CASE REPORT

doi: 10.5455/medarh.2022.76.229-233
MED ARCH. 2022 JUN; 76(3): 229-233
RECEIVED: APR 15, 2022
ACCEPTED: JUN 08, 2022

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Novel Technique for Mesh Fixation to the Bone in Recurrent Post Traumatic Lumbar Hernia

Ketan Vagholkar

ABSTRACT

***Background*:** Traumatic lumbar hernia is due to shearing of bony insertions of the muscle in the lumbar region. In recurrent cases, there is more attenuation of muscles. This makes fixation of the mesh extremely difficult. Hence, the need to develop a new technique. ***Case report*:** A 27-year-old male presented with a recurrent post-traumatic right- sided lumbar hernia. He had a severe two wheeler accident. Following the accident he had undergone various surgical interventions for a fractured pelvis with a deglowing injury involving the right gluteal region and upper thigh. He had also developed a post-traumatic lumbar hernia for which he had undergone open mesh repair. Subsequently he developed recurrence of the post traumatic right-sided lumbar hernia. After complete investigation he underwent open mesh repair for the recurrent post traumatic lumbar hernia. The defect was wide and was devoid of healthy surrounding muscles. The mesh was fixed to the ileal bone with bone anchors and to the twelfth rib with trans-osseous fiber sutures passed through holes drilled in the twelfth rib. Flaps were created from the remnant surrounding attenuated muscles. They were double-breasted to cover the mesh. Postoperative outcome was excellent with no recurrence for the last six months. ***Discussion*:** The various anatomical and technical considerations of bone fixation of the mesh for hernia repair are discussed. ***Conclusion*:** Bone fixation of the mesh with bone anchors is a viable option especially in cases where there is severe attenuation of adjacent muscles for mesh fixation.

Keywords: Traumatic, lumbar hernia, bone, fixation, mesh repair.

1. BACKGROUND

Lumbar hernia is an uncommon type of hernia. Post-traumatic lumbar hernia is an acquired variety of lumbar hernia (1). The etiology of this hernia is attributable to lateral shearing forces which disrupt the musculature from the iliac crest (2). There is hardly any musculature left to enable fixation of the mesh during open surgical repair. The only option therefore remains to fix the mesh to the bone either by bone anchors or by sutures passed through surgically created trans osseous holes.

2. CASE REPORT

A 27-year-old male patient presented with a large bulge from the right lateral abdominal wall extending from the twelfth rib to 4 inches below the iliac crest (overhanging the iliac crest). The patient had a two-wheeler accident 2 years ago. He had sustained a fracture of the pelvis with extensive degloving injuries involving the right buttock, upper and lateral aspect of the thigh. The patient had also developed a bulge in the right lateral abdominal wall. He had undergone approximately twenty interventions for treatment of the various injuries to achieve pelvic stability and healing of the degloving injuries. Subsequently he had undergone an open mesh repair for the post traumatic lumbar hernia. However, the surgery for lumbar repair was followed by a recurrence within 6 months. The hernia increased in size over the last one and a half years to assume the present size at presentation (Figure 1). Patient did not have any gastrointestinal symptoms. Contrast enhance computed tomography (CECT) was done which revealed a large defect in the right lateral abdominal wall with extensive herniation of small bowel loops and large bowel (ileocecal junction, caecum, and ascending colon) (Figure 2). The size of the defect measured 10 to 11 cm anterior-posteriorly and 12 to 13 cm craniocaudally starting just inferior to the 12th rib and extending inferiorly up to the iliac crest. Anteriorly, it extended upto 12 cm from the midline where-

