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CASE REPORT

Modification of the Rectus Muscle Repair for Ventral Hernias: A Report

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ABSTRACT

Background: In an attempt to avoid mesh-related complications, many authorities have described non-mesh repair of midline ventral hernias. We described rectus muscle repair (RMR) for ventral hernias in 1993, but we noticed that a limitation was the inability to repair large hernia defects. We now describe a modification of this technique that allows it to be used for larger defects.

Methods: We report a case in which the modified RMR was used to repair a large ventral hernia. In the original RMR, sutures were placed through each rectus abdominis to approximate the muscles, thereby obliterating the linea alba and repairing the hernia. In this modification of the RMR, the hernia sac and the linea alba were imbricated and a vertical relaxing incision was made in each anterior rectus sheath, keeping the underlying muscle and posterior sheath intact.

Results: This relaxing incision is a useful modification of the original RMR, especially where there is significant tension on the suture line. This patient had an uneventful recovery with no recurrence on clinical examination at his last clinical review 5 years post-operation.

Conclusion: The modified RMR repair for ventral hernias is an acceptable alternative to mesh repair. It brings a low complication profile and avoids the burden of mesh-related complications.

Introduction

Midline ventral hernias are commonly repaired with mesh despite the frequency of mesh-related complications. Mesh complications are relatively common, and include prosthesis infections, mesh migration, adhesions, entero-cutaneous fistulas, and chronic pain.

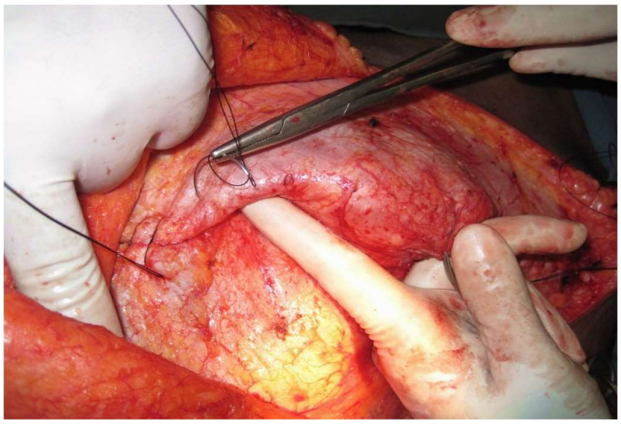
In an attempt to avoid mesh-related complications and the ensuing hernia lawsuit industry, many authors have described non-mesh repairs. Many of these focus on the type of suture material used and the placement of these sutures to approximate the linea alba. However, we believe these are inherently flawed as the linea alba in patients with ventral hernias is already thinned, widened, and attenuated.

In 1993, Naraynsingh. et al. [1] described the rectus muscle repair (RMR) technique to repair ventral hernias without the use of mesh. However, we noticed that a limitation of this technique was the inability to repair large hernia defects. The aim of this report was to describe a modification of this technique that allows it to be used for larger defects.

Report of a Case

A 55-year-old man with a body mass index of 34.5 Kg/M2 and a prolonged history of smoking presented to the surgical department with a large ventral abdominal wall hernia. He was prepared for general anaesthesia and taken to the operating theatre where he underwent a modified RMR repair.

The operation commenced with a Phannesteil incision for an abdominoplasty exposure, and the abdominal wall pannus was lifted to expose the Linea Alba. The hernia sac was dissected to its neck and freed from the Linea Alba extra-peritoneally. No attempt was made to dissect the contents of the sac. Instead, the sac and Linea Alba were inverted using a vertical continuous suture line. To achieve this, non-absorbable sutures were deliberately passed through the anterior sheath, the rectus abdominis muscle 2cm from the medial edge, and the posterior rectus sheath to approximate both sides en-masse. The index of the non-dominant hand was placed into the defect to allow a full-thickness bite of the rectus muscle and to protect the underlying bowel (Figure 1). The suture line extended at least 5cm above and below the hernia sac, essentially obliterating the weakened linea alba. In order to ensure unobstructed vision during closure, two suture lengths were used commencing from the upper and lower ends of the Linea Abla and meeting at the middle (Figure 2),



