GENERAL SURGERY

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Laparoscopic totally extra-peritoneal groin hernia repair with self-gripping polyester mesh: a series of 780 repairs

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Abstract

Background: Laparoscopic groin hernia repair is an increasingly common procedure with benefits of reduced post-operative pain and infection. Post-operative chronic pain remains an ongoing concern in about 10% of patients. Parietex ProGrip™, a polyester self-gripping mesh, has a theoretical benefit of avoiding tacks for mesh-fixation. This case series reflects our long-term experience of this technique.

Methods: We conducted a retrospective case series from November 2011 to December 2017. Patients were identified through an operative Medicare Benefits Schedule item number search. Clinical documentation was reviewed with length of stay, mesh infection, chronic pain, recurrence and re-operation as primary data points.

Results: A total of 514 patients underwent 780 laparoscopic inguinal hernia repairs with self-gripping polyester mesh during this period. There were 53 female (10.3%) and 461 male patients (89.7%). Unilateral hernia repair was performed in 248 patients (48.2%) and bilateral repair in 266 patients (51.8%). Almost all repairs (779, 99.8%) were primary hernias. There were no mesh infections. Four recurrences were noted (0.51%) and three of these subsequently underwent open redo-hernia repairs (0.38%). Post-operative follow-up was up to 4.4 years.

Conclusions: Our series of laparoscopic groin hernia repair with self-gripping mesh demonstrate this is a safe and reliable mesh and effective technique with low recurrence rates.

Introduction

Inguinal hernias account for approximately 97% of all groin hernia repairs with males representing 90% of these repairs.[1] Inguinal hernias have been repaired through a variety of approaches with growing evidence comparing open, laparoscopic transabdominal preperitoneal, and totally extra-peritoneal (TEP) approaches.[2–4] The introduction of robotic surgery provides another emerging minimally invasive approach.[5] A Cochrane review in 2003 showed superior outcomes for postoperative pain, numbness, haematoma formation and surgical site infection for TEP and transabdominal preperitoneal repair over open surgery.[6] A recent meta-analysis further reinforced that TEP has a lower incidence of post-operative complications, earlier return to work and shorter hospital stay.[7] Whilst supportive of a laparoscopic approach from smaller case series, the 2018 International guidelines for groin hernia management strongly recommended the need for further evidence from larger series with long-term results.[8]

Another area that lacks consensus is the type of mesh utilized. Whilst a recent Cochrane review and the recent international guidelines demonstrate the benefits of the use of mesh, there is no guidance on the type.[8,9] The characteristics of mesh such as type of polymer, textile structure, total amount of material, porosity, configuration of textile bindings, implant location and mechanical strain all interplay to influence the outcome of the mesh hernia repair.[8] There is weak evidence that lightweight, large pore mesh may reduce the incidence of chronic pain and foreign body related discomfort.[10] Another dimension to the complexity of the issue is the use of mesh fixation devices.[11–13] Complications of fixation such as migration, recurrence and chronic pain have ensured that this also is an area of considerable debate.[14] There are no current recommendations regarding the use of self-gripping mesh in TEP repair.[15] Parietex ProGrip™ (Covidien, Dublin, Ireland) mesh has a

lightweight monofilament composition and large pore size which is understood to increase tissue integration and reduce foreign body reaction.[16] The re-absorbable polylactic acid gripping system gives the mesh self-adhesive properties, which degrades over time to reduce overall tension on the mesh.[17]

We present a large retrospective case series of polyester self-gripping mesh in TEP groin repair with long-term follow-up. This case series builds on our earlier published experience of this technique.[15]

