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Retrospective analysis of 16 cases of lumbar hernia

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ABSTRACT

Background: Through a retrospective analysis of 16 cases of lumbar hernia, we discussed the anatomical basis, clinical manifestations, diagnosis, and treatment of this rare condition.
Methods: We collected medical data of 15 patients with a primary lumbar hernia and one patient with a secondary lumbar hernia treated in the General Surgery Department of Wuxi No.2 People's Hospital between January 2008 and June 2021 and analysed their demographic, preoperative, and postoperative data.
Results: All patients underwent elective surgery performed by the same treatment team for superior lumbar hernias. The median area of the hernia defect was 12 cm^2. Fifteen patients underwent sublay repair, and one underwent onlay repair. The median operative time and blood loss were 48 min and 22 mL, respectively. The hernia contents were extraperitoneal fat in 15 patients and partial small intestine in one. The median visual analogue scale score on postoperative day 1 was 3. A postoperative drainage tube was placed in three cases but not used in 13. The median duration of hospital stay was 5 days. Postoperative incision infection occurred in one case. During the follow-up period, no postoperative complications, including haematoma, seroma, incision infection or rupture, recurrence, and chronic pain, occurred in the other 15 cases.
Conclusion: Lumbar hernias are rare and can be safely and effectively treated by open tension-free repair.

1. Introduction

Lumbar hernias are extremely rare and often encountered only once during the career of a hernia surgeon. De Garangeot reported the first case of lumbar hernia in 1731 [1]. Lumbar hernia is defined as abdominal organs or retroperitoneal fat protruding between the 12th rib and the iliac crest through the abdominal wall or retroperitoneum. They commonly present as protruding, reversible bulges in the posterior abdominal wall. Owing to its low incidence, clinicians have insufficient experience diagnosing this disease, often leading to misdiagnosis or delayed diagnosis. Therefore, some patients arrive at the hospital's emergency department with incarcerated or strangulated hernias. Abdominal computed tomography (CT) is vital in diagnosing this disease.

Due to the risk of incarceration and strangulation, a lumbar hernia should be treated promptly once diagnosed [2]. Surgery is the best way to treat this disease; however, there is no consensus on the choice of surgical method. As a result of the extremely low

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incidence rate, most reports of lumbar hernias can only be case reports or retrospective studies with a few cases [3–6]. We also retrospectively studied 16 patients with lumbar hernia to explore the anatomic basis, clinical manifestations, diagnosis, and treatment.

2. Materials and methods

Fifteen patients with a primary lumbar hernia who underwent sublay repair and one patient with a secondary lumbar hernia who underwent onlay repair between January 2008 and June 2021 were assessed. The patches used in the operation were all 10 × 15 cm lightweight large mesh patches. All the patients presented with unilateral or bilateral reversible masses protruding from the superior lumbar triangle (Fig. 1). The diagnosis was confirmed based on typical clinical manifestations, careful physical examination, and abdominal CT (Fig. 2). All data, including patient age, sex, side of lumbar hernia, previous lumbar trauma or surgery, body mass index (BMI), primary or secondary lumbar hernia, and surgery-related information, were obtained from electronic medical charts. Informed consent was obtained from all the patients. The Wuxi No.2 People's Hospital Ethics Committee approved the scientific research ethics review materials on July 1, 2,019, with acceptance number 2019Y-4.

2.1. Surgical procedure

All surgeries were performed under general anaesthesia by the same treatment team. The patients were placed in the lateral decubitus position to provide a better view of the lumbar region. The surface of the reversible mass was selected, and an incision was made along the skin texture, approximately 6–8 cm in length. The skin and subcutaneous tissues were cut layer-by-layer until the hernia sac and orifice were reached (Fig. 3). Care was taken to protect the contents of the hernia during separation, especially when separating the adhesions between the hernial sac and orifice. In the only case of secondary lumbar hernia in this study, due to the previous trauma and splenectomy, the local tissue adhesion was severe, and the preperitoneal space could not dissociate; finally, onlay repair was selected, and the other 15 patients were treated using the sublay technique. The typical peritoneal space is relatively loose. We could use our fingers and wet gauze to separate gently with a separation range of at least 3 cm beyond the edge of the hernial orifice. The patch was then cut according to the size of the hernial orifice, placed in the preperitoneal space, and placed flat. Finally, the

Fig. 1. A reversible mass in the right superior lumbar triangle.

