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Early Postoperative Eventration: Surgical Treatment with Use of Biological Prosthesis

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Abstract

Purpose: Eventration is a rare complication after laparotomy and its treatment is actually not standardized. We retrospectively analyzed 12 patients with early postoperative eventration; 8 of 12 were treated with use of biological mesh (non-cross-linked porcine derma).

Materials and Methods: We observed, from January 2009 to January 2014, 12 patients with eventration. In 4/12 patients we performed a direct abdominal wall closure and these patients were excluded from the study; remaining 8 patients encountered inclusion criteria and were enrolled on study. Study population was composed by 8 patients (6 male, 2 female). Mean age was 53 years (range 35-70). Direct abdominal wall closure was not performed because of the risk of "abdominal compartment syndrome" (ACS).

In six of eight patients early post-operative eventration occurred after urgent surgery Surgical technique: in 4 patients we performed direct wall closure with biological prosthesis (porcine derma) (one-step procedure). In 2 patients wall closure with similar technique was delayed after 9 and 12 days of intra-abdominal VAC (vacuum assisted closure) Therapy (two-step procedure). In 2 cases, because of large skin defect, we applied biological prosthesis and a surface VAC Therapy system on the prosthesis after intra-abdominal VAC Therapy (three-step procedure).

Results: We observed immediate complications in four cases (seroma). No patients underwent re-eventration. One year after surgery one patient manifested laparocele.

Conclusions: In our opinion, in these cases biological prosthesis can be used as valid device. However, our study is limited by number of patients and other studies are needed to draw definitive conclusions.

Keywords: Eventration; Biological prosthesis; VAC therapy

Introduction

Eventration consists of protrusion of the abdominal viscera due to dehiscence of all planes of the abdominal wall after laparotomy [1]. Although not very common, eventration is a serious complication leading to patient's death. It is observed in 0.2-7% of all the laparotomies [2]. The most frequent risk factors are: age greater than 65 years, hemodynamic instability, increased intra-abdominal pressure, emergency surgery, infection of the wound of abdominal wall, hypoproteinemia, anemia, ASA (American Society of Anesthesiologists) greater or equal III, operations on the large intestine [1,2]. Surgical treatment is difficult and actually not standardized. When eventration occurred, surgeon often has difficulties on treatment and it's important to find definitive solutions and avoid "abdominal compartment syndrome". Use of biological prosthesis is actually indicated for wall closure in contaminated field and in large wall defect, but there is no evidence in Literature about its use on treatment of eventration. The aim of this paper is to analyze our experience on use of biological prosthesis for treatment of early postoperative eventration in 8 patients.

Materials and Methods

We observed, from January 2009 to January 2014, 12 patients with eventration. In 4/12 patients we performed a direct abdominal wall closure using absorbable suture with Vycril 0 and these patients were excluded from the study; remaining 8 patients encountered inclusion criteria and were enrolled on the study. So, study population was composed by 8 patients (6 male, 2 female) (Table 1). Mean age was 53 years (range 35-70). Seven patients had comorbidities: respiratory distress in one case; diabetes in two cases; low levels of blood proteins in two cases; atrial fibrillation in two cases. Excluded 4 patients, in the remaining 8 patients a direct wall closure was not performed because

Patients	8
Male/Female	6/2
Mean age	53 YEARS (RANGE 35-70 YEARS)
Mean Follow-Up	32 MONTHS (RANGE 12-60 MONTHS)
Eventration After Urgent Surgery	6/8 PATIENTS
Eventration After Elective Surgery	2/8 PATIENTS

Table 1: Patients characteristics.

of the risk of "abdominal compartment syndrome". In these cases abdominal closure was obtained using a tension free technique with biological mesh preceded in 4 cases by intra-abdominal VAC Therapy. Indications for tension free technique were inability to close the abdomen due to severe bowel edema, poor quality of the fascia making the patient unsuitable for primary closure and contamination.

