INTRODUCTION

There have been dramatic improvements in hernia surgery over time. Laparoscopic repair with mesh placement has less morbidity and early recovery in comparison to open surgery.1-3 Laparoscopic facilities are not freely available in the majority of the local hospitals. Most of the surgical units rely upon open procedures while dealing with abdominal wall hernias.

Each year, approximately two million laparotomies are performed, with an incisional hernia rate of 2-11%.4 Recurrence rates after incisional hernia repair are between 10-50% and more than 50% incisional hernias present within the first two years after primary operation. The common clinical problems associated with large incisional hernia patients, who have often undergone several surgical procedures, are obesity and cardiopulmonary diseases. Therefore, the surgical repair of incisional hernias should assist in the replacement of the abdominal wall defects and also in the restoration of the normal physiologic makeup of the abdomen.5

After the introduction of prosthetic repairs, recurrence rates following conventional (open) ventral abdominal wall (incisional) hernia repairs has fallen to between 12.5 and 19%.6 The repair of incisional hernia by extraperitoneal mesh is known as the Rives-Stoppa repair. However, the large skin incisions, extensive dissection and mobilization, retraction and bowel handling are responsible for significant wound morbidity postoperatively. Thus, a significant number of potential cavities can be created, requiring efficient and continuous drainage. Moreover, cardiopulmonary comorbidities associated with such patients also hamper early convalescence due to prolonged surgery and pain associated with large incisions that restrict respiratory excursions postoperatively.7

ABSTRACT

Objective: To determine the outcome of treatment in terms of infection and recurrence using open extraperitoneal mesh repair technique.

Study Design: Quasi-experimental study.

Place and Duration of Study: The department of General Surgery, Combined Military Hospital, Bahawal Nagar Cantonment, from February 2006 to November 2008.

Methodology: Female patients with abdominal wall hernias with defect of 4 cm or more were studied. A history of previous surgery along with clinical findings on examination like size of defect and previous scar were noted. At surgery, hernial sacs were carefully opened and omental and intestinal adhesions were carefully separated. Polypropylene mesh was placed over extraperitoneal space and secured with interrupted vicryl 2/0 sutures. Redivac drains were placed over the mesh and the fascial repair. The patients were discharged on the 3rd - 4th postoperative day and were followed-up at 3 monthly intervals for postoperative sequelae like seroma, haematoma, infection and recurrence.

Results: There were 32 cases with a mean age of 41.25±10.79 years. The mean follow-up period was 15.78±9.02 months. Previous abdominal surgical intervention was found in 16 (50%) cases. Out of those, 14 (43.7%) had defects through the previous scar. A history of multiple caesarean sections alone, or in combination with either hysterectomy or laparotomy in the last 5 years was present in 7 patients. There were 12 (37.5%) cases of paraumbilical hernia, 4 (12.5%) of a recurrent paraumbilical hernia, 5 (15.6%) epigastric hernia, 2 (6.2%) mix hernia, 7 (21.8%) incisional hernia and 1 (3.1%) each of Spigelian hernia and postlaparoscopic cholecystectomy portal (paraumbilical) hernia. The mean size of the defect was 4.9 cm in primary paraumbilical hernias and 7.2 cm in recurrent paraumbilical hernias. The mean size of the defect in incisional hernias was 9.4 cm, larger than all other types. Superficial wound infection was seen in only 1 morbidly obese (BMI > 30) patient. No case of seroma, haematoma, deep seated abscess or recurrence was noted in the follow-up period.

Conclusion: Abdominal wall hernias are common in female patients, especially those with previous surgical intervention. Open extraperitoneal mesh repair with placement of redivac drains is an effective method for the management of abdominal wall hernias with a smaller complication rate and less recurrence.

Key words: Extraperitoneal mesh. Prolene (polypropylene). Redivac drain.

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Keeping in view the number of routine surgeries conducted and patients presenting with abdominal wall hernia, the objective of this study was to determine the causative factors for abdominal wall hernias and the outcome of extraperitoneal mesh repair in terms of post-operative recurrence and infections in females.

