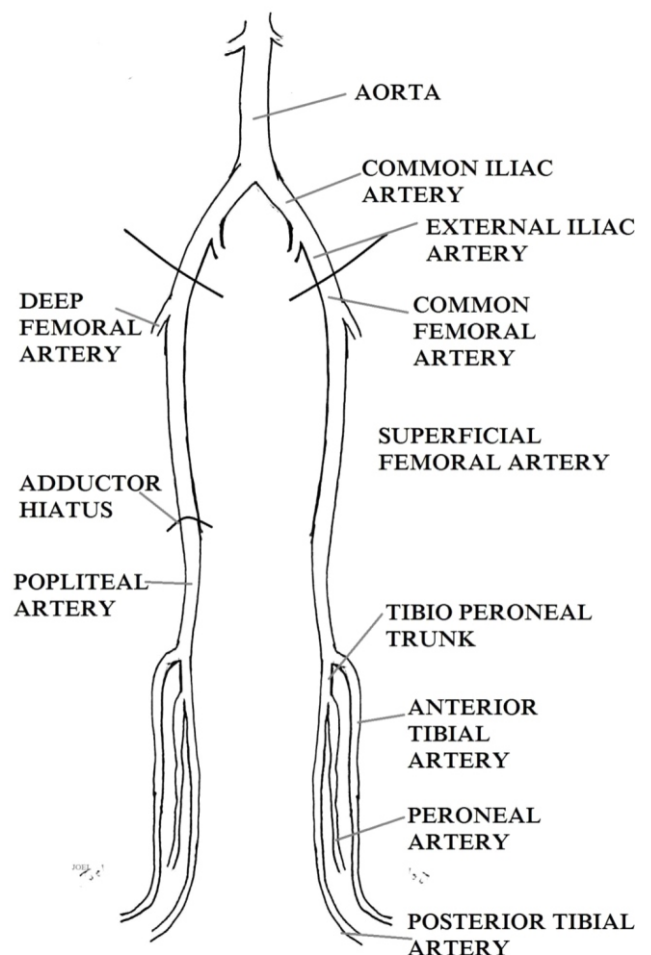


Figure 1. Arteries of the lower limb

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Received: 11-01-2021 Accepted: 28-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8794>



Introduction

The prevalence of occlusive arterial disease [OAD] increases with age. In a study done among 2174 individuals in United States the overall prevalence of OAD among those older than 40 years was 4.3% and it increased to 14.5% in individuals older than 70 years [1]. In a study done at the Gampaha district of Sri Lanka among individuals aged 40 to 70 years, the prevalence of OAD was 3.6 % [2]. The Sri Lankan population is rapidly aging and the number of patients undergoing interventions for OAD is increasing in Sri Lanka.

Arteries involved with OAD vary depending on the risk factors [3]. In a study done among 2659 patients undergoing angioplasty, the incidence of iliac artery disease was common among younger patients with hypertension and smoking. Whereas infragenicular OAD was common among older male patients with diabetes mellitus [4]. In Sri Lanka one study reported the pattern of OAD among patients undergoing angioplasty. In this study the description of the pattern of OAD was based on conventional or catheter angiography [5]. However there were no studies describing the patterns of OAD based on computerized tomographic angiography [CTA] based imaging was reported in Sri Lanka earlier. The study was done among 367 patients undergoing bypass surgery for lower limb OAD, 55% had infra popliteal disease. This indicates that the distal OAD is more prevalent [6].

This study describes the pattern of OAD among patients who needed vascular interventions at the Teaching Hospital Anuradhapura [ANP] in the NCP in Sri Lanka.

Method

This is a prospective study of patients admitted for vascular interventions to the ANP Sri Lanka. The study was done from October 2017 to October 2019. All patients who were planned for intervention were in Fontaine stages IIB - IV [IIB Disabling claudication, III - rest pain, IV - ulcers or gangrene]. Data on patient demography, clinical presentation, comorbidities, and sites of arterial occlusions were collected. All patients underwent computed tomographic angiography [CTA] assessment to assess the sites of arterial occlusion before intervention. All CTA were interpreted by the vascular surgeon together with the radiologist. To overcome the difficulties in interpretation caused by arterial wall calcification, the image contrast level and the window level were adjusted and the images were reviewed both in cross-sectional and longitudinal views. Unclear images due to non-enhancement by contrast [due to poor timing], images with inadequate extent of exposure and images of patients who have undergone previous arterial interventions were excluded. The sites of arterial occlusions were classified into segments for further description i.e. Iliac [CIA and EIA], femoral [CFA and SFA], popliteal [PA] and distal [AT, PT and PA].

Results

120 CTA images were analysed. 100 patients were included. 20 were excluded [Unclear images due to non-enhancement by contrast [due to poor timing], images with inadequate extent of exposure and images of patients who have undergone previous arterial interventions]. 81 [81%] were males and 19 were females. Mean age was 67.6 years [53-83]. 60 [60%] had ulcers, 25 [25%] gangrene, 10 [10%] rest pain and 5[5%] had disabling claudication. 63 [63%] were smokers. Diabetes mellitus [DM], hypertension [HT], ischemic heart disease, heart failure and chronic kidney disease were present in 65 [65%], 47 [47%], 25 [25%], 11[11%] and 13 [13%] respectively [Table 1].

Distal vascular disease [Anterior Tibial- AT - 55 and Posterior Tibial - PT - 44] was present in 65 [65%]. Femoral, Iliac diseases were present in 57 [57%] and 15 [15%] respectively [Table 2]. 14 of 15 [93.3%] patients with iliac artery disease were smokers. Among rest of the patients 63/100 [63%] were smokers. This association of smoking and iliac artery disease was statistically significant [p-0.02] [Table 3]. All the patients who had iliac arterial disease were males. The association of hypertension and diabetes mellitus with iliac artery disease was not significant. 28 [28%] had isolated distal arterial disease. The association between diabetes mellitus and isolated distal disease or anterior tibial disease was not statistically significant [p - 0.39]. And the association of hypertension, and smoking with femoral and distal occlusive arterial diseases were not found to be statistically significant in this study [Table 3]. There was no statistically significant correlation found between the site of OAD and the presentation. This is probably due to the low numbers.

Table 1. Associated Risk factors

Co morbidities / Risk factors	Number [%]
Diabetes Mellitus	65 [65%]
Hypertension	47 [47%]
Smoking	63[63%]
Ischaemic Heart Disease	25 [25%]
Heart Failure	11 [11%]
Chronic Kidney Disease	13 [13%]

Table 2. Arterial segment involved

Arterial segment involved	Number [%]	
Iliac	15	
Femoral	57	
Popliteal	21	
Distal	AT	55
	PT	44
	Combined AT/ PT and PA	65

Table 3. Significance of associated risk factors with arterial segments involved

Arterial Segment	Risk Factors	P Value
Iliac	Diabetes Mellitus	P - > 0.05
	Hypertension	P - > 0.05
	Smoking	P - 0.02
	Age	P - > 0.05
	Gender	P - > 0.05
Femoral	Diabetes Mellitus	P - > 0.05
	Hypertension	P - > 0.05
	Smoking	P - > 0.05
	Gender	P - > 0.05
Anterior Tibial	Diabetes Mellitus	P - > 0.05
	Hypertension	P - > 0.05
	Smoking	P - > 0.05

Discussion

The pattern of arterial segments involved with OAD varies with the risk factors. This study shows that the distal disease is the commonest [65%] followed by femoral disease [57%] among patients admitted for interventions at ANP. Whereas in other studies the commonest diseased segment was femoro-popliteal [51.2%] followed by the distal disease [21.1%] [4].

Previous studies have shown that younger age is associated with proximal [iliac] disease whereas old age is associated with tibial arterial disease [4] [7] [8]. All the patients who had iliac disease in this study were younger males. However this association of iliac disease with younger age was not statistically significant [Table 3]. Both active and passive smoking increases the risk of occlusive arterial disease [9]. This study also shows a statistically significant association of smoking with iliac arterial disease.

Diabetes mellitus is a well-known risk factor for occlusive arterial disease [10] [11]. The prevalence of diabetes mellitus varies depending on the population. In one study done in Sri Lanka among rural population in 2005 the prevalence of diabetes mellitus was 14.2% among males and 13.5% among females [12]. However prevalence of diabetes mellitus among patients undergoing interventions for occlusive arterial disease is higher. In this study 65% of the patients with occlusive arterial disease undergoing interventions had diabetes mellitus. In another study done at the University of Colombo among patients undergoing interventions for critical limb ischemia the prevalence of diabetes mellitus was 80% [6]. Previous studies have reported an association between diabetes mellitus and distal vascular disease [7] [13] [14]. However this study does not show an association between diabetes mellitus and the distal disease [p - 0.39] probably due to the small number of subjects in this study.

Further countrywide studies with a larger study population are needed to come to a final conclusion about the true nature of the pattern of occlusive arterial disease in Sri Lanka. In

addition these differences in the incidence and the site of occlusion need to be considered when allocating resources for the revascularisation procedures.

In addition hyperlipidaemia is a well-known risk factor for occlusive arterial disease. Especially fasting cholesterol level of greater than 270 mg/dl is associated with a two fold increase in the incidence of occlusive arterial disease [15]. Hyperlipidaemia is associated with more proximal [iliac] disease [4]. However in this study data on hyperlipidaemia was not included. This is a limitation of this study.

Conclusions

This study reports the pattern of OAD based on CTA images. Previous studies have not reported the pattern of OAD based on CTA in Sri Lanka. This study shows that distal disease is the commonest [65%] followed by femoral disease [57%]. This study does not show an association between diabetes mellitus and the distal disease, contrary to the popular belief. However the number included in this study is not adequate to come to a final conclusion. Further countrywide studies are needed in the future. In addition the pattern of OAD should be considered when allocating resources for vascular interventions.

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

References

1. Prevalence of and risk factors for peripheral arterial disease in the United States: results from the National Health and Nutrition Examination Survey, 1999-2000. Selvin E, Erlinger TP. 6, Aug 2004, *Circulation*, Vol. 110, pp. 738-43. <https://doi.org/10.1161/01.CIR.0000137913.26087.F0>
2. A cross-sectional study on peripheral arterial disease in a district of Sri Lanka: prevalence and associated factors. Weragoda J., Seneviratne R., Weerasinghe M.C. Wijeyaratne M., 829, 2015, *BMC Public Health*, Vol. 15. <https://doi.org/10.1186/s12889-015-2174-7>
3. Comparison of global estimates of prevalence and risk factors for peripheral artery disease in 2000 and 2010: a systematic review and analysis. Fowkes F.G, Rudan D, Rudan I, Aboyans V, Denenberg J.O, McDermott M.M., 2013, *Lancet*, Vol. 382, pp. 1329-1340. [https://doi.org/10.1016/S0140-6736\(13\)61249-0](https://doi.org/10.1016/S0140-6736(13)61249-0)
4. Association of cardiovascular risk factors with pattern of lower limb atherosclerosis in 2659 patients undergoing angioplasty. Diehm N, Shang A, Silvestro A, Do D.D, Dick F, Schmidli J. 2006, *Eur J Vasc Endovasc Surg*, Vol. 31, pp. 59-63. <https://doi.org/10.1016/j.ejvs.2005.09.006>
5. Percutaneous transluminal lower limb angioplasty [PTA] for chronic limb threatening ischaemia [CLTI] in a low resource setting - 4 year experience. Cassim MRN, Godahewa S,

- Paviththiran S, Wijeyaratne SM. 3, 2020, Sri Lanka Journal of Surgery, Vol. 38, pp. 13-20.
<https://doi.org/10.4038/sljs.v38i3.8789>
6. Clinical Outcomes Following Lower Extremity Vein Bypass for Chronic Limb Threatening Ischaemia [CLTI] at the University of Colombo, Sri Lanka. Mandika Wijeyaratne, et al. 2020, Eur J Vasc Endovasc Surg, Vol. 60, pp. 560-566.
<https://doi.org/10.1016/j.ejvs.2020.06.039>
 7. Impact of atherosclerotic risk factors on the anatomical distribution of peripheral arterial disease. M. Haltmayer, T. Mueller, W. Horvath, C. Luft, W. Poelz, D. Haidinger. 3, 2001, Int Angiol, Vol. 20, pp. 200-207.
 8. Gender variation in symptomatic peripheral arterial occlusive disease among type-2 diabetic patients. Al-Zoubi, N. A., & Shatnawi, N. J. 2019, SAGE open medicine, Vol. 7, p. 2050312119840198.
<https://doi.org/10.1177/2050312119840198>
 9. Secondhand smoke exposure and subclinical cardiovascular disease: the multi-ethnic study of atherosclerosis. Jones MR, Magid HS, Al-Rifai M, McEvoy JW, Kaufman JD, Hinckley Stukovsky KD. 2016, J Am Heart Assoc, Vol. 5, p. e002965.
<https://doi.org/10.1161/JAHA.115.002965>
 10. Risk profile and occlusive periphery artery disease [OPAD]. Widmer LK, Biland L, DaSilva A. 1985. Proceedings of the 13th International Congress of Angiology. p. 28.
 11. Diabetes, atherosclerosis and aging. RW, Stout. Supp2, 1990, Diabetes Care, Vol. 13, pp. 20-23.
<https://doi.org/10.2337/diacare.13.2.S20>
 12. Prevalence of hypertension, diabetes and obesity: baseline findings of a population based survey in four provinces in Sri Lanka. **Wijewardena K, Mohideen MR, Mendis S, Fernando DS, 2005, Ceylon Medical Journal, Vol. 50, pp. 62-70.
<https://doi.org/10.4038/cmj.v50i2.1571>
 13. Combined clinical and pathologic study of diabetic and nondiabetic peripheral arterial disease. Strandness Jr, D.E, Priest R.E, Gibbons G.E. 1964, Diabetes, Vol. 13, pp. 366-372.
<https://doi.org/10.2337/diab.13.4.366>
 14. Study of vascular lesions in diabetic, nondiabetic patients. Clinical, arteriographic, and surgical considerations. Gensler S.W., Haimovici H. 1965, Arch Surg, Vol. 91, pp. 617-622.
<https://doi.org/10.1001/archsurg.1965.01320160071016>
 15. Intermittent claudication: incidence in the Framingham Study. Kannel WB, Skinner JJ Jr, Schwartz MJ, Shurtleff D. 1970, Circulation, Vol. 41, pp. 875-883.
<https://doi.org/10.1161/01.CIR.41.5.875>
 16. Influence of coronary heart disease on morbidity and mortality after lower extremity revascularization surgery: a population-based study in Olmsted County, Minnesota [1970-1987]. Farkouh ME, Rihal CS, Gersh BJ, Rooke TW, Hallett JW Jr, O'Fallon WM, Ballard DJ. 1994, J Am Coll Cardiol, Vol. 24, pp. 1290-1296.
[https://doi.org/10.1016/0735-1097\(94\)90111-2](https://doi.org/10.1016/0735-1097(94)90111-2)

Trends in early onset colorectal cancer (EOCRC) in a South Asian cohort: data from a specialized tertiary care center in western Sri Lanka

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Keywords: Early onset colorectal cancer; South Asia; survival; colorectal cancer

Abstract

Introduction

Early onset colorectal cancer [EOCRC] has significantly increased during the past decade globally. It is defined as cancers diagnosed in those aged 50 years or less. Most research on EORC are from western populations where the tumour biology and risk factors may differ from other regions. Evidence on EOCRC from the South Asian region is particularly scarce. This study presents the basic trends in presentation and overall survival [OS] pattern of EOCRC using data from a single specialized tertiary care institution over two decades.

