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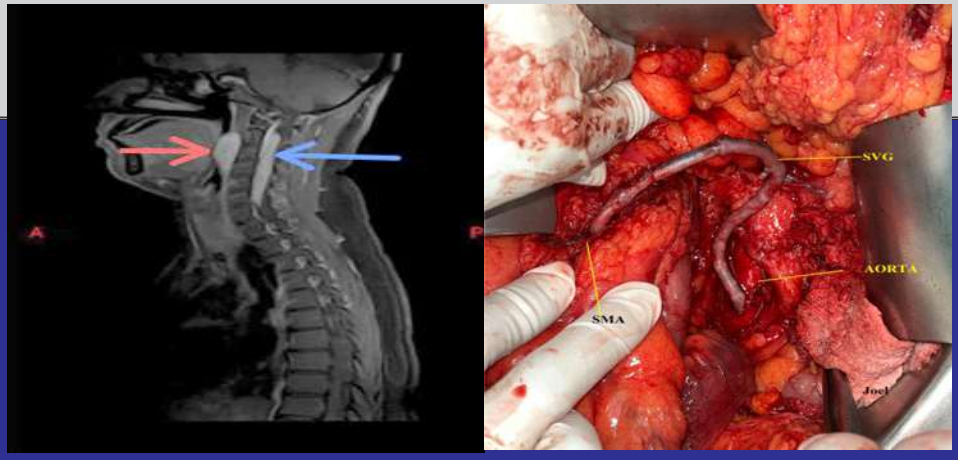

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Case report

SCIENTIFIC ARTICLE

Shifting the paradigm of percutaneous treatment for renal stones ; experience from a single tertiary care centre in Sri Lanka

H. K. S. Niroshan, R. Nisanthan, N. D. Perera
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Keywords: Supine PCNL, Treatment outcomes

Abstract

Supine Percutaneous Nephrolithotomy (PCNL) is increasingly recognized as an effective and patient-friendly technique for managing complex renal calculi. This study evaluates the efficacy and treatment outcome of 32 supine PCNLs performed by a surgical trainee in a tertiary care hospital in Sri Lanka. Efficacy in view of operative time, stone free rates and the outcome in view of postoperative complications were assessed.

Results demonstrated a high complete Stone Free Rate (SFR) of 87.5% with a mean operative time of 49.7 min. All the patients had a double J stent in situ for 2 weeks and only one patient required a Percutaneous Nephrostomy (PCN) tube sitting. Three patients developed minor postoperative complications. One was a febrile Urinary Tract Infection (UTI) managed with intravenous antibiotics; two patients developed haematuria which needed irrigation via 3-way catheter. None of the patients had colonic injury or developed bleeding which required blood transfusion.

Supine PCNL is a safe and effective technique which can be adopted with acceptable postoperative complication rates with comparable stone free rates. It provides potential advantages of reduced operative time, less patient handling and simultaneous ureteroscopic access.

Introduction

Percutaneous Nephrolithotomy (PCNL) is the gold standard for treating large renal calculi [1]. Though the conventional prone PCNL has been widely practiced as the treatment of choice for the management of large renal stones, the paradigm is shifting globally with the introduction of the supine PCNL technique due to its inherent advantages such as improved anesthetic access, reduced cardiopulmonary risks, and enhanced ergonomics for the surgeon [2], [3]. It is particularly useful in obese patients where prone position can compromise anesthetic safety. Modified Valdivia position is well recognized for supine PCNL due to its safety and high success rates.

The aim of this study is to analyze the efficacy and treatment outcome of a cohort of supine PCNLs, performed by a surgical trainee in a tertiary care hospital in Sri Lanka.

Materials and methods

Study Design

This a prospective, single-center, observational study, conducted at the National Hospital of Colombo, Sri Lanka, on a cohort of 32 patients undergoing supine PCNL for renal calculi from April 2022 to August 2022. The procedures were performed in the modified Valdivia position by a postgraduate surgical trainee. A retrospective analysis of collected data was performed.

Patients with stone size ≥20 mm who did not have contraindications to general anesthesia were included. Patients with uncorrected coagulopathy or complex renal anatomy such as horseshoe kidney were excluded from the study. Demographic variables including patients' age and gender, clinical variables including stone size (maximal diameter for single stones and maximal diameter of the largest stone for multiple stones) and location (upper/mid/lower/partial or complete staghorn) were recorded.

Procedure

All the procedures were carried out by a postgraduate surgical trainee in modified Valdivia position. Patients were positioned supine with a slight flank elevation to facilitate renal access. Mid and posterior axillary lines were marked to guide the boundaries of surgical access. Procedure was started by performing a cystoscopy and placing a ureteric catheter. Under fluoroscopic guidance, renal puncture was performed,

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fragmented using pneumatic lithotripsy and stone fragments were retrieved using stone retrieval forceps. A double J stent was routinely inserted at the end of each procedure and a nephrostomy tube was placed only if there was a concern of bleeding. A 16Fr urethral catheter was placed on free drainage in every patient.

Operative parameters including time for renal access, operative time and need for blood transfusion were recorded. Routine postoperative care was carried out in the urology ward and the urethral catheter was removed on postoperative day 1, provided there wasn't a significant hematuria. Nephrostomy tube was removed on day 1-2 depending on clinical judgment.

Outcome measures were the stone-free rate (SFR), assessed by postoperative imaging (Xray KUB, non-contrast CT or ultrasound) and complications, a categorized using the Clavien-Dindo classification. The duration of hospital stay (duration from surgery to discharge) was also recorded.

Results

A total of 32 patients underwent supine PCNL during the study period, out of them 22 (68.7%) were males and 10 (31.2%) were females. Mean age was 50.3 (range 24-66) years. Procedure was performed on the left side in 24 (75%) patients and on the right side in 8 (25%) patients. None of the patients underwent bilateral PCNL.

The average stone size was 3.3cm (range 2-4.9cm) with an average density of 1165.8HU (range 600-1480HU). Stones were located in the renal pelvis in 20 (62.5%), in the lower pole in 2 (6.2%), in the upper pole in 1 (3.1%) of the patients and 9 presented with staghorn stones (28.1%) (Table1).

Renal access was obtained via a single puncture in 30 (93.7%) patients, among them only one patient required an upper calyx puncture. 2 (6.2%) patients required a second puncture due to a complete staghorn extending to the upper calyx. Successful access was solely achieved via lower calyx in 29 (90.6%) patients.

Mean operative time was 49.7min (range 20-100) and the average time to access the pelvicalyceal system was 4.9min. Complete stone clearance was achieved in 28 (87.5%) patients. There was a significant correlation between stone size and operative time ($p<0.05$) (Figure1). A double J stent was inserted in all 32 patients and a simultaneous percutaneous nephrostomy was sited in one patient. This was following a multiple puncture for a complete staghorn.

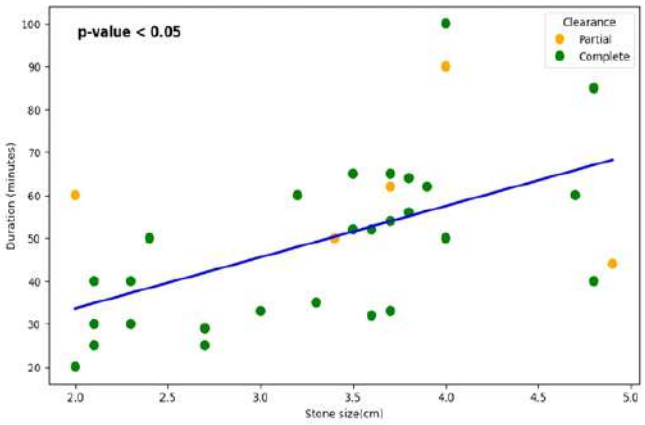

Figure 1: Stone clearance and duration of the surgery based on stone size

The median hospital stay was 2 (1-5) days (Figure 2). 3 (9.3%) patients developed minor postoperative complications (Clavien-Dindo Grade I-II). Figure3 One was a febrile urinary tract infection (UTI), managed with iv antibiotics, and 2 patients developed hematuria which needed irrigation via a 3-way catheter. None of the patients developed major complications such as colonic injury, sepsis requiring ICU admission or developed bleeding which required blood transfusion.

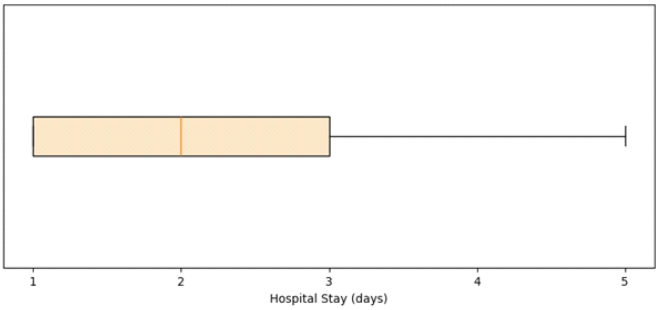

Figure 2: Duration of hospital stay

Varaible		Mean (SD)	Count (Percentage)
Gender	Male	-	22(69)
	Female	-	10(31)
Age		50(10.4)	-
Stone size(mm)		3.3(0.87)	-
Stone density(HU)		1165.8(227.3)	-
Side	Left	-	24(75)
	Right	-	8(25)
Location	Upper		1(3.1)
	Lower		2(6.2)
	Renal pelvis		20(62.5)
	Stag horn		9(28.1)

Table 1 : Clinicopathological features

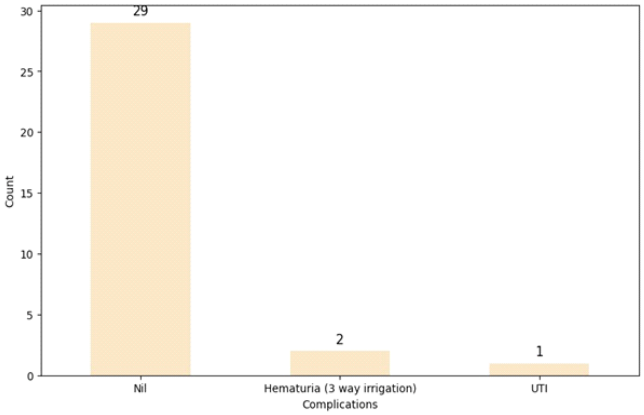

Figure 3 : Incidence of complications

Discussion

Prone PCNL is the traditionally favored technique in managing large renal stones due to increased surface area to make the puncture and low risk of intra-abdominal visceral injury [6]. However, supine PCNL is becoming increasingly popular due to its advantages over prone position which includes shorter operative times, simultaneous retrograde access and favorable anesthetic outcome in high-risk patients [7], [8].

Supine approach for PCNL demonstrated high efficacy and the safety in this cohort. The stone-free rate of 87.5% aligns with results from previous studies comparing supine and prone PCNL [9]. The supine position facilitated reduced operative times, likely due to efficient patient positioning and this could have been further improved by simultaneous retrograde access using a flexible ureterorenoscope. Although the literature recommends "total tubeless PCN" as a safe and effective method, insertion of a double J stent or a nephrostomy tube depends on clinical judgement and surgeon's preference. Definitive guidelines on whether to insert a stent or not are lacking [10]. High number of JJ stent insertions in this cohort reflects the practice of our center.

Complication rates of this cohort were low, with occurrence of minor complications, primarily managed without invasive surgical or radiological interventions. The single case of febrile UTI was effectively treated with IV antibiotics, underscoring the importance of preoperative infection control.

The study's findings reinforce the feasibility of supine PCNL in achieving good stone clearance while keeping the post operative complications low. This approach is recognized for improving anesthetic access, reducing cardiopulmonary risks, and providing better ergonomics for surgeons. The fact that this cohort demonstrates comparable outcomes with a low complication rate suggests that supine PCNL can be adopted by an experienced surgical trainee which would shift the paradigm of percutaneous treatment of large renal stones towards the supine PCNL in Sri Lanka.

Limitations

This study's primary limitation is its small sample size. Larger, multi-center trials are needed to validate these findings. Lack of availability of flexible ureterorenoscopes might have compromised the complete stone clearance rate compared to cohorts from high volume centers in the world.

Conclusions

Supine PCNL is a safe and effective alternative to the traditional prone approach for managing large renal calculi. In this cohort, the procedure achieved a high stone-free rate with a low complication rate. Future studies should explore long-term outcomes and refine techniques to further optimize supine PCNL outcomes.

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SCIENTIFIC ARTICLE

Retrospective analysis of the clinical outcomes following popliteal artery aneurysm repair.

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Keywords: Popliteal artery aneurysm, Popliteal artery aneurysm repair, clinical outcome, poor run-off vessels, Major amputation

Abstract

Introduction
Popliteal artery aneurysms (PAA) have a low incidence (0.1%–2.8%) in the general population. The aim of this study was to assess the outcomes of popliteal aneurysm repair with respect to the type of presentation, size of the aneurysm, mural thrombus, and the number of run-off vessels.

Methodology
This is a retrospective study carried out in the Royal Preston Hospital, United Kingdom from January 2015 to January 2021. All for those patients who were intervened for PAA were included except who were managed conservatively.

Results
A total of 42 patients were treated for PAA during this study period. All the patients were male and the mean age at presentation was 75.2 years (±9 years).

The mean diameters of symptomatic and asymptomatic patients with PAA were 4.11 cm (± 1.74 cm) and 3.3cm (± 0.79 cm) respectively (p=0.08). Considering the presence of a mural thrombus, 44% (n=7) of asymptomatic patients presented with a mural thrombus, and in symptomatic patients, 50% had symptoms of acute limb ischemia. Regarding management, all of the asymptomatic patients had undergone bypass surgery. Considering symptomatic patients, the majority (88%) had undergone bypass surgery, and only three patients had undergone endovascular stenting. In the 30-day follow-up, 5% (n=2) of the patients had undergone below knee amputation, both of them presented with mural thrombosis and had single run-off vessels (p=0.03). Stent occlusion occurred in one case in 30 days.

Conclusion
In our experience, symptomatic clinical presentation and poor run-off vessels were significantly associated with poor outcomes.

