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MESH HERNIOPLASTY FOR INGUINAL HERNIAS

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Summary

A prospective study was performed at Saddam Teaching Hospital in Basrah over a thirteen months period to evaluate the use of mesh hernioplasty for repairing inguinal hernias. Forty-eight patients with inguinal hernias repaired electively with mesh hernioplasty. The age distribution was (17–79) years. Three of them were diabetics, three hypertensive, two with chronic obstruction airway diseases and one with bleeding tendency. Perioperatively, the hernias were classified according to Gilbert's classification. Forty-seven primary hernias repaired according to Lichtenstein technique and one through preperitoneal approach (recurrent hernia). Forty-six hernias repaired under general anaesthesia and two under local anaesthesia. Prophylactic antibiotic was given as a single dose at induction of anaesthesia and a single postoperative dose. There were thirty patients (62.5%) indirect hernias, thirteen patients (27%) of direct hernias, five patients (10.4%) of pantallon type. The mesh used was polypropylene either as plug in one patient (2%) or plug with on-lay mesh in thirty-three patients (68.75%) or as on-lay mesh in fourteen patients (29.1%). In six patients closed suction drainage used if there was unsatisfactory haemostasis, there were few post operative complications, all patients complained of mild postoperative pain that did not require strong analgesia. No urinary difficulty detected. Six patients (12.5%) developed scrotal oedema mainly at the beginning of the study, one scrotal haematoma (2%), four (8.3%) wound seroma and one (2%) superficial wound infection, neither chronic sinus nor orchitis. No recurrence with a follow up period of 2 – 12 months were recorded.

Introduction

Hernia is as ancient as man himself. It was one of the first diseases to be recognized and recorded since the discovery of writing and recording of medical history by ancient Egyptian 1600 B.C.[1]. Many etiological factors may play a role in causation of hernia [2-6].

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 inci-

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sion in which case, the hernial orifices are exposed directly on entry to the properitoneal space[3].

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[2,5]. Regarding early recurrence: most recurrence appear within (2–3) years of the primary repair, many factors single or in combination may lead to recurrence[5–21]. 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[12,22].

The Ideal Prosthetic Mesh Material should [23]:

1. Not be physically modified by tissue fluid.
2. Be biochemically inert.
3. Not be exciting an inflammation or foreign body reaction.
4. Be non-carcinogenic.
5. Not be producing a state of allergy or hypersensitivity.
6. Be capable of resisting mechanical strains.
7. Be capable of being fabricated in the form required.
8. Be capable of being sterilized.

The properties of polypropylene mesh that make it more acceptable than other types of mesh are [5]:

1. Readily inserted into any size without fragmentation.
2. Used in the groin without discomfort by the patient.
3. Less affected by infection.
4. Having high tensile strength.
5. Resistant to most chemicals.
6. Softening temperature 260 oF (127 oC) and so sterilization by boiling was not a problem.

According to the above mentioned properties, we applied the liechtenstein technique in this study aiming at recording the benefit and the degree of complications of the tension free repair of inguinal hernias.

Patients and Methods

Forty-eight patients diagnosed with an inguinal hernia were studied prospectively in a period of thirteen months (from July 1999 to September 2000), repaired surgically with mesh hernioplasty. All operations were done by the same team (i.e. two consultant surgeons and one junior). Data were collected according to the form in. All patients were examined clinically and investigated with usual preoperative investigations such as haemoglobin level, blood urea, blood sugar as well as chest x-ray with electrocardiography for patients above forty years. Hypertensive and diabetic patients were controlled preoperatively. All patients were fasting more than 6 hours before operation. Prophylactic antibiotics were given routinely at time of induction of anaesthesia, either ampicilin (500mg) and cloxacillin (500mg) or cephalosporine (1gm) intravenously according to the availability.

Anaesthesia

All operations were performed under general anaesthesia with controlled endotracheal intubation except two operations have been done under local anaesthesia.

