DOI: https://doi.org/10.53350/pjmhs22166898

ORIGINAL ARTICLE

Evaluation of Mesh Infection in Patient with Laparoscopic Inguinal Hernia Repair: A Retrospective Study

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ABSTRACT

Aim: To evaluate Post-Laparoscopic infection in Mesh followed by inguinal hernia repair.
Study design: A retrospective study
Place and Duration: This study was conducted at Jinnah Postgraduate and Medical Centre Karachi from April 2021 to April 2022
Methodology: A total of 80 participants were included in the study. All the patients had an extensive infection in the mesh followed by mesh hernia repair through laparoscopy. The preoperative workup was done for all the patients before a laparoscopic excision of mesh. A drain was placed in the preperitoneal space after the removal of the mesh. Closure of the peritoneal flap was done after that with a 3/0 absorbable suture.
Result: The course of the operation was uneventful for all the patients. Only two patients required a sigmoidectomy for the repair of the fistula. Three patients presented with contralateral side infection and mesh residues around the pubic. A second laparoscopy was done on those three patients. Recurrence of hernia was seen in four of the cases observed on follow-up.
Conclusion: Laparoscopic removal of the mesh is a superior approach to the open surgical removal of the mesh for the treatment of mesh infection. However, prevention of infection by prophylactic antibiotics, maintaining an aseptic environment during hernia repair surgery, and proper sterilization of the instruments can prevent the infection.
Keywords: laparoscopic, mesh infection, inguinal hernia repair

INTRODUCTION

The rate of recurrence of hernia has decreased with the increase in the trend of using a synthetic mesh [1]. However, complications such as infections can be expected despite using prophylactic antibiotics perioperatively and performing the procedure under aseptic measures. In such a situation, surgical intervention is necessary. The exact cause of infection is not usually understood. It is not easy to detect whether the source of the infection is endogenous or exogenous [2]. Literature suggests that 10% of infections are seen after the use of polytetrafluoroethylene (PTFE) mesh for the repair of hernia [3]. Other factors responsible for mesh infections are mycobacterial infection, sterilization methods, and methods of disinfection of laparoscopic instruments.

The incidence of infection in the mesh is not significantly high, yet its management is a complicated procedure. According to some recent studies, it has been found that the rate of infections followed by laparoscopic hernia repair is from 0.7 to 2%. In the case of open incisional and inguinal hernia, it is 9-18% [4].

The common clinical features of mesh infection are fever, local swelling, local pain, and purulent or serous discharge from the wound. The complete blood picture of those patients shows elevated erythrocyte sedimentation rate (ESR), elevated C-reactive protein (CRP), and leukocytosis. The mode of treatment is dependent on the extent of the disease. The conservative management includes percutaneous drainage of the discharge, wound therapy through negative pressure, and intravenous antibiotics. Nonetheless, mesh excision is required in most cases. Excision of the mesh is a significant step in the treatment of mesh infection [5].

As the trend of the repair of inguinal hernia through laparoscopic surgery is increasing, the incidence of mesh infection is no longer a rare complication. Infection is common in setups with large number of patients. Traditionally the mesh infection was treated in such a way that the wound was opened at the site of the previous incision. Mesh was extirpated, sutures were applied and the fascia was closed depending on the possibility of its closure [6]. In a laparoscopic hernia repair, the preperitoneal mesh is placed through a posterior approach rather than an anterior approach.

The present study aims at reviewing a comparison of removal of the mesh by open surgical procedure and laparoscopic surgery, for the treatment of mesh infection after a laparoscopic inguinal hernia repair.

METHODOLOGY

In this retrospective study, 80 patients were included to evaluate the treatment of mesh infection. Permission was taken from the ethical review committee of the institute. The files of the patients were thoroughly studied for the operative findings as well as post-operative examination findings on the follow-up visits. The patients had undergone the surgery in different local healthcare setups. Some of them had already been treated conservatively with intravenous antibiotics and drainage of wounds. Some had even undergone incomplete excision of mesh.

