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CASE REPORT

Conservative treatment of infected mesh by use of gentamycin impregnated calcium sulphate antibiotic beads: a report of two cases

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Introduction

Reinforcing an abdominal wall hernia repair with permanent mesh reduces the risk of recurrence [1]. However, mesh infection can occur in up to 5% of implants [2]. This devastating complication may require prolonged hospitalization and systemic antibiotics, repeat interventions to drain sepsis and ultimately mesh explantation. Compared to primary repair, the latter is typically a difficult operation in a hostile abdomen with higher risk of morbidity including bowel injury and subsequent enteric fistulae, bleeding, wound dehiscence and hernia recurrence. Consequently, it is desirable to salvage the mesh by non-operative means. Large studies investigating the optimal method of mesh salvage are lacking and methods to manage mesh infection are mainly derived from case studies. Typically, drainage of the associated infection with prolonged systemic antibiotics are the mainstay, but other therapies such as V.A.C.® (KCI Inc., San Antonio, TX) negative pressure wound therapy (NPWT) [3], medicinal honey [4] and antibiotic irrigation [5] have been described. Stimulan® (Biocomposites Ltd. Staffordshire, England) calcium sulphate antibiotic beads (CSAB) are a biodegradable material that deliver high levels of antibiotics locally to a site of infection and have been described in the salvage of other infected permanent prostheses such as breast implants and vascular grafts [6, 7]. We present a unique approach to salvage of infected permanent abdominal wall mesh using gentamicin impregnated CSAB in conjunction with NPWT and systemic antibiotics. In both cases, the patients gave informed consent for the off label use of CSAB in this setting and consented to the use of their information as part of a case report. Neither author has financial interest in CSAB or other conflict of interests to report.

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Case report 1

A 38-year-old female was referred with a painful incisional hernia in the right hypochondrium. She had no medical comorbidities and was a lifelong nonsmoker. Her surgical history was significant for a laparoscopic converted to open cholecystectomy for cholecystitis, complicated by a common bile duct injury for which she required a hepaticojejunostomy. She subsequently developed an anastomotic leak for which she required washout and drainage, followed by percutaneous drainage of abscesses on 2 occasions as well as a 6-week course of culture-sensitive antibiotics.

At surgery, she required extensive adhesiolysis of intra-abdominal adhesions. A 15 × 25 cm midweight polypropylene mesh (Ventralite® C.R. Bard Inc., Murray Hill, NJ) was placed over the fascial defect in the preperitoneal space and anchored to the diaphragm and abdominal wall muscle with a total of 8 absorbable 2–0 polydioxanone sutures (PDS®, Ethicon Inc, Bridgewater, NJ). The abdominal wall musculature was approximated over the mesh using no.1 PDS®.

The patient presented to the emergency department on postoperative day 14 with fever, nausea and vomiting and worsening right hypochondrium pain. A computed tomography (CT) scan of her abdomen revealed a large collection anterior and posterior to the mesh (Fig. 1). The wound was opened in the OR and approximately 400 ml of pus was drained. The mesh was visible through a 2 cm dehiscence of the abdominal wall muscle. The wound was extensively lavaged and NPWT applied. Cultures grew *E coli* sensitive to gentamicin and meropenem. She was put on a 6-week course of ertapenem. At the subsequent dressing change, CSAB were prepared with gentamicin and placed along the base of the wound, including the exposed mesh. The CSAB were covered with a layer of Adaptic™ (Systagenix, Gatwick, UK) as a barrier to the foam of the NPWT. After discharge, dressing changes were provided by home care nurses 3 times per week. At 6-week follow-up the wound had healed to the skin and the CSAB were no longer visible. At 1-year

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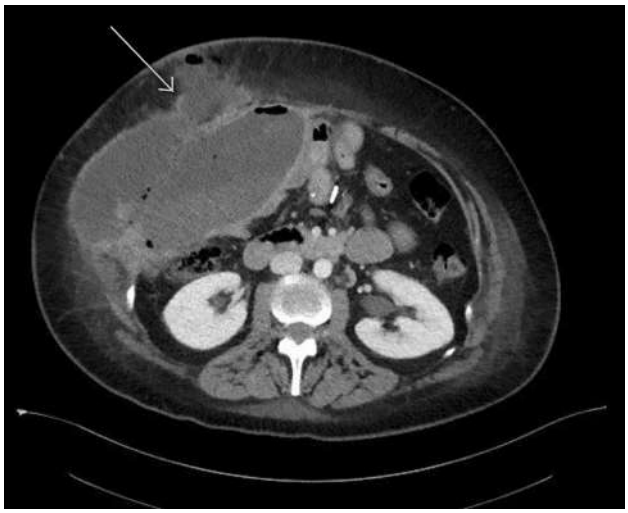

Fig. 1 CT image of abscess around mesh at incisional hernia repair site 2 weeks postoperatively

follow-up, the wound remained completely healed, and the hernia repair intact.