Introduction

Popliteal artery aneurysms (PAA) have a low incidence (0.1%–2.8%) in the general population [1]. However, PAA is the most common peripheral aneurysm other than the brain and aortoiliac system and accounts for approximately 70% of all cases (2). This may be due to the similarities seen in the popliteal artery wall with the central elastic artery rather than a muscular artery typical of the periphery [2].

In 50% of the cases, it is bilateral and in 38% of the cases, it can be associated with aorto-iliac aneurysms [3]. The Society of vascular surgery (SVS) recommended that patients diagnosed with PAA should be screened for PAA in the contralateral leg and abdominal aortic aneurysms [1]. It presents mainly in the 6-7 th decades and almost exclusively in men. Only 3-4% of women present with PAA. The most common underlying etiology is atherosclerosis [2].

Often, it can be asymptomatic, but if symptomatic, it represents a high risk of major amputation [4]. Approximately 60% of the patients can be symptomatic at the time of repair [5].

The most common acute symptoms include claudication or rest pain caused by thrombosis or distal embolization of the thrombus, and 25% of patients present with acute limb ischemia, which is associated with high rates (14%) of morbidity and major amputation within 30 days [6]. Alternatively, chronic symptoms can develop in the same manner but in the presence of adequate collateral vessels, uncommonly present with leg pain and swelling due to the compression of adjacent structures such as nerves and veins [7]. Rupture of popliteal artery aneurysm is rare, its presentation was less than 5% [8].

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The size threshold to intervene in the popliteal aneurysm is unclear. The main concern in PAA is thrombosis and embolism. Aneurysm diameter is one of the factors that can predict the onset of complications. Many vascular society guidelines have recommended 2 cm as a threshold to intervene [1]. The presence of symptoms, Mural thrombus, and poor runoff are also other parameters that can predict poor outcomes [7].

The aim of this study was to assess the outcomes of popliteal aneurysm repair with respect to the type of presentation, size of the aneurysm, mural thrombus, and the number of run-off vessels.

Materials and methods

This is a retrospective study carried out in the Royal Preston Hospital, United Kingdom from January 2015 to January 2021. All the patients with popliteal aneurysms who were intervened during this period were included. Data were extracted from the hospital's electronic database. It consists of the patient's demography, comorbidities (diabetes mellitus, hypertension, ischemic heart disease, atrial fibrillation, chronic obstructive pulmonary disease, chronic kidney disease, and cerebrovascular disease), the morphology of the popliteal aneurysm, clinical presentation (asymptomatic, claudication, acute limb ischemia, chronic limb ischemia, compression, mass effect, and rupture), number of runoff vessels,mode of intervention (open aneurysmorrhaphy or endovascular), and outcomes (major amputation and stent occlusion,). All the patients who were intervened for popliteal aneurysm during this period were included, and patients who were managed conservatively were excluded from this study. During this period, 42 patients underwent popliteal aneurysm interventions. Statistical analysis was performed using the SPSS v 21 package**.**

Results

A total of 42 patients were operated on during the study period, including symptomatic and asymptomatic patients with a PAA diameter of >2 cm, as recommended in the recent SVS guidelines.

All the patients were male and the mean age at presentation was 75.2 years (55-89, SD 9.3).

The proportion who had concomitant aortic artery aneurysm was 50% (AAA); one-third of patients had bilateral PAA, whereas femoral artery aneurysm was associated with 11% of patients. Unilateral PAA (71%, n=15) associated with AAA was more than twice as common in patients with bilateral PAA (28%, n=6)

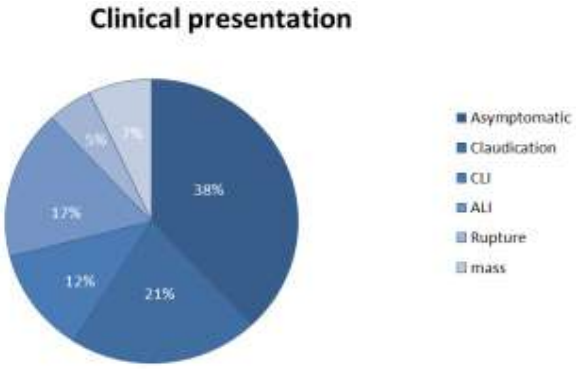

Figure 1: Spectrum of the Clinical presentation of PAA

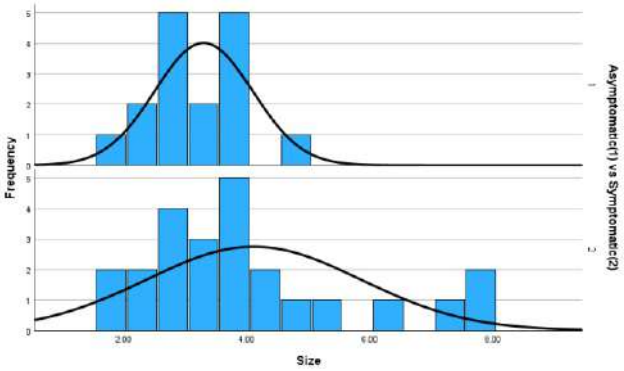

Figure 2: Distribution of PAA diameters among asymptomatic and symptomatic patients

The mean diameters of the symptomatic and asymptomatic patients with PAA were 4.11 cm (S± 1.74 cm) and 3.3cm (± 0.79 cm) respectively (p=0.08).

Co-morbidities	Number of patients (percentage %)
Hypertension	22(52%)
DM	4(10%)
IHD	8(19%)
COPD	5(12%)
AF	3(7 %)
CKD	3(7%)
CVD	3(7%)

Table 1: Pattern of comorbidities among the study population

In the above table 1, describe the patterns of comorbidities among patients.

Considering the presence of a mural thrombus, 44% (n=7) of

asymptomatic patients presented with a mural thrombus. In symptomatic patients, although 38% (n= 10) presented with mural thrombosis, 50% (n=5) had symptoms of ALI. In symptomatic patients, the mean diameter of PAA with the presence of the mural thrombus was smaller than that of the non-thrombotic PAA (3.4 cm vs. 4.5cm). (Figure 3).

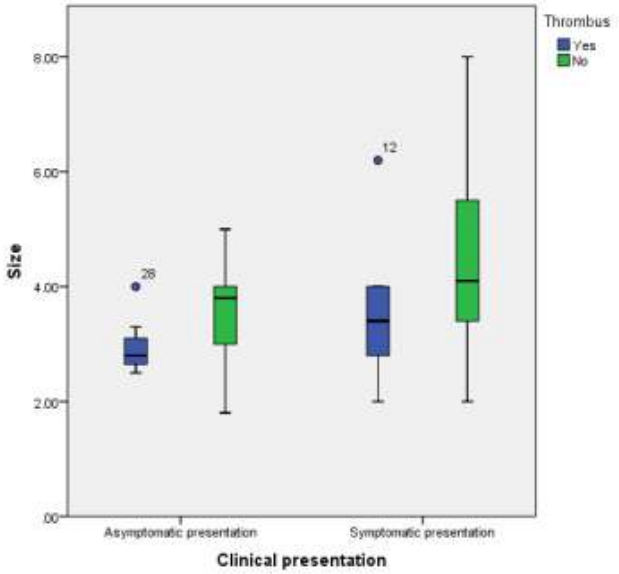

Figure 3: Association of clinical presentation with the size of PAA and presence of mural thrombus

All of the asymptomatic patients (n=16) had undergone bypass surgery. Most of the cases (88%) were approached posteriorly, while 2 patients were approached medially. In 80% of cases, negative vein grafts were used, while only 3 cases used a prosthetic graft.

Considering symptomatic patients (n=26), the majority (88%) had undergone bypass surgery (19 posterior approach, medial approach 4). The vein was used as a conduit in 86% of the cases. Only three patients had undergone endovascular stents due to concerns about their comorbidities and life expectancy. Considering runoff vessels, 19%, 7%, and 71% had single, two, and three vessels runoff vessels respectively.

Regarding 30day follow-up, 5% (n=2) patients had undergone below knee amputation, both of them, presented with mural thrombosis and had single run-off vessels (p=0.03), the remaining limbs were salvaged, including those who presented with ruptured aneurysm (n=38) and stent occlusion occurred in only one case.

Discussion

In our study, we retrospectively analyzed 42 patients with PAA in 5 year period. We aimed to access the clinical outcomes following popliteal artery aneurysm repair.

Though some studies documented the prevalence of PAA is 0.1% to 1% in the general population, as the current study was a hospital-based study we couldn't provide an incidence or prevalence of PAA in the UK [2] [4].

A Systematic Review of 2445 PAA documented concomitant contralateral PAA and AAA were 50% and 30% respectively. But the present study indicated that 50% of patients had concomitant AAA; one-third of patients had bilateral PAA which is comparable to the range (contralateral PAA (16-80%) and AAA (10-80%)) provided by the study was done among data were published regarding PAA for last 25 years. [5][6]

The nationwide study conducted in Sweden and a hospital-based study in Italy documented that bilateral PAAs associated with AAA were twice as common in patients with unilateral PAA but in our study results were vice versa. It may be attributed to the small study population [9][10]. Considering the comorbidities, most (52.38%) of the popliteal aneurysm patients had Hypertension (HT) while only 9.52% of them had Diabetes Mellitus (DM). These results were compared with the retrospective study which was done among 14 countries in the Vascunet collaboration. [11]
Even though SVS recommended diameter for intervention in asymptomatic patients is >2cm, in our study, the mean diameter of the asymptomatic patients who underwent intervention is 3.3cm (1.8-5cm). It may be due to associated co-morbidities and clinical presentation [1].

Open and endovascular approaches are available to treat PAAs. Even though the gold standard treatment is open operative management [5], optimal treatment depends on the patient's comorbidities and life expectancy as endovascular popliteal aneurysm repair has an advantage in selected high-risk patients though it hasn't been demonstrated clinical equipoise to standard surgery. In open surgery, most studies have found no overall difference between the medial and posterior approaches, while some cases demonstrated decreased incidence of aneurysm sac expansion and improvement in patency with the posterior approach [7].

Single runoff vessels were significantly associated with poor outcomes than others (p=0.027). Asymptomatic patients had better runoff vessels than symptomatic patients (p=0.03). These results were comparable with the study which was done in Switzerland and Italy [12] [13].

In our study, patients who had undergone below knee amputation were 5%, and all of them were with single run-off

vessels. These results were comparable with the previous study which was done in Switzerland [13]. Patients with ruptured PAA had a mean diameter twice larger than the patients with non-ruptured PA diameter. (6.00cm and 3.67cm p=0.028), this similar finding documented in the study which was done in Denmark [8].

Limitations of the study

Even though the data were collected retrospectively for the five years, it ended up with only a few numbers of observations (42 patients), as mentioned above popliteal aneurysm has a low incidence.

Though one of the common risk factors for atherosclerosis is smoking [5], we couldn't analyze the variable as some of the details regarding smoking were missing. The study was conducted among the patients in a single center; this may be attributed to selection bias. We couldn't able to compare the open and endovascular interventions as endovascular interventions were performed on a limited number of patients in our study period.

Conclusion

In our experience, symptomatic clinical presentation and poor run-off vessels were significantly associated with poor outcomes.

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SCIENTIFIC ARTICLE

Thoracic aortic dimensions in a Sri Lankan cohort; a computerized tomography-based study

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Keywords: Thoracic aorta dimensions, Sri Lanka, case series, Computed tomographic study, Size, diameter

Abstract

Introduction

In adults the Thoracic aorta (TA) begins from the ascending aorta at the level of the manubrio sternal joint and arches backward and to the left over the left main bronchus and ends at the level of 4th thoracic vertebra. From this level it continues as descending thoracic aorta (DTA). The TA diameter decreases progressively from the ascending aorta (ASA) to the DTA. In addition the diameter of the TA also varies according to the age, gender and race. It is believed that diameters of the arteries including the thoracic aorta may be smaller in Sri Lankan population. Therefore this study was done on the diameters of the thoracic aorta because accurate knowledge of these diameters are essential to define abnormalities, and to plan interventions.

Methodology

The patients who underwent contrast-enhanced computerised tomographic scans (CECT) of chest for non-aorta-related diseases at the National Hospital of Sri Lanka in Colombo were included. The imaging was done using a Toshiba Aquilion scanner with 3D reconstructions. Omnipaque 300 (Iohexol) intravenous contrast agent. Data on age, gender, and ascending (D1) and descending aortic (D2) diameters were collected. Aortas with variations, unclear images and images with artefacts were excluded. Statistical significance was regarded as a p-value of less than 0.05.

Results

Total of 50 CECT were evaluated. 28 images were analysed. Mean age was 56.0 years (20-81). 16 (57.1%) were males. The mean diameter at the mid ascending aorta (D1) was 27.6 mm (21.0 - 34.0). The mean diameter at mid DTA (D2) was 21.9 mm (15.6 – 33.0). This difference was statistically significant ($P < 0.0001$) compared to values reported from other races in literature. Similarly the D2 in the present study was 21.9 mm (15.6- 33.0). This difference was also statistically significant ($P < 0.0001$).

Conclusion

This study findings indicate that the diameters of the thoracic aorta in the study population is smaller than the western population. This is likely to be the case with the all Sri Lankan population. Therefore country wide study is needed to confirm the above findings. Further, the aortic aneurysm size definition and the size threshold for aortic aneurysm repair have to be redefined in the Sri Lankan population.

Introduction

In adults the thoracic aorta (TA) begins from the left ventricle of the heart at the level of aortic valves as the ascending aorta (AA). AA ends at the level of the manubrio sternal joint and continues as the aortic arch (ARC). The ARC arches backward and to the left over the left main bronchus and ends at the level of 4th thoracic vertebra and continues as descending thoracic aorta (DTA). DTA enters the abdomen through the diaphragmatic hiatus at the level of the twelfth thoracic vertebra (T12). The diameter of the TA reduces from the ascending aorta (AA) to the DTA. In addition the diameter of the TA also varies according to age, gender, body size and the race [1].