Sterilization of the mesh

The mesh was sterilized by Gluteraldehyde vapour, by placing it in a

dram with gauze or cotton socked with Gluteraldehyde (2%) for thirty minutes then washed thoroughly with normal saline and then socked in Betadine (10%). This method of sterilization was checked by swabs, taken from the mesh for culture (aerobic and anaerobic), and proved to be effective in ten occasions. The mesh then was ready for use.

Operative technique

All patients hernias were repaired according to Lichtenstein technique except one with recurrent hernia repaired with preperitoneal approach. The hernias were assessed and classified according to Gilbert's Classification (Appendix II).

Postoperative management

In the word the patients were given diclofenac sodium (75 mg) intramuscularly and another dose of antibiotic. To those patients with drains, antibiotic continued till the removal of them. All patients assessed for postoperative pain, difficulty in micturation and early postoperative complications. Summary discharge and follow up card given, and patients were instructed to be seen weekly in the first month and then once in every month.

Results

Forty-eight patients diagnosed with an uncomplicated inguinal hernias, all were males with age distribution (17–79 years) (Table I), hernias repaired electively with mesh hernioplasty.

Age	10-19	20-29	30-39	40-49	50-59	60-69	70-79	total
No. of pats.	2	3	7	9	14	8	5	48
%	4.0	6.25	14.5	18.7	29.0	17.0	10.5	

Table I. age distribution of patients.

Nine patients with concomitant diseases, three of them were diabetics on oral hypoglycemic agent, three were hypertensive, two with chronic obstructive airway diseases and one with bleeding tendency (Table II).

Concomitant disease	No.	%
Diabetic patients.	3	6.25
Hypertensive patients.	3	6.25
Chronic obstructive airway	2	4.0
Bleeding tendency	1	2.0

Table II. Patients with concomitant diseases.

According to Gilbert's classification, operative findings were shown in (Table III and IV).

Type	I	II	III	IV	V	VI	VII	total
No. of hernias	2	19	9	9	4	5	/	48
%	4.0	39.5	18.7	18.7	8.5	10.5		

Table III. Preoperative classification of hernias according to Gilbert's classification.

Indirect		Direct		Pantaloon	
30	62.5%	13	27%	5	10.5%

Table IV. Types of hernia

Thirty hernias were indirect, thirteen were direct and five were pantaloon type. Forty-seven hernias repaired with Lichtenstein technique and one through posterior preperitoneal approach (recurrent inguinal hernia), all done under general anaesthesia except two under local anaesthesia. In twenty-four indirect hernias (80%), the hernial sacs were inverted without excision, and six of indirect hernias (20%) the sacs were excised. In all direct hernias as well as pantaloon type sacs were inverted (Table V).

Type of hernia	No.	Sac inverson		Sac excision	
Indirect	30	24	80%	6	20%
Direct	13	13	100%	0	0%
Pantaloon	5	5	100%	0	0%

Table V. Dealing with sacs

The deep ring repaired with plug only in one patient (2%), the posterior wall strengthened with plug and on-lay mesh in thirty-three patients (69%) and only

with on-lay mesh in fourteen patients (29%) (Table VI). In six patients closed suction drainage used mainly at the beginning of the study (Table VII). The mean operative time was 35 minutes (25 – 60 minutes).

Plug only		Plug +on-lay mesh		On-lay mesh	
1	2%	33	69%	14	29%

Table VI. Methods of mesh application.

Hernias	No.		Time of discharge
With drain	6	12.5%	2-3 days except one for 10 days
Without drain	42	87.5%	First post operative day

Table VII. Usage of drains and time of discharge from hospital.

