

Outcomes After Laparoscopic Transabdominal Pre-Peritoneal Repair (TAPP) For Groin Hernia In A Single Consultant Series

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Aim: TAPP repair is an established minimally invasive approach for groin hernia repair. The objective of this study was to report post-operative outcomes after TAPP repair in a single surgeon series and benchmark these against reported outcomes in the literature.

Methods: All patients who had an elective or emergency TAPP repair of a groin hernia from September 2016 to March 2020 in a district general hospital were retrospectively analysed from the electronic care record (ECR) for post-operative morbidity, re-admission, recurrence and length of hospital stay. The primary outcome of interest, chronic post-operative pain, was assessed via telephone interviews using the European Registry for Abdominal Wall Hernias Quality of Life (EuraHS-QoL) questionnaire.

Results: 164 patients, incorporating 190 hernia repairs were included. 155 (94.5%) were men and 9 (5.5%) were women. The median age was 51 (range: 20-81). 160 (97.6%) patients had an elective repair and 4 (2.4%) had an emergency repair. 157 (95.7%) patients underwent a primary inguinal hernia repair, of which 26 (15.8%) had a bilateral inguinal hernia repair. 7 (4.3%) patients had a femoral hernia repair. All procedures were performed by a single consultant surgeon. One emergency patient required conversion to open to allow for resection of ischaemic small bowel, however, the hernia itself was repaired laparoscopically. 94 (57.3%) patients were successfully contacted to provide EuraHS-QoL scores. 13/94 patients (13.8%) complained of chronic pain at rest on an average follow-up of 32.7 months (range: 16-43m). 2/94 (2.1%) patients had mild pain, 9/94 (9.6%) had moderate pain and 2/94 (2.1%) patients had severe pain at rest. 131 (79.9%) TAPP repairs were performed as day case procedures. Median length of stay in those patients who were not day cases was 1 day (range=1-11 days). Post-op morbidity rate was 7.9% (n=13), however, these were minor complications (Clavien-Dindo I/II). Incidence of seroma and haematoma was 1.8% (n=3) each. Re-admission rate was 3% (n=5). Mean follow-up of patients was 21 months (SD 12.6m, range=1-43m). Two patients (1.2%) had a recurrent groin hernia during this time period and one patient (0.6%) had a port site hernia.

Conclusion: The outcomes of chronic post-operative pain and rate of recurrence were comparable to those reported

in the literature. Re-admission rate was low and there were no major complications. The majority of patients were performed as a day case.

Keywords: Laparoscopic groin hernia repair, trans-abdominal pre-peritoneal repair, chronic pain, hernia recurrence, elective surgery, day case surgery.

Introduction

Minimally invasive techniques (TAPP and TEP (totally extra-peritoneal repair)) for groin hernia repair were first introduced in the early 1980s.¹ Since then, outcomes from these procedures have been extensively reported in the literature. Recurrence rate after laparoscopic repair is comparable to that of open conventional techniques and has been reported to be up to 5%.^{2,3} A multi-centre randomized controlled trial reported incidence of chronic pain following laparoscopic repair to be half that of open Lichtenstein repair at the end of 5 years, 9.4% compared to 18.8%.⁴

Both TAPP and TEP are equally popular as established laparoscopic techniques. A detailed review of outcomes following laparoscopic inguinal hernia repair by the HerniaSurge group in 2018 did not show any significant difference in operative times, recovery time, post-operative pain, total complication rates, hospital length of stay, recurrence rates or costs between TAPP and TEP repair. However, access-related complications can differ; there is increased risk of visceral injury during trans-abdominal entry with TAPP while there is increased risk of vascular injury during extra-peritoneal entry and dissection during TEP.⁵

The aim of our study was to review the post-operative outcomes in a single consultant surgeon series of TAPP procedures for both an elective and emergency presentation of a groin hernia and benchmark these against accepted published standards. The primary outcome of interest was incidence of chronic post-operative pain. Secondary outcomes were post-operative morbidity, readmission rates, hernia recurrence and length of hospital stay.