Fig. 2. Left lumbar hernia (red arrow)

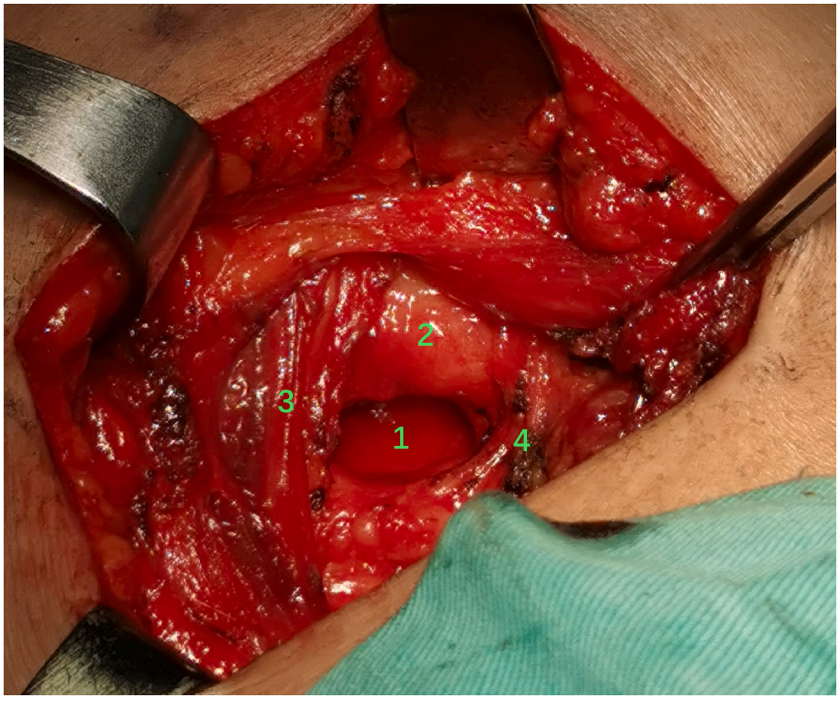

Fig. 3. Intraoperative view.

patch, surrounding muscle, and fascial tissues were fixed using absorbable sutures. In cases where no adjacent muscle remains because of attenuation, creating muscle flaps, according to Vagholkar et al. [7], was also a good choice to enhance the repair effect. Considering the pain and inconvenience caused by the placement of drainage after surgery, we only placed drainage in three patients.

2.2. Peri-operative evaluation and follow-up

Demographic data, including sex, age, BMI, previous lumbar trauma or surgery, primary or secondary lumbar hernia, history of chronic obstructive pulmonary disease (COPD) and/or constipation, side of lumbar hernia, and American Society of Anaesthesiologists (ASA) score were collected. Surgery-related information included the size of the abdominal wall defect, hernia contents, operative time, blood loss, postoperative drainage, wound infection, postoperative hospital days, and the visual analogue scale (VAS) score on postoperative day 1. All patients were followed up by telephone calls and outpatient clinic visits, and the last follow-up was conducted in June 2022.