Methods

A total of 723 patients treated at the University surgical unit of the North Colombo teaching hospital from 1995 to 2020 were included in the analysis. Overall survival of the EOCRC was compared with that of the older population using Kaplan-Meier survival curves. Survival patterns over two time periods [pre-2010 vs post-2010] were also compared between the two populations. The stage at presentation, family history of colorectal or related cancers, tumour site, and tumour stage were also compared.

Results

The proportion of EOCRC in this cohort has not shown a significant increase over the past two decades [2001-2010: 24% vs 2011-2020: 21%]. The advanced tumour stage at presentation and the presence of significant family history are also comparable. EOCRC cohort demonstrates a better OS for the entire study period [Median survival: < 50 years – not reached; >50 years – 91 months; 95%CI – 72-132; P<0.001]. However, this survival advantage is only observed during the pre-2010 period [Median survival: < 50 years – 160 months; 95%CI – 120 – not reached; >50 years – 84 months; 95%CI – 62-132; P=0.01] and becomes comparable in the 2010-2020 period [P=0.16]. OS of the EORC has not also improved over the two decades from 2001 to 2020 [P=0.51].

Conclusion

There is no significant increase in the EOCRC rates in this population over time although the rate has remained high throughout. The OS of the EOCRC population is better compared to the older population. A significantly better OS is observed during the pre-2010 period in the EOCRC but is not present in the post-2010 period. Advancement in therapy may have improved the survival of the older population during the latter part but not that in the EOCRC due to its inherently aggressive nature. This paper provides preliminary data on EOCRC from Sri Lanka. The South Asian population may have a different disease pattern with younger age at onset compared to the western populations and needs to be further explored.

Introduction

Colorectal cancer [CRC] is the fourth most commonest cancer globally accounting for 1.9 million new cases in 2020 representing close to 10% of all cancers [1]. It has the third highest mortality rate from cancer with over 900,000 deaths annually. Bowel cancer screening programmes worldwide have been able to achieve a reduction in incidence and mortality [2]. Identification of premalignant lesions through screening has helped in reducing the incidence while early identification of cancer has improved overall survival from CRC [2].


A recent rise in the incidence of early-onset colorectal cancers [EOCRC] has been reported globally. CRC in adults up to the age of 50 years is classified as EOCRC. Studies from Europe, the USA, Australia and other high-income earning countries have reported a significant increase in the incidence of EOCRC during the past couple of decades [3-5]. Some authors have linked the increase to the obesity pandemic given the causal relationship between the two [6]. The EOCRC are detected at a higher stage compared to the older

Table 1. Demographics of the study population

	≤50	>50	Pvalue
Number	153	466	
Age			
Median	47	73	
Range	17-50	51-85	
Sex			
Female	54%	49%	0.28
Stage			
>T3/T4	77%	72%	0.22
Family history	17%	17%	1

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Received: 07-07-2022 Accepted: 29-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8978>



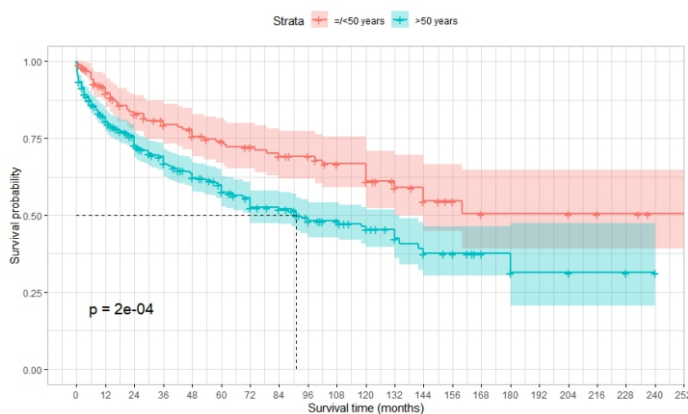


Figure 1. Kaplan-Meier survival curves comparing overall survival between EOCRC and older patients >50 years following surgery for colorectal cancer from 1995 to 2020.

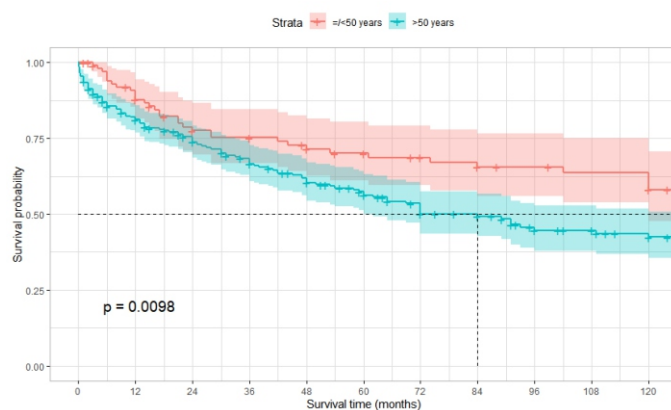


Figure 2. Kaplan-Meier survival curves comparing the overall survival of EOCRC versus older patients between 2001 and 2010.

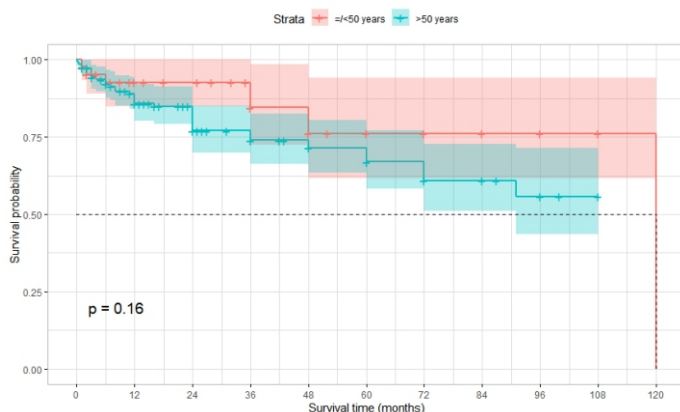


Figure 3. Kaplan-Meier survival curves comparing the overall survival of EOCRC versus older patients between 2011 and 2020.

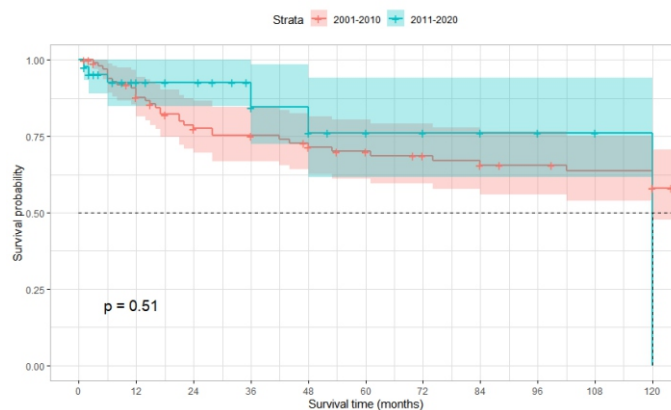


Figure 4. Kaplan-Meier survival curves comparing the overall survival of the EOCRC patients during time periods 2001 – 2010 and 2011–2020.

populations although they haven't reported a worse outcome [4, 5]. Data on EOCRC from the South Asian region is scarce. In this article, we present the trends in EOCRC over 25 years to the University Surgical Unit of the North Colombo Teaching Hospital [NCTH] in Sri Lanka. The unit is a tertiary care speciality centre for colorectal surgery and the NCTH is the only tertiary care centre located in the Gampaha district. The district has a population of over 2.5 million and has a fair representation of all socio-economic fractions in the country [7].

Methodology

All patients presented to the University Surgical Unit of the North Colombo Teaching Hospital between 1995 and 2020 were included in the analysis. All patients were treated as per the unit protocol. Following preoperative staging locally advanced rectal cancers diagnosed after the year, 1999 were subjected to neo-adjuvant chemo-radiation [NCRT]. All receiving NCRT followed with surgery after an interval of 6 to 8 weeks before 2006 and 8 to 10 weeks from 2007 onwards. All patients were prospectively followed up with 3 monthly intervals for the first 2 years, 6 monthly intervals for the next 3 years and annual intervals thereafter. The survival time was

right censored and where the ten-year periods were compared the censoring was done at 120 months. Those who were lost to follow-up were censored at the last follow-up date. Those who were 50 years or less were considered in the EOCRC group. The stage at presentation, family history of colorectal or related cancers, tumour site, tumour stage and overall survival [OS] were analysed. Kaplan-Meier curves were used to compare the survival between the EOCRC and older counterparts with open source software R Core Team [2021]. Test of proportions and the T-test were used to compare the populations with a P value of 0.05 considered significant.

Results

Out of 845 patients, a total of 723 CRC patients with completed prospective follow-up records presented between 1995 and 2020 were analysed [drop-out rate - 14%]. Of the total, 184 were aged 50 years or less [Female = 100, Mean age- 43 years, Age range – 17 to 50 years]. Considering the past two decades, EOCRC accounted for 24% of the total CRCs between 2001 and 2010 while it was 21% between 2011 and 2020. There was no statistically significant difference in the proportion of EOCRC detected between the two time periods. The median age of the EOCRC cohort is 34.5

years [range 17-50] compared to 63 years [range 51 to 89] from 1995 to 2010 and 35 years [range 21-50] compared to 63 years [range 51-85] in the period from 2011 to 2020. The median follow-up for the pre-2010 period is 48 months [range 0 - 256] and for the post-2010 is 24 months [range 0 – 120]. A family history with at least one 1st degree family member or two 2nd degree family members with CRC or related cancers was observed in 17% of the study subjects in the EOCRC group and was comparable with the older population [P=1]. The proportion of advanced tumours [$>T3$] at presentation is also comparable between the two groups [Table 1]. The overall survival of patients with EORC who underwent curative surgery from 1995 to 2020, is significantly better than their older counterparts [Median survival: < 50 years – not reached; >50 years – 91 months; 95%CI – 72-132; $P<0.001$] [Figure 1].

Survival pattern between periods

On subgroup analysis comparing periods from 2001-2010 and 2011 – 2020 [n=619], the EOCRC patients demonstrate a significantly better OS compared to older patients in the period from 2001 to 2010 [Median survival: < 50 years – 160 months; 95%CI – 120 – not reached; >50 years – 84 months; 95%CI – 62-132; $P=0.01$] [Figure 2]. However, the OS between the two groups is comparable during the period from 2011 to 2020 [Median survival: < 50 years – 120 months; 95%CI – both values not reached; >50 years – median survival not reached; $p=0.16$] [Figure 3]. Also, there is no change in the OS at 10 years of the pre and post-2010 EOCRC patient cohorts [Median survival: Pre 2010 – 160 months; 95%CI – 120 – not reached; >50 years – median survival not reached; $P=0.51$] [Figure 4]. Advanced cancer [T3/T4] proportion for the EOCRC were 77% vs 70% and 67% vs 70% for the older age group for the two time periods.

Discussion

Although there is a significant increase in the incidence of EOCRC globally, this study did not demonstrate an increase in EOCRC as a proportion during the past decade. It is noteworthy that the data is from a single centre, although NCTH is the only tertiary care centre in the district of Gampaha which has a representative Sri Lankan population sample with both urban and rural communities [7]. Over time, the proportion of EORC in this population has remained above 20% of the total CRC incidence, which is higher than that observed in western populations [3-5, 8, 9].

A study on migrant South Asians in the UK has shown a younger age of onset of CRC compared to the Caucasian population indicating a possibility of a different disease pattern in this group [10]. A population-based study from India also reported a young CRC [<40 years] rate of over 34% [11]. The same study and several other authors have also reported a mean age of less than 50 years in Indian patients with CRC [11-13]. The CRC in the younger population is considered to be generally more aggressive and to have a higher chance of recurrence [14, 15]. However, in this cohort,

the EOCRC does not have a worse outcome. Other authors have also observed a similar pattern with better overall outcomes in the young CRC cohort probably owing to their better physiological reserves [9]. Also, the proportion of those having a significant family history is comparable between the two groups. It is worth noting that a recall bias may affect this information since the family history was not confirmed with medical records.

The OS of the populations were compared in the two decades pre and post-2010, as the treatment facilities and resources have changed over time. Use of better imaging, improvement in adjuvant treatment and advancements in surgical technique may all have had an impact on the overall survival of patients. The post-2010 period saw an improvement in the availability of imaging, high-quality radiation and chemotherapy facilities in the local healthcare system. Improvement in infrastructure and services in perioperative care was also observed during this period.

The significant gap in the OS between the two groups observed in the pre-2010 decade narrowed during the following decade. However, the OS of the EOCRC group has not significantly improved post-2010, while that of the elderly counterparts shows a significant improvement.

