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# Evaluation of early outcome and complications of Lap TARM

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**Abstract**
LeBlanc and Booth in 1993 first reported application of intra-peritoneal onlay mesh (IPOM) for ventral and incisional hernia. It is based on the principles of Rives-Stoppa technique of repair of ventral hernia in which a large pre-peritoneal mesh is placed and stipulated even distribution of force throughout the mesh area resulting in stronger repair than onlay mesh technique. Laparoscopic technique was adopted in an effort to reduce wound complications, post-operative pain and early return to work. Since then various methods of laparoscopic repair have been performed and studied in an effort to find out the most suitable, least expensive way to deal with ventral hernias. LVHR is a safe alternative to the open method, with the main advantages being minimal postoperative pain, shorter recovery, and decreased wound and mesh infections. This is a retrospective study in which we evaluated the performance of 10 cases of Laparoscopic TARM (Trans Abdominal Retro rectus Mesh repair) from Oct 2018 to Jul 2019. This study is being conducted to evaluate early outcome and complications of this procedure amongst the initial cases at our institute. We chose midline hernias only, both Primary and Incisional, for feasibility to do TARM procedure in retrorectus space. Patients were evaluated for post-operative outcome in terms of pain, local collection and intestinal obstruction. Pain was experienced in mild-moderate degree in four patients, collection in three and small bowel obstruction in two patients. Early results indicate that TARM can be performed as a cheaper alternative to IPOM mesh repair. Further studies are needed to establish this procedure as the preferred method for treatment of midline hernias.

**Keywords:** Laparoscopy, preperitoneal, ventral hernia, polypropylene mesh

## Introduction
Ventral hernia repair can be managed by both open and laparoscopic methods. LVHR has a steep learning curve with risk of bowel and vascular injury. There is high quality evidence with strong recommendation that laparoscopic ventral hernia repair has a lower rate of wound infections compared to open repair [5]. In open mesh repair the wound related complications range from 3.5% to 18% with an average of 8.1% whereas in laparoscopic repair it is overall 2% [23-24-25-26-27]. Recurrences are also higher with open method. Recurrences have fallen from 31% - 54% in open method to less than 10% by laparoscopic method [2-3]. Regarding post-op pain it is debatable whether laparoscopic method offers any clear advantage [5]. No clear advantage in pain may be due to larger area of dissection and nerve entrapment in sutures or tacks in laparoscopic method. Nevertheless, LVHR continues to hold ground because of better cosmesis, early recovery among other advantages.
In 2000, Schumpelick stated that a classification of incisional hernias, like we have for groin hernias, is urgently needed. There was a need to classify ventral hernia in order to recommend management guidelines and conduct studies. This became apparent and several members of the EHS board and some invitees gathered at the initiative of the Belgian Section for Abdominal Wall Surgery (BSAWS) and the Dutch Hernia Society (DHS) for 2 days in May 2007 to discuss the development of an EHS classification for primary and incisional abdominal wall hernias [29].
in 2000 Chevrel and Rath proposed classification for incisional hernias [29]. Chevrel classification uses three midline zones and grouped hernias close to bony structures into separate subgroups. They pose specific therapeutic approaches and have an increased recurrence risk. An easily memorable classification from M1 to M5 going from the xiphoid to pubic bone was proposed. There are five ‘M’ zones for midline hernia:

1. M1: sub-xiphoidal (from the xiphoid till 3 cm caudally)
2. M2: epigastric (from 3 cm below the xiphoid till 3 cm above the umbilicus)
3. M3: umbilical (from 3 cm above till 3 cm below the umbilicus)
4. M4: infra-umbilical (from 3 cm below the umbilicus till 3 cm above the pubis)
5. M5: suprapubic (from pubic bone till 3 cm cranially).

