Laparoscopic total extraperitoneal superior and inferior lumbar hernias repair without traumatic fixation: Two case reports

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Abstract:

BACKGROUND: The lumbar area is limited by the bone structures (superiorly by the 12th rib and inferiorly by the iliac crest); furthermore, several important nerves, including the genitofemoral nerve, lateral femoral cutaneous nerve, and ilioinguinal and iliohypogastric nerves, are all exposed in this area after retroperitoneal dissection during lumbar hernia repair, which render the risk and challenge for lumbar hernia repair and mesh fixation. In addition, the superior and inferior lumbar hernias, although had the same name of lumbar hernia, are quite different according to the anatomical location, and there is no standard and preferred method for lumbar hernia repair. In the present study, we present our techniques of total extraperitoneal (TEP) superior and inferior lumbar hernia repair.

METHODS: The TEP approaches were performed in the superior and inferior lumbar hernias. Due to the different anatomic locations of the superior and inferior lumbar hernias, the trocar sites were also different. In the present procedure, with the use of self-gripping mesh, the traumatic fixation was avoided.

RESULTS: After TEP lumbar hernia repair, both patients had minimal postoperative pain and were discharged 1 day and 3 days after operation without complications, respectively.

CONCLUSION: Different pathways and trocar arrangement are necessary according to the different locations of superior and inferior lumbar hernias. The use of self-gripping mesh in the retroperitoneal space avoids the traumatic fixation, and TEP could be a promising technique for primary lumbar hernia repair.

Keywords: Lumbar hernia, lumbar hernia repair, mesh fixation, mesh repair, preperitoneal repair

Introduction

Lumbar hernias are uncommon clinical defects of posterolateral abdominal wall. Twenty percent of lumbar hernias are congenital, and about 80% of lumbar hernias are acquired, which can be either primary (spontaneous) or secondary (incisional/traumatic). The lumbar hernias generally protrude through two anatomical regions: the superior lumbar triangle of Grynfelt–Lesshaft, which was described by Grynfelt in 1866,[2] and the inferior lumbar triangle of Petit, described by Petit in 1783.[3] About 95% of lumbar hernias occurred through these two triangles, whereas the other 5% are considered to be of diffuse type. The typical clinical presentation of lumbar hernias is a hemispherical protrusion in the lumbar region with a slow growth. However, strangulated primary lumbar hernia, although rare, may occur in about 9% of cases, especially in elderly patients,[4,5] and thus, surgical treatment should always be carried out to avoid complications.

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Although many techniques have been described for the surgical treatment of lumbar hernias, none of them can be recommended as the standard method due to the relative rarity of this disease and the lack of collective experience. Laparoscopic repair of lumbar hernia was first published in 1977 by Heniford et al.,[6] and a large prospective study comparing open and laparoscopic lumbar hernia repair suggested that laparoscopic approach was safe, effective, and more efficient than open repair.[7] However, laparoscopic lumbar repair is challenging due to the presence of the bone structures that limit operative maneuvers and the risk of nerve injury following mesh fixation. Furthermore, although different laparoscopic techniques have been described in literature, including transabdominal preperitoneal and total extraperitoneal (TEP) approaches, traumatic fixations (tacker, suture, or combined tack and suture) were used to fix the mesh in place in all these reported techniques,[8‑14] which increased the risk of nerve injuries and postoperative pain. In addition, the superior and inferior lumbar hernias, although both exist in the lumbar region, are quite different according to the anatomical boundaries and locations; thus, the laparoscopic/endoscopic approaches are also different in both the pathway and trocar arrangement. In the present study, we present our method of TEP technique for lumbar hernia repair without traumatic fixation. We described different approaches according to the hernia locations (superior lumbar hernia and inferior lumbar hernia).

Methods and Results

Case 1: Technique description of laparoscopic inferior lumbar hernia repair
An 86-year-old male came to our clinic with a painful mass on the right lumbar region for 3 months, and the lump increased in size gradually; he complained episodes of intermittent, dull pain. The patient’s body mass index (BMI) was 25.2, his previous medical history included hypertension under medical treatment, he had a history of cholecystectomy, and he had no history of trauma. On physical examination, a 5 cm × 5 cm sized, soft and reducible bulge was found at the posterolateral part of the right flank and above the right iliac crest. Computed tomography (CT) scan showed the herniation of ascending colon through the fascial defect at the right inferior lumbar triangle [Figure 1a].

