Research Article

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Lichtenstein mesh hernioplasty for inguinal hernias: simplicity is the ultimate sophistication

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ABSTRACT

Background: Mesh hernioplasty has gained wide spread acceptance due to its superior outcome in terms of reduced recurrence rates which are in the range of 1 to 2%. Lichtenstein mesh hernioplasty is currently the most popular operative technique for open repair of inguinal hernia. We aim in this paper to evaluate the treatment outcome of the tension free repair of inguinal hernias by the liechtenstein mesh repair.

Methods: 649 Saudi Arabian patients treated for inguinal hernia between January 2003 and December 2012 was reviewed. 595 (91.7%) were males, and 54 (8.3%) were females, ratio = 12:1. Age of the patients ranged from 20-80 years, with mean age of 43.203 ± 14.41 years.

Results: 42 (6.5%) patients develops wound hematoma, 59 (9%) patients developed numbness at the site of operations, 62 (9.6%) patients felt the sensation of a foreign body in the groin area, 24 (3.7%) patients developed wound infection, 17 (2.6%) patients developed scrotal swelling, 14 (2.2%) patients developed seroma, and 7 patients (1.1%) develop chronic groin pain at the site of operations. No recurrence was recorded with a follow up period of 24 months.

Conclusions: Tension-free mesh repair is a simple, safe and effective method of treatment for inguinal hernia with extremely low early and late morbidity and remarkably low recurrence rate, combined with the ability of patients to return to work in a short period makes it the best approach to manage inguinal hernia in terms of clinical, and socioeconomic outcome.

Keywords: Inguinal hernia, Tension-free, Mesh repair, Lichtenstein, Recurrence

INTRODUCTION

Abdominal wall hernias are common, with a prevalence of 1.7% for all ages and 4% for those aged over 45 years. Inguinal hernias account for 75% of abdominal wall hernias, with a lifetime risk of 27% in men and 3% in women.¹

Inguinal hernias present with a lump in the groin that goes away with minimal pressure or when the patient is lying down. Most cause mild to moderate discomfort that increases with activity. Many etiological factors may play a role in causation of hernia. ²⁻⁵

A hernia is reducible if it occurs intermittently (such as on straining or standing) and can be pushed back into the abdominal cavity, and irreducible if it remains permanently outside the abdominal cavity. A reducible hernia is usually a longstanding condition, and diagnosis is made clinically, on the basis of typical symptoms and signs. The condition may be unilateral or bilateral and may recur after treatment (recurrent hernia).³

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Inguinal hernias are often classified as direct or indirect, depending on whether the hernia sac bulges directly through the posterior wall of the inguinal canal (direct hernia) or passes through the internal inguinal ring alongside the spermatic cord, following the coursing of the inguinal canal (indirect hernia).⁴

Surgery is the treatment of choice varying from a nylon darn, Open mesh repair, Shouldice layered, Lichtenstein mesh to a laparoscopic repair. Mesh hernioplasty has gained wide spread acceptance due to its superior outcome in terms of reduced recurrence rates which are in the range of 1 to 2%. The Lichtenstein mesh hernioplasty is currently the most popular operative technique for open repair of inguinal hernia.⁵

The objective of groin hernioplasty is to prevent peritoneal protrusion through the myopectineal orifices. Hernias are repaired either anteriorly through groin incision in which case the structure in and around the inguinal canal must be divided in order to reach the inner most aponeurotic fascial layer, or posteriorly through abdominal incision in which case, the hernial orifices are exposed directly on entry to the properitoneal space.⁶

Tension is the principle cause of failure of all hernioplasties that close the myopectineal orifices by aponeurotic approximation. Synthetic mesh prosthesis is widely accepted in the management of all hernias of the groin, the mesh is used to patch or plug the myopectineal orifices, to reinforce a classical repair and to replace the transversalis fascia. ^{2,3,5,6}

Recurrent groin hernias can be classified as early and late recurrences. From Regarding early recurrence: most recurrence appear within (2–3) years of the primary repair, many factors single or in combination may lead to recurrence. While late recurrence which may appear as long as thirty years postoperatively may be due to aging process and collagen metabolism disturbance, the incidence of recurrence of groin hernia taper off after 5 years.

