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Case Report

Hernia mesh infection: a surgical disaster

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ABSTRACT

Mesh infection is one of most disastrous complication following hernia surgery. The consequences are more complex especially following a laparoscopic hernia repair operation. Understanding the pathophysiology of mesh infections is pivotal in adopting preventive strategies. Once infected, exact determination of the extent of the septic complication by CECT is essential. A two staged surgical intervention yields excellent results. A case of infected laparoscopic mesh repair treated by a two staged operation is presented along with a brief review of literature to highlight the safety and efficacy of this approach.

Keywords: Mesh infections, Hernia repair treatment

INTRODUCTION

Within the last few years the use of mesh for repair of various types of hernia has become a standard practice.[1] The incidence of recurrence has gone down significantly making this a gold standard for hernia repair.[2,3] However in the event of infection developing a series of catastrophic events ranging from localized swelling and redness to severe sepsis with fistula formation can develop.[1,3] Identifying the various factors which may predispose to infection can prevent such septic calamities.[4] A case of laparoscopic mesh infection treated by a two staged surgical procedure is presented with a review of literature.

CASE REPORT

A 34 year old male patient was referred to our surgical facility for management of severe mesh infection following a laparoscopic repair for an upper abdominal ventral hernia. The patient gave a history of having undergone a laparoscopic mesh repair for an upper abdominal ventral hernia. Two weeks after the surgery the patient developed swelling and redness at one of the port sites. The patient sought treatment from the surgeon who had operated upon him. The surgeon introduced a negative suction drain and was then periodically irrigating the operative site with an antibiotic solution. However there was no response to treatment. The negative suction tube was discharging frank pus. The daily output was approximately 15 to 20 cc per day. The patient then was refereed to me. On physical examination there was a firm indurated mass measuring approximately 13 cms in diameter with the tube drain exiting laterally from the mass (Figure 1).

Figure 1: Swollen and reddened area with a sinus opening along with the drainage tube exiting from the lateral aspect.

Haematological investigation revealed neutrophilic leucocytosis. Other blood tests were normal.

A contrast enhanced CT (CECT) revealed an indurated mass in the anterior abdominal wall. The mesh was not clearly seen in the CT scan (Figure 2).

Figure 2: CECT showing the inflamed mass marked by arrows communicating externally by a sinus.

A two staged approach was adopted. Stage one comprised of removing the drain followed by incision and drainage of the softened area over the indurated mass. (Figure 3) The underlying stitch was removed. (Figure 4) Drainage of the area led to reduction in the size of the indurated mass. However, the purulent discharge though significantly reduced still continued.

Figure 3: Stage 1-operation comprising of an incision and drainage of the inflamed mass.

Figure 4: Infected underlying sutures removed during the stage 1 operation.

The patient then underwent the second stage operation. In this a midline incision was made. The peritoneal cavity was accessed from the lower normal midline. The infected mesh was contained in a shell of fibrous tissue (Figure 5). This was opened and the infected PTFE mesh was removed (Figure 6). The infected cavity was irrigated and the unhealthy tissue was scraped. The incision was closed in a single layer with monofilament suture material. The lower part of the wound exhibited delayed wound healing. However it healed with periodic dressings. The patient is following up for last one year with no evidence of a midline hernia.

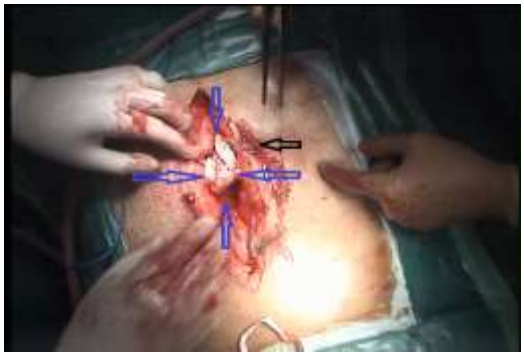

Figure 5: Walled of fibrous cavity incised to reveal the infected mesh during the course of stage 2 operation.

Figure 6: Infected PTFE mesh removed from the cavity.

DISCUSSION

Various factors play a significant role in the development of mesh infections.[1-3]

Type of mesh

The search for ideal material for a mesh continues, however none of material available till date can be described as ideal. Nature of material of the mesh is an important factor. PTFE meshes are associated with higher incidence of infection and fistula formation as was evident in the case presented.

Nature of filament of the mesh also affects the chance of infection. Monofilament meshes such as polypropylene

or light weight meshes are less prone to develop infections, however multifilament meshes such as polyesters lead to increase bacterial persistence or spread of infection as well.

Porosity of mesh

Micro porous meshes are associated with high rates of infection as well as development of seroma, whereas macro porous meshes are associated with lower incidence of infection but with higher incidence of adhesions and erosive events.

Micro pore mesh has a pore diameter of less than 10 μm. As a result bacteria can penetrate the mesh easily, but leukocytes cannot as there mean size is 75 μm. The result is that these bacteria are shielded from the immunological defenses of the patient.

