

COMPARISON OF POST-OPERATIVE WOUND INFECTION AFTER INGUINAL HERNIA REPAIR WITH POLYPROPYLENE MESH AND POLYESTER MESH

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ABSTRACT

Background: Hernia is one of the most commonly encountered disease in a general surgeon's carrier. Lichtenstein hernioplasty is the method of choice and wound infection remains most common as well as most dreadful complication challenging clinicians. The reported incidence of mesh related infection varies from 1-8% being influenced by underlying comorbidities, type of mesh used, the surgical technique employed and the strategy adopted for the prevention of this grave complication.

Study Design: Randomized controlled trial

Objective: To compare post operative wound infection frequency after inguinal hernia repair with polypropylene and polyester mesh using standard Lichtenstein hernioplasty technique.

Place and Duration: This study was conducted at general surgery department CMH/MH Rawalpindi from 08 April 07 to 01 Jan 08 over a period of 09 months.

Patients and Materials: Sixty patients received through outpatient department with diagnosis of inguinal hernia satisfying inclusion/exclusion criteria were included. Patients were divided into two groups randomly. Group 1 included those patients in whom polypropylene mesh was used while group 2 patients were implanted with polyester mesh. Demographic as well as data concerning post operative wound infection was collected and analyzed.

Results: Fifty seven patients (95%) were males while remaining (05%) were females. Mean age in group 1 was 41.17±9.99 years while in group 2 was 41.47±9.79 years ($p=0.907$). One patient (3.3%) in each group developed wound infection diagnosed by clinical evidence of pain at wound site, redness, induration and purulent discharge.

Conclusion: There is no difference in post operative wound infection rate after inguinal Lichtenstein hernioplasty using either polypropylene or polyester mesh.

Key words: Lichtenstein hernioplasty, polypropylene, polyester, mesh related infection

INTRODUCTION

Hernia has plagued humans throughout recorded history and descriptions of hernia reduction date back to Hammurabi of Babylon and the Egyptian Papyrus¹. Inguinal hernia is a major health problem and in USA approximately 90,000 ventral hernias are repaired each year². It is one of the most common diseases a surgeon encounters³.

Multitudes of techniques as well as prosthetic materials have been attempted to repair inguinal hernia with variable success⁴. Table 1 shows various types of biosynthetic

materials available for hernia repair.

First generation meshes were of heavy weight type with small pore size, greater weight: area ratio, lower elasticity and higher burst pressure. However these biophysiochemical properties had been reversed in later generation light weight meshes making them more tissue friendly⁸. These mechanical and biological properties are influenced by type of tissue structure (woven or knitted) and type of fiber used (mono or polyfilament). Various studies have suggested that lower density and larger pore size may lead to decreased inflammatory response and thinner scar net formation⁹.

Polypropylene meshes are monofilament, non-absorbable, inert, sterile and porous with thickness approximately 0.44mm while polyester meshes are non-absorbable,

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polyfilament meshes with properties mimicking polypropylene. Both allow growth of adjacent tissue in micro pores of mesh resulting in strong and durable repair¹⁰.

Mesh repair is favored surgical technique on account of ease to perform/learn,¹¹ provides tension free repair with good long term results¹² and lower recurrence rates^{13,14}. Nevertheless mesh repair is associated with complications like foreign body reaction, infection, pain, fistula formation, migration, shrinkage and recurrence¹⁵. Infection is the most commonly reported adverse event in otherwise clean cases of prosthetic hernia repair^{16,17}. Rate of infection is influenced considerably by underlying comorbidities, diabetes mellitus, immunosuppression and obesity.

Aim of this study was to evaluate the frequency of post operative infection with the application of polypropylene and polyester mesh using standard Lichtenstein hernioplasty.

MATERIALS AND METHODS

These randomized control trails were conducted at department of surgery CMH/MH Rawalpindi from 08th April 07th to 1st Jan 08. In this duration, sixty patients received through OPD with diagnosis of inguinal hernia were included. Inclusion criteria was adults of both gender from 20-70 years of age, reducible hernia and evidence of groin swelling > 03months. Exclusion criteria was age <20 and >70 years, recurrent hernia, obstructed hernia, strangulated hernia, patients with diabetes mellitus, immunosuppression or steroid therapy already prone to development of higher rate of infection.