The normal ascending aortic diameters are 36mm and 38mm in females and males respectively [2]. Similarly the normal diameters of the descending aorta in females and males are 25.4 mm and 34.5 mm [3]. The aorta and other arteries are thought to be smaller in diameter among the south Asian and Sri Lankan populations. For example in a computed tomographic (CT) imaging based study done in Sri Lanka, The abdominal aortic dimensions were significantly lower in Sri Lankan population when compared with the western population [4].

However no similar studies have been done to assess the diameters of the thoracic aorta. Furthermore, thoracic aortic surgeries are frequently performed. Knowing the diameter of

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the thoracic aorta in Sri Lankan population will assist in clinical decisions i.e. to define the aortic aneurysm and thresholds for intervention. It also helps in choosing the correct sized graft for thoracic aortic surgeries. The current study evaluates the diameter of the thoracic aorta from CT images.

Materials and methods

This is a retrospective cross sectional descriptive study done at the National hospital of Sri Lanka, Colombo (NHSL). The patients who underwent contrast enhanced computerized tomographic scan (CECT) of the chest at the radiology department at the NHSL for non-aorta related diseases were considered for inclusion. Imaging was done with multi-detector Toshiba Aquilion 16 slice CT scanner with 3 dimensional (3D) reconstructions. As an intravenous contrast agent, Omnipaque 300 (Iohexol) was used (volume used was approximately 80 ml, i.e. 1ml/kg). The timing was done automatically by selecting the region of interest (ROI) at the arch of the aorta (approximately 20 seconds).

The images were analysed at workstation (console) using Vitrea software by the radiologist and the vascular surgeon in the arterial phase (axial, coronal, sagittal, and 3D views). Data on age, gender and aortic diameters (ascending and descending) were collected. Aortas with arch branching pattern variations, non-clear images (due to wrong timing of the contrast), inadequate exposure and images with artefacts (due to Central Venous lines, previous surgeries, and mediastinal pathology) were excluded.

The diameter of the aorta was measured as follows. The ascending aorta diameter was measured in the middle of AA (mid ascending aortic diameter D1) (Figure 1). The descending aorta diameter (D2) was measured at the level of the fourth thoracic vertebra. The maximum axial luminal diameter was measured in two directions (at right angles to each other). The average diameter was calculated and entered into the data sheet. A "p" value of less than 0.05 was considered statistically significant.

Results

Total of 50 CECT were evaluated. 22 (44.0%) CECT scans were excluded. 28 images were analysed. Mean age was 56.0 years (20-81). 16 (57.1%) were males and 12 (42.9%) were females. The mean diameter at the mid ascending aorta (D1) was 27.6 mm (21.0 - 34.0). The mean diameter at mid DTA (D2) was 21.9 mm (15.6 – 33.0). The mean D1 in males were 28.83 mm (22.8-34.0) and the mean D1 in females was 25.95 mm (21.0-32.6) this difference was statistically significant (p-0.04). Similarly the mean D2 in males was 23.05 mm (16.0 to 33.0) and the mean D2 in females was 20.45 mm (15.6 to 24.0) this difference was also statistically significant (p-0.04).

In patients less than 55 years of age, the mean D1 was 26.79 mm (21.0 - 34.0) and the mean D1 in patients more than 55 years was 28.13 mm (23.0 - 33.0). However this difference was not statistically significant (p-0.18). Similarly the mean D1 of females less then and more than 55 years were 24.82 mm (21.0 – 27.3) and 27.1 mm (23.0 – 32.6). However these differences were also not statistically significant (p- 0.13). Furthermore the mean D1 of males of less than and more than 55 years were 29.16 mm (22.8 – 34.0) and 28.69 mm (23.0 – 33.0). These differences were also statistically not significant (p- 0.40).

However in patients less than 55 years the D2 was 20.34 mm (16.0 - 22.6) and the mean D2 in patients more than 55 years was 22.97 mm (19.0 - 29.0). This difference was statistically significant (p-0.04).

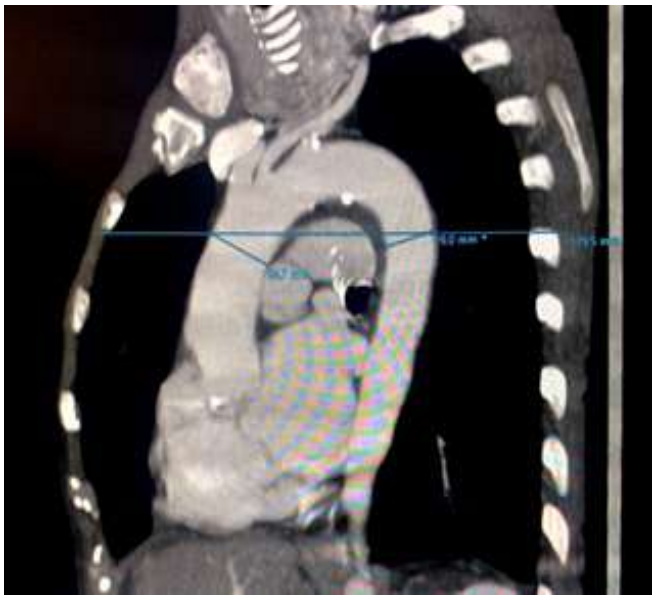

Figure 1: Measurement of diameters

Discussion and Conclusions

The mean D1 of individuals in this study was 27.6 mm (21.0 - 34.0). The mean D1 in males were 28.83 mm (22.8-34.0) and the mean D1 in females was 25.95 mm (21.0-32.6). This was compared with the D1 values from other studies. In a study done among 2353 individuals in Korea, the mean diameter of the ascending aorta was 34.1mm. When compared with the mean D1 of the present study, this difference was statistically significant ($P < 0.0001$) [3]. Similarly the mean D2 in the

Korea, the mean D2 was 24.8mm. This difference was also statistically significant (P < 0.0001). In another study done in Germany among 70 Individuals [5], diameter of the ascending aorta was 29.4 mm. This diameter also was significantly larger when compared to the current study population (p-0.018).

In another study done at the United States among 1442 individuals, the mean D1 of male and females were 33.6 mm and 31.1 mm [6]. This difference in D1 was statistically significant when compared to the present study diameters.

These findings indicate that the diameters of the ascending aorta and the descending aorta were significantly smaller in the current study compared to other populations in the world.

The thoracic aortic diameter is known to increase with aging. Studies have reported that the thoracic aortic diameter increases by 0.7 mm to 1.7 mm per decade [7] [8] [9]. In the present study the mean D2 in patients less than 55 years was 20.34 mm (16.0 - 22.6) and the mean D2 in patients more than 55 years was 22.97 mm (19.0 - 29.0). This difference was statistically significant (p-0.04). Whereas the mean D1 in patients less than 55 years was 26.79 mm (21.0 - 34.0) and the mean D1 in patients more than 55 years was 28.13 mm (23.0 - 33.0). However this difference was not statistically significant (p-0.18). This is probably due to the smaller numbers of individuals in this study.

This study finding indicates that the diameters of the thoracic aorta in the study population are smaller than the western population. Therefore the Sri Lankan population is also likely to have smaller diameter thoracic aorta. Therefore a country wide study with a larger population is needed to confirm the above findings in Sri Lankan population. These marked differences in diameters suggest that the aortic aneurysm size definition and the size threshold for aortic aneurysm repair have to be redefined in Sri Lankan population.

Limitations

The number of subjects included in this study is small compared to other similar studies mentioned above. This is a drawback in this study. Also as mentioned earlier the diameter of the aorta is also known to vary with patients' comorbid conditions (hypertension), height and BMI [8]. These factors were not assessed in this study because the current study was a retrospective study from the records at the radiology department. Therefore the above details cannot be accessed. This is also a drawback in this study. Therefore similar studies are needed in the future with a larger countrywide sample.

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SCIENTIFIC ARTICLE

A study on validity of Goodsall's rule in accurately predicting the course of anal fistulous tract ; comparison with MRI and surgical findings

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Keywords: Fistula in ano, Goodsall's rule, MR Fistulogram, Vallidity, Predictive accuacy

Abstract

Background:

Fistula-in-ano is a granulation tissue lined tract that opens deeply in the anal canal or rectum and superficially on the perianal skin. Most of these fistulae are formed from ano rectal abscess which burst spontaneously. The secondary causes of fistula in ano include conditions such as Crohn's disease, Tuberculosis and Carcinoma rectum. Fistula in ano can be broadly classified into Anterior and Posterior, Low lying or High Fistula in ano as well as Simple and Complex fistula in ano. Goodsall's rule depicts the relationship of the external opening of the fistula with the course of fistulous tract. The three main radiological imaging techniques that are used in evaluating perianal fistulas include contrast fistulography, endorectal ultrasonography and magnetic resonance imaging(MRI). Our aim was to assess the accuracy of Goodsall's rule in predicting the course of anal fistulae and its reliability for evaluating patients presenting with Fistula in ano. We also correlated the clinical and intra-operative findings with that of Magnetic Resonanace(MR) Fistulogram to know whether MR Fistulogram can be used selectively for evaluating Complex Fistula in Ano

Methods:

This was a Prospective Mono-centric Observational Study conducted at the General Surgery department of Apollo Main Hospital Chennai, from August 2022 to December 2023. The final study sample after considering the inclusion and exclusion criteria was 67. Various parameters such as demographic details, clinical symptoms, characteristics of fistula were studied and comparison was done between the clinical and intra operative findings as well as the imaging findings.

Results:

Out of the 67 patients with Fistula in ano, 56 (83.6%)were males and 11 (16.4%) were females. Out of the 67 patients, 43(64.2%) had pain, 46(68.7%) had perianal swelling, 59(88.1%) people had complaints of discharge per anum. Antrior fidtula in ano was observed (43.3%) and a posterior opening was observed in 38 (56%). The fistulous tract was found to be simple in 42(62.69%) and complex in 25(37.31%). The overall predictive accuracy of Goodsall's rule was 71.6%, The predictive accuracy was 75.86% with anterior fistula in ano and 68.42% with posterior fistula in ano. MRI was able to accurately delineate the course of the tract in 92.5%. MR fistulogram had a sensitivity of 93.8% (95% CI) - 93.8% (91.4% - 96.2%)

Conclusion:

We conclude that the overall accuracy of Goodsall's rule in predicting the course of the fistulous tract is 72% and the predictive accuracy was high for anterior fistulae and complex fistulae. Goodsall's rule can thus be used as tool for the pre operative evaluation of patients with fistula in ano and also can help in assessing the necessity of MR fistulogram in complex cases.

Introduction

The medical definition of fistula is an abnormal "pipe-like" communication between any two anatomic body parts that do not normally communicate[1]. Fistula-in-ano is a granulation tissue lined tract that opens deeply in the anal canal or rectum and superficially on the perianal skin[2].

The incidence of anal fistula is about 8.6 per 100,000. Fistulae are two to three times more common in men than in women[3].

An anal fistula usually presents with a history of intermittent swelling with pain, discomfort and discharge in the peri anal region. Fistula in ano can be simple or complex. "Complex" fistulas include those involving more sphincter muscle, or recurrent fistulas, anterior fistulas in females and those that are associated with pre-existing faecal incontinence, those associated with radiation exposure, or inflammatory bowel disease[4].

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Fistulas are divided into anterior and posterior based on the location of the external opening with respect to a transverse line drawn along the middle of the anus. Identification of both the external and internal openings of the fistula tract are essential to delineate the course of the tract completely[5].

David Henry Goodsall postulated a rule, in the year of 1900, regarding the relationship of 'external opening to the tract' in cases of Fistula-in-ano. According to Goodsall's rule, 'if the external opening is anterior to the transverse anal line and within 3 cm. from the anal verge, the internal opening will be in straight radial line. But, if the external opening is behind the transverse line or more than 3 cm. from the anal verge, the internal opening will be at the posterior midline of the anal canal.'In such cases the tract will be a tortuous one[6]. In cases when there are multiple anal fistulae, because of branching and communication between the openings, the tract will take a course similar to that of posteriorly opening fistulae[7].

The three main radiological imaging techniques that are used in evaluating perianal fistulas include contrast fistulography, endorectal ultrasonography and magnetic resonance imaging(MRI).

For preoperative evaluation of perianal fistulas, MR imaging has emerged as the imaging technique of choice, providing a highly accurate, rapid and non-invasive means of pre-surgical assessment[8]. In addition to accurately demonstrating the disease extent, MRI also helps to make therapeutic decisions, predict prognosis and monitor therapy[9-10].

Materials and methods

A prospective, monocentric observational study was conducted at the.....at the General Surgery department of Apollo Main Hospital Chennai, from August 2022 to December 2023. We included all the patients above the age of 18 years with primary fistula in ano and with a visible external opening and were advised Magnetic Resonance(MR) fistulogram and were willing for surgical intervention. The exclusion criteria included Patients with recurrent fistulae, fistula in ano secondary to peri-anal abscess, patients for whom MRI is contra-indicated and those who are not willing for MR fistulogram.

Since there is a lacuna in the application of Goodsall's rule, in this study, our aim was to assess the accuracy of Goodsall's rule in predicting the course of anal fistulae and its reliability for evaluating patients presenting with fistula in ano. We also correlated the clinical and intra-operative findings with that of MR fistulogram to know whether MR fistulogram can be used selectively for evaluating complex fistula in ano. This study was approved by our institutional ethical committee - Bio Medical Research, Apollo Hospitals, Chennai. (Approval Number: AMH - DNB-049/08-22).

67 consecutive patients attending the General Surgery out patient department at Apollo Main Hospital Chennai, with fistula - in - ano during the time period from August 2022 to December 2023, who fulfill the inclusion criteria and exclusion criteria, were enrolled for the study and prior informed consent was taken from each patients.

After taking a detailed history focussing on the symptomatology and comorbidities, they were clinically examined for general physical parameters, systemic evaluation followed by Digital rectal examination and proctoscopy. Goodsall's rule was applied for identifying the course of fistulous tract and findings were recorded. Later, they were referred to radiology department for MR fistulogram. Findings as per MR fistulogram were noted. After adequate counselling of the patient, anesthetic evaluation and clearance, the patients were taken up for surgery. Intra operatively, the findings were recorded. Clinical findings and MR fistulogram findings were compared with the intra operative findings and the predictive accuracy of Goodsall's rule and sensitivity of MRI were assessed.

