



Clinical and postoperative outcomes of laparoscopic groin hernia repair

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Abstract: Hernia surgeries are most common procedures performed by general surgeons. The existence of hernial defects since pre-historic times has evolved the surgical techniques from generation to generation with transition from pre-mesh era to mesh era with latest laparoscopic equipments for hernia repair. Inguinal hernia is most common groin hernias. Minimal invasive inguinal hernia surgery has gained popularity with gratifying results in terms of early return to work, reduced postoperative pain, decline in mesh infection and minimal recurrence. The clinical outcomes of any surgical technique act as assessment indicators for surgeons to upgrade their knowledge and acquire advanced skills to improve their practice. This study will amalgamate the postoperative outcomes of inguinal laparoscopic hernia repair and will also validate the evaluation measures.

Keywords: Inguinal hernia; clinical outcomes; evaluation measures

Received: 20 April 2017; Accepted: 10 May 2017; Published: 09 June 2017.

doi: 10.21037/ales.2017.05.04

View this article at: <http://dx.doi.org/10.21037/ales.2017.05.04>

Introduction

Hernia is a pathological defect which has affected the mankind from prehistoric times. There are varied modalities of treatment for hernia being practiced by surgeons all round the world. The prevalence of hernia is rapidly increasing and accounting to major health care liability. Of all the groin hernias, around 75% are inguinal hernias (1,2).

Groin hernia surgery is common procedure performed worldwide (3). The historic revolution have made us to take a giant leap from pre-mesh era to the Lichtenstein approach of tension free repair and securing the mesh (4). The surgical techniques have evolved over the past few decades to achieve tension free mesh repair as a gold standard for inguinal hernia management.

Inguinal hernia is a benign disease following a static course but their consequent complications may be drastic and frequent. Surgical repairs done under emergency conditions are invariably morbid in nature. Hence, an elective and planned surgery is always a preferred choice for a surgeon.

Open hernia repairs have been standard methods of treatment. With current trends in surgery, the majority of surgical techniques, open or laparoscopic are performed with mesh for tension free repair. In past two decades laparoscopic techniques have been introduced for the treatment of hernias which includes transabdominal preperitoneal (TAPP) method and totally extraperitoneal (TEP) approach (5,6).

Minimal invasive inguinal hernia surgery is gaining acceptance world wide as results are gratifying in terms of post-operative pain, early mobilization with restoring to normal activity, less chance of mesh infection with minimal recurrence. The clinical outcomes of laparoscopic inguinal hernia repair are appreciable irrespective of limitations, risks and steep learning curve. It is however crucial for every clinician to acquire an adequate experience and anatomical knowledge before performing this advanced inguinal repair. This descriptive study, will mainly throw light on the postoperative outcomes of laparoscopic inguinal hernia repair.

Importance of clinical outcomes

Clinical outcomes are the assessment indicators for surgeons to review their knowledge, update and advance their skills to improve their practice. Constant monitoring of clinical outcomes of surgical techniques provides quality assurance around our clinical effectiveness and caters best cure to patients. The benefits of measuring clinical outcomes of surgery enable surgeons a better basis for judging and improving their practice. To determine impact of treatment, it is necessary to evaluate outcome.

In current trends and modernization, laparoscopic hernia repair has gained popularity and offered patients the basis to make informed choices about their care. Although skill acquisition for minimal invasive surgery has been arduous, laparoscopic hernia surgery is adopted choice of surgery for better clinical outcomes.

Postoperative outcomes

Pain

This is the most common postoperative immediate complication. There have been many methodological techniques used to evaluate the pain score. The intensity of pain is measured by two unidimensional scales visual analogue scale (VAS) and verbal rating scale (VRS). VAS comprises a horizontal line with endpoints labeled “no pain” (0 mm) and “worst possible pain” (100 mm) and is sensitive to changes in pain intensity (7,8).

In the literature VAS has been used for estimation of pain during rest and movement-evoked pain. The results have suggested more intense pain during movement in first 3 postoperative days (9).

VRS is a four-point category scale (1= none, 2= light, 3= moderate, 4= severe) and is less sensitive to changes in pain intensity compared with VAS (10). It is convenient and user friendly scale compared to VAS and only minimal instruction is needed from the clinician. VRS can be used to assess the overall pain.

The etiology of postoperative pain after laparoscopic surgery includes patient related factors (11), surgical related factors (12,13) and inadequate preoperative analgesic treatment (12,14). Furthermore, postoperative pain intensity is largely dependent inter-individual threshold and variation.