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Methods

All patients who had an elective or emergency TAPP repair of a groin hernia at our district general hospital from September 2016 to March 2020 by one consultant surgeon were retrospectively analysed for post-operative morbidity, re-admission, hernia recurrence and length of hospital stay. All information was retrieved from electronic care records (ECR) by assessing discharge summaries and any subsequent documents or relevant investigations that may report a recurrence.

All patients presenting with an elective or emergency groin hernia were offered a TAPP repair unless they had a large, irreducible inguinoscrotal hernia when an open repair was offered. A standard 3-port TAPP repair was performed using a flat 15x10cm lightweight, macroporous polyester mesh secured in a standard way with absorbable tacks and the peritoneal flap closed with an absorbable continuous suture.

Chronic post-operative pain was defined as pain occurring more than 3 months after surgery, as per the International Association of the Study of Pain,⁶ and was analysed using the European Registry for Abdominal Wall Hernias Quality of Life (EuraHS-QoL) score via telephone interviews. The EuraHS-QoL score is a validated disease-specific, patient-reported outcome tool that can be used to quantify pain at the site of the hernia repair, restriction of daily activities and cosmetic discomfort.^{7, 8} We did not have any preoperative scores for this cohort of patients and cosmetic scores were not recorded as it was felt that this outcome is more relevant to major incisional hernia repairs. Reasonable efforts were made to contact initial non-responders on at least 2 further occasions in order to maximise the data obtained.

Descriptive statistics were used to analyse the data in Microsoft Excel (Version 16.16.22).

Results

164 patients, 94.5% (n=155) men and 5.5% (n=9) women, were included in the defined time period. The median age of the patients was 51 (range: 20-81). 160 (97.6%) patients had an elective repair and 4 (2.4%) had an emergency repair. 157 (95.7%) patients underwent a primary inguinal hernia repair, of which 26 (15.8%) patients had a bilateral inguinal hernia repair. 7 (4.3%) patients had a femoral hernia repair. Therefore, the total number of groin hernia repairs was 190. All procedures were done by a single consultant surgeon (RT). One patient required conversion to open to allow for resection of ischaemic bowel in a strangulated femoral hernia, however, the hernia itself was repaired laparoscopically.

131 (79.9%) patients were performed as a day case. Median length of stay in those patients who were not day cases was 1 day (range=1-11 days). Post-operative morbidity occurred in 13 (7.9%) patients. These were all minor complications (Clavien-Dindo I/II) as outlined in Table 1. 3 (1.8%) patients had a seroma and 3 (1.8%) had a haematoma. 5 (3%) patients

Table 1: Post-operative complications

Patient Age	Morbidity	Clavien-Dindo Grade	Day Post-op	Management
58	Vasovagal episode	I	0	Conservative
20	Urinary retention	I	0	Catheterized
75	Urinary retention	I	0	Catheterized
70	Haematoma	I	1	Conservative
50	Nausea & Vomiting	I	2	Non-specific, resolved with conservative management, discharged
76	Chest Sepsis, Paralytic Ileus, Haematoma	II	2	IV antibiotics TPN HDU Level 2 care
37	Haematoma	II	6	Conservative
70	Port site infection	II	7	Oral antibiotics
51	Pleuritic chest pain	I	8	Admitted under medics, negative CTPA, discharged
44	Testicular pain and bruising	I	16	Required admission, non-specific, conservative management
42	Seroma	I	24	Conservative
32	Seroma	I	51	Conservative
33	Seroma	I	75	Conservative

needed a re-admission (Table 2). Mean follow-up of patients was 21 months (SD 12.6m, range=1-43m). 2 patients (1.2%) had a recurrent groin hernia during this time period. One (0.6%) patient had a port site hernia.

Table 2: Re-admissions

Reason for Admission	Day Post-op	Diagnosis and Treatment
Nausea & Vomiting	2	Non-specific, resolved with conservative management, discharged
Pyrexia & suprapubic tenderness	6	Infective collection, resolved with IV antibiotics
Pleuritic chest pain	8	Admitted under medics, CTPA negative, discharged
Testicular pain and bruising	16	Non-specific, conservative management
Groin swelling & pain	24	Conservative management

94 patients were available to provide EuraHS-QoL scores via telephone interviews. Mild pain was defined as score 1 to 3, moderate pain as score 4 to 7 and severe pain as score 8 to 10. Likewise, restriction to daily activities, both indoor and outdoor, and restriction to sports and heavy labour was also stratified as mild (score 1-3), moderate (score 4-7) and severe (score 8-10). Pain and restriction scores of contactable patients are described in detail in Tables 3-6.

