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Interposition of the omentum and/or the peritoneum in the emergency repair of large ventral hernias with polypropylene mesh

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ABSTRACT

Background: Ventral and incisional hernias are common surgical problems and their repairs are among the common surgeries done by a general surgeon. Repair of a large ventral hernia is still associated with high postoperative morbidity and recurrence rates. No single approach to ventral hernia repair will be the best choice for all patients. Large ventral hernias are often better approached with open surgery but may still be problematic when the defect is too wide for primary fascial closure to be achieved, as this leaves mesh exposed, bridging the gap. Techniques for incisional hernia repair have evolved over many years, and the use of mesh has reduced recurrence rates dramatically. The use of polypropylene mesh is reported to be associated with long-term complications such as severe adhesions and enterocutaneous fistula, which occur more commonly if the mesh is applied intraperitoneally with direct contact of the serosal surface of the intestine. Composite meshes containing expanded polytetrafluoroethylene (ePTFE) have been used recently; their major drawbacks lie in their high cost, inferior handling characteristics, and poor incorporation into the tissues. Although several studies have clearly demonstrated the safety and efficacy of prosthetic mesh repair in the emergency management of the incarcerated and/or strangulated inguinal and ventral hernias, however, surgeons remained reluctant to use prosthetics in such settings.

Purpose: The aim of this work was to evaluate the effectiveness and safety of placing the omentum and/or the peritoneum of the hernia sac as a protective layer over the viscera in the emergency repair of large ventral hernias using on-lay polypropylene mesh whenever complete tension-free closure of the abdominal wall was impossible.

Patients and methods: This study was carried out on all patients with large ventral hernia presented to the Gastrointestinal Surgery Unit, Main Alexandria University Hospital in an emergency situation during the period from October 2005 till October 2012. All patients were treated by placing the omentum and/or the peritoneum of the hernia sac between the viscera and the mesh whenever complete tension-free closure of the abdominal wall was impossible. Some patients necessitated removal of previous meshes and resection-anastomosis of the non-viable bowel prior to mesh repair. Those who underwent complete closure of the abdominal wall without tension prior to mesh repair were excluded from the study as there was no need for interposition of the omentum and/or peritoneum. All patients' data, surgical procedures, complications and follow-up were collected, reviewed and analyzed. After approval of local ethics committees of both the General Surgery Department and the Alexandria Faculty of Medicine, all patients included in the study were informed well about the operative procedure and use of prosthetic mesh and an informed written consent was obtained from every patient before carrying the procedure.

Results: Between October 2005 and October 2012; 105 patients (13 males and 92 females) with incarcerated and/or strangulated large ventral hernias were operated upon in the Gastrointestinal Surgery Unit, Main Alexandria University Hospital using an onlay polypropylene mesh. Their age ranged from 37 to 83 years with a mean of 59.3 + 11.7 years. The hernia was para-umbilical in 5 patients (4.8%), incisional in 22 patients (21%) and recurrent in 78 patients (74.3%). The recurrent hernias were recurrent para-umbilical hernias in 56 patients and recurrent incisional hernias in 22 patients. Resection anastomosis of non-viable, devitalized or injured small intestine during removal of adherent previous meshes was performed in 19 patients (18%). Hospital stay ranged from 2 to 13 days with a mean of 3.57 + 1.6 days. There was one perioperative mortality. Complications were encountered in 28 patients (26.7%) and included wound infection with delayed wound healing in 6 patients, seroma formation in 12 patients,

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chest infection in 8 patients and deep vein thrombosis in 2 patients. Follow-up duration ranged from 13 to 80 months with a mean of 46.8 + 20.3 months.

Conclusion: Placing the omentum and/or the peritoneum of the hernia sac as a protective layer over the viscera in repair of incarcerated and/or strangulated large ventral hernia using on-lay polypropylene mesh is cost-effective and safe even with resection anastomosis of small intestine.

1. Introduction

Ventral and incisional hernias are common surgical problems and their repairs are among the common surgeries done by a general surgeon. Repair of large ventral hernia is still associated with high postoperative morbidity and recurrence rates. No single approach to ventral hernia repair will be the best choice for all patients. Furthermore, there is no standard nomenclature system to accurately stratify ventral or incisional hernias. This has led to the use of poorly defined, confusing terms such as “complex ventral hernia repair”, “large defects”, and “loss of abdominal domain”. Large ventral hernias are often better approached with open surgery but may still be problematic when the defect is too wide for primary fascial closure to be achieved, as this leaves mesh exposed, bridging the gap. This risks seroma formation and infection where the mesh lies subcutaneously and bowel adhesion, erosion and fistula formation where it is in contact with intraperitoneal contents [1,2].