**METHODOLOGY**

This study was conducted at the Combined Military Hospital, Bahawal Nagar Cantonment, from February 2006 to November 2008. Female patients with abdominal wall hernias with a defect of 4 cm or more were included in the study, while male patients were excluded. A detailed history and clinical examination of the patients was conducted by two general surgeons independently and included in the study accordingly. Demographic statistics, duration of symptoms, site of swelling, history of previous surgery and co-morbid conditions along with the clinical findings on examination, like size of defect, reducibility, cough impulse and previous scar were noted on a predesigned proforma. The patients were counseled about the surgical procedure, the use of mesh and possible outcomes. After pre-anesthetic assessment, written informed consent was taken and surgery was planned. Patients were advised to clean the umbilicus thoroughly with povidone iodine for 48 hours before surgery.

Peri-operative antibiotic cover (intravenous ceftriaxone 1 gram) was given at the time of induction of anaesthesia. The operative field was sterilized by povidone iodine and an incision was made according to the requirement. The hernial sacs were carefully dissected and opened. In cases of recurrent and incisional hernias, omental and an intestinal adhesions were separated by a sharp dissection without breach in the intestinal continuity. In lower midline incisions, the peritoneum was separated from the overlying rectus abdominus muscle by a sharp dissection and meticulous hemostasis. Above the arcuate line, the posterior rectus sheath had to be taken alongwith the peritoneal layer, whereas in obese individuals, a sufficient amount of extraperitoneal fat served the same purpose. Once adequate extraperitoneal space had been created, this layer was closed in the midline by continuous vicryl 2/0 sutures. In all the cases, polypropylene mesh was placed over this layer and secured with interrupted vicryl 2/0 sutures. It was then washed with normal saline and Redivac suction drain(s) was placed over the mesh. The covering linea alba/fascial defect was closed with continuous sutures and the space above it was also washed and a suction drain was placed. The superficial layers were then closed accordingly with vicryl 2/0 in the subcutaneous fat and prolene 3/0 over the skin. In all cases of paraumbilical hernia, the umbilicus was removed after due consent.

A Foley’s catheter was retained in all the cases. It was kept for 48 hours in recurrent, incisional and mix hernias, while it was removed the next morning in other cases. Postoperatively, all the patients were initially kept on injectable ceftriaxone for 3-5 days and later on oral quinolones (ciprofloxacin/levofloxacin) for 3-9 days. The antibiotics were continued till the removal of the drains (Figure 1).

The drains placed over the fascial repair were removed on the 3rd postoperative day in cases of paraumbilical hernia/epigastric hernia/spigelian hernia however, in recurrent paraumbilical hernias/incisional hernias/mix hernias, they were removed on the 6th postoperative day. Similarly, the drains placed on the mesh were removed on the 6th postoperative day and 12-14th postoperative day respectively. Cases of wound infection were managed by opening up the superficial layers, repeated dressings and prolonged antibiotics. The patients were followed-up at 3 monthly intervals.

The mean was calculated on SPSS version 16.0 for descriptive variables like age and size of defect in the abdominal wall, while frequency was determined for different types of abdominal wall hernia, surgical incision used and history of previous surgical intervention.

**RESULTS**

During the study period, there were 33 cases of abdominal wall hernias, of which 32 (96.9%) were females and one (3%) male patient who was excluded from the study. The mean age of the patients was 41.25±10.79 years (ranging from 28 to 70 years) and the mean duration of symptoms was 2 years. The patients were followed-up at 3 monthly intervals and the mean follow-up period was 15.78±9.02 months (ranging from 3 to 33 months). Previous abdominal surgical intervention was found in 16 (50%) cases. Out of those, 14 (43.7%) patients had defects through the previous scar and two had concomitant hernias with normal previous scars. History of multiple caesarean sections alone, or in combination with either hysterectomy or laparotomy in the last 5 years was present in 7 patients.

This study included 12 (37.5%) cases of paraumbilical hernia, out of which one had a previous history of a caesarean section through a pfannenstiel incision with a healthy scar. A total of 4 (12.5%) recurrent paraumbilical
hernias were found. Another case, 1 (3.1%), of paraumbilical hernia was seen, which was a postlaparoscopic cholecystectomy portal hernia. Seven (21.8%) cases of incisional hernias were subjected to the Rives-Stoppa repair. These included one case of postlaparotomy (for ruptured ectopic pregnancy), 4 cases with post-multiple caesarean sections, one post-multiple caesarean section with hysterectomy and one post-multiple caesarean section with laparotomy (also for ruptured ectopic pregnancy). Five (15.6%) cases of epigastric hernia and 1 (3.1%) case of Spigelian hernia was noted which had a previous history of hysterectomy, but the scar was normal. Two (6.2%) combination hernias were also studied. One had recurrent epigastric hernia with a paraumbilical hernia and the other had incisional hernia (post-multiple caesarean sections) with a paraumbilical hernia (Table I).

