

Laparoscopic inguinal hernia repair: over a thousand convincing reasons to go on

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Abstract

Background Laparoscopic hernia repair has emerged as an effective alternative method for treating inguinal hernias. The ability to provide this service as day surgery or short-stay (23-h stay) treatment makes it an attractive method in this age of resource limitations. The technique is cost-effective when the use of disposable instruments is kept to a minimum.

Methods Our team performed laparoscopic transabdominal pre-peritoneal (TAPP) inguinal hernia repair on 1,389 patients in the period from September 1999 to March 2007. We take this opportunity to discuss the lessons we have learnt and our experience and views with regards to certain procedure-specific problems encountered by many of our peers.

Results A variety of commonly encountered inguinal and groin hernias were treated by TAPP with good results, minimal morbidity (4.39%) and one mortality. We have discussed our views on technical aspects of the procedure, such as the extent of pre-peritoneal dissection, methods of treating the hernia sac, the size and number of pre-peritoneal prosthetic meshes deployed, fixation of the mesh and reconstitution of the peritoneum. Our views on the causes and our strategies for managing complications such as seroma formation (3.09%), recurrence (0.29%), bleeding (0.36%) and mesh infection (0.14%) have been outlined. We believe that incidental

hernias ($N=150$) discovered during initial laparoscopy can be safely treated with no added morbidity, provided the patients' views and consent regarding the treatment are given due consideration.

Conclusion Laparoscopic TAPP hernia repair has proven to be an efficient method of providing treatment for groin hernias. Our experience over the last eight years has given us over a thousand convincing reasons to continue working and improving upon this service.

Keywords Laparoscopic · Surgery · Groin · Hernia · Inguinal

Introduction

Laparoscopic inguinal hernia repair has come a long way since its inception in the early 1990s to the current technique based on Nyhus' and Stoppa's principle [1–3] and in keeping with the principles of tension-free prosthetic hernia repair [3, 4]. From being dismissed as a whim of the enthusiast, it has now been recognised as an effective alternative mode of treating groin hernias [5].

Laparoscopic transabdominal pre-peritoneal (TAPP) repair of groin hernia was introduced to our trust in September of 1999 as a treatment option for patients. An initial audit of our performance and introspection into our methods provided conviction and encouragement to persist with our efforts [6]. Growing experience and encouraging results have strengthened this conviction.

We would like to share our experiences and the lessons learnt from the 1,389 laparoscopic hernia operations we have performed with colleagues who share our interest in this procedure.

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Materials and methods

Laparoscopic groin hernia repair was mainly offered as day case or as short-stay (23-h) procedures. Only patients who could not fulfil the criteria (Table 1) for selection into the above pathways needed to be treated as inpatients.

We continue to follow the same procedure as previously discussed, but we have learnt to modify certain steps of the procedure to tailor it to the nature of the hernia and the individual anatomy of the patient's hernia to optimise the results.

Patients were followed up in an out-patient clinic 2 weeks after the procedure and again if it was felt necessary at that visit. Contact details for the team were provided to all patients to ensure direct access to the team. Randomly selected patients were sent questionnaires two years from treatment to assess the results of the treatment and patient satisfaction with our methods.

All information was recorded on a pre-designed proforma and records were maintained. A questionnaire was also sent out to all other surgeons in the hospital to assess any incidents with respect to the procedure for which the patient may have sought help from any of our colleagues.

Our team carried out regular auditing of our results to ensure efficacy and safety, while ensuring continued education and training. We have also discussed our methods and thoughts in forums at national and international speciality meetings to invite thought and criticism, which have proven to be invaluablely constructive [7, 8].

Results

Commencing in September 1999 up until March of 2007, we had operated on 1,389 patients with groin hernias. There was an understandable male predominance, with 1,295 male to 94 female patients. In total, 1,134 patients had unilateral hernias

and 248 had bilateral hernias, while seven patients underwent laparoscopic groin exploration and eventual repairs for unilateral pain in the groin (Chart 1). Chart 2 illustrates the admission options available to us, the number of patients admitted into those pathways and those that were discharged through those pathways. About six patients from the day-surgery group and 14 from the 23-h admission group were admitted to hospital for variable periods before discharge for various medical and social reasons. Chart 3 outlines the types of groin hernias encountered and treated by our team in this series. It is interesting to note that we observed and treated 150 incidental hernias, which were clinically undetectable.