Chronic inguinodynia is a postoperative complication, which is associated with discomfort and pain. Postoperative inflammatory process of 3–6 months is a period of

chronicity. Chronic postsurgical pain (CPSP) has been defined as pain that develops after surgical intervention and lasts for at least 2 months, other causes of pain excluded (10). There are various studies on CPSP differing in definitions, end points and methodologies. The reported frequency in literature for CPSP following inguinal hernia repair is 10–12% (15–17). The chronic pain which affects normal routine of individual is agreed to be 0.5–6.0% (18). The etiology and source of CPSP is complex and includes hernia recurrence, tissue inflammation, meshoma, and inguinal nerve injury or entrapment (19,20). The evaluation of CPSP demands complete case history and thorough clinical examination. There are myriad of questionnaire formats for pain assessment like short-form McGill Pain Questionnaire (SF-MPQ), Neuropathic Pain Questionnaire (NPQ) and Activity Assessment Scale which acts as screening tools.

Mesh has also been implicated in the occurrence of CPSP. Recent systemic reviews and metaanalysis have demonstrated significant reduction of CPSP for light weight mesh (21,22). The lightweight mesh reduces CPSP due to greater biocompatibility and elasticity.

A comparative study between TEP and open-mesh herniorrhaphy using a retrospective questionnaire in 560 patients, after mean follow-up period of 21 months showed 22.5% of laparoscopic patients had pain compared with 38.3% of those treated by open mesh repair (23). One of the largest study in 300 patients reported with incidence of 3.3% CPSP following laparoscopic TEP repair as compared to 9.7% after Lichtenstein's mesh procedure (24).

There are numerous methods for fixation of mesh including staples, tackers, sutures with recent development of fibrin glue adhesives. Fibrin glue is biocompatible, feasible and has given competition to the standard tissue penetrating mesh fixation. The adhesive effect being superficial, mesh is readily secured and stabilised without traumatizing the underlying tissues. Several studies have compared the use of staples and fibrin glue for fixation methods. In a review and metaanalysis study, 394 cases were mesh fixed using staples or tacks and rest other 268 cases were mesh fixed using fibrin glue. Total hernia repairs were 662. The results attained with respect to incidence of chronic inguinal pain (at 3 months) were higher with fixation of mesh with staples/tacks as compared to fibrin glue. However, there was no significant difference in recurrence rate, seroma formation, operative time, early return to normal activity (25). Existing data support the intensity of chronic pain is minimized using laparoscopic techniques.

Seroma

It occurs frequently in inguinal region. It mimics the postoperative recurrence of hernia and is psychological stress and concern to patients. It is the fluid entrapment between the transversalis fascia and prosthetic mesh resulting in tension seroma. Seroma usually subsides spontaneously in 2–6 weeks. It occurs in a large hernia, and more often in an indirect than in direct hernia. The incidence varies from 5–25% (26). A retrospective chart review examined outcomes of 1,240 laparoscopic hernia operations in 783 patients which demonstrated only 3% incidence of seroma (27). In a large study, conducted on 1,542 patients charted into five randomized controlled trials and seven comparative studies, evaluated through modern meta-analytic methods showed less incidence of seroma formation in patients operated through laparoscopic technique as compared to open repair (28). Current studies reveal, the persistence of seroma greater than 6 weeks, growing continuously, symptomatic is the only situation when its considered as a complication (29). The foremost technique to confirm the diagnosis is the groin ultrasonography. This imaging technique is always recommended before aspiration to aid in accurate treatment planning to address seroma (30). Aspiration is not the cure and should be avoided to prevent any mesh infection. The incidence of seroma and cord haematoma can be reduced by an adequate division of indirect hernial sac and avoiding the excessive dissection of sac from cord structures.

Convalescence

Convalescence has been defined as number of postoperative days away from work or main leisure activity (31). There are very limited studies which focus on efforts to expedite return to activity by encouraging patients to expect a shorter convalescence. The advancement in new surgical techniques has challenged the practice of recommending a prolonged period of convalescence after hernia repair. Recovery is patient-centered and dependent on regular work activities and individual pain experience.

Recovery time is crucial to describe the disorder into patient's life and the estimated loss calculated for the days patient did not work and contributed to the society. There are many analyses in literature which have found to be supportive with respect to early return to normal activity in lightweight mesh group. In the randomized trial, 402 patients underwent TEP repair and patient in lightweight

mesh group achieved early return to normal activity (1.8 days) as compared to heavyweight mesh group (2.09 days). There are very limited studies describing quality of life (32).

