Open Umbilical Hernia Repair versus Laparoscopic Hernia Repair

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Abstract: An umbilical Hernia can occur in both men and women. It can occur at any age although it is often present at birth. Umbilical hernias are found in about 20% of new born, especially premature infants. Umbilical hernias are more common in male than in female infants; with regard to race, they are eight times more common in African Americans than in Caucasians (or) Hispanics. In adults the female to male ratio is 3:1. The repair used depends on the size of the hernia. The repair presents challenge even for the experienced surgeon because of high incidence of morbidity and recurrence. Laparoscopic umbilical hernia repair has grown in popularity since it was first reported in the early 1990s. Low recurrence, fewer complications and shorter hospital stay have led to believe that it sets the new standard for umbilical hernia repair. With the introduction of inert prosthetic material such as PTFE and dual sided meshes the laparoscopic repairs of ventral hernias have gained more momentum.

Keywords: umbilical Hernia, Laparoscopic umbilical hernia, Open umbilical hernia repair, Primary Closure, Mesh repair

1. Introduction

Embryology and Anatomy of the umbilicus
Embryologically, the fascial margins of the umbilical defect are formed by the third week of foetal life when the four folds of the somatopleurae tend to fold inward. An umbilical cord is produced in the fifth week. By the tenth week of embryonic life, abdominal contents return from their location outside the coelom into the developing abdominal cavity. The vitelline duct and the allantois regress by the fifteenth to sixteenth week. If any of these processes are defective, umbilical malformations occur. At birth, the umbilical arteries and the umbilical vein are thrombosed, and the vitelline duct and the allantois have already been obliterated. The umbilical ring then scars and contracts. The obliterated umbilical vein (round ligament) is usually attached to the inferior border of the umbilical ring along with remnants of the urachus and the two obliterated umbilical arteries. The round ligament, by crossing and partially covering the umbilical ring, may protect against herniation.

An umbilical Hernia can occur in both men and women. It can occur at any age although it is often present at birth. Umbilical hernias are found in about 20% of new born, especially premature infants. Umbilical hernias are more common in male than in female infants; with regard to race, they are eight times more common in African Americans than in Caucasians (or) Hispanics. In adults the female to male ratio is 3:1.

The pathophysiology of umbilical hernia in adults is disputed. It is generally believed that these hernias do not represent persistence from childhood but arise de novo in adult life. A retrospective review of adults with umbilical hernias found that only 10.9% recalled having hernias from child – hood. In a separate serried of 71 women and 82 men, it was noted that only two women had recurrence of their infantile umbilical hernias and this occurred during pregnancy. In both cases, the hernia resolved completely after delivery. None of the men followed developed a recurrence. While the infantile umbilical hernia is a direct hernia, umbilical hernias in adults are indirect herniations through an umbilical canal that is bordered by umbilical fascia posteriorly, the linea alba anteriorly, and the medial edges of the two reactus sheaths on each side. Therefore, these hernias tend to incarcerate and strangulate, and do not resolve spontaneously. Askar suggests that they are really paraumbilical hernias that occur just above and laterally to the umbilicus. Their clinical behavior is certainly more akin to paraumbilical hernias. The incidence of incarceration of umbilical hernias in adults is 14 times than in children. In addition there is a high associated morbidity and mortality. There is a large sex difference with over 90% occurring in women, and almost all are obese and multiparous.

2. Aim & Objective

To study the outcome of
1) Open repair and Laparoscopic repair for umbilical hernias – a comparative study.
2) Primary closure versus mesh repair.

3. Methods

These is a prospective type of comparative study conducted who underwent open anatomical and mesh repair and laparoscopic anatomical and mesh repair methods of umbilical Hernia repair. The patients included in this study were randomly selected from those who underwent open anatomical and mesh repair and laparoscopic anatomical and mesh repair including elective and emergency procedures for complications. The relevant data of patients included in the study were collected recorded as follows, Name, age, sex, occupation, Nutritional Status, present history, size of defect, complications, Post operative period and complications were noted.