In 6/8 patients' early postoperative eventration occurred after urgent surgery: splenectomy in two cases after trauma, nephrectomy in one case after trauma, total colectomy in one case caused by intestinal infarction, post-traumatic retroperitoneal hematoma in one case, bowel perforation in one case for occlusive cancer of sigma.

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In two cases eventration occurred after elective surgery: in these patients we performed left hemicolectomy for recto-sigmoidal cancer and after 6 and 8 days these patients undergone relaparotomy for peritonitis caused by anastomotic dehiscence.

Postoperative eventration occurred about eight days (range 3-12 days) after primary laparotomy. All patients received first procedure by median laparotomy. All procedures were performed by surgeons with large expertise on urgency surgery.

Surgical technique after eventration

In 4 patients after urgent surgery (2 splenectomies, 1 nephrectomy, 1 intestinal resection) (Table 2). We performed direct wall closure with biological prosthesis (non-cross-linked porcine derma) (One-step procedure: tension free closure with mesh). We applied biological prosthesis in contact with bowel, sutured with rectus muscle using absorbable suture (Vycril 0) with "U-stitch" anchoring sutures to obtain biological prosthesis in contact with bowel but sutured to abdominal wall too. We performed subcutaneous layer suture and, finally, we sutured the skin. A suction drain was placed on the biological prosthesis.

In 2 patients after urgent surgery (1 total colectomy, 1 posttraumatic retroperitoneal hematoma) wall closure with similar technique (use of biological mesh) was delayed after 9 and 12 days of intra-abdominal VAC Therapy (Two-step procedure: VAC Therapy and

Procedure	Patients
One Step-Procedure	4
Two-Step Procedure	2
Three-Step Procedure	2



 Table 2: Surgical procedure.





Figure 3: After 6 days.



Figure 4: Final result.

mesh): a polyethylene sheet was placed intra-abdominally adjacent to the viscera. Polyurethane sponges were placed on polyethylene sheet and covered with occlusive thin polyethylene sheets. A continuous topical negative pressure of 50-75 mmHg was applied according to the surgeon's preference. We performed dressing change even three days.

In two cases of anastomotic dehiscence after elective surgery we performed diverting stoma and applied intra-abdominal VAC Therapy (with technique previously described) (Three-step procedure: intraabdominal VAC Therapy-mesh and VAC Therapy-definitive closure). We performed dressing changed even three days. After 10 days we applied biological mesh (Figure 1) and surface VAC Therapy (Figure 2). In these cases we applied biological mesh and surface VAC Therapy because of impossibility to close subcutaneous layer or skin (Figure 3). After 6 days we concluded intervention with skin closure (Silk 2/0) in one patient (Figure 4). In other patient general sepsis due to peritonitis determined large skin defect; so, in this case we performed multiple skin graft after 30 days of VAC Therapy. Complete skin closure was obtained 48 days after first skin graft.

To decide between different procedures we evaluate if anatomic and functional conditions of abdominal wall permit anchoring of prosthesis.

Results

Mean follow up is 32 months (range 12-60 months): we observed patients after intervention at 1, 3, 6, 12 months and after. We lost one patient at follow up who died one year after intervention for myocardial infarction. We observed immediate complications (14 days after surgery) in four cases (seroma) (in 2 cases between patients underwent one-step procedure; in 1 case between patients underwent two-step procedure and in 1 case between patient underwent three-step procedure), all treated with conservative therapy (Table 3). No patient underwent re-eventration. Quality of scar was acceptable in all patients.

Seroma (14 days after surgery)	4/8 Patients
Laparocele (one year after surgery)	1/8 Patients

	Table	3:	Complications.
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One year after surgery patient that underwent skin graft manifested laparocele (Table 3). Actually, this case is on study to find definitive solution.

Discussion

Fascial dehiscence is a serious complication after primary closure of the abdomen and has been associated with a mortality of 44% [3,4]. Its reported incidence ranges from 0.4%-3.5% [5]. Fascial dehiscence can result in eventration and in this case urgent surgery is needed. Data from Literature didn't shown the optimal treatment of eventration.

Different techniques are described, including transtissue fixation [6] or prosthetic devices (synthetic and biologic), used as definitive solution or in a bridge technique [7].