3. Results

Demographic data are shown in Table 1, and surgery-related information is presented in Table 2. Fifteen patients with primary lumbar hernia and one with secondary lumbar hernia were included in the study, including six (38 %) males and 10 (62 %) females. The patients were aged 31–81 years (median, 54 years), with a median BMI of 20.4 kg/m^2 (range, 16.3–26.7 kg/m^2). One (6 %) patient had a secondary lumbar hernia due to previous trauma and splenectomy, while the other 15 (94 %) patients had primary lumbar hernias. Five (31 %) patients had a history of COPD and/or constipation (two patients with COPD, two cases with constipation, and one with both). The entire cohort consisted of nine (56 %), six (38 %), and one (6 %) patients with left, right, and bilateral lumbar hernias, respectively. Twelve (75 %) patients had an ASA score of I, and four (25 %) had an ASA score of II.

All patients underwent an uneventful surgery. The median size of the abdominal wall defect area was 12 cm^2 (range, 4–25 cm^2), of which 11 (69 %) cases were 4–15 cm^2, and five (31 %) cases were larger than 15 cm^2. The hernia contents were extraperitoneal fat in 15 (94 %) patients and partial small intestine in one (6 %) patient. The median operative time and blood loss were 48 min (35–65 min) and 22 mL (15–50 mL), respectively. Postoperative drainage was performed in three (19 %) patients and was absent in the remaining 13 (81 %). The median postoperative hospital stay and VAS score on postoperative day 1 were 5 days (4–9 days) and 3 [2–5], respectively. Except for one patient with postoperative wound infection, none of the other patients developed postoperative complications, including seroma, haematoma, incision infection, recurrence, or chronic pain.

4. Discussion

4.1. Anatomical basis and aetiology

Lumbar hernias account for <2 % of all external abdominal hernias. According to the aetiology, it can be divided into congenital (20 %) and acquired (80 %) lumbar hernias; the latter includes primary (55 %) and secondary (25 %) lumbar hernia [8,9]. The hernia generally protrudes through two anatomical constants, the inferior and the superior lumbar triangles, described by Petit and Grynfeltt in 1783 and 1866, respectively [10].

The lumbar region lies between the 12th rib and iliac crest, bordered medially by the mass of the erector spinae muscles. It includes muscular and aponeurotic planes.

From superficial to deep, the first superficial plane is formed by the posterior parts of the external oblique and latissimus dorsi muscles. The second plane comprises the internal oblique muscle and posteroinferior serratus muscle posteriorly; the third plane is formed by the transversalis muscle and its aponeurosis and the block of the medial spinal muscles. Finally, the fourth deep plane is formed by the quadratus lumborum muscle, whose anterior aspect inserts into the lumbar bundle of the diaphragm [11].

Lumbar hernias can be classified based on their location and aetiology [12]. According to the anatomical location of the defect, they are divided into Grynfeltt (superior triangle) and Petit (inferior triangle) hernias (Fig. 4). However, blunt abdominal trauma may also

Table 1
Demographic and clinical characteristics of lumbar hernia (n = 16).

Parameters	n%
Sex	
Male	6 (38)
Female	10 (62)
Age (year: median [range])	54 (31–81)
BMI (kg/m2: median [range])	20.4 (16.3–26.7)
Previous lumbar trauma or surgery	1 (6)
Primary/secondary lumbar hernia	15(94)/1(6)
History of COPD and (or) constipation	5 (31)
Side of lumbar hernia	
Left	9 (56)
Right	6 (38)
Bilateral	1 (6)
ASA score	
I	12 (75)
II	4 (25)

BMI, Body Mass Index; COPD, chronic obstructive pulmonary disease.

Table 2
Surgery-related information (n = 16).

