

Mesh Related Infections: Retrospective Analysis

Hari Shankar Prasad¹, Kashinath Pandit²

¹Assistant Professor, Department of General Surgery, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India

²Senior resident, Department of General Surgery, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India

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Corresponding author: Dr. Kashinath Pandit

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Abstract

Aim: The aim of this study was to analysis of mesh related infections in a tertiary care centre.

Methods: A retrospective observational study was conducted in the department of General Surgery, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India for one year and 50 patients were included in the study.

Results: Mesh infection was more common in males. Among 50 patients, 40 were males and 10 female patients. Majority of the patients were in the age group 40-50 (40%) followed by 50-60 age group 30%. 30% cases were repaired with open repair and rest of the patients was repaired with lap repair. In our study, mesh infection was more common in obese patients with a mean BMI of 32.70+/-1.78kg/m². (Range 30.40-34.10). 40% patients had co-morbidities. The antibiotic protocol was followed in 48 cases out of 50. Antibiotic has used according to the protocol of our hospital; it was followed in 48 patients in the first surgery i.e., hernia repair surgery. Parenteral cephalosporin was used in 48 patients and amoxicillin-clavulanic acid in 2 patients. Antibiotic has repeated if the procedure was beyond 2 hours. After postoperative day 2, patients were switched over to oral antibiotics for three days. Likewise, during the second admission, i.e., when the patient was admitted with mesh infection, 48 patients were given cephalosporin, and 2 patients were given Piperacillin tazobactam.

Conclusion: In our study incidence was more common after laparoscopic surgeries because there was a lapse in the sterilization process of the laparoscopic instruments, which was rectified with timely culture sensitivity tests and stringent sterilization process.

Keywords: Laparoscopic Surgeries, mesh, Infection

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Introduction

Huge incisional ventral hernia is defined as hernia defect size ≥ 10 cm¹, and its surgical correction is considered technically challenging and with a high chance of recurrence. Although repair with prosthesis was proven to reduce hernia recurrences, it

associates a series of mesh-related complications like seroma, mesh erosion with sinus formation, chronic pain and discomfort, etc. Even in expert centers, postoperative wound related infective complications as high as 40–50%.²⁻⁴

Seroma formation and mesh infection may also occur as long-term morbidities.⁵ Nowadays, mesh removal is the preferred management strategy for mesh infection after incisional hernia repair⁶⁻⁸, which inevitably causes secondary trauma to the abdominal wall tissue and increases the risk of recurrence and other morbidities. Repair of re-recurrent hernia subsequent to mesh removal is even more technically demanding and which usually requires prolonged hospitalization and high medical expenses without promising results.

Hernioplasty is one of the most common surgeries performed by general surgeons. With the advent of synthetic mesh recurrence rates and the burden on healthcare have drastically reduced.⁹ Incidence of mesh infection is 2% - 4% for open inguinal hernia repair, 6% -10% for open incisional hernia repair¹⁰ and 3.6% for laparoscopic incisional hernia repair.¹¹ Mesh infection can lead to potential re surgeries and morbidity to the patient and thus should be prevented. Factors influencing mesh infection are patient factors like COPD, high BMI, consumption of tobacco, advanced age, ASA>3, comorbidities.¹²

In today's environment, biologic mesh is primarily used in patients with class 3 (contaminated) and class 4 (dirty) wounds.¹³ Its use in class 1 (clean) and class 2 (clean- contaminated) wounds has not been well studied. Its efficacy has been debated in the recent medical literature with some studies finding that biologic mesh is associated with higher recurrence rates than synthetic mesh and others finding similar performance between the two techniques.^{13,14}

A majority of ventral hernias are repaired using mesh, with synthetic mesh being the most common choice.¹⁵ Synthetic mesh has been well demonstrated to significantly reduce the hernia recurrence rate in ventral hernia repairs.^{16,17} However, synthetic

mesh is susceptible to becoming infected in both clean and contaminated repairs, resulting in the need for additional procedures to remove the infected mesh and repair a now larger hernia defect.^{18,19} This adds additional costs due to extra procedures and a longer duration of stay in the hospital. The development and use of biologic mesh has been identified as an alternative to synthetic mesh for reducing infections. Biologic mesh has been used in contaminated cases to resist infection, thereby reducing the morbidity of postoperative wound infection and the need for additional procedures, which may justify the high cost of the mesh itself.¹⁹

The aim of this study was to analysis of mesh related infections in a tertiary care centre.

Methods

A retrospective observational study was conducted in the department of General Surgery, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India for one year and 50 patients were included in the study.

All cases that underwent ventral and groin hernia surgeries and reported with mesh infections in the Department of General Surgery were included in the study. Files with incomplete and inappropriate data needed for the study were excluded from the study. All primary hernia repairs were done on an elective basis, and antibiotics are given as per the protocol of our hospital. All cases of mesh infection during the study period (n=50) were analyzed. Demographics like age, sex and factors associated with mesh infection like BMI, comorbidities, time of presentation, tobacco consumption, ASA grade, type of hernia, type of hernia repair done were taken from medical records of the patients and their association with mesh infections were analyzed.