Lichtenstein presented his open mesh repair technique for inguinal hernia in 1986. The Lichtenstein technique has since become the most commonly used (with various modifications) on account of its ease of operation and because it provides a tension-free repair with good longterm results. The advantages of this repair were its association with less pain, rapid postoperative recovery, early return to normal activity and very low recurrence rate. Tension-free mesh repair is nevertheless associated with complications such as foreign body reaction, infection, pain (The incidence of chronic groin Pain following this procedure is reported to be as high as 75.5%), fistula formation, migration, shrinkage, and recurrence. Other complications include skin anaesthesia, bruising and haematoma formation, seroma formation, orchitis and testicular atrophy. A large number of materials have been tested but currently three are in common use: Polyester mesh (Dacron, Mersilene), Polypropylene (Marlex, Prolene) and expanded polytetrafluoroethylene (PTFE).⁸

The Ideal Prosthetic Mesh Material should not be physically modified by tissue fluid, be biochemically inert, not be exciting an inflammation or foreign body reaction, be non-carcinogenic, not be producing a state of allergy or hypersensitivity, be capable of resisting mechanical strains, be capable of being fabricated in the form required, and be capable of being sterilized.

The properties of polypropylene mesh that make it more acceptable than other types of mesh include readily inserted into any size without fragmentation, used in the groin without discomfort by the patient, less affected by infection, having high tensile strength, resistant to most chemicals, softening temperature 260 °F (127 °C) and so sterilization by boiling was not a problem. ¹⁰

The Liechtenstein mesh repair is under reported in Saudi Arabia, as evident by thorough literature review. Therefore, we aim in this paper to evaluate the treatment outcome of the tension free repair of inguinal hernias by the Liechtenstein mesh repair, and to determine the acceptability, practicality, effectiveness, and safety of inguinal hernia repair using mesh in our local Saudi Arabian community.

METHODS

A retrospective database analysis of the treatment outcome of 649 Saudi Arabian patients who were treated surgically for inguinal hernia between January 2003 and December 2012 in a public health general hospital in Medina, Saudi Arabia was done.

Inclusion criteria included all adult patients age 12 years and above (according to the age classifications in hospitals of the Saudi Arabian ministry of health), patients who were diagnosed at or referred to the outpatient clinics, and operated electively for inguinal hernia. Exclusion criteria included patients presenting to the emergency with incarcerated or strangulated inguinal hernias, and recurrent hernia. Random selection in regard to gender was done.

All patients had the same diagnostic investigations (complete blood count, blood chemistry, chest x-ray, ultrasound abdomen, and electrocardiogram).

All operations were done by the same team (three consultant surgeons and four specialists). Hypertensive and diabetic patients were controlled preoperatively. Prophylactic antibiotics were given routinely one hour before surgery (1 gram cefazoline and 500 milligram metronidazole intravenously). All operations were performed under general anaesthesia.

All patients hernias were repaired according to Lichtenstein technique. Polypropylene mesh was used in all patients. No drains were used.

Operative technique was conducted as follows: The patient is placed in the supine position. The groin is prepared by cleaning with iodine and alcohol. After incising the skin, subcutaneous tissue, and external oblique aponeurosis, the spermatic cord is elevated from the posterior wall of the inguinal canal. In indirect hernias, the hernial sac is identified, dissected to the internal ring and opened to allow examination of its contents. The sac is ligated and its distal portion is usually excised. However, in large indirect inguinal hernias, where the sac descents down to the scrotum, the distal part of the sac may be left open to prevent the formation of a hydrocele, thus allowing spontaneous obliteration. A polypropylene mesh (3 × 5 inch) is trimmed to fit the floor of the inguinal canal, and its apex is first sutured to the public tubercle using a 2–0 Prolene suture. The same continuous suture then sutures the lower border of the mesh to the free edge of the inguinal ligament, after an opening is made into its lower edge to accommodate the spermatic cord. The continuous suture extends up just medial to the anterior superior iliac spine. Interrupted Prolene sutures then suture the two cut edges of the mesh together around the spermatic cord. The inferomedial corner of the mesh is then attached well overlapping the pubic tubercle. The aponeurosis of external oblique is then closed using absorbable sutures (Vicryl 2-0).