This improvement in OS can probably be attributed to the improvement in overall care affecting the OS of the elderly population but not so much of the younger population. The discrepancy could be due to the aggressive nature of the EOCRC, which fails to improve even with better oncological care. There is a significant lack of data on EOCRC from the South Asian region. Future studies from this region with robust data are necessary to arrive at definitive conclusions.

Limitations

This study includes data from a single centre hence may not reflect the entire population and the data may be biased. Detailed analysis of the co-morbidities, different oncological treatment modalities, and histopathological and molecular profiling data if available would have given a better overall picture of the EOCRC. However such information is not historically available. The survival analysis is not a multivariate analysis therefore might not reflect the effect of co-morbidities and disease-related factors on survival.

Conclusion

There is no significant increase in the EOCRC rates during the past two decades in this cohort over time although the rate has remained high throughout. In the study group, the OS of the EOCRC population is better compared to the older population. A significant difference in the survival pattern is observed during the pre-2010 period but not in the post-2010 period. The improvement in imaging and treatment modalities could be attributed to the better survival observed in the older population in the post-2010 period although not conclusive without considering other confounders. However,

the EORC population may not demonstrate a similar improvement owing to the tumour biology and the aggressive nature of cancer. The South Asian population may have a different disease pattern compared to the western population and needs to be further explored.

List of abbreviations

EOCRC – early onset colorectal cancer

CI – Confidence interval

CRC – colorectal cancer

OS – overall survival

NCTH – North Colombo Teaching Hospital

Ethics approval and consent to participate

Informed consent from individual patients was not required as the study was a cohort study based on analysing clinical outcome data. Ethical clearance to analyse the database has been obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya.

Authors' contributions

PC and SK were involved in patient management, concept, data analysis, manuscript writing and critical appraisal of the paper. JW and GM were involved in the assessment of pathological specimens and MDT management of the patients. PC and SG were involved in data collection, data analysis, preparation of the manuscript and PC, SK, JH and GM critical appraised the paper.

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

References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2021. <https://doi.org/10.3322/caac.21660>
2. Pinsky P, Rabeneck L, Lauby-Secretan B. The IARC Perspective on Colorectal Cancer Screening. *N Engl J Med*. 2018;379[3]:301-2. <https://doi.org/10.1056/NEJMc1807173>
3. Araghi M, Soerjomataram I, Bardot A, Ferlay J, Cabasag CJ, Morrison DS, et al. Changes in colorectal cancer incidence in seven high-income countries: a population-based study. *Lancet Gastroenterol Hepatol*. 2019;4[7]:511-8. [https://doi.org/10.1016/S2468-1253\(19\)30147-5](https://doi.org/10.1016/S2468-1253(19)30147-5)
4. Virostko J, Capasso A, Yankeelov TE, Goodgame B. Recent trends in the age at diagnosis of colorectal cancer in the US National Cancer Data Base, 2004-2015. *Cancer*. 2019;125[21]:3828-35. <https://doi.org/10.1002/cncr.32347>
5. Vuik FE, Nieuwenburg SA, Bardou M, Lansdorp-Vogelaar I, Dinis-Ribeiro M, Bento MJ, et al. Increasing incidence of colorectal cancer in young adults in Europe over the last 25 years. *Gut*. 2019;68[10]:1820-6. <https://doi.org/10.1136/gutjnl-2018-317592>
6. Berger NA. Young Adult Cancer: Influence of the Obesity Pandemic. *Obesity [Silver Spring]*. 2018;26[4]:641-50. <https://doi.org/10.1002/oby.22137>
7. Niriella MA, De Silva AP, Dayaratne AHGK, Ariyasinghe MHADP, Navarathne MMN, Peiris RSK, et al. Prevalence of inflammatory bowel disease in two districts of Sri Lanka: a hospital based survey. *BMC gastroenterology*. 2010;10:32-. <https://doi.org/10.1186/1471-230X-10-32>
8. Siegel RL, Jakubowski CD, Fedewa SA, Davis A, Azad NS. Colorectal Cancer in the Young: Epidemiology, Prevention, Management. *Am Soc Clin Oncol Educ Book*. 2020;40:1-14. https://doi.org/10.1200/EDBK_279901
9. Rodriguez L, Brennan K, Karim S, Nanji S, Patel SV, Booth CM. Disease Characteristics, Clinical Management, and Outcomes of Young Patients With Colon Cancer: A Population-based Study. *Clin Colorectal Cancer*. 2018;17[4]:e651-e61. <https://doi.org/10.1016/j.clcc.2018.06.007>
10. Norwood MGA, Mann CD, Hemingway D, Miller AS. Colorectal cancer: presentation and outcome in British South Asians. *Colorectal disease: the official journal of the Association of Coloproctology of Great Britain and Ireland*. 2009;11[7]:745-9. <https://doi.org/10.1111/j.1463-1318.2008.01675.x>
11. Deo SVS, Kumar S, Bhorival S, Shukla NK, Sharma A, Thulkar S, et al. Colorectal Cancers in Low- and Middle-Income Countries-Demographic Pattern and Clinical Profile of 970 Patients Treated at a Tertiary Care Cancer Center in India. *JCO Glob Oncol*. 2021;7:1110-5. <https://doi.org/10.1200/GO.21.00111>
12. Pokharkar AB, Bhandare M, Patil P, Mehta S, Engineer R, Saklani AP. Young Vs Old Colorectal Cancer in Indian Subcontinent: a Tertiary Care Center Experience. *Indian J Surg Oncol*. 2017;8[4]:491-8. <https://doi.org/10.1007/s13193-017-0670-1>
13. Patil PS, Saklani A, Gambhire P, Mehta S, Engineer R, De'Souza A, et al. Colorectal Cancer in India: An Audit from a Tertiary Center in a Low Prevalence Area. *Indian J Surg Oncol*. 2017;8[4]:484-90. <https://doi.org/10.1007/s13193-017-0655-0>
14. Mauri G, Sartore-Bianchi A, Russo AG, Marsoni S, Bardelli A, Siena S. Early-onset colorectal cancer in young individuals. *Mol Oncol*. 2019;13[2]:109-31. <https://doi.org/10.1002/1878-0261.12417>
15. Sharma V, Sharma A, Raina V, Dabkara D, Mohanti BK, Shukla NK, et al. Metastatic colo-rectal cancer: real life experience from an Indian tertiary care center. *BMC Cancer*. 2021;21[1]:630. <https://doi.org/10.1186/s12885-021-08398-z>

A systematic review on clinical outcomes of human amniotic membrane preparations in the management of venous leg ulcers

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Keywords: Human amniotic membrane; venous leg ulcers; chronic ulcers

Abstract

Introduction

Venous leg ulcers are the commonest type of chronic lower leg ulcers worldwide. It impacts the patient's quality of life significantly. Our objective was to assess current evidence on using human amniotic membranes (HAM) in venous leg ulcer management.

Methods

Google Scholar, PubMed, and the Cochrane library were utilized to search the following search terms (MeSH terms in PubMed) in the abstract field or in the title, "Amnion" OR "Placenta" AND "Varicose ulcer" OR "Stasis ulcer" OR "Chronic venous ulceration" in studies published until the 1st of March 2022. We used standard methods to assess the quality of the published articles. The articles thus included were cohort studies (both retrospective and prospective) and randomized control trials.

Results

When the above criteria were used in the search, 12, 8, 15, 6, and 4 citations were found in MEDLINE, Cochrane Library, Google Scholar, Embase, and Web of Science respectively. The 15 nonduplicate studies were screened with the inclusion and exclusion criteria, we selected 7 studies for this review. However, the amniotic membrane preparations used in these studies were not uniform. All randomized controlled trials (n=3) have concluded that there is an improvement in healed ulcer percentage at the end of the study in the interventional group when compared to the control group, which was statistically significant ($p < 0.05$). The percentage of ulcers that had healed at the end study was 60% in interventional groups of the above trials. One prospective study showed that the recurrence rate was less than 30% at a 3-year follow-up examination. We couldn't perform a meta-analysis due to study heterogeneity.

Conclusion

Current scientific evidence indicates that amniotic membrane preparations can be utilized in promoting chronic forms of venous leg ulcers adjunctive to traditional treatment or as second-line therapy.


Introduction

The entity of venous leg ulcers is becoming a major health challenge over the past years [1]. They have emerged as the commonest type of lower extremity ulcers as it has been shown that 80% of lower extremity ulcers have a venous component [2]. Venous leg ulcers have higher rates of recurrence making them a chronic health problem and refractory to conventional treatments of wound debridement, wound dressing, and compression therapy. It is shown that less than 50% of ulcers achieve healing in 12 weeks with traditional treatment [3]. Even after the correction of aetiology for venous hypertension like saphenofemoral, sapheno-popliteal, and superficial venous insufficiency and other contributing factors like anaemia, cellulitis, and oedema, still, a significant proportion of patients are left with non-healing venous leg ulcers [4,5]. Owing to poor healing, which is usually slow and painful, venous leg ulcers are associated with significant morbidity and poor quality of life [6].

The mainstay of venous leg ulcer management is graduated compression bandaging. Various types of surgical dressings such as collagen products, polymer sponges, hydrogel, hydrocolloids, and membranes, have been used for treating refractory or non-healing ulcers [7]. The Human Amniotic Membrane (HAM) is considered a dressing that is natural or biological and had been used as an allograft in several studies. In past studies in patients with diabetic foot ulcers human amniotic membrane (AM) has shown properties of healing and proven its potential as an allograft [8]. In addition, it has been shown that the human amniotic membrane produces certain well-known wound healing compounds such as epidermal growth factors (EGFs), platelet-derived growth factors (PDGFs), and epidermal growth factor (EGF), and transforming growth factor-beta (TGF- β) [9]. Another mechanism by which the amniotic membrane facilitates wound healing is by accelerating the regenerative process of

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Received: 25-01-2022 Accepted: 15-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8934>



damaged tissue by delivering hyaluronan polymers [10].

Biological dressings based on amniotic membranes have been used over the past few decades. Due to their inherent biological properties, they can facilitate the healing of ulcers of different etiologies such as burns, diabetes, neuropathic, and bedsores [11-13]. Amniotic membranes have been processed and manufactured in different ways. Such as cryopreserved, dehydrated, or stem cell extractions to utilize in wound treatment [14]. There are several studies conducted on patients with venous leg ulcers to investigate the efficacy of HAM preparations with or without comparing with standard management.

A previous systematic review has assessed the cost-effectiveness of using HAM preparations. However, this study has not evaluated the clinical outcome of this method [15]. We aimed at assessing the suitability of amniotic membrane preparations as potential grafts for venous leg ulcers to facilitate the healing process in this systematic review through published studies. To the best of our knowledge, this is the first systematic review aimed at assessing the clinical outcomes of amniotic membrane preparations.

Methods

We searched the following databases Google Scholar, PubMed, and the Cochrane library using Mesh terms, “Amnion” OR “Placenta” AND “Varicose ulcer” OR “Stasis ulcer” OR “Chronic venous ulceration”. (MeSH terms) in the abstract field or in the title of studies published before 1st March 2022. Additionally, a non-English database named APAMED was also utilized in the search to minimize publication bias. To identify any additional publications that we would have missed we screen the reference lists of the full papers.

Using the Downs and Black checklist, the quality of the studies was assessed. The articles thus included were cohort studies (both retrospective and prospective) and randomized control trials. However, case reports were excluded from the present study. We exclusively selected studies conducted on human subjects and other studies such as those done on animal models or in-vitro studies were excluded. The main aim of the study was to assess the success of HAM preparations in the treatment of venous leg ulcers as measured by wound healing. The secondary objectives were to assess its safety, and future recurrence rates.

We performed the initial screening for eligibility based on the abstracts and their titles from the electronic databases. Full texts were screened using the inclusion and exclusion criteria. We sought the opinion of the senior investigator in doubtful

situations. Two independent reviewers evaluated the study's eligibility to be included. The studies which were included used different HAM preparations namely stem cell extractions, cryopreserved, and dehydrated preparations.

We included the studies which have used different preparations of the amniotic membrane allografts (cryopreserved, dehydrated, and stem cell extractions). Randomized control trials, that compared the amniotic membrane treatment with standard care (multilayer compression therapy) were selected. Those of animal models or in vitro were excluded. Studies that were performed aiming at the analysis of the molecular or chemical factors without measuring the clinical outcome of the HAM allograft treatment were excluded (figure 1).

From the studies included in the review following data were extracted: Study setting, year, trial designs (study designs), characteristics of the participants, details of the amniotic membrane preparations, outcome measures, and statistical significance of the results. Outcome measures were the healing percentage, healing time, adverse outcomes, and recurrence during the follow-up.

Results

From the respective databases, we identified the following number of articles when searched with the search terms: Google scholar (n=15), PubMed (n=12), Cochrane (n=8),

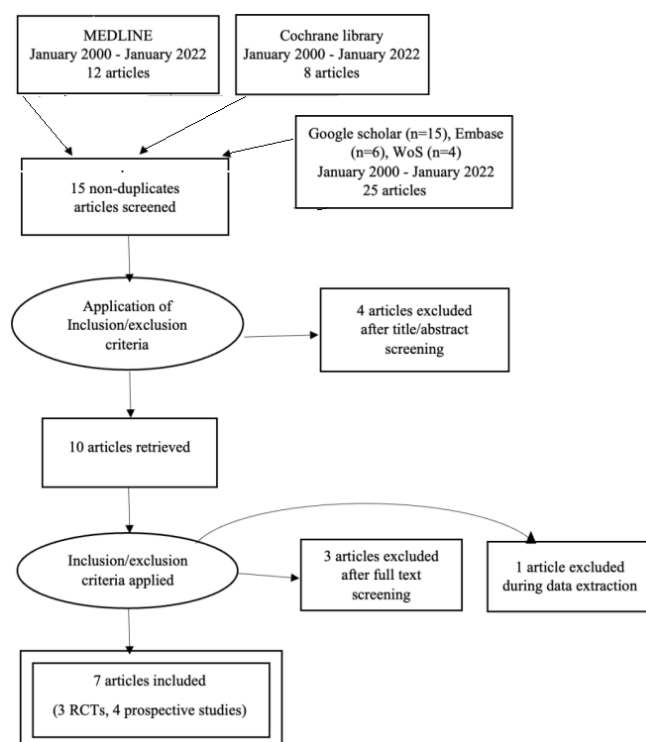


Figure 1. Prisma flow chart

Embase(n=6), and Web of Science(n=4). After removing the duplicates and the applications of the inclusion and exclusion criteria, we included a total of seven articles in the present study. A summary of the search strategy is depicted in figure 1. The studies included here were all conducted after the year 2000. We found 3 randomized control trials [16,17,18] and all were multicenter trials conducted in the United States. Out of 4 prospective studies, 2 were done in India [19,20] and one each in France [21] and Spain [22].