Incisional hernias complicate about 2%–11% of laparotomies, and they are a major source of morbidity and recurrence [3–5]. Techniques for incisional hernia repair have evolved over many years, and the use of mesh has reduced recurrence rates dramatically [6,7]. Although incisional hernia can be repaired effectively with several types of synthetic mesh, repair of giant and complex incisional hernias with massive depletion of fascial and muscular tissues is difficult [8–10]. Ultimately, the choice of technique is generally determined by the surgeon’s preference, surgical tradition, or even by the hospital’s economic situation [8].

The use of polypropylene (PP) mesh is reported to be associated with long-term complications such as severe adhesions and enterocutaneous fistula, which occur more commonly if the mesh is applied intraperitoneally with direct contact of the serosal surface of the intestine [10–12]. Hence the newer meshes were introduced with its attendant high cost. Newer meshes like PTFE, composite mesh, PCO (polyester coated with antiadhesive collagen layer), Proceed mesh (polypropylene with oxidized regenerated cellulose).

Composite meshes containing expanded polytetrafluoroethylene (ePTFE) have been used recently, especially in laparoscopic repair of incisional hernias. Despite the low adhesive potential of these meshes, their major drawbacks lie in their high cost, inferior handling characteristics, and poor incorporation into the tissues. Encapsulation occurs slowly, and infection can occur during the encapsulation process. When infected, ePTFE mesh almost always requires removal. Newer meshes are 15–20 times costlier than polypropylene mesh [12–14].

Although several studies have clearly demonstrated the safety and efficacy of prosthetic mesh repair in the emergency management of the incarcerated and/or strangulated inguinal and ventral hernias, however, surgeons remained reluctant to use prosthetics in such settings [15–17].

The aim of this work was to evaluate the effectiveness and safety of placing the omentum and/or the peritoneum of the hernia sac as a protective layer over the viscera in the emergency repair of large ventral hernias using on-lay polypropylene mesh whenever complete tension-free closure of the abdominal wall was impossible.

2. Patients and methods

Between October 2005 and October 2012; 105 patients with incarcerated and/or strangulated large ventral hernias underwent repair of their hernias using onlay polypropylene mesh with interposition of the omentum or the peritoneum of the hernia sac as a protective layer between the viscera and the mesh. Those who underwent complete closure of the abdominal wall without tension prior to mesh repair were excluded from the study as there was no need for interposition of the omentum and/or peritoneum.

Patients’ age, sex, body mass index, American Society of Anethesiologists (ASA) score and associated co-morbidities were recorded.

All patients were operated upon under general or epidural anesthesia. Prophylactic intra-venous antibiotic (a third generation cephalosporin and metronidazole) was given to all patients at the time of induction of anesthesia and was continued postoperatively for at least two days. Prophylactic low molecular weight heparin was given to all obese patients and those at high risk and was continued postoperatively during the period of hospital stay.

Transverse elliptical incision overlying the hernia and including the initial scars in case of incisional/recurrent hernias was used in almost all patients. The hernia ring was cut in opposite extremities to release the tension and make further steps of surgery easier. Following complete adhesiolysis and removal of previous meshes and dealing with the contents, the defect was partially closed without tension at its two ends by simple interrupted sutures (Prolene 1, Ethicon). If there were multiple defects, they were transformed into one large defect. All non-viable and injured small intestines were resected prior to abdominal wall closure. Intestinal anastomosis was performed in a single-layer interrupted extramucosal manner using absorbable sutures (Vicyl 3/0, Ethicon). The remaining defect in the abdominal wall after partial closure was covered by the omentum and/or the peritoneum of the hernia sac as a protective layer between the viscera and the overlying polypropylene mesh. Having dissected the skin and subcutaneous flaps from the abdominal wall, a polypropylene mesh (Prolene, Ethicon) was then fixed to the edges of the defect and the abdominal wall muscles as an onlay patch (i.e. between the abdominal wall muscles and the subcutaneous tissue) using interrupted polypropylene sutures (Prolene 2/0, Ethicon). The size of the mesh should be large enough to cover the defect and the lacerated abdominal wall as well. A closed-suction drain (Redivac, 18 Fr) was inserted under the subcutaneous tissue and was kept in place as long as its daily output was more than 20 ml per day. The patients were encouraged to mobilize with abdominal bandages in the early postoperative period. Abdominal bandages were kept in place for 3 months postoperatively.

The operative time, postoperative mortality and morbidity and hospital stay were recorded. Follow-up was performed by clinical examination every week for the first month and then every three months for the first year and then every six months thereafter to detect complications and recurrence.

Seroma was defined as an accumulation of fluid in the operative field after drain removal, for which percutaneous drainage or aspiration was required. Wound infection was defined as redness