



Experience of Diagnosis and Treatment in Mesh-Related Infection After Inguinal Hernia Repair

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Abstract

Objective: To investigate the diagnosis and treatment of mesh-related infection after tension-free repair of inguinal hernia.

Methods: The clinical data of 12 patients with patch infection after tension-free repair admitted to our hospital from May 2016 to June 2019 were retrospectively analyzed. Among the patients, there were 7 cases.

After Transabdominal preperitoneal (TAPP), 3 cases after Totally Extraperitoneal herniorrhaphy (TEP), and 2 cases after Mesh plug-patch tension-free hernia repair.

Results: All nine patients were treated with laparoscopic surgery and a combination of antibiotics. The patients were recovered from the mesh-related infection. Among the patients, ten of them received the primary suture after the removal of mesh. Besides, one patient was irrigated with abscess under laparoscopy combined with certain double cannula irrigated with drainage after the surgery. The patient remained the mesh and got healed after secondary suture. And the last patient was treated conservatively by continuous irrigation and drainage and daily incision dressing change. All patients were follow-up observed for 6 months after discharge. There was no hernia recurrence and incision infection.

Conclusion: Mesh-related infection after tension-free repair of inguinal hernia is a serious but uncommon complication. While the causes of the disease is complicated. Reasonable operation method, timely preventive intervention and suitable mesh type are beneficial to the decrease of the occurrence rate of mesh-related infection. Meanwhile, laparoscopy may plays an important role during the treatment.

Received: Dec 21, 2020

Accepted: Feb 09, 2021

Published Online: Feb 12, 2021

Journal: Annals of Gastroenterology and the Digestive System
Publisher: MedDocs Publishers LLC

Online edition: <http://meddocsonline.org/>

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Introduction

Inguinal hernia is one of the most common surgical diseases, and guidelines for the treatment of adult inguinal hernia indicate that more than 20 million inguinal hernia repairs are performed worldwide each year [1]. With the development and popularization of hernia surgery, a small number of patients have experienced unavoidable postoperative complications. The complication caused by mesh is called "mesh related complication", These complications mainly include pain, erosion, displacement, adhesion, shrinkage, calcification, degeneration, and infection [2]. Mesh - related infection is one of the most serious complications after hernia repair. It can lead to local redness, abscesses, and even causes tissue necrosis to form sinus passages. Reoperation is often necessary to remove the abscess focus or remove the mesh. In this paper, 12 patients with mesh-related infection after tension-free inguinal hernia repair admitted to our hospital from May 2016 to October 2019 were selected. The diagnosis, treatment and experience are reported as follows:

Materials and methods

The general information

12 patients with mesh-related infection after tension-free inguinal hernia repair admitted to our hospital from May 2016 to October 2019 were included. Among them, 7 cases underwent transabdominal preperitoneal inguinal hernia repair (TAPP), 3 cases accepted laparoscopic totally extraperitoneal inguinal hernia repair (TEP), 2 patients were treated with plug-patch tension-free operation. All the patients showed varying degrees of symptoms of incisional effusion, redness and swelling, poor healing and local infection after the primary hernia repair. Two patients with fecal exudation after TEP surgery were suspected to be intestinal fistula. B ultrasound and CT were improved to identify abdominal soft tissue infection and the formation and location of sinus tract.

Treatment measures

One case was diagnosed as infection after TAPP operation, then cut off the suture, open the wound, extract the pus routinely and send it for examination and culture. According to the results of culture and drug sensitivity, sensitive antibiotics were selected to fight infection. At the same time, continuous rinsing and drainage with double cannula was accepted. We change the dressing of incision gauze daily and provide adequate drainage to ensure clean and dry wound dressing.

Surgical treatment

The remaining 11 patients were treated with laparoscopic surgery. After successful general anesthesia, take the supine position and routine disinfection sheet. Methylene was injected into the sinus tract, The skin, subcutaneous tissue, aponeurosis of the external oblique, internal oblique muscle and abdominal horizontal plane were incisively cut around the sinus tract, Pay attention to protect spermatic cord and inferior epigastric artery, carefully separate adhesion tissue, and pay attention to the presence of intestinal tube, The effusion was aspirated and specimens were collected for bacterial culture. The patch was removed under laparoscope guidance, and the purulent cavity was repeatedly rinsed. Drainage tube was placed according to the condition of the lesion, the wound was sutured in one stage, and a skin piece was placed under the skin for drainage after abdomen closing. Small intestinal fistula was confirmed in

2 patients with suspected intestinal fistula during operation. At the same time, the patch was removed, and the small intestine was partially removed and anastomosed. Appropriate antibiotic anti-infection treatment was selected according to the bacterial culture results after the operation, and the surgical incision was changed regularly.

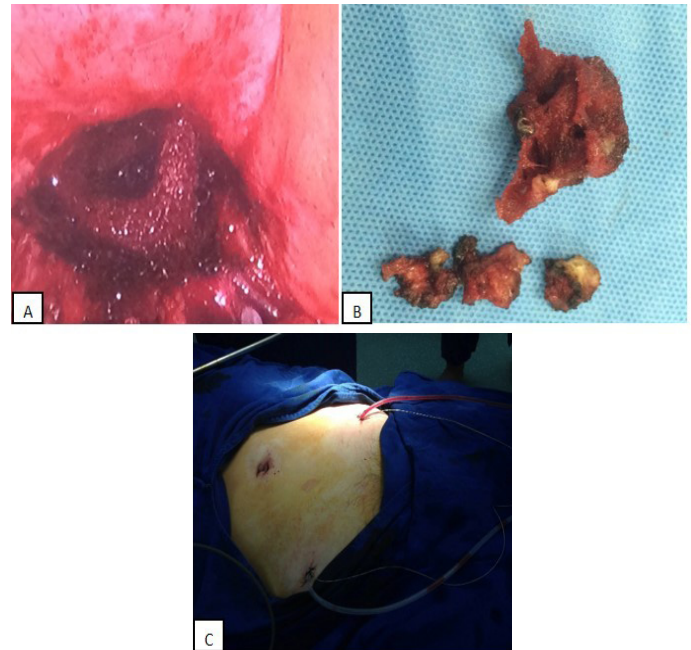


Figure 1: (a) Laparoscopic exploration of the infected area of mesh and tissue, (b) Surgical removal of infected mesh and tissue, (c) After the operation, the double cannula was indwelling and the continuous negative pressure flushing and drainage were carried out.

Treatment results

Among the 12 patients selected, 1 patient recovered after continuous irrigation and drainage, daily dressing change and adequate drainage of the incision, combined with sensitive antibiotics. The other 11 patients were treated by laparoscopic surgery and combined with antibiotics, and the mesh infection was cured. Ten patients received primary suture after the mesh was removed surgically, and one patient received secondary suture after the abscess was rinsed surgically combined with double cannula rinsing and drainage. All patients were followed up for 6 months after discharge, and no hernia recurrence or incision infection was found.

Discussion

Tension-free hernial repair is the most common and effective treatment for inguinal hernia at present. Compared with the traditional surgical method, it has the advantages of simple operation, quick recovery and low recurrence rate and has become the preferred surgical method for inguinal hernia repair [3]. But as the operation procedure became more widespread, a small number of patients have postoperative complications such as fever, surgical site infection, mesh displacement, mesh erosion, etc. Within inguinal hernia repair, the risk of split-related infection is about 1%-4% [4]. The incidence may not be high on the whole, but the annual number of inguinal hernia patch patients worldwide is huge. Therefore, this is a problem that cannot be ignored, which is an economic burden for both the society and individuals. Moreover, hernia mesh-related infection has been shown to cause hernia recurrence or mesh erosion, leading to a

series of complex and serious complications. Infections can appear early and persistent after surgery, lasting for weeks or even months, and sometimes not cured until the patch is removed. Superficial infections occur in the aponeurosis of the external oblique, and most infections do not involve patch, only manifested as local tissue swelling and pain, and can usually be cured by surgical dressing change and systemic antibiotic treatment. Deep infections are usually manifested as persistent purulent secretions and the formation of cavities infected at the incision site, which usually occurs several months or even half a year after the operation. It is located in the aponeurosis of the external oblique, most of which involve the patch, so it is difficult to cure clinically.

The effect of prophylactic use of antibiotics [5] in perioperative period on patch infection after tension-free inguinal hernia repair is inconsistent and controversial in literature. Many surgeons around the world use prophylactic antibiotics in the perioperative period even though there is no evidence that they work.