The series had low morbidity; however, we had one mortality from an unrelated cause from myocardial infarct while awaiting discharge. Table 2 illustrates our observed morbidity. Seven patients returned within a median time of 13 months (range 2–26 months) for the repair of a new hernia on the contralateral side. No hernia was seen on that side during their previous operation.

Discussion

The introduction of laparoscopic groin hernia repair into our NHS trust was a major paradigm shift in terms of

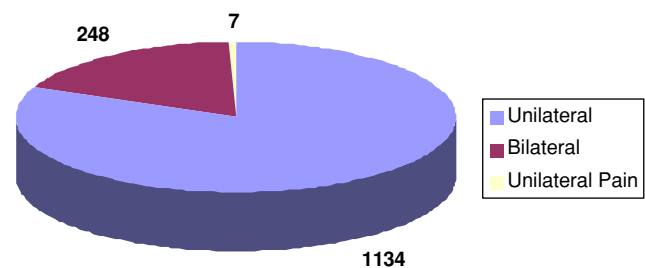


Chart 1 Distribution of the side of groin hernias

Table 1 Criteria for the selection of patients into day surgery and short-stay treatment

For day surgery unit	For treatment centre: short stay (23-h)
Age over 18 months (ages 18 months to 3 years to be confirmed with anaesthetist)	Age over 16 years
ASA I or II	ASA I or II
BMI <35	BMI <35
Diabetic patient: well controlled with haemoglobin A1c <9%	Diabetic patient: well controlled with haemoglobin A1c <9% (8% for major operations)
Availability of responsible adult at home for 24 h post-discharge after general anaesthetic (GA)	No personal or family history of anaesthetic complication
Patients aged <16 and >50 years for GA to be pre-assessed at DSU. Others through telephonic pre-assessment form	No evidence of risk of difficult airway access
	All patients pre-assessed by a nurse-lead team in the centre

Exceptions to the above to be considered only in agreement with the consultant anaesthetist and surgeon

BMI=body mass index

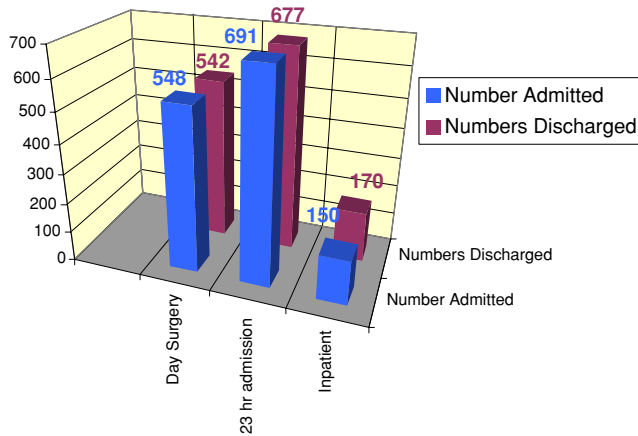


Chart 2 Admissions and discharges

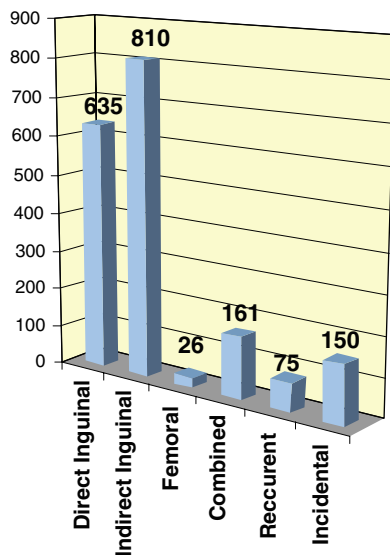


Chart 3 Types of groin hernia treated

Table 2 Morbidity observed in the series

Complication	Number	Percentage (%)
Reccurence	4	0.29
Bleeding	5	0.36
Seroma	43	3.09
Pain	6	0.43
Infection	2	0.14
Bowel obstruction	1	0.07
Mortality	1	0.07

service provision. The emphasis was on safety and providing efficient treatment with better patient experience through the treatment journey. Our experience with this operation and form of treatment has shown that we have succeeded in achieving the projected objectives.

