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Predictors of mesh infection and explantation after abdominal wall hernia repair

José Bueno-Lledó, Ph.D.*, Antonio Torregrosa-Gallud, Ph.D., Angela Sala-Hernandez, M.D., Fernando Carbonell-Tatay, Ph.D., Providencia G. Pastor, M.D., Santiago B. Diana, M.D., José I. Hernández, M.D.

Surgical Unit of Abdominal Wall, Department of Digestive Surgery, Politecnic "La Fe" Hospital, University of Valencia, Valencia, 46008, Spain

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Abstract

BACKGROUND: The main objective was to identify predictive factors associated with prosthesis infection and mesh explantation after abdominal wall hernia repair (AWHR).

METHODS: This is a retrospective review of all patients who underwent AWHR from January 2004 to May 2014 at a tertiary center. Multivariate analysis identified predictors of mesh infection and explantation after AWHR.

RESULTS: From 3,470 cases of AWHR, we reported 66 cases (1.9%) of mesh infection, and 48 repairs (72.7%) required mesh explantation. Steroid or immunosuppressive drugs use (odds ratio [OR] 2.22; confidence interval [CI] 1.16 to 3.95), urgent repair (OR 5.06; CI 2.21 to 8.60), and postoperative surgical site infection (OR 2.9; CI 1.55 to 4.10) were predictive of mesh infection. Predictors of mesh explantation were type of mesh (OR 3.13; CI 1.71 to 5.21), onlay position (OR 3.51; CI 1.23 to 6.12), and associated enterotomy in the same procedure (OR 5.17; CI 2.05 to 7.12).

CONCLUSIONS: Immunosuppressive drugs use, urgent repair, and postoperative surgical site infection are predictive of mesh infection. Risk factors of prosthesis explantation are polytetrafluoroethylene mesh, onlay mesh position, and associated enterotomy in the same procedure.

The use of the prosthesis in the abdominal wall hernia repair (AWHR) has introduced new problems. Although mesh has reduced hernia recurrence rates, it has its own set of complications. So, infection is one of the most devastating complications after the implantation of any mesh.[1]

The risk of infection in AWHR appears to be higher than other clean cases, but there is a wide range reported from 1% to 10%[2] depending on the type of mesh, technique, and patient population. Infection of abdominal wall prostheses can have grave and costly consequences and severe impact on the patient's life because of prolonged hospitalizations and multiple reinterventions and very elevated social costs.[3] So, these are an incentive to explore any and all means that might reduce the incidence of mesh infection.

Over the years, numerous types of prosthesis have been developed to provide greater strength and lower recurrence rates, and at the same time, the risk of infection and other

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* Corresponding author. Tel.: +34-651-525-437; fax: 963-425-301.
E-mail address: buenolledo@hotmail.com

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complications have been decreased.[4] Some known risk factors for mesh infection have been reported: prolonged operative time and type of mesh are the predictive factors in heterogeneous series of groin hernia repairs or AWHR.[5–7] On the other hand, postoperative surgical site infections (SSIs) or concomitant intra-abdominal procedures have been related to mesh explantation in hernia repair.[8] But no previous study has been conducted considering factors relating the mesh infection and explantation following AWHR together.

The main purpose of this retrospective study was to identify the incidence, etiologies, and independent predictors associated with prosthesis infection and mesh explantation after AWHR.

Methods

A retrospective review was performed of all patients who underwent AWHR from January 2004 to May 2014 at a tertiary center. Only patients admitted for hernia repair with prosthesis were considered. Patients with laparoscopic hernia repair were excluded.

Prosthetic infection was diagnosed when pathogenic organisms were found in the periprosthetic fluid obtained by surgical drainage or percutaneous puncture using ultrasound. Minor infections, such as cellulites, that could be treated with antibiotics alone were not included in the mesh infection group. Patients who underwent subsequent mesh-related infection were compared with patients without infection: all factors related to mesh infection were collected by retrospective revision of clinical data.

The treatment of prosthetic infection consisted on antibiotics according to antibiogram, percutaneous drainage, or standard wound debridement under general or local anesthesia. If the infection remained, despite these measures, the prosthesis was removed. Mesh explantation was defined as any surgery where the prosthesis was partially or completely removed in a subsequent procedure. Reasons for abdominal reoperation and mesh explantation were documented. Further analysis of patients who required complete or partial mesh removal after the index surgery was compared with patients who did not require it. All patients maintained prophylactic antithrombotic (subcutaneous enoxaparin) and prophylactic dose of antibiotic at the moment of mesh implantation. Patients who needed surgery of mesh explantation received antibiotic therapy according to previous antibiogram.

Demographic variables including patient's age and sex were collected. The following medical comorbidities were reported: body mass index (BMI), chronic obstructive pulmonary disease, steroid use, immunosuppression, diabetes mellitus, smoking history, and American Society of Anesthesiologist score. Types and sizes of mesh were identified using physician-abstracted operative notes and we further classified into onlay, underlay, or inlay. Microbiology data were collected on all patients. Additional variables of interest included postoperative SSI and history of previous surgical debridement. Hernia characteristics collected included emergency repair, number of previous hernia repairs, type of repair, drain use, concomitant repair (where another procedure was performed at the same time, such as enterotomy and ventral hernia repair), recurrent hernia, and hernia location. In addition, the type of removed mesh and any related intraoperative or postoperative complications were also noted.

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.

In the statistical analysis, a commercial software program (SPSS, version 20.0) was used. Univariate analysis was performed using Student t test to explore quantitative variables and "chi square" (or Fisher test) if they were dichotomous. Univariate variables with significance values P less than .05 were included in a logistic regression analysis, identifying independent predictors of mesh infection and explantation, expressed in terms of "odds ratio" (OR) and 95% confidence interval (CI). The significance level was P less than .05.

Results

Over the 10-year study period (January 2004 to May 2014), 3,470 AWHR were performed at our hospital. At a median of 50.6 months (range 14 to 85 months) of postoperative follow-up, we reported 66 cases of mesh infection and 48 repairs (72.7%) required mesh explantation. The overall infection rate in AWHR was 1.9%.

Mesh infection

Characteristics were distributed equally in the subgroups with and without prosthetic infection (Table 1). The average age of the mesh infection group was 55.3 ± 21.6 years, and the population was predominantly women (53.1%). Sixteen patients were diabetic, 50.5% had hypertension, and 13.5% had chronic obstructive pulmonary disease. Approximately, 9% (307 of 3,404) of repairs were performed in patients with immunosuppressive therapy, mainly hepatic and kidney transplantation; of them, 5.4% (16 of 307) of patients developed mesh infection. BMI superior to 30 was observed in 49 cases (74.2%). Almost half of patients smoked at the moment or had a history of using tobacco (46.9%).

According to the type of hernia repair, we found mesh infection in 6 patients with Lichtenstein repair (9% of repairs with prosthesis infection), 2 patients with Rutkow–Robbins technique (3%), 5 cases in Rives–Stoppa technique (7.5%), 11 patients in component separation technique (16.6%), 15 cases in preperitoneal repair (22.7%), and 27 cases with Chevrel technique (40.9%).

In 22 patients, intestinal resection was planned in a concomitant procedure with the ventral hernia repair