Ergonomic laparoscopic surgical repair of three large external herniae through just three optimally placed working ports – A case report with review of literature

Mounish Raj[1], Abhijit Joshi[2]

From [1]First Year DNB Resident, Department of General and Laparoscopic Surgery, [2]Consultant, Department of General Surgery, General, GI and Endo-Laparoscopic Surgeon, Dr. L H. Hiranandani Hospital, Hillside Avenue, Powai, Mumbai, Maharashtra, India.

ABSTRACT

At present, hernia repair is one of most frequent procedures performed by general surgeons. Like many other abdominal operations, the laparoscopy revolution has influenced the surgical repair of external herniae as well. Laparoscopic repair of groin and ventral hernia has become more and more popular over the years. Ventral herniae are mostly repaired transperitoneally while groin herniae can be repaired both trans- as well as extraperitoneally. Herein, we describe the case of a 60-year-old man who presented to us with large umbilical and large bilateral inguinal herniae. All the three large external herniae were repaired laparoscopically, through just three carefully selected trocar sites. The purpose of this paper is to highlight the importance of ergonomics in optimum laparoscopic trocar placement, so as to achieve maximum results with minimum number of port sites.

Key words: *Trans-abdominal pre-peritoneal approach, Intraperitoneal onlay meshplasty, Laparoscopy*

It is estimated that about 20 million operations for hernia per year are performed worldwide [1]. An external hernia in adults is surgically repaired generally using a synthetic mesh either with open surgery or increasingly using the lesser invasive laparoscopic procedures. The most common laparoscopic techniques for inguinal hernia repair are trans-abdominal pre-peritoneal (TAPP) repair and totally extra-peritoneal (TEP) repair. One of the common laparoscopic techniques for repair of ventral hernia is intraperitoneal onlay meshplasty (IPOM). Both TAPP as well as IPOM are well documented and well-studied procedures. A combination of both may have to be performed in the same sitting, in some clinical scenarios, as seen in this report.

CASE REPORT

A 60-year-old averagely built man presented to the surgical outpatients department (OPD) with a large painful lump in his umbilical area and painless swellings in both his groins. He had noticed the umbilical lump since 2 years and the groin swellings since 6 months. He was a retired school teacher and did not have any addictions and co-morbidities. He gave history of moving bowels normally in the recent past. There was no history suggestive of prostatomegaly. On examination, his umbilical lump was irregular, well defined, minimally tender, and irreducible. It transmitted an expansile cough impulse through it. The groin swellings were reducible, soft, ill-defined, and expansile cough impulses were noted at their sites. A per rectal examination revealed a clinically normal prostate gland. Thus, a diagnosis of an incarcerated umbilical hernia along with bilateral uncomplicated inguinal herniae was made. He was then counseled for surgical repair. Both, open and laparoscopic repairs were discussed with him and his family. He opted for laparoscopic surgical repair of his three herniae. After doing his basic investigational workup and confirming fitness for general anesthesia, he was taken up for surgery. He was given a supine position with both his hands tucked in, close to his body. The monitor was placed at his foot end. The operating surgeon stood on his right side while the camera assistant surgeon stood on his left, during the IPOM. During the bilateral TAPP, they interchanged positions with the operating and camera assistant surgeons standing on the contralateral and ipsilateral sides, respectively. A three trocar technique was applied. Pneumoperitoneum was first established by the closed technique, through the Verress' needle inserted at the midline in the epigastrium. The optic 10 mm trocar was then inserted in the epigastrium. Two 5 mm working trocars were then inserted, one on either side of the optic trocar; but at a slightly lower level. These peculiar trocar positions were a deviation from our routine

Access this article online	
Received - 01 January 2023 Initial Review - 12 January 2023 Accepted - 26 January 2023	Quick Response code
DOI: 10.32677/ejms.v8i1.3821	