A qualitative systematic review included 14,273 patients who were evaluated for convalescence post laparoscopic inguinal hernia repair from a period of 1990–2016. This study concluded with a recommendation of 1–2 days of convalescence after laparoscopic inguinal hernia repair (33). A measure of quality of life is assessed and evaluated by the results achieved post surgery. All patients desire early mobilisation post surgery. In our experience, time to return to normal activity is rather subjective and shorter for laparoscopic group of patients.

Mesh infection

The introduction of mesh in hernia repair has revolutionized the trends in surgery by decreasing the recurrence. In a randomized control trial, non-mesh *vs.* mesh repair of primary inguinal hernia was compared in 289 patients. Results showed recurrence rates of 7% for non-mesh technique *vs.* 1% for mesh repair (34). Mesh-related infections following surgery are relatively rare but pose a greater risk of morbidity once infection is established. The rate of mesh infections after elective open repair is 1.5%. Laparoscopic hernia repair has low rates of infection, varying from 0.03% to 0.095%. Mesh infections are multifactorial relationship between bacteria, device and host factors (35). The microorganisms which are related to mesh infections involves the following bacteria: Staphylococcus species, especially Staphylococcus aureus, group B streptococcus, gram negative and anaerobic bacteria. In addition to these organisms, atypical microorganisms like mycobacterium fortuitum, mycobacterium chelonae and Mycobacterium abscesses are also known to cause mesh infection. *M. chelonae* bacteria is associated with nosocomial skin, soft-tissue infections following contaminated injections, surgical procedures and laparoscopic surgery. The source of infection is contamination of wound directly or indirectly with colonized tap water. The mesh infections post laparoscopic surgery are attributed to fallacy in the sterilization technique (26).

Clinicians should consider the occurrence of mesh infection in operated patients who has fever of unknown etiology or symptoms and/or signs of infection of the abdominal wall. Late infections are more indolent with varied presentations. Symptoms can be chronic, recurrent or

totally absent until the progression of sepsis. The reported interval between hernia repair and the manifestation of a mesh infection ranges from 2 weeks to 39 months (36).

Diagnostic imaging techniques like ultrasonography, computerized tomography are used for confirming the mesh infection. In the presence of infection, an image has different psychogenic or density characteristics from that in other conditions like seroma. It reveals an area of inflammation in the subcutaneous fat around mesh. The imaging methods also aid in assessing the presence of a fistula or an abscess (37). In situations of extensive infection and abscess formation, early surgical intervention is the method of cure.

Recurrence

The success for any surgery is measured by evaluation of its outcomes. Recurrence following hernia repair has been reported to be over 15% before the emergence of tension free mesh repair (38). There are various proposed factors which contribute to recurrence after laparoscopic inguinal hernia repair like insufficient dissection, inappropriate mesh fixation and mesh slitting (39). The recurrence rates for laparoscopic repairs have been: TAPP, 1.0–4.3% (40) and TEP, 0–4% (41).

A review of literature showing the results and recurrence rate using mesh are as follows: Nyhus buttress, 0–1.7%; Rives, 0–9.9%; and tension free repairs, 0–1.7%. Laparoscopic inguinal hernia repair caters good results in hands of experienced surgeons (42,43). The long learning curve and requirement of expertise in surgical skills adds a potential risk in rate of recurrence. The need for structured trainers and to abide by the principles of laparoscopic hernia repair is the key for successful hernia surgeries. Patients with recurrence are clinically examined and confirmed with ultrasonography.

In large study, which included 33 trials, quasi-randomized and small studies on 6,000 hernia repairs showed superiority in favor of laparoscopic repair (44). The meticulous dissection and reinforcement with mesh of groin avoids recurrence. The literature suggests, the recurrence in groin hernia is multifactorial and dependent on prosthetic mesh used, type of surgical approach and patient related comorbidities.

The search for excellence in hernia repair lies in the hands of experienced surgeons. The advent of laparoscopic hernia repair has challenged the conventional ideologies in

surgical practice and has proven to deliver better clinical outcomes.

Discussion

Laparoscopic hernia repair is beneficial to the surgeons with respect to improved and better postoperative clinical outcomes. Evaluation of clinical outcomes is essential for monitoring growth factor for surgeons. It is like self-surveillance to assess the postoperative results of surgeries. The newer advanced concepts and armamentarium in hernia surgeries have proven to be less time consuming, good control over postoperative pain, better convalescence with minimal recurrence.