Materials used
Open Repair
Anatomical repair: No ‘1’ prolene
No “1” Ethilon

**Mesh Repair:** Poly propylene mesh

**Laparoscopic Repair**
- Anatomical repair - No “1” Prolene , No “1” Ethilon
- Mesh Repair - ePTEE mesh
- Poly tetra fluoro ethylene mesh

**Case Selection**
- Type of Repair Defect Size
- Laproscopic repair < 3cm & 3cm
- Open Repair > 3cm
- Types of umbilical Hernia Repair

**Conventional Repairs**
- Mayo’s Repair Primary closure
- Prosthetic mesh Repair
- Onlay mesh Repairs
- Underlay mesh Repairs (River’s stoppa wahtz)
- Inlay mesh repairs (Intraperitoneal river type repair)

**Laparoscopic repairs**
- Primary closure
- [Shoe lace technique]
- Prosthetic mesh repairs
- Intraperitoneal onlay mesh repair with defect closure.

### 4. Results

**Table 1: Sex distribution of the cases**

<table>
<thead>
<tr>
<th>Gender</th>
<th>No of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>Female</td>
<td>34</td>
<td>68%</td>
</tr>
</tbody>
</table>

**Table 2: Age wise distribution of the cases**

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-20</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>21-30</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>31-40</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>41-50</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>51-60</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>&gt;60 yrs</td>
<td>9</td>
<td>18%</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Table 3: Type of hernia among patients**

<table>
<thead>
<tr>
<th>Type of hernia</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Umbilical</td>
<td>14</td>
</tr>
<tr>
<td>Paraumbilical</td>
<td></td>
</tr>
<tr>
<td>Supraumbilical</td>
<td>29</td>
</tr>
<tr>
<td>Infraumbilical</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

**Table 4: Post operative complications**

<table>
<thead>
<tr>
<th>Complications</th>
<th>Open repair</th>
<th>Laproscopic repair</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anatomical</td>
<td>Mesh</td>
</tr>
<tr>
<td></td>
<td>Anatomical</td>
<td>Mesh</td>
</tr>
<tr>
<td>Wound infection</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Seroma formation</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pain</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Recurrence</td>
<td>2</td>
<td>Nil</td>
</tr>
</tbody>
</table>

**Table 5: Availability of facilities and expertise**

<table>
<thead>
<tr>
<th>Availability of facilities and expertise</th>
<th>Open repair</th>
<th>Lap. Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectivity</td>
<td>Equal</td>
<td>Equal</td>
</tr>
<tr>
<td>Feasible</td>
<td>Equal</td>
<td>Equal</td>
</tr>
<tr>
<td>Safe</td>
<td>Equal</td>
<td>Equal</td>
</tr>
<tr>
<td>No. of hospital stay days</td>
<td>More</td>
<td>Less</td>
</tr>
<tr>
<td>Postoperative complication</td>
<td>More</td>
<td>Less</td>
</tr>
<tr>
<td>Cosmetic &amp; functional results</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>More</td>
<td>Less</td>
</tr>
</tbody>
</table>

### 5. Discussion

In our study we selected 50 patients. 30 of them subjected to open repairs. Among them 11 of them underwent anatomical

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repair and 18 of them underwent open mesh repair. 20 patients were selected for laparoscopic repair. 10 of them underwent primary closure. 10 of them underwent primary closure with mesh repair. The laparoscopic approach to umbilical hernia has shown to be safe and effective. The benefits of laparoscopy includes:

- Reduction in postoperative pain no cases complained of pain to
- 3 cases in open repair.
- Shorter length of stay 3 days compared to 9 - 14 days.
- Seroma formation one case compared to 2 cases.
- Wound infection no cases compared to 6 cases.
- Decreased morbidity due to early bowel movements.
- Improvements in recurrence rates 10% as compared to 18% with the open procedure.
- The comesis is good.