Statistical Analyses: Descriptive statistics were presented with frequency (percentage) and Mean ± SD (Standard Deviation) for the categorical and continuous factors respectively. Median (IQR) was presented while the data follows non-normal distribution. Shapiro-Wilk test was used to find out the normality of the data. Kappa statistics was used to find out the agreement between accuracy of Goodsall's rule and MRI. Chi-square/Fisher's exact test was used to find out the association between two independent categorical factors. Sensitivity, specificity, positive predictive Value, negative predictive value along with 95% CI(confidence interval) were calculated. P-value < 0.05 considered as statistical significance. All the analysis was carried out by using the statistical software SPSS (IBM, 28.0)

Results

Out of the 67 patients with Fistula in ano, 56 (83.6%)were males and 11 (16.4%) were females. The mean age was 43.2 years (+/-11.4). Other demographic details are given in Table 1.

Parameters	(n=67), n (%)
Age in years	
Mean ± Standard Deviation (SD)	43.2 ± 11.4
Range	18-73
Co-morbidities	
Diabetes Mellitus	2 (3.0)
Hypertension	7 (10.4)
Hypothyroidism	3 (4.5)
Diabetes Mellitus + Hypertension	3 (4.5)
Diabetes Mellitus + Hypothyroidism	3 (4.5)

Table 1: Demographic details of the study population

The mean BMI(Body Mass Index) was in the range of 17.8 - 43.01, with a mean of 26.2 (+/-3.9). Out of the 67 people, 7 were obese, 38 were overweight, 21 had a normal BMI, and 1 was underweight.

Out of the 67 patients, the most common symptoms were discharge per rectum (88.1%) followed by perianal swelling (68.7%) and pain (64.2%) (Table 2)

Clinical symptoms	(n=67), n (%)
Pain	43 (64.2)
Swelling	46 (68.7)
Discharge per rectum	59 (88.1)
Constipation	17 (25.4)
Bleeding	4 (6.0)
Fever	1 (1.5)
Burning sensation	3 (4.5)

Table 2: Table showing the frequency of various symptoms among the study population

Out of the 67 patients with fistula in ano, 29(43.3%) people had anterior fistula in ano and 38(56.7%) had posterior Fistula in ano. (Figure 1)

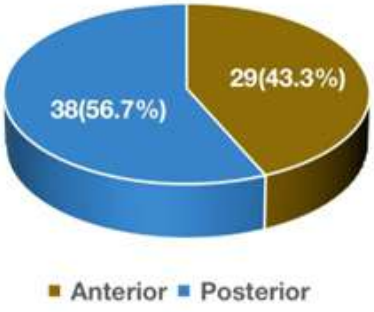

Figure 1: Pie diagram showing the distribution of patients according to the location of the external opening of the fistulous tract

According to Park's classification, 50(74.6 %) of the fistulae were Inter-sphincteric, and the remaining 17(25.4%) were trans-sphincteric in course. The fistulous tract was found to be simple in 42(62.69%) and complex fistulous tracts were observed in 25(37.31%) (Figure 2)

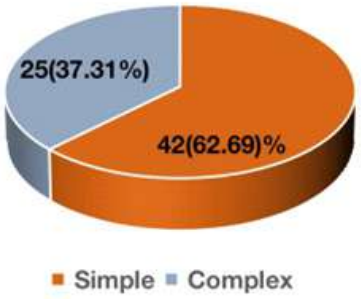

Figure 2: Pie diagram showing the distribution of patients according to the type of fistula in ano

Out of the 67 patients with fistula in ano, the course of the fistulous tracts, which were preoperatively predicted by applying Goodsall's rule, was found to correlate well with the intraoperative findings in 48(71.6%). (Figure 3)

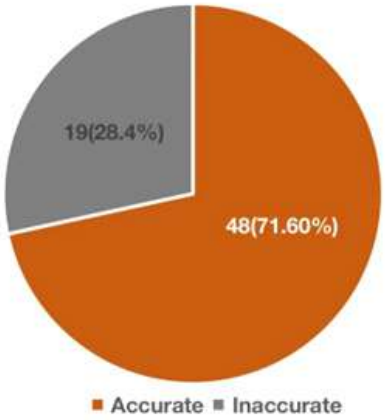

Figure 3: Pie diagram showing overall predictive accuracy of Goodsall's rule in comparison to intra operative findings

Out of 29 patients having anterior fistula in ano(Table 3), Goodsall's rule could very well predict the course of the tract in 22 patients(75.86%).

Distance from anal verge	Clinical examination		Intra-operative findings
	Straight tract	Curved tract	
<3cm (n=18)	12 (66.67)	-	Straight
	6(33.33)	-	Curved
>3cm (n=11)	-	1 (9.1)	Straight

Table 3: Showing number of anterior fistula (n=29) obeying Goodsall's rule as per intra operative findings

Out of the total 38 patients with posterior fistula in ano (Table 4), it was found that Goodsall's rule was found to be accurate in 26 patients(68.42%).

Distance from anal verge	Clinical examination		Intra-operative findings
	Straight	Curved	
<3cm (n=26)	-	11 (42.3)	Straight
	-	15 (57.7)	Curved
>3cm (n=12)	-	1 (8.3)	Straight
	-	11 (91.7)	Curved

Table 4: Showing the number of posterior fistula (n=38) obeying Goodsall's rule as per intra operative findings

In the case of the 42 patients with simple fistulas in the group, Goodsall's rule could accurately predict the course of the fistulous tract in 25(59.52%). For the 25 patients who had a complex fistula in ano, 23 patients(92%) had the course of the fistulous tract as per Goodsall's rule. (Table 5)

Goodsall's rule	Type of Fistula, n (%)	
	Simple	Complex
Accurate	25(59.52%)	23(92%)
Not accurate	17(40.48%)	2(8%)
Total	42	25

Table 5: Showing a comparison between the type of Fistula and Goodsall's Rule

In patients with anterior fistula in ano, the course of the fistulous tract depicted by Magnetic Resonance Imaging (MRI) was found to be accurate in the case of 27(93.1%) patients. (Table 6)

Magnetic Resonance Imaging (MRI)	Location, n (%)		Total	P-value
	Anterior	Posterior		
Accurate	27 (93.1)	35 (92.1)	62 (92.5)	>0.99
Not accurate	2 (6.9)	3 (7.9)	5 (7.5)	

Table 6: Showing the accuracy of Magnetic Resonance Imaging(MRI) with respect to the location of the fistula in ano

*- Chi square/Fisher's exact test; P-value < 0.05 was considered significant

MRI was found to be accurate in case of 38(90.48%) patients with simple Fistula. Out of 25 complex fistulas, the course of 24(96%) fistulae were accurately delineated pre-operatively by MR fistulogram . (Table 7)

Magnetic Resonance Imaging (MRI	Type of Fistula, n (%)		Total	P-value
	Simple	Complex		
Accurate	38 (90.5)	24 (96)	62 (92.5)	0.643
Not accurate	4 (9.5)	1 (4)	5 (7.5)	

Table 7: Showing accuracy of Magnetic Resonance Imaging(MRI) with respect to Type of Fistula in ano

*- Chi square/Fisher's exact test; P-value < 0.05 was considered significant

Goodsall's rule was found to be well correlating with MR fistulogram in 45 patients(67.16%). In 17(25.37%) patients, Goodsall's rule was inaccurate, but MR fistulogram accurately delineated the course, and in 3(4.47%) patients, MR fistulogram failed to delineate the tract, but Goodsall's rule was found to be accurate. Both Goodsall's rule and MR fistulogram were inaccurate in 2(3%) patients. MR fistulogram had a sensitivity of 93.8% (95% CI) - 93.8% (91.4% - 96.2%)((Table 8)

Magnetic Resonance Imaging (MRI)	Goodsall's rule, n (%)	
	Accurate	Not accurate
Accurate	45 (93.8)	17 (89.5)
Not accurate	3 (6.3)	2 (10.5)
Total	48	19

Table 8: Showing correlation between Goodsall's rule and Magnetic Resonance Imaging (MRI)

Sensitivity (95% CI) – 93.8% (91.4% – 96.2%)
Specificity (95% CI) – 10.5% (8.1% – 12.9%)
Positive Predictive Value (95% CI) – 72.6% (70.5% – 74.7%)
Negative Predictive Value (95% CI) – 40% (38.4% – 41.6%)

Discussion

Fistula-in-ano, the history of which can be traced back to the days of Hippocrates, remains a distressing disease with reduced quality of life. A sound knowledge of the clinical anatomy of fistula in ano, added with a thorough clinical examination, and in cases of complex anal fistulae, an imaging modality that better delineates the complexity of the disease, helps the surgeon to select an appropriate procedure, thus ensuring a satisfactory outcome [11].

In this observational study, we prospectively studied 67 patients with fistula in ano. From our study, we found that the incidence of fistula in ano was more in middle-aged people (mean age was 43.2 years (+/-11.4), with a strong predisposition to male gender(83.6%).

Out of the study population, around 12% of the patients were diabetic. Nabiyah Bakhtawar et al. [12]. depicted in their literature that Diabetes Mellitus is one of the major comorbidities that increase the risk of recurrence of Fistula in ano. In our study, patients with Diabetes Mellitus accounted for about 12%.

Patients with posterior fistula(56.7%) were more as compared to those with anterior Fistula in ano(43.3%). In a study done by Sukhlecha A Get al., [13], with a study population of 50 patients, found that 42 patients(84%) had a posterior fistula in ano and 8(16%) had an anterior Fistula in ano.

It was seen that Goodsall's rule was more accurately applicable in anterior Fistula (75.86%) in ano as compared to posterior fistulae(68.42%). Among anterior fistulae, Goodsall's rule was found to be more accurate when the external opening was located at a distance more than 3cm from the anal verge(90.9%) as compared to anterior fistulae with external opening lying at a distance of less than 3 cm from the anal verge(66.67%). In the study done by Cuinas et al., [14] they found that Goodsall's rule was accurate in 43.1% of anterior fistulae and 66.8% of posterior fistulae, and the fistulae having an external opening closer to the anal verge is more likely to obey Goodsall's rule.

In this study the predictive accuracy of Goodsall's rule was significantly high for complex Fistula in ano(92%) as compared to simple Fistulae (59.52%), which was in contrary to the findings of the study done by Samaranayake G V P et al., [15], where Goodsall's rule was more applicable for simple fistulae. The descrepency between the studies may be due to the lesser number of complex fistulae in the current study.

The accuracy of the MR fistulogram with regard to anterior (93.1%) and posterior Fistula (92.1%) was comparable. MRI could accurately delineate the course in 96% of complex fistulae and 90.5% of simple fistulae. In a study done by Annapurna Patwari et al., [16] they compared the MR fistulogram findings with intraoperative findings and found that the accuracy of the MR fistulogram was 90%. Ruchi Gupta et al., [17] conclude from their study that MR fistulogram is the investigation of choice in the case of Fistula in ano for delineation of perianal fistulas due to its excellent soft-tissue resolution and demonstration of the external sphincter and pelvic floor.

Conclusions

We conclude that, even though being an age old rule, the overall accuracy of Goodsall's rule in predicting the course of the fistulous tract is 72%. Also, the predictive accuracy was high for anterior fistulae and complex fistulae. Provided the high sensitivity and Positive Predictive Value of Goodsall's rule, in a resource low setting, Goodsall's rule can very well guide the clinician for the management of most of the patients with anterior fistulae and also can be used as a clinical tool for assessing the necessity of MR fistulogram in complex cases.

Thus, MR Fistulogram can be used selectively in case of complex Fistula in ano, as well as posterior fistulae which often have complex tracts. MR Fistulogram when clubbed with clinical examination findings, it helps accurately delineate the fistulous tract. It can clearly make out the percentage involvement of the sphincter complex so that the surgeon can very well customize the intervention required based on the complexity of the Fistulous tract.

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CASE SERIES

Successful application of platelet rich fibrin; a novel technique for reconstruction of onco-surgical partial glossectomy

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Keywords: Platelet Rich Fibrin, Glossectomy, Onco-surgery

Introduction

Tongue cancer is one of the commonest carcinoma of the oral cavity which needs extensive wide surgical resections in order to minimize post-operative recurrences. Reconstruction of these ablative onco-surgical partial glossectomy defects is essential to minimize post-operative speech and swallowing difficulties. Microvascular free flaps, local flaps, distant flaps and regional flaps are the main reconstructive armamentarium for these surgical defects; however it results additional surgical procedure at another donor site.

Oral & maxillofacial (OMF) region is unique for personal identification and self-esteem as it comprises precise, self-identifiable and self-specific important tissue architectural characters. Since it is an area of highly compact aesthetically and functionally important structures, reconstruction of the OMF region is a challenge and has a high demand. Oro-pharyngeal cancer is the highest prevalent carcinoma among the Sri Lankan males' and the tongue is the second most common individual site of occurrence [1]. Reconstruction of the partial glossectomy surgical defect after the tumor ablation is an extreme necessity to re-gain the speech and swallowing functions of the individual to maintain the social acceptance and personality.

Platelet rich fibrin is known to be used in many surgical interventions in oral and maxillofacial region with successful outcome. This non-invasive therapeutic option would overlook the necessity of additional reconstructive flap procedures. Use of platelet rich fibrin for human tongue onco-surgical reconstruction is not yet reported in the medical literature. Herein, we describe successful application of platelet rich fibrin for reconstruction of series of onco-surgical partial glossectomy defects.