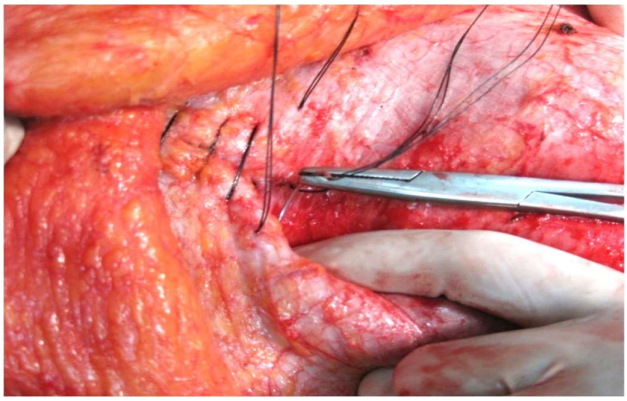


Figure 1: The surgeon's index finger is used to protect underlying structures, thereby allowing full-thickness bites of each rectus abdominis muscle to approximate the muscles and obliterate the linea alba.

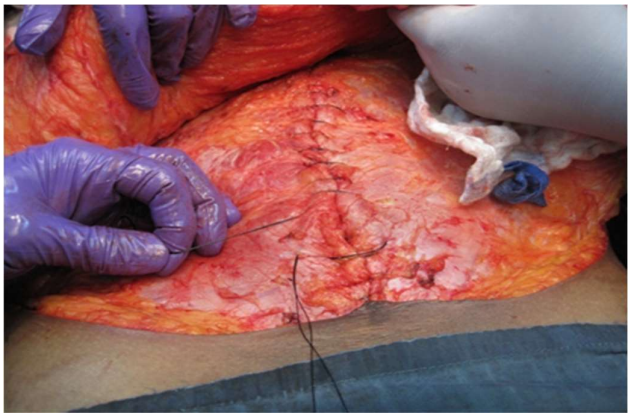


Figure 2: Two lengths of suture are used, commencing from the upper and lower ends of the Linea Alba respectively in order to reduce

tension at the widest point and to allow direct vision during closure.

The technique allows the rectus muscles to close the defect while the entire hernia sac and linea alba are inverted into the abdominal cavity. This was the standard RMR techqnique as described by Naraynsingh et al [1]. However, we realized that a limitation of this technique was that it created tension on the suture line when it was applied to the large herniae. Therefore, we modified the RMR technique when repairing hernia defects >6cm in maximal diameter.

In this modification, we extended the dissection 3-5cm from the medial edge of the anterior sheath of the rectus abdominis muscle. A vertical relaxing incision was made in each anterior rectus sheath (3-5 cm lateral to the suture line), keeping the underlying muscle and posterior sheath intact (Figure 3). This relaxing incision was not extended >1 cm below the umbilicus as there is a deficient posterior rectus sheath beyond that point.

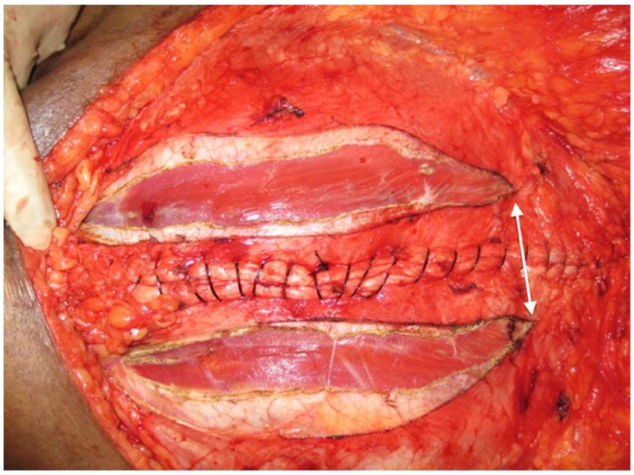


Figure 3: Relaxing incisions are placed in the anterior rectus sheath, but never extended >1cm inferior to the umbilicus (arrow)

This is a useful modification of the original RMR, especially where there is significant tension on the suture line. In this case, the patient had an uneventful recovery and there was no recurrence on clinical examination at his last clinical review 5 years post-operation.

