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A Long-term Follow-up of a Single Rural Surgeon's Experience with Laparoscopic Inguinal Hernia Repair

Tim Napier, MD, FACS; Jeremi T. Olson, PA-C; Jennifer Windmiller, BA; Jennifer Treat, MA

ABSTRACT

Introduction: Inguinal hernia repair is one of the most common surgical procedures performed in the United States, with an estimated 700,000 or more completed annually.

Objective: This study looks at 7 years of laparoscopic totally extra-peritoneal (TEP) inguinal hernia repair at a rural Wisconsin medical center. The goal is to accurately measure recurrence rates and mechanisms of recurrences within a single professional's practice using a follow-up of no less than 2 years. A secondary goal was to record the percentage of patients with short-term and long-term complications.

Method: Patients with laparoscopic TEP inguinal hernia repairs from 1997 through 2004 were seen in follow-up visits ≥2 years after their initial repair. Of a possible 165 patients, 100 (61%) participated, returning for a total of 141 (64%) follow-up exams. Follow-up range was 2-7 years, with a mean of 3.7 years. All repairs were completed using a single technique (TEP) by a single surgeon. Repair variables included mesh thickness, style of mesh to cord accommodation, and fixation technique. Study participants ranged from 16 to 88 years, with an average age of 65.9 years. A wide range of socioeconomic indicators were represented, including education, occupation, and household income. Five participants were female and 95 were male.

Main Outcome Measure: The primary study outcome was the identification of an accurate recurrence rate along with the mechanism of hernia recurrence. Patients with long-term groin pain (dysesthesia) and identification of short-term complications were also noted.

Results: Between 2004 and 2007, 100 patients were seen for follow-up. None had symptomatic hernia recurrences. One recurrence was found at exam and confirmed with a herniogram and laparoscopic surgical exploration. Two additional patients, identified by exam and herniograms as having suspected recurrences, are awaiting surgical exploration. In the case of 1 recurrence, the mechanism appears to be partial migration of mesh from the placement area. Long-term groin dysesthesias (moderate or occasional) occurred in 2 patients or 1.4% of repairs. Spermatic cord hematoma (18% of repairs) was the most common short-term complication.

Conclusions: Laparoscopic TEP inguinal hernia repairs are effective and durable in a rural setting. An acceptable recurrence rate (0.7%-2.1%) may be related to mesh placement, completeness of dissection, and the small but real risk of mesh migration or displacement prior to healing fixation. Long-term pain complications are reasonably low.

INTRODUCTION

Inguinal hernia repair is one of the most common surgical procedures performed in the United States, with an estimated 700,000 or more completed annually. A number of hernia repair techniques are used, each with pros and cons, resulting in relatively variable hernia recurrence rates due to a variety of factors.

A prospective VA Medical Center study published in April 2004 that compared laparoscopic inguinal hernia repairs with open mesh hernia repairs concluded that laparoscopic repairs had a higher recurrence rate than open hernia repairs.[1] This study had a number of potential weaknesses, including variability of technique between surgeons, the likelihood of residents performing repairs, and the inclusion and variation between

Author Affiliations: Mile Bluff Medical Center and Hess Memorial Hospital, Mauston, Wis (Napier, Treat, Olson, Windmiller); St. Mary's Hospital, Dean Clinic, Madison, Wis (Olson).
Corresponding Author: Tim Napier, MD, FACS, Mile Bluff Medical Center, 1040 Division St, Mauston, WI 53948; phone 608.847.9839; e-mail tnapier@milebluff.com or timnapier@verizon.net.

2 laparoscopic repairs (transabdominal preperitoneal [TAPP] and totally extraperitoneal [TEP]). Some long-term studies (>2 years) of hernia recurrence in laparoscopic TEP repairs have involved only 1 surgeon with 1 technique.[2]

Previous studies regarding inguinal hernia recurrences have not specifically identified the nature or mechanism of their recurrences. In most studies, it appears that in laparoscopic repairs, hernia recurrences appear early (within months of the repair) as opposed to open hernia repairs, where recurrences may not happen until years later.[3] A 1996 study by Liem et al identified 3 factors relating to recurrences after laparoscopic TEP repairs: (1) missed indirect hernia, (2) improper mesh placement, and (3) incomplete dissection of cord and surrounding structures.[4] These technical problems usually show themselves within a relatively short time post-operative as hernia recurrences. Two additional issues not discussed in the study should also be considered as potential causes for recurrence: (1) migration or displacement of mesh (away from proper placement) and (2) finer (thin) mesh with reduced positional stability.