The skin was closed by 3-0 Nylon interrupted sutures.

Plug with loose sutured mesh were used to repair the deep ring and posterior wall in 298 (45.9%) patients when the deep ring was more than (2) cm and weak posterior wall. Loose sutured mesh only was used to repair the posterior wall in 351 (54.1%) patients, either with direct hernia and intact deep ring or indirect hernia with the deep ring less than (2) cm in size.

Postoperatively, all patients had the same care protocol, three doses of the same antibiotics as preoperatively, and intramuscular and oral analgesia (voltaren and acetaminophen).

All patients were discharged in the first post operative day, followed up in the outpatient clinic once every week for one month then once every two weeks for two months, then once every month for nine months, and once every three months for 24 months (total of 36 months). They were recommended to restrain from driving until the 7th day and riding (bike, camels, horses) until the 14th day; and lifting heavy objects >10 kg was allowed after 3 months.

Sutures were removed after 10 days of the operation, and those who developed wound infection had alternate stitch removal and daily wound irrigation with normal saline

socked surgical gauze until infection subsided, then completion removal of the rest of stitches.

A database file was initiated for each patient. Data recorded included age, sex, predisposing factors, symptoms, duration of symptoms, site of hernia, uni or bilateral hernia, postoperative complications, and recurrence.

RESULTS

649 Saudi Arabian patients with an uncomplicated inguinal hernias were reviewed, 595 (91.7%) were males, and 54 (8.3%) were females, ratio = 12:1. Age of the patients ranged from 20-80 years, with mean age of 43.203 ± 14.41 years.

Inguinal swelling was the dominant symptom followed by pain and inguinoscrotal swelling. Duration of symptoms range was 11 - 34 weeks, (median = 22.5). Figure 1 presenting symptoms in the study population.

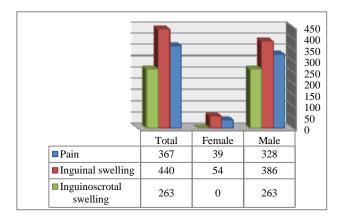


Figure 1: Symptoms in the study population.

Chronic constipation was the dominant predisposing factor, followed by chronic cough, heavy weight lifting, pregnancy, and trauma. Figure 2 presenting predisposing factors in the study population.

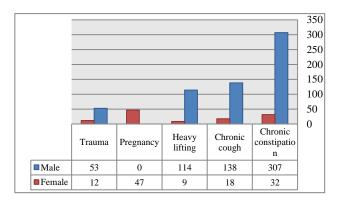


Figure 2: Predisposing factors in the study population.

297 (45.8%) patients had right sided inguinal hernia, 273 (42.1%) patients had a left sided hernia, and 79 (12.2%) patients had bilateral hernia.

408 (62.9%) patients had indirect hernia and 241 (37.1%) patients had direct hernia.

479 (73.8%) patients presented with pure inguinal hernia wile 170 (26.2%) patients presented with inguinoscrotal hernia. Table 1 showing type of hernia in the study population.

Table 1: Type of hernia in the study population.

Hernia type	Patients No / %
Right sided inguinal hernia	297 (45.8%)
Left sided inguinal hernia	273 (42.1%)
Bilateral inguinal hernia	79 (12.2%)
Indirect inguinal hernia	408 (62.9%)
Direct inguinal hernia	241 (37.1%)
Pure inguinal hernia	479 (73.8%)
Inguinoscrotal hernia	170 (26.2%)

42 (6.47%) patients were diabetics, 58 (8.93%) patients were hypertensive, 34 (5.23%) patients had bronchial asthma, 24 (3.85%) patients had ischemic heart disease, while 47 (7.24%) female patients had symptoms appearing following pregnancy. Table 2 showing Comorbidity in the study population.

Table 2: Co-morbidity in the study population.

