ORIGINAL RESEARCH PAPER

General Surgery

COMPARATIVE OUTCOMES OF OPEN ANATOMICAL REPAIR VS LAPAROSCOPIC ANATOMICAL REPAIR OF UMBILICAL HERNIA WITHOUT MESH OVERLAY

KEY WORDS:

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ABSTRACT

Background: Umbilical hernia is one of the most common anterior abdominal wall defects.While mesh reinforcement is the gold standard in larger defects, anatomical suture-only repair remains relevant for small primary defects and in selected patient groups. This study compares outcomes of open anatomical repair (OAR) and laparoscopic anatomical repair (LAR) without mesh overlay. **Methods:** A prospective comparative study was conducted on 60 patients with primary umbilical hernia <2 cm. Patients were randomized into OAR (n=30) and LAR (n=30) groups. Outcomes assessed included operative time, blood loss, post-operative pain, hospital stay, wound complications, and recurrence. **Results:** OAR had a significantly shorter operative time (38.5 vs 56.3 min, p<0.001), while LAR demonstrated reduced post-operative pain (VAS Day 1: 4.1 vs 6.2, p<0.001) and shorter hospital stay (1.4 vs 2.1 days, p=0.01). Recurrence at 12 months was 6.7% in OAR and 3.3% in LAR, not statistically significant (p=0.55). **Conclusion:** Both OAR and LAR are safe and effective for small umbilical hernia repairs without mesh. LAR offers advantages in terms of post-operative recovery, while OAR remains cost-effective and less technically demanding. Surgical choice should be individualized.

INTRODUCTION

Umbilical hernia accounts for approximately 6–14% of all abdominal wall hernias in adults. Standard practice favors mesh reinforcement for larger defects, but controversy persists regarding mesh use in small (<2 cm) primary hernias due to risk of foreign body reaction, chronic pain, and cost implications.

Anatomical repair without mesh, either open or laparoscopic, remains a valid alternative in such cases. While open repair is straightforward and widely practiced, laparoscopic anatomical repair is increasingly utilized due to advancements in intracorporeal suturing. Comparative evidence, however, remains limited. This study aims to evaluate short-term outcomes of OAR versus LAR without mesh overlay in terms of operative parameters, morbidity, and recurrence.

MATERIALS AND METHODS

Design: Prospective comparative study conducted in the Department of General Surgery, Al Ameen Medical college and Hospital Bijapur, from Jan 2025 to Dec 2025..

Sample: 60 patients with primary umbilical hernia <2 cm, randomized equally into OAR and LAR groups.

Inclusion Criteria

Hernia<2cm

Above 18y

Willing to participate voluntarily

Exclusion Criteria:

Below18y

Recurrent and complicated hernia defect >2 cm, cirrhosis/ ascites, prior mesh repairs.

Direct interviews and clinical examination of patients had been adapted as a method of collection of data. Using a proforma with relevant information (patient data, clinical findings, lab investigations) had been collected from all the selected patients. A detailed clinical history from the patients or their attendees on various aspects like age, sex, clinical presentation, and duration of the presenting symptoms. Clinical history regarding the duration of hernia, progression in size, associated complaints like pain in the swelling or abdomen, vomiting, reducibility, chronic cough, constipation, difficulty in micturition, abdominal distension history suggestive of ascites and other causes of abdominal distension, number of pregnancies, previous surgery . In the local examination, special attention was given to the site, size, shape, composition, cough impulse, reducibility, skin over the swelling, size of the defect in linea alba, and tone of abdominal muscles. In routine general physical examination, attention was given to obesity,hypertension, in finding the cause of abdominal distension, per-rectal examination to look for mass (malignant) in the rectum, benign prostatic enlargement, examination to look for external meatal stenosis and stricture urethra in males. Respiratory system examination to look for rhonchi, and crepitations suggestive of COPD. While presenting the case, only relevant positive findings were recorded in the proforma case sheet and a master chart dealing with all the aspects was designed and presented. All cases were clinically diagnosed, and all patients included in the study underwent surgery following a preoperative investigation in the form of Hb%, BT, CT, FBS, PPBS, Blood urea, serum creatinine, urine for albumin, sugar, and microscopy, ECG, chest X-ray and ultrasound abdomen & pelvis. Cases were prepared for surgery after preoperative correction of anemia, hypertension, diabetes, and local skin conditions. All patients underwent surgical procedures after following preoperative preparation.

1. Nil by mouth after 10:00 pm from the previous night of surgery
2. Injection tetanus toxoid 0.5 ml IM.
3. Injection of xylocaine test dose.
4. Preparation of the parts by shaving.

All patients received one dose of preoperative antibiotic iv 1 gm of 3rd generation cephalosporins during or immediately after induction of anesthesia

Surgical Techniques:

OAR: The open approach to umbilical hernia repair represents the traditional surgical method with a long-standing historical record. The procedure typically begins with the administration of local anesthesia with sedation or regional anesthesia, though general anesthesia may also be used. The surgeon makes a single incision near the umbilical area, typically ranging from 3-5 cm depending on the hernia size and patient factors. Through this incision, the hernia sac is carefully identified, and the rectus sheath is defined circumferentially around the defect.