Parameters	n%
Size of abdominal wall defect area (cm^2: median [range])	12 (4–25)
4-15	11 (69)
>15	5 (31)
Hernia contents	
Extraperitoneal fat	15 (94)
Partial small intestine	1 (6)
Operative time (min: median [range])	48 (35–65)
Blood loss (ml: median [range])	22 (15–50)
Post-operative drainage	
Present	3 (19)
Absent	13 (81)
Wound infection	1 (6)
Post-operative hospital stay (days: median [range])	5 (4–9)
VSA/POD1 (median [range])	3 (2–5)

VAS, visual analogue scale; POD1, post-operative day 1.

create lumbar hernia, which is classified as the "diffuse" type and is not confined to these two triangles [13,14]. The Grynfeltt superior lumbar triangle (or quadrilateral) is located at the 2nd muscular plane. The superior lumbar triangle is located at the lower margin of the 12th rib; the inner lower boundary of the triangle is the lateral border of the erector spinae, the outer lower boundary is the posterior margin of the internal oblique muscle, and the inner upper boundary is the posteroinferior serratus muscle. Sometimes, the posteroinferior serratus and the internal oblique muscles do not contact the attachment point on the 12th rib, and the lower margin of the 12th rib is also involved in forming a side, forming an unequal quadrilateral space. Its deep surface is the aponeurosis at the beginning of the transverse abdominis. The inferior lumbar triangle lies outside and below the superior lumbar triangle at the level of the 1st muscular plane. It is formed by the iliac crest, posterior margin of the external oblique of the abdomen, and anterior and inferior margins of the latissimus dorsi. The deep layer is the internal oblique abdominal muscle.

The superior and inferior lumbar triangles are the weak areas of the posterior and posterior-lateral abdominal walls, respectively. Owing to the lack of muscle protection, the abdominal organs can protrude into the abdominal wall through these two triangles to form a lumbar hernia. Since the superior lumbar triangle is larger in area than the inferior lumbar triangle and the deep surface is weaker, the superior triangle is the most common site of lumbar hernia [15]. We also think most people have stronger muscles on the right side of their bodies than on the left. Therefore, lumbar hernias are more often found on the left side and in the superior lumbar triangle [16,17]. In the present study, we also found that the majority of lumbar hernias were located in the left and superior triangles. Moreover, bilateral lumbar hernias are even less frequently documented, and most reports are case reports [18,19] Our results showed one patient with a bilateral lumbar hernia. Lumbar hernias most often contain extraperitoneal fat; however, they may also include the colon, small intestine, and spleen. Our results are consistent with previous findings.

Trauma, infection, and surgery are important causes of secondary lumbar hernia.12 The secondary lumbar hernia underwent splenectomy due to trauma, considered an important cause of lumbar hernia formation. Primary lumbar hernias typically have no obvious cause. Increased abdominal pressure may also contribute to the development of lumbar hernias. Five patients with a long history of COPD and/or constipation were included in this study. Moreover, due to various reasons, waist muscle atrophy may be an important factor in developing this disease. Possible causes of congenital lumbar hernia include somatic cell mutations caused by transient hypoxia, embryological defects, local nerve apraxia, spina bifida nerve compression, and external compression caused by an intraperitoneal mass [20].

4.2. Clinical manifestations and diagnosis

Lumbar hernias present as a protruding reversible bulge in the posterior abdominal wall that increases with increased abdominal pressure, such as cough and constipation. As the duration of diagnosis increased, the bulge volume also increased.

Most patients are asymptomatic, and only a small number present with flank, back, or abdominal pain/discomfort. However, the above symptoms are atypical, and the location of the disease is relatively hidden, especially in some obese patients, often leading to diagnostic difficulties. It has been reported that 9–24 % of patients with lumbar hernia visit the hospital because of intestinal obstruction [21].

The diagnosis of this disease depends mainly on the clinical manifestations, careful physical examination, and abdominal CT scans. In the absence of incarceration, a protruding mass can return to the abdominal cavity, whereas lipomas, abscesses, haematomas, and kidney tumours cannot. Abdominal CT is critical for the diagnosis of this disease. It can accurately diagnose hernias and clearly reveal the surrounding anatomical structures and contents, excluding the possibility of tumours and other pathological conditions [22]. Preoperative abdominal CT examinations were completed in the 16 patients to diagnose the disease accurately. Moreover, the hernia contents and the size and location of the hernia orifice were determined preoperatively, providing reliable guidance for surgical safety.