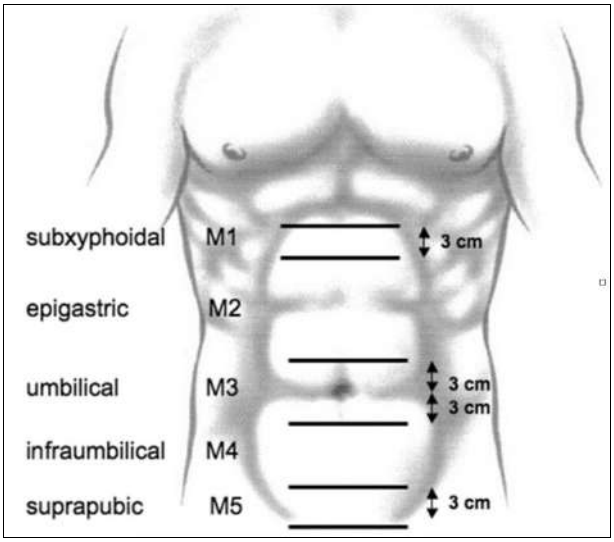


**Fig 1:** Classification of midline hernias.

Lateral hernias are grouped as

1. L1: Subcostal
2. L2: Flank
3. L3: Iliac
4. L4: Lumbar

**Table 1:** Hernia size.

| European Hernia Society Primary Abdominal Wall Hernia Classification | | Diameter | Small <2cms | Medium>=2-4cms | Large>=4cms |
|---|---|---|---|---|---|
| Midline | Epigastric | | | | |
| | Umbilical | | | | |
| Lateral | Sigelian | | | | |
| | Lumbar | | | | |

Hernia which is present in more than one region are taken to be from the region which is most important or where it is predominating.

There are various types of managing ventral hernia by laparoscopic method. In the earliest methods a flat mesh was placed under the defect and fixed. It was soon clear that with polypropylene mesh there were significantly more adhesions and bowel adhesions were worrisome. Eptfe and barrier meshes were replaced which decreased adhesion rate. However cost factors soon surfaced and they were prohibitively costly especially for the majority economically weaker section of society and especially in third world countries. As they say need is the mother of invention/ innovation. Surgeons started burrowing into layers of abdominal wall in order to prevent adhesions with much cheaper alternatives of mesh. Pre-peritoneal polypropylene mesh placement is one such option. However peritoneum being thin tends to be damaged during surgery resulting in multiple holes and exposure of underlying mesh to intra-peritoneal structures. Then came various techniques of mesh placement anterior to posterior sheath which resulted in firm adhesion of mesh due to rich blood supply from the muscle and also satisfying principles of Rives-Stoppa repair. Principally at present this looks to be the most attractive option at low cost and various techniques are evolving continuously in an attempt to give best results. TARM is one such method for treatment of midline hernias.

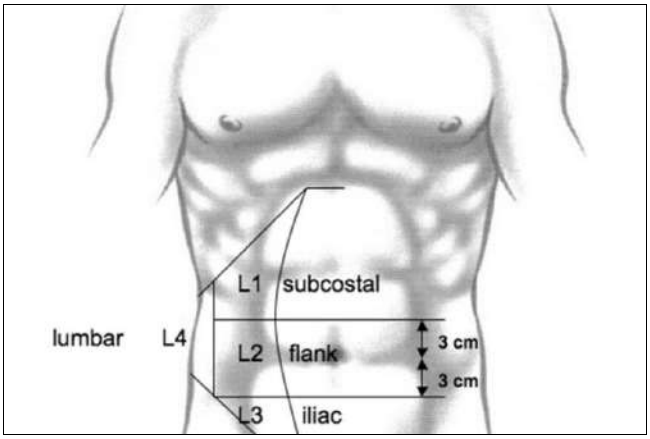


**Fig 2:** Classification of Lateral hernias.

## Materials and Methods

10 patients were operated between October 2018 and July 2019 by this technique. Five were small (<2cms), four were medium (2-4cms) and one was large (>4cms) as per EHS classification. Six were primary hernia and four incisional hernias. IV Antibiotics and analgesics were given routinely in all cases till discharge. Patients were discharged 2-5 days after surgery.

After routine workup they were taken for surgery under general anaesthesia. In supine position three ports were placed at different locations as per feasibility.

1. 10mm Sub-xiphoid, two 5mm right and left subcostal for umbilical and infra-umbilical hernias - 3 cases.
2. 10mm Supra-pubic, two 5mm right and left iliac fossa for epigastric hernia - 1 case.
3. 10mm Left lumbar with two 5mm ports on either side for umbilical, infraumbilical and epigastric hernia - 6 cases.

