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Repair of lumbar incisional hernia using polypropylene mesh strip sutures – A case report

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ABSTRACT

INTRODUCTION: Lumbar hernias are considered rare and they constitute less than 1.5% of all abdominal wall hernias.
CASE REPORT: Here we present a case of a 72-year-old female with a left flank swelling since 2-years diagnosed as a lumbar incisional hernia. This lumbar incisional hernia[1] was repaired successfully using polypropylene mesh strip sutures.[2]
DISCUSSION: Many surgical techniques have been described for repair of LIH. Suture repair, mesh repair and myofascial flaps have been described for lumbar hernias. Repairing a lumbar hernia can be surgically challenging because of its proximity to bony structures, which can limit proper dissection and mesh overlap. We performed defect closure with PMSS. Patient has no recurrence after 2 years of follow up.
CONCLUSION: In our case of left lumbar incisional hernia, defect closure with PMSS was an effective operation. This technique may also be effective in potentially contaminated settings due to reduced implant load. Further studies are required to understand its biomechanics and long-term outcomes.
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1. Introduction

Lumbar hernias are considered rare and they constitute less than 1.5% of all abdominal hernias. It was first described by Barbette in 1672 [1]. Lumbar incisional hernias can have varied presentations from wide ill-defined fascial defects caused by abdominal denervation, to well defined reducible swelling [2]. CT scan is accurate in differentiating between denervation muscle atrophy and well-defined defects [2].

Here we present a case of a 72-year-old female with a flank swelling since 2-years diagnosed as a LIH. This LIH was repaired successfully using PMSS.

This case report is compliant with the SCARE Guidelines 2020 [3].

2. Case report

A 72-year-old female presented in the office with an intermittently painful left flank swelling since two years. The swelling would become more prominent on standing up or coughing. She weighed 51.6 kg and had a BMI of 19 kg/m^2. In the past, she had undergone laparoscopic cholecystectomy and left-sided open pyelolithotomy, 5 years and 2 years back respectively. She was hypertensive and on medications since 5 years. There was no relevant family history. Examination revealed a large well defined completely reducible swelling in the left flank.

A plain CT scan of the abdomen revealed a left sided LIH containing small bowel loops. There was a left sided defect 5 cm in length and 5.6 cm wide, positioned between the 12th rib and the iliac crest (Fig. 1). The External oblique, Internal oblique, Tranversus abdominis muscles and the recti were well preserved with no signs of atrophy. According to the European Hernia classification this incisional hernia was L4, recurrence – no, Length – 5 cm, Width – 5.6 cm, W2.

The procedure was performed in general anesthesia by the first author. Patient was placed in right modified flank position with a 60° elevation of the left flank. The table was broken and extended to spread the space between the 12th rib and the iliac crest. The right leg was flexed at the hip and knee in a comfortable position and the left leg too was flexed slightly, a pillow was kept between the legs to cushion the bony prominences. All other pressure points were

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[1] LIH – Lumbar incisional hernia.
[2] PMSS – Polypropylene mesh strip sutures.

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Fig. 1. The pre-operative CT scan image showing the left sided lumbar incisional hernia defect (red box). The maximum width of the defect being 5.6 cm.

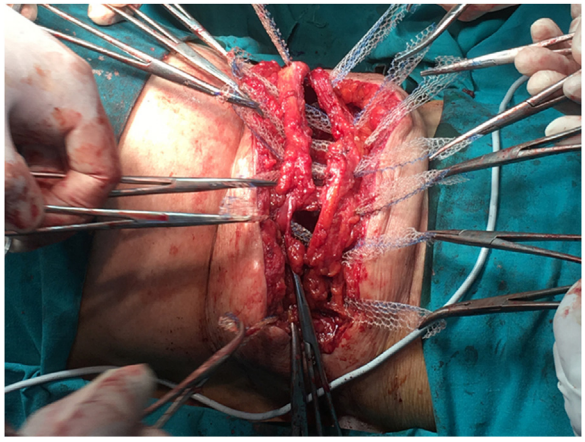

Fig. 2. All the Polypropylene mesh sutures have been placed and are ready to be tied.