Correspondence to: Mounish Raj, Department of General and Laparoscopic Surgery, Dr. L H. Hiranandani Hospital, Hillside Avenue, Powai, Mumbai, Maharashtra, India. Email: mounishraj.nagula@gmail.com

practice of inserting left lateral trocars for IPOM and similar but lower placed triangulated three trocars for TAPP. These high paced triangulated three trocars gave us easy access to all three large herniae that the patient had. The other challenge was to reach the inguinal herniae through these trocars, placed far away. We surmounted this using the longer 100 cm telescope and longer instruments, usually used in bariatric surgery. On laparoscopic entry, a tightly incarcerated umbilical omentocele was noted along with large bilateral direct inguinal hernial defects in the background, at a distance (Fig. 1a, c, e). Small intestinal loops were loosely incarcerated in the right inguinal hernial defect, while the left defect was found to be empty (Figs. 1d and 2b). The umbilical omentocele was carefully reduced first, using controlled traction with monopolar cautery and the bare defect identified (Fig. 1b). After achieving this, the small bowel loops in the right inguinal defect were easily reduced. Thereafter, a peritoneal flap proximal to the upper edge of the defect was raised and dissection extended deep into the extraperitoneal space (Figs. 1f, 2b, 3a). The direct sac was completely reduced and the defect bared (Figs. 2c, 3b and c). A 15×12 cm Prolene® mesh was then introduced and optimally spread out over the inguinal area (Figs. 2e, 3d and e). It was then tack-fixed to the Cooper's ligament using Protack® (Figs. 2d, 3e). The peritoneal flap was then placed back up so as to completely cover the mesh and tacked in place (Figs. 2a and f, 3f, 4a). The same procedure was repeated on the left side, which had a slightly smaller defect. A 15 cm diameter Parietex® mesh was then rolled and introduced inside. It was raised using four equidistant trans-facial sutures and optimally placed over the defect, so as to have the defect in its center (Figs. 4b and c). It was then fixed to the parietes with the transfacial sutures and an absorbable tacker (Absorbatack®) (Fig. 4d and e). Greater omentum was then rolled down so as to lie below the area covered by the mesh (Fig. 4f). The abdomen was then desufflated, trocar sites suture closed, and pressure dressings given externally at the three sites. Thus, an IPOM along with a bilateral TAPP repair were performed for the umbilical and bilateral inguinal herniae, respectively. On his post-operative day 10 OPD follow-up visit, all his operative wounds had healed well. At the time of writing this paper, a telephonic interview was conducted with the patient. Six years after his surgery, he continues to be asymptomatic.

DISCUSSION

The history of evolution of hernia surgery is fascinating. It can broadly be divided into four periods [2]. The first period refers to the middle ages where the groin anatomy and pathogenesis

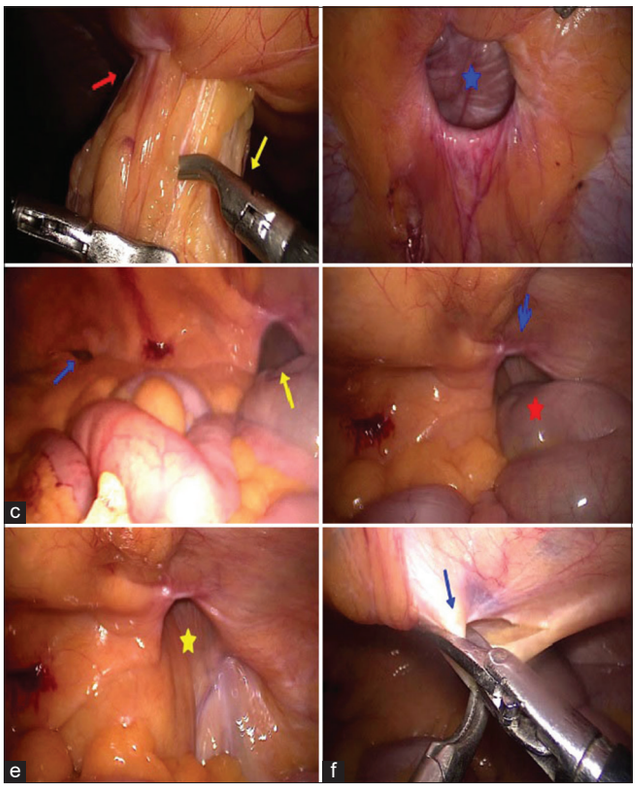

Figure 1: (a) Attempted reduction (yellow arrow) of incarcerated umbilical omentocele (red arrow), (b) Bare umbilical hernia defect (blue asterisk) after complete reduction of contents, (c) Rt. (yellow arrow) and Lt. (blue arrow) inguinal hernia defects, (d) Small bowel loops (red asterisk) seen herniating into Rt. inguinal hernia (blue arrow), (e) Rt.direct inguinal hernia defect (yellow asterisk) after reduction of bowel, (f) Peritoneum being incised (blue arrow) to enter the extra-peritoneal space during Rt.TAPP

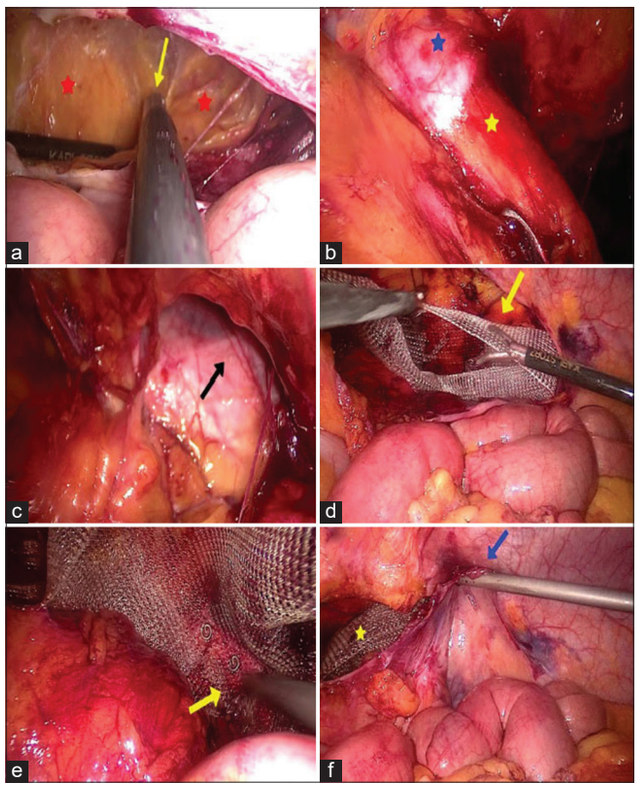

Figure 2: (a) Dissection during Rt.TAPP (yellow arrow) opening up the extraperitoneal space (red asterisks), (b) Rt.direct true sac (yellow asterisk) being separated frm the pseudosac (blue asterisk), (c) Bare Rt.direct inguinal defect (black arrow) after complete reduction of contents, (d) Prolene mesh being spread out (yellow arrow) over the hernia defect during Rt.TAPP, (e) The spread out mesh being tack-fixed to Cooper's lig (yellow arrow), (f) Perioneal flap being reflected back in place and tack-fixed to parietes (blue arrow)

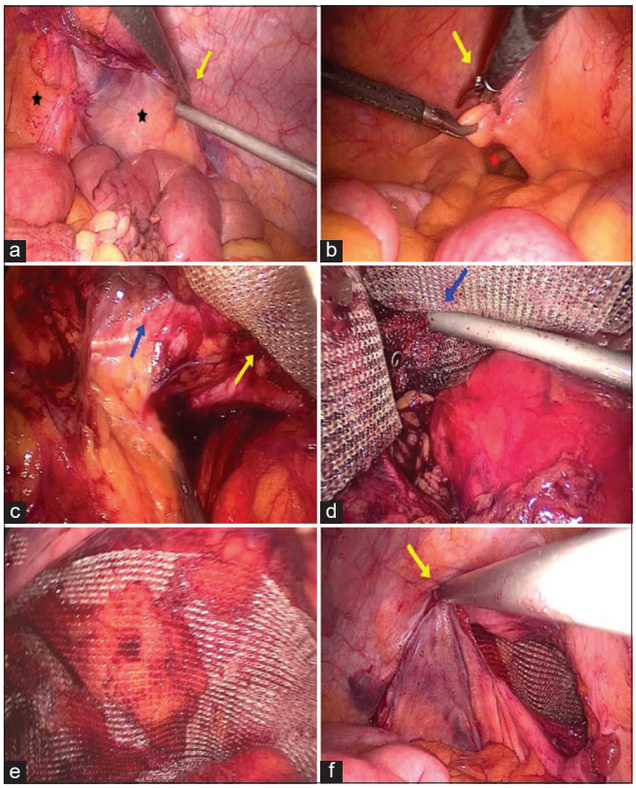

Figure 3: (a) Peritoneal flap (black asterisks) being tacked back in place (yellow arrow) to extra-peritonealise the mesh at the end of Rt.TAPP, (b) Peritoneum being incised (yellow arrow) during start of Lt. TAPP for Lt. direct inguinal hernia (red asterisk), (c) Bare Lt. direct inguinal hernial defect (blue arrow) with mesh of Rt. TAPP (yellow arrow), (d) Prolene mesh being tack-fixed (blue arrow) to left Cooper's ligament, (e) Optimally placed mesh over Lt. inguinal hernia, (f) Peritoneal flap being tack-fixed back in place (yellow arrow)

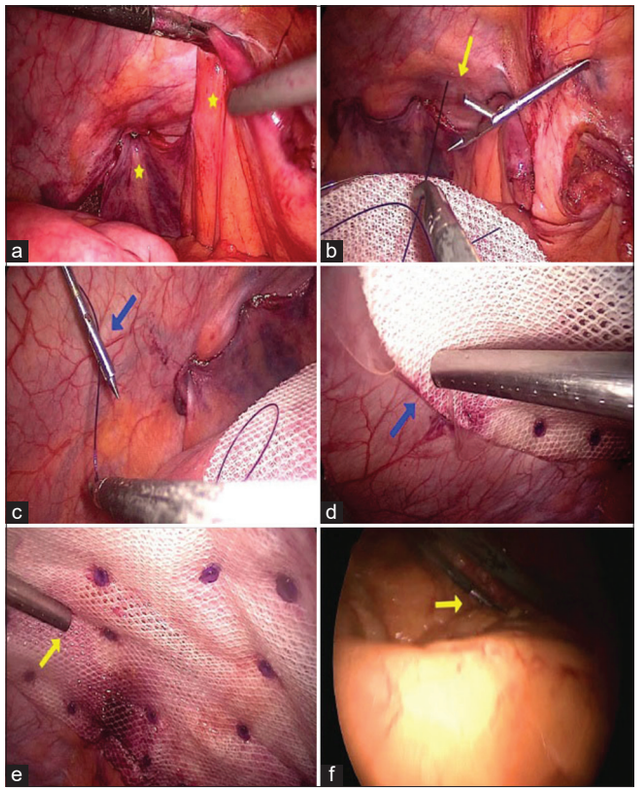

Figure 4: (a) Complete coverage of left mesh by peritoneal flap (yellow asterisks), (b) and (c) Corner trans-facial stitches of IPOM mesh for umbilical hernia being held by suture passer(yellow and blue arrows), (d) and (e) Parietex dual mesh being tack-fixed to parietes (blue and yellow arrows), (f) Greater omentum being spread over small bowel (yellow arrow) before desufflation

of hernia as a disease were not perfectly known. The repair was performed by barber-surgeons to the royal courts. This commonly resulted in significant blood loss, sometimes loss of the testis, infection, and occasionally death. Then came the second period towards the end of the nineteenth century when there was a big leap forward in understanding the anatomy as well as the pathogenesis. Eduardo Bassini (1844–1924) from Padua in Italy was the first to recognize that a hernia is not only a simple breach in the pelvic floor but also a result of a weak rear wall of the inguinal canal due to both a weak transversalis fascia and a weak conjoint tendon [3]. In 1887, Bassini published a technique for suture-reinforcement of the weak rear wall of the inguinal canal. His technique was rapidly adapted by the surgical fraternity and stood the test of time for more than 50 years [3].

In 1944, Edward Earl Shouldice enunciated a new repair by double breasting the fascia transversalis. Two problems were identified with Shouldice repair – it was difficult to learn and when widely used, had a high recurrence rate of more than 10%, especially in patients with large hernias (Type III, European Hernia Society classification) [4]. Furthermore, new evidence that hernia is caused by some disturbance of collagen metabolism led to the belief that the best suture technique will not be able to prevent recurrence in the long-term follow-up. In 1878, the great German surgeon Theodor Billroth had already prophesized that "If it would be possible to produce artificial tissue showing the properties of human fascia or tendon, we would have detected the secret of radical hernia repair" [5]. Eighty years after that prophecy, the first mesh was developed by Francis C. Usher and heralded the advent of the third period [6].

After 30 more years, a sound hernia repair technique based on the implantation of a mesh was developed and published by Irving L. Lichtenstein in 1989. He called it "The tension-free hernioplasty" and concluded that "With the use of modern mesh prosthetics, it is now possible to repair all hernias without distortion of the normal anatomy and with no suture line tension. The technique is simple, rapid, less painful, and effective, allowing prompt resumption of unrestricted physical activity." Indeed, mesh repair reduces the recurrence rate to <2.7–5% [7]. However, in several studies, a high percentage of surgical site chronic pain was noted with incidence between 12% and 54% [8].

The high percentage of chronic pain after open mesh repair may be related to excessive foreign body reaction, direct damage of the inguinal nerves intra-operatively, involvement of the nerves within the chronic inflammatory process around the mesh, or may be caused by incorrect mesh fixation. To summarize, although the post-Lichtenstein repair hernia recurrence rate is low, chronic pain remains a problem. In spite of all the improvements in operative techniques as well as in mesh technology, the incidence of chronic pain remains as high as 13.8% [9].

Of late, the trend toward minimally invasive surgery has brought on the fourth and the latest period of inguinal hernia surgery. According to Stoppa *et al.*, the pre-peritoneal position of the mesh is based on Pascal's hydrostatic principle/law and is the working mechanism of both TAPP as well as TEPA [10]. Ralph Ger was the first to perform a "posterior clip approach" laparoscopically for inguinal hernia, in 1979. However, it was not widely accepted, then. The first laparoscopic inguinal hernioplasty by pre-peritoneal approach (TAPP of present day) was performed and described by Maurice Arregui in 1992 [11].

The TEP approach (TEPA of present day) was pioneered by J B McKernan, H L Laws and J L Dulucq in 1993 [11]. The IPOM was pioneered by Karl LeBlanc in 1993 [12]. In IPOM surgery, three trocars are placed in the lateral abdominal wall usually on the left side after creating pneumoperitoneum. After reducing the contents of the hernia (often greater omentum, sometimes small bowel, sometimes both), a synthetic tissue separating dual mesh is placed behind the defect intraperitoneally which is then sutured and tacked to abdominal wall. The mesh acts as a scaffolding into which the mesothelium grows over and secures the mesh and creates an artificial support which strengthens the previously weak abdominal wall.

In scenarios where multiple external herniae exist in the same patient at the same time, one has to alter the classical trocar positions so as to optimally access and repair all, through minimum number of trocars; as seen in this report.

CONCLUSION

Careful planning of trocar entry sites and suitable modification of established sites as well as instrumentation, depending on the customized requirements of certain special clinical scenarios, help the surgeon to offer the best results to patients; as seen in this paper. To the best of our knowledge this is the first case report in which a concurrent large umbilical hernia and large bilateral inguinal herniae were surgically repaired in the same sitting, using only three trocars, which were ergonomically placed so as to access and repair all three large defects.

REFERENCES

1. HerniaSurge Group. International guidelines for groin hernia management. Hernia 2018;22:1-165.
2. Bittner RR, Felix EL. History of inguinal hernia repair, laparoendoscopic techniques, implementation in surgical praxis, and future perspectives: Considerations of two pioneers. Int J Abdom Wall Hernia Surg 2021;4:133.
3. Bassini E. Sulla cura radicule dellérnia inguinale. Arch Soc Ital Chir 1887;4:38.
4. Miserez M, Alexandre JH, Campanelli G, *et al.* The European hernia society groin hernia classification: Simple and easy to remember. Hernia 2007;11:113-6.
5. Fitzgibbons RJ, Greenburg AG, editors. Nyhus and Condon's Hernia. 5th ed. Philadelphia, PA: Lippincott, Williams and Wilkins; 2002. p. 39.
6. Usher FC, Ochsner J, Tuttle LL Jr. Use of marlex mesh in the repair of incisional hernias. Am Surg 1958;24:969-74.
7. Lundström KJ, Holmberg H, Montgomery A, *et al*. Patient-reported rates of chronic pain and recurrence after groin hernia repair. Br J Surg 2018;105:106-12.
8. Aasvang EK, Gmaehle E, Hansen JB, *et al.* Predictive risk factors for persistent postherniotomy pain. Anesthesiol 2010;112:957-69.
9. Riaz W, Birmingham K, Thompson R. Outcomes after laparoscopic transabdominal pre-peritoneal repair (TAPP) for groin hernia in a single consultant series. Ulster Med J 2022;91:4-8.
10. Stoppa RE, Rives JL, Warlaumont CR, *et al*. The use of Dacron in the repair of hernias of the groin. Surg Clin North Am 1984;64:269-85.
11. Hori T, Yasukawa D. Fascinating history of groin hernias: Comprehensive recognition of anatomy, classic considerations for herniorrhaphy, and current controversies in hernioplasty. World J Methodol 2021;11:160-86.
12. Arora E, Kukleta J, Ramana B. A detailed history of retromuscular repairs for ventral hernias: A story of surgical innovation. World J Surg 2022;46:409-15.

Funding: None; Conflict of Interest: None Stated.

How to cite this article: Raj M, Joshi A. Ergonomic laparoscopic surgical repair of three large external herniae through just three optimally placed working ports – A case report with review of literature. Eastern J Med Sci. 2023;8(1):26-29.