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ORIGINAL ARTICLE

Early results from the use of the Lichtenstein repair in the management of strangulated groin hernia

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Abstract
Background Use of prosthetic repairs in the management of strangulated hernias has so far been very limited due to the fear of an associated higher incidence of complications, especially those related to the presence of the mesh. The aim of this study was to prospectively determine whether the use of the Lichtenstein repair in the management of strangulated groin hernias was associated with a higher rate of wound infection and/or mesh-related complications than in the elective setting.
Patients and methods The results obtained fromthe use of the Lichtenstein repair in the management of 25 patients with strangulated groin hernias (group I) were compared to those of another 25 age- and sex-matched patients undergoing Lichtenstein repair for elective groin hernia repair (group II).
Results In group I, one patient (4%) developed a scrotal hematoma. No other postoperative complications were encountered, whether related or unrelated to the presence of the mesh. No complications were encountered in group II patients. Throughout the 20-month duration of the present study, no mesh had to be removed and no recurrences were encountered in either group.
Conclusion The good short-term results of the present study in terms of absence of wound infection, mesh-related complications and recurrence suggest that use of the Lichtenstein repair in the management of strangulated groin hernias is safe and is not associated with a higher rate of complications compared to its use in the elective setting.

Keywords Strangulated hernia · Groin hernia · Lichtenstein repair · Tension-free repair

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Introduction

Although tension-free hernia repair has been established as the gold standard for the management of uncomplicated groin hernias, its use in the setting of strangulation has so far been very limited [1, 2]. The main reason for this is the assumption that the use of prosthetic repairs in the setting of strangulation is associated with a significantly higher rate of mesh-related complications. This assumption is not supported by clinical experience, as evidenced by the paucity of reports on the use of prosthetic repairs in the setting of strangulation. The aim of the present study was to prospectively determine whether the use of the Lichtenstein tension-free repair in the management of strangulated groin hernias was associated with a significantly higher rate of wound infection and/or mesh-related complications than in the elective setting.

Patients and methods

From October 2004 to June 2006, 25 consecutive patients with strangulated groin hernias admitted to the emergency department of the main university hospital in Alexandria were operated upon (group I).

During the same period, and for the purpose of comparison, another 25 age- and sex-matched patients admitted for elective groin hernia repair were included as a control group (group II).

The Lichtenstein tension-free repair with the use of a monofilament polypropylene mesh (Prolene, Ethicon, Somerville, NJ, USA) was utilized in all patients [3]. All patients were operated upon under spinal or epidural anesthesia. In group I patients, perioperative intravenous antibiotics (a third-generation cephalosporin and metronidazole) were given to all patients at the start of operation and were continued for 48 h postoperatively. In patients where resection of nonviable bowel had been performed, intravenous antibiotics were continued until the fourth postoperative day. Antibiotics were then continued orally until the end of the first postoperative week in all patients. On the other hand, in group II patients, only a single dose of intravenous antibiotic (a third-generation cephalosporin) was given at the start of operation. In the present study, the presence of nonviable intestine and thus the need to perform intestinal resection was not considered to be a contraindication for mesh repair unless there were signs of generalized peritonitis. Whenever resection of nonviable intestine was to be undertaken, the operative field was protected from contamination with povidone-iodine-soaked towels, taking great care not to spill intestinal contents into the field.

The length of postoperative hospital stay and postoperative complications were recorded. Particular emphasis was placed upon wound infection and mesh-related complications, e.g., clinically detectable seroma, mesh infection, wadding of the mesh to a ball, or so-called "meshoma" [4].

Follow-up was performed in the outpatient clinic by physical examination on weekly basis for the first six postoperative weeks and then on a three-monthly basis thereafter.

Statistical analysis was performed using the *t*-Student and chi-square tests. Data are expressed as mean ± SD. Statistical significance was assumed if $P < 0.05$.

Results

The present study included 50 male patients. In group I (25 patients), the age ranged from 21–85 years with a mean of 60.2 ± 18.7 years. In group II (25 patients), the age ranged from 28–74 years with a mean of 58.7 ± 12.2 years. The difference in the mean ages of both groups was statistically insignificant ($P = 0.743$). The American Society of Anesthesiologists (ASA) grade and the incidences of associated comorbidities in both groups are illustrated in Table 1. No statistically significant difference was found between both groups in regards to the ASA grade and the incidences of associated comorbidities.

Table 1 The American Society of Anesthesiologists (ASA) grade and the incidences of associated comorbidities

	Group I (25 patients)	Group II (25 patients)	*P*
ASA grade			
Grades I and II	22 (84%)	24 (96%)	0.61
Grade III	3 (12%)	1 (4%)	
Associated comorbidities			
Hypertension	6 (24%)	5 (20%)	0.73
Diabetes mellitus	3 (12%)	2 (8%)	0.63
Ischemic heart disease	2 (8%)	2 (8%)	1.00
Bronchial asthma	1 (4%)	2 (8%)	0.55

Statistical significance was assumed if $P < 0.05$

In group I, 22 patients (88%) had primary inguinal hernias and three patients (12%) had recurrent inguinal hernias following a previous tissue repair. All primary inguinal hernias were of the indirect type. Resection of nonviable small intestine was performed in four patients (16%). In group II, 22 patients (88%) had primary inguinal hernias and three patients (12%) had recurrent inguinal hernias following a previous tissue repair. Of all the primary inguinal hernias, 13 (52%) were of the indirect type and nine (36%) were of the direct type.

In group I, the postoperative hospital stay ranged from two to six days with a mean of 2.7 ± 1.3 days. The four patients in whom resection–anastomosis was performed were kept off oral intake for four days, allowed oral intake on the fifth day, and finally discharged on the sixth postoperative day. On the other hand, the postoperative hospital stay in group II was one day for all patients. The difference in postoperative hospital stay was statistically significant ($P < 0.05$). There were no mortalities in either group. In group I, one patient (4%) developed a scrotal hematoma following the dissection of a large recurrent inguinoscrotal hernia. This hematoma was managed conservatively. No other postoperative complications were encountered, whether related or unrelated to the presence of the mesh. No complications were encountered in group II patients.

In group I, the follow-up duration ranged from 6–20 months with a mean of 11.4 ± 4.5 months, while in group II it ranged from 6–20 months with a mean of 11.7 ± 4.4 months. The difference in the follow-up duration was statistically insignificant ($P = 0.826$). Throughout the study period, there were no complications related to the presence of the mesh, no mesh had to be removed, and no recurrences were encountered in either group.

Discussion

The main finding of the present study is the absence of any significant difference in the rates of wound infection and mesh-related complications between both studied groups. Such a finding suggests that the use of the Lichtenstein tension-free repair in the setting of strangulation is not associated with a significantly higher rate of either wound or mesh-related complications compared to its use in the elective setting.

The successful use of prosthetic repairs in the open management of strangulated groin hernias has been reported by others [5–8]. Wysocki et al. [5] reported their experience with the use of polypropylene meshes for the management of strangulated inguinal and incisional hernias. Of the 16 patients treated by Lichtenstein repair for strangulated groin hernias, only one patient (6.3%) developed seroma. They reported neither wound infection nor any other mesh-related complications [5]. In a later report by the same group, 27 patients were treated by Lichtenstein repair for incarcerated groin hernias, where resection of nonviable intestine was carried out in one patient (3.7%) [6]. Two patients died of causes unrelated directly to mesh implantation, namely myocardial and cerebral infarctions. Only one of their 25 surviving patients (4%) developed a subcutaneous fluid collection [6]. Again, