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Case report

Biologic mesh infection with Candida albicans after abdominal wall reconstruction with calcium sulphate antibiotic beads: A case report

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ABSTRACT

Mesh infection after abdominal wall reconstruction is a rare and usually devastating complication. Herein, we describe a unique case of a delayed and non-lethal Candida albicans mesh infection after abdominal wall reconstruction with placement of a biologic graft impregnated with antibiotics. Mesh explantation was not required, and the wound healed by secondary intention. This work suggests that locally delivered antibiotics may change the culprit microbes of skin infections to more unusual species such as Candida spp. Future research is required to study the effect of including antifungal agents in the locally delivered antimicrobials for abdominal wall reconstructions with biological meshes.

Introduction

Mesh infection in abdominal wall reconstruction is rare (5–10%) [1], but is associated with considerable morbidity, such as prolonged hospital stays, additional procedures and mesh explantation [2,3]. Innovation to reduce the risk of mesh infection is of great interest and has included antibiotic impregnated meshes and use of calcium sulphate antibiotic beads (CSAB) [4–10]. In other settings, such as intensive care and burn units, use of prophylactic broad-spectrum antibiotics can increase antibiotic resistance, alter the microbial environment and promote opportunistic infections, resulting in an increase in fungal infections [11–13]. Herein, we describe a case of a patient who developed a Candida albicans mesh infection after an abdominal wall reconstruction with placement of a porcine submucosa hernia graft along with CSAB impregnated with vancomycin and gentamicin.

A 57-year-old female with a history of open hiatal hernia repair presented to hospital with a recurrent incisional hernia. Her initial incisional hernia repair with mesh, three years prior at another institution, was complicated by a mesh infection requiring partial mesh explantation. The resulting open wound was then treated with a negative pressure dressing and closed by secondary intention. The hernia recurred measuring 15 cm wide and 10 cm long with loss of abdominal domain.

Her past medical history included obstructive sleep apnea, gastroesophageal reflux disease and ductal carcinoma in situ treated with lumpectomy and adjuvant radiotherapy. Her BMI was 37 and she reported smoking five to ten cigarettes per day. Her medications included acetaminophen with codeine, pantoprazole, furosemide and lorazepam. Pre-operatively she had stopped smoking four weeks prior and lost 13 pounds. Botox injection into the abdominal wall was performed three weeks prior to surgery to help facilitate fascial closure.

Preoperative prophylactic antibiotics involving two grams of cefazolin were given at induction of anaesthesia and repeated intraoperatively four hours later. A midline laparotomy and lysis of adhesions were performed with no enterotomies. All previous mesh was removed. There was no evidence of active infection. Bilateral component separation, utilizing release of the external obliques several centimeters above the ribs and extending inferiorly to the inguinal ligament, were performed. Subcutaneous flaps were raised with preservation of as many perforators as possible, but the main umbilical perforator was sacrificed. The midline was approximated without tension and the repair was reinforced with an intra-peritoneal porcine submucosa hernia graft measuring 15 cm by 20 cm that was circumferentially anchored with full thickness #1 PDS sutures. A Stimulan® 20cc CSAB kit was prepared using vancomycin 4 gm and gentamicin 480 mg with the small bead mold. Half of the beads were placed on top of the mesh with the fascia closed primarily above with a running #1 PDS suture. Three Jackson-Pratt (JP)

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drains were placed, with one on top of the mesh below the fascia and two above the external oblique lateral release points in the subcutaneous tissue. The remaining half of the antibiotic beads were placed in the subcutaneous tissue above the fascia. A vertical skin abdominoplasty was performed to remove the redundant tissue. The subcutaneous tissue was closed in three layers with interrupted 2–0 Vicryl sutures. The skin was closed with a running subcuticular suture employing a 4–0 Monocryl. A Prevena® negative pressure dressing was placed over the skin and set to −125 mmHg continuous suction.

The patient's post-operative course in hospital was unremarkable with no complications. The JP drain placed on top of the mesh was removed on post-operative day four when drainage had ceased. She was discharged from hospital on post-operative day five. Home-care nursing was arranged to care for the remaining JP drains in the subcutaneous space.

Four weeks later, the patient developed ischemic dehiscence of the midline skin and the wound was managed with a negative pressure system.

Five months post-operatively the wound had still not filled in and the patient presented to the emergency department with increasing abdominal pain. A CT scan demonstrated a 9.4 cm × 3.1 cm abscess between the abdominal wall and the hernia graft (Fig. 1). She underwent CT guided placement of a percutaneous drain that drained frank pus that was culture positive for Candida albicans with sensitivity to fluconazole. The patient was treated with oral fluconazole for six weeks after which a follow-up CT scan demonstrated resolution of the abscess with an intact fascia and no evidence of recurrence.

Case discussion

Fungal mesh infections are extremely rare and an unusual complication of abdominal wall reconstruction [14]. In 2015, Forrester et al. [15], performed a systematic review reporting on nine cases in the literature [14–22]. Since then, only one other case has been described by Ober et al. [23], who outlined a devastating fungal mesh infection resulting in sepsis, hemodynamic instability and required mesh explantation. In the aforementioned studies [14–22], most patients had one or more risk factors for fungal infection, such as enteric contamination and/or prolonged broad spectrum systemic antibiotics in the setting of critical illness. All but two of these cases required mesh explantation [20,21]. Only two other cases of a fungal mesh infection after an elective procedure in a non-critically ill patient have been described [15,23].

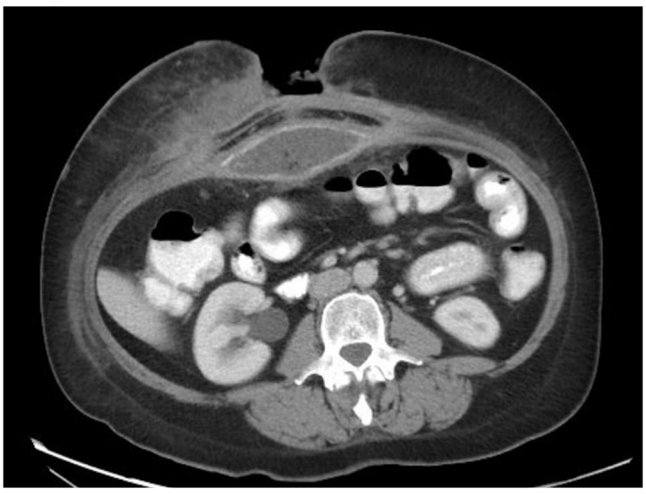

Fig. 1. 9.4 cm × 3.1 cm abscess involving the hernia graft.

Unique to our case is the occurrence of fungal infection after the use of locally delivered broad spectrum antibiotics using CSAB along with an implanted biologic graft for abdominal wall reconstruction. The data on the efficacy of incorporating local antibiotics into biologic hernia grafts is scant, with reported infection rates of 6.8–20.8% [4,24]. None of these studies have identified a case of fungal infection. However, these devices only used a single antibiotic agent that may not have provided as broad of antimicrobial coverage as supplied by the combination of gentamicin and vancomycin utilized in this case with the CSAB. Broad spectrum antibiotics are a well-recognized risk factor for the development of fungal infection [25] and was one of this patient's risk factors for a fungal infection as well as obesity and wound dehiscence. In the series reported by Forrester et al. [15], prolonged use of broad spectrum systemic antibiotics may have had a similar effect to the prolonged release of local antibiotics by the CSAB. As the use of antibiotic impregnated devices in hernia repair expand, surgeons should be aware of fungal infections as a possible complication. A hypothetical solution that has been suggested is to add antifungals along with the locally delivered antimicrobials within the CSAB [26,27]. More research is required to examine incidence of fungal infection after the use of locally delivered broad spectrum antibiotics with mesh implant in abdominal wall reconstruction and possibly evaluate the efficacy of locally delivered antifungals in the prevention of fungal infections.

CRediT authorship contribution statement

Kelly Brennan: Writing – original draft. **Pooja Patel:** Conceptualization, Data curation. **Ashley Drohan:** Conceptualization. **Samuel Minor:** Supervision, Writing – review & editing.

Compliance with ethical standards

Ethical approval

Ethical approval is not required for this type of study.

Human and animal rights

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institution and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Experiments with laboratory animals were not included in this study.

Informed consent

The patient in this study provided informed consent for the off-label use of antibiotic impregnated calcium sulphate beads and for the use of their information as part of this case report.

Declaration of Competing Interest

None of the authors have any conflict of interest to declare.

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