Water contact angle or wettability of a mesh determines the ease with which bacteria can get attached to the mesh. Mesh with high contact angle is considered hydrophobic and as a result the chances of bacterial attachment are significantly less. A material with low water contact angle exhibits a hydrophilic nature and so is more prone to attachment by bacteria. However mixed results have been observed with respect to this particular criterion.

Awareness of the pathophysiology of microbiological aspects of mesh infections is important for treatment.[4,5] *Staphylococcus aureus* is still the commonest organism. In addition to *S. aureus* other organism encountered are *Streptococcus* species, *Enterobacteriaceae* and anaerobic bacteria such as *Peptostreptococcus*. Infections with atypical mycobacteria are encountered in laparoscopic procedures.

The presence of a foreign material decreases the local immunity thereby decreasing the number of bacteria needed to cause infection.[6]

Co morbid medical conditions significantly hamper immunological defense mechanisms in the host.[7] Bacteria get attached to foreign material. They proliferate and form a bio film all around the synthetic material. The bio film contains a wide spectrum of bacteria which release an exopolysaccharide component. This component provides an excellent skeletal structure which exerts a protective effect for bacteria not only against antibiotics but also against a host defense mechanism.

High grade sterilization of scopes may not be practised in all centres. Instead most centres rely on high grade disinfection with glutaraldehyde after rinsing with ordinary potable water. The chance of water born organisms causing infection also increases. This includes atypical mycobacterium and pseudomonas. The use of disinfection without meticulous bacterial decontamination in this situation is another factor contributing to mesh infection.

Adequate rinsing of instruments followed by vigorous sterilization ideally by autoclaving is essential for prevention of infection by atypical mycobacterium.

Despite use of povidone-iodine scrub yet infection continues to thrive especially at umbilical site.

The use of fresh solution can help to reduce contamination there by reducing infection rate in hernia surgery.

Clinical manifestation of mesh infection develops anywhere from 2 weeks to 14 months.[2,3] Clinical features typically suggestive of local inflammation characterized by pain, redness, tenderness, swelling and raised local temperature. Systemic features may be fever associated with chills and malaise. In a few cases mesh related infection may present as a fistula discharging pus or an intra-abdominal abscess as seen in laparoscopic mesh infection.

An accurate diagnosis has to be made with respect to the extent and severity of infection. Involvement of adjacent organs in close vicinity especially in abdominal cases needs to be determined.

Haematological investigations will show anaemia in chronic infection and raised neutrophils. A contrast enhanced CT scan will identify the site of collection, extent of the induration mass, status of mesh and involvement of any adjacent organ system.[7,8]

A combined medical and surgical approach is the preferred strategy for management.

Intravenous antibiotics are essential to begin with. However it may not lead to a complete cure as penetration of the fibrous capsule surrounding the mesh is difficult. Hence surgical approach is inevitable and mandatory.[9]

Two stage surgical approach yields better success as was done in the case presented.

The first stage comprising of a release incision to drain the pus in the infected area. This allows reduction in the inflammatory process there by reducing the severity of induration.

Once volume of discharge decreases, the extent of induration is reduced and systemic signs of infection resolve one can proceed to the second stage of surgical intervention.[10]

The second stage comprises of removal of mesh. In majority of cases the mesh lies floating in a pool of pus and debris. This cavity has to be access followed by removal of mesh and evacuation of all purulent and particulate debris. A good scraping of abscess cavity will enhance the healing process. It is preferable to allow the

wound to heal by secondary intention as it causes complete resolution of the infection process. Secondary suturing can be done once healthy granulation has set in. However in case of midline abdominal wall infections, primary closure needs to be done with acceptance of the fact that wound infection and development of an incisional hernia at a later date is inevitable in most cases.[11] There is high likelihood of hernia recurrence after such a surgical intervention. Patient needs to be informed in advance of this outcome.

A two staged approach is therefore the best option for the treatment of infected mesh. It reduces the chances of damage to adjacent and underlying viscera and also prevents excessive loss of overlying tissue including skin.

Preventive strategies

Preventive strategies are absolutely essential before embarking on a mesh repair for hernia.

Proper selection of patient ensuring good control of co morbid medical conditions and absence of any sort of infection.[12]

Rigid sterilization by autoclaving of both instruments and scopes.

Meticulous technique of dissection with periodic irrigation of operative site with normal saline during the course of surgery.[12,13]

Meticulous haemostasis before closure. However if doubt still persist in cases which involve extensive dissection, it is advisable to keep a negative suction drain in order to prevent formation of a seroma which can serve as an ideal nidus for infection.[12,13]

CONCLUSION

Mesh infection continues to be the biggest nightmare for the general surgeon. Adopting various preventive strategies is the key to success.

A two stage surgical approach is the gold standard for treating mesh infections.

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