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Platelet rich fibrin

Platelet rich fibrin (PRF) is an autologous second generation platelet concentrate, an improved product over platelet rich plasma (PRP). This was first developed for specific use in OMF surgeries. PRF is considered as a novel non-surgical reconstructive option and it is an ideal biological product to facilitate the regeneration of similar textured anatomical structures of the OMF region. Currently, PRF is widely practiced in OMF reconstructive surgeries as a supportive therapy.

a. Mechanism of action

PRF is recovered from the centrifugation of autologous peripheral blood of the patient in a glass tube which initiates the coagulation cascade. Resulting PRF consists of fibrin matrix polymerized in a tetra molecular structure, with incorporation of platelets, leucocytes, plasma proteins, and circulating stem cells [2]. The matrix of the PRF is an ideal media for cell migration and it serves as a reservoir of numerous bioactive molecules such as growth factors, cytokines, fibrinogen, adhesive proteins, and coagulation factors [3],[4]. Once applied to a surgical site, they are responsible for initiating cellular proliferation and differentiation, angiogenesis and regulating inflammatory reactions. Furthermore, it has been suggested that PRF can protect growth factors from proteolysis leading to sustain their activity for a long time duration [5] resulting rapid wound healing [6].

b. Applications of PRF

PRF is known to use in many surgical interventions in OMF region with satisfactory outcome. There are evidences of successful usage of PRF in bone augmentation, socket preservation, sinus lifts and periodontics for correction of intra bony defects, gingival recession, periapical lesions, guided bone regeneration, pulpotomies, periapical surgeries etc [7].. The use of PRF for the reconstruction of human glossectomy defect is not yet reported in the medical literature although PRP has been tried on murine models following partial glossectomy [8].

Herein, we describe the application of PRF for reconstruction of partial glossectomy onco-surgical defects done at District General Hospital, Ampara. In the first case, PRF was grafted instead of another reconstructive flap procedure following a regional nasolabial flap failure. It was used as a regenerative agent directly on the partial glossectomy site in the other three cases.

Method and materials

PRF was prepared at the blood establishment of the hospital using the following method.

a. Preparation of PRF

After cleaning the phlebotomy site, 10 ml of patient's venous blood was collected into a sterile tube of 10 ml capacity without anticoagulant and immediately centrifuged at 3000 rpm for 10 minutes using the Heraeus Labofuge 400 bench-top tube centrifuge. Centrifugation at a high spin separates whole blood into layers; the fibrin clot lies just above the red cell layer. The fibrin clot was recovered using a tissue forceps with catch under the sterile condition. A piece of sterile gauze was used to remove the thin layer of red cells remained at the bottom of the clot. Finally, fibrin clot was placed in a sterile container and sent to the theater for application.

b. Application of PRF to the surgical site

PRF was stitched in place by 3-0 vicryl sutures and primary closure was obtained wherever possible. Daily Povidone iodine gentle irrigation was done to minimize the infection risk.

Case scenario

Case 1: A 28-year-old lady with a gradually expanding ulcerative exophytic growth on left tongue, measuring 4 cm x 2 cm with everted and indurated margins was seen at the OMF clinic. It had started as a pin point lesion and expanded to this level during the last three months with no pain, however gradual reduction of the tongue mobility affected the speech and swallowing greatly. The lesion extended to ventral aspect of the tongue however the floor of the mouth was not involved. She was otherwise healthy and was not on any medication. Multiple-incisional biopsies histo-pathologically confirmed the lesion as squamous cell carcinoma. In addition, 2 cm single ipsilateral submandibular lymph node with no clinical evidence for distant metastasis suggested the lesion as T2N1M0.

Wide local surgical resection of the primary tumor was done and ipsilateral pedicled naso-labial flap was used for the reconstruction of the partial glossectomy defect, which was more than 6 cm x 4 cm in size. Naso-labial flap was harvested, preserving the underneath facial vascular pedicle with elliptical skin paddle to match the surgical deficiency. Reconstructive flap was mobilized to the neck and delivered to the glossectomy site by creating a surgical tunnel through the mylohyiod muscle. Ipsilateral extended supra-omohyoid selective neck dissection was done to control the local metastasis of the disease.

The reconstructive flap was functioning well initially, however looked dry, shrunken and gradually separating with time, indicating failure. The cause would be compromised vascularity in the level lb submandibular region and post-operative tissue oedema. Therefore, the flap was removed, indicating an additional reconstructive option for the surgical defect. The surgical options available were another local, regional or distant pedicled myo-mucosal flap or a radial forearm or anterior lateral thigh free flap. By this time, we could obtain the histopathology results of the excised primary lesion. It reported, complete resection of the tongue lesion with more than 10 mm margins in all directions and no neck nodal involvement in the selective neck dissection. As she was a young girl, instead of an additional reconstructive flap procedure with another donor site wound and a post-operative surgical scar, we preferred PRF grafting as a non-invasive reconstructive option for the surgical defect.

PRF graft, prepared from autologous whole blood, was applied to the glossectomy defect and secured by 3-0 vicryl sutures (Figure 2- a & b). Nasogastric feeding was done to minimize disturbances during meal. Supportive oral care, good hydration and initial antibiotic cover to minimize risk of infections were facilitated.

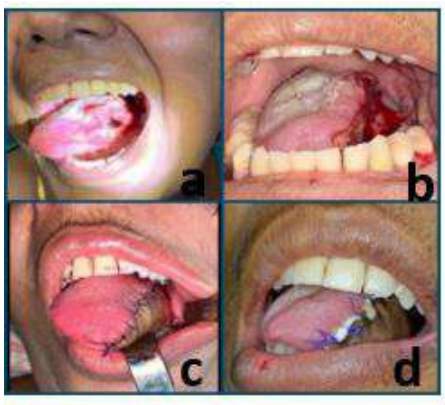

Figure 1: a- Squamous cell carcinoma tongue, **b**-wide local resection of the primary lesion, **c**-Naso-labial flap reconstruction, **d**-failure of the regional flap

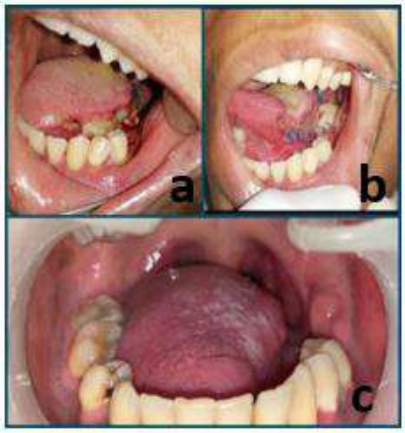

Figure 2: a & **b**- PRF grafted and secured with 3/0 vicryl suture, **c**-regeneration after three weeks

With the above evidences of successful partial glossectomy regeneration, we used PRF for reconstruction of partial onco-surgical glossectomy defects in patients fulfilling following specific inclusion criteria. Patients' informed consent was taken before each application.

1. The lesion should be proved as a cancer with an incisional biopsy.
2. The lesion should be less than 4 cm in size (Up to T2 - TNM 8 Oro-pharyngeal cancer classification).
3. There should not have clinically or radiologically suspected cervical lymph nodes.
4. Additional 10mm cuff of normal healthy tissues need to be incorporated to the excisional biopsy from all directions including the deeper margins in order to minimize the recurrence.
5. For inclusion, the lower limit of platelet count was taken as $150x10^9/L$.

Meantime patients with below mentioned conditions were excluded.

1. Lesions with clinically and radiologically suspicious neck nodes or distant metastasis
2. Lesions larger than 4cm in size(lesions beyond T2 –TNM8 oro-pharyngeal cancer classification)
3. Patients on anti-platelet drugs
4. Patients with known platelet function disorders

Case 2: A 65-year gentleman presented with a gradually enlarging irregular, non-tender, hard, whitish patch with indurated margins measuring 1 cm x 1.5 cm on left anterior lateral boarder of the tongue. Incisional biopsy confirmed the lesion as squamous cell carcinoma which was clinically T1N0M0. Wide local resection with adequate margins and PRF grafting was carried out. The defect resolved completely with similar tongue tissues maintaining the functional and aesthetic outcome in three weeks' duration (Figure 3).

Figure 3: a- primary lesion, **b**-wide local resection of the primary lesion, **c**- primary closure with PRF, **d**- regeneration of the tongue after three weeks

Case 3: A 63 year male patient with exopythic growth on the right anterior tongue measuring 3cm x 3 cm was diagnosed as verrucous carcinoma with the incisional biopsy. Wide local surgical resection and PRF grafting was carried out which gave the expected similar functional and aesthetic results in three weeks' time (Figure 4 & 5).

Figure 4: a-verrucous carcinoma left anterior tongue, **b**-wide local resection, **c**-glossectomy defect following surgical excision, **d**-grafting of PRF

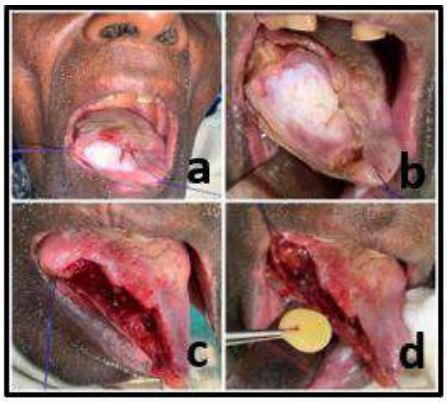

Figure 5: a & b - Verrucous carcinoma **c**- surgical defect after primary resection **d**- Incorporation of PRF

Case 4: fifty five year old male patient presented with predominantly whitish irregular lesion measuring 3 cm x 3 cm in size with everted exophythic nature was diagnoses as verrucous carcinoma of the tongue with an incisional biopsy. PRF grafting was done following wide surgical excision of the lesion and near normal regeneration of the tongue was observed in three weeks' time (Figure 6 &7).

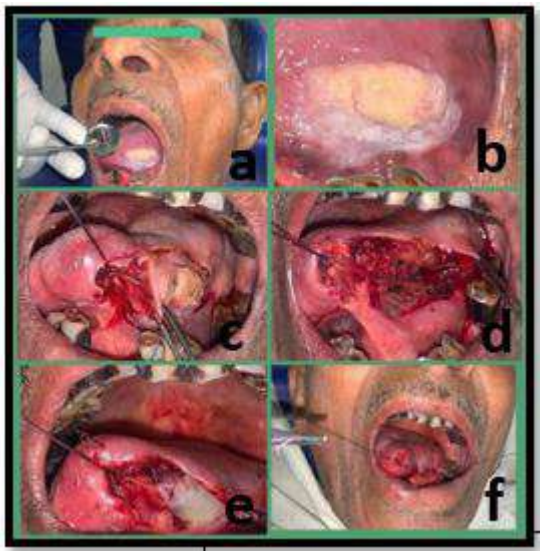

Figure 6: a-left anterior tongue verrucous carcinoma, **b**-close look of the lesion, **c & d-** resection of the primary lesion, **e**-grafting of PRF, **f**-primary closure of the surgical site

Figure 7: Regeneration of the surgical defect with normal epithelial covering and mobility

Superficial/epithelial and deep incisional biopsies from the regenerated site in all cases were done and confirmed it's the normal tongue tissue with neither residual tumor nor any recurrences.

We could obtain satisfactory results in all cases of PRF grafted regeneration of the partial onco-surgical defects, with neither complications nor any tumor recurrences or any residual tumor. All patients were satisfied about the functional outcome of the implemented non-surgical intervention and are being followed up in the routine OMF clinic.

Discussion

Oral cancer is an emerging dilemma in South Asian region including Indian subcontinent. Squamous cell carcinoma of the oral cavity is the prime cancer among Sri Lankan males, attributed to habits of betel chewing, tobacco and excessive alcohol consumption. Buccal mucosa is the commonest site of occurrence while tongue and floor of the mouth rated subsequently [1]. Wide local resections of these aggressive lesions cause massive aesthetically and functionally unacceptable defects which needs proper reconstruction to maintain the social acceptance, self-esteem and the personality.

Glossectomy defects can be categorized as partial-glossectomy, hemi-glossectomy, sub-total glossectomy and total glossectomy according to the amount of tongue tissue resection. Tumor ablations of the tongue essentially affect the swallowing and quality of speech of the individual. Site, size, type and the nature of the cancer determines the additional resection needed to minimize the recurrence of the disease. Moreover, tongue, floor of the mouth and midline cancers are recommended for excessive resections with additional wider margins, due to high vascularity and bilateral lymphatic drainage, which may disseminate the disease easily and frequently.

Local, regional and distant flaps are recommended for the post-ablative glossectomy defect reconstruction, besides radial forearm and anterior lateral thigh free flaps, the gold standards in developed world [1]. Even smaller glossectomy defects could seal-off with primary closure, for moderate to severe defects (more than 2-3cm) need reconstruction armamentarium beyond primary closure and secondary intension to minimize post operative speech and swallowing deformities [1]. Pedicled naso-labial regional flap was used for the extensive partial glossectomy defect closure of the first case, however it was not successful. Since she was a young lady, considering the donor site morbidity of another local or regional surgical reconstruction, PRF grafting was preferred, and this paved the pathway to initiate this non-surgical intervention.

With the successful outcome of the first case, we considered the effectiveness and safety of implementing this method to onco-surgical partial glossectomy defects, with inclusion and exclusion criteria. Malignant tumors more than 4 cm in size were excluded, as they have higher tendency of local and distant metastasis [1]. Any patient with clinically or radiologically suspicious cervical nodes were left out, as they

have higher chance of loco-regional spread of the disease. Normal tissue cuff 5 mm is recommended in oro-pharyngeal cancer primary resections, however, more than 10mm margins were considered in this case series to minimize recurrences [1]. This was taken as an additional measure since there is a possibility of PRF induced cancer recurrence, if any tumor remnants left behind [9]. This was confirmed with excisional biopsy report for the first case and additional wider excision for the other cases as fresh frozen section facility is not yet available in our center. Further evaluation of the regenerated sites with superficial and deep incisional biopsies after six months of complete healing confirmed the presence of normal regional tissue architecture with neither recurrences nor residual tumor.

For hemi-glossectomy and partial-glossectomy defects up to 4cm, PRF grafting would be a better option [7]. Further, this non-invasive option would effectively cut down the long theatre times of cancer surgeries and would reduce the length of ICU care as there is no surgical reconstruction is needed. Since the method of PRF production is simple, non-expensive and cost-benefit wise it is a very useful alternative for invasive surgical options. Minimum scaring of the post ablative glossectomy site with PRF mediated regeneration, decrease the swallowing and speech alterations, which seems a huge privilege of this method.

Conclusion

Precise reformation of ablated tissues is not being completely obtained by any type of reconstructive flap procedure. Because of this, introduction of this novel glossectomy reconstructive option with precise aesthetic and functional correction, is worth exploring to meet the increasing demand.