The three randomized controlled trials (RCTs) had a total of 169 and 152 participants in the interventional and control groups respectively. A total of 155 patients were treated with HAM preparations in the prospective studies. The mean ages of the participants in both groups were 60.9 years and 60.6 years in the interventional group and the control group respectively. Whereas in the prospective studies the mean age was 48.9 years. Ulcer location was the gaiter area in many participants, as it is a typical location of venous leg ulcers. Mean ulcer duration was more than 10 months in the RCTs and more than 12 weeks in prospective studies. In RCTs patients with ulcer size, more than 5cm² were in both interventional and control groups. Notably, participants in one prospective study [20] had a larger baseline ulcer area (more than 16cm²). Only in one study surgery has been done for varicose veins before the treatment with amniotic membrane preparations. (Table-1).

In the above studies, different preparations of HAM had been used such as EpiFix (commercially available preparation, manufactured by MIMEDX) [16,17], dehydrated amnion/chorion membrane (dHAM) [18,22], and cryopreserved amniotic membrane (prepared at the institutes) [21]. The frequency of assessment of the patients was weekly in majority of the studies. Duration of treatment and follow-up periods were also different in the studies. In all RCTs, investigators have spent initial 2 weeks for screening. All RCTs have concluded with statistically significant ($p < 0.05$) improvement in healed ulcer percentage at the end of the study in the interventional group compared to the control group. In the RCT interventional groups, the healed percentage of ulcers was 60%. In one RCT [17] a notable reduction in the baseline surface area of the ulcers in patients treated with HAM was observed. A prospective study conducted by Francis et al [19] demonstrated less than a 30% of recurrence rate of venous leg ulcers during a 3-year follow-up period. Furthermore, Hanumanthappa et al [20] in their prospective comparative study have shown that 80% of ulcers achieved epithelialization at 3 weeks with HAM dressing and it was statistically significant. ($p < 0.005$). The results of each study are summarized in table 2.

Discussion

This review was focused on evaluating the current literature and scientific evidence on the effectiveness of the use of HAM in the management of venous leg ulcers. All studies that used HAM preparations on venous ulcers that had not seen significant improvement on conventional therapy or had recurred after conventional therapy were assessed. HAM was not a popular first-line mode of treatment. It remains an experimental therapy for venous ulcers that had failed to achieve re-epithelialization with conventional therapy such as compressive bandage and wound debridement. We have included altogether 6 studies in this review. There was a notably higher rate of wound closure compared to conventional treatment observed in all randomized controlled trials. Adverse effects attributable to HAM products were not observed in the 3 studies which included adverse outcomes. This indicates amniotic membrane treatment has a good safety profile.

All the RCTs were conducted in the United States. Different preparations had been used for treatment. Data was limited to assess the efficacy of the different preparations. Except study done by Francis et al, in other studies, an adjunct compressive bandage has been used. Long-term recurrence after therapy had been assessed in only one study (less than 30% in 3 years) [19]. Previous epidemiological studies imply the recurrence rate is 26-70% [23]. With these previous studies, amniotic membrane therapy has a comparatively lower recurrence rate. More studies are required to support the evidence of HAM as a potential allograft in venous leg ulcer treatment. Despite these drawbacks, we were able to do qualitative analysis. We couldn't perform a meta-analysis owing to study heterogeneity. Some factors that influenced the heterogeneity of the studies included clinical diversity, duration, variability of the study design, and different amniotic membrane preparations. Due to the variability of the methods employed to assess the outcomes of the intervention and publication bias was not assessed due to the availability of a small number of studies for comparison.

The use of HAM as a biological dressing or allograft is more expensive than the conventional treatment methods. It has been applied weekly in most of the studies. But when compared with the biocompatible skin graft which has been used for refractory venous ulcers, HAM is relatively cost-effective [15]. A study done by Hanumanthappa et al [20] has described a cost-effective method of harvesting amniotic membrane from the placenta during cesarean section, preservation, and application methods. In comparison with the results of other biological allografts amniotic membrane preparation has been shown higher healing rate in the study done by Bianchi et al [17], (EpiFix 60% compared with the

Table 1. Study group characteristics

Author	Year	Location (setting)	Study type	Size of the study	Mean age in (years)/SD	Ulcer Location/s	Mean ulcer duration (weeks)/SD	Median Ulcer duration (weeks)/ (range)	Mean baseline ulcer size(cm ²)/SD
Bianchi et al ¹⁶	2019	Multicenter USA	RCT	128 (I=64, C=64)	I=62.2(14.3) C=60.3(11.4)	Medial, anterior, lateral around malleolus, low gaiter	I= 40.0(55.6) C=61.5(71.6)	I=20(4-312) C=39(4-384)	I=7.4(5.8) C=8.6(6.8)
Marinello et al ²²	2018	Single-center Spain	Prospective study	10	76.1 (15.4)	Leg, ankle	52.8	105.2	21.75(18.17)
Bianchi et al ¹⁷	2017	Multicenter USA	RCT	109 (I=52, C=57)	I=61.5(14.9) C=60.0(10.6)	Medial, anterior, lateral around malleolus, low gaiter	I=41.9(60) C=58.9(72.6)	I=17.5(4-312) C=35(4-384)	I=7.6(6.1) C=8.3(6.7)
Serena et al ¹⁸	2014	Multicenter USA	RCT	84 (I=53, C=31)	I=59(17.75) C=62.6(13.53)	Gaiter area	I=55.2(83.2) C=52(65.6)	I=16 C=22	I=6.0(4.33) C=6.3(5.27)
Francis et al ¹⁹	2013	India	Prospective study	40	45	Leg, ankle, and foot	Mean ulcer duration not mentioned 12-24 weeks- 8 >24 weeks -32	NA	Mean ulcer size not mentioned 3-5cm ² -14 >5cm ² -26
Hanumanthappa et al ²⁰	2012	Mangalore India	Prospective comparative study	200 (I=100, C=100)	I=46.5 C=45.5	Leg, ankle	I=18 C=20	Range I=12-24 C=12-28	>16
Merment et al ²¹	2007	Besancon, France	Prospective study	15	79	Ankle, gaiter area	NA	>12 weeks	4.59(2.49)

SD-Standard deviation; RCT-Randomized control trial; I-intervention group; C- control group; USA-United States of America
NA- Not Available

Table 2. Outcomes and Interventions of the studies

Author	Year	Type of study	Intervention and size of the group	Frequency of evaluation	Study duration	Ulcer area reduction	Healed percentage	Recurrences	Adverse outcomes. (Amniotic membrane product related)
Bianchi et al ¹⁶	2019	RCT	EpiFix-64 SOC-64	Weekly	16 weeks (2-week screening, 12-week treatment, 2 week follow-up)	NA	Healed at 12 weeks – I=50%, C=31% (p=0.0473) Healed at 16 weeks – I=59%, C=39%(p=0.0335)	NA	NA
Marinello et al ²²	2018	Prospective study	dHACM-10	Weekly	8 weeks	80% mean reduction	Complete healing percentage -66.7%	NA	Increased exudate in 4 patients
Bianchi et al ¹⁷	2017	RCT	EpiFix-52 SOC-57	Weekly	16 weeks (2-week screening, 12-week treatment, 2-week follow-up)	At 12 weeks – p=0.0435 At 16 weeks- p=0.0098	Healed at 12 weeks – I=60%, C=35% (p=0.0128) Healed at 16 weeks – I=71%, C=44%(p=0.00625)	NA	Not observed
Serena et al ¹⁸	2014	RCT	dHACM-53 SOC-31	Weekly	6weeks (2-week screening, 4-week treatment phase,)	NA	At 4 weeks- I=62% and C=32% showed greater than 40% closure. (p=0.005)	NA	Not observed
Francis et al ¹⁹	2013	Prospective study	Amnion transfer-40	Follow up at 10,30 1st 90 days. Long-term follow-up at 1 and 3 years	Up to 3 years of follow up	At 30 days a)>75% area reduction in 47.5% b)50-75% area reduction in 32.5%	NA	Less than 30% recurrences 3 year follow up	NA
Hanumanthappa et al ²⁰	2012	Prospective comparative study	Amniotic membrane dressing-100 SOC-100	Weekly	3 weeks	NA	I=81% and C=40% showed epithelialization (p<0.005)	NA	NA
Merment et al ²¹	2007	Prospective study	Cryopreserved AM graft-15	Weekly	3 months follow up	Granulation tissue 17% on day 0 to 69% on day14 Decrease of the fibrinous slough from 36% on day 0 to 16% on day 14 Mean ulcer area from 4.59cm ² to 2.91cm ² on day 30	At 3 months - 80% healed	NA	Not observed

RCT- Randomized Control Trials; SOC-Standard of Care; NA-Not Available; I-intervention group; C- Control group; dHACM – dehydrated Human Amnion/Chorionic Membrane; AM-Amniotic membrane.

Apligraf-31% [24] and Dermograft-38% [25]). With this background, it is suitable as second-line treatment or as an adjunct in the management of venous ulcers.

A study done in 2018 showed that healing of leg ulcers was faster if early endovenous ablation of superficial venous reflux was achieved [26]. Current literature indicates similar ulcer healing rates between superficial venous surgery and the use of compression. However, with a lesser recurrence rate [27]. Therefore, the effect of superficial venous surgery on ulcer healing cannot be disregarded in the current study. Most of the studies included in this review have been done before 2018 and only one study mentioned that the patients in their study had undergone surgery for varicose veins before the treatment with amniotic membrane allografts [19]. Two studies [20,21] mentioned that the patients in the study had not received surgical treatment for varicose veins.

Limitations

One of the main drawbacks was that the study methods weren't uniform and there was heterogeneity among them. As a result, the differences in outcomes could be due to the study methods and cannot be solely attributed to the use of HAM. Another drawback was the smaller number of RCTs.

Conclusion

Data available in the literature is limited at the moment. Available scientific evidence indicates that amniotic membrane preparations can be utilized to promote the healing of chronic venous leg ulcers as an adjunct to traditional treatment or as second-line therapy. Further studies which compare standard therapy with HAM are needed. These studies need to be conducted on a larger cohort.

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

References

1. Zenilman J, Valle MF, Malas MB, Maruthur N, Qazi U, Suh Y, et al. Chronic venous ulcers: a comparative effectiveness review of treatment modalities. [Internet]. Rockville, MD: Agency for Healthcare Research and Quality (US); 2013 Dec; 2013.
2. O'Meara S, Al-Kurdi D, Ovington LG. Antibiotics and antiseptics for venous leg ulcers. *Cochrane Database Syst Rev* 2008; (1): CD003557.
3. McLafferty RB. Venous leg ulcers. In: Mowatt-Larssen E, Desai SS, Dua A, Shortell CEK, eds. *Phlebology, Vein Surgery and Ultrasonography: Diagnosis and Management of Venous Disease*. Cham, Switzerland: Springer; 2014:341-355.
4. Cornwall JV, Doré CJ, Lewis JD (1986) Leg ulcers: epidemiology and aetiology. *Br J Surg* 73:693-696
5. Baker SR, Stacey MC, Singh G, Hoskin SE, Thompson PJ (1992) Aetiology of chronic leg ulcers. *Eur J Vasc Surg* 6:245-251
6. Persoon A, Heinen MM, van der Vleuten CJ, de Rooij MJ, van de Kerkhof PC, van Achterberg T. Leg ulcers: a review of their impact on daily life. *J Clin Nurs* 2004; 13: 341-54.
7. Patel NP, Labropoulos N, Pappas PJ (2006) Current management of venous ulceration. *Plast Reconstr Surg* 117:254S-260S
8. Thompson, Patricia, et al. "Comparing human amniotic allograft and standard wound care when using total contact casting in the treatment of patients with diabetic foot ulcers." *Advances in skin & wound care* 32.6 (2019): 272-277
9. Parolini O, Solomon A, Evangelista M, Soncini M. Human term placenta as a therapeutic agent: from the first clinical applications to future perspectives. In: Berven E, editor. *Human placenta: structure and development*. Hauppauge, New York: Nova Science Publishers, 2010: 1-48.
10. Jiang D, Liang J and Noble PW: Hyaluronan in tissue injury and repair. *Ann Rev Cell Dev Biol* 23: 435-461, 2007.
11. Torрати FG, Rossi GA, Ferreira E et al (2000) Analysis of cost of dressings in the care of burns patients. *Burns* 26:289-293
12. Shun A, Ramsey-Stewart G (1983) Human amnion in the treatment of chronic ulceration of the leg. *Med J Aust* 2:279-283
13. Quinby WC, Hoover HC, Schefflan M, Walters PT, Slavin SA, Bondoc CC (1982) Clinical trials of amniotic membranes in burn wound care. *Plast Reconstr Surg* 70:711-716
14. Su, Ya-Na, et al. "Human amniotic membrane allograft, a novel treatment for chronic diabetic foot ulcers: A systematic review and meta-analysis of randomized controlled trials." *International Wound Journal* 17.3 (2020): 753-764.
15. Gutiérrez-Moreno S, Alsina-Gibert M, Sampietro-Colom L, Pedregosa-Fauste S, Ayala-Blanco P. Estudio Cost-benefit analysis of amniotic membrane transplantation for venous ulcers of the legs that are refractory to conventional treatment. *Actas Dermosifiliogr*. 2011 May; 102(4):284-8. Spanish. doi: 10.1016/j.ad.2011.01.003. Epub 2011 Mar 25. PMID: 21440240
16. Bianchi C, Tettelbach W, Istwan N, Hubbs B, Kot K, Harris S, Fetterolf D. Variations in study outcomes relative to intention-to-treat and per-protocol data analysis techniques in the evaluation of efficacy for treatment of venous leg ulcers with dehydrated human amnion/chorion membrane allograft. *Int Wound J*. 2019 Jun; 16(3):761-767. doi: 10.1111/iwj.13094. Epub 2019 Mar 12. PubMed PMID: 30864259; PubMed Central PMCID: PMC6850648.
17. Bianchi C, Cazzell S, Vayser D, Reyzelman AM, Dosluoglu H, Tovmassian G; EpiFix VLU Study Group. A multicentre randomised controlled trial evaluating the efficacy of dehydrated human amnion/chorion membrane (EpiFix®) allograft for the treatment of venous leg ulcers. *Int Wound J*. 2018 Feb; 15(1):114-122. doi: 10.1111/iwj.12843. Epub 2017 Oct 11. PubMed PMID: 29024419.
18. Serena TE, Carter MJ, Le LT, Sabo MJ, DiMarco DT; EpiFix VLU Study Group. A multicenter, randomized, controlled clinical trial evaluating the use of dehydrated human amnion/chorion membrane allografts and multilayer compression therapy vs. multilayer compression therapy alone in the treatment of venous leg ulcers. *Wound Repair Regen*. 2014