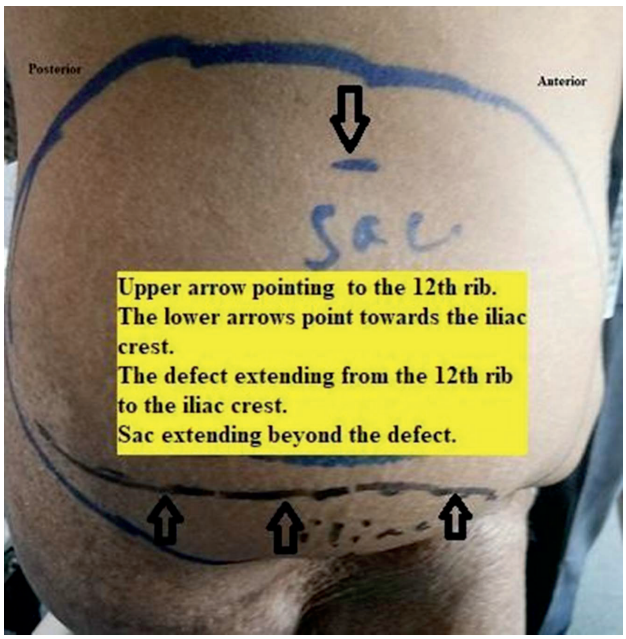

Figure 1. Large lateral bulge

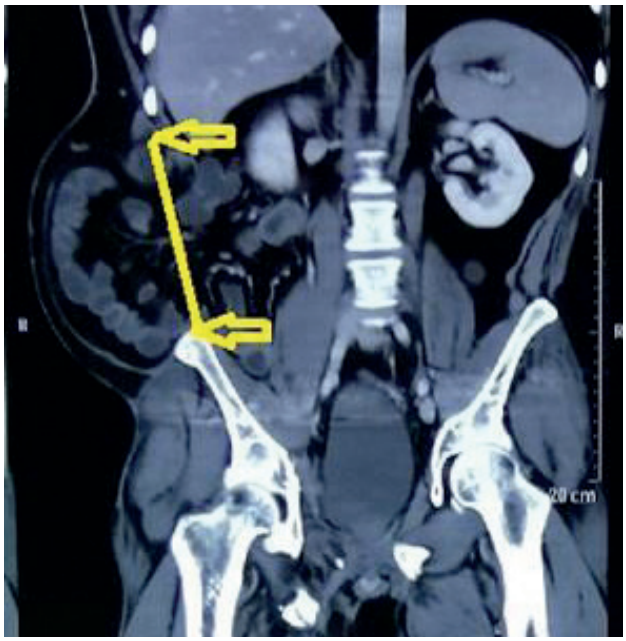

Figure 2.CECT showing vertical extent of the defect

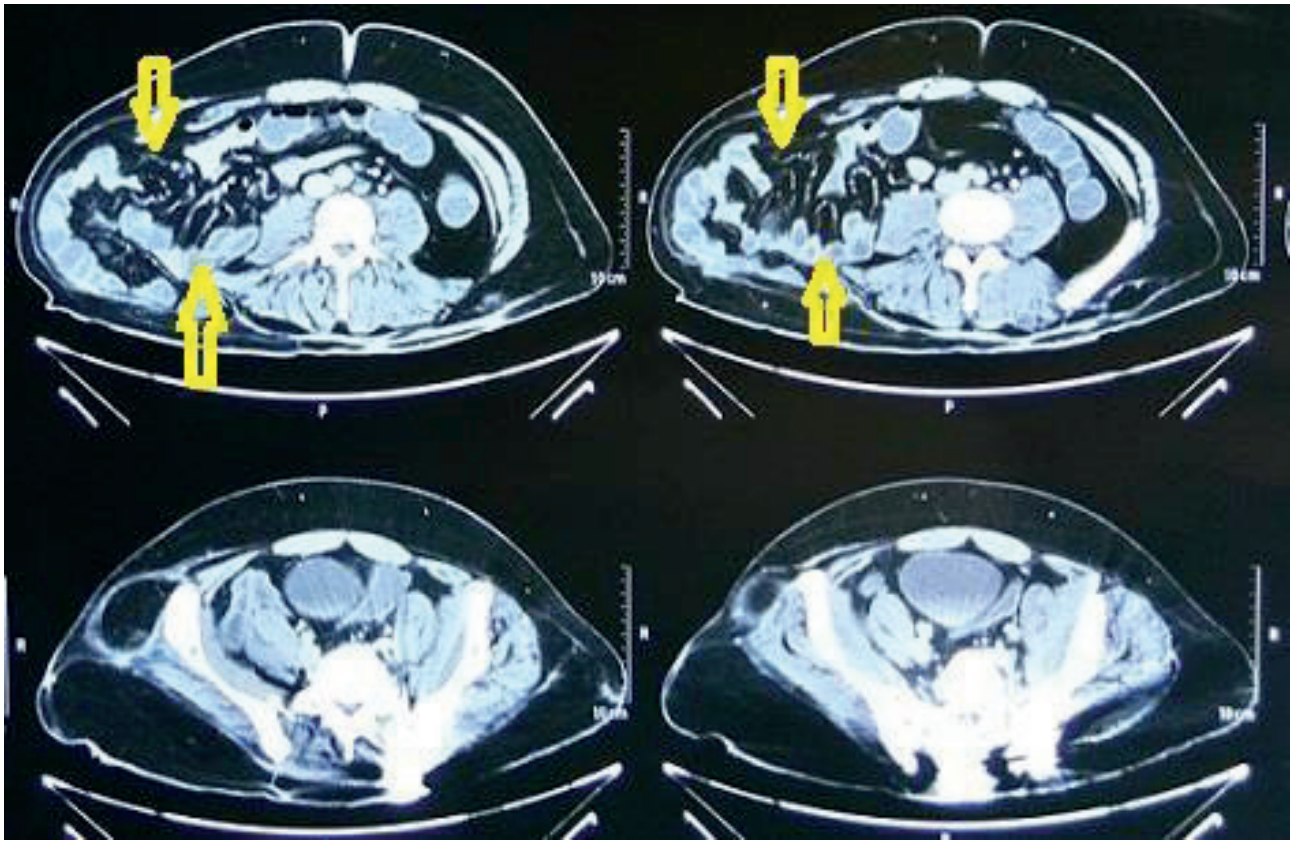

Figure 3. CECT showing horizontal extent of the defect

as posteriorly it extended up to 10 cm from the midline (Figure 3). The patient underwent open mesh repair under general anesthesia. He was placed in left lateral position. The extent of the sack was marked. A transverse elliptical incision was marked over the maximum convexity of the bulge (Figure 4). The sac was identified and dissected from the over lying skin and attenuated-muscle up to the neck (Figure5). Anterior and posterior margins were identified. The inferior margin was the entire length of the iliac crest up to the anterior-inferior iliac spine. The superior border of the defect was almost up to the twelfth rib with a narrow sliver of muscle in between. The sac along with its contents was reduced without opening it. No attempt was made to open the sack in view of the right colon being a content. A polypropylene mesh measuring 15 by 15 cm was placed over the sac and fixed all around, ensuring an overlap of at least two inches beyond the defect. Inferiorly it was fixed with four bone anchors placed at a distance of one and a half inches from each other to the iliac crest (Figure 6). Superiorly, the mesh was fixed to the twelfth rib. As the width of the twelfth rib is narrow, two trans-osseous

holes were created in the anterior two thirds of the twelfth rib. Fiber threads were passed through the holes and used to fix the superior border of the mesh (Figure 5) Anteriorly, the mesh was fixed to the lateral border of the external and internal oblique muscles with interrupted 2-0 polypropylene stitches. Posteriorly, the mesh was fixed to the paraspinal muscles with interrupted 2-0 polypropylene stitches (Figure 7). Continuous suturing of the anterior and posterior border was avoided in view of the fact that the muscles were attenuated and had poor holding strength. A 12 French negative suction tube drain was placed over the mesh and brought out through a separate incision inferior to the main incision.

Figure 4. Transferse elliptical incision

Figure 5. Fiber threads

Flaps were created from the remnant surrounding muscle, both superiorly and inferiorly. These flaps were double breasted horizontally and fixed with 2-0 polypropylene interrupted sutures. Another 12 French negative suction tube drain was placed over the double breasted muscles and brought out through a separate incision. Subcutaneous tissues were approximately 2-0 polyglactin sutures. Skin was approximated with 2-0 monofilament non-absorbable sutures. Suture removal was done on the twelfth postoperative day after complete healing of the incision (Figure 8). The patient is following up for the last six months with no evidence ofrecurrence.