An elective TEP lumbar hernia repair was performed.

General anesthesia was used. The patient was placed in a left semilateral position on his left side, and secured to the operating table, with a 30° elevation of the right side. The first inframongiblical 1-cm incision was made for endoscope and then insufflation of carbon dioxide with an extra-pneumoperitoneum pressure of 12 mmHg was created. The extraperitoneal space was created with endoscope blunt dissection. The other two 5-mm trocars were placed in the midline after space creation, similar to TEP for inguinal hernia repair [Figure 1b]. Initially, the preperitoneal space (Retzius space) was gently dissected, and the dissection was toward the right posterior lateral side in the retroperitoneal space. During further dissection, the optional fourth one was placed in the right upper abdominal lateral to the rectus muscle. The margins of the hernia defect were identified, the hernia sac was inspected, the adhesions were cut, and the dissection was extended and reached the iliac crest and the lumbar spine. Care was taken that the iliohypogastric and ilioinguinal nerve and lateral femoral cutaneous nerves were protected from injury. Dissection around the margins of the defect was made wide enough to accommodate a mesh extending 5 cm from the edges of the defect. After the hernia sac was completely reduced, the defect was measured as 6 cm × 9 cm [Figure 1c]. The hernia defected was closed with a 3-0 Stratafix™ barbed suture (Ethicon, Inc., Shanghai, China) [Figure 1d]. To avoid a traumatic fixation in this area, a self-gripping mesh (ProGrip™ Self-Gripping polyester Mesh, Covidien, Trevoux, France) of 15 cm × 20 cm (constructed from two meshes with 2-0 Prolene suture) was used. The mesh was rolled, introduced into the retroperitoneal space through the 10-mm trocar, and unrolled on the lumbar wall to cover the defect [Figure 1e]; due to the self-fixation property of the mesh, no traumatic fixation methods were applied. Then, the gas was released, and the procedure was completed.

Postoperative recovery of inferior lumbar hernia repair
The patient recovered very well and returned normal diet and normal activities the next day after operation; the postoperative pain on the next morning was minimal; and the visual analog scale (VAS) score was 2 at rest and 3 during activities. He was discharged 3 days after operation. There were no postoperative complications and no recurrence during the short-term follow-up of 3 months, and the CT scan was performed 2 months after operation, which showed no recurrence and that the mesh was well positioned [Figure 1f].

Case 2: Technique description of laparoscopic superior lumbar hernia repair
A 62-year-old female presented to us with a bulge on the left lumbar area for 1 month, she had no pain and fever, and she had no previous surgery or trauma. Her previous medical history was normal, and the BMI was 20.8. On physical examination, she had a 4 cm × 4 cm reducible bulge at the posterolateral part of the left flank below the 12th rib. The CT scan detected a herniation
through the fascial defect at the left superior lumbar triangle [Figure 2a].

After general anesthesia, the patient was placed on a full right decubitus position with lumbar roll in place, with the iliac crest and costal margin being marked [Figure 2b]. We used three trocars for the TEP procedure: the first 1-cm incision was made along midaxillary line between the iliac crest and the costal margin, and the endoscope was inserted into the retroperitoneal space, the retroperitoneal space was explored under gas inflation, using the up-and-down movements of the 30° scope, and the retroperitoneal fat was detached until the anterior extremity of the 11th rib was reached, and then two 5-mm operating trocars were placed at the same level of the first trocar with an equal distance of 4 cm under direct vision [Figure 2c]. The detachment of the retroperitoneal fat was achieved, and the borders of the superior lumbar defect were cleared, and the dissection was extended to the iliac crest inferiorly and the diaphragm superiorly. A 3 cm × 4 cm defect of superior lumbar hernia was identified [Figure 2d]. Then, the defect was closed with a barbed suture [Figure 2e]. An octagonal self-gripping mesh (ProGrip™ Self-Gripping polyester Mesh, Covidien, Trevoux, France) measuring 9 cm × 15 cm was rolled and introduced into the retroperitoneal space through the 10-mm trocar, and the mesh was unrolled on the lumbar wall to cover the defect. No extra fixation was used, and no drainage was placed [Figure 2f]. The patient was discharged the next day after operation and she had minimal pain after operation [Figure 2g], with VAS score of 2–3 at activities. There was no recurrence during the 2-month follow-up.