- Nov-Dec;22(6):688-93.
doi: 10.1111/wrr.12227. Epub 2015 Jan 8. PubMed PMID: 25224019.
19. Francis J, Shajimon CR, Bhat AK, Kanakambaran B. Use of Amnion Transfer in Resistant Nonhealing Venous Leg Ulcers. *Indian J Surg.* 2015;77(Suppl 2):457-462.
doi:10.1007/s12262-013-0875-7
20. Hanumanthappa M.B, Gopinathan S, Guruprasad Rai D. Amniotic membrane dressing versus conventional dressing in the lower limb varicose ulcer. *International Journal of biological and medical research.* 2012;3(2):1616-1620
21. Mermet I, Pottier N, Sainthillier JM, Malugani C, Cairey-Remonnay S, Maddens S, Riethmuller D, Tiberghien P, Humbert P, Aubin F. Use of amniotic membrane transplantation in the treatment of venous leg ulcers. *Wound Repair Regen.* 2007 Jul-Aug;15(4):459-64.
doi: 10.1111/j.1524-475X.2007.00252.x. PMID: 17650088
22. Marinello J, S.-P. M., Albuxech C, Carreño P, Lopez-Palencia J, Palomera E, Alos J (2018). Safety and Efficacy of Amniotic Membrane Implant in Venous Leg Ulcers. *Journal of Vascular Medicine & Surgery.* 2018 6(5).
doi: 10.4172/2329-6925.1000373
23. Mościcka P, Szewczyk MT, Cwajda-Białasik J, Jawień A. The role of compression therapy in the treatment of venous leg ulcers. *Adv Clin Exp Med.* 2019;28(6):847-852
24. Marston WA, Sabolinski ML, Parsons NB, Kirsner RS. Comparative effectiveness of a bilayered living cellular construct and a porcine collagen wound dressing in the treatment of venous leg ulcers. *Wound Repair Regen* 2014;22:334–40.
<https://doi.org/10.1111/wrr.12156>.
25. Krishnamoorthy L, Harding K, Griffiths D, Moore K, Leaper D, Poskitt K, Sibbald RG, Brassard A, Dolynchuk K, Adams J, Whyman M. The clinical and histological effects of Dermagraft® in the healing of chronic venous leg ulcers. *Phlebology* 2003;18(1):12–22.
<https://doi.org/10.1258/026835503321236858>.
26. Gohel MS, Heatley F, Liu X, et al. A Randomized Trial of Early Endovenous Ablation in Venous Ulceration. *N Engl J Med.* 2018;378(22):2105-2114. doi:10.1056/NEJMoa1801214
27. Ren, Shi-Yan et al. “Strategies and challenges in the treatment of chronic venous leg ulcers.” *World journal of clinical cases* vol. 8,21 (2020): 5070-5085.
doi:10.12998/wjcc.v8.i21.5070

Choice of androgen deprivation therapy for prostate cancer

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Keywords: Androgen deprivation therapy; prostate cancer; evidence based medicine; bilateral orchidectomy

The prevalence of prostate cancer [PCa] is rising globally and the rates in Asian countries are expected to increase exponentially [1]. The majority of patients with PCa have metastatic disease at the time of presentation in developing countries [1]. According to National Cancer Control Programme statistics, there have been 1009 new cases of prostate cancer reported in 2019 and is the fifth commonest cancer among Sri Lankan men [2]. The incidence seems to be increasing with the majority presenting with metastatic disease [3,4]. Medical or surgical [bilateral orchiectomy] androgen deprivation therapy [ADT], is the standard of care for metastatic PCa. ADT is also used as neoadjuvant therapy in patients with locally advanced PCa prior to definitive treatment. Gonadotropin-releasing hormone [GnRH] agonists are the commonly used form of medical ADT especially in the developed world [5]. The reasons given are its reversibility and supposedly better profile of adverse events when compared to surgical ADT. However, a review of published literature in the past 20 years showed that the advantages of medical ADT in terms of sexual dysfunction, osteoporosis, metabolic adverse events and vasomotor symptoms are minimal or inconclusive [Supplementary table 1]. Furthermore, these studies comparing medical versus surgical ADT have not made any conclusive recommendations against surgical treatment.

Compared to surgical treatment, Luteinising Hormone Releasing Hormone [LHRH] agonists achieved significantly lower levels of serum testosterone [6]. However, the clinical significance of such a difference is not clear. The risk of osteoporosis and fracture rate was significantly lower in the bilateral orchiectomy group when compared to LHRH agonists [7]. Teoh et al, showed that the risk of cardiovascular thrombotic events was found to be higher among patients who underwent orchiectomy than LHRH agonists, however, a population-based study from Sweden did not reveal any

statistically significant increase in the risk [8,9].


The survival rates, change in plasma glucose values, risk of cardiovascular disease, cognitive disorders, fracture risk and sexual function after surgical ADT was found to be non-inferior to medical treatment. The popular belief that surgical ADT is associated with poor psychological morbidity and quality of life lacks evidence as studies have shown that the quality of life and sexual function following two treatment modalities were similar [Supplementary table 1- Table S1]. A meta-analysis comparing intermittent vs. continuous ADT did not show any significant difference in overall survival, cancer-specific survival, and progression-free survival but physical and sexual functioning favoured intermittent ADT [10]. The difference in the self-reported quality of life of the participants was also minimal.

Another important factor in selecting the choice of ADT is the cost, more relevant in resource-poor settings. Two studies have compared the relative cost of surgical treatment with LHRH agonist therapy. The cost of orchiectomy was exceeded within 4.2 to 5.3 months and the cost for two years of medical ADT was 10.7 to 13.5 times of surgical ADT. The duration of medical ADT depends on the life expectancy of the patient and in this study, 15% of patients were alive after 10 years [Table S1]. In a study published in 2000, the total cost of bilateral orchiectomy was \$2,022 while the cost of treatment with LHRH agonists for 30 months was \$13,620. Medical ADT requires good patient compliance to ensure frequent visits to a medical care facility which may not be optimal in resource-poor settings, giving surgical ADT yet another advantage [Table S1]. ADT is necessary only for a limited period of 24-36 months when it is used as neoadjuvant therapy. In such situations where reversibility is important, medical ADT is more advantageous [Table S1].

The choice of ADT should be individualized depending on the patient's clinical indication, life expectancy, compliance and patient's wishes. The cost of treatment should not be forgotten, more so, in resource-poor settings like Sri Lanka [11]. When counselling patients to decide on the type of ADT, it is important to consider the non-inferiority of surgical androgen ablation to medical forms of ADT. Accurate

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Received: 29-05-2022 Accepted: 24-06-2022

DOI: <https://doi.org/10.4038/sljs.v40i2.8967>



evidence should be provided to the patients so that they could make informed decisions regarding their management.

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

References

1. Teoh JY, Hirai HW, Ho JM, Chan FC, Tsoi KK, Ng CF. Global incidence of prostate cancer in developing and developed countries with changing age structures. *PloS one* 2019; 14: e0221775. doi: 10.1371/journal.pone.0221775
2. Cancer Control Programme, Ministry of Health & Indigenous Medical Services, Sri Lanka [2021]. [<https://www.nccp.health.gov.lk>] [Accessed on 01.02.2022]
3. Abeygunasekera AM. Prostate cancer in Asia: A collaborative report - The situation in Sri Lanka. *Asian journal of urology* 2015; 2: 128-. doi:10.1016/j.ajur.2015.04.015
4. Jayarajah U, Vidanapathirana S, Mahadewa S et al. Diagnostic yield and outcome of transrectal ultrasound-guided prostate biopsy in Sri Lanka. *Ceylon Med J* 2021; 66: 162-7. doi: 10.4038/cmj.v66i4.9506.
5. Jespersen CG, Nørgaard M, Borre M. Androgen-deprivation therapy in treatment of prostate cancer and risk of myocardial infarction and stroke: a nationwide Danish population-based cohort study. *European urology* 2014; 65: 704-9. doi: 10.1016/j.eururo.2013.02.002
6. van der Sluis TM, Bui HN, Meuleman EJ et al. Lower testosterone levels with luteinizing hormone-releasing hormone agonist therapy than with surgical castration: new insights attained by mass spectrometry. *The Journal of urology* 2012; 187: 1601-7. doi: 10.1016/j.juro.2011.12.063
7. Gandaglia G, Sun M, Popa I et al. The impact of androgen-deprivation therapy [ADT] on the risk of cardiovascular [CV] events in patients with non-metastatic prostate cancer: a population-based study. *BJU international* 2014; 114: E82-E9. doi: 10.1111/bju.12732
8. Thomsen FB, Sandin F, Garmo H et al. Gonadotropin-releasing hormone agonists, orchiectomy, and risk of cardiovascular disease: semi-ecologic, nationwide, population-based study. *European Urology* 2017; 72: 920-8. doi: 10.1016/j.eururo.2017.06.036
9. Teoh JY, Chan SY, Chiu PK et al. Risk of cardiovascular thrombotic events after surgical castration versus gonadotropin-releasing hormone agonists in Chinese men with prostate cancer. *Asian Journal of Andrology* 2015; 17: 493. doi: 10.4103/1008-682X.143313
10. Magnan S, Zarychanski R, Pilote L, Bernier L, Shemilt M, Vigneault E, et al. Intermittent vs continuous androgen deprivation therapy for prostate cancer: a systematic review and meta-analysis. *JAMA oncology*. 2015;1[9]:1261-9. doi: 10.1001/jamaoncol.2015.2895
11. Jayarajah U, Abeygunasekera AM. Cancer services in Sri Lanka: current status and future directions. *Journal of the Egyptian National Cancer Institute* 2021; 33: 1-7. doi: 10.1186/s43046-021-00070-8

CASE REPORT

Malignant sigmoid colon tumour causing a large bowel obstruction in a morgagni hernia: an unusual presentation in an elderly lady

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Keywords: Morgagni hernia; elderly; congenital diaphragmatic hernia; colon cancer; large bowel obstruction

Introduction

A Morgagni hernia is a congenital defect and is found in the anterior and medial portion of the diaphragm, allowing herniation of contents of the abdominal cavity into the thorax. [1-3]. It rarely presents in childhood and is often diagnosed incidentally or due to symptoms in adulthood[1-3]. Reports of symptoms appearing in the elderly population are scarce[2-3]. Colonic tumours, however, are frequently the cause of large bowel obstruction in older patients [4]. Surgery is the definitive treatment for both a Morgagni hernia and an obstructing colonic tumour[2-5].

Case study

A female, 83 years old, presented as an emergency to our hospital. She was suffering from vomiting, pain at the epigastrium and abdominal distension for 2 days. In the preceding 3 months, she had noticed some constipation with loss of appetite and weight. Her past medical history included Type II Diabetes Mellitus and Hypertension. She had never undergone any surgeries in the past. On physical examination, her abdomen was distended with hyperactive bowel sounds, and her upper abdomen was tender.

A chest radiograph showed loops of bowel within the right hemithorax. (Figure 1). There was dilatation of large bowel loops seen on an Abdominal X-Ray. A contrasted CT scan of her chest and abdomen showed an irregular enhancing mass at the sigmoid colon (Figure 2), with surrounding fat streakiness and enlarged pericolic lymph nodes. This mass was causing proximal bowel dilatation. There was also evidence of herniation of dilated large bowel loops into the thoracic cavity via a defect at the medial aspect of the right hemi diaphragm, consistent with a Morgagni hernia (Figure 3). There was thickening of bowel wall and fluid seen within the hernia sac, concerning features for bowel strangulation. The imaging

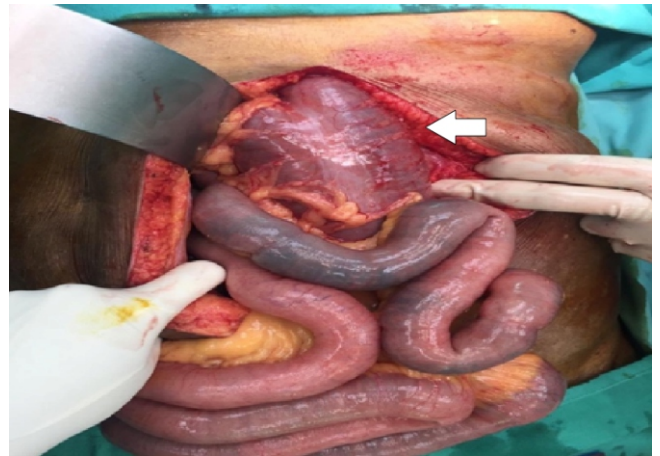


Figure 1. Intraoperative findings – Grossly dilated loop of transverse colon seen entering the hernia defect (White arrow)

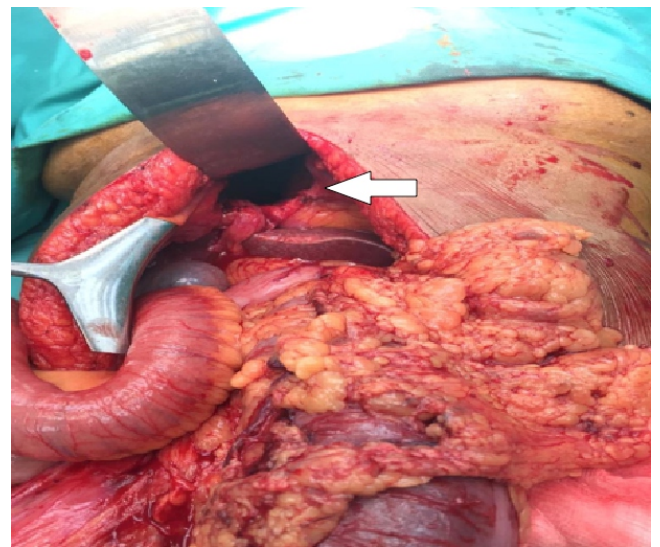


Figure 2. The diaphragmatic defect after reduction of hernia contents (White arrow)

confirmed our suspicion of a strangulated diaphragmatic hernia, however, we were surprised to find that the primary cause of the obstruction was a sigmoid colon tumour. The patient underwent an emergency laparotomy. Intraoperative findings were a constricting tumour at the sigmoid colon, causing proximal large bowel dilatation. A defect was found over the right side of her diaphragm and the contents were reduced, which included a grossly dilated caecum, and ascending and transverse colon, which was dusky with

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Received: 10-08-2021 Accepted: 16-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8879>



ischemic patches (Figure 4). The defect measured 4x4cm (Figure 5). A subtotal colectomy with end ileostomy creation was performed. The diaphragmatic defect was primarily repaired with non-absorbable nylon sutures in two layers. The patient recovered and was discharged home. Histopathological examination of the resected bowel specimen confirmed a poorly differentiated adenocarcinoma of the sigmoid colon. Six months later, the patient remained symptom-free but declined further adjuvant treatment due to advanced age and poor functional status.