Case report 2

A 60-year-old male developed a midline incisional hernia of 7 cm width following a Nissen fundoplication. He had no risk factors for mesh infection. An open repair with placement of a 15 cm x 15 cm monofilament polypropylene Bard® mesh in the retrorectus space was performed. This was complicated by an infected hematoma that spontaneously drained 3 weeks post operatively with complete dehiscence of the skin. At the time, the anterior rectus sheath had dehisced and mesh was visible at the base of the wound. A 3-week course of cefazolin was initiated and an NPWT dressing applied. The wound swabbed positive for pan sensitive Staphylococcus lugdunesis. On 6-week follow-up the mesh was extruded to the level of the skin (Fig. 2). The patient remained free of local or systemic symptoms of sepsis but, despite ongoing NPWT, wound healing did not progress as expected. At the time, the patient did not wish to undergo mesh explanation. As there was no significant improvement in the wound over the next 6 months, we thought of the possibility of salvaging the mesh with CSAB and offered the patient the option of debriding the exposed mesh and attempting to sterilize the remaining mesh with CSAB. In the operating room, unincorporated mesh was excised, skin flaps and rectus muscle was circumferentially raised, and the incorporated mesh was approximated with interrupted 2−0 polypropylene sutures (Prolene®, Ethicon Inc, Bridgewater, NJ). CSAB, prepared with vancomycin and gentamicin, were placed in the wound over top of the

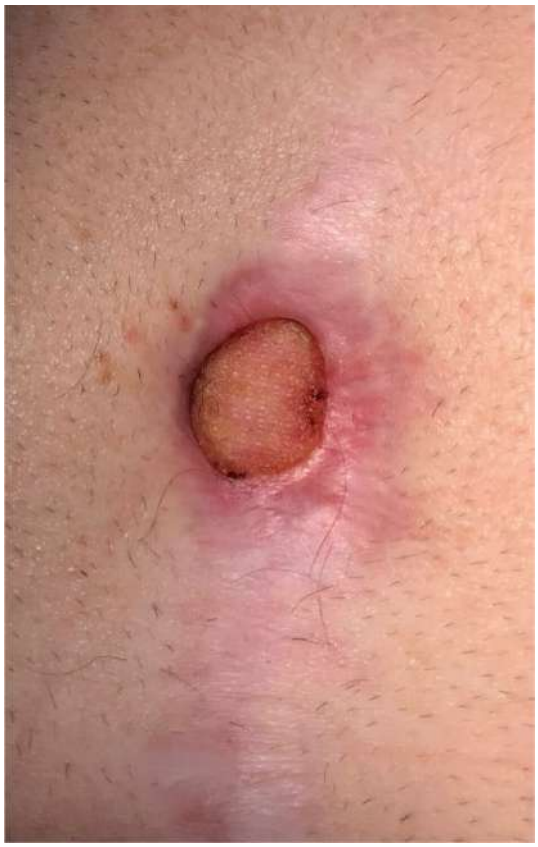

Fig. 2 Exposed mesh

mesh closure, and the skin closed (Fig. 3). The wound subsequently dehisced at its inferior aspect on POD#7 and this was managed by homecare nurses with NPWT dressing and a 3-week course of cefazolin oral antibiotics. On 3-month follow-up, the wound had achieved complete epithelialization with no evidence of infection or hernia recurrence. The patient remained free of infection and the hernia repair intact on 9-month follow-up.

Discussion

By employing a multimodality treatment regimen combining CSAB with culture-sensitive systemic antibiotics and NPWT, we hoped to optimize the chance of avoiding surgical mesh explant. The concept of administering antibiotics directly onto infected mesh is not new [5, 7]. However, CSAB allows for a one-off application that maintains local antibiotic levels consistently above the minimum inhibitory concentrations for up to 3 months, whilst systemic exposure and risk for toxicity remain low [8]. Compared to liquid antibiotic installation this represents a significant decrease in the overall burden and cost of care.

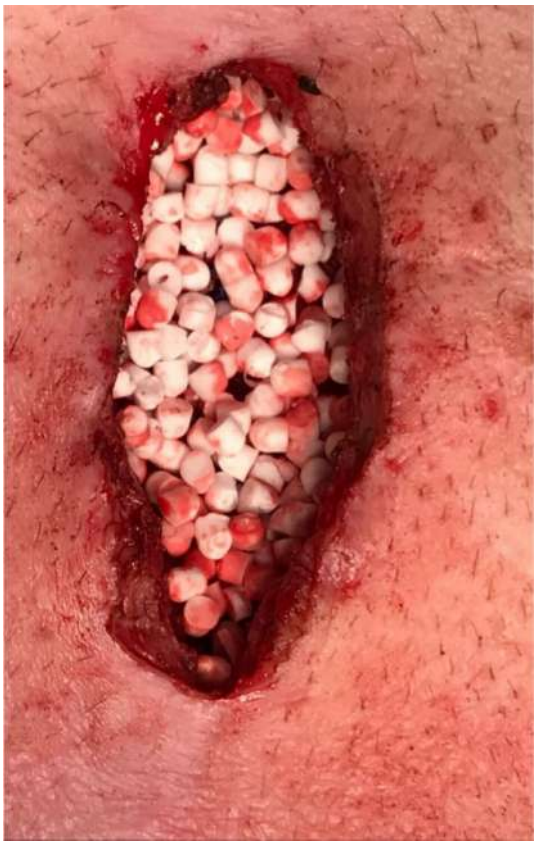

Fig. 3 Wound with CSAB prior to closure

Conclusion

These 2 cases demonstrate the potential for CSAB to be used as part of a multimodality therapy in the salvage of prosthetic hernia meshes and represents a new tool for the surgeon in the management of this difficult clinical problem.

Compliance with ethical standards

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

Ethical approval Ethical approval is not required for this type of study.

Statement on 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 Both individuals who participated 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.

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