In all the cases of recurrent paraumbilical and recurrent epigastric hernias there was no evidence of any non-absorbable suture material or mesh found in the scar. The patients with incisional hernias showed defects through the previous midline/paramedian incisions and none showed any sign of previously used non-absorbable suture material.

A transverse incision was made in 22 (68.7%) cases. Twelve (37.5%) cases of paraumbilical hernia (primary), 5 (15.6%) cases of epigastric hernia (primary), 4 (12.5%) cases of recurrent paraumbilical hernia and 1 (3.1%) case of postlaparoscopic cholecystectomy portal hernia were subjected to transverse incisions. The mean size of the defect in paraumbilical hernias (primary) was 4.9 cm and 7.2 cm in recurrent paraumbilical hernias. It was 5.2 cm in the epigastric hernia. A midline incision was made in 9 (28.1%) cases and one (3.1%) case was subjected to a right paramedian incision through the previous scar with incisional hernia. The midline approach was through the previous scar in 6 (18.7%) cases of incisional hernia and 2 (6.2%) cases of combined hernia. One (3.1%) case of Spigelian hernia was also managed by a midline incision. It was lower midline in 7 (21.8%) patients and upper midline in 2 (6.2%) cases. The mean size of the defect in the abdominal wall in incisional hernias was 9.4 cm, which was the larger than all other types. The defect size in different hernias varied from 15x10 cm to 4x3 cm.

A mesh size of 15x15 cm was used in 14 (43.7%) cases while a 11x6 cm mesh was used in 15(46.8%) cases. A large mesh of 30x30 cm was used in 3 (9.3%) cases.

Regarding co-morbidities; one patient was diabetic, one was hypertensive, seven were obese and three were morbidly obese. All of them made a good recovery except one morbidly obese (BMI > 30) patient who developed superficial wound infection. Intravenous cefradine was added on the 3rd postoperative day and continued for 7 days in this patient. It was followed by oral moxifloxacin and co-amoxiclav for 11 days, till the removal of drains on the 20th postoperative day. All the patients were discharged on the 3rd to 4th postoperative day, except the one with superficial wound infection, who was sent home on the 7th postoperative day. No case of seroma, haematoma, deep seated abscess or recurrence was noted. No case of recurrence was found during the follow-up period.

**DISCUSSION**

In this study, extraperitoneal mesh repair was found to be a successful proceeding in the abdominal wall hernias in females. There was not a single case of inguinal, femoral, lumbar or obturator hernia in the females. The majority were paraumbilical hernias, incisional hernias, and recurrent hernias. Most of the patients of paraumbilical hernias were obese. The high rate of incisional and recurrent hernias, highlights the importance of primary surgery. Such cases clearly indicate the inappropriate repair techniques of midline incisions and abdominal wall hernias being performed by under-trained surgeons. The absence of non-absorbable suture materials in the cases presenting to the study centre as recurrent abdominal wall hernias and incisional (midline) hernias was probably the main cause of those hernias.

The prosthetic mesh can be placed as sublay (extraperitoneal/pre-peritoneal), inlay (extraperitoneal) or onlay (on the fascia). Each technique has its own advantages as well as limitations. The intraperitoneal placement exposes the mesh to the intestines/omentum and can lead to significant adhesions causing intestinal obstruction and fistula formation, which is mostly seen with polypropylene mesh. This has been reduced with the use of polytetrafluoroethylene (PTFE) mesh, but Dacron mesh may be used as well. It does not require dissection of the intermediate layers, which definitely lowers the incidence of postoperative wound infection.
The onlay technique demands that the mesh be secured in the subcutaneous planes just above the fascial repair, thus increasing the incidence of infection. The inlay mesh placement seems to be the ideal technique avoiding the problems associated with the other procedures. The inlay (extraperitoneal) mesh repair consists of placement of the mesh beneath the muscle (rectus abdominus-retrorectus). A naturally occurring barrier, consisting of both the anatomic membrane lining of the abdomen (peritoneum), and the trans-abdominal (transversalis) fascia, is maintained between the mesh and the underlying intestines. A portion of the posterior rectus sheath is also included above the arcuate line. This natural layer prevents problematic adhesions from forming to the intestines and omentum later on. Therefore, while the mesh is secure beneath the muscle, it is not fully within the abdominal cavity. It is positioned where it will be most effective, yet completely safe and covering large defects as well. This mesh extends well beyond the under edges of the muscle to reduce pressure on the hernial defect, thereby reinforcing the entire area simultaneously.