Discussion

Morgagni hernia is the cause of only 2-3% of diaphragmatic hernias[1-2]. It is caused by failure of fusion of the sternal and costal portions of the diaphragm[3] and is located anterior and medially[1-3]. Even though it is a congenital hernia, the condition is usually diagnosed in adults[1]. It is postulated that increasing abdominal pressure with age is required to stretch the defect and allow herniation of the bowel into the thorax[1,3]. Other contributing factors include obesity, trauma and pregnancy[2-3]. Many patients remain asymptomatic and are diagnosed incidentally during a workup for other pathologies[1,3]. When symptoms are present, they are vague and may persist for years[3]. Common symptoms are related either to the pulmonary system (cough, shortness of breath, exertional dyspnea) or gastrointestinal symptoms (indigestion, dysphagia, reflux, intermittent discomfort or pain) [2,3]. Some patients present more dramatically in an emergency setting with intestinal obstruction or strangulation of the bowel[1,3].

Plain abdominal radiographs of the chest and abdomen will show gas-filled bowel loops in the thoracic cavity[2]. Various diagnostic imaging methods have been used to confirm the diagnosis, including ultrasound, barium studies[1,2,5], endoscopy[2] and MRI[2,5]. However, in our opinion, a CT scan remains the gold standard[1,5] as it is accurate, fast, non-invasive, easily available and cost-effective. In a minority of patients, a conclusive diagnosis may be difficult as the bowel can slip in and out of the sac. A diagnostic laparoscopy then provides a means to both diagnose and repair the defect[3].

Surgery is the definitive treatment[2]. The hernia can be approached via an open method, either through the thorax or abdomen[5]. The abdominal approach allows for evaluation of the contralateral diaphragm for any additional defects and it is also the easier approach for reduction of hernia contents[2-3]. It is preferred in the emergency setting because it allows for the repair of any intra-abdominal pathology[5]. Some authors have described success with a thoracotomy approach, as separating the sac from structures in the mediastinum is easier. [2]. In an elective setting, laparoscopy

is an excellent option, with a faster post-operative recovery[2-3]. As with most hernias, the defect can be primarily repaired using sutures[2,3,5], with mesh repair reserved for larger defects[2,3,5].

In older patients, colon cancer is one of the most common causes of large bowel obstruction[4]. In our patient, the obstruction caused by the sigmoid tumour resulted in dilatation of the proximal large bowel and subsequent strangulation of bowel loops within a previously asymptomatic Morgagni hernia. This has never been previously seen or reported in the literature. While the standard treatment of an obstructed sigmoid colon tumour is either a Hartmann's procedure or a sigmoidectomy with anastomosis[4], we performed a subtotal colectomy to address the tumour along with the unhealthy proximal bowel. A midline laparotomy allowed us excellent access to reduce the hernia contents, perform the bowel resection and close the hernia defect successfully.

Conclusion

Morgagni hernia is rare but can present as bowel obstruction or strangulation. Prompt diagnosis is required before bowel gangrene or perforation occurs. Plain radiographs together with a contrast CT scan will confirm the diagnosis, and also identify other concurrent abdominal pathologies that need to be addressed. Surgery is the mainstay of treatment, via an open or laparoscopic approach.

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

References

1. Dodis LB, Bennett MW. Gastroduodenal obstruction from Morgagni hernia in an elderly patient. *Medscape General Medicine*. 2005;7(4):70. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1681716/#>
2. Horton JD, Hofmann LJ, Hetz SP. Presentation and management of Morgagni hernias in adults: a review of 298 cases. *Surgical endoscopy*. 2008 Jun 1;22(6):1413-20. <https://doi.org/10.1007/s00464-008-9754-x>
3. Loong TP, Kocher HM. Clinical presentation and operative repair of hernia of Morgagni. *Postgraduate medical journal*. 2005 Jan 1;81(951):41-4. <https://doi.org/10.1136/pgmj.2004.022996>
4. Kim YJ. Surgical Treatment of Obstructed Left-Sided Colorectal Cancer Patients. *Annals of coloproctology*. 2014 Dec 31;30(6):245-6. <https://doi.org/10.3393/ac.2014.30.6.245>
5. Testini M, Girardi A, Isernia RM, De Palma A, Catalano G, Pezzolla A, Gurrado A. Emergency surgery due to diaphragmatic hernia: case series and review. *World Journal of Emergency Surgery*. 2017 Dec;12(1):23. <https://doi.org/10.1186/s13017-017-0134-5>

Learning Points:

- Morgagni hernia in itself is rare, presenting as an emergency with bowel obstruction secondary to a tumour has never been reported, thus clinical suspicion and appropriate imaging are required to confirm the diagnosis and initiate treatment
- CT scan is an easily available, non-invasive tool to confirm the diagnosis and also identify any other concurrent pathology that would require surgical correction.
- Surgery is the definitive treatment and should not be delayed to avoid bowel perforation, gangrene or sepsis.

The pulsatile bulge on the oesophagus: rare cause for hematemesis

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Keywords: Aorto-esophageal fistula; mycotic aneurysm; pulsatile bulge

Introduction

Aortoenteric fistula is a rare but fatal condition. Here we present a case of primary aortoenteric fistula due to a thoracic aneurysm.

Case presentation

A 52 years old gentleman was admitted with a history of chest pain for 3 weeks duration associated with dysphagia. Although he denied a history of fever, he had a history of loss of appetite and loss of weight. The initial examination was unremarkable.


His white cell count was 22,000/mm³ with 90% of neutrophils, haemoglobin was 10g/dL and platelet was 364 X 10⁹ /L. His C-Reactive Protein (CRP) was 221 mg/L on admission. Other blood investigations were unremarkable. The initial blood culture was negative and the echocardiogram did not reveal any vegetation. As he had a history of dysphagia, he underwent upper gastrointestinal endoscopy (UGIE) which revealed a narrowing of the oesophagus at the level of 28 cm from incisor teeth but there were no mucosal abnormalities. Subsequently, he underwent Computed Tomography (CT) chest and abdomen. CT revealed a saccular descending thoracic aneurysm extending up to the level of the celiac artery with evidence of concealed rupture (Figure 1) and gas pockets around the aneurysm (Figure 2). While he was awaiting an urgent repair, he developed massive hematemesis and died.

Discussion

Aortoenteric fistula (AEF) is a rare but highly fatal disease. Dubreuil described this condition in 1818 in a patient who ingested beef rib [1]. AEF can be primary or secondary. Primary AEF occurs in the native aorta due to aneurysm, foreign body, malignancy and radiation. Secondary AEF occurs in an aorta which was previously operated [2].

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Received: 20-12-2021 Accepted: 06-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8928>

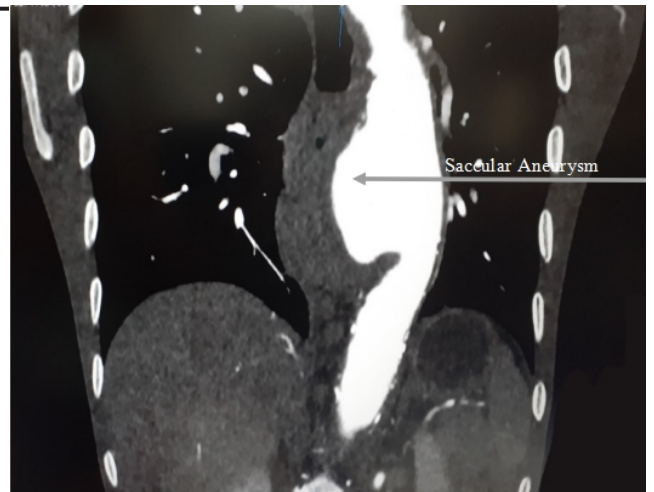


Figure 1. CT chest showing saccular aneurysm

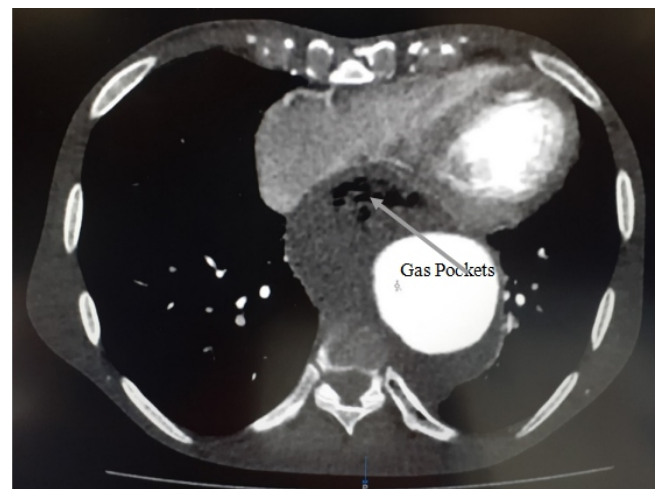


Figure 2. CT chest showing gas pockets around the aneurysm

Secondary AEF is more commoner than primary because of an increased proportion of aortic procedures.

In this patient, we suspect a mycotic aneurysm because of clinical and radiological features. Clinically this patient had a loss of appetite and loss of weight before the onset of other symptoms. In addition to this, his inflammatory markers were high on admission and there were air pockets in the CT chest both suggestive of active infection. The rest of the aorta was normal without any evidence of atherosclerotic changes. Blood cultures were negative may be because of a partially treated infection.

Oesophagus is affected in 28-30% of cases of aortoenteric fistula [2]. Chiari explained the triad of symptoms; mid-thoracic chest pain or dysphagia, sentinel haemorrhage followed by massive haemorrhage [3]. Our patient had this typical triad although only 45% of the patients with AEF presented with Chiari's triad [4]. Initial mid thoracic pain may be due to rapid stretching of the aortic wall, erosion and dissection of the aortic wall and oesophageal perforation. Air pockets in the CT chest can be due to mediastinitis due to oesophageal perforation which is also another cause of chest pain. Dysphagia was due to mechanical compression. Initial herald bleeding settled because of hypotension and clot formation.

UGIE and computed tomography angiogram (CTA) can be used to diagnose the fistula. There are reported cases where initial UGIE might fail to diagnose AEF as in our case. Pulsatile bulging with or without adherent clots is rarely seen in UGIE [2].

In patients with hematemesis and aorto-esophageal fistula, thoracic stenting would be a bridging therapy or primary treatment. In long run, there is a chance of stent graft infection due to a mycotic aneurysm, so some authors recommend lifelong antibiotic treatment. If the stenting is done as bridging therapy aorta should be replaced with either a prosthetic graft or an autologous graft. A prosthetic graft carries the same risk of infection as a stent graft. There are reported cases of replacement of aorta with bovine pericardium [5]. In this patient, as he developed massive hematemesis immediately after the diagnosis we couldn't proceed with stenting or definitive surgical repair.

Aortoenteric fistula should be suspected in patients with mid-thoracic pain and herald bleeding which is bright red. Unnecessary delay in initial diagnosis might negatively affect the outcome.

Conclusion

Even though upper gastrointestinal bleeding due to aortoenteric fistula is rare, it should be suspected in a patient with chest pain and dysphagia. Initial herald bleeding is the only warning sign and thoracic covered stenting would be the ideal treatment at least as a bridge.

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

References

1. Kokatnur L, Rudrappa M. Primary aorto-esophageal fistula: great masquerader of esophageal variceal bleeding. *Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine*. 2015 Feb;19(2):119. doi: 10.4103/0972-5229.151022
2. Monteiro AS, Martins R, da Cunha CM, Moleiro J, Patrício H. Primary Aorto-esophageal Fistula: Is a High Level of Suspicion Enough? *European Journal of Case Reports in Internal Medicine*. 2020;7(8). doi: 10.12890/2020_001666
3. Chiari H. Ueber Fremdkörperverletzung des oesophagus mit aortenperforation. *Ber Klin Wochenschr*. 1914;51:7-9
4. Heckstall RL, Hollander JE. Aorto-esophageal fistula: recognition and diagnosis in the emergency department. *Annals of emergency medicine*. 1998 Oct 1;32(4):502-5. doi:10.1016/S0196-0644(98)70182-9
5. Al - Thani H, Wahlen B M, El - Menyar A, Hussein A, Sadek A, Fares A, Saih MM, Almulla A. Presentation, management and outcome of aorto-esophageal fistula in young patients: two case-reports and literature review. *Journal of Surgical Case Reports*. 2021 Jun;2021(6):rjab213. doi: 10.1093/jscr/rjab213

Learning Points:

- Primary aortoenteric fistula is a rare cause of hematemesis
- Typical triad of chest pain, sentinel haemorrhage followed by massive haemorrhage only occur in some patients.