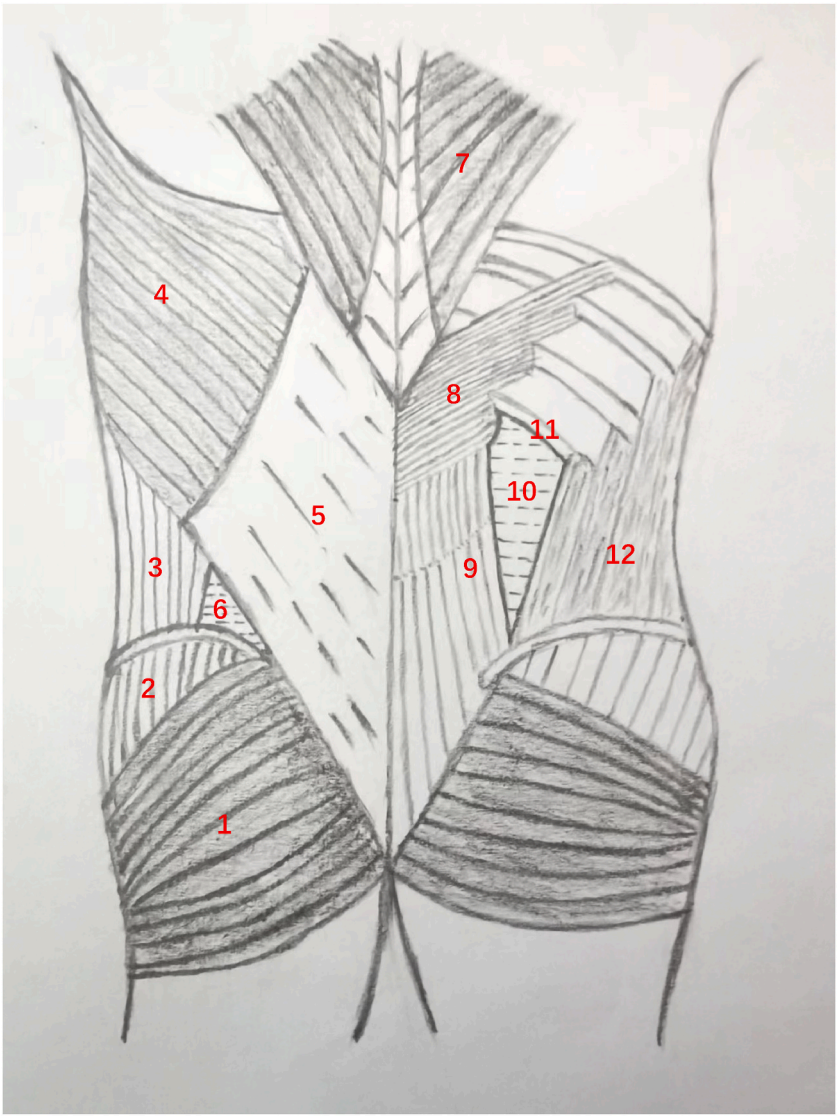

Fig. 4. The muscular layers of the posterior abdominal wall and the position of the superior and inferior lumbar triangles
(1. Gluteus maximus; 2. Gluteus medius muscle; 3. External oblique muscle; 4. Latissimus dorsi; 5. Thoracolumbar fascia; 6. Inferior lumbar triangle; 7. the trapezius muscle; 8. Postero-inferior serratus muscle; 9. Erector spinae muscles; 10. Superior lumbar triangle; 11. the 12th rib; 12. Internal oblique muscle).