Acknowledgements

We would like to thank the staff members of OMF unit, Operation Theater and blood bank of district general hospital, Ampara for the support given in managing these patients.

Conflicts of Interests

There is no Conflict of Interest to declare.

Learning Points:

- Platelet Rich Fibrin (PRF) is an advanced autologous regenerative therapy that enhances healing and improves outcomes in reconstructive surgery.
- Most prevent cancer among Sri Lankan males is Oral Cancer.
- Reconstructing glossectomy defects is crucial for minimizing post-operative speech and swallowing difficulties.
- PRF can be effectively utilized for reconstructing up to stage 2 (T2) partial glossectomy onco-surgical defects, under controlled conditions, to reduce the need for complex advanced surgical reconstructions.

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PERSPECTIVE

Establishing a spine surgery service in a low-resource setting: an experience from Herat, Afghanistan

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Keywords: Spine surgery, Establishing, Low-income countries , Afghanistan

Introduction

In this era, surgical care is increasingly recognized as a public health priority with the transition of disease patterns toward chronic and non-communicable. A significant proportion of diseases originated from causes like injuries, malignancies, and musculoskeletal disorders which are often correctable by surgeries. As such, surgical amenable pathology is identified as a major contributor to the global burden of disease [1]. Despite remarkable gains observed in global health within the last two decades, the overall positive development is not observed in low-income and middle-income countries (LMIC) where increased morbidity and mortality from surgically correctable common conditions have been observed [2].

In Afghanistan, there is a growing unmet surgical need owing to an underdeveloped healthcare system resulting from persistent political and economic instability. The scope of health services in Afghanistan is defined by the Basic Package of Health Services (BPHS) and the Essential Package of Hospital Services (EPHS) released by the Afghan Ministry of Public Health [3,4]. Basic and essential surgical care is not included as one of the seven major elements of BPHS [3]. The fragmented and resource-depleted healthcare system is lacking in the specialized surgical workforce and thus is insufficient to cater to the country's needs.

Spine surgery is one of the least developed surgical specialties in Afghanistan due to the lack of local orthopedic surgeons and neurosurgeons. Even though it is relatively new compared to other surgical fields, it is essential to treat a range of diseases, conditions, or deformities involving the spine, spinal cord, and peripheral nerves. These include discopathy, spinal canal stenosis, tumors of the spinal cord, spinal cord meninges, and vertebral spine, infective diseases of the spine, vertebral spine fractures, and congenital diseases of the spine to name a few. Currently, military treatment facilities in Afghanistan provide a substantial amount of civilian care to cover the gap in healthcare needs among the local community. A study by Barbier *et al.* shows that orthopedic surgery constituted almost half of the procedures performed in a Role 3 medical treatment facility in Kabul commanded by France [5]. Another study reports that roughly half of the surgeries performed for local civilians in U.S. military facilities in Afghanistan during more than a decade of war were for non-combat injuries and health problems[6].

A great proportion of patients with spinal conditions are forced to seek treatment from neighboring countries due to the lack of public and privately-funded spine surgery services within the region. These medical trips do not only induce considerable costs including costs for transportation and accommodation but, visas are often required this result in a bureaucratic delay in receiving timely treatment. Other than that, finding and consulting a reliable doctor in a foreign country is also a challenge.

Due to a high unmet need, the first spine surgery center was established in 2018 in Herat, a province in western Afghanistan. Establishing a specialized surgery center and providing quality surgical care is challenging in a resource-depleted setting. In this paper, we share our experience in establishing the center, the challenges we faced, and the ways in which we overcame them.

Setting up the service

Subspecialization in orthopedics and neurosurgery, particularly in spine surgery is not provided in the tertiary education facilities in Afghanistan. The idea of establishing a spine surgery service was started by an orthopedic surgeon who initially completed his medical education and residency in Kabul, Afghanistan. Subsequently, he pursued his further education under a doctorate scholarship at Osaka Metropolitan University, Japan, specializing in orthopedic and spinal surgery. Upon returning to Afghanistan, he focused primarily on initiating a spine surgery service to provide essential surgical treatment to the local community.

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Funding

Compared to some other surgery disciplines, the budget required for spine surgery in terms of equipment is relatively higher. This is because spine surgery involves various pathologies and the need to acquire various implant instruments and peripheral equipment. Due to the high rate of interest, lack of government support, and lack of regulation in the country, taking a loan from financial institutions is not a viable option for many of the enterprises in Afghanistan [7]. Private funding was utilized by our team to set up the service. Sufficient loans were successfully obtained from the families of the founding members after much effort.

The day-to-day operation of the service is funded by fees charged to the patients who obtain treatment at our hospital. Most of the patients pay for the treatment out-of-pocket. Out-of-pocket expenditure is the predominant form of health financing and comprises over three-quarters of the total health expenditure in Afghanistan[8].

Infrastructure, equipment, and instrumentation

The fundamental requirements for a basic spine surgery service include an emergency room, examination room, a dedicated ward, preoperative preparation room, operating theatre, and post-operative care room. Instead of building a center from scratch which requires colossal funding and considerable time, our team opted to establish our service in an existing healthcare facility. Jami Hospital was chosen as our base as it is one of the hospitals with the most comprehensive facilities within the region.

Another challenging aspect in establishing the service was the lack of access to surgical equipment essential for spinal surgery in the local setting. The procurement of equipment via hospital administration would require many months as it involves several administrative steps and bureaucracy. To facilitate procurement, our team obtained assistance from personal contacts from other countries who have access to the equipment and selected companies that possess import permits to import surgical equipment to Afghanistan. Other than that, many instruments and equipment were also contributed by colleagues and personal contacts from other countries, especially Japan. Most of the items were supplied from Germany, China, Pakistan, Japan, and the United Arab Emirates. Listed below are the equipment we procured to initiate the service:

- Spine surgery operation table
- Surgical ceiling lights
- Headlight
- Spine frame
- Skull Holder clamp
- Anesthesia machine
- Electrocautery
- Suction
- Cervical Casper retractor
- Lumbar spine Casper retractors
- Discectomy instrument set
- Microdiscectomy instrument set
- Lumbar spine Pedicle screw insertion instrument set
- Cervical spine pedicle screw instrument set
- Posterior lumbar interbody fusion set
- Lumbar spine corpectomy instrument set
- Anterior cervical spine discectomy fusion set
- Spinal cord tumor resection set
- High-speed microdrill
- Sagittal saw
- Spine surgery operation microscope
- C-arm fluoroscopy

Personnel and training

The lack of trained healthcare professionals was another challenge in establishing the service. At the time of writing, our team consists of six surgical doctors, two anesthesiologists, ten nurses (four preoperative care nurses, two OT nurses, two postoperative care nurses, and two scrub nurses), and three housekeepers.

All of the surgical doctors received specialized training outside of Afghanistan and possessed previous experience in the orthopedics and/or neurosurgical field. The lead consultant was trained at Osaka Metropolitan University, Japan for 4.5 years. Two of the doctors completed short-term fellowship training at the Spine Injury Center in Izuka Japan.

Competent nurses are indispensable in the provision of comprehensive and optimal care to patients in every spine surgery treatment phase, from preoperative to postoperative care. The nursing team underwent a strict selection process conducted by the founding members. Successful candidates were then provided with relevant specialized training in their roles. Preoperative nurses were trained in carrying out joint examinations of the patient's condition, preparing patients for operative procedures, standard operating procedures in handling emergency cases, and provision of patient care upon the completion of the operative procedure. Scrub nurses were trained in working and handling instruments and implants under sterile conditions. OT nurses received training in examining patients' general conditions and vital signs, setting up the operating room as well as handling instruments and

implants under sterile conditions. Post-operative nurses received training in providing care, and moving and ambulating patients with spinal cord trauma as well as measures to prevent bedsores and muscle breakdown.

Raising awareness and building trust

It was difficult to gain the trust of the local community during the initial phase as spine surgery is a relatively new field in Afghanistan. Most of the patients were generally more confident to undergo their treatment and surgery in neighboring countries despite the logistical obstacles and financial burden. Our team decided to perform basic and elective procedures like laminotomy and discectomy and target conditions with higher prevalence among the local population during the initial phase of the establishment. For more complex procedures, a collaboration was initiated with the Spine Surgery Department of Osaka Metropolitan University, where the lead consultant obtained his sub-specialization. Treatment options and surgical technicalities were discussed with the overseas counterpart to provide the best possible individualized treatment plan with the resources available.

The types of procedures conducted have been expanding gradually in a selected manner over the past six years along with the increase in trust towards our service among the local population. Consultations and discussions with professors from Osaka Metropolitan University are still being carried out at the time of writing. The range of procedures carried out at Jami Hospital before and after the establishment of the service is presented in Table 1.

Before the Establishment of Spine Surgery Service (Initial phase:2018)	After the Establishment of the Spine Surgery Service (Current:2024)
• Laminectomy and discectomy • Instrumentation for thoracolumbar fractures	• Microscopic discectomy • Minimally invasive spinal decompression surgery • Posterior lumbar interbody fusion • Anterior cervical discectomy fusion • Cervical spine corpectomy and fusion • Cervical spine pedicle and lateral mass screw fixation post fractures • Cervical spine laminoplasty • Lumbar spine corpectomy fusion • Gibus deformity correction surgery • Vertebral kyphoplasty • Spinal cord tumor resection surgery • Posterior fossa decompression surgery • Posterior spine instrumentation post-fracture • Spine needle biopsy • Different kinds of spinal blocks

Table 1: Comparison of services provided at the hospital before and after the establishment of the spine surgery

Achievements and future perspectives

Over the years, the number of operations with favorable outcomes increases steadily. The number of patients from other cities who seek treatment at our center is also rising significantly. Several surgical procedures that were not performed in the western region of Afghanistan previously are now made possible with a local spine surgery team. Since the initiation of the service, more than 2700 surgical procedures with varying pathologies have been carried out. Spinal cord tumor removal, posterior lumbar interbody fusion, anterior cervical spine discectomy and fusion, posterior fossa decompression surgery, cervical spine laminoplasty, deformities correction surgery, and balloon kyphoplasty were performed for the first time in the region at our center.

Our team aims to provide a standardized and high-quality evidence-based spine surgery service. With our aspiration to expand the service, we aim to create more employment opportunities for local healthcare workers and act as a spine surgery training center. It is of paramount importance that the younger generation of aspiring healthcare professionals have access to specialized knowledge to ensure the provision of a sustainable service.

The exchage of professional knowledge conducted between our center and institutions abroad has played an important role in the success of the service thus far. It highlights the importance of collaboration with institutions from other developed countries when working under tight financial budgets with a lack of trained healthcare professionals. Our team hopes to initiate more collaborations with various agencies and organizations shortly to optimize the service provided. International collaboration could also be a gateway for the continuation of the education of our existing staff.

The development of a comprehensive spine rehabilitation service is eminent to optimize the utilization the limited surgical resources and maximize patients' long-term outcomes especially in the realm of spine surgery. Our team aspires to develop a comprehensive and cost-effective rehabilitation program to support postoperative recovery and community reintegration of patients. This is particularly important in a country like Afghanistan where over one-third of the population lives below the poverty line[8].

Conclusion

Although diseases and conditions related to the spine can affect the quality of life of afflicted patients immensely, spine

surgery field has been under the radar of the Afghan government and other private and international organizations. Establishing and maintaining a sustainable spine surgery service in a resource-depleted setting is undeniably challenging but also rewarding. Setting up a spine surgery service in western Afghanistan is undoubtedly a notable achievement and marks the beginning of specialized and individualized surgical treatment within the region. Nevertheless, there are several potential areas for development and improvement to bridge the knowledge gap and to provide high-quality evidence-based service.

Acknowledgements:
We would like to thank all staff in the Spine Surgery Department, Osaka Metropolitan University (O.M.U.) for their continuous support. The Department provided the pivotal platform for the lead consultant for his sub-specialisation study. They also assisted our team by sending over specialized surgical equipment to Afghanistan. All the consultants are extremely helpful and selfless in sharing their expertise and knowledge during case discussion sessions. We are also thankful to Izuka Spine Injury Center which offered two short-term fellowship opportunities for two of the doctors in our team.

We would like to express our utmost gratitude to Professor Yamano Yoshiki who has been actively involved in volunteering work in the healthcare sector in Afghanistan for the past few decades. He is the pioneer of spine surgery in Afghanistan and has been facilitating and coordinating specialized training and scholarship programs for Afghan surgeons via collaboration with universities and institutions in Japan for the past two decades. The first of its kind training program for Afghan surgeons was established and initiated by Professor Youshiki in 2007.

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CASE REPORT

Retropharyngeal Schwannoma excised through Smith Robinson approach: a rare cause for dysphagia

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Keywords: dysphagia, retropharyngeal mass, schwannoma, smith robinson approach

Introduction

Neurofibromatosis (NF) is a neurocutaneous disorder that leads to tumor formation in the central and peripheral nervous systems, affecting the brain, spinal cord, organs, skin, and bones. It is classified into three types: NF1, which constitutes approximately 96% of cases; NF2, occurring in about 3%; and schwannomatosis (SWN), which accounts for less than 1%.[1]. Neurofibromatosis type 2 (NF2) is defined by the formation of multiple benign tumors in the nerve sheath, known as schwannomas, which primarily impact the vestibular nerve [2]. Schwannoma has an extended clinical latency and a late and difficult diagnosis characterize it. Space-occupying lesions in the retropharyngeal region are uncommon. Several types of masses have been identified in this area, including angiomyomas, ganglioneuromas, malignant mesenchymomas, and neuroblastomas, with hamartomas being the most frequently observed. Clinical presentations vary, but common symptoms include difficulty breathing (dyspnea), trouble swallowing (dysphagia), and obstructive sleep apnea. Here, we present a rare case of retropharyngeal neurofibroma that was managed surgically.

