The Benefit of Open Rives-Stoppa Procedure in Complex Incisional Hernia.

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Abstract

Introduction: Ventral hernia is one of the most common general surgical pathologies. An incisional hernia will develop in 10–15% of patients with an abdominal incision, and the risk increases to up to 23% in those who develop surgical site infections. Ventral hernia repairs are mostly elective (90%) procedures, but the repair methods are highly variable. Popularized in Europe by Rives and Stoppa, the neuromuscular technique has proven to be very effective, with a 94.2% probability of having the lowest odds for recurrence and a 77.3% probability of having the lowest odds for SSI. The study aimed to evaluate our experience at a secondary care center performing Rives-Stoppa repair for abdominal ventral and incisional hernias.

Materials and Methods: Between April 2019 and August 2021, 46 patients in the practice at a secondary regional hospital, Teni Konomi, Korce, Albania, underwent a Rives-Stoppa incisional hernia repair.

Results: There were 14 (31%) males and 32 (69%) females (age range 31-75).

Most incisional hernias were midline xiphoid-pubic incision and supraumbilical, with several subcostals (2 right and 1 left) hernias. Most incisional hernias were symptomatic and evident on the physical exam during the repair. In four cases, the hernia sac was incarcerated at the presentation time.

Conclusion: The Rives-Stoppa technique has excellent long-term results and low morbidity in patients with large primary or recurrent incisional hernias. It is the gold standard for most surgeons.

Keywords: Incisional Hernia, Mesh polypropylene, abdominal wall surgery, Rives-Stoppa Procedure

Introduction

Hernia repair surgery is one of the most common operations in general surgery. Incisional hernias often complicate abdominal operations.[1]

Incisional hernia commonly reported incidence varies from 2 to 20%. [2, 3] This percentage may be as high as 69% in high-risk groups with long-term follow-up. [3] The presence of an incisional hernia is associated with significant morbidity and has a considerable impact on patients’ overall quality of life [4]

Complications of incisional hernias include infection, ulceration, incarceration of viscera, and small bowel obstruction. [5]

Patients also experience discomfort and a cosmetically displeasing bulge at the incision site. Successful repair of
incisional hernias continues to be challenging. Primary suture closure of incisional hernias results in recurrence rates of 31%-58%. [6, 7]

The addition of prosthetic mesh implants has been shown to decrease the incidence of recurrence by 8%-10%. [7]

Various operative techniques for incisional hernia repair use only sublay (intramuscular or extra fascial) or underlay (intraperitoneal or subfascial). [8] On multiple treatment analyses, retro-rectus was ranked as the best mesh placement option with a high probability of being the best treatment. [9]

Retrorectus repair (Rives-Stoppa) had a 94.2% probability of having the lowest odds for recurrence and a 77.3% probability of having the lowest odds for surgical site infection (SSI). [10]

We elected to use the European Hernia Society (EHS) classification as simple, practical, and user-friendly. It divides hernias into primary and incisional (secondary) and subdivides them by anatomical location and size. Incisional hernias are also categorized by recurrence in a binary fashion. (Tables 1-2) [11, 12]

The length of the hernia defect is defined as the most significant vertical distance between the most cranial and the most caudal margin of the hernia defect. In case of multiple hernia defects from one incision, the length is between the cranial margin of the most cranial defect and the caudal margin of the most caudal defect. (Figure 1) [13]

Disadvantages include complexity, long operative times, and the possibility of chronic abdominal pain. [7]

The sublay technique, which requires the use of the mesh, was made famous by Jean Rives and Rene Stoppa in the late 1980s, dissecting a retromuscular plane between the muscle bellies and the posterior aponeurosis of the abdominal rectus muscles provides a vascularized space where the mesh can be placed and frees the muscles for a tension-free closure of the musculoaponeurotic flap in the midline (Figure 1), thus reconstructing the anatomy of the abdominal wall [14].

In adults, the Rives-Stoppa neuromuscular technique (RSRT) is considered the technique of choice when it comes to repairing > 5 cm midline hernias [15].

**Short description of Technique:** Given the size of the hernia defect and the presence of symptoms such as pain and discomfort, various techniques are used to repair the defect. These include primary repair, sublay repair, and underlay repair. Each technique has its advantages and disadvantages, and the choice of technique depends on the size, location, and type of hernia.