Laparoscopic repair of a rare type of internal hernia :a case of left para-duodenal hernia

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Keywords: Left para duodenal hernia; laparoscopic repair of internal hernia

Introduction

Internal hernias are a rare cause of acute small bowel obstruction. Para-duodenal hernias (PDH) are the commonest of internal hernias, which result from malrotation of the midgut, causing potential spaces around the ligament of Treitz. Left para-duodenal hernia is the commonest type of para-duodenal hernia. Here we presented a case of left PDH which was managed laparoscopically and a literature review of published cases of left PDH. To the best of our knowledge, this is the first case of Left PDH from Sri Lanka publishing in English literature.

Case study

A 43-year-old woman has had several episodes of sudden onset central abdominal pain after meals lasting for 5-10 minutes. It got worsened progressively over the days. On the 7th day of the illness, she had severe colicky central abdominal pain, and soon after a heavy meal made her rush to the emergency department. The pain became generalized within minutes and was associated with nausea, vomiting and sweating. Her bowel habits were normal. Her abdominal examination revealed epigastric tenderness.

Her blood investigations and imaging were unremarkable. After initial medical management her condition improved, but the usual abdominal pain- after a meal, persisted. She underwent upper and lower GI endoscopies which were normal.

Her CT scan was re-evaluated and found an internal herniation of a loop of small bowel into a possible left para-duodenal fossa (fossa of Landzert). She was subjected to diagnostic laparoscopy & found her jejunum was herniated into the fossa of Landzert causing sub-acute small bowel obstruction. Hernia reduced laparoscopically by emptying the jejunal loops from the fossa of Landzert. The inferior

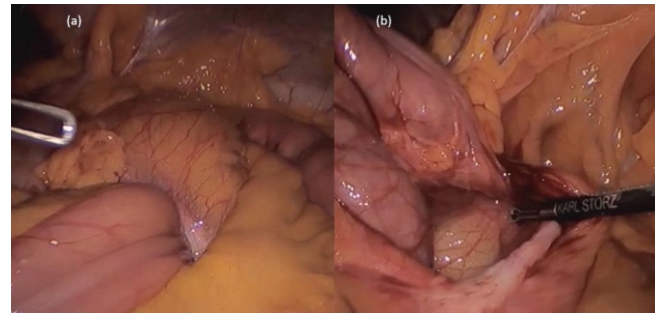


Figure 1. (a) Jejunal loops found inside fossa of Landzert (b) Left paraduodenal hernia after emptying the jejunum

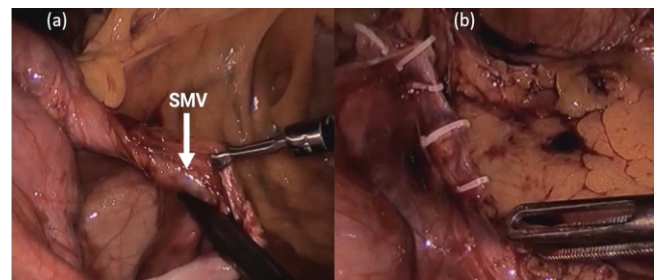


Figure 2. (a) Skeletonising Superior Mesenteric Vein (SMV) (b) Closing the defect by approximating the peritoneal leaves with hemolock® clips (b) Left paraduodenal hernia after emptying the jejunum

mesenteric vein and the Ascending left colic artery were skeletonized from the congenital adhesions and retro-peritonealized by closing the fossa of Landzert.


Patient had an uneventful recovery and was discharged on 3rd post-operative day.

Discussion

Protrusion of an abdominal viscera through a peritoneal or mesenteric aperture into a compartment in the abdominal or pelvic cavity is known as the internal hernia. The commonest type of internal hernia is Para-duodenal hernia (LPDH) out of which 40% occur on the left side. This happens when a viscera protrudes into the fossa of Landzert which is a congenital mesenteric defect, found left to the fourth part of the duodenum formed by lifting a fold of peritoneum by inferior mesenteric vein. [1]. It is three times more commoner than the

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Received: 06-09-2021 Accepted: 05-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8887>



right para-duodenal hernia which is called Waldayer's hernia [2].

The clinical presentation varies from asymptomatic hernia detected incidentally to emergency admissions that need immediate intervention [1,3,4]. The herniated bowel loops can get obstructed and present as acute abdomen. Pre-operative confirmation of para-duodenal hernia needs a high amount of suspicion and abdominal computed tomography is the standard investigation of choice to diagnose the condition. [5]. Either laparotomy or laparoscopy is conducted as emergency surgery to relieve the obstruction as this condition has nearly 20-40% mortality [2]. Laparoscopy is a good tool to both diagnose and treat the condition and is the current standard of practice for Para-duodenal hernia [4].

A literature review was done in 'PubMed' to search cases of LPDH from 1980- 2020. Sixty-nine reported cases have been found. Male: female ratio was 7:3. Mean age at presentation was 47, and there were 5 paediatric patients including 2 infants. One-third of those patients had chronic abdominal symptoms. Forty-nine patients (71%) have presented to the emergency department with features of intestinal obstruction. Out of 49 cases, 24 were confirmed by pre-operative imaging, whereas 25 were clinically diagnosed.

Pre-operative radiological diagnosis with computer tomography had been possible only in 56% of these cases. Emergency surgery was performed in 45 patients (65%) including 31 laparotomies, and 10 laparoscopies. Laparoscopy has been converted to open surgery in four patients. Reasons for conversion were inability to mobilise the ileal loop, not being able to achieve pneumoperitoneum, impeded laparoscopic view and reduced bowel remaining dusky. Elective surgery was performed in 9 cases (13%), including 4 laparotomies and 5 laparoscopies.

Conclusions

Para-duodenal hernias are a rare cause of small bowel obstruction. A high degree of clinical suspicion should be made to diagnose this condition. Computer tomography is supportive imaging but has been non-diagnostic in a fair percentage of reported cases. Laparoscopy is diagnostic and the majority of the cases can be managed laparoscopically as well.

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

References

1. Haoux Xu, Ning Nie, Fanmin Kong, Banghua Zong. Large left paraduodenal hernia with intestinal ischemia: a case report and literature review. *J Int Med Res.* 2020 Sep;48(9). doi: 10.1177/0300060520955040
2. MB Moussa, Ismail N, Taib L, ME Absi, El Hassan EFE Alami, ME Ouanani, et al. A paraduodenal hernia revealed by bowel obstruction: case report and literature review. *Pan Afr Med J.* 2018;31. doi: 10.11604/pamj.2018.31.120.13538
3. Sleiman Y, El-Kheir A, El-Khoury M, Hamdach O, Ismail L, Allouch M. Small bowel obstruction secondary to left paraduodenal hernia: A case report and literature review. *Int J Surg Case Rep.* 2018;53:29–31. doi 10.1016/j.ijscr.2018.10.018.
4. Teresa C, Natalie K, Othmar S. Treitz Hernia: Report of a Case and Review of the Literature. *Surg Laparosc Endosc Percutan Tech.* 2019 Dec;29(6):e102–7. doi: 10.1097/SLE.0000000000000704
5. Masakazu W, Satoru K, Tomohide T. Laparoscopic repair of acute small bowel obstruction due to left paraduodenal hernia: A case report. *Int J Surg Case Rep.* 2018 Jan;51:194–9. doi: 10.1016/j.ijscr.2018.08.050

Learning Points:

- Para-duodenal hernia is a rare presentation of acute abdomen
- Laparoscopy is both diagnostic and therapeutic

Abdominal wall abscess with fish bone migration from proximal ileum

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Keywords: Abdominal; wall abscess; fish bone; proximal ileum; inflammatory mass

Introduction

Foreign body ingestion occurs either intentionally or unintentionally, culprits are mostly food particles like fishbone or chicken bone, metal particles like coins or batteries or glass pieces. Most of the time foreign bodies pass through uneventfully [1]. But they can occasionally bring about complications such as obstruction, perforation and sepsis. Even though most of the patients are managed conservatively, 10%-20% of patients need endoscopic intervention. Surgical intervention is required in less than 1% of patients [1]. We report the case of accidental ingestion of fish bone which led to ileal perforation followed by concealed anterior abdominal wall abscess with fish bone which required surgical intervention.

Case presentation

A 60-year-old Lady presented to the hospital with a history of peri umbilical pain over the one-month duration with a lump to the left side of the umbilicus. She had been on treatment for diabetes, hypertension and rheumatoid arthritis in good control and had undergone LRT 20 years back. Her family histories were unremarkable. She is a housewife, non-Smoker and non-Alcoholic. She denied knowledge of fish bone ingestion in the recent past. She was well one month back and developed intermittent peri umbilical pain over three weeks and was treated as gastritis as an outpatient. She noticed the appearance of a tender lump towards the left of her umbilicus associated with an intermittent fever over one week which ultimately led to her hospital admission.

On examination, there was a sub umbilical scar and a lump on the left side of the umbilicus which extended to the left lumbar region with a size of 8cm * 10cm. It was severely tender, deep to the rectus and had no skin colour changes. The rest of the abdomen was unremarkable. She was afebrile, not pale and

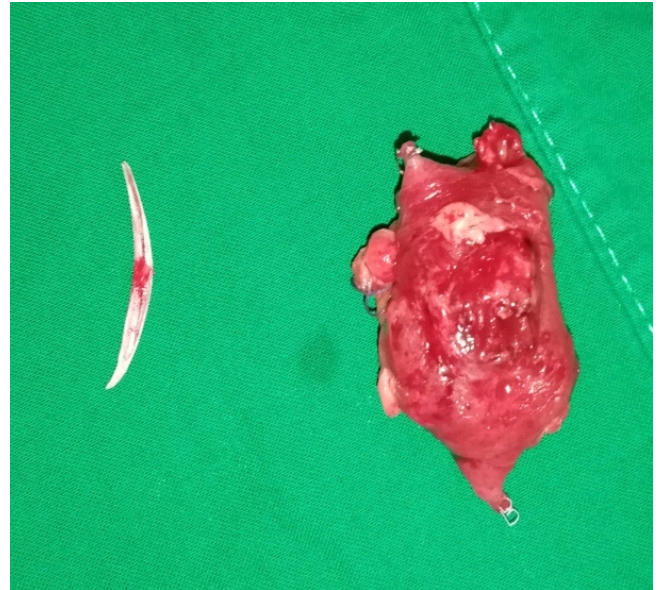


Figure 1a. Inflammatory mass with fish bone

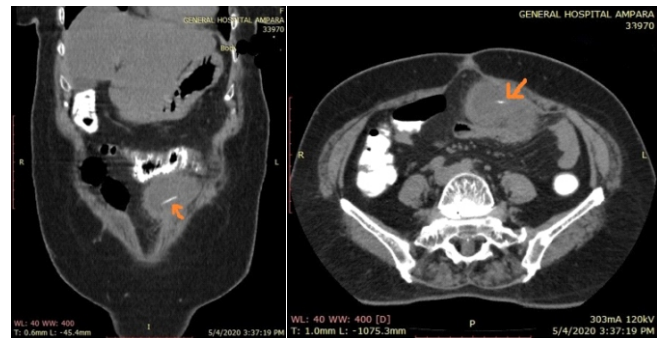


Figure 1b. Foreign body within the mass on CT

was not icteric. Her pulse rate and blood pressures were 80 beats per minute (bpm) and 140/80mmHg, respectively.

The white cell count and C-reactive protein levels were elevated while the rest of her biochemistry was normal. Abdominal ultrasonography showed hyper-peristaltic bowel loops with a slightly hypo echoic anterior wall of bowel with a small out pouching onto the rectus muscle suggestive of a small abscess with a linear foreign body seen in situ.

Computed tomography (CT) showed a 4cm size hyper dense linear foreign body (179HU) surrounded by central cystic and peripheral solid complex lesion with regional inflammation and infiltration into left side rectus abdominis muscle. There

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Received: 11-10-2021 Accepted: 25-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8982>



were possible adhesion with adjacent transverse colon and ileal loops. Although she was unaware of having ingested a sharp object like a fish bone, a strong suspicion of such occurrence was raised following the imaging studies. Initially, we treated with IV antibiotics conservatively for one week as the patient refused to go ahead with the surgery. The patient went home on her own accord following the completion of medical treatment. One week later patient presented again to the hospital due to the persistence of the same symptoms. In this admission, she agreed to go ahead with surgical exploration after discussing the probabilities and complications at length.

The patient underwent midline laparotomy under general anaesthesia and findings revealed a large inflammatory mass lesion with greater omentum adhered to the anterior abdominal wall. On further exploration, the mass turned out to be an abscess containing pus and a large fish bone communicating with a proximal ileal loop. Pus was drained and sent for culture and ABST. The point of ileal perforation had unhealthy edges with surrounding inflammation. The unhealthy ileal part was resected and side-to-side stapler anastomosis was performed. An abdominal drain was placed and laparotomy was closed in mass closure technique. Postoperatively she was treated with IV antibiotics for one week and the drain was removed on the 6th post-operative day. She had an uneventful postoperative course and was discharged on the 7th day following surgery.

Discussion

Accidental foreign body ingestion is usually associated with dietary foreign bodies which may rarely give to perforation in the adult population [1] and frequently with fish bones. The eaten fish bone may be forgotten but there can be an interval between symptoms related to stagnated fish bone and ingestion. 80% to 90% of swallowed foreign bodies exit the Gastrointestinal tract without any complication and only 10% to 15% need intervention [2]. History is not a reliable factor to suspect fish bone ingestion which can complicate abscess formation according to previous case reports [3]. Complications related to fish bone ingestion may present with a wide range of symptoms including odynophagia, dysphagia, upper GI haemorrhage, bowel obstruction, concealed perforation to frank peritonitis. Surgical intervention can be carried out via laparoscopy or laparotomy [1] only a few cases abdominal wall abscess formation due to accidental fish bone ingestion [1]. As a result, the history and presentation of the clinical condition itself don't offer information indicative of fish bone ingestion.