The cases selected in this paper can be roughly divided into conservative treatment and surgical treatment. All patients were treated with sensitive antibiotics. One patient was cured after continuous dressing change, irrigation and drainage. Eight patients underwent laparoscopic surgery, during which abdominal cavity irrigation was performed to remove the infected mesh. After the surgery, le's double cannula negative pressure irrigation and drainage were placed in all the patients, and all the patients were cured and discharged. In these 9 patients, except for 2 patients with intestinal fistula, the length of hospital stay was significantly shorter with surgical treatment than with conservative treatment. It can be seen that laparoscopic mesh removal can be used to treat mesh infection. However, due to the limitation of sample size, whether the efficacy of laparoscopic mesh removal is better or worse than that of conservative and/or open surgical mesh removal depends on further expanding the sample size, including as many influencing factors as possible, and conducting rigorous studies. At present, it is still controversial whether the contaminated wound should be treated with multistage hernia repair. Multistage herniorrhaphy involves the removal of an infected patch during the first operation and the suture of the fascia defect, followed by the final repair using a synthetic patch during the planned second operation after the infection has been cleared and healed.

To assess and predict patients at high risk for patch - associated infection

Since mesh - related infections can cause serious and complex complications, it is important to assess and predict who will be affected by mesh infection. The occurrence of mesh-related infection is often related to the patient's own condition and the characteristics of perioperative period. Certain factors are associated with surgical site occurrences and surgical site infections, these include ASA grading, prolonged duration of surgery, obesity, mesh use, smoking, diabetes, immunosuppression/steroid use. After risk adjustment, Poru.k.e. [5] et al. selected three evaluation criteria namely ASA grading \geq grade 3, operative time \geq 4h, and postoperative vacuum dressings without wound to predict the possibility of patch infection within 30 days after surgery, based on the ventral hernia Working Group (VHWG) scoring criteria and Ventral Hernia Risk Score (VHRS). Patients placed with negative pressure vacuum dressings (VSD) at the end of surgery were found to have a significantly reduced risk of SSI and SSO, while ASA grading and prolonged operation

time may increase the risk of split-related infection. The advantages of negative pressure suction therapy are manifested in several aspects. It can remove excess effusion and provide a controlled moist environment, thus promote the formation of new blood vessels and granulation tissue, and stimulate wound narrowing and healing [6]. Due to the high cost of VSD, it is recommended to use negative pressure vacuum dressing preventatively for people who may have mesh infection, which is not easy to popularize in clinical practice. It can be replaced with a relatively inexpensive Double cannula, which can be used for both primary surgery and mesh removal, and is easier to operate and replace.

Choice of mesh material and stitching

In the past, ordinary silk suture was often used. Because it is a multi-strand woven silk thread, pathogenic bacteria may colonize in the silk thread [7], thus forms an infection that is extremely difficult to clear and causing local chronic inflammatory response. However, with the popularity of prolene thread and so on, few surgeons choose ordinary silk thread. Among all kinds of mesh, polypropylene mesh [8] is often the first choice of surgeons because of its many excellent properties. It is chemically inert, extremely stable, non-immunogenic, non-toxic, light weight, high tensile strength and relatively less susceptible to infection. Some foreign scholars [9] pointed out that the repair of abdominal hernia could be carried out safely with monofold polypropylene fiber or polyfilament polyester mesh, and the infection rate of mesh was similar to the recurrence rate of hernia.

Bacterial biofilm and effective porosity

Bacterial biofilm infection and patch porosity may be associated with delayed patch infection and patch contracture caused by failed hernia repair. Jacombs A.S.W. [10] introduced the concepts of biofilm and effective porosity. Effective porosity, originally derived from the metallurgical industry, refers to the ratio of interconnected pore volume to total volume. Biofilm is defined as an aggregate of microorganisms. In 2008, Engels man et al. [11] first published research results on the effect of surgical mesh materials and the growth morphology of biofilms. The bacterial biofilm may reduce the effective porosity of the patch, leading to non-suppurative mesh - related complications, and may lead to late suppurative infection, especially in patients with low immunity. Newer and more stable biomaterials such as polyvinylidene fluoride may have advantages over traditional polypropylene patches whose properties degrade over time. Its effective porosity is beneficial to reduce the risk of infection. However, due to the uneven surgical skill of surgeons, whether the mesh is fully unfolded and flat, the effective porosity often fails to achieve the expected effect in the process of surgery [12]. It is beneficial for surgeons to improve their surgical skills and level and strictly observe aseptic operation to reduce the risk of split-related infection.

