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The "Inside-out" Technique for Hernia Repair with Mesh Underlay

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Background: An improved method for mesh repair of ventral/incisional hernias after component separation is presented. The use of a Carter-Thomason suture passer (Cooper Surgical, http://www.coopersurgical.com) allows for safe passage of preplaced sutures on the mesh from within the abdominal cavity through the anterior rectus sheath. This "inside-out" method makes the underlay of mesh fast and easy by improving visualization and control of sharp instruments as they are passed through the abdominal cavity. Preplacement of sutures circumferentially on the mesh also improves the distribution of tension around the repair, which may ultimately reduce the risk of hernia recurrence.
Methods: The "inside-out" technique was performed on 23 patients at a single tertiary academic medical center from November 2011 to February 2014. We have followed these patients for a median of 24.5 months to assess for postoperative complications and hernia recurrence.
Results: We report an acceptable hernia recurrence rate (2 of 23 = 8.7%). One recurrence was observed in a patient who underwent repair of a recurrent ventral hernia and the other had significant loss of domain requiring an inlay mesh.
Conclusions: The "inside-out" technique for ventral hernia repair with a mesh underlay after component separation using a Carter-Thomason suture passer is easy, safe, and reliable. We have observed no hernia recurrence in patients who underwent repair for a primary ventral hernia with an underlay technique. *(Plast Reconstr Surg Glob Open 2015;3:e422; doi: 10.1097/GOX.0000000000000377; Published online 17 June 2015.)*

Mesh has firmly supplanted primary use of suture closure for the repair of ventral/incisional hernias. Mesh underlay has been shown to be superior to both inlay[1] and onlay mesh locations in reducing the rate of reherniation,[2] but there is a lack of consensus on the method of installation to use.[3] Each method has benefits and drawbacks, leaving opportunity to improve the technical installation of the mesh. We present a method of securing mesh (either prosthetic or biologic) as an underlay concurrent with component separation,[4,5] with preplaced sutures on the material, to the overlying fascia through an "inside-out" technique using a Carter-Thomason suture passer (Cooper Surgical, http://www.coopersurgical.com). The Carter-Thomason is a sharp, narrow trocar (50 µm to 2 mm diameter at the tip) with the ability to grasp a suture at the distal, sharp end. It was originally designed to aid with

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closure of laparoscopic ports by facilitating the placement of sutures through fascia around port sites.[5,6]

SURGICAL TECHNIQUE

The abdomen is opened using a prior vertical midline incision, and a generous lysis of adhesions is performed. The fascia is found and freed on either side of the midline, and any hernia sac is removed. The peritoneum, where it will contact mesh, is also scored or removed to promote adhesion at this interface. The skin and subcutaneous tissue is elevated from the fascia taking care to protect any significant perforators supplying the overlying skin. A component separation is performed by incising with monopolar cautery lateral to the lateral border of the rectus muscle to free the external oblique aponeurosis, allowing the rectus to move medially for possible direct closure of the midline fascia. A generous piece of mesh is prepared and placed into the abdomen and then cut to allow overlap with the fascia of at least 5 cm from the reapproximated midline defect.[6] The mesh is then brought to a back table where the location of polypropylene or polyester interrupted sutures is marked every 2 cm circumferentially and 2 cm from the edge. Sutures are placed and the needles removed. The mesh is placed back into the abdomen with the sutures on hemostats. The location where sutures should exit the rectus sheath is marked on the outside of the fascia to facilitate even distribution and tensioning. A Carter-Thomason is used to retrieve the sutures and pass them through the fascia from within the abdomen (Figs. 1 and 2). The sutures are then tied external to the rectus sheath, alternating from side-to-side around the defect to help distribute tension and firmly secure the mesh to the underside of the rectus sheath. A #15 suction drain is placed in the potential space between the mesh and the posterior rectus. A #19 suction drain is placed over each component separation. Over the top of the mesh, the fascia is closed with #1 or #0 looped polydioxanone suture. Scarpa's fascia and the deep dermis are approximated with interrupted 3-0 absorbable suture. The skin is then closed with a technique commensurate to the degree of wound contamination. The authors understand and abide by the rules set forth in The Declaration of Helsinki.

RESULTS

We have used the "inside-out" technique in 23 cases. The median follow-up period was 24.5 months (range, 14–42 months). There were 3 (13.0%) superficial wound infections and 1 (4.3%) deep wound infection. There were 6 (26.1%) bowel-related complications, including 1 case whose repair was reversed due to an anastomotic leak. There were 4 (17.4%) postoperative complications in other organ