Voeller et al. presented 407 laparoscopic ventral/incisional repair. The patients were large, with a mean body mass index of 32 kg², and 90% had previous abdominal surgery, with 136 of the hernias being recurrent. The average hernia size was 100 cm². Length of stay was short, with few serious complications and no mortality. The mean follow-up has been approximately 2 years, with a range of 0 to 5 years. There were six bowel injuries and four mesh infections. The 14 recurrences (3.4%) compares favorably to the 10% to 36% described in the literature for open ventral/incisional hernia repair. The majority of recurrences were from mesh removal due to infection.

The laparoscopic technique described above has been used to repair lumbar hernias as well as parastomal hernias as described via an incision by Sugar baker. The high coronary artery bypass graft (“CABG”) epigastric hernia and the low juxtaphubic bone hernia can present many challenging aspects laparoscopically. The mesh in the low hernia must be sutured to Cooper’s ligament, and in the high epigastric hernia sutured to any available tissues around the sternum and ribs. The author has laparoscopically reoperated upon several patients who have had a prior laparoscopic ventral/incisional hernia repair and found any adhesions to be filmy and readily taken down when PTFE mesh, especially the dual-sided mesh from W. L. Gore, is used. There is a “pseudoperitoneum” covering the mesh, and if one dissects between this and the mesh the adhesions are quickly lysed much more readily than the dense adhesions seen with polypropylene mesh. Thus, laparoscopic repair of ventral/incisional hernias now appears to be a very safe technique that can give a very low recurrence rate. It is absolutely essential that suture fixation of the prosthesis be a part of the procedure to continue to yield low recurrence rates. A long-term follow-up will certainly be necessary to further evaluate the procedure.

Causes of recurrence

- Transfascial sutures not employed
- Use of smaller sized meshes
- Ineffective anchoring of mesh
- Steep learning curve
- Size of the defect
- Obesity
- Diabetes mellitus
- Chronic cough
- Multiparity are considered as risk factors for recurrence.

In one of the largest series of laparoscopic hernia repairs, Heinfret et al has reported a low rate of conversion, Shorter hospital stay and low risk for recurrence. In an analysis of 850 patients who underwent laparoscopic ventral including umbilical hernia repairs over 9 years the following results were published: Mean operating time was 120 min, mean estimated blood loss was 49 and hospital stay averaged 2.3 days. There were 128 complications in 112 patients (13.2%). The most common complications were ileus (3%) and prolonged seroma 2.6%. During a mean follow up time of 20.2 months the hernia recurrence rate was 4.7%. The recurrence was found in larger hernias, longer operating times, previous hernia repairs and higher complication rates.

In a study by Hesslink et al hernias smaller than 4 cm, had a significantly lower recurrence rate 25% than larger hernias 41%. Careful dissection, minimal bowel handling, proper fixation with either sutures (or) anchors and selection of ideal cases will reduce rates considerably.

6. Conclusion

Laparoscopic mesh repair produce low recurrence rate with less morbidity. The evidence available at present suggests that laparoscopic repair is feasible, safe although experience with the new meshes is still limited and less cost effective. With the existing data, it will be prudent to recommend laparoscopic repair as the first line treatment for umbilical hernia where the facilities and expertise are available, where it is not, open mesh repair remains a suitable alternative. As laparoscopic skills improve, it is likely that laparoscopic repair will be more widely performed in future.

<table>
<thead>
<tr>
<th>Complications</th>
<th>No</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged ileus</td>
<td>9</td>
<td>2.21</td>
</tr>
<tr>
<td>Seroma (&gt;6 wk)</td>
<td>8</td>
<td>1.97</td>
</tr>
<tr>
<td>Suture pain (&gt;8 wk)</td>
<td>8</td>
<td>1.97</td>
</tr>
<tr>
<td>Intestinal injury</td>
<td>6</td>
<td>1.47</td>
</tr>
<tr>
<td>Mesh cellulitis</td>
<td>5</td>
<td>1.23</td>
</tr>
<tr>
<td>Haematoma/bleeding</td>
<td>4</td>
<td>0.98</td>
</tr>
</tbody>
</table>
References


Author Profile

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