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Partial versus complete removal of the infected mesh after abdominal wall hernia repair

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ABSTRACT

Background: To compare the results with complete mesh removal (CMR) versus partial mesh removal (PMR) in the treatment of mesh infection after abdominal wall hernia repair (AWHR).
Methods: Retrospective review of all patients who underwent surgery for mesh infection between January 2004 and May 2014 at a tertiary center.
Results: Of 3470 cases of AWHR, we reported 66 cases (1.9%) of mesh infection, and 48 repairs (72.7%) required mesh explantation. CMR was achieved on 38 occasions, while PMR was undertaken ten times. We observed more postoperative complications in CMR than PMR group ($p = 0.04$). Three patients with intestinal fistula were reoperated in postoperative period after a difficult mesh removal; one of them died due to multiple organ failure. The overall recurrence rate after explantation was 47.9%: recurrence was more frequent in CMR group ($p = 0.001$), although persistent or new mesh infection was observed more frequently with PMR ($p = 0.001$).
Conclusions: Although PMR has less postoperative morbidity, shorter duration of hospitalization and lower rate of recurrence than CMR, prosthetic infection persists in up to 50% of cases.

1. Introduction

Mesh Infection is one of the most devastating complications after abdominal wall hernia repair (AWHR). It can have serious and costly consequences and severe impact on patient's life due to prolonged hospitalizations and multiple reinterventions, as well as very high societal costs.[1] The risk of infection has been reported from 1% to 10%[2] depending on the technique, patient population and type of mesh.[3]

Complete removal of the infected mesh (CMR) has been recommended if the infection cannot be resolved by conservative measures and/or antibiotic therapy.[4] However, this fact generally induces a hernia recurrence, and needs subsequent surgical procedures such as autologous flap reconstruction or another mesh implantation after the infection has been resolved.[5] CMR also can lead to a high complications rate, until 36–50%, due to adhesions and high complexity during its removal.[6] Therefore, salvage of the infected mesh without surgical removal would be desirable.

An alternative to CMR is the partial removal of mesh (PMR). PMR means the excision of the non-integrated mesh; although less frequently leads to failures and complications, some patients still require many reoperations for healing to take place.[7]

The main purpose of this study is to assess the efficacy of mesh removal therapy in the treatment of mesh infection, and to compare the results with CMR versus PMR after AWHR at a tertiary center.

2. Material and methods

From January 2004 to May 2014, from a prospective database, we retrospectively selected patients who underwent surgery for mesh infection after AWHR at a tertiary center. Only patients admitted for hernia repair with a permanent prosthesis were considered. Patients with laparoscopic hernia repair were excluded due to our limited experience with this approach.

Prosthetic infection was diagnosed when pathogenic organisms were found in the periprosthetic fluid. Minor infections such as cellulitis that could be treated with antibiotics alone were not

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included. Treatment was standard wound debridement and drainage under general or local anaesthesia. Mesh explantation was defined as any surgery where the mesh was partially or completely removed in a subsequent procedure. A bacteriological analysis of the abscess and of the mesh was systematically performed, and the antibiotherapy was adapted to the results of this analysis. Prosthesis removal was performed if the infection remained, despite these measures. A prophylactic dose of antibiotic was administered to each patient before surgery. All patients maintained antithrombotic prophylaxis (subcutaneous enoxaparin) after surgery. Explantation was always performed under general anaesthesia. In most cases, clinical presentation was a cutaneous fistula; in these patients, fistula was identified intraoperatively by methylene blue and was excised, and the path to the exposed mesh was excised too (Figs. 1–3). We try to preserve part of the mesh (PMR) if it was well incorporated and vascularized or if the sinus indicated an isolated focus of infection to remove. We performed CMR if not was possible this action because the prosthesis was completely affected by infection and it was impossible to keep it, or if the type of infected mesh was PTFE. After mesh removal, surgeon considered the type of abdominal wall reconstruction and the need to place other synthetic or biological mesh. Fascial suture was performed with long-term synthetic absorbable monofilament suture made of Poly-4 Hydroxybutyrate (Monomax™, Bbraun, Tuttlingen, GER).

Demographic data including patient's age and gender were collected. The following medical co-morbidities were reported: body mass index, chronic obstructive pulmonary disease, steroid use, immunosuppression, diabetes mellitus, smoking history and American Society of Anaesthesiologist score. Hernia characteristics collected included number of previous hernia repairs, concomitant repair (where another procedure was performed at the same time such as enterotomy and ventral hernia repair), recurrent hernia, and hernia location. Mesh types were identified using physician-abstracted operative notes and we further classified into onlay, underlay or inlay. In addition, any related intra- or post-operative complications were also noted. Microbiology data were collected on all patients. Additional variables of interest included post-operative surgical site infection (SSI) and history of previous surgical debridement. Surgical data including complete or partial removal of mesh, duration of surgery (min), type of fascial closure, bridged repair (repair without closure of the fascial defect) and prosthesis versus non prosthesis repair.