A computed tomographic (CT) was included in the preoperative workup of all the patients. Those patients who had a sinus in the abdominal wall were sent for radiography as well. This was done to determine the connection of the sinus with any other organ such as the colon, small intestine, and urinary bladder. Radiography also helped in the exploration of the infection. A specimen of pus was taken from the wound or sinus in the abdominal wall. The specimen was sent for culture and sensitivity so that the right choice regarding antibiotics could be made. The decision to remove the mesh was taken for the patients showing no improvementwith conservative management or those having a fluid collection in the area of the mesh.

The laparoscopic surgical procedure was done under general anesthesia. A urinary catheter and nasogastric tube were introduced in all the patients followed by the induction of anesthesia. Both were removed after the surgery making sure of no injury to the bowel and bladder. The trocars were inserted at the scar of the previous laparoscopy. Firstly, the abdominal cavity was explored for the identification of infection. Then the abdominal cavity was looked for fistulas by the division of adhesions if any. After the identification of the abscess, a small incision was given on the lateral margin of the abscess with the help of endoscopic scissors. The pus was then completely aspirated to avoid contamination in the abdominal cavity. A Sample of the pus was taken to send for culture and sensitivity. Peritoneum was explored about 2 cm above the internal inguinal ring for the exploration of the infected mesh. The grasper and sucker were used for dividing

the mesh. It is usually difficult to separate the mesh from the pubic bone. Special care is needed to avoid bladder injury, injury to iliac vessels, and inferior epigastric vessels. The peritoneal pockets were irrigated thoroughly and a drain was placed for flushing. A 3/0 absorbable suture was used to close the peritoneal flap. Methylene blue injection was given if a sinus was present and an open excision was done. Antibiotics were given intravenously after the laboratory results of culture and sensitivity collected. The amount of drainage was regularly monitored. The drain was removed after confirmation through ultrasonography and CT scan. SPSS version 22 was used to compute the data.

RESULTS

Excision of mesh was done in 80 patients. A total of 54 (67.5%) were male participants and 24 (32.5%) were female participants. The mean age of the patients was 40 ± 23.2 years. The ages ranged from 22 years to 64 years. Transabdominal preperitoneal repair (TAPP) was done in 67 (83.75%) of the patients, where 12 (17.91%) had a bilateral hernia. A total of 13 (16.25%) underwent extraperitoneal repair (TEP), while 10 (76.92%) had a bilateral hernia. Table 1 shows the baseline characteristics. A total of 14 (17.5%) patients reported infection after the surgery in less than 3 months. The remaining 66 (82.5%) patients reported infection from 3 months to 1 year. The common clinical features represented by the patients were erythema, pain, local swelling, and discharge. Leukocytosis and raised levels of CRP were noticed in most of the patients during laboratory investigations. CT scan of all the patients had a common feature of the collection of pus in the preperitoneal space of the inguinal area. Risk factors were found in 30 (37.5%) patients with mesh infection. These risk factors have been shown in Table 2.

A total of 55 (68.75%) patients underwent laparoscopic mesh removal as an initial treatment for mesh infection. However, the remaining 25 (31.25%) had already received surgical intervention. A total of 16 (20%) had received an open surgical procedure for partial removal of the mesh and 9 (11.25%) patients were treated by percutaneous drainage. Sigmoidoscopy was performed on two patients who had developed a fistula connecting to the sigmoid colon. All the surgical procedures went uneventful with zero mortality and without any serious complications. On average, the time taken for the surgery was 90 minutes ranging from 70 minutes to 110 minutes. The blood loss was 20ml to 80ml.

Table 1: Baseline characteristics of the study participants

Variables	Frequency	Percentage
Age (years)		
22-30	8	10
31-40	28	35
41-50	26	32.5
51-64	18	22.5
Gender		
Male	54	67.5
Female	24	32.5
TAPP repair	67	83.75
TEP repair	13	16.25

Table 2: Risk factors found in study participants

Risk factor	Frequency (n=30)	Percentage
Large post-operative hematomas	11	36.67
Repeated seroma aspiration	5	16.67
Smoking	4	13.33
Obesity	6	20
Diabetes	4	13.33

The peritoneal drain was placed in all the patients and it was removed on the 3rd to 7th postoperative day followed by a CT-scan confirmation and when the drain was less than 10 ml per day. The average time of healing the wounds of trocar was 7 days. The average healing time of the wound of sinus excision was 14-16 days. Patients were called for follow-up visits from 7 months to 48 months, depending on their clinical features. A total of 12 (15%) patients had developed recurrent hernias after the removal of the mesh. The culture and sensitivity results of the patients were positive for all the patients. The findings are given in Chart 1. A total of 46 (57.5%) had staphylococcus species, 21 (26.25%) had Escherichia coli and 13 (16.25%) had Pseudomonas species.