All patients complained only of mild pain at the operation site, for which they did not require strong analgesia and they could walk freely four hours post-operatively with mild discomfort (Table VIII). Neither case of urinary retention nor difficulty to pass urine were reported despite the fact that one third of patients were more than fifty-five years of age (Table VIII). Six patients (12.5%) developed scrotal oedema during the first three days post operatively observed at the beginning of the study. Four patients (8.5%) felt a firm area or induration noticed by the surgeon at operation site, which were disappeared within the first month postoperatively and they were tolerable by all patients (Table VIII). Four patients reported to have seroma that needed drainage locally by aspiration with complete resolution (Table VIII). One patient (2%) developed scrotal haematoma, which needed exploration and proved to have bleeding tendency due to thrombo-cytopenia. One patient (2%) developed superficial wound infection controlled with dressing and appropriate antibiotic with complete resolution within a week. No patient with chronic sinus formation or rejection noticed. No patient with epididymorchitis or postoperative hydro-cele. Forty-two patients (87.5%) discharged from the hospital at the first post operative day, six patients (12.5%) with drains remained (2-3) days according to the time of drain removal except the patient with bleeding tendency remained for 10 days (Table VII. The overall median time for return to work was 10 days (7 – 14 days) (Table IX). No recurrence was noticed with a follow up period of two to twelve months.

Complications	No.	%
Pain required strong analgesia	0	0
Urinary difficulty	0	0
Scrotal oedema	6	12.5%
Scrotal haematoma	1	2%
Wound seroma	4	8.5%
Wound infection	1	2%
Chronic sinus	0	0
Orchitis	0	0

Table VIII. Postoperative complications.

Occupation	No.		Time of return to work
Manual worker	13	27%	12-14 days
Desk or sedentary worker	29	60.5%	8-10 days
Retired*	6	12.5%	7-9 days

**Return to social activity*

Table IX. Return to work.

Discussion

The most important eras in the evolution of groin hernia surgery is that of the early nineteenth century when cadaver dissection and diverse clinical studies culminated in a more thorough anatomic understanding of groin hernia. Various surgical literatures and books chapters attest to the efficacy of mesh hernioplasty[2,3,4,26]. It is technically simple surgical operation, which can be used to repair any groin hernia. 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[5].

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[4]. All patients in our series were males, with age ranging from (17–79) years, the indirect hernias thirty patients (62.5%), direct hernias thirteen patients (27%) and pantaloon type five patients (10.5%) (Table I, IV).

The use of local anaesthesia in inguinal hernia repair which is an easy procedure with marked decrease in the operative and postoperative complications. Several centers (Gilbert in Miami, Shulman at Lichtenstein Clinic, Wantz in New York), accepted that the surgical procedure with local anaesthesia, tension free on-lay mesh and same day discharge is favorable and received high patient acceptance as a consequence of much reduced post operative discomfort, which permitted immediate ambulation and early return to normal activities[27]. Two patients in our series who had chronic obstructive airway diseases, operated on under local anaesthesia, which was an easy procedure, and the patient could walk freely from the operating theatre to the recovery room. Both patients were discharged next morning, though they were ready to be discharged at operating day.

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 post operative 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 present[2,5]. In this study, if the hernial sac of indirect hernia was small or sliding type, it was inverted without opening while in big sac, excision with high dissection achieved. All direct hernial sacs were inverted (Table V).

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[2,3]. 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[2,3,5]. So 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[5]. Therefore, the sutured material used in the repair was monofilament non-absorbable suture (nylon or 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[5]. That's why the suturing technique 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[2,3]. Plug used to snug the deep ring without on-lay mesh in one young adult patient with congenital indirect hernia and intact posterior wall. Plug with on-lay mesh used to repair the deep ring and posterior wall in thirty-three patients (69%) when the deep ring more than (2) cm (Gilbert Class II and III) and weak posterior wall. On-lay mesh only used to repair the posterior wall in fourteen patients, either with direct hernia and intact deep ring or indirect hernia with the deep ring less than (2) cm in size (Table VI).

Post operative drainage should not be used routinely in a standard hernia repair, however, post operative 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[2,5]. In six patients, closed suction drainage used when there was unsatisfactory haemostasis or large hernia with heavy dissection mainly at the beginning of the study (Table VII).

Authors in British hernias center reported the results of 3175 inguinal hernias repaired with open mesh hernioplasty in 2906 consecutive patients. A total of 97% of the patients were men and the age range was 15 – 92 years, just 480 patients (17%) were older than 70 years. No cases of urinary retention were reported in spite of 30% of patients were retired, with symptoms of prostatism present in the majority. 63 patients (2%) develop a wound haematoma and two of these were drained. The total number of wound infection was 45 patients (1.3%) and all responded to appropriate antibiotics treatment. Three abscesses required drainage but all resolved and no cases of chronic sinus formation occurred, testicular swelling occurred in 31 patients (1%) all of which settled. Postoperative pain persisted for up to 2 months in 36 patients (1%) and for up to one year in 13 patients (0.4%). There were 14 recurrences with a follow up period from 18 months to 5 years[28].