padded, and patient was secured to the table with one strap over the left shoulder and other just above the left knee. The hernia area was marked with a sterile pen. A 20 cm linear incision was made and the hernial sac was exposed. The external oblique was thinned out and adherent to the sac. The sac was opened, and dissection was performed between external and the Internal oblique muscles. Tip of 12th rib was felt which marked the lateral border of the neck. After the mobilization was completed the table was flexed to allow easy approximation of the margins. Two cm wide and 15 cm long strips PROLENE® Soft Polypropylene Mesh (Ethicon US, LLC.) were prepared. These PMSS were hitched to 1.0 polypropylene suture. Using this suture, the mesh strips were rail-roaded with bites 2 cm beyond the edge on either side. The mesh strips sutures were placed 2 cm apart. A total of 7 strips were placed to close the internal oblique – tranversus abdominis muscle complex after flexing the table (Fig. 2). Similarly, 7 strips were used to close the external oblique muscle defect. Flexing the table while tying the PMSS is important to achieving a tension free closure.

Two Jackson Pratt drains was inserted, one under the external oblique muscle and the other in the subcutaneous plane. Intra-operatively sequential calf pump was used for DVT prophylaxis, postoperatively the patient was administered injection Enoxaparin 40 mg daily, till the day of discharge. Patient was mobilized within 4 h of surgery. Jackson Pratt drains drained 200 mL on the first postoperative day, 50 mL on 2nd and 3rd postoperative day. The drains were removed on the 4th post-operative day. An abdominal binder was prescribed for 6 weeks. No adverse outcomes were noted during the whole period.

Patient adhered to post operative instructions during the first 3 months, where she was advised to restrict lifting of heavy objects. She has been followed up for 2 years and clinically did not show any signs of recurrence. A CT scan done after 2 years showed no evidence of recurrence (Fig. 3).

3. Discussion

LH can be congenital, post-traumatic/incisional. The boundaries are defined by the 12th rib superiorly, the iliac crest inferiorly, the erector spinae posterio-medially, and laterally by the free border of the external oblique muscle [2].

Hernia rates of 0.4–17% following flank incision have been reported [4]. Incisional lumbar hernias complicate 7% of retroperitoneal approaches [5]. LIH have been reported after renal surgeries, retro-peritoneal surgery for aortic aneurysm, iliac crest bone graft harvesting [5–7].

Osman analyzed 100 consecutive patients who underwent renal surgeries with flank incisions, the incidence of flank bulge was 14% and for lumbar hernia was 10% at 6 months follow-up. He identified High BMI, the use of self-retaining retractor, inability to identify or preserve the neuro vascular bundle, postoperative abdominal distention, single layer wound closure, surgical wound infection, and constipation as significant risk factors leading to postoperative LH and bulge [7]. Some studies have also found old age to be a risk factor for LIH [8].

The primary lumbar hernias are classified as the superior (Grynfeltt–Lesshaft) triangle and inferior (Petit's) triangle herinias, but no specific classification exists for LIH [1]. So in accordance to the European Hernia Society classification the Lumbar incisional hernias are those that would lie in L4, L3 and L2 in the order of occurrence [9].

Though ultrasound is occasionally used for making a diagnosis, CT scan is the investigation of choice in the assessment of the symptomatic patient suspected of LIH [7,10]. CT scan allows accurate assessment of the shape, size of the defect, the anatomy of the abdominal musculature, the contents of the hernial sac, and any other intra-abdominal pathology if present [10].

Fig. 3. CT scan done after 2 years shows no recurrence (white box).

Repairing a lumbar hernia can be surgically challenging because of its proximity to bony structures, which can limit proper dissection and mesh overlap [1]. Prosthetic mesh repair is largely accepted over primary suture repair and is the most widely used method in reported abdominal wall closure [11–13]. Laparoscopic repair of LIH with composite mesh has been described as a technique but fixation near bony prominence is a challenge while fixation in the region of psoas is forbidden [2]. However, mesh implant has its own set of complications such as infection [14], enterocutaneous fistula, seroma and adhesion formation, and reduced pliability of the abdominal wall [15]. Some studies have reported recurrences of incisional hernias to be as high as 37% even after use of prosthetic mesh for repair [12,16–18]. Lastly, the high cost of synthetic biomaterials when used in abdominal wall closure are significant and usually ignored. These potential complications and high costs associated with prosthetic mesh repair do raised questions regarding their perceived benefits [11]. Interestingly, in an animal study published by Seror et al., they used three types of repair i.e. Simple closure, closure with mesh & Mayo's repair. The average bursting pressure in the above study was 1383 +/- 299 mm Hg for the primary closure group, 1200 +/- 409 mm Hg for the mesh reinforcement group, and 1607 +/- 337 mm Hg for the imbrication repair (Mayo) group ($P < 0.03$). This data highlighted the robust nature of Mayo repair over the other two repairs [19]. When PMSS are used as sutures there is even distribution of the force at the level of the suture [20].