Simple randomization was done to divide patients into two groups. Group 1 included patients in whom polypropylene mesh was used while group 2 was implanted with polyester mesh. Following admission, detailed history and physical examination was carried out. Relevant baseline investigations were done and final assessment was confirmed by attending anesthetist. A detailed explanation was given to patients about participation in the study and written consent obtained. All

surgeons undertaking the procedure were unaware of the inclusion of the patient in this particular study.

Operative Technique

Under spinal anesthesia, a suprainguinal skin crease incision was made. External oblique aponeurosis was cut exposing inguinal canal. Ilioinguinal nerve preserved where possible and spermatic cord lifted. Hernial sac dissected and dealt according to type of hernia leaving entire floor and posterior wall exposed for placement of 6x11 cm mesh. Respective meshes were trimmed to fit space and a lateral slit was made to accommodate spermatic cord. The mesh was placed with its medial edge 1-2 cm medial to pubic tubercle. It was fixed inferiorly with continuous prolene 2/0 suture and superiorly with 3-4 interrupted sutures till it lies in ideal position. The two tails were then overlapped and secured with two or three sutures making sure that cord is not constricted. A single dose of intravenous antibiotic was administered 03 hours before surgery in all cases. Mobilization was advised 4-6 hours after surgery. Wound infection was diagnosed by clinical evidence of pain at wound site, redness, induration and purulent discharge.

Patients were assessed on 3rd post operative day, at the time stitch removal on 8th post operative day and 30th post operative day respectively. Examining surgeon was blinded from type of mesh used. Infected cases were followed indoor as well as outdoor till complete wound healing.

A performa containing demographic data, type of hernia, details of investigations and details of individual procedure was recorded. Data collected included duration of hospital stay, length of scar and wound infection rate. Data was fed and analyzed on SPSS version 12.0. Descriptive statistics were used to describe the data. Independent sample t-test was applied for the comparison of normal variables while Mann-Whitney U test was applied for non normal variables between the two groups, *p*-value < 0.05 was considered significant.

RESULTS

Sixty patients were included in this study conducted over a period of 09 months. They were randomized into two groups. Group 1 included patients who received polypropylene mesh while group 2 was incorporated with polyester mesh. Mean age of patients in group 1 was 41.17± 9.99 while in group 2 was 41.47±9.79 years. Group 1 included two (6.67%) females and group 2 had one (3.33%). Mean duration of presentation from time of occurrence till surgery was 7.4±3.05 months in group 1 and 7.97±3.41 in group 2. History of weight lifting was ascertained in 21 patients (35%) (Table-2).

The operating time in cases of both groups was similar. Mean time in group 1 was 40.17±7.25 minutes while in group 2 it was 41.80±7.74 minutes, which was not statistically significant. One patient (3.3%) out of each group developed post operative wound infection diagnosed by pain at local site not

responding to painkillers, redness, inflammation and swelling around incision (Southampton grade IV) (p=1.000). Both patients were male and were successfully managed conservatively with opening of stitches, wound toilet and antibiotics. Follow up of both revealed complete healing at 30th post operative day.

DISCUSSION

Inguinal hernia is a major health problem and one of the most common disease general surgeon encounters in his career³. Improved surgical technique and better understanding of the anatomy and physiology of the inguinal canal has significantly improved outcome. Repair of hernia has undergone major evolution over past 100 years culminating in the last couple of decades with introduction of tension free repair, laparoscopic repair and emergence of the specialist hernia clinic¹. Lichtenstein

Table-1 Nonmetal synthetic prosthesis available for inguinal hernia repair (Courtesy Medscape: http://cme.medscape.com/viewarticle/420354_3)

Nomenclature	Properties	Nomenclature	Properties
Nylon (1944)	Disintegrates in tissue and loses most of its tensile strength within 6 months.	Expanded polytetrafluoroethylene	Produces minimal adhesions when placed intraperitoneally ⁶ .
Polyethylene mesh (1958)	High-density polyethylene (Marlex).	Polyglycolic acid mesh (Dexon) Polyglactin 910 mesh (Vicryl)	Absorbable mesh
Polypropylene mesh (1962)	Available as a flat mesh as well as 3-dimensional devices(Prolene, Hermesh3, Per Fix Plug) ⁵	Polyester mesh (MERSILENE)	Can be inserted into narrow spaces without distortion ⁷ .