For over 10 years, the surgeon in this study performed laparoscopic inguinal hernia repairs for single-sided, bilateral, and recurrent inguinal hernias in rural Wisconsin. During that time, no patients returned with a symptomatic recurrence. Laparoscopic hernia repairs were utilized over open repairs for a number of reasons, including favorable results of early studies (ie, reduced recurrences, reduced pain, earlier recovery).[5] A more intuitive factor was the surgeon's belief that an inner patch repair should have a mechanical advantage to an outer patch and that a larger patch could be placed in the pre-peritoneal position as opposed to the open anterior hernia wound. However, when the VA study[1] was published it seemed necessary to assess this practice's data regarding laparoscopic repairs and recurrences.

All of these repairs were completed with 1 technique: TEP. Variables in repairs included size of mesh, mesh thickness, spermatic cord accommodation, and mesh fixation techniques. The repair technique evolved somewhat over time with regard to the listed variables (Figures 1-3). Lower profile fixation methods (reducing the amount of tissue entrapped) were used; most recently fibrin sealant has been used to secure the mesh. This change was an attempt to reduce the number of patients with post-operative dysesthesia from presumed nerve entrapment via tacks. Currently the Bard 3DMax Mesh in standard sizes is utilized, rather than fashioning the shape and size from a flat piece of (15 cm. x 15 cm.) marlex mesh as had been done in the past. A small incision is made in the mesh to restore the spermatic cord (or round ligament) to its natural anatomic position with respect to the internal inguinal ring. Initially, a lateral-horizontal slit (Figure 1) in the mesh was made

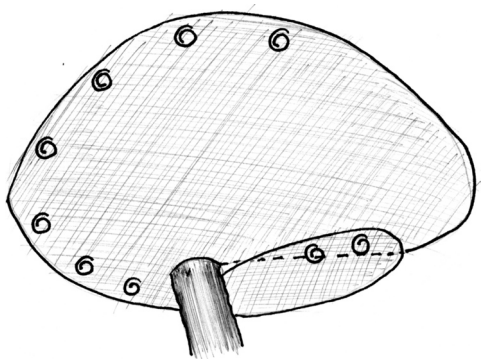

Figure 1. 5 mm Helical Tacks. Lateral Horizontal Slit with overlap.

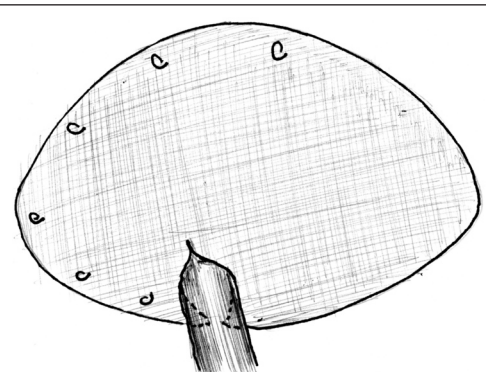

Figure 2. 5 mm Salute Tacks. Vertical Slit in preformed (3-D) mesh.

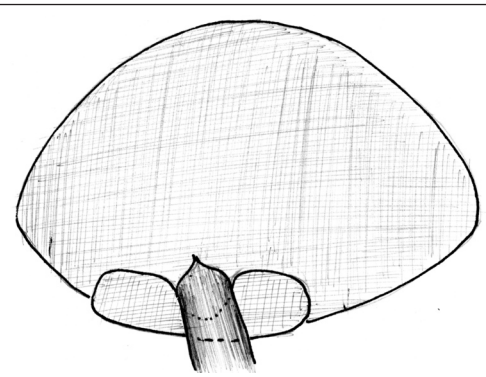

Figure 3. Fibrin Sealant (no tacks). Vertical Slit with underlying mesh.

Table 1. Long-term Complications

Complication Type	Number of Patients	Complication Percent
Mild—rare dysesthesia	8	5.7
Moderate—occasional dysesthesia	2	1.4
Hydrocele	2	1.4
Residual cord hematoma	1	0.7

Table 2. Short-term Complications

Complication Type	Number of Patients	Complication Percent
Spermatic cord hematoma	25	18
Scrotal seroma / hydocele	3	2.1
Umbilical hematoma	2	1.4
Pneumonia	1	0.7
Prostatitis / epididymitis	1	0.7
Abdominal pain and hospital admission	1	0.7
Prolonged discomfort	1	0.7

but now a vertical slit is used (Figure 2). A second small rectangular piece of mesh is used to prevent tissue protrusion below the cord through the vertical slit in the mesh (Figure 3).

METHODS

This is a retrospective study with long term (≥2 years) follow-up in a patient pool of prior laparoscopic TEP inguinal hernia repairs. Out of a total of 165 eligible patients, 100 patients participated. Eligible patients had undergone laparoscopic inguinal hernia repairs from 1997 through 2004. All repairs were completed with 1 technique (TEP) by 1 surgeon. Variables included mesh type (mesh thickness), style of mesh to cord accommodation, and fixation (Figures 1-3). Follow-up range was 2-7 years, with a mean follow-up of 3.7 years.