Co morbidity	Patients No.
Diabetes Mellitus	42
Hypertension	58
Bronchial asthma	34
Ischemic heart disease	24
Pregnancy	47

386 (73.8%) were operated on by consultant surgeon, 263 (22.3%) by specialist surgeon. Duration of surgery was less than 1hr in 341 (39.8%) patients, and more than 1hr in 308 (60.2%). The mean operative time was 62.5 minutes (45-80 minutes).

Plug with loose sutured mesh were used to repair the deep ring and posterior wall in 298 (45.9%) patients when the deep ring was more than (2) cm and weak posterior wall. Loose sutured mesh only was used to repair the posterior wall in 351 (54.1%) patients, either with direct hernia and intact deep ring or indirect hernia with the deep ring less than (2) cm in size.

4 (0.6%) patients developed wound hematoma, 8 (1.2%) patients developed numbness at the site of operations, 11 (1.7%) patients felt the sensation of a foreign body in the groin area, 8 (1.2%) patients developed wound infection, 3 (0.5%) patients developed scrotal swelling, 4 (0.6%)

patients developed seroma, and 5 patients (0.8%) developed chronic groin pain at the site of operations. The overall morbidity rate was 6.6%. Figure 3 showing morbidity of mesh repair for inguinal hernia.

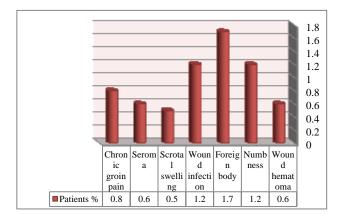


Figure 3: Morbidity of mesh repair for inguinal hernia.

The overall median time to return to work and normal daily activities was 10 days (7 - 14 days).

No recurrence was recorded with a follow up period of 36 months, (all patients completed 36 months follow up).

DISCUSSION

The inguinal hernias mainly occur in males. Male to female ratio of (20:1). In adult, the indirect hernia is 65% and the direct one is 35%. However, the incidence of inguinal hernias increases with increasing age.⁵ In our series, the ratio was 12:1.

The use of a mesh patch with or without plug is a technically easier to work than the classical methods and far simpler to secure to surrounding tissues. The interstices of the mesh become completely infiltrated with fibroblast and remain permanently strong.¹¹

Because the peritoneum is highly sensitive structure, the long held belief that ligating a sac is important adjunct to groin hernia operation, does nothing more than lead to miniature peritonitis and contribute to postoperative discomfort and malaise that accompany sutured hernia repair. Hernial sac should not be routinely opened for manual or visual inspection assuming that no evidence of strangulation, acute incarceration or some other pathologic condition is present¹². In this study, if the hernial sac of indirect hernia was small or sliding type, it was inverted without opening, while in big sacs, excision with high dissection was achieved.

High ligation and excision of the sac do not influence the recurrence while high dissection of the sac well up into retroperitoneum and freeing the sac from the edges of the internal ring are important in prevention of recurrence and to allow good exposure of the ring to facilitate the

repair.¹³ For that reason, in our work, the indirect sacs were dissected up to the retroperitoneal fat with complete separation of the sac from the internal ring.

The common medial, direct, recurrent hernia at the angle between the rectus sheath and the inguinal ligament occurs when the buttress has not been constructed sufficiently medially on the pubic tubercle and beyond. ¹⁴ In repairing the posterior wall, we did overlap the pubic tubercle well with mesh.

The process of healing of groin hernia repair takes approximately one year. By the end of six months, the wound gained about 80% of its final strength, so that the wound must be supported for at least this time by using monofilament non-absorbable suture. Catgut loses (50 – 80%) of its tensile strength within fourteen days and disintegrates within few weeks, the silk and cotton lose 40% of their strength within six weeks and begin to disintegrate by three months. ¹⁵ Therefore, the sutured material used in the repair was monofilament non-absorbable suture (polypropylene) with non-absorbable mesh.