We found that treatment could be achieved with very low recurrence rates and minimal morbidity [6]. These results do not reflect the learning curve of the surgeon, though there is no argument about the fact that results are bound to improve with growing experience and the continuous learning process.

We would like to take this opportunity to discuss certain technical issues, which we found to be of importance in the success of the procedure. We would also like to discuss our experience with the management of some of the frequently associated complications of laparoscopic TAPP inguinal hernia repair.

The TAPP versus TEP debate

Our team has favoured the TAPP approach due to our training with this method and experience with this technique. We cannot, therefore, comment on the merits of one approach over the other. The principle of pre-peritoneal mesh repair remains the basis of both methods.

Extent of pre-peritoneal dissection

In keeping with Fruchaud’s [4, 9, 10] description of the myopectineal orifice, we feel that the creation of a pre-peritoneal space large enough to expose the undersurface of the conjoint muscle superiorly, the lower half of the intra-abdominal component of the psoas major muscle inferiorly, to reach a point midway between the lateral border of the deep inguinal ring and the anterior superior iliac spine laterally and to expose the medial part of the contra-lateral rectus muscle just past the linea alba medially would ensure adequate repair (Fig. 1). Inadequate medial dissection has been a recognised cause of recurrence in open and laparoscopic groin hernia repairs [10–12]. This dissection would allow treatment of the hernia while also reinforcing the femoral and obturator canals, which are areas of potential weaknesses in the affected side of the groin, without the need for any additional effort. This could be viewed as an advantage of the laparoscopic approach over open surgery.

What size of mesh is the right size?

This issue is still under debate [10, 12, 13] and we agree that there cannot be only one single answer. We have been using a polypropylene mesh of size 10×15 cm (Cousin, Cousin Biotech, France) for all of our repairs. We believe that an overlap [14] of 3 cm or more over the edge of the myopectineal defect needs to be achieved to ensure adequate repair, bearing in mind the observed contraction of the mesh during its incorporation into tissue.

We also believe that it is necessary to place the mesh flat in contact with the tissues and to prevent the rolling

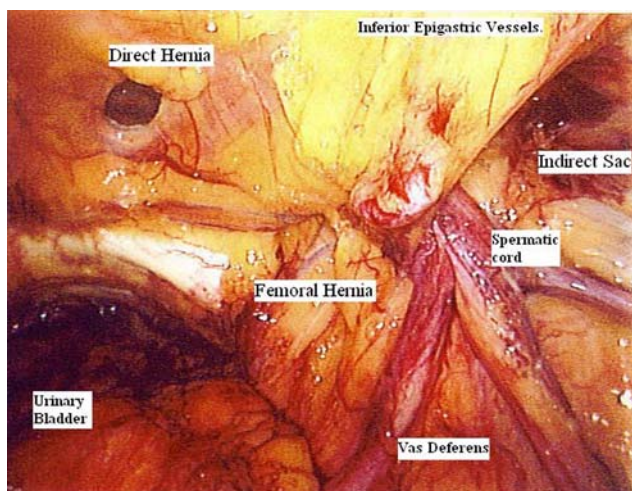


Fig. 1 Pre-peritoneal anatomy demonstrating the full extent of the myopectineal orifice

up of the edges [10, 11]. Retraction of the edges due to rolling up could lead to a potential area of weakness and recurrence as was seen on re-surgery with two recurrences in our series.

Multiple mesh use

With the advent of prosthetic mesh repair and the growing popularity of mesh-based tension-free techniques came questions about the rationale behind the size and numbers of meshes. While there seems to be little justification to support the use of larger meshes [10, 12, 13], there seems to be growing evidence to support the use of multiple meshes [10, 15–17] to achieve adequate margin overlap. We have used two meshes in a number of patients where we suspected inadequate overlap or as an alternative to the fixation of a single mesh in those cases when a diffuse weakness of the fascio-aponeurotic layer was perceived.

To fix or not to fix!

That has really been the question! The argument being between the risk of pain from nerve entrapment versus the risk of mesh migration [10, 12, 14].