At University of Genea, Italy: the results of 221 patients, mean age 74 (range 66–93 years). Concomitant diseases were present in 157 patients repaired with tension free or plug technique. A total of 232 operations including four emergency hernia repair, were carried under local anaesthesia showed no perioperative mortality, urinary retention occurred once following emergency hernia repair under general anaesthesia and twice after

elective hernia repair under local anaesthesia. Local complications include four scrotal haematomas (2%), 3 wound-infection (1%) and one case of orchitis with atrophy after repair of a recurrent hernia. No recurrence was observed after mesh repair [29].

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 single injection of diclofenac sodium (75 mg) intramuscularly. The analgesic drug chosen is more likely to reflect the type of postoperative pain [30]. patients could walk freely four hours post operatively with little discomfort. There was no case of urinary retention or difficulty in urination despite the fact that one third of patients were more than fifty-five years and there were no changes in the symptoms for those patients already complaining of prostatism. Six patients (12.5%) developed scrotal oedema which disappeared within three days, these occurred in patients at beginning of the study, thought to be due to inadequate washing of the mesh with normal saline after sterilization with Gluteraldehyde. One patient (2%) with big inguino-scrotal hernia developed wound haematoma which required local exploration and drainage and the patient later proved to have bleeding tendency. Four patients developed seroma of the wound, which needed no more than aspiration by syringe with complete resolution. Four patients felt firm area or induration at site of repair could be due to exacerbated inflammatory process, healing and fibrosis invading mesh interstices (Table VIII).

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 [31,32]. The management of wound infection in which there is a synthetic prosthesis is not different from that of infected wound[3]. One patient (2%) developed superficial wound infection controlled with dressing and appropriate antibiotic. Three diabetic patients repaired with mesh hernioplasty receiving short course of perioperative antibiotics showed no manifestation of infection.

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 [2]. Large series of reports from specialized centers showed low recurrence after open tension free hernioplasty. Martin and Shureth used Marlex mesh routinely in 299 primary inguinal hernia repairs over 10 years period with no reported wound infection and no recurrences after follow up of 1–10 years [33]. Barnes used Marlex mesh for all groin hernias in 277 patients over 11 years period, he noted high patient satisfaction and low postoperative pain with mean follow up of 6 years, he found three recurrence [34]. Despite relatively short follow up period, no single recurrence reported in our series, and patients, hopefully, will be followed for 10 years period. Patients with multi-recurrent hernia, 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 preperitoneal giant prosthetic reinforcement or posterior preperitoneal laparoscopic repair[35,36]. In one patient (2%) with re-recurrent hernia, posterior preperitoneal approach was used in the repair.

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 worker or retired.

Rutkow has suggested several outcome measures in assessing the choice of operation. These should include ease of operation, reproducibility by junior staff, likelihood and severity of possible complications, postoperative discomfort, time of return to work and daily activities and the financial cost involved[37]. We found that mesh hernioplasty is among the easiest of hernia repair for the average surgeon to understand and requires a minimal learning curve.

Conclusion

Tension free hernioplasty using Lichtenstein method is an easy procedure. Fears of complications related to mesh implantation proved to be without foundations. It can be done easily under local anaesthesia with the same day discharge, without the need for complex and expensive instrumentation, combined with the ability of patients to return to work in a short period. Overall cost can be kept to a minimum without compromising the safety or the long-term success of the procedure.

Recommendations

1. Tension free hernioplasty is an easy procedure, with mild postoperative pain, few postoperative complications and low recurrence. It can be used for repair of primary and recurrent inguinal hernia.
2. Despite the fact of short follow up period and having forty-eight patients only, favorable results were obtained. Further numbers of patients with a longer period of follow up needed to assess any late complications.

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