After bringing down any omental and bowel contents of hernial sac, peritoneum and posterior rectus sheath was incised 5 cms away from defect margin and retrorectus space was entered. The space was dissected on both sides by combination of monopolar hook dissection and bipolar cutter dissection. Retrorectus space was developed upto fusion of anterior and posterior sheath bilaterally and by crossing the midline. In one case right lateral dissection was extended beyond fusion of anterior and posterior sheath to space anterior to transversalis muscle as the hernial defect was large at 4.9cms. Hernial defect was taken down by cutting its margin which left a hole in posterior sheath. Midline defect between the rectus muscles and hernial defect was closed with running 1/0 Polypropylene suture in initial two cases, running No.1 Polydioxanone (PDS) barbed suture (Stratafix, Ethicon) in all others. 15X15cms mesh in most cases, was placed and fixed with interrupted 2/0 Polypropylene stitches. Defect in posterior sheath and peritoneum were closed with running 2/0 Polyglactin 910 suture in some cases and 2/0 Polyglycolic barbed suture (V-loc, Covidien).

Patients were evaluated postoperatively at discharge, 1 week and 1 month for pain and any complications. Last case operated on 10th July 2019 developed subacute intestinal obstruction one week after surgery which improved with NBM, IV fluids and conservative management. She was discharged, is taking full diet and is well except for mild pain abdomen (Pain score 3/10) as on 25/July/2019.

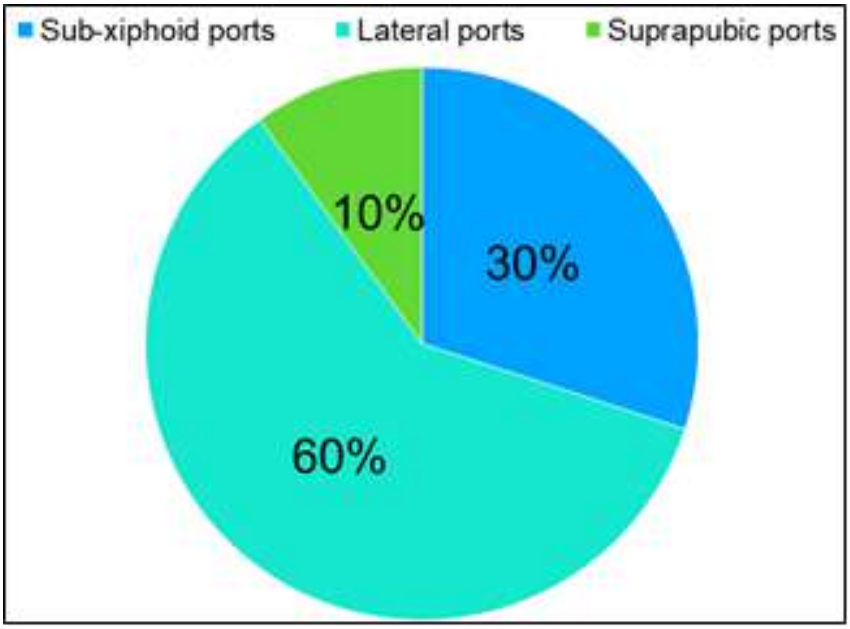


**Fig 3:** Proportion of port placements in patients.

**Table 2:** Patient characteristics.

| S. No | Primary or Incisional | Type of Hernia. EHS Classification. | Defect Size | Suture used to close anterior midline and hernial defect | Suture used to close posterior sheath and peritoneal defects | Mesh used |
|---|---|---|---|---|---|---|
| 1 | Primary | Umbilical. M3 | 1.9 cms | 1/0 Polypropylene | 2/0 Polyglactin 910 (Vicryl) | 15X15cms Polypropylene mesh. |
| 2 | Incisional | Infraumbilical M4 | 4.9 cms | 1/0 Polypropylene | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 3 | Primary | Umbilical M3 | 2 cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 4 | Incisional | Infraumbilical M4 | 1.7 cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 5 | Primary | Epigastric M2 | 1 cm | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglactin 910 (Vicryl) | 15X15cms Polyester 3D mesh (Meril) |
| 6 | Incisional | Umbilical M3 | 1.1 cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 7 | Primary | Umbilical M3 | 1.5 cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 8 | Primary | Umbilical M3 | 2.5cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 9 | Incisional | Infraumbilical M4 | 2.7 cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |
| 10 | Primary | Epigastric M2 | 2 cms | No.1 PDS barbed suture (Stratafix) | 2/0 Polyglycolic barbed suture (V-loc) | 15X15cms Polyester 3D mesh (Meril) |