4.3. Treatment

Since lumbar hernias can cause discomfort and even incarceration, immediate treatment is recommended once diagnosed. Surgery remains the most effective treatment for this disease. However, surgery is not recommended for patients who do not have a strong desire for surgery or those who cannot tolerate anaesthesia. Owing to its low incidence, the choice of surgical method remains controversial. Surgical methods primarily include laparoscopic and open surgeries. In recent years, some cases of laparoscopic repair of lumbar hernias have been reported [9,19,23]. The advantages of laparoscopic surgery include fuller exposure of the hernia orifice, a small incision, reduced postoperative pain, and quick postoperative recovery. However, it also has disadvantages, including potential damage to the abdominal organs, complex surgery, a long learning curve, and only a few experienced large hernia centres, which limits the technique's popularity. Open repair is currently the most commonly used technique for treating lumbar hernias [16].

Open surgery consists mainly of the traditional Dowd, Sublay, Onlay, and 'sandwich' (Onlay + Sublay) techniques, the latter three being tension-free repairs. Dowd surgery requires self-tissue repair, resulting in large surgical trauma, high local tissue tone, muscle flap prone to ischaemic necrosis, and high recurrence rate, and has been rarely used [24]. Sublay technique, also known as the Rives-Stoppa technique, repairs the defect through the retromuscular or preperitoneal space. Its safety and effectiveness have been confirmed by relevant studies, [25] and this technology is currently the most widely used in clinical practice [26]. The Onlay technique

is used to repair defects through the premuscular space and is less effective than the sublay technique because it lacks the tension provided by the muscles and fascia. In our study, 15 patients underwent sublay repair, and one underwent onlay repair. The tissue space of patients with a primary hernia is loose and easy to separate, and the preperitoneal space can be relatively easily established. However, for patients with a history of surgery or trauma, local tissue adhesion is severe, it is difficult to enter the anterior peritoneal space, and blind separation can easily damage the abdominal organs; therefore, we chose onlay repair. We attempted to separate the premuscular space as much as possible to reduce the postoperative recurrence rate. We believe that the larger the patch area, the better the reinforcement. Sandwich repair may improve the repair effects and reduce postoperative recurrence in patients with extreme emaciation and/or back muscle weakness. Hernial orifice size is an essential factor that should be considered during repair. According to Loukas's classification, [27] lumbar hernias are classified into four types based on the size of the defect area: type I, <5 cm^2, type II, 5–15 cm^2, type III, >15 cm^2, and type 0, no triangle is formed. In our study, 11 patients had type II hernias, and five had type III hernias. The 10×15 cm lightweight mesh patch can meet the above repair requirements after proper cutting, and the cutting principle is at least 3 cm beyond the edge of the hernia orifice. In addition, we believe that, depending on the size of the hernia orifice, nonabsorbent sutures can be used to reduce or close it without tension to enhance the repair effect. In our study, one incision infection occurred, possibly related to the patient's diabetes and the absence of postoperative drainage.

There are still many limitations to our study, although there were no patients with recurrence during the follow-up period, which may be due to the small number of cases or short follow-up time. In addition, there were no cases of congenital or inferior lumbar hernias. Moreover, our study was retrospective rather than a randomised controlled trial with a large case-control study. Future studies with larger sample sizes are required to explore this disease's diagnostic and treatment outcomes.

5. Conclusion

Lumbar hernias are rare, with reversible masses in the posterior abdominal wall as the primary clinical manifestations. Abdominal CT can be used to diagnose the disease accurately. The selection of the surgical method should be determined according to the specific patient's conditions. Open-tension-free repair is a safe and effective treatment approach.

Data availability statement

Data included in article/supp. material/referenced in article.

Ethics declarations

This study was reviewed and approved by [The Ethics Committee of Wuxi Second People's Hospital], with the approval number: [2019Y-4].

All participants/patients (or their proxies/legal guardians) provided informed consent to participate in the study.

All participants/patients (or their proxies/legal guardians) provided informed consent for the publication of their anonymized case details and images.

CRediT authorship contribution statement

Zhi-ming Chen: Writing – original draft. **Xin-qi Fan:** Data curation, Formal analysis. **You-xin Zhou:** Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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