

A retrospective observational assessment of the mesh related infections in a tertiary care facility

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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 descriptive study was conducted in the department of Surgery 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

Introduction

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 ^[1]. Incidence of mesh infection is 2%-4% for open inguinal hernia repair, 6%-10% for open incisional hernia repair ^[2] and 3.6% for laparoscopic incisional hernia repair ^[3]. 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 ^[4].

Huge incisional ventral hernia is defined as hernia defect size ≥ 10 cm ^[5] 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% [6-8]. Seroma formation and mesh infection may also occur as long-term morbidities [9]. Nowadays, mesh removal is the preferred management strategy for mesh infection after incisional hernia repair [10-12], 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.

At present, there are only a few reports on mesh-preserving treatment of mesh infection after hernia repair [13-15] and more cohort trials are needed to validate the mesh-preserving treatment strategy for mesh infection after ventral hernia repair. Patient comorbidities have been reported to contribute to a higher risk of postoperative infection and complications including higher recurrence rates [16]. A diagnosis of chronic obstructive pulmonary disease (COPD), diabetes mellitus and obesity have been shown to leave patients at higher risk to postoperative complications [17]. The association between high body mass index (BMI) and ventral hernias, as a result of increased stress on the abdominal wall, has also been well demonstrated [18]. Further, a history of smoking, prior ventral hernia repairs and subsequent infections following repair have also been shown to contribute to complications [17, 19]. The aim of this study was to analysis of mesh related infections in a tertiary care centre.

Materials and Methods

A retrospective descriptive study was conducted in the department of Surgery 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 explantation.

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

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. As ours is a teaching hospital, surgeries are performed by surgeons in the early phase of the learning curve, so it takes much longer to perform surgery than an experienced surgeon would take. Many parameters impact operating time, including pre-operative planning, surgeon experience, operating room staff experience, and access to equipment etc., which would lead prolonged exposure of the incision site to the environment and bacterial contamination.

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