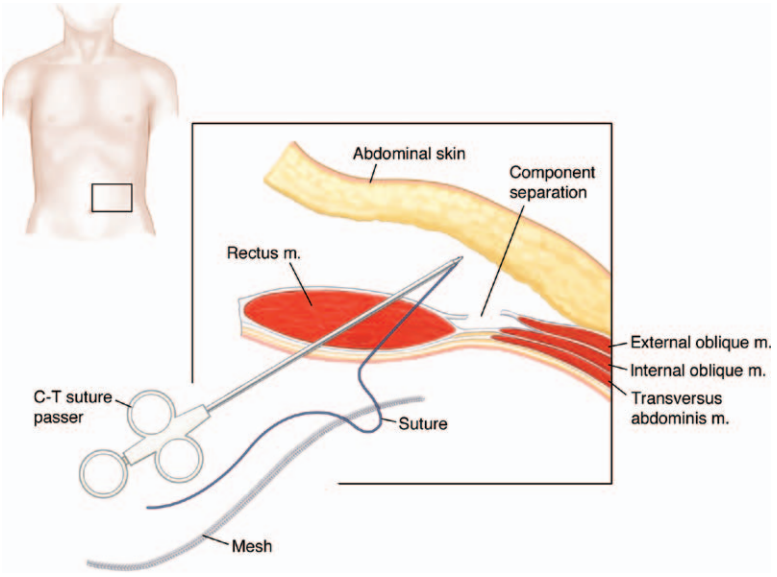

Fig. 1. A Carter-Thomason suture passer is used to grasp each suture and pass it through the rectus abdominis under direct vision and without the need for a suture needle within the abdominal cavity. The mesh protects the viscera from inadvertent injury by the sharp end of the Carter-Thomason suture passer. Sutures are tied external to the rectus sheath, alternating from one side of the defect to the other to evenly distribute tension. (Original artwork commissioned and paid for by Dr. Simon G. Talbot, all rights to publish are retained by the owner, Dr. Simon G. Talbot.)

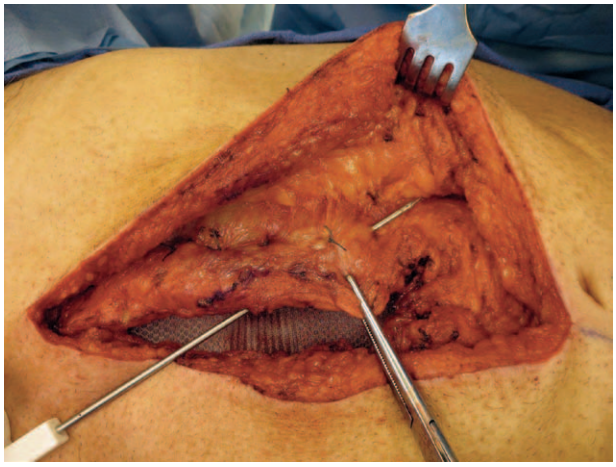

Fig. 2. The Carter-Thomason suture passer (lower left instrument) is used to retrieve each end of the preplaced sutures on the mesh and pass them through the abdominal fascia from within the abdomen. The skin and subcutaneous tissue is retracted to allow direct visualization and control of the suture passer. Interrupted mattress sutures are tied over the anterior rectus sheath, alternating from one side of the defect to the other to evenly distribute tension.

systems. There have been 2 recurrences (8.7%): one in a patient at 383 days postoperatively and the other at 311 days postoperatively. The former recurrence occurred in a patient who underwent repair for a recurrent ventral hernia, and the latter patient had significant loss of domain requiring an inlay mesh. There were no hernia recurrences in patients who underwent repair of a primary ventral hernia with an underlay technique.

DISCUSSION

Common techniques for open mesh repair of an incisional/ventral hernia involve passage of a needle from the anterior surface of the rectus into the abdomen.[7,8] Care must be taken to avoid visceral injury. Fibrin glue is a relatively new alternative that avoids needles, but long-term data are lacking to support its efficacy in preventing hernia recurrence. Tacks have also been described,[9] but they are frequently associated with chronic pain.

The technique described here seemingly reduces the risk of bowel injury by allowing direct visualization of the entire path of the sharp instrument, the tip of the Carter-Thomason, as it passes through the rectus. By passing this device from inside to outside of the abdomen, the surgeon can expeditiously place sutures easily and with less need for retraction. Additionally, preplaced sutures lie between the mesh and the posterior rectus fascia, allowing the mesh to shield the viscera from the path of the Carter-Thomason.

We believe that this technique optimizes the strength of mesh fixation in multiple ways. By preplacing the sutures in the mesh, these can be evenly spread, giving the surgeon better control over the distribution of tension across the repair. The Carter-Thomason tool allows for easy passage of the sutures in an alternating fashion around the mesh, further improving the distribution of tension. Sutures placed in the typical "outside-in" fashion can be completed haphazardly, creating "weak links" in the chain of mesh attachments to the overlying fascia. Lastly, preplacement of the sutures ensures greater overlap between the mesh and the rectus, further enhancing the overall strength of the repair.

Adequate healing around the mesh is important for the long-term stability of the repair. In the immediate postoperative period, drain placement improves tissue adherence by preventing hematomas, seromas, and infection. Removal of the hernia sac, scoring of peritoneum, and minimizing slack in the mesh also prevent seroma formation and facilitate the strength of the repair.

CONCLUSIONS

The "inside-out" technique for mesh ventral/incisional hernia repair after component separation using a Carter-Thomason suture passer is easy, safe, and reliable. In a series of 23 complex patients, we have observed an acceptable recurrence rate (2 of 23; 8.3%) and no recurrences in 8 patients who underwent repair for a primary hernia with the described mesh underlay technique.

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