Table-2 Data of demographic variables (n=60) of patients undergoing Lichtenstein repair with polypropylene (Group 1) and polyester mesh (Group2) respectively.

S.No	Group 1(n=30)	Group 2(n=30)	P value
Age (years) (Mean± SD)	41.17± 9.99	41.47±9.79	0.907
Sex Ratio	28:2	29:1	0.554
Mean duration of presentation (months)	7.4±3.05	7.97±3.41	0.480
Heavy weight lifted	11(36.67%)	10(33.33%)	0.787
Mean operation time(minutes)	40.17±7.25	41.80± 7.74	0.402
Mean Hospital stay (days) (Mean± SD)	2.37±0.81	2.8±0.89	0.055
Type of hernia			
Indirect	21(70%)	22(73.33%)	0.774
Direct	09(30%)	08(26.67%)	

technique has become the most commonly used procedure on account of ease of operation¹¹, good long term outcome¹², easy learning curve and lower recurrence rate^{13, 14}. The incidence of perioperative and post operative complications is minimal¹⁷. Most of the patients return to routine life within 48-72 hours and 60% of the physical laborers return to work within 04 weeks¹⁸.

There has been continuous effort towards finding the best type of mesh for hernia repair. Multitude of techniques as well as prosthetic material has been used with variable success⁴. Mesh allows growth of the adjacent tissues into pores resulting in strong and durable repair¹⁰. Micro porous mesh is associated with high rate of infection as it prevents passage of leukocytes while macro porous variety is associated with higher incidence of adhesive/corrosive events^{19,20}. Infection is the most commonly reported adverse event in mesh hernioplasty leading to significant morbidity¹⁶ and rates up to 1.5% have been reported²¹.

Current study focuses on the frequency of infection using different type of meshes following standard Lichtenstein technique. One patient in each group presented with post operative wound infection which was successfully managed conservatively. Results are comparable to studies conducted by Khan²² and Smietanski²³, 3.3% of the patients developed wound infection which is comparable to studies conducted worldwide²⁴. However a study at Atlanta USA revealed lower contraction rates with polyester when compared with polypropylene²⁵. Evaluation for wound infection following mesh repair for 121 cases of incisional hernia was carried out at Dresden, Germany. 7% cases developed wound infection. All infected PTFE patches had to be removed whereas drainage was sufficient treatment for the infected polypropylene and polyester meshes²⁶.

Infection rate after hernioplasty is influenced considerably by underlying co morbidities and seems to be increased in patient with diabetes mellitus, immunosuppression or obesity²⁷. The question of whether the incidence

of infectious complications is higher after repairs involving use of mesh in comparison to older techniques without mesh remains controversial²⁸. Many approaches are currently in practice namely (a) thorough rinsing of the wound with antibiotic solution²⁹ (b) placement of gentamicin laced tampons in front of mesh³⁰ (c) use of antibiotic impregnated mesh and (d) traditional administration of perioperative antimicrobials³¹. No definitive recommendation can be made in favor of any particular strategy due to lack of comparative outcome data.

Limitation of the current study is small data size and shorter follow up period. A larger sample size with evaluation for at least 05 years may define superiority of either mesh in due course. Further studies are required for a more objective comparison of mesh behavior in our environment.

CONCLUSION

Inguinal hernia is a sure met disease with numerous options for repair using different type of prosthetic materials available in surgical armamentaria. Currently no recommendations are available on best type of material to be used for repair. Present study confers to same result. Probably larger sample size analysis over longer period of time incorporating other meshes like PTFE, Vicral and composite mesh in different institutions is required to recommend best type of mesh for repair of this commonality.

Footnotes

Source of support = Nil

Conflict of interest = none declared.

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