**Fig 4a:** Adherent small bowel through a hole in sutured posterior sheath.

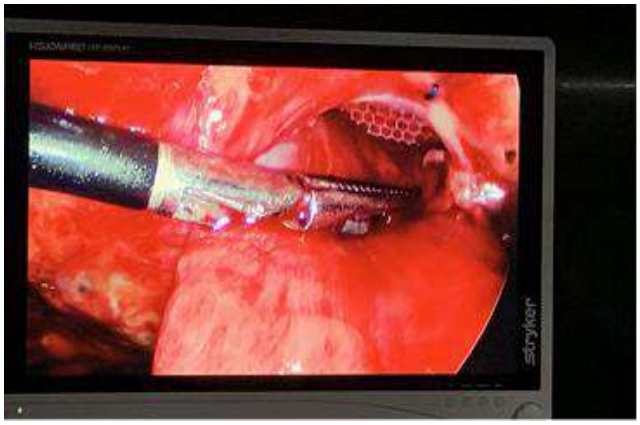

**Fig 4b:** Releasing adherent bowel from overlying mesh.

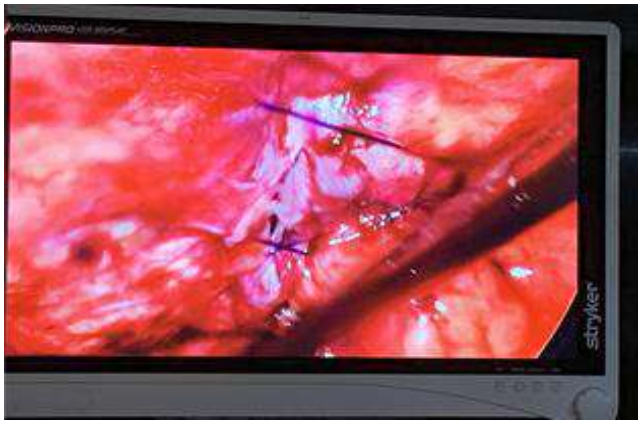

**Fig 4c:** Posterior sheath resutured with 2/0 polyglactin 910.

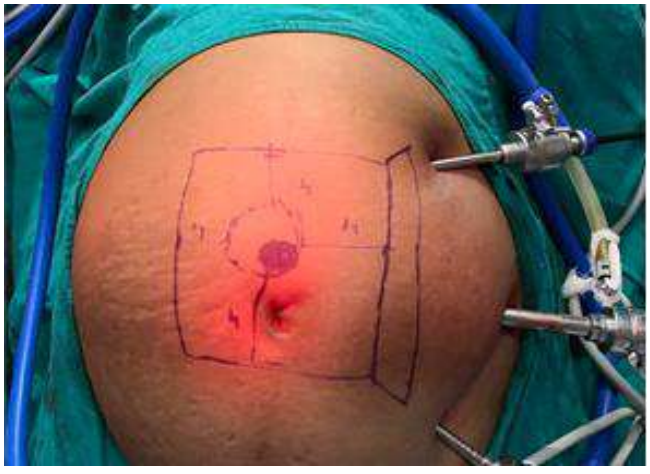

**Fig 6:** Placement of lateral ports

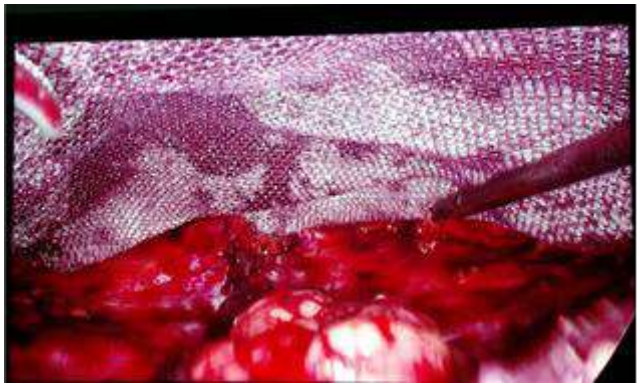

**Fig 5:** Placement of mesh in retrorectus space

## Results

Mean operating time was about 3 hours. Most of the patients (6 out of 10 patients) experienced little or no pain post-operatively and were comfortable on discharge. Two patients had severe pain and vomiting about one week after surgery and were diagnosed to have small bowel obstruction. One patient had to be reoperated, bowel adhesion taken down and posterior sheath defect resutured. A small inadvertent iatrogenic small bowel perforation during taking down of bowl adhesion was sutured with interrupted 2/0 PDS. The patient had a smooth post-op recovery after re-operation and was discharged without further event. The second patient was admitted 8 days after surgery with increased pain abdomen, vomiting after meals. There was mild abdominal distention and she was passing stools. X-ray showed multiple air fluid levels and USG abdomen showed dilated small bowel loops upto 3cms in diameter. Patient was diagnosed subacute small bowel obstruction and small seroma formation in central abdomen, she improved on conservative management and was discharged after 3 days. Thereafter she followed up after one week in OPD with mild to moderate pain (Subjective pain score 3/10) and was prescribed oral analgesics. She is taking full diet and has no other symptoms. Seroma were not aspirated and they resolved on their own.