Results

Table 1: Patient characteristics

Gender	N%
Male	40 (80)
Female	10 (20)
Age in years	
<40	10 (20)
40-50	20 (40)
50-60	15 (30)
>60	5 (10)
Type of repair	
Open Repair	
Open PP	10 (20)
Lichtenstein	5 (10)
Lap Repair	
IPOM	10 (20)
SCOLA	10 (20)
TEP and eTEP	15 (30)
BMI kg/m²	
<18.5	0
18.5-25	0
25-30	5 (10)
>30	45 (90)

Mesh infection was more common in males. Among 50 patients, 40 were males and 10 female patients. Majority of the patients were in the age group 40-50 (40%) followed by 50-60 age group 30%. 30% cases were repaired with open repair and rest of the patients was repaired with lap repair. In our study, mesh infection was more common in obese patients with a mean BMI of 32.70 \pm 1.78kg/m². (Range 30.40-34.10).

Table 2: Time of presentation of mesh infection after primary repair, Co-morbidities in cases of mesh infection

Time in months	N%
1-5	34 (68)
6-10	16 (32)
Co-morbidities	
Present	34 (68)
Absent	16 (32)

The time of presentation after surgery was more after 5 months. The Mean \pm SD being 5.55 \pm 3.27 (Range being 1-10 months).

Table 3: Details of co morbidities, antibiotics used in cases of mesh infection and mesh used

Co-morbidities	N
COPD	5
COPD+Type 2 DM	5
Type 2 DM	3
COPD +HTN	2
Antibiotics	
1st admission	
Cephalosporin	48
Amoxicillin clavulanic acid	2
2nd admission	
Cephalosporin	48
Piperacillin tazobactam	2
Mesh used	
Polypropylene mesh	42
Composite mesh	8

40% patients had co-morbidities. The antibiotic protocol was followed in 48 cases out of 50. Antibiotic has used according to the protocol of our hospital; it was followed in 48 patients in the first surgery i.e., hernia repair surgery. Parenteral cephalosporin was used in 48 patients and amoxicillin-clavulanic acid in 2 patients. Antibiotic has repeated if the procedure was beyond 2 hours. After postoperative day 2, patients were switched over to oral antibiotics for three days. Likewise, during the second admission, i.e., when the patient was admitted with mesh infection, 48 patients were given cephalosporin, and 2 patients were given Piperacillin tazobactam. Polypropylene mesh was used in 42 patients, and the composite mesh was used in 8 patients who underwent IPOM. Polypropylene suture was used in all ten patients.

In our study, 44 patients underwent mesh explantation, i.e., complete removal of the mesh, the infected sinus, and the surrounding infected tissue, followed by proper drainage of the surgical site. 2 patients were managed conservatively with an antibiotic wash, and parenteral antibiotics and 4 patients were tried to manage conservatively but later underwent mesh explanation.

Discussion

Abdominal wall and inguinal hernia are common clinical scenarios in surgical practice. It is widely accepted that any sizable abdominal wall defect requires placement of mesh for reinforcement of repair and longer recurrence-free period.²⁰ SSI is defined as infections occurring within 30 days after surgery and affecting either the incision, organs, or body spaces at the site of the operation.²¹

Mesh infection is a type of surgical site infection (SSI). Patient factors known to increase the risk of SSI and mesh infection are morbid obesity, tobacco abuse, chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM), and

immunosuppression.²² The incidence of SSIs varies across surgical procedures, with a range of 0.1% to 50.4% reported in a systematic review by Korol et al.²³ Data showed that the laparoscopic inguinal hernia repair is associated with a lower incidence of mesh infection than an open procedure.²⁴ Nevertheless, thorough sterilization of laparoscopic instruments is more challenging, and the instruments are more prone to carry debris or organisms that can lead to infections.²⁵

However, in our centre, according to the antibiotic protocol, the antibiotic dose was repeated if the procedure took more than 120 minutes. In line with the world literature even our study showed mesh infections in procedures' that took more than 100 minutes to complete. The time duration of open surgery was 94+/-21.17mins and in patients who eventually had mesh infection were 118.0+/-20mins. Duration of surgery in patients who underwent laparoscopic surgery was 111.50+/-13mins, and in patients with mesh infection post, the laparoscopic repair was 133.45+/-30mins. Time duration to complete a laparoscopic procedure is more compared to open procedure. The cause of prolonged surgery could be that the procedure was performed by surgeons in the early phase of their learning curve. The risk for complications after hernia repair is increased among patients with comorbid conditions, such as obesity or diabetes.²⁶ Likewise, the body mass index of >30kg/m² was associated with mesh infection. Proper selection of the patient, ensuring good control of comorbid medical conditions will prevent mesh infections.²⁷ Patient age, ASA score, smoking and were found to be associated with the development of mesh infection.

Micro porous, multifilament mesh, and laminar mesh construction increase the surface area for bacterial adherence, impede leukocyte migration for bacterial clearance and leads to biofilm formation.²⁸ Pretreatment of mesh with antimicrobial

agents is not done in our setting. In our study, polypropylene mesh was used in 44 patients and composite mesh in 4 patients who underwent IPOM repair. Different guidelines exist to treat mesh infections but not very clear evidence in the literature to support a single optimal approach. While some studies prefer conservative management, some others prefer complete mesh removal. Large-pore monofilament mesh seems to be salvable in a majority of cases, particularly when placed in an extra peritoneal position, while micro porous, multifilament, and composite meshes typically require explantation.²⁹

Conclusion

Because of a failure to properly sterilize laparoscopic devices, our study found that incidence was higher following laparoscopic procedures. This problem was solved by conducting culture sensitivity testing and sterilizing the instruments more thoroughly. Due to the fact that our facility is also a teaching hospital, surgical procedures take far longer than they would with a more seasoned surgeon. Exposure of the incision site to the environment and bacterial contamination is increased if the operating time is prolonged due to factors such as inadequate pre-operative planning, inexperienced surgeons, inexperienced staff, lack of necessary equipment, etc.

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