Patients were followed up at 1 month, 3 months and 1 year after surgery (and subsequent annual reviews). Long-term readmission or referral to another hospital was checked through the hospital database.

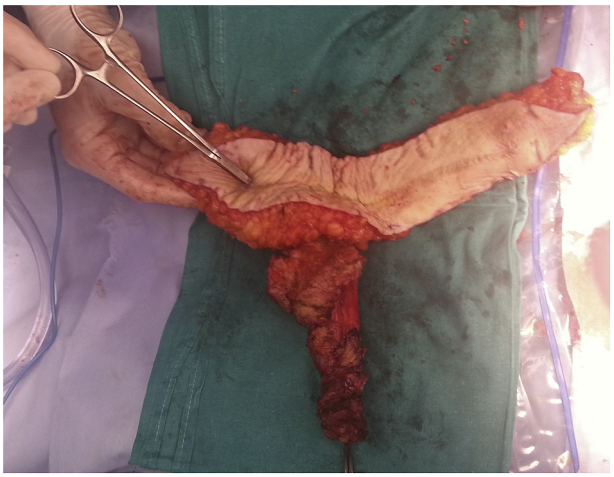

Fig. 2. Excision of the infected mesh.

For the statistical analysis, a commercial software program (SPSS version 20.0) was used. Univariate analysis was performed using "t-Student" to explore quantitative variables and "Chi square" (or Fisher test) if they were dichotomous. The significance level was $p < 0.05$.

3. Results

Over the 10-year study period (January 2004 and May 2014), 3470 AWHR were performed at our Hospital. At a median of 51.6 months (range 16–87 months) of postoperative follow-up, we reported 66 cases of mesh infection, and 48 repairs (72.7%) required mesh explantation. The length of follow-up in the patients who did not need mesh removal was 43.4 months (range 18–77) and in the case of those who needed PMR or CMR was 55.7 months (range 17–86) and 51.8 months (range 16–82) respectively. The interval between AWHR and presentation of mesh infection was 5.5 months (range 2–10 months). The overall infection rate in AWHR was 1.9%.

Sixteen patients with mesh infection did not have any explantation. Infection was resolved with conservative measures in all cases. In 14 patients, polypropylene (PPL) mesh was used in the previous AWHR (87.5%) and in 2 patients, PVDF prosthesis (12.5%).

Table 1 shows demographic and surgical variables related to

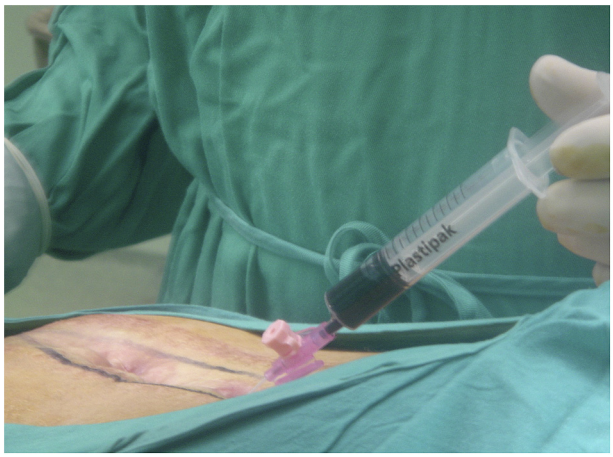

Fig. 1. Identification of cutaneous fistula to the infected mesh with methylene blue.

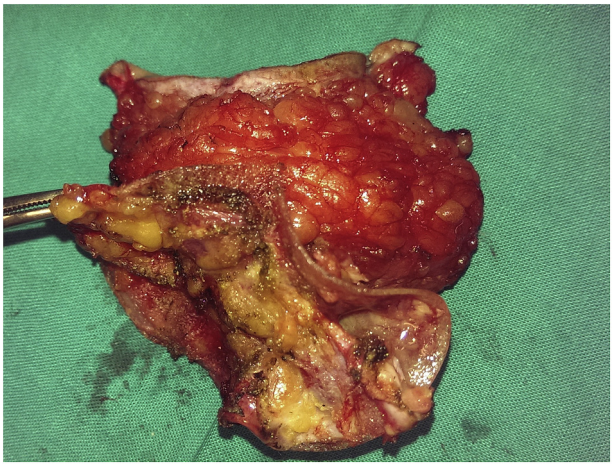

Fig. 3. Excision of the infected mesh.