Figure 1: (a) Computed tomography revealed the right inferior lumbar hernia. (b) Intraoperative trocars positions of total extraperitoneal repair for inferior lumbar hernia. (c) The inferior lumbar hernia defect was measured. (d) The inferior lumbar hernia defect was closed with barbed suture. (e) The self-gripping mesh was used to cover the hernia defect. (f) Computed tomography showed no hernia recurrence 2 months after total extraperitoneal inferior lumbar hernia repair

Figure 2: (a) Computed tomography revealed the left superior lumbar hernia containing ascending colon. (b) The left costal margin and iliac crest were marked before operation. (c) Intraoperative trocars position of total extraperitoneal repair for superior lumbar hernia. (d) The superior lumbar hernia defect was exposed. (e) The superior lumbar hernia defect was closed with barbed suture. (f) The self-gripping mesh was used to cover the hernia defect. (g) Postoperative incisions after total extraperitoneal superior lumbar hernia repair
Discussion

Lumbar hernia is an infrequent pathology; only about 300 cases have been reported in the English literature.\(^{[8]}\) Ninety-five percent of lumbar hernias protrude through two anatomical locations: the inferior and superior lumbar triangles. The inferior lumbar triangle is a weakened area of the dorsal abdominal wall bordered by the iliac crest at the base, the external abdominal oblique muscle laterally, and the lateral edge of the latissimus dorsi medially. The superior lumbar triangle is usually larger than inferior triangle and is a more common site for lumbar hernias.\(^{[15]}\) It is limited superiorly by the 12\(^{th}\) rib and the serratus posterior inferior muscle laterally by the posterior border of the internal oblique muscle and medially by the anterior border of the erector spinae muscle. About 9\% of lumbar hernia cases present with incarceration;\(^{[9]}\) therefore, the surgical treatment should be suggested once the diagnosis was established. However, although both open and laparoscopic approaches have been described in literature, none of them can be recommended as the preferred method due to the relative rarity of this disease. In addition, in both the superior and inferior lumbar hernias, the defects were limited by bone structures, i.e., the 12\(^{th}\) rib in superior lumbar hernia and the iliac crest in inferior lumbar, which render the difficulty for proper mesh fixation. Furthermore, unlike the ventral hernias in the anterior abdominal wall, several important nerves, including the iliobypogastric nerve, ilioinguinal nerve, genitofemoral nerve, and lateral femoral cutaneous nerve, are all exposed in this area, and the fascial penetrations of the 12\(^{th}\) dorsal intercostal neurovascular pedicle are also across the superior lumbar triangle,\(^{[16,17]}\) which should be prevented from injury during dissection and mesh fixation; as a consequence, traumatic fixation run a risk of nerve injury in the area. In the present TEP technique, the self-gripping mesh was used, which is made of lightweight isoeelastic large-pore knitted monofilament polyester fabric that incorporates resorbable microgrips to provide self-gripping fixation during the first few months after implantation.\(^{[17]}\) Therefore, the use of Progrip mesh greatly facilitated mesh fixation without the requirement for sutures or tacks that can penetrate underlying tissues and damage the underlying nerves.

Another important issue is that, although both inferior and superior lumbar hernias are located in the posterolateral area, their anatomic locations are quite different; therefore, the TEP techniques are different. Anatomically, the inferior lumbar triangle locates more ventral than the superior lumbar triangle; thus, we choose to enter the preperitoneal space and plan the operating trocars location in a way similar to the inguinal hernia repair, and the inferior lumbar hernia could be repaired without difficulty in this way. While the superior lumbar triangle is in a much more dorsal location, we choose to enter the retroperitoneal space in the dorsal part, which facilitates the dissection and mesh placement. The most important step of TEP lumbar hernia repair is finding and entering the correct plane of the retroperitoneal space; in our cases, the correct planes were found without entering the abdominal cavity, and if the peritoneum was opened, it should be closed and the TEP procedure could be continued.

In the present study, we used different accesses in performing TEP techniques in the superior and inferior lumbar hernia repair according to the different anatomical locations, which proved to be a feasible and easy approach; furthermore, combined with the use of the self-gripping mesh, the traumatic fixation (suture and tackers) could be avoided, and thus, both acute and chronic postoperative pain could be greatly reduced. The limitation of the present study is that the case number is low, and the follow-up period is short, and further assessment of our technique is needed.

Conclusion

TEP procedure is a ideal technique for primary lumbar hernia repair.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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