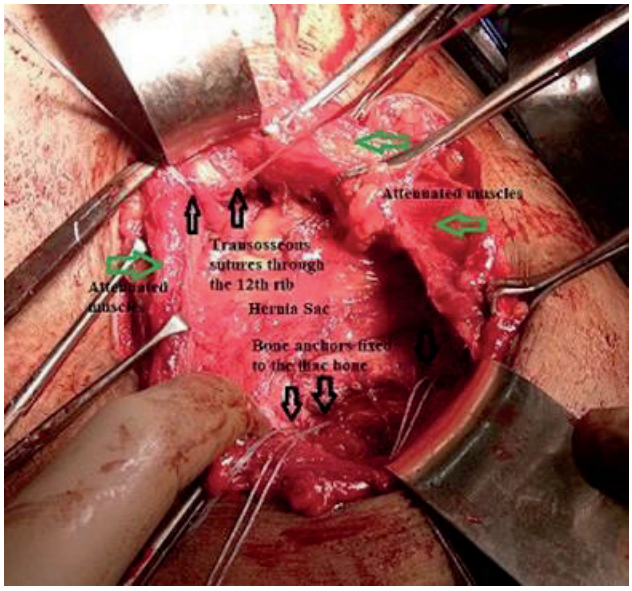

Figure 6. Bone anchors fixed to the iliac bone and trans osseous suture passed through the twelfth rib

3. DISCUSSION

Traumatic lumbar hernia is quite uncommon. Lumbar hernia usually arises from the lumbar triangles. The superior lumbar triangle of Grynfeltt is the common site for herniation. It is bounded superiorly by the 12th rib, anteriorly by the internal oblique muscle and posteriorly by the quadratus lumborum and the erector spinal muscles. The inferior triangle of Petit is bounded inferiorly by the iliac crest, anteriorly by the external oblique and posteriorly by the latissimus dorsi (1, 2). A contrast enhanced CT of the abdomen is essential to study the exact extent of the defect as well as to ascertain the contents of the sac (3). Majority of lumbar hernias are caused by increased intra-abdominal pressure and lateral shearing forces occurring in the deceleration phase of a vehicular accident. Understanding the anatomy and transmission of the forces that cause rupture of the musculature and herniation helps in planning the technique and pattern of repair.

In the case presented, the defect was extensive extending vertically from the twelfth rib to the iliac crest. Anteriorly and posteriorly, the muscles could not be ascertained as they were attenuated and admixed with remnants of the mesh used during the previous repair. The left lateral position during surgery ensured the complete reduction of the sac, thereby preventing any injury to the contents while reaching up to the neck of the sack. Inferior border of the defect was the iliac crest (4). Lateral shearing forces usually disrupt the musculature attached to the iliac crest. Scant attenuated muscles are invariably left in such cases as was seen in the case pre-

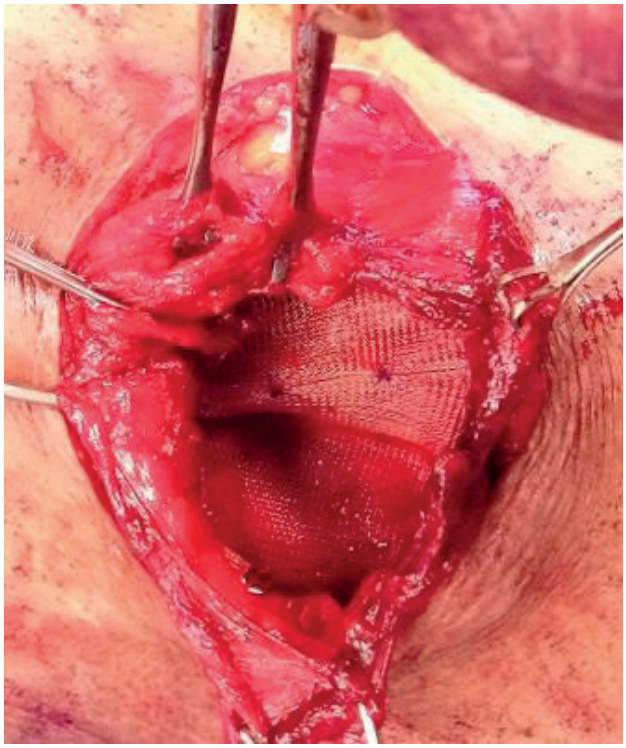

Figure 7. Mesh fixed by fiber sutures

Figure 8. Surgical outcome

sented. It is preferable not to open the sac in right sided cases as this prevents injury to the right colon. Once the neck or the borders of the sac are reached and identified, an attempt to undermine the muscles constituting the edge of the defect can be made. The purpose of the exercise is to achieve maximum length of the overlying flaps safe enough to cover the mesh (1, 2, 4). Surrounding muscles can also be used to fix the mesh.