Simple monofilament suture closure of IH is technically straightforward and also reduces the amount of prosthetic material, but it results in an undesirably high rate of recurrence [16]. On the other hand mesh repair has shown reduction in recurrence when compared with suture repairs for ventral hernias, but with an increased risk of seroma and SSI. Hence, further high-quality studies are required to determine whether suture or mesh repair is more ideal [21]. As per EHS guidelines open and laparoscopic repair have been described for lumbar hernia repair, but no data on the preferred method exists and prospective studies are needed to outline the optimal treatment strategies [9].

In 2016 Lanier et al. described A new closure technique is introduced, which uses strips of macroporous polypropylene mesh as a suture for closure of abdominal wall defects [22]. According to Lanier all high-tension abdominal wall closures require that the 'ultimate tensile strength' of the repair should remain greater than the natural muscular forces so as to reduces the tension at the 'suture-tissue interface'. The demographics of the 107 patients in this study included elderly, high BMI, diabetics, smokers, patients on immunosuppressants, multiple previous operations, previous mesh infections and ASA $\geq$ 3 with a mean follow-up of 178 days. Lanier closed flank defects in two layers, approximating the transversus abdominis and internal oblique in the first row, and the external oblique in the second row using 2 cm width strips of mid-weight soft polypropylene mesh. The recurrence rate with mesh strip suture closure was 4.1%, SSI was 4.6% [22]. In our case a similar technique was used to repair the LIH. Dumanian et al. studied mesh strip suture repair with or without anterior component separation in 48 contaminated incisional hernias with defect size ranging from 5 to 25 cm, they reported SSO of 27%, SSI of 19% and 3% recurrence rate [20]. All SSIs healed after local wound care in their series [20]. Souza et al. conducted tensiometric testing comparing polypropylene soft mesh strips and monofilament sutures which demonstrated mesh strips to have comparable tensile strength and greater extensibility [23].

Failure or recurrence after an incisional hernia repair is multifactorial. Obesity is an established factor for recurrence specially with in the first year after surgery [24]. A 10-year review concluded that BMI > 30 kg/m2 has significantly higher rate of failures [25]. Smoking is also an important risk factor in recurrence. Smokers are at a higher risk for postoperative wound infection leading to recurrence [26]. Other morbidities in smokers like chronic bronchitis and abnormal connective tissue metabolism can also lead to a weakening of the abdominal wall [26]. Past exposure to radiation therapy weakens the integrity of the abdominal tissue and vasculature leading to recurrence [11].

In view of the above data, PMSS closure could be an effective method of treating LIH and in our case has shown to be successful on one-year follow up.

4. Conclusion

LIH are rare entities. Anatomically they are challenging to repair due their proximity to bony prominences and retro-peritoneal structures. There are several methods to repair these hernias including open simple sutures, polypropylene mesh, both with and without component separation. Laparoscopic composite mesh can also be used but is an expensive affair. As of now no data on the pre-

ferred method for LIH repair exists and it has been suggested that prospective studies are needed to outline the optimal treatment strategies.

Sutured mesh repair is a promising new technique where strips of polypropylene mesh are used to close the defect in with or without CS. PMSS have demonstrated better resistance to suture pull-through when compared to conventional polypropylene sutures. It is also a good alternative to using a giant mesh and avoids bone anchoring of the mesh hence avoiding iliac crest injury. This technique may also be potentially effective in contaminated settings due to reduced implant load. Further studies are required to understand its biomechanics and long-term outcomes.

Declaration of Competing Interest

There is no conflict of interest

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

Not applicable.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Anil Deshpande – Treating surgeon, responsible for concept and data collection.

Preety Deshpande – Co-surgeon. Role – review of literature.

Sharad Sharma – Corresponding author. Role – Drafting of the case report, review of literature.

Registration of research studies

Not Applicable.

Guarantor

Anil Deshpande.

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