The risk of primary closure is "abdominal compartment syndrome" [8], that occurs when intra-abdominal pressure is abnormally high in association with organ disfunction [9]. In these cases, open abdomen is the solution to avoid ACS. Delayed closure of the abdomen and the use of mesh involve the risk of infection, fistulas, adhesions and herniation [10]. In our experience, in 8 patients to avoid ACS we used biological prosthesis (non-cross-linked porcine derma) in one-step procedure or biological prosthesis (porcine derma) in association with VAC Therapy (two- or three-step procedure). To decide between different procedure we evaluate if anatomic and functional conditions of abdominal wall permit anchoring of prosthesis.

Due to high risk of infection, it was considered impossible to use synthetic mesh to close the abdomen in our cases.

Regarding results, we observed immediate complications in four cases (seroma) (in 2 cases between patients underwent one-step procedure; in 1 case between patients underwent two-step procedure and in 1 case between patient underwent three-step procedure), all treated with conservative therapy.

One year after surgery patient that underwent skin graft manifested laparocele. These complications are described in Literature with use of biological mesh. Seroma, recurrence of hernia, infection and enterocutaneous fistula are reported in different studies with different rate of incidence. Furthermore, these prosthesis are more expensive than synthetic meshes [11,12].

Despite these limitations, biological prosthesis are actually a valid alternative in some conditions. In fact, biological prosthesis have specific indications in contaminated fields, especially when peritonitis occurs.

Acellular dermal matrices are believed to integrate with surrounding tissues while demonstrating resistance to infection, extrusion, erosion and adhesion formation [11].

These materials has been shown to become revascularized, as like as scaffold. Biological mesh contribute to restore the structural as well as the functional anatomy of the abdominal wall [12,13]. The scarcity of Literature comparing the different types of biological grafts precludes an evidenced-based decision about which to use [14]. In our cases, we decided according to patient characteristics and abdominal status.

An alternative to this technique is the use of biological mesh

associated with VAC Therapy, as like as in our experience in 4 cases.

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Open abdomen defined as a damage control laparostomy may be indicated in several clinical conditions [15]. In these cases, VAC Therapy has been shown to promote resolution of complicated abdominal dehiscence. It works in open abdomen providing mechanical containment of abdominal viscera, third space fluid loss estimation, and prevention of intestinal fistula and infection while in abdominal dehiscence it stimulates granulation tissue growth, removal exudates, and promotion of neoangiogenesis [16]. In our experience, we decided to use VAC Therapy to reduce intra-abdominal pressure and to use biological prosthesis to obtain wall closure with a device placed in contact with bowel.

The association between VAC Therapy and biologic mesh avoid the necessity of other reconstructive procedure which could be much more invasive in complicated patients.

Biological mesh behaved like a scaffold for granulation tissue which growth was stimulated by negative pressure therapy allowing a final closure with a spit-thickness graft [16].

In our cases, after removal of surface VAC Therapy, biological mesh was perfectly and totally integrated within the abdominal wall. Regarding our experience, maintaining an open abdomen by means a temporary abdominal closure is a valuable surgical technique in the management of a wide range of complex abdominal injuries and conditions including trauma, damage control, sepsis and relaparotomy [17]. A systematic review of the literature has demonstrated greater rate of primary fascial closure in patients treated with VAC therapy, especially where it is used along-side a dynamic closure technique, compared with other methods of temporary abdominal closure (e.g. mesh-mediated traction, dynamic retention sutures, Bogota bag, etc...) [17,18].

However our study, being a preliminary study, has, obviously, some limitations. The small sample size is the most important limitation, since it may influence the evaluation of surgical technique. Moreover, our study is retrospective and therefore in order to better evaluate the technique described above, there is a need for additional, prospective and randomized studies [19].

Conclusions

The present study suggests that biological prosthesis (non-crosslinked porcine derma) used in one-step or multi-step procedure should be the optimal treatment of eventration. However, other studies are needed to draw definitive conclusions and to establish correct indications for each procedure.

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