Methods

A retrospective review was conducted on patients of a single surgeon, identified through Medicare Benefits Schedule operative item number search (laparoscopic groin hernia repair, 30609). A total of 514 consecutive patients undergoing elective laparoscopic inguinal hernia repair in a single centre between November 2011 and December 2017 were included in the study. Inclusion criteria included adults (≥18 years of age) undergoing elective repair of groin hernias using a TEP approach with Parietex ProGrip mesh. Patients who had previously undergone open groin hernia repairs presenting with recurrence were eligible for inclusion. Exclusion criteria included patients with previous laparoscopic inguinal hernia surgery and emergency procedures for incarcerated or strangulated hernias. Data were extracted from electronic medical records (including inpatient and consultant clinic documentation) with attention to patient demographics, hernia characteristics, post-operative morbidity and recurrence. All post-operative morbidities were documented and then categorized. The two broad categories were immediate (inpatient) and delayed post-operative morbidities. The immediate morbidity category was subdivided into urological, haematological, haematoma/seroma, infection, lipoma and prolonged stay. Delayed complications included recurrence and chronic pain. Chronic pain was defined as persisting pain requiring analgesia for more than 3 months, affecting quality of life and requiring further investigation as per the International Guidelines for Groin Hernia Management.[8]

The study was conducted in accordance with approval from the NSW Health South Eastern Sydney Local Health District Human Research Ethics Committee (HREC reference number 18/131 LNR/18/POWH/264).

Our surgical technique has been previously described in detail.[15] All patients underwent a TEP approach with two 5 mm ports and balloon-assisted preperitoneal dissection through a 12-mm camera port (Fig. S1). Prior to introduction into the preperitoneal space, a 12 cm × 15 cm mesh was rolled from both the superior and inferior margins towards a mid-horizontal plane. The rolled mesh was marked transversely with a sterile surgical pen along both rolled edges and longitudinally two-thirds along the intended medial border. These markings aided with orientation by positioning the mesh over the deep inguinal ring and also facilitated appropriate medial coverage (Fig. S2). The inferior and then superior aspect of the mesh are unrolled in a lateral to medial direction to ensure even placement within the groin and pelvis (Fig. S3). Desufflation of the preperitoneal space following satisfactory positioning is performed under vision (Fig. S4).

Results

Five hundred and fourteen patients underwent 780 TEP laparoscopic groin hernia repairs between November 2011 and December 2017 using Parietex ProGrip mesh. The mean age was 57.87 ± 16 years. There were 53 female (10.3%) and 461 male patients (89.7%). Unilateral hernia repair was performed in 248 patients (48.2%) and bilateral repair in 266 patients (51.8%). There was only one redo hernia repair included (0.001%) (Table 1).

Median follow up was 2.83 ± 26 weeks, with the longest follow-up to 4.4 years. Patients were followed up 2 weeks post-operatively and as clinically indicated thereafter. From this cohort, 44 patients were lost to follow-up. Both immediate and delayed complications were uncommon (0.13–1.67% of hernia repairs; Table 2). The most common adverse event was chronic pain (1.67%). This was followed by urological complications (which included urinary retention; seven patients, hydrocele; three patients or epididymitis; one patient) and haematoma/seroma both at 1.41%. Lipomas occurred in 1.28% of patients while haematological morbidity, namely post-operative bleeding requiring blood product transfusion, occurred in 0.51%. Prolonged stay (0.38%) was defined as an admission greater than 24 h. The causes of prolonged stay included post-operative confusion, abdominal tenderness and medical complications (cardiac arrhythmia) with each occurring in one patient. Recurrence was diagnosed in four patients (0.51%). Three of these patients underwent open revisional hernia surgery.

Discussion

There is a lack of consensus in many aspects of groin hernia repair. One area of contention involves the type of mesh and mesh fixation utilized. The recent International Hernia Guidelines does not resolve this issue. The guidelines do, however, show some evidence that using fixation techniques such as tacks and glue do not confer any advantage in TEP groin hernia repair.[8] It also demonstrated strong evidence that the choice of mesh can change clinical outcomes. The use of self-gripping mesh theoretically avoids many of the suggested complications of fixation by tacks or glue, namely post-operative pain and numbness.[16] Previous studies with self-gripping mesh have not been able to consistently confirm lower chronic pain rates when compared with other mesh fixation.[18–21] Our study revealed a chronic pain rate of 1.67% with self-gripping mesh which is lower than the median rates in recent meta-analysis studies of chronic pain in mesh (3.5%) and non-mesh repairs of groin hernias (2.9%).[22]