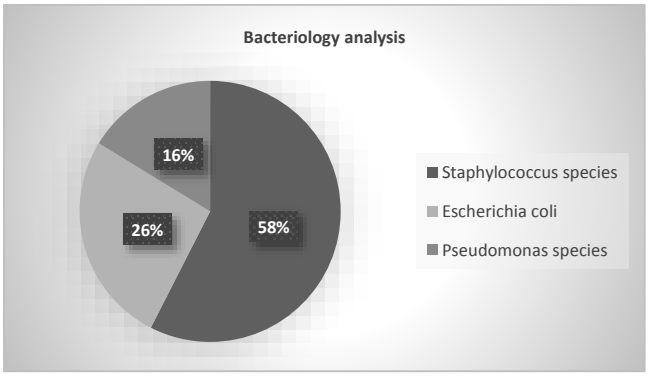

Chart 1: Culture and sensitivity results of the study participants

DISCUSSION

The present study is a review of the management of laparoscopic mesh removal due to mesh infection after the TEP or TAPP procedures. The study by McCormack et al suggests that the rate of infection in case of open hernia repair is more than in laparoscopic hernia repair [7]. The reason for this difference could be the direct introduction of mesh in the peritoneal space directly through the port. This minimizes the exposure of the internal environment of the body to the outer environment. Moreover, in laparoscopic procedures, the location of mesh which is peritoneal space is away from the site of incision compared to open hernia repair procedure. However, the sterilization of instruments used in laparoscopic surgery is a challenging procedure. They are also more prone to bring outer organisms and debris inside the body, hence causing infection [8].

According to the study by LeBlanc et al, common risk factors for causing infection in patients of mesh hernia repair surgery are a positive history of infection, obesity, chronic obstructive pulmonary diseases, compromised immunity, and diabetes [4]. Moreover, other factors related to surgery are postoperative hematoma, long operative time, repeated seroma aspiration, contaminated procedure, and non-sterilized instruments [9]. Commonly found organisms in mesh infections are Staphylococcus species, Streptococcus species, gram-negative bacteria including E.Coli and anaerobic bacteria, and Peptostreptococcus species [10]. Firstly, the bacteria attach to the mesh, after that, the bacteria proliferate and then form a biofilm on the surface of the mesh. This leads to infection around the mesh [11]. This biofilm is responsible for the protection of bacteria from antibiotics. Hence, the infection is most persistent and antibiotics are unable to eradicate the infectious bacteria [12]. Although the diagnosis of mesh infection can be made straightforwardly, the ideal management of mesh infection is not clear. In the present study, the management of some of the patients was done conservatively such as through percutaneous drainage and administration of intravenous antibiotics. Some also had undergone partial or incomplete removal of mesh and developed infection recurrently. Hence, it was observed that complete excision of mesh is a better treatment option for such an extensive mesh infection. According to the study by Fawole et al, mesh excision was found to have no role in the recurrence of the infection and no residual pain was observed in any of the patients in their study [13]. In the present study, recurrence was seen in four patients. The recurrence can be repaired by an open procedure.

The study of Johanet et al included a review of mesh infection management by fifty surgeons. According to the results of

the study, it was concluded that the removal of the mesh is the most effective and appropriate management of extensive, recurrent, and complicated infection of mesh infections [14].

CONCLUSION

Laparoscopic removal of the mesh is a superior approach to the open surgical removal of the mesh for the treatment of mesh infection. However, prevention of infection by prophylactic antibiotics, maintaining an aseptic environment during hernia repair surgery, and proper sterilization of the instruments can prevent the infection.

Source of funding: There was not a specific source of funding

Conflict of interest: The present study did not have any kind of conflicts of interest

Permission: Permission was asked for and taken from the ethical committee of the institute.

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