**Table 3:** Mean operating time.

| | Operating time. In hours. | Anaesthesia time |
|---|---|---|
| 1 | 2 | 2 ½ |
| 2 | 3 ½ | 4 |
| 3 | 4 | 5 |
| 4 | 5 | 5 ½ |
| 5 | 2 ½ | 3 |
| 6 | 2 ¼ | 3 ¾ |
| 7 | 2 ½ | 3 |
| 8 | 3 | 3 ¼ |
| 9 | 3 | 3 ½ |
| 10 | 4 | 4 ½ |

**Table 4:** Complications

| | Pain score | Seroma | Bowel obstruction |
|---|---|---|---|
| 1 | 0/10 | No | No |
| 2 | 2/10 | Yes | No |
| 3 | 4/10 | Yes | Yes. Re-operated. Bowel was found adherent to mesh via a hole in the posterior sheath. |
| 4 | 0/10 | No | No |
| 5 | 0/10 | No | No |
| 6 | 0/10 | No | No |
| 7 | 0/10 | No | No |
| 8 | 2/10 | No | No |
| 9 | 0/10 | No | No |
| 10 | 3/10 | Yes | Yes. Managed conservatively. |

## Discussion

TARM is a feasible procedure for midline ventral hernias. However, we found significant post-op pain (4/10 cases) at one week and one month after surgery. Possibly this may be due to the large size mesh 15X15 cms placed in retrorectus space which we found slightly oversized in lateral dimensions thus irritating the nerves at the fusion of anterior and posterior sheath laterally. There was also a fair incidence of seroma formation (3/10 cases) which resolved spontaneously. There was no need for seroma aspiration in our series. The best approach for epigastric hernias is three port supra-pubic approach. In lateral three ports placement we found it ergonomically difficult to suture midline defects in epigastric region. There was no difficulty in suturing defects in umbilical and infra-umbilical region by lateral approach. Sub-xiphoidal port placement is also recommended for umbilical and infra-umbilical hernia. Difficulties we encountered with this approach was in suturing anterior defects because of interference by breast tissue in female patients and by costal margin in male patients which interfered with hand movements. There was also the problem access because of falciform ligament in 10mm port sub-xiphoidal access. Therefore, we gained initial access by 5mm port with 5mm telescope in left subcostal region after pneumoperitoneum by a Veress needle. We then dissected down the falciform ligament distally to proximally and then inserted 10mm sub-xiphoidal port under vision.

Of all these three approaches we found suprapubic approach versatile for epigastric hernias and lateral approach for umbilical and infra-umbilical hernias. Sub-xiphoidal approach is ergonomically difficult in our experience. From our initial experience of these 10 cases it we feel it may be better to reduce mesh size to 12X15 cms with 12cms placed laterally so that lateral nerves are not unduly irritated and to reduce postoperative pain.

## Conclusion

Presently TARM appears to be the most feasible laparoscopic procedure for midline ventral hernias as it does not involve use of expensive mesh and neither extensive fixation. However, much experience is required in laparoscopy before attempting this procedure as it involves suturing defects in anterior abdominal wall which require high degree of laparoscopic suturing proficiency. As reported in a study by Eriksen JR *et al*., Hernia 2009., the median VAS pain score post-operatively in 35 patients with hernias >3cms treated with Lap LVHR in the first month of surgery was 60 and 31 (on visual scale of 1-100) during activity and at rest [30]. In our series the mean VAS pain score in 4 patients was 3 on a scale of 1-10 at one month after surgery. This compares with the earlier reports and needs to be reduced further. It has to be studied whether slight reduction in the size of the mesh laterally to avoid undue irritation of nerves there, use of glue to fix the mesh will reduce postoperative pain.

Seroma is one of the most common complications after laparoscopic ventral hernia repair. Incidence of seroma after laparoscopic ventral hernia repair has not been properly documented and analysed since the definition used by different authors is not the same from one series to another. It is observed in almost all cases by radiological examination [31]. In our series it was clinically apparent in 3 out of 10 cases which did not need any intervention and subsided in one month.

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