Our preference has been to avoid fixing the mesh. We rely on the adequate overlap of margins of the defect, flat mesh placement and peritoneal closure to achieve stability. This reduced the use of tackers, thereby, reducing the risk of neurovascular injury and improving the cost-effectiveness of our technique.

Where necessary, we used spiral tackers (Autosuture, Tyco Healthcare Group, USA). We are currently trying to use loosely tied Vicryl sutures (Ethicon, Johnson & Johnson

Intl., Belgium) to secure the mesh instead of metal tacks in such cases.

Closure of peritoneal defects with 2-0 Vicryl and adequate mesh size leaves very little room for mesh migration. Peritoneal closure isolates the mesh from exposure to the bowel, thus, avoiding adhesions (Fig. 2). We would recommend full closure of the defect without residual peritoneal defects to prevent internal bowel herniation and obstruction, as we unfortunately observed in one of our patients.

Reduction of hernia sacs

Complete dissection and reduction of hernial sacs would be preferable to circumcision of the sac close to the deep ring [18, 19]. We have observed a greater incidence of seroma formation where the hernial sac was amputated high, close to the deep ring. This could result from the ready availability of epithelialised dead space, where reactionary fluid could collect. In hernias extending beyond the neck of the scrotum, we would dissect the sac and amputate it as distal to the deep ring as possible. This reduced the risk of damage to cord structures whilst, hopefully, reducing the risk of seroma formation.

Seroma formation

Seromas occur due to the collection of reactionary fluid in the potential space in the inguinal region after laparoscopic repair [19]. Most seromas resolved uneventfully, but four patients of our cohort needed aspiration of the seroma and one needed a formal exploration and treatment of the hydrocele. Patients were informed of this possibility pre-operatively to avoid undue anxiety from the suspicion of recurrence.

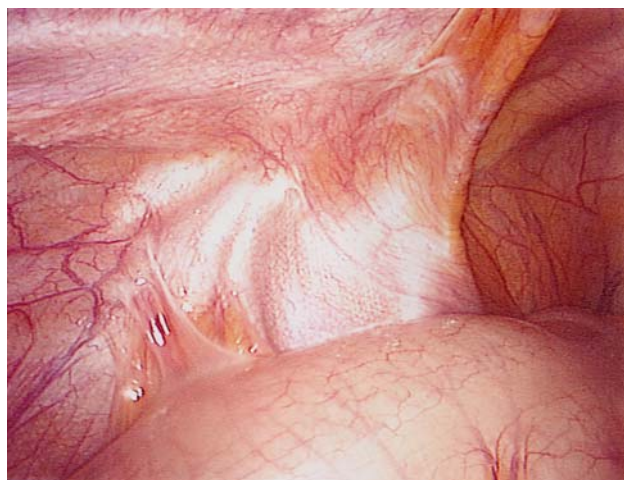


Fig. 2 Previous transabdominal pre-peritoneal (TAPP) hernia repair revisited at laparoscopy

Synchronous defects in the affected groin

Where synchronous defects are discovered in the affected groin, our policy was to ensure adequate overlap of the margins using one or multiple meshes, as described before.

Incidental hernias

There has been an ongoing debate [20, 21] with regards to repairing clinically asymptomatic inguinal hernias and abdominal wall defects detected during laparoscopic surgery [20] for a contralateral inguinal hernia. There is limited understanding about the natural progression of such hernias and defects. A peritoneal sac may not always be present, in spite of the synchronous presence of an asymptomatic musculo-aponeurotic defect, since the widened canal could be presently occupied by pre-peritoneal fat. Seven patients in our series presented within 2 years of the primary operation (median 13 months; range 2–26 months) for a symptomatic hernia on the other side. Although this number is not significant enough to justify any procedure on the asymptomatic contra lateral groin without any evident peritoneal sac, it does add weight to the argument that we should offer hernia repairs for those incidentally detected asymptomatic defects with established peritoneal hernia sacs at the deep ring or femoral canal [22–24].

We offered to repair incidentally detected contralateral hernias for all of our patients pre-operatively after explaining the risks involved in the surgery. We do not attempt to repair ill-defined weakness resulting from poor overall muscle tone. We inform patients that we were not certain as to what proportion of these defects would progress into symptomatic hernias.