The incidence of CPSP is low which is subjective in nature. Long-term studies vary in literature from 9–23% during a mean follow-up period ranging from 12–65 months (23,45,46). However, the existence of bias needs to be ruled out with synchronized approach for evaluation. The intensity of postoperative pain also contributes to the convalescence factor. In addition, aggressive treatment requires more recovery time and at the same time good preoperative counselling fastens recovery. Convalescence is patient dependent and considering every patient from different socioeconomic strata and occupation may impact patients recovery in future studies.

Seroma is the most common complication following laparoscopic hernia repairs. Seromas are usually asymptomatic, unnoticeable and diagnosis is always clinical. Although seromas appear to be benign, they impair quality of life for patients and add psychological stress of pseudo recurrence, various studies reporting with a rate of 0.52–37.8% (47–49). It requires no surgical intervention and usually subsides by its own around 2–3 weeks.

The introduction of mesh, though advantageous, posed a new set of postoperative difficulty of mesh infection. Laparoscopic hernia repairs have reduced the incidence to 0.1–0.2% as opposed to open hernia repair. Besides the sterilization breaks, different mesh characteristics also have been implicated as the contributing factors for infection (50,51). The evaluation of infection is through clinical symptoms of raised body temperatures which are not known. Consequently, there are no definite measurable criteria for mesh infection.

The measure of success for any surgery is dependent on rate of recurrence. Recurrence has been a major drawback following non-mesh open hernia repairs. The

new revolution of mesh repair has given a new outlook to better postoperative outcomes with decline in recurrence rates. Recurrence with laparoscopic mesh repair is lower as the mesh is deeply seated in tissues as compared to the placement of mesh superficially in case of open repair. In laparoscopic hernia repairs, adequate dissection of preperitoneal space with appropriate size of mesh and along with proper fixation evades the chance of recurrence (39). As we have already taken a giant leap towards laparoscopic hernia repairs, the surgeons also need to be mindful to preclude the risk of recurrence by eliminating preperitoneal lipomas which have potential for conversion into hernias despite correct stabilization of mesh (39).

There are very limited studies with long-term follow-up to present the postoperative outcomes. Postoperative evaluation of outcomes together is a daunting task and requires a standardized scale for measurement. Numerous studies need to be undertaken to accomplish the complete evaluation under same preoperative, intraoperative and postoperative conditions.

The future of laparoscopic hernia repair is promising with self-fixation meshes to reduce the overall expenditure by avoiding fixation devices and at the same time early return to activity and reduced CPSP. The recent application of fibrin glue as an expensive method of mesh fixation has been equally effective in reducing CPSP by eliminating the need to traumatize the underlying tissues by conventional methods. There is a need to explore and conduct long-term studies before we introduce the innovative methods to practice. In the current scenario, surgeons need to be fully equipped with the knowledge to perform laparoscopic hernia surgeries. The demand for learning laparoscopic hernia repair is growing as the results achieved are relatively superior to open approaches. The pros and cons of any procedures need to be weighed. Although many authors have over weighed the advantages of laparoscopic inguinal hernia repair, open repair still remains the mainstay for the clinicians operating at rural hospitals due to lack of modern equipments. Another limitation to this latest advancement is that it can be performed only under general anesthesia unlike open surgery which has options for both local anesthesia and general anesthesia.

Findings comparing various studies demonstrate that the mastery in laparoscopic approaches can yield better outcomes with good results. To conclude, the current modalities of treatment for hernia repair have helped clinicians to grow in their surgical skills and to meet the utmost expectations of their patients.

Acknowledgments

I thank Rajesh Sardana, medical writer, Max Institute of Minimal Access Metabolic and Bariatric Surgery for compiling the content of article.

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editors (Davide Lomanto and Anil Sharma) for the series “Inguinal Hernia Repair” published in *Annals of Laparoscopic and Endoscopic Surgery*. The article has undergone external peer review.

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/ales.2017.05.04>). The series “Inguinal Hernia Repair” was commissioned by the editorial office without any funding or sponsorship. The author has no other conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/ales.2017.05.04

Cite this article as: Khullar R. Clinical and postoperative outcomes of laparoscopic groin hernia repair. *Ann Laparosc Endosc Surg* 2017;2:103.