Table 3: Post-operative pain scores

**Average follow-up*

Severity of pain	Pain at rest n (%) [Avg. f/u*=32.7m (range=16-43m)]	Pain during day-to-day activities n (%) [Avg. f/u=30.5m (range=16-43)]	Pain during last week n (%) [Avg. f/u=28.8m (range=16-43)]
Mild	2 (2.1%)	2 (2.1%)	1 (1.1%)
Moderate	9 (9.6%)	8 (8.5%)	10 (10.6%)
Severe	2 (2.1%)	5 (5.3%)	2 (2.1%)
Total	13 (13.8%)	15 (15.9%)	13 (13.8%)

Table 4: Post-operative restriction to activities

Severity of restriction to activities	Restriction to daily indoor activities n (%) [Avg. f/u=24.2m (range=16-42m)]	Restriction to daily outdoor activities n (%) [Avg. f/u=20.2m (range=16-34m)]
Mild	4 (4.3%)	2 (2.1%)
Moderate	None	3 (3.2%)
Severe	2 (2.1%)	1 (1.1%)
Total	6 (6.4%)	6 (6.4%)



Table 5: Post-operative restriction to sports

Severity of restriction	Restriction to sports Avg. f/u=23.6m (range=16-43m)
Mild	None
Moderate	5 (7.9%)
Severe	2 (3.2%)
Did not do sports	31 (33%)

Table 6: Post-operative restriction to heavy labour

Severity of restriction	Restriction to heavy labour [Avg f/u=26.2m]
Mild	4 (5.4%)
Moderate	3 (4%)
Severe	2 (2.7%)
Did not do heavy labour	20 (21%)

Discussion

This was a retrospective study which aimed at reporting important surgical outcomes after laparoscopic TAPP repair of groin hernia. The primary outcome of interest was the incidence of chronic post-operative pain. Prevalence of chronic post-operative pain ranges from 1 to 32% in the literature. The incidence of chronic pain in our cohort was 13-16%, of which approximately 5% was reported to be severe by patients. Table 7 shows our rate of chronic pain when compared to other studies.^{4, 9-17}

Table 7: Prevalence of chronic pain

Study	Chronic pain in laparoscopic group	Chronic pain in open group
Butters 2007	13/81 (16%)	24/76 (31.5%)
Eker 2012	37/247 (15%)	66/235 (28.1%)
Eklund 2010	58/616 (9.4%)	124/659 (18.8%)
Gokalp 2003	1/61 (1.6%)	0/62 (0)
Heikkinen 2004	0/62 (0)	4/59 (6.8%)
Lau 2006	9/91 (9.9%)	18/83 (21.7%)
Pokorny 2008	6/119 (5%)	4/65 (6.1%)
Sevinc 2019	5/147 (3.4%)	39/155 (25.2%)
Wang 2013	0/168 (0)	2/84 (2.4%)
Westin 2016	39/188 (20.7%)	62/187 (33.1%)
Riaz et al. (our study)	13/94 (13.8%)	x

The lack of a standard definition is primarily responsible for the variable rates of chronic pain reported in the literature.¹⁸⁻²¹ A recent systematic review identified 22 different definitions of chronic post-operative inguinal pain, of which the definition provided by the International Association for the Study of Pain was applied most often.²² This is the definition we have used in our study.

Molegraaf et al. also noted that the Visual Analog Scale (VAS) and the Short Form-36 (SF-36) were the most commonly used assessment methods for pain intensity and quality of life (QoL) assessment after inguinal hernia repair.²² Several hernia-specific scores have been validated for assessment of pain and QoL in hernia patients: Carolina Comfort Scale (CSS), Inguinal Pain Questionnaire (IPQ) and the recently validated EuraHS-QoL score.^{7, 23, 24} The EuraHS-QoL score takes into account patient-reported outcome measures of pain and QoL, has been validated for use both pre- and post-operatively, uses fewer questions and is easier to use; hence why we opted to use it for pain and QoL assessment in our study.