Hernia recurrence was initially detected during scheduled examinations. Patients with equivocal findings by exam were recommended for further evaluation by herniography. Four of 6 patients with possible recurrences agreed to this. Laparoscopic exploration for further confirmation and repair was recommended for patients with radiographic findings of recurrence. As part of a patient's follow-up examination, they were asked questions regarding recurrent symptoms of pain, chronic pain at rest, or bulging during strenuous activity.

Postoperative complications were classified as short- and long-term. Short-term complications consisted of post-operative problems lasting no longer than 1 year and were identified by reviewing postoperative care records. Long-term complications were problems lasting longer than a year, and were usually identified through interview at the follow-up exam.

The study was performed at a rural medical center in south central Wisconsin.

RESULTS

One hundred sixty-five patients who had undergone a total of 220 laparoscopic TEP inguinal hernia repairs over a 7-year period (1997-2004) were eligible for the study. One hundred (61%) of these patients, representing 141 (64%) hernia repairs, participated in the study. None were symptomatic for hernia recurrence. Of the 141 hernia repairs, 6 repairs in 6 different patients were found, upon examination, to have possible recurrences. One patient had a clinically evident hernia recurrence, while the other 5 patients had equivocal exams. Of these 6 patients, 4 consented to radiographic herniograms. The herniograms showed 3 of the patients had the radiographic criteria of hernia recurrence. Only 1 of these 3 patients consented to and underwent laparoscopic exploration, confirmation of hernia recurrence, and repair. One elderly patient with an equivocal exam died (of unrelated causes) before a herniogram or surgery could be completed for confirmation. With only 1 confirmed recurrence, recurrence rate is 0.7%. Hernia recurrence for this patient was identified intraoperatively as a result of displacement of the mesh around the internal inguinal ring, which allowed protrusion of tissue through a previously compromised (dilated) internal ring. In the event that all 3 herniogram suspected recurrences are confirmed with surgery, the long-term recurrence rate would be 2.1%.

Long-term complications (Table 1) included 2 patients (1.4%) with moderate to occasional groin dysesthesia. Eight (5.7%) patients described very mild or rare groin dysesthesias, sometimes only noticed with lifting. The most common short-term complication (Table 2) was that of spermatic cord hematoma, occurring in 25% of patients or 18% of the total repairs. None of the patients with either short- or long-term complications were found to have recurrences.

DISCUSSION

Overall, the rate of recurrence was within the expected norm. The 1 surgically confirmed recurrence was felt to be secondary to mesh displacement around the internal ring. This probably occurred as a separation at the key-

hole slit of the mesh (which was placed before the surgeon began using a second piece of mesh in that area). In effect, this allowed a recurrent indirect inguinal hernia to occur. (In exploration of the recurrent hernia, the surgeon approached it from an intraperitoneal position to encounter the hernia defect from a field that had not been dissected (Figure 4). This approach allowed better identifcation of the position and mechanism of the recurrence defect.) Once the nature of recurrence was identified, the recurrent hernia was repaired with a TAPP technique.

Two patients with presumed small (asymptomatic) hernia recurrences noted through herniography are pending surgical exploration. Herniograms are quite helpful, but not solely diagnostic and as such these patients are not officially counted as recurrences until proven surgically.

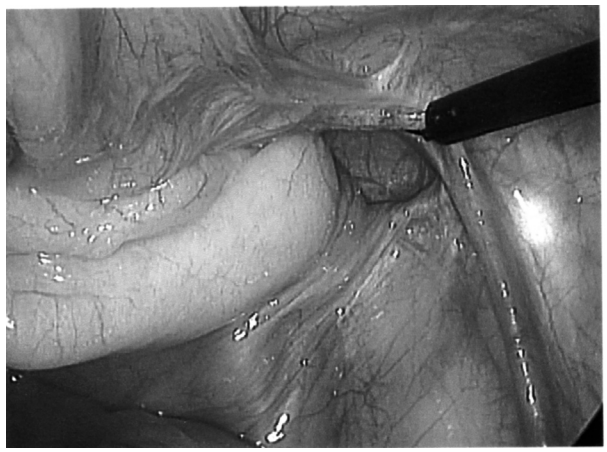

Figure 4. Recurrent indirect inguinal hernia defect viewed laparoscopically.

CONCLUSION

Laparoscopic TEP inguinal hernia repairs are effective and durable in a rural setting. An acceptable recurrence rate (0.7%-2.1%) may be related to mesh placement, completeness of dissection, and the small but real risk of mesh migration or displacement prior to healing fixation. Long-term pain complications are reasonably low.

The current development of a database of hernia repair patients to be seen for long-term periodic follow-ups should allow tracking of a relatively accurate recurrence rate for laparoscopic repairs over a short- and long-term period. This approach toward patient care is also consistent with the ever-advancing quality-of-care initiatives coming to general surgery, as well as the rest of medicine.

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