Continuous suturing technique has a greater wound bursting pressure than simple interrupted methods. A continuous suture perceived as spiral, giving better distribution of tension along the entire length of approximated tissue. With interrupted technique, tension is focused on each individual stitch, so dehiscence begins at the stitch where tension exceeds the suturing holding capacity. In our technique, the suturing method in fixation of the mesh used was a loose continuous suturing.

Inadequate reconstruction of the internal ring and failure to close the ring snugly around the cord leaves a gap through which a recurrent indirect hernia may appear. Also failure to construct and reinforce the posterior wall of the canal causes some hernias to recur over the years because of aging scar tissue and disturbed collagen metabolism. ^{17,18} Plug with loose sutured mesh were used to repair the deep ring and posterior wall in 298 (45.9%) patients when the deep ring was more than (2) cm and weak posterior wall. Loose sutured mesh only was used to repair the posterior wall in 351 (54.1%) patients, either with direct hernia and intact deep ring or indirect hernia with the deep ring less than (2) cm in size.

Postoperative drainage should not be used routinely in a standard hernia repair, however, postoperative suction drainage can significantly reduce the incidence of wound seroma, haematoma and infection following repair of large hernias, recurrent hernia, difficult hernia requiring much dissection and other complicated hernias. The drain should be used selectively, brought out through a separate stab incision and removed as soon as possible to avoid retrograde infection.¹⁹

It was found that all patients in our series complained of mild pain postoperatively which was a subjective feeling assessed according to the need of analgesic drugs. All patients needed no more than three injections of voltaren (75 mg) intramuscularly, but 7 patients required oral analgesia for more than 4 weeks. The analgesic drug chosen is more likely to reflect the type of postoperative pain. The most likely causes of chronic pain, apart from surgical trauma related to hernioplasty and technical accuracy, are the psychological and somatic characteristics of patients as well as the type of mesh and placement site.²⁰

Patients could walk freely four hours postoperatively with little discomfort.²¹ 17 (10.7%) developed scrotal oedema which disappeared within 3 -7 days. 14 (8.7%) patients developed seroma of the wound, which needed no more than aspiration by syringe with complete resolution.

Any theoretical objection to mesh such as foreign body rejection or untreatable infection that require mesh removal were not substantial, and the use of mesh did not appear to increase the incidence of infection or alter the incidence of superficial wound infection.²²

The management of wound infection in which there is a synthetic prosthesis is not different from that of infected wound. 8 (1.2%) patients developed superficial wound infection controlled with dressing and appropriate antibiotic. All 8 patients were diabetic patients, while the other 34 diabetics showed no manifestation of infection. Wound infection in diabetic patients has been reported as a cofactor. 4

The incidence of recurrent hernia after primary repair varies from 1% in specialized center to 30% in general survey, most recurrence appear within 2–3 years after primary repair. Despite relatively short follow up period (36 months), no single recurrence was reported in our series. Patients with multi-recurrent hernia are a troublesome problem to the surgeon, but the use of alternative approach to the classical methods should be considered for repair including the use of prosthetic material with posterior preperitoneal approach, an anterior pre-peritoneal giant prosthetic reinforcement or posterior preperitoneal laparoscopic repair. ^{26,27}

In a study of 2523 patients with inguinal hernia, repaired with mesh hernioplasty reporting their return to work or normal activities with over all median time of (8) days (7 – 10 days), the manual worker took slightly longer time (12 days) than did desk workers or retired.²⁸ The patients in this study were allowed to return to social activities, full activities and work at their discretion, but overall median time return to normal activities was (10) days (7 – 14 days). It was found perhaps not surprisingly that manual workers took slightly longer time to return to work than did desk workers or retired.

The result of our series had a great impact on the approach to manage inguinal hernia in our local community surgical practice. Tension free mesh repair is now the standard approach in our hospital, and 3 other general public health hospitals in the same city adopted the same approach. In addition, 5 private sector hospitals did the same.

CONCLUSION

Tension-free mesh repair is a simple, safe and effective method of treatment for inguinal hernia with extremely low early and late morbidity, and remarkably low recurrence rate, combined with the ability of patients to return to work in a short period makes it the best approach to manage inguinal hernia in terms of clinical and socioeconomic outcome.

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