We performed incidental hernia repairs on 150 patients who consented to repair after informed pre-operative consent was given. We did not observe any morbidity or clinical recurrence with any of these patients.

Post-operative pain

Six patients had dull post-operative pain in the groin lasting 3 months after the operation, which eventually resolved. This, we believe, was due to the tissue and peritoneal reaction to the prosthetic mesh. We attribute the absence of neuralgic pain to the prevention of nerve entrapment in mesh fixation stitches or staples.

Recurrence

Recurrence occurred in four patients in our series. Two occurred from possible technical difficulties in medial dissection due to previous pelvic surgery highlighting the importance of adequate medial dissection [11]. Two patients had possible rolling up of the inferior border of the

mesh either during placement or from mesh shrinkage. This highlights the need for adequate inferior dissection and flat mesh placement [10, 11]. We did not attempt laparoscopic re-exploration and repaired these recurrences using the Liechtenstein tension-free technique.

We are optimistic that our long-term recurrence rates over 10 years will prove to be less than that observed for open hernia repairs.

Laparoscopic groin exploration for groin pain

Laparoscopic exploration of the groin was undertaken in 43 patients with unexplained groin pain. Local factors linked to groin hernia, such as musculo-aponeurotic defects, hernia sacs or pre-peritoneal fat herniation and cord lipomas were found and treated in 36 of these patients, relieving them of symptoms. No obvious cause of pain was found in seven patients, but their symptoms were relieved after pre-peritoneal exploration and mesh hernioplasty. Laparoscopic exploration of the groin could, thus, be an effective alternative to open exploration [25], especially where there is a high suspicion that the pain could come from an early hernia or musculo-aponeurotic weakness. It provides access to visualise and repair all of the possible areas of weakness in the groin.

Post-operative retention of urine: more than a mere inconvenience

A distended bladder secondary to post-operative urinary retention can cause more damage than just pain and the need for catheterisation.

One patient in our series developed small-bowel obstruction following laparoscopic hernia repair, due to internal herniation of a loop of small bowel into the pre-peritoneal space through a rent in the peritoneal flap suture line closure. We believe that the rent developed following distension of the urinary bladder from post-operative urinary retention.

In addition, there is also the risk of displacement of the medial edge of the mesh by over-distension of the bladder, which could, as discussed before, pose as a risk factor for the medial recurrence of hernias [11].

All of our patients are now encouraged to fully empty their bladder pre-operatively before proceeding to theatre. If initial laparoscopic assessment reveals a considerable volume of residual urine in elderly patients, we now consider prophylactic urinary catheterisation before reversal from general anaesthetic, with a view to preventing the problems linked to post-operative urinary retention.

Mesh infection

There might be a potential benefit with the laparoscopic approach in reducing the incidence of mesh infection

because, when combined with a glove change prior to handling, the mesh does not come into contact with the skin of the entry wound. Our patients were not randomised or controlled to this effect; consequently, we are unable to comment conclusively on this matter.

Resource utilisation and benefit in the context of the health services

Our experience illustrates the practicality of offering laparoscopic hernia repair as a modality of service provision in an NHS district hospital setting. Our current experience has also shown that safe and efficacious treatment can be provided with no increase in hospital occupancy. Most patients, except those with significant medical or social problems, can be treated either as day cases or in independent 23-h overnight stay treatment centres with no increase in morbidity.

The early return to normal activity and the relative lack of pain are great advantages, since groin hernias are common in the young and productive individuals, whose rapid return to work is of unquestionable benefit to both the patients and the society at large.

Conclusion

The established safety and efficacy of laparoscopic groin hernia repair and the right of the patients to expect a choice of the available treatment options prompted its introduction into our region. Laparoscopic hernia repair in regular health service represents the effective use of minimal access technology in improving patient experience and outcome in the treatment of a common condition, with little or no burden to the NHS trust by the optimum use of existing facilities. Team-building and the appropriate training of medical and allied staff is paramount to ensuring safety and efficiency.

Laparoscopic groin hernia repair could prove to be as effective as, if not better than, existing methods of groin hernia repair. Our experiences with this method over the past eight years have given us over a thousand satisfying reasons to carry on scoping!

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