Case Report

A 31-year-old female patient with a background history of thalassemia trait, NF type 2- multiple neurofibromatosis, was referred to our neurosurgery unit in February 2024 for evaluation of spastic quadriparesis. The patient presented with progressive weakness over both the upper limbs and lower limbs. But she denied other local pressure effects neither loss of weight nor loss of appetite. The patient also complained of non-progressive painless dysphagia at the throat.

On clinical examination, the patient had increased tone but reduced power over both upper and lower limbs (power of 2/5) but had no objective sensory deficit. There was no obvious swelling or any palpable lymphadenopathy. Her ESR value was within the normal range. The patient underwent an MRI which showed four intra-spinal masses/neurofibromas;

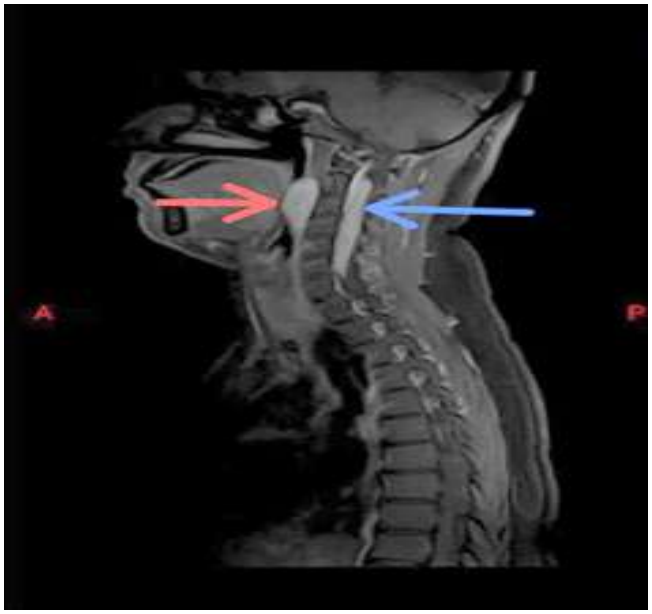

Figure 1: Sagittal view of the pre-op T1 weighted MRI; Blue arrow denotes the intra spinal schwannoma, Red arrow denotes the pre vertebral schwannoma.

Figure 2: Surgical resection of the retropharyngeal neurofibroma. White arrow depicts the pre-vertebral mass

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the largest was seen within the cervical spinal canal anterior to the cord, measuring 7.3x1.1x1.9cm, compressing the cervical spinal cord. In addition, a similar lesion measuring 4x2x1.6cm was seen at the C2–C4 level shifting the anterior cervical soft tissues to the right of the oropharynx, down to the epiglottis. It compressed and distorted the oropharynx (Figure:1).

Following pre-operative assessment, the patient underwent C2–C6 laminectomy and cervical neurofibroma excision under general anaesthesia. A tumour was identified at the C5 ventral root, and complete macroscopic resection was performed. The patient had an uneventful recovery. The bilateral upper limb and lower limb power were improved to 4/5 post operatively. The histology report revealed Schwannoma CNS WHO grade 1, containing Antoni A and B tissue architecture. The patient was discharged with the plan of elective surgery for the excision of the right-sided retropharyngeal schwannoma after 2 months.

Complete excision of the retropharyngeal schwannoma was performed under general anaesthesia using the Smith-Robinson approach, and a nasogastric tube was inserted for immediate post-op feeding. A right-sided transverse cervical incision was made, and subplatysmal myocutaneous flaps were raised. The blunt and sharp dissection was carried out medial to the sternocleidomastoid muscle. Once the cervical oesophagus was retracted medially, the schwannoma was identified anterior to the pre-vertebral plane (Figure 02).

Complete resection was carried out. The patient resumed oral feeding on postoperative day 2 and was discharged from the hospital the next day following an uneventful recovery. The histology report confirmed a schwannoma. The patient was asymptomatic during the follow-up.

Discussion

The hallmark of NF2 is a mutation in the NF2 gene responsible for the production of a protein called merlin, which acts as a tumour suppressor gene located on chromosome 22. This genetic mutation results in abnormal cell proliferation and loss of apoptosis, leading to an increased risk of developing various benign and malignant tumours, particularly within the CNS [3]. Patients with NF2 often develop spinal schwannomas, which grow from the dorsal roots of spinal nerves, can be intradural or extradural. Extradural schwannomas, comprising 60% to 70% of cases, usually appear as painless masses that compress and displace the spinal cord, nerve roots, and nearby structures such as the vertebral artery.

Tumors of the parapharyngeal space (PPS) are rare, accounting for less than 1% of all head and neck neoplasms. Approximately 50% of PPS schwannomas originate from the vagus nerve, while the cervical sympathetic chain is the next most common source. The clinical presentation of schwannomas varies depending on the anatomical area involved but often includes pressure-related symptoms such as dysphagia and hoarseness of voice. In the present case, patient initially presented with spastic paraplegia and non-progressive dysphagia. Hence, an MRI was carried out, and the lesion was noted in the right parapharyngeal area distorting the oropharynx.

MRI is particularly helpful in identifying the originating nerve, with some studies reporting a perfect success rate. Although closely associated with the nerve of origin, neurological function is maintained in 86% of patients after resection. A biopsy is used to diagnose schwannomas, which typically exhibit both Antoni A and B tissue patterns. Antoni A areas are characterized by densely packed nuclei with central thickening and tapered ends, while Antoni B areas display a more relaxed arrangement of slender, spindle-shaped cells. [4]. Similar findings are seen in our patient's histology report. Hence, the biopsy was not obtained.

Transoral biopsy and removal of schwannomas in the parapharyngeal space can result in complications, including incomplete excision, bleeding, infection, and damage to cranial nerves. The preferred surgical methods primarily involve a transcervical approach, but other options include transparotid, transzygomatic, transmandibular, and a combination of transparotid and transcervical techniques.. The transcervical approach is typically adequate for most tumours in the post-styloid compartment. However, total resection is the gold standard for treating patients with sensory or motor deficits due to extradural intradural spinal tumours.

Surgical excision is the preferred treatment, with recurrence being infrequent if the tumour is completely removed. However, incomplete removal can lead to recurrence, necessitating repeat excision.

In conclusion, retropharyngeal schwannomas can be asymptomatic and cause challenging in diagnosis. The Smith Robinson approach would give adequate exposure. Complete resection will cure the symptoms and minimal chance of recurrence.

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Learning Points:

- In rare cases, retropharyngeal schwannoma can present with local obstruction symptoms
- They can pose challenges in both diagnosis and surgical approach.
- Complete surgical resection is the gold standard to preserve or improve neurological function.

CASE REPORT

Oesophageal perforation from sword swallowing: a case report of successful endoscopic closure

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Keywords: Oesophageal perforation, Endoscopic closure

Introduction

Oesophageal perforation is an uncommon cause of high morbidity and mortality [1]. Since the oesophagus lacks an outer serosal surface to protect its wall, close relationships with vital organs can lead to perforations that easily involve the surrounding tissues, potentially causing mediastinitis and lung empyema. We present a rare case of an oesophageal perforation caused by "sword swallowing," which was successfully managed by endoscopic clipping.

Case Report

A 28-year-old male street performer presented to the hospital with severe retrosternal pain four days after swallowing a sword during a performance. He appeared unwell but was afebrile, with a heart rate of 110 beats per minute. A chest X-ray revealed mediastinal gas shadows and fluid in both lungs, which were confirmed by a CT scan. Laboratory tests showed a C-reactive protein (CRP) level of 150 mg/dL and a white blood cell (WBC) count of 15 x 10^3/µL. The patient was kept nil by mouth was started on intravenous fluids and antibiotics. Two chest drains were inserted to remove the fluid from both lungs. An upper gastrointestinal endoscopy (UGIE) identified a 15-mm perforation at 26 cm in the anterior esophagus. A multidisciplinary discussion among a general surgeon, thoracic surgeon, and gastroenterologist concluded with the decision to attempt endoscopic closure of the perforation.

On endoscopy, the edges of the perforation were oedematous and ragged. Options for endoscopic closure were through the scope (TTS) hemoclips or over the scope clip (OTSC) and endoscopic suturing if available. Stenting with a fully covered metal stent was not considered successful because previous experience with stenting of oesophageal perforations were unsuccessful. TTS clips could not be applied as the edges were oedematous, ragged, and difficult to grasp. Therefore, it was decided to apply OTSC clips (11mm Oesophageal OTSC, Ovecso, Tubingen, Germany). Initially, the edges of the perforation were touched with Argon plasma coagulation to create a raw surface to enable better healing. The centre of the perforation was located so that it was well focused at the centre of the endo-cap, and suction was applied to make sure the whole perforation was sucked into the cap. Once this was confirmed, the OTSC clip was applied, and complete closure

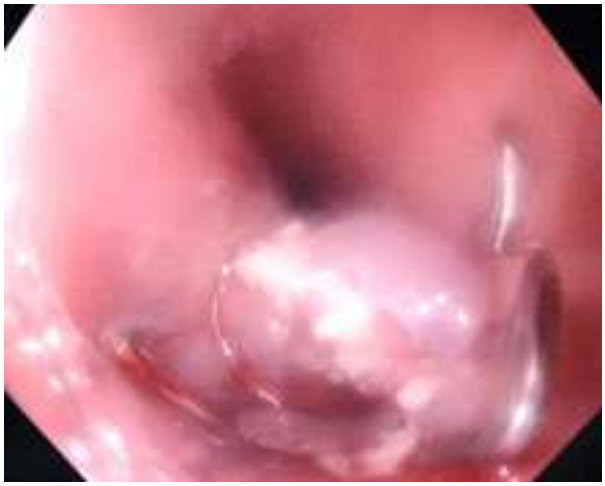

Figure 1.

Figure 2.

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of the defect was confirmed by direct vision. A 16-gauge nasogastric tube (NGT) was inserted into the stomach under direct vision, and the patient was started on clear fluid. After 48 hours, a non-ionic contrast study of the oesophagus was performed, which did not reveal any further leaking. The NGT was removed after 48 hours, and the patient was asked to take clear fluids orally for 24 hours. Thereafter, the consistency of the fluid increased, and after a further 48 hours, the patient was advised to eat a normal meal.

Antibiotics were continued for 7 days, and chest drains were removed on days 6 and 7. The CRP and WBC returned to normal within 10 days. When a repeat UGIE in 1 month was done, the clip was still in place, and the perforation was completely healed.

Discussion

Sword swallowing is a unique and inherently dangerous stunt performed by experts in the field. This high-risk procedure poses significant dangers to the surrounding structures. To date, there have been only two published cases of oesophageal perforation due to sword swallowing [2, 3]. One patient was managed by surgical correction, and the second was managed conservatively. Both perforations were in a similar location to our patient's, in the upper third of the oesophagus. In contrast to the above two patients, our patient was managed successfully. Immediate successful endoscopic closure in a ward setting with an inter-costal tube and parenteral and oral antibiotics for seven days.

Management of oesophageal perforations relies on two critical steps: restoring the integrity of the lumen and assessing for any extraluminal contamination to prevent sepsis. Additionally, comprehensive supportive care is essential, including haemodynamic monitoring, systemic antibiotic therapy, and other supportive measures.

The choice of treatment whether surgical or conservative is primarily influenced by the timing of presentation, as delayed intervention increases the risk of sepsis and organ failure, worsening the prognosis. Both approaches have their respective advantages and drawbacks, such as the potential for re-intervention, morbidity, and mortality. However, with advancements in endoscopic tools and techniques, endoscopic therapy has become an increasingly preferred, minimally invasive option for treating oesophageal perforations in suitable cases.

Endoscopic closure is a standard approach for managing iatrogenic perforations in the oesophagus, stomach, and intestines, using methods like TTS clips, OTSC clips, sutures, and stents. This is the first documented case in English literature of an oesophageal perforation from sword swallowing treated successfully with endoscopic OTSC clipping. Due to the oedematous edges, TTS clips couldn't secure the defect, making OTSC the effective choice (Ovecso, Tubingen, Germany).

In a study of 48 patients with oesophageal perforation, 90% achieved a successful closure [4]. Although success rates are high with OTSC clips, their placement can be technically challenging, especially if the defect is large and the edges are necrotic. Larger perforations (more than 20 mm) will either require multiple OTSCs or other closure devices like suturing [5].

Conclusion

With the emergence of therapeutic endoscopy and its armamentarium, oesophageal perforations should no longer be associated with high mortality, although high morbidity may remain significant and inevitable. Early recognition and urgent initiation of appropriate treatment are critical. A multi-disciplinary discussion to decide on the best mode of treatment is then required to ensure a high success rate.

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Learning Points:

- Endoscopic OTSC clipping can be a successful, minimally invasive alternative to surgery for oesophageal perforations if managed promptly.
- Early collaboration among specialties is essential in determining optimal management and improving patient outcomes in complex cases.
- Prompt recognition and treatment initiation are crucial to prevent complications like mediastinitis and sepsis in oesophageal perforations.

CASE REPORT

A rare case of sacral chordoma excised via nerve sparing posterior surgical approach

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Keywords: Sacral chordoma, posterior approach, nerve sparing approach, Sri Lanka, case report

Introduction

Chordoma is a rare locally aggressive malignant tumour with predominant involvement of the sacral region. The slow growing nature usually leads to late presentation of the tumour which may preclude curative resection. We report a patient with a sacral chordoma managed with surgical resection via posterior approach.

Case presentation

A 63-year-old Sri Lankan male with a history of diabetes mellitus presented with progressively enlarging lower back lump for 4 months duration. There were associated constipation and progressive perineal numbness without any radiating pain along the lower limbs. He denied any lower urinary tract symptoms or faecal incontinence or difficulty in walking. On examination, there was a sacral subcutaneous lump of 20 x 30 cm with fixity to sacrum. Digital rectal examination showed a reduction in squeeze and resting tones with posterior indentation by a mass without any contact bleeding. There was objective peri-anal sensory impairment. The lower limb neurological examination was unremarkable. Flexible sigmoidsocopy showed a large posterior rectal wall indentation without any mucosal changes. Magnetic resonance imaging (MRI) showed a large mass arising below the level of second sacral vertebra with associated destruction of both anterior and posterior sacral walls, rectal compression and subcutaneous extension suggestive of a sacral chordoma (Figure 1).