Ultrasonography in experienced hands can detect foreign body suggestive of fish bone with inflammatory mass [4] in

the anterior abdominal wall associated with bowel loops as in our case. Radiopaque foreign bodies can usually be identified by plain radiography with a sensitivity of 79% (eg, animal bones, woods and metals) including some fish bones [5]. CT abdomen confirmed the foreign body and location within inflammatory mass associated with bowel loop communication.

Initially, the patient was managed conservatively with IV antibiotics due to the patient's reluctance to go ahead with the surgery. Surgical exploration is almost always necessary for foreign bodies complicated with abscesses. As in our case, laparotomy was carried out to remove the foreign body which was found within the abscess cavity and laparoscopy was not performed because of the presence of adhesions involving the bowel loops and anterior abdominal wall. The fish bone was removed with part of the omentum, the entirety of the inflammatory mass and part of the unhealthy proximal ileum. The object was identified as a 4 cm-long fish bone. proximal ileal ends were anastomosed side-to-side with the stapler technique. Her post-operative stay was uneventful. Proximal ileal extraluminal migration of foreign body that leads to anterior abdominal wall abscess is unusual and no previous cases were reported to the best of our knowledge.

Conclusion

Accidental foreign body ingestion is common in the adult population. It rarely leads to complications like obstruction, perforation and bleeding. Most of the time, this type of Clinical condition can be managed conservatively, on occasions endoscopic management has taken place. Surgical intervention is needed rarely but in complicated cases like perforation, almost always needs surgical intervention.

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

References

1. Kuwahara, K., Mokuno, Y., Matsubara, H. et al. Development of an abdominal wall abscess caused by fish bone ingestion: a case report. *J Med Case Reports* 13, 369 (2019). <https://doi.org/10.1186/s13256-019-2301-7>
2. Kamali, A., & Moudi, E. (2017). Unusual presentation of an abdominal foreign body: A case report. *Caspian journal of internal medicine*, 8(2), 126–128. <https://doi.org/10.22088/cjim.8.2.126>
3. Hsu, S. D., Chan, D. C., & Liu, Y. C. (2005). Small-bowel perforation caused by fish bone. *World journal of gastroenterology*, 11(12), 1884–1885. <https://doi.org/10.3748/wjg.v11.i12.18844>.

4. Bekki, T., Fujikuni, N., Tanabe, K. et al. Liver abscess caused by fish bone perforation of stomach wall treated by laparoscopic surgery: a case report. *surg case rep* 5, 79 (2019).
<https://doi.org/10.1186/s40792-019-0639-0>

Learning Points:

- Abdominal wall abscess is a rare complication associated with foreign ingestion-related perforation.
- History is not direct or helpful when a foreign body is accidentally ingested.
- CT is a more sensitive investigation to identify, and locate the radio-opaque foreign body and give better anatomical delineation of the surrounding structures to plan the surgery.

Parenchyma preserving surgery in pancreatic trauma

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Keywords: Pancreatic trauma; cyst gastrostomy; parenchymal preserving surgery; pancreatectomy

Introduction

The pancreas is a retroperitoneal structure, lying posteriorly across the upper lumbar vertebrae extending from the curvature of the duodenum to the hilum of the spleen. Therefore, injuries to the pancreas are not that common with abdominal injuries, accounting for about 4% of all abdominal injuries and especially in children; it's about 0.5% [1][2]. One of the problems associated with pancreatic injuries following blunt abdominal trauma is its delay in diagnosis or misdiagnosis causing high morbidity and mortality.

The mechanism of injury of nonpenetrating pancreatic trauma is either due to acceleration-deceleration forces on the parenchyma or due to crushing injury of the parenchyma on the vertebral column. The crushing injuries results in fracture of the parenchyma at the level of the neck or body region due to compression over the lumbar vertebrae. This can lead to complete or partial injury of the pancreatic duct. Even though major ductal injuries account only for about 15% of all pancreatic injuries, it carries higher morbidity as well as higher mortality [3]. Therefore, early diagnosis and vigorous treatment are paramount. Pancreatic injuries are graded according to the American Association for the Surgery on Trauma[4]. The diagnosis and grading of pancreatic injuries in abdominal trauma are usually done with the operative findings in cases of open injuries and by the findings in imaging, especially by contrast-enhanced CT scan in cases of blunt abdominal injury. The sensitivity and specificity of the CECT in detecting pancreatic trauma are around 87-98%, respectively, and in about 40% of cases, it may be undetected, especially if carried out early that is within 12 hours following injury [5]. The CT scanning should be done according to the pancreatic protocol to increase the sensitivity. The ductal injury, which is a major prognostic factor in pancreatic injuries, can be missed if there is a partial rupture. If such is suspected, further imaging should be carried out to confirm

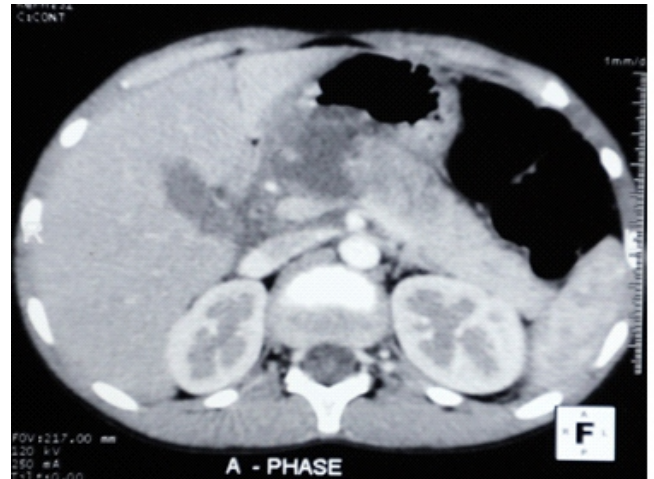


Figure 1. The CECT films of the pancreatic injury

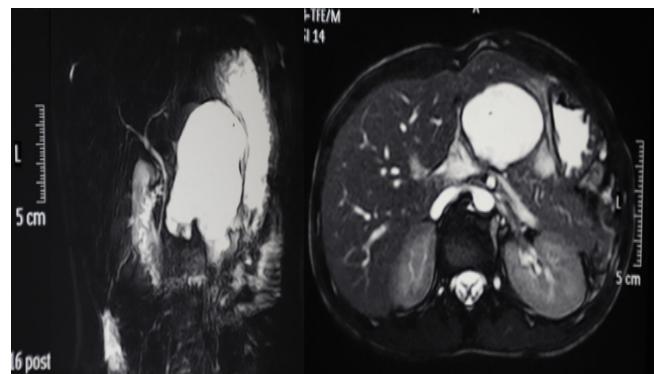


Figure 2. MRCP of the collection following the injury

the diagnosis by either an ERCP or MRCP. In certain situations, the ductal injuries are diagnosed intra-operatively while exploratory laparotomy is being carried out for acute abdomen following trauma.

We present here a case report on a pancreatic injury of a 14-year-old boy who presented late to a tertiary care centre with complete ductal disruption and its management. This patient sustained a blunt abdominal trauma when he had fallen onto a cement block and was transferred to a tertiary care unit after 5 days following the injury. On presentation, the patient was complaining of severe abdominal pain. Ultra sound scan has shown free fluid posterior to the stomach and the subsequent contrast-enhanced CT showed evidence of pancreatic injury with a localized fluid collection posterior to the stomach [Figure 1].

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Received: 02-03-2022 Accepted: 24-07-2022

DOI: <http://doi.org/10.4038/sljs.v40i2.8948>



The imaging showed a pancreatic transection near the neck. This was a grade IV injury, according to the pancreatic injury scale. There were no other injuries. The patient was hemodynamically stable and there was localized tenderness and guarding in the epigastrium.

Since there was evidence of main pancreatic duct disruption, an MRCP was carried out, which demonstrated a complete transection of the neck of the pancreas including the main pancreatic duct. Both proximal and distal portions were viable and there was no injury to the splenic vessels. The fluid collection was localized to the lesser sac. The collection was around 7x9 cm which was also symptomatic as it was pushing the stomach anteriorly.

Since the boy was transferred 5 days later it was not safe to do an early operation of repairing the duct over a stent or performing a pancreaticojejunostomy due to severe inflammation in and around that area. The possibility of distal pancreatectomy was ruled out as this would have caused endocrine and exocrine insufficiency in the child since the distal segment was about 80% of the total parenchyma. This caused a management dilemma but the patient was managed with analgesics and a few days later started on an oral diet. He responded to the conservative management but required definitive treatment as he was getting symptomatic with the fluid collection. His requirement for analgesics escalated and in addition, he required a regular dose of anti-emetics.

He was managed conservatively in the initial period allowing the fluid collection to be well localized. After about 6 weeks, he was reimaged to check the thickness of the cyst wall. This revealed a thick fibrous cyst wall which was closely adherent to the stomach and the position was also favourable for a cyst gastrostomy. A cyst gastrostomy was carried out under general anaesthesia and he had an uneventful recovery. This was followed by a good recovery in the perioperative period. He was followed up for 3 years and there were no complications. He did not have endocrine or exocrine insufficiency. His weight gain and growth were normal.

Discussion

One of the main challenges in blunt abdominal trauma is the diagnosis of retroperitoneal injuries, of which pancreatic injuries carry higher morbidity and mortality adversely affecting the outcome. In a resource-poor setting in Sri Lanka where CT scans and MR scans are only available in tertiary care centres, the diagnoses of such injuries are being made on clinical and on the available imaging modalities such as sonography and X-rays. This explains the delay in the transfer of this patient to a tertiary centre. On presentation to the tertiary care unit, the child was hemodynamically stable and

the abdomen did not show any evidence of peritoneal irritation, except for some tenderness in the epigastric region. This presentation gave us a chance of investigating him further and did not warrant an early laparotomy which otherwise would have led to a disruption of the well-localized collection. This would have led to a distal pancreatectomy which would be the only option available in a laparotomy in a situation like this. There was no possibility of stenting the main pancreatic duct as demonstrated in the MRCP that there was a complete disruption of the main duct. An ERCP was not attempted at that time for pancreatic duct stenting due to this reason. The advantage was that the collection between the proximal and distal segments was well localized in the lesser sac. However, on the other hand, the collection was significant in size [figure 2] and was causing pressure effects on the surrounding structures.

Since the collection was symptomatic with compression of the stomach, surgical intervention was required. Therefore, we decided on a cyst gastrostomy. This was carried out after 6 weeks giving ample time for the cyst wall to mature. The other alternative at that time was to perform a distal pancreatectomy. This would have resulted in an endocrine and exocrine failure of the child, which would have also led to many complications in his development. Pancreaticojejunostomy to the distal segment is another option that is available in preserving the pancreatic parenchyma in a situation similar to this in early presentation. Since this was a delayed presentation, it would have been an unsafe procedure to carry out in the presence of intense inflammation in and around that area. This would have made the surgery difficult and given rise to complications like pancreatic fistulae and intra-abdominal collections. We planned to treat the collection with a cyst gastrostomy upon maturity of the cyst, as it was well localized and there was no peritonitis. There is much evidence in the literature to show that a cyst gastrostomy is a safe option in these kinds of presentations, especially in preserving the pancreatic parenchyma [6][7]. The other options would have been endoscopic cyst gastrostomy which requires endoscopic ultrasonography, which was not available in our setting or else an endoscopic transpapillary stenting of the collection. Both these were not attempted as we did not have the necessary equipment and expertise.

This procedure was carried out with minimal disturbances and with no complications. We can strongly recommend this approach in selected patients as safe and effective in late presentation of pancreatic trauma with the localized fluid collection. This is also parenchyma preserving surgery which is essential in the pediatric age group.

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References

1. Lahiri R, Bhattacharya S. Pancreatic trauma. Vol. 95, *Annals of the Royal College of Surgeons of England*. 2013. <https://doi.org/10.1308/003588413X13629960045913>
2. Jobst MA, Canty TG, Lynch FP. Management of pancreatic injury in pediatric blunt abdominal trauma. *Journal of Pediatric Surgery*. 1999;34[5]:818-24. [https://doi.org/10.1016/S0022-3468\(99\)90379-2](https://doi.org/10.1016/S0022-3468(99)90379-2)
3. Iacono C, Zicari M, Conci S, Valdegamberi A, De Angelis M, Pedrazzani C, et al. Management of pancreatic trauma: A pancreatic surgeon's point of view. *Pancreatology*. 2016;16[3]:302-8. <https://doi.org/10.1016/j.pan.2015.12.004>
4. Moore EE, Cogbill TH, Malangoni MA, Jurkovich GJ, Champion HR, Gennarelli TA, et al. Organ injury scaling, II: Pancreas, duodenum, small bowel, colon, and rectum. *The Journal of trauma*. 1990;30[11]:1427-9. <https://doi.org/10.1097/00005373-199011000-00035>
5. Geyer LL, Körner M, Linsenmaier U, Huber-Wagner S, Kanz KG, Reiser MF, et al. Incidence of delayed and missed diagnoses in whole-body multidetector CT in patients with multiple injuries after trauma. *Acta Radiologica*. 2013 Jun;54[5]:592-8. <https://doi.org/10.1177/0284185113475443>
6. Houben CH, Ade-Ajayi N, Patel S, Kane P, Karani J, Devlin J, et al. Traumatic pancreatic duct injury in children: minimally invasive approach to management. *Journal of Pediatric Surgery*. 2007;42[4]:629-35. <https://doi.org/10.1016/j.jpedsurg.2006.12.025>
7. Farr BJ, Fox VL, Mooney DP. Endoscopic cyst gastrostomy for traumatic pancreatic pseudocysts in children: A case series. *Trauma Surgery and Acute Care Open*. 2020;5[1]:12-5. <https://doi.org/10.1136/tsaco-2020-000456>

Learning Points:

- Parenchymal preserving surgery is possible in late presentations following pancreatic trauma.
- Adequate time should be allowed for the localized collection to be properly walled off with fibrous capsule.
- A cyst gastrostomy is a safe option for a well localized walled off collections following a complete transection of the pancreas.
- This preserves the endocrine and exocrine function of the pancreas.