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POLYPROPYLENE MESH REPAIR IN ABDOMINAL WALL HERNIAS;

AN ANALYTIC STUDY AT TERTIARY HOSPITALS OF NORTHERN BORDER REGION OF SAUDI ARABIA

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ABSTRACT... Objectives: To determine the beneficial out comes, recurrence rate and complications of the repair of abdominal wall hernia reinforced with polyprolene mesh. **Study Design:** This was a retrospective interventional quasi experimental study. **Setting:** Surgical departments of Central Hospital and Prince Abdul Aziz Bin Musaad Hospital, Arar, Saudi Arabia. **Duration of Study:** November 2012 to October 2016. **Material and Methods:** Adult patients of both genders, who underwent repair for various abdominal wall hernias during above mentioned period, were included in the study. Their demographic data, relevant history and physical examination, post-operative notes, prognosis and any complications, including recurrence, infection, adhesions, pain and mesh degradation were recorded in a pre-structured questionnaire. The data was then analyzed with standard statistical methods. **Results:** From a total of 156 patients, 94 (60.3%) were males and 62 (39.7%) female between the age of 20 to 75 years. There were relatively fewer complications, including seroma (12.8%), post-operative pain (9.6%), infection (3.8%), adhesions (0.6%) and no recurrence rate. The uneventful recovery was observed in 73% of cases. **Conclusions:** Pure polypropylene mesh is economical than the newer composite meshes for the open repair of abdominal wall hernia, is easily available and caused relatively fewer complications with no recurrence rate.

Key words: Abdominal wall hernias, propylene mesh repair, recurrence rate, complications.

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INTRODUCTION

Ventral abdominal wall hernia repair is commonly carried out by general surgeons. Previously, these hernias repairs were done by primary suture technique, but were followed by high rates of complications and recurrences (31 % - 54 %).[1,2] Usher in 1958, for the first time, introduced the use of polypropylene mesh in rat models.[1] Later, in 1963, he also used polypropylene mesh for the repair of abdominal wall hernia in humans, and since then the technique has been used very extensively in open surgery without much complications.[3] In 2002, the EU Hernia Trialist Collaboration analyzed 58 randomized controlled trials and reported that the use of synthetic mesh was superior to primary suturing techniques. They noted that the repair of abdominal wall hernia with synthetic mesh was followed by fewer complications, including post-operative pain and recurrence.[4]

The mesh repair is a very simple technique and involves the use of synthetic material to reinforce the natural scar formation in the abdominal wall. The synthetic mesh can be applied in different ways, including on-lay, in-lay and sub-lay (sandwich) techniques. In the on-lay mode the mesh is placed over the external oblique fascia, in the in-lay technique the mesh is placed either intra-peritoneal or in pre-peritoneal plane and in the sub-lay method one mesh is placed on-lay and the other in-lay. Laparoscopic methods are also being commonly used and involve the placement of mesh intraperitoneally.[3]

Apparently, meshes made of strong materials would be more suitable and able to induce more fibrosis. However, excessive fibrosis can cause undesirable stretching, pain and limitation of movement. In order to reduce pain and facilitate movement the surface area and strength of the

mesh have to be modified. Calculations of intra-abdominal pressures proved that the tensile strength of a mesh required to withstand the maximum abdominal pressure is only a tenth of that of most meshes.[5]

Light-weight meshes were first introduced in 1998, which have relatively large pores and a small surface area. They cause minimum inflammatory reaction and have greater elasticity and flexibility. Unfortunately, despite these improvements, they continue to have complications such as recurrence, infection and adhesion formation. Thus, the search for an ideal mesh would continue.[6]

In an effort to improve the quality of synthetic mesh for the repair of abdominal wall hernia, the concept of composite meshes has been introduced, comprising of more than one material. The main advantage of the composite meshes is that they can be used in the intra-peritoneal plane with minimal adhesion formation. Despite the vast selection of brands available, nearly all of these meshes are composed of three basic materials: Polypropylene, polyester and poly-tetra-fluro-ethylene (PTFE). A range of additional materials such as titanium, omega 3, monocryl, polyvinylidene fluoride (PVDF) and hyaluronate are also being incorporated to reinforce these basic components. Despite manufacturers' claims of their strength, flexibility and safety, it appears that none of these synthetic materials is without disadvantages.[7]

The present study was aimed to determine the beneficial outcomes, recurrence rates and other possible complications of the use of pure polypropylene mesh, which is cheaper and easily available than most composite meshes for the repair of ventral abdominal wall hernias by open surgical technique at the Prince Abdul Aziz Bin Masaad Hospital and Central Hospital, Arar, Saudi Arabia; which are the major tertiary hospitals of the Northern Border Region of Saudi Arabia.