Table 1: Incisional Hernia Classification. [12]

<table>
<thead>
<tr>
<th>Midline</th>
<th>Sub-xiphoidal</th>
<th>Epigastric</th>
<th>Umbilical</th>
<th>Infra-umbilical</th>
<th>Suprapubic</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td></td>
<td>M2</td>
<td>M3</td>
<td>M4</td>
<td>M5</td>
</tr>
<tr>
<td>Lateral</td>
<td>Subcostal</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
<td>L4</td>
</tr>
<tr>
<td>Recurrent Incisional Hernia</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (cm)</td>
<td>&lt; 4cm: W1</td>
<td>4–10cm: W2</td>
<td>&gt; 10cm: W3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width (cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: M & L Zones for Incisional Hernia Classification [12]**

<table>
<thead>
<tr>
<th>Medial</th>
<th>Lateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Subxiphoidal xiphoid to 3 cm caudally</td>
</tr>
<tr>
<td>M2</td>
<td>Epigastric 3 cm below the xiphoid to 3 cm above the umbilicus</td>
</tr>
<tr>
<td>M3</td>
<td>Umbilical 3 cm above to 3 cm below the umbilicus</td>
</tr>
<tr>
<td>M4</td>
<td>Infraumbilical 3 cm below the umbilicus to 3 cm above the pubis</td>
</tr>
<tr>
<td>M5</td>
<td>Suprapubic pubic symphysis to 3 cm cranially</td>
</tr>
<tr>
<td>L1</td>
<td>Subcostal between the costal margin and a horizontal line 3 cm above the umbilicus</td>
</tr>
<tr>
<td>L2</td>
<td>Flank lateral to the rectal sheath in the area 3 cm above and below the umbilicus</td>
</tr>
<tr>
<td>L3</td>
<td>Iliac between a horizontal line 3 cm below the umbilicus and the inguinal region</td>
</tr>
<tr>
<td>L4</td>
<td>Lumbar laterodorsal to the anterior axillary line</td>
</tr>
</tbody>
</table>
as abdominal pain and local discomfort, surgical repair was decided upon. The hernia defect is accessed through a midline incision in the previous scar, and the hernial sac is dissected into the annulus, separating it from the subcutaneous cellular tissue (fig. 2).[7] The hernial sac was opened using an adhesiolysis, and the abdominal cavity and fascial defect were explored. The rectus muscles were later displaced on both sides of the hernia ring. A longitudinal cut was performed on the back wrap during muscle exposure across the defect. (fig. 3). [7]

A retromuscular plane was dissected below the rectus muscle, detaching the posterior sheath from the belly of the muscle. Dissection extended laterally to the perforating branches of the inferior epigastric vessels was identified and followed 3cm above and below the aponeurotic defect. (fig. 2, 4). [7]

A first plane was reconstructed by closing the peritoneum and the posterior sheath of the rectus muscle in the midline.

A planar polytetrafluoroethylene mesh was placed over this, stretching it across the new neuromuscular space (Fig. 4). An aspiration drain was placed at this level. Finally, the muscle flap and the anterior rectus muscle sheath were sutured in the midline, with a tension-free closure that allows for the anatomy of the abdominal wall to be reconstructed.

Basic principles of the Rives-Stoppa neuromuscular technique include A) Longitudinal incision on the posterior sheath of the rectus muscle. B) Dissection of a retromuscular plane between the muscle belly and the posterior sheath. C) Closure of the posterior sheath in the midline (red arrow) with mesh placement on this plane and closure of the anterior musculoaponeurotic flap (black arrow)
**Materials and Methods**

A descriptive retrospective study was conducted at a secondary regional hospital, Teni Konomi, Korce in Albania, from April 2019 to August 2021; we recorded all the data for patients who presented to our hospital and underwent inguinal hernia repair in our hospital under the conditions of hernia surgery.

**Results**

Our study included 46 patients, 14 (31%) males and 32 (69%) females (age range 31-75). (Tab. 3)

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-34</td>
<td>6</td>
<td>6.51</td>
</tr>
<tr>
<td>35-44</td>
<td>8</td>
<td>17.4</td>
</tr>
<tr>
<td>45-54</td>
<td>18</td>
<td>39.1</td>
</tr>
<tr>
<td>55-64</td>
<td>10</td>
<td>21.7</td>
</tr>
<tr>
<td>65-74</td>
<td>4</td>
<td>8.7</td>
</tr>
</tbody>
</table>

*Table 3. Age distribution*

Most incisional hernias were midline xiphoid-pubic incision and epigastric, with several subcostals (2 right and 1 left) hernias. (Tab. 4) At the time of repair, in most cases, 42 (91.3%) incisional hernias were asymptomatic and evident on physical exam, and in four cases (8.7%), incisional hernias were symptomatic and incarcerated at admission to the ED. The prosthetic material used was polypropylene, and the prosthetic size ranged from 8x8 cm to 30x30 cm. Polypropylene mesh has the advantage of allowing rapid incorporation on both sides of the mesh.

We start the surgery with a laparotomy as the patient presents with a midline incisional hernia. After that, we dissect the subcutaneous tissues until we identify the incisional sac. In most cases, we opened the sac to determine its content, and we found greater omentum, but also, in one case (2.17%), a small bowel was found incarcerated. In one case (2.17%), it presented as intestinal occlusion, and the transverse colon was found.

Due to adhesion formation, the incisional sac should be left intact. This also improves postoperative comfort for the patient.

The following surgical step involves exposing the neuromuscular pre-fascial space, which is approached through a longitudinal dissection of the rectus sheath along its entire length.