In general, mesh infection remains one of the most serious complications after hernia repair, despite advances in surgical techniques and the use of mesh materials. The best strategy is prevention. If modifiable risk factors can be identified and optimized preoperatively, the incidence of split-related infection can be significantly reduced. We can apply VHWG or VHRS assessment scale and simplify according to the actual situation to evaluate the potential risk of patch infection in patients, identify high-risk patients early and take preventive intervention, such as using negative pressure suction dressing or double cannula.

After the occurrence of mesh-related infection, the surgical removal of mesh is the main treatment. Continuous negative pressure irrigation and surgical dressing change are conducive to promoting wound healing. Appropriate mesh and high surgical level are also important factors to reduce the incidence of split-related infection. If clinicians can timely assess and screen high-risk patients and take preventive measures, and can find the disease earlier and make accurate diagnosis and intervention after the occurrence of infection, the occurrence of mesh related infection after hernia repair can be reduced and the pain and burden of patients can be reduced.

Reference

1. Kargar S , Shiryazdi S M , Zare M, Mirshamsi MH, Ahmadi S, et al. Comparison of postoperative short-term complications after laparoscopic transabdominal preperitoneal (TAPP) versus Lichtenstein tension free inguinal hernia repair: A randomized trial study. *J Minerva Chirurgica*, 2015; 70: 83.
2. Zhenlin Ji. The erosion of the mesh after hernia repair. *J Journal of Surgery Concepts and Practice*. 2018; 23: 309-311.
3. Wang D, Chen H. Experience in the treatment of deep incision infection after tension-free inguinal hernia surgery. *J Lingnan Modern Clinics In Surgery*. 2018; 18: 390-392.
4. Guillaume O, Perez-Tanoira R, Fortelny R, Redl H, Moriarty TF, et al. Infections associated with mesh repairs of abdominal wall hernias: Are antimicrobial biomaterials the longed-for solution?. *J Biomaterials*. 2018; 167: 15-31.
5. Mazaki T, Mado K, Masuda H, Shiono M, Tochikura N, et al. A randomized trial of antibiotic prophylaxis for the prevention of surgical site infection after open mesh-plug hernia repair. *J. American Journal of Surgery*. 2014; 207: 476-484.
6. Poruk KE, Hicks CW, Magruder JT, Rodriguez-Unda N, Burce KK, et al. Creation of a novel risk score for surgical site infection and occurrence after ventral hernia repair. *J Hernia*. 2017; 21: 261-269.
7. Amreen Faruq, HM Sabbir Raihan, Muhtarima Haque. Management of non-absorbable mesh infection after hernia repair by negative pressure wound therapy. *J. IMC Journal of Medical Science*. 2019; 13: 1-7.
8. Kai Min, Cheng Zhou, Jun Ren, et al. Diagnosis and treatment of mesh infection after tension-free inguinal hernia repair. *J Chinese Journal of General Surgery*. 2018, 27: 528-530.
9. Bellows CF, Shadduck P, Helton WS, et al. Early report of a randomized comparative clinical trial of Strattice reconstructive tissue matrix to lightweight synthetic mesh in the repair of inguinal hernias. *J Hernia*. 2014; 18: 221-230.
10. Crystal T, Patrice B, Mathilde L, et al. Polyester vs polypropylene, do mesh materials matter? A meta-analysis and systematic review. *J Medical devices (Auckland, N.Z.)*. 2019; 12: 369–378.
11. Jacombs ASW, Karatassas A, Klosterhalfen B, Richter K, Patiniott P, et al. Biofilms and effective porosity of hernia mesh: are they silent assassins?. *J. Hernia*. 2019: 1-8.
12. Engelsman AF, van der Mei HC, Busscher HJ, Ploeg RJ. Morphological aspects of surgical meshes as a risk factor for bacterial colonization. *Br J Surg*. 2008; 95: 1051–1059.
13. Klosterhalfen B, Klinge U. Retrieval study at 623 human mesh explants made of polypropylene—impact of mesh class and indication for mesh removal on tissue reaction. *J Journal of Biomedical Materials Research Part B: Applied Biomaterials*. 2013; 101: 1393-1399.