METHODS

Study design and place

This was a retrospective interventional quasi experimental study conducted at Prince Abdul Aziz Bin Masaad Hospital and Central Hospital, Arar, Saudi Arabia between November 2012 and October 2016. Adult patients of both genders, who underwent repair for various abdominal wall hernia during above mentioned period, were included in the study. Their demographic data, relevant history and physical examination, post-operative notes, prognosis and any complications, including recurrence, infection, adhesions, pain and mesh degradation were recorded in a pre-structured questionnaire. The data was then analyzed with standard statistical methods.

Inclusion criteria

Patients of both genders and ages between 20 - 75 years with abdominal hernia repaired by propylene mesh at the Prince Abdul Aziz Bin Masaad Hospital and Central Hospital, Arar, Saudi Arabia between November 2012 and October 2016.

Exclusion criteria

a. Patients operated at other hospitals and reporting to the above mentioned hospitals for treatment of recurrence or complications during the study period.
b. Patients operated in the above mentioned two hospitals, but before the commencement of the study and reporting for recurrence or complications.
c. Patients undergone multiple surgeries for abdomen.
d. Patients below 20 years of age (Manufacturer of the polypropylene mesh does not recommend use of the propylene mesh in patients below 18 years, who are during their growth).
e. Patients addicted to alcohol or drugs and infectious diseases.
f. Hernia repaired by laparoscopy

Polypropylene mesh

Pure propylene meshes prepared by United Medical Industries Co., Ltd. Riyadh, Saudi Arabia (Under the license of Sutures Limited, Wales, United Kingdom) were used for the reinforcement

during the repair of abdominal hernia. These meshes are reported to be inert, sterile, non-absorbable and have low risk of infection.

Surgical techniques

The epigastic hernias were accessed by giving transverse incision along the anatomical lines of Langerhans, as a result contents which is mainly omentum often is reduced back into abdomen. Then a propylene mesh was placed between the rectus abdominis and the peritoneum extending to both sides of the linea-alba. The muscles were approximated by loose absorbable sutures and the skin was closed by sub cuticular absorbable suture.

The para-umbilical hernias were surgically accessed by giving supra-umbilical transverse incision to preserve umbilical beauty. The defect was closed by approximating then augmenting anterior placed propylene mesh repair. The majority of cases of anterior abdominal wall hernias are less than 2 cm and for such cases a primary Mayo's repair is done which can be done tension free. Mesh was placed in midline anterior to the peritoneum. The muscles were approximated by loose absorbable sutures, anterior to mesh and then finally skin was closed by sub-cuticular absorbable suture.

All the inguinal hernias were explored by giving supra inguinal medial 1/3rd transverse incision. The external oblique aponeurosis was split open, spermatic cord identified and mobilized out to show the posterior wall of inguinal canal. The deficiency in the fascia transversalis was noticed and the direct hernia coming from Hessalbeck triangle (medial to inferior epigastric artery, above inguinal ligament and lateral to rectus abominis muscle) was reduced. The defect was reinforced by approximating the conjoined tendon to the inguinal ligament posteriorly(Lichtenstein's repair).in it the propylene mesh was placed in front of the repaired area and the spermatic cord placed back in the inguinal canal. The external oblique aponeurosis was realigned to construct anterior inguinal wall creating medially a superficial inguinal ring just admitting the tip of little finger for the exit of spermatic cord to testis. In the end skin was closed by sub-cuticular absorbable suture.

RESULTS

A total of 156 patients were operated for the repair of abdominal wall hernia using propylene mesh at the Prince Abdul Aziz Bin Masaad Hospital and Central Hospital, Arar, Saudi Arabia, between November 2012 and October 2016. Amongst these 94 (60.3%) were males and 62 (39.7%) females, aged between 20-75 years.

The distribution of various types of hernia is given in Table-I.

S. No.	Hernia type	No. of patients	Percentage
1	Inguinal hernia	90	57.69%
2	Para umbilical hernia	55	32.25%
3	Incisional hernia	6	3.84%
4	Epigastric hernia	5	3.20%

Table-I. The distribution of percentage of abdominal wall hernia in 156, repaired by proplyelene mesh hernioplasty.

Regarding the complications, the infection was observed in 6 patients (3.84%).They were treated by regular dressings on daily basis for one to two weeks, given appropriate antibiotics (Amoxiclav and Cephalexin) and the infection resolved without further complications. Adhesions were seen in 1 patient (0.64%), suffering from para-umblical hernia, and was treated with the resection of band fiber and readjustment of mesh. Post-operative pain was reported by 15 patients (9.61%); and was managed by suitable analgesics (Paracetamol or Ibuprofen). Seroma was noticed in 20 patients (12.82%) who were treated satisfactorily with drainage, compression bandage and antibiotics cover.

The complications have been summarized in Table-II.

The mean post-operative hospital stay was six days, with a range of 5-7 days and mean time to return to work was 21 days (ranging from 14-30 days).