We later continue the dissection on an avascular space to reach the lateral border of the rectus muscle, allowing rapid incorporation on both sides of the mesh.

Then, we start creating the new abdominal wall closing the fascial defect by reappropriating the posterior rectus sheath using continuous absorbable sutures Vicryl® 2.0.

Tension was minimal, and the posterior rectus fascia was closed in all patients.

We used polypropylene mesh (Betatech Polymesh®) placed retro muscular, anchored on rectus muscles’ lateral borders using nonabsorbable monofilament Prolen 1.0 sutures.

Then, we continuously close the anterior rectus sheath on nonabsorbable monofilament prolene 1.0 sutures. In all the cases, we left two bulb suction drains between the anterior rectus sheath and the skin. The skin was closed routinely.

All patients tolerated the procedure well, with no intraoperative complications. We had two cases (4.34%) of perioperative complications. In one case (2.17%), a patient suffered nosocomial pneumonia, which was readmitted and treated with antibiotics venously.

The other patient developed rectus hematoma, which was treated conservatively with no need for drainage. Two patients (4.34%) developed seromas, and one (2.17%) developed wound hematoma. None of the patients developed deep or superficial wound infections. Hospital discharge typically occurred on postoperative day 5.

There is no evidence that any of these patients developed a recurrent incisional hernia.

**Discussion**

The open Rives-Stoppa procedure has emerged as a popular option for repairing complex incisional hernias, particularly those characterized by large defects, significant tissue weakness, or previous failures. [16, 17]

The benefits of the Rives-Stoppa technique are:

- **Low Recurrence Rate:** Yaghoobi Notash, A. et al., in their study, demonstrate a remarkably low recurrence rate for the Rives-Stoppa procedure, ranging from 0.3% to 28%, significantly lower than other techniques for complex hernias. This can be attributed to its meticulous anatomical reconstruction and favorable mesh placement. [18]

- **Versatility:** The Rives-Stoppa approach adapts well to various hernia sizes and complexities. Sneiders D. et al.
The Benefit of Open Rives-Stoppa Procedure in Complex Incisional Hernia.

The open Rives-Stoppa procedure offers a compelling option for treating complex incisional hernias, exhibiting low recurrence rates, versatility, and anatomical restoration. However, its technical complexity and potential drawbacks necessitate careful patient selection and meticulous surgical execution by experienced surgeons.

The Rives-Stoppa technique has excellent long-term results and low morbidity in patients with large primary or recurrent incisional hernias. It is the gold standard for most surgeons.

The Rives-Stoppa technique preserves the functionality and integrity of the abdominal wall, factors considered crucial for effectively repairing abdominal wall defects by the separation of components technique.

The Rives-Stoppa technique employs mesh as reinforcement, which is generally believed to decrease recurrence rates, as described previously.

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References


Conclusion

The Rives-Stoppa procedure emphasizes preserving native anatomy. Molina Caballero, A. Y., et al. found that by reconstructing the natural layers of sheaths allows the placement of a large mesh under the muscle, providing secure reinforcement regardless of the defect size. [19]

Tissue Preservation: Verheij E. et al. show that, unlike some techniques that require extensive tissue removal, the Rives-Stoppa procedure preserves native tissues. This minimizes potential complications like wound infections and seroma formation.[20]

Restoration of Anatomy: Molina Caballero, A. Y., et al. found that by reconstructing the natural layers of the abdominal wall, the Rives-Stoppa technique aims to restore normal muscle function and improve long-term stability, potentially reducing pain and discomfort. [21]

Considerations:

Technical Difficulty: The Rives-Stoppa procedure demands high surgical expertise due to its meticulous dissection and reconstruction steps. Surgeons require specialized training and experience to ensure optimal outcomes.[17]

Longer Operative Time: Compared to more straightforward techniques, the Rives-Stoppa procedure typically takes longer. This can be a factor for patients with certain medical conditions or poor surgical candidates.

Mesh-Related Complications: As with any mesh-based repair, potential complications like infection, seroma formation, and mesh erosion exist. Careful mesh selection, meticulous surgical technique, and proper follow-up care are crucial in minimizing these risks.

When to Consider the Rives-Stoppa Procedure:

Large or complex incisional hernias: The Rives-Stoppa procedure offers a robust repair with proven durability for defects exceeding 10cm or those with significant tissue weakness.

Previous failed repairs: In cases where other techniques have failed to achieve long-term success, the Rives-Stoppa approach can provide a definitive solution.

Patients with good tissue quality: The procedure relies on sufficient healthy tissue for appropriate dissection and closure.

Beyond this discussion, further points to consider could include:

Recent advancements and modifications of the Rives-Stoppa technique include composite meshes or laparoscopic assistance.

Cost-effectiveness comparisons with other hernia repair techniques.

The impact of patient factors like comorbidities and lifestyle habits on surgical outcomes.

By considering these points and engaging in open discussions with healthcare professionals, patients with complex incisional hernias can make informed decisions about the most suitable repair approach for their needs.