However, in the case presented, the defect was large with hardly any muscles in the superior and inferior borders thereby posing the biggest challenge to fix the mesh. Hence, an innovative method was used to fix the mesh by way of bone anchors and trans-osseous suturing. Literature on this technique is scant. There are anecdotal reports describing fixation of the muscle by bone anchors (5, 6). In the case presented, bone anchors were fixed to the iliac bone at an interval of one and a quarter inch starting from the anterior end of iliac crest to the posterior end. The mesh was fixed to the iliac crest with the fiber threads of bone anchors. Since the 12th rib has very little width, inserting bone anchors could have led to fracture of the rib (7). Hence, to avoid this, 2 trans-osseous holes were created at a distance of 1 and a half inches in the anterior two thirds of the rib. Utmost care was taken to prevent dissection of the posteriorone - third of the twelfth rib in view of its relation to the pleura. Fiber threads were passed through the holes to fix the mesh superiorly. Excessive traction was avoided in the vertical direction. Anteriorly, the mesh was fixed to the internal oblique and external oblique musculature with interrupted non-absorbable sutures. Posteriorly, it was fixed to the lateral border of the electoral spine and latissimus dorsi muscles with non-absorbable sutures. This enabled uniform and complete coverage of the mesh width and including the border of the mesh extending approximately one and a half inches beyond the entire border of the defect. A 12 French negative suction tube train was placed over the mesh to prevent the formation of a seroma. This tube was brought out through a separate stab incision inferior to the main incision. Further dissection with a view to create long flaps from the attenuated surrounding muscle was carried out. A double breasting technique was adopted in order to ensure complete coverage of the mesh. Both anteriorly and posteriorly, the flaps are fixed to the adjacent musculature. A 12 French negative suction drain was placed in the subcutaneous plane to prevent the formation of a siroma in the subcutaneous space. This was again brought out through a separate incision inferior to the main incision. It has been a safe practice to utilize negative suction drains in hernia repairs. This ensures that no seromas collect and there is adequate approximation of tissues spaces during the immediate postoperative period. Fixation of a mesh to the periosteum of the ilium has been described.

However, reliability of this technique is questionable. This is due to the fact that penetration of the periosteum may not be adequate at all times leading to loosening of the fixation sutures thereby leading to creation of a defect causing a recurrence (8). Hence, the use of bone anchors provides a reliable alternative to address this critical issue. Review of literature reveals hardly any reports of this technique being used for fixation of the mesh. There are anecdotal reports of bone anchors being used for fixing the muscles over the mesh (5-8). But this holds true only if there is adequate length of healthy muscles. Therefore in situations such as in the case presented, wherein a previous attempt at hernia repair had failed, one cannot rely on the surrounding musculature for fixing the mesh. Therefore, it is prudent to fix the mesh to the rigid structure namely the bone in order to avoid a recurrence. Laparoscopic approach has also been described for lumbar hernia repair (8).

However in the case presented laparoscopic approach would have had debatable benefit in view of the large size of the defect as well as lack of healthy surrounding soft tissues to fix themesh.

4. CONCLUSION

Mesh fixation to the bone with bone anchors and with fiber sutures passed through trans-osseous holes is an excellent option especially in cases where the surrounding musculature is grossly attenuated due to previous surgery.

- **Patient's Consent Form**: No patient identifiable data included in this case report. So, no written consent obtained from the patient for publication.
- **Data Availability**: There are no additional data or supplementary files. All the required information have been included in the manuscript itself.
- **Acknowledgements**: The author would like to than the Dean, D.Y.Patil University School of Medicine for granting permission to publish this case report.
- **Author's contribution**: The author was involved in all steps of the preparation this artcile including final proofreading. **Conflict of interest:** There are no conflicts of interest
- **Funding**: Nil.

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