S. No.	Complications/ status	No. of patients	Percentage
1	Seroma	20	12.82%
2	Post-operative pain	15	9.61%
3	Wound infection	6	3.84%
4	Adhesions	1	0.64%
5	Recurrence	0	0%
6	Uneventful recovery	114	73.07%

Table-II. The distribution of complications of abdominal wall hernia in 156 patients, who were repaired by proplyelene mesh.

DISCUSSION

Meshes used for the repair of abdominal wall hernia are mostly composed of three basic materials (Polypropylene, polyester and PTFE) and are reinforced with a range of additional materials such as titanium, omega 3, monocryl, polyvinylidene fluoride (PVDF) and hyaluronate.[7] At the Prince Abdul Aziz Bin Masaad Hospital and Central Hospital Arar, Pure polypropylene meshes are mostly used for the repair of abdominal wall hernias, which are claimed to be non-irritant, flexible, sterile, non-absorbable and to have low risk of infection.[8] In the present study the beneficial outcomes, possible complications and recurrence rate for the use of polypropylene meshes were determined.

In a recent systemic review and meta-analysis the incidence of infectious complications for open repair of ventricular hernia versus laparoscopic repair was reported to be 23.53% and 4.4%, respectively.[9] In another meta-analysis the incidences of wound infection for open repair and laparoscopic surgery were found to be 16.2 % and 2.8 %.[10] Similarly, in another study higher rates of infection with open repair were reported as compared to laparoscopic surgery, 16–18% and 2–3%, respectively.[11]

In our study the infection rate was 3.84%, similar to those of laparoscopic approach and much lower than the other reports of open surgery. The infection in these cases was treated by regular dressings and appropriate antibiotics and resolved without further complications. The risk of infection could be reduced with the impregnation of meshes with antiseptics (e.g. Pyodine), but can lead to bleeding and hematoma formation.[12] Therefore, in our study routine prophylactic antibiotic cover was given rather than the use of impregnated sterile meshes.

Mesh degradation/recurrence is another common problem reported after abdominal hernia repairs even with the use of various types of meshes. The incidence of hernia recurrence varies greatly between studies and is reported to be between 1-32%.[13,14,15,16]

In our study there was no recurrence observed up to a follow up period of 4-5 years. The recurrence of hernia occurs at the edges of meshes, which is due to inadequate fixation. In our study the zero incidence of recurrence is possibly due to proper fixation of the meshes and appropriate and timely handling of the complications like seroma and infection.

Chronic pain following hernia repair is another common complaint reported in the literature, with a quoted risk of around 50%[17,18], whereas in our study pain was noticed in only 9.61% cases, did not exceed beyond 6 months and was managed with routine analgesics.

Development of seromas is another common problem. Seromas are usually asymptomatic; however, patients may experience pain, pressure, and erythema. Risk factors include non-reducible hernia, multiple incisions and recurrent hernia.[19] Seroma can develop with any mesh type and is due to an excessive inflammatory response to sutures or mesh. In most cases the fluid resolves spontaneously but may require aspiration.[20] In our study occurrence rate of seroma was 12.8%, whereas, in some other studies the incidence of seroma is reported to be 25%.[21] Compression dressing for 1 week after surgery reduces the occurrence of seromas.[22] In our study also the seromas were treated with aspiration and compression bandage.

In some earlier studies reported in the literature the mean hospital stay after laparoscopic surgery was generally shorter, 1.5 to 5.7 days, as compared to open surgery, 3 to 10 days.[11,23,24] In the present study the mean post-operative hospital stay

was six days, with a range of 5-7days, i.e. little more than that of laparoscopic surgery and on the average shorter than other studies of open surgery.

CONCLUSIONS

The present study aimed to determine the benefits, complications and recurrence rate for the open repair of the abdominal wall hernias using pure polypropylene mesh at the major tertiary hospitals of the Northern Border Region of Saudi Arabia. In general there were relatively fewer complications as compared to other studies reported in the literature for the use of open surgery for the ventral abdominal hernia; including seroma, post-operative pain, infection and adhesions; which were adequately managed without further adverse outcomes. The recurrence rate was zero and the results were not much different than the laparoscopic surgical technique. Uneventful consequences were perhaps due to aseptic environment, proper fixation of the meshes and appropriate handling of the complications.

So far as prevalence is concerned; for inguinal hernias predominantly males are affected as 100% seen in our studies. Whereas the ratio of females in epigastric, para umbilical and incisional hernia is high, may be due to morbid obesity prevailing all over the kingdom.

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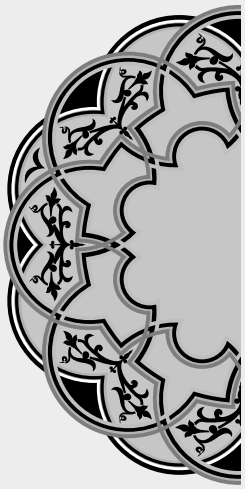

"Opportunities multiply as they are seized."

Sun Tzu

AUTHORSHIP AND CONTRIBUTION DECLARATION

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