Table 1 Patient demographics

Number of total patients	514
Total number of repairs	780
Female, *n* (%)	53 (10.3)
Male, *n* (%)	461 (89.7)
Age (mean years)	57.87 (±16.0)
Unilateral, *n* (%)	248 (53.8)
Bilateral, *n* (%)	267 (46.2)

Table 2 Post-operative morbidity

Recurrence, *n* (%)	4 (0.51)
Re-operation, *n* (%)	3 (0.38)
Prolonged stay, *n* (%)	3 (0.38)
Chronic pain, *n* (%)	13 (1.67)
Wound infection, *n* (%)	1 (0.13)
Haematoma/seroma, *n* (%)	11 (1.41)
Lipoma herniation, *n* (%)	10 (1.28)
Urological complication, *n* (%)	11 (1.41)
Haematological complication, *n* (%)	4 (0.51)

In our study, post-operative morbidity was classified as immediate or delayed. Immediate complications included prolonged hospital stay, wound infection, haematoma/seroma, urological complications and haematological complications. Delayed complications included chronic pain and recurrence. The overall morbidity rate was 7.68% for patients having had one of the above complications. There were no patients identified in this cohort that required referral to a chronic pain specialist. The 6-year follow-up period allowed a reasonable amount of time for identifying patients with post-operative chronic pain; however, it is difficult to draw conclusions on this due to the relatively short median follow-up. One patient reported pain which lasted 6 months post-operatively that settled without intervention. When comparing the morbidity rate of our study to a recent Cochrane review, our wound infection was 0.13% versus 4%, and our overall haematoma/seroma rate was 1.41% versus 4–7% for haematoma and 2–5% for seroma.[9] This indicates that the results and low morbidity rates of our high-volume experience compares well to other published studies. These results build on our previously published early experience on this technique.[15] A consistent rate of recurrence in groin hernia repair is difficult to determine in the literature, with a range from 0.88% to 15% being reported.[23,24] A hernia registry of 11 228 patients revealed a recurrence rate with mesh fixation of 0.88% at 1 year, while no mesh fixation had a recurrence rate of 1.1% without a significant difference in unadjusted analysis.[23] A Cochrane systematic review reported a recurrence risk of 4% in non-mesh repair and 1–3% in mesh repair.[9]

A recent randomized trial of 270 patients compared self-fixating with control mesh-reinforcement.[25] The study demonstrated reduced early post-operative pain in the control group, with no difference at 3 weeks or 1 year and no recurrences. However, the authors utilized tacks in 19 patients (14.3%) in the self-fixating group and only a minority received tacks in the control group (31.6%). Our protocol is for no tacks to be used with self-gripping mesh and the routine use of absorbable tacks in conventional mesh-reinforcement. Another large series of 527 patients with 649 TEP repairs demonstrated 1.5% recurrence rate and 1% chronic pain at 6 years follow-up.[26]

The strengths of our study are the operations were performed by a high-volume surgeon at a single centre. Our study demonstrated a very low recurrence rate (0.51%) and low chronic pain rate (1.67%) in a large case series of 780 TEP repairs. The retrospective nature of our series and lack of a comparative conventional mesh with fixation arm are limitations. Although the mean follow-up period was relatively short, patients with any postoperative issues would return to our practice due to the high-volume nature of the centre. Even with an assumption of measurement bias and increasing the recurrences by a factor of 3 would still result in a low recurrence rate.

This study builds on our early published experience[15] and demonstrates that TEP repair of inguinal hernias with self-gripping mesh is a safe and effective technique with low recurrence and early postoperative pain rates. A future randomized study of conventional mesh with routine tacks and self-gripping mesh without tacks, with long-term follow-up is recommended before conclusions regarding recurrence and chronic pain can be drawn.

Conflicts of interest

None declared.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Figure S1. Dissection of the preperitoneal space.
Figure S2. Positioning of the mesh over the deep inguinal ring.
Figure S3. Unrolling of the mesh following the contour of the groin and pelvis.
Figure S4. Deflation of the preperitoneal space following satisfactory positioning of the mesh.