In this study, polypropylene mesh was used in all the cases firstly because of its easy availability and secondly due to its extensive tissue reaction potential, thus reducing the recurrence rate. There was not a single recurrence. One case (3.1%) of superficial infection was noted that responded to local wound management and antibiotics. By this extraperitoneal technique, the direct contact of the polypropylene mesh with the intestine/omentum was avoided. Due to extensive dissection in the extraperitoneal space, adequate drainage is essentially required through Redivac drains. In primary surgeries they can be safely kept for 5-7 days, but in large incisional hernias they may be required for even up to 2 weeks. This may cause transient morbidity but certainly avoids long-term effects of the infection.

The contraction of the mesh leads to its movement causing recurrence. Wrinkling of the mesh causes the mesh to bunch up into a ball of mesh (meshoma). This later initiates recurrence of the hernia as well as chronic pain secondary to mechanical pressure of the meshoma on the surrounding soft tissue. So fixation is essentially required.

Critics of mesh repair also exist. The main issue is an increased risk of infection with a placement of foreign body and cost factor. Autologous tissue based repair of incisional hernia are associated with less chances of wound infection and gastroenterocutaneous fistula formation. Postoperative complications like seroma formation, haematoma, cellulitis and wound infection have been attributed largely to the extensive dissection and tissue handling during hernia repair. Repair with mesh requires a longer operating time and results in greater intraoperative blood loss. Both these factors have been reported to be associated with increased wound infection. Arnaud and Tuech noted a 2% superficial infection, 2% deep infection necessitating mesh removal and 3.2% recurrence while managing incisional hernias with a Dacron mesh. The critics are still working on its modifications like Cardiff repair, reversed rectus sheath repair and sliding door techniques.

Baure et al. reported the use of an expanded polytetrafluoroethylene (ePTFE) patch for incisional hernias. They documented 5% seromas, 3% fistulas related to removal of a previously implanted prosthesis, 9% infections and 19% overall recurrence rate noted over 12 years in a series of 98 large incisional hernias. In a review of literature, Houck and colleagues reported the rate of infection after incisional hernia repairs, with or without a prosthesis, as ranging from 15% to 45%. They expressed the view that these procedures should be considered "contaminated" for surveillance and reporting purposes.

Recurrence rates of open repair of incisional hernias historically range from 6% for the classical Rives-Stoppa repair to 35-45% for some of the techniques more commonly used in the United States. In patients with incisional hernias, retrofascial pre-peritoneal polypropylene mesh repair is superior to suture repair to prevent the recurrence of hernia, even in patients with small defects. Heartstill et al. and Notash et al. reported Rives-Stoppa repair on incisional hernias as a technically difficult but significantly successful repair. Aggressive efforts to identify infection and treat early may prevent abscess formation and subsequent recurrent hernia. Indeed, it has excellent long-term results with minimal morbidity in large primary as well as recurrent incisional hernias.

The common clinical problems associated with large incisional hernia patients, who have often undergone several surgical procedures, are obesity and cardiopulmonary diseases. The surgical repair of incisional hernias should then assist in the replacement of abdominal wall defects as well as the restoration of the normal physiologic makeup of the abdomen. An intraperitoneal modification to the original Rives-Stoppa repair has also been found to have a low recurrence rate for large incisional hernia repairs with minimal complications and a low rate of mesh infection.

**CONCLUSION**

Abdominal wall hernia are common in female patients with a history of previous surgical intervention. Open extraperitoneal mesh repair with placement of Redivac drains is an effective method for the management of abdominal wall hernias with a low complication rate and low recurrence even in large hernial defects.
REFERENCES


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