There is good evidence in the literature supporting the superiority of laparoscopic groin hernia repair to open

repair with regards to early post-operative pain, analgesia requirement, time to return to normal daily activities and chronic pain.^{4, 25-29} A recent updated network meta-analysis has reaffirmed these findings: apart from significantly reduced early postoperative pain, time to return to work/activities and chronic pain, minimally invasive TEP and TAPP were also associated with significantly reduced risk of hematoma and wound infection compared to the open Lichtenstein tension-free repair. However, risk of hernia recurrence and seroma were similar between both groups, so was the post-operative length of hospital stay.³⁰

In our study, recurrence rate was low and well within rates reported in the literature (Table 8).^{4, 9-17, 31, 32} Immediate post-operative morbidity was uncommon and of minor severity. None of the patients required any immediate operative re-intervention. The British Association of Day Surgery has suggested that 80% of inguinal hernia repairs should be carried out as day case procedures.³³ This figure was achieved in our cohort.

Table 8: Hernia recurrence rates

Study	Chronic pain in laparoscopic group	Chronic pain in open group
Anadol 2004	0/25 (0)	0/25 (0)
Butters 2007	1/81 (1.2%)	1/76 (1.3%)
Eker 2012	12/247 (4.9%)	19/235 (8.1%)
Eklund 2010	21/616 (3.4%)	7/659 (1.1%)
Gokalp 2003	0/61 (0)	0/62 (0)
Heikkinen 2004	5/62 (8.1%)	2/59 (3.4%)
Koju 2017	3/51 (5.9%)	0/51 (0)
Lau 2006	0/100 (0)	0/100 (0)
Pokorny 2008	6/119 (5%)	0/65 (0)
Sevinc 2019	5/147 (3.4%)	8/155 (5.2%)
Wang 2013	0/168 (0)	4/84 (4.8%)
Westin 2016	2/188 (1.1%)	4/187 (2.1%)
Riaz et al. (our study)	1/190 (1.05%)	x

The 2009 European Hernia Society (EHS) guidelines recommend that bilateral hernia should preferably be treated by a laparoscopic method provided expertise is available.³⁴ The advantages of laparoscopic repair (faster recovery, lower risk of chronic pain and cost-effectiveness) are increased when performing two hernia repairs via the same approach. The European Association of Endoscopic Surgery (EAES) guidelines also recommend laparoscopic repair to be an excellent choice in bilateral groin hernias.³⁵ This view is also endorsed by the British Hernia Society groin hernia guidelines. These guidelines also recommend laparoscopic approach to be the preferred method of choice in women, in patients at risk of chronic pain (younger patients, other chronic pain problems, pre-operative presentation of severe groin pain with only a small hernia on palpation) and in patients with a recurrent hernia if the index operation was an open repair.³⁶

The Department of Health (DoH) Northern Ireland published a policy statement in July 2020 for the proposed establishment of a regional service for day case elective care procedures in Northern Ireland.³⁷ Elective procedures could therefore be carried out without any competition from emergency procedures, thus reducing the likelihood of last-minute cancellations. Furthermore, at COVID-light or COVID-free facilities, this could also minimise risk to



elective patients and allow more effective use of resources. A regional elective service could potentially reduce waiting times for elective procedures that have seen an all-time high as a result of the COVID-19 pandemic.³⁸

One of the general surgical procedures proposed in the DoH policy statement is primary repair of an inguinal hernia. In view of the arguments put forward in our paper in favour of laparoscopic repair, we propose that the regional elective surgical services in Northern Ireland should consider offering laparoscopic repair at least to the patient groups that are highly likely to benefit from it: young men, women, and bilateral or recurrent hernias. Our data show acceptable levels of chronic pain and hernia recurrence following laparoscopic hernia repair in all patients deemed suitable for a laparoscopic repair and also reaffirm that the figure of 80% day cases is achievable with the laparoscopic approach.

Conflict of Interest: None declared.

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