After a multi-disciplinary discussion, he underwent an excision of the tumour via a nerve sparing posterior approach (Figure 2). Tumour with part of the sacrum below S2 level was removed. Dural closure of the remaining part of the spinal cord was done with a regional muscle flap. Post-operative

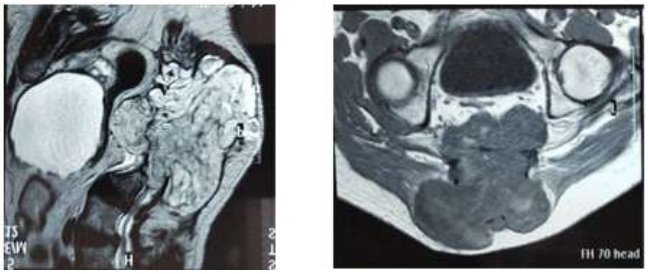

Figure 1: Magnetic resonance imaging (MRI) showing a large mass arising below the level of second sacral vertebra with associated destruction of both anterior and posterior sacral walls, rectal compression and subcutaneous extension

Figure 2: Intra-op image of the dissected sacral chordoma via the posterior approach

recover was uneventful except small area of dermal necrosis of the flap which was managed conservatively. There was initial bladder and bowel dysfunction with incontinence which improved with bladder retraining and pelvic floor exercises within 3 weeks.

The final histology revealed an encapsulated tumour composed of sheets of large round to polygonal cells with microscopic involvement of the medial margin. The immunohistochemistry revealed that the tumour cells were positive for epithelial membrane antigen (EMA) pan-cytokeratin (Pan-CK) suggestive of a chordoma. The Ki-67

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proliferation index was 3%. After a multi-disciplinary meeting, patient was referred for adjuvant radiotherapy. After 2 years of follow-up, he remains free of any disease recurrence.

Discussion

Chordoma is a rare malignant tumour of notochordal origin which is known to occur in the sacrum and accounts for 1-4% of malignant tumours of the bone[1]. Due to the slow growing nature, late presentation is common and is associated with an unfavorable prognosis [2]. The clinical presentation is explained by the compression of the sacral nerve roots which supplies the bladder, bowel, and genital organs and lower limb neurological symptoms in relatively higher lesions. In the reported patient, the main complaint was a mass over the sacral region associated with perianal numbness. Digital rectal examination was suggestive of an extra luminal mass rather than a rectal tumour.

Although the bony destruction is visible with plane X-ray and computed tomography (CT) scan of the sacrum, the extent of soft tissue mass is well delineated by an MRI scan. It will also help in pre-operative planning including the need for spino-pelvic reconstruction [3]. Due to the close proximity to the sacral nerves, surgical excision is challenging and patients recover with variable degree of bladder, bowel and lower limb neurological dysfunction [4]. The involvement of sacro-iliac joints and ligamentous structures may lead to instability of pelvis needing further intervention for stabilization.

The objectives of chordoma management focus on complete removal of tumour while preserving the neurological functions. Surgery approaches include anterior, posterior or combined techniques. The anterior approach involves the surgery via the abdomino-pelvic cavity and posterior approach through the sacral region as in the reported patient. The posterior approach is carried out in many institutions with good post-operative outcomes [4]. For larger tumours, combined anterior and posterior approach has shown lower recurrence rate however, at the expense of neurological function [4]. Posterior approach was selected in the reported patient because of the localized nature of the tumour without rectal infiltration and surgeons' experience. Post-operative bladder bowel dysfunction improved considerably with pelvic floor exercises within 3 weeks. This may indicate a neuropraxia than a complete nerve injury. Post-operative radiotherapy was considered in this patient because of the microscopic involvement of the resection margin. Localized radiotherapy after tumour resection was found to be associated with decreased tumour recurrence[5].

Declarations

Ethics approval and consent to participate: Not applicable

Consent for publication: Informed written consent for publication and accompanying images were obtained from the patient prior to collecting information.

Availability of data and material: All data generated or analyzed during this study are included in this published article

Competing interests: The authors declare that they have no competing interests.

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Learning Points:

- Chordoma is a rare locally aggressive, slow growing malignant tumour associated with a late presentation.
- The objectives of sacral chordoma management focus on complete removal of tumour while preserving the neurological function.
- Posterior approach was successful in our patient without any significant long-term morbidity.

CASE REPORT

An uncommon presentation of acute mesenteric ischemia following isolated spontaneous superior mesenteric artery (SMA) dissection

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Introduction

Acute mesenteric ischemia (AMI) results from sudden reduction in aterial blood flow threatening its' viability. It can be due to four different pathologic processes;arterial thrombosis, arterial embolism, non-occlusive mesenteric ischaemia and mesenteric venous thrombosis [1,2]. Thromboembolic occlusion of the superior mesenteric artery (SMA) is the most common cause of acute mesenteric ischemia accounting for 67 to 95 percent of cases [3]. AMI presents with sudden onset abdominal pain with minimal signs on abdominal examination. Therefore the diagnosis is often missed or delayed resulting in poor outcome. Isolated superior mesenteric artery (SMA) dissection causing AMI is a rare presentation with an incidence of 0.06%, and can be easily missed [4,5]. Among the visceral arteries, SMA dissection is the [6]. In arterial dissection, there is an intimal tear resulting in the blood entering the sub intimal or intimo-medial plane. This results in separation of the arterial wall layers. As a consequence, dissection causes obstruction to blood flow by means of a dynamic or a static intimal flap [7]. Potential etiologies include atherosclerosis, medial degeneration of the arterial wall, infection, hypertension, and arteriopathies. Arteriopathies associated with SMA dissection include Ehlers-Danlos syndrome type IV and other connective tissue disorders [4]. Here we present a surgically managed case of an isolated SMA dissection and its outcome.

Case presentation

A 63-year-old male with a history of diabetes mellitus and hypertension for 3 years duration presented to the emergency department with a sudden onset epigastric pain for 6 hours. The pain worsened with meals. He did not have a fever. The patient was not a smoker and he did not have hypertension.

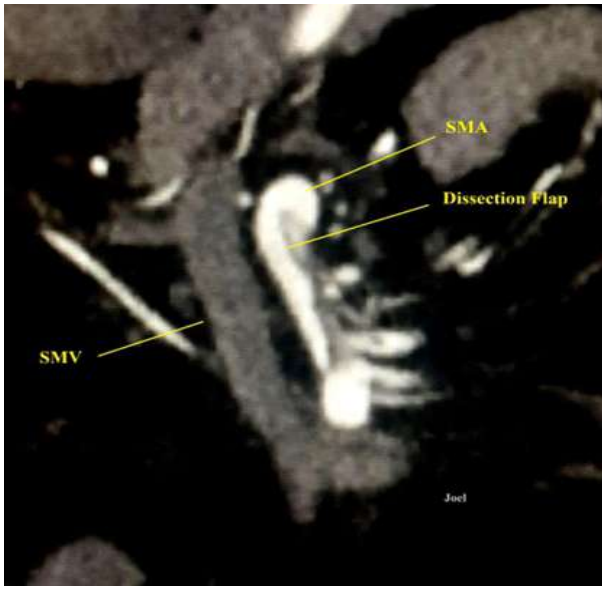

Figure 1: Angiogram showing the SMA dissection with thrombosed false lumen.

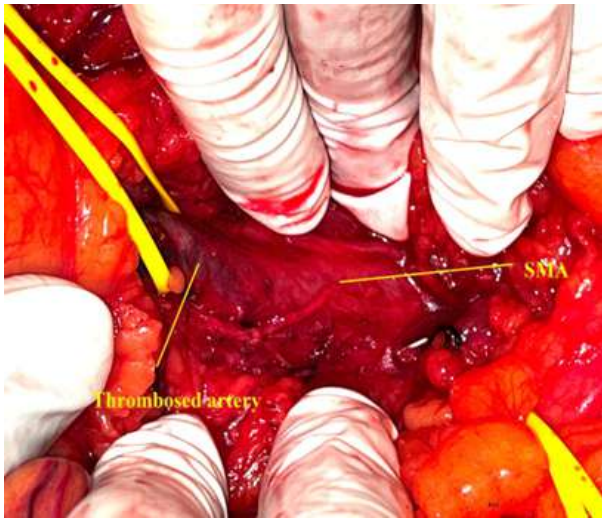

Figure 2: Intraoperative image demonstrating thrombosed SMA.

His abdomen was non tender on examination and he was haemodynamically stable. The bowel sounds were sluggish on auscultation. Distal pulses were equal and symmetric in all four extremities.

An abdominal x-ray did not reveal any abnormalities. The

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serum lactate level was elevated (2.6 mmol/L, normal - 0.5-1). An ultrasound scan of the abdomen revealed no flow in the distal SMA and a possible thromboembolic occlusion of the SMA was suspected. A Contrast enhanced computed tomography scan (CT) of the abdomen and pelvis with a computed tomography angiogram (CTA) was done. This showed an isolated flow limiting SMA dissection. The dissection flap started about 3 cm distal to the origin of the SMA. The dissection flap extended for about 5 cm. The major branches of the SMA were perfused from the true lumen while the false lumen was false lumen was thrombosed (Figure 1). The distal SMA was also thrombosed and bowel wall was edematous.

An emergency laparotomy was done. On laparotomy, the small and the large intestines were viable. SMA was mobilized; a thrombosed segment extending from 3 cm to 8 cm along the SMA was noted (Figure 2).

A longitudinal arteriotomy was done on the SMA at the distal healthy segment. Intimal flap was noticed proximally. A thrombectomy was done to the distal segment using a Fogarty catheter. Following which a good backflow was noted. The dissection flap was tagged with 7/0 Polypropylene sutures. The infrarenal aorta was exposed and an aorta to SMA saphenous venous graft bypass was performed (Figure 3). A good graft and distal pulses were noted intraoperatively. Following reperfusion, there was a transient reduction in blood pressure that recovered with fluid boluses. The serum lactate level was elevated to 3.6 mmol/L in the immediate postoperative period, and returned to the normal level in 6 hours.

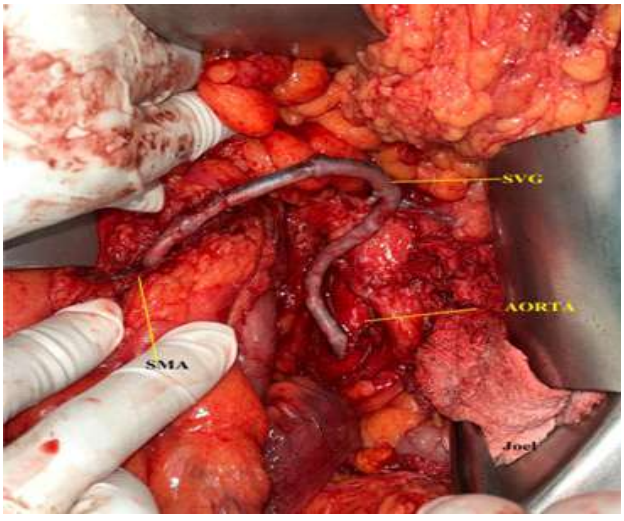

Figure 3: intra operative image showing aorta to SMA saphenous vein graft bypass

Patient had an uneventful recovery following an Intensive Care Unit (ICU) stay of two days and was discharged home on day six.

Discussion

Isolated superior mesenteric artery (SMA) dissection causing AMI is a rare presentation with an incidence of 0.06% [4,5].The usual described mean distance from the SMA ostium to the beginning of the dissection is from 1.5 cm to 3 cm. At this site, there is a transition zone between the fixed retro pancreatic proximal part of the artery and the relatively mobile distal part. The mobile part of the artery moves on the fixed part with the movements of the bowel [5,9]. This is thought to be the cause for the 1.5 cm to 3 cm segment being commonly affected by the dissection. In this patient the dissection began at 3cm from the SMA origin.

There is a male predominance in isolated SMA dissection among the published literature is difficult to be delineated [9]. The etiology for the dissection amidst the presence of normal inflammatory and autoimmune markers, the patient being a non-smoker with well controlled blood pressure.

The management of SMA dissection depends on the timing (delay) of the diagnosis, the degree of bowel ischemia on presentation and the hemodynamic stability of the patient [8]. Management modalities include conservative, endovascular, and surgical. However the best treatment strategy for isolated SMA dissection has not been defined due its rarity [8].

Conservative management includes bowel rest, blood pressure control, anticoagulation with heparin and antiplatelet administration. This is possible only if the patient is haemodynamically stable and with no clinical or radiological evidence of bowel ischemia or rupture of SMA branches [9].

Revascularization should be considered in the presence of bowel ischemia, progression of dissection and progression of thrombus in the SMA [10].

Endovascular treatment includes intralesional thrombolytic therapy, angioplasty combined with placement of stents [9, 13]. It was not opted in this case as the emergency endovascular facilities were not available and the bowel wall was showing evidence of ischemia i.e. oedema of the bowel wall.

The absolute indication for emergency surgical intervention is the presence of bowel infarction and arterial rupture [11].

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The first reported saphenous vein graft bypass for SMA dissection was a performed by Sisteron and Vieville in 1975 [12]. Other described surgical procedures include resection and anastomosis with an interposition graft, SMA transposition, thrombectomy, intimectomy and venous patch repair and bypass with synthetic grafts [9].

In this case a surgical treatment was opted as there was worsening symptoms and radiological evidence of bowel oedema. Therefore an aorta to SMA saphenous vein graft bypass was done and a successful outcome was obtained.

Conclusion

Spontaneous isolated SMA dissection causing acute mesenteric ischemia is a rare presentation and can be easily missed. Being aware of such cause for a sudden onset abdominal pain is essential to prevent delays in diagnosis. Management depends on the early diagnosis, degree of bowel ischemia and hemodynamic stability of the patient. It can be managed conservatively or by endovascular and surgical revascularization. The best management modality is not established but it has to be tailored to the individual patient.

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Learning Points:

- Acute mesenteric ischemia can present with nonspecific symptoms
- High degree of clinical suspicion is needed to make the diagnosis
- Revascularisation should be considered in patients with no imaging and surgical evidence of bowel gangrene.