The key technical steps in open anatomical repair include:

- Hernia Sac Management: The sac is entered, and adhesions are separated between the sac and surrounding tissues in all directions. The sac may be either excised or reduced into the abdominal cavity without excision based on surgical judgment and anatomical considerations.

- Fascial Reconstruction: For primary suture repair (without mesh), the defect in the rectus sheath is closed primarily with non-absorbable sutures in a layered fashion. The classic Mayo repair technique, described in 1901, employs a "vest-over-pants" imbrication of the superior and inferior aponeurotic segments, though this technique is now used infrequently.
- Tissue Approximation: The tissue along the muscle edge is meticulously sewn together, followed by fixation of the umbilicus back to the muscle layer to restore normal anatomical relationships. This technique is particularly suitable for small defects (<1-2 cm) where tension-free closure can be achieved.

Following fascial closure, the subcutaneous tissue and skin are closed in layers, with drains placed only if extensive dissection has created significant dead space or bleeding. The open approach is noted for its technical simplicity, direct visualization of anatomical structures, and ability to be performed under local anesthesia, making it particularly valuable in resource-limited settings or for patients with contraindications to general anesthesia.

LAR: Laparoscopic umbilical hernia repair represents a minimally invasive approach that has gained significant popularity since its introduction in the 1990s. This technique is invariably performed under general anesthesia and involves the creation of multiple small incisions (typically three to four) ranging from 5-11 mm in the abdominal wall, placed strategically away from the hernia defect. The procedure begins with the establishment of pneumoperitoneum, most commonly using a Veress needle inserted at Palmer's point (in the upper left quadrant) to insufflate the abdominal cavity with carbon dioxide gas, creating working space.

The critical steps in laparoscopic repair include:

- Port Placement and Exploration: After initial access, additional trocars are placed under direct vision in the lateral abdominal wall. A laparoscope with a high-resolution camera is introduced, providing magnified visualization of the intra-abdominal contents and hernia defect.
- Adhesiolysis and Content Reduction: Using specialized instruments inserted through the working ports, adhesions are carefully divided, and the hernia contents are reduced using a combination of blunt and sharp dissection with judicious use of electrocautery to minimize thermal injury to visceral structures. The hernia sac itself is typically left in situ. fascial defect closure with non-absorbable sutures, no mesh placement.

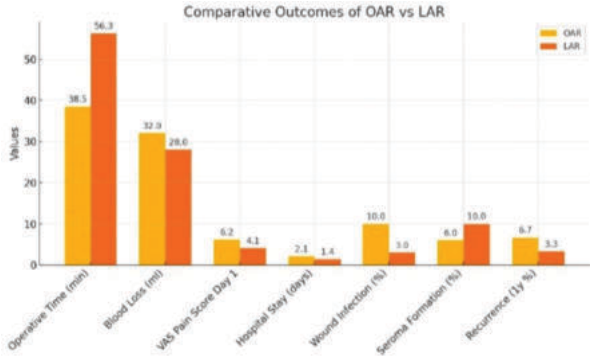
Follow-up: Clinical and ultrasonographic follow-up at 1, 6, and 12 months.

Statistical Methods: All the available data was refined and uploaded to an MS Excel spreadsheet and analyzed by SPSS version 21 in Windows format. The continuous variables were represented as mean, standard deviation, and percentages. The categorical variables were calculated by Chi-square test to determine differences between the two groups. The values of p (<0.05) were considered as significant

RESULTS

Characteristics			
Parameter	OAR (n=30)	LAR (n=30)	p- value
Mean Age (years)	42.5 ± 10.3	40.8 ± 11.1	0.62
Male: Female	18:12	16:14	0.60
Mean Hernia Size	1.8 ± 0.5	1.9 ± 0.4	0.74

Operative & Post-operative Outcomes			
Outcome	OAR	LAR	p- value
Operative Time (min)	38.5 ± 8.2	56.3 ± 12.4.	<0.001
Blood Loss (ml)	32 ± 8	28 ± 6.	0.08
VAS Pain Score day1	6.2 ± 1.1	4.1 ± 0.9	<0.001
Hospital Stay (days)	2.1 ± 0.7	1.4 ± 0.5.	0.01
Wound Infection.	10%	3%	0.25
Seroma Formation	6%	10%	0.64
Recurrence (1y)	6.7% (2/30)	3.3% (1/30).	0.55



DISCUSSION

This study highlights important differences between OAR and LAR for small umbilical hernias without mesh overlay.

OAR was faster and simpler, making it attractive for low-resource settings.

LAR provided superior recovery outcomes—lower pain and shorter hospital stay— consistent with global trends in minimally invasive surgery.

Recurrence rates were low and statistically comparable, supporting the feasibility of both approaches in appropriately selected patients.

Literature corroborates these findings: randomized trials show that suture-only repair remains effective for small defects, though long-term recurrence is slightly higher compared with mesh reinforcement (Arroyo et al., Br J Surg; Muysoms et al., Hernia classification studies).

Limitations include modest sample size and short follow-up. Larger multicenter trials with long-term data are required.

CONCLUSION

Both open and laparoscopic anatomical repairs without mesh are safe, effective, and viable for small umbilical hernias.

OAR remains simple, time-efficient, and cost-effective.

LAR offers less pain, faster recovery, and better cosmesis.
Choice of approach should be individualized, balancing patient preference, surgeon expertise, and healthcare resources.

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