Discussion

In the 21st century, most midline ventral hernias are repaired using mesh. However, mesh utilization is associated with many complications such as infection, adhesions, seromas, fistula formation, and significant postoperative pain [2-7]. Additionally, in limited resource settings such as ours, both the cost of mesh and its inconstant availability limit its utilization [8]. Finally, mesh utilization reduces but does not prevent hernia recurrence. The surgical literature documents recurrence rates ranging from 3-20% after mesh repair of ventral hernias [4,7,9,10,11].

For these reasons, we found the RMR technique attractive as it avoided mesh-related complications and resulted in low recurrence rates. In a previous report, Naraynsingh et al. [1] reported on the outcomes of 85 RMRs over a decade, documenting 1.2% recurrence at 12 months follow-up. In our opinion, the principles supporting this are sound: midline ventral hernias recur through the linea alba or beside the mesh - not through the mesh or through the rectus muscles with their anterior and posterior sheaths. It seems logical, then, that the RMR which eliminated the linea alba by bringing the rectus muscles together in the midline, would minimize the risk of recurrence. However, in our experience, we noted that there was increased tension on the suture line when we attempted to apply the RMR to large hernia defects >7 cm in maximal diameter. To counterbalance this, we developed the modification herein described. This modification allows the principles of RMR to be maintained.

It should be noted that this technique is different from the Keel operation which is a suture repair that was discontinued owing to a high recurrence rate. The major difference in this technique is that the 'inverting' suture goes en-masse through the anterior rectus sheath, rectus muscle, and posterior rectus sheath, thus eliminating the linea alba. In the Keel repair, the muscle is not engaged at all. Rodney Maingot described this operation in 1940 and, in his famous book Abdominal Operations, clearly states that he uses sutures 'for uniting and inverting the fibro aponeurotic margins of the defect', not the muscle [12]. We believe that the linea alba and all tissue medial to the rectus muscle must be obliterated by the repair since it is through this tissue that herniation occurs, not through the muscle. Maingot [12] also described a longitudinal incision through each anterior rectus muscle sheath about 10 cm lateral to the fibro aponeurotic margins to aid relaxation during

approximation of the fibrous ring'. We believe that the relaxing incision can be safely done 3 cm to 5 cm from the suture line. Both the 10 cm recommended by Maingot [12] and the Ramirez compartment separation technique [13] require far more lateral dissection than is necessary.

There is data to document that of the 20 million hernia repairs done every year worldwide, prosthetic mesh is used in 18 million cases [14]. Using a conservative estimate from the previously quoted data that recurrences occur in 3% of patients who undergo mesh repair of ventral hernias [4,7,9,10,11], 540,000 patients will have recurrences annually. Also, considering that 6-10% of patients will develop mesh infections [15,16,17,18], this amounts to a conservative estimate of 1,080,000 patients with mesh infections per annum. This modification of the RMR technique has the potential to eliminate mesh infection in 1,080,000 patients and reduce recurrences.

The authors believe this is such a compelling argument, that we have not even discussed other mesh-related complications, such as chronic pain [7,19,20,21], adhesions [22,23,24,25,26] and fistula formation [27,28]. Neither have we considered the cost of mesh and/or the well-documented financial, social, and legal implications of mesh-related complications [2-8].

Conclusions

The modified rectus muscle repair for ventral hernias is an acceptable alternative to mesh repair. It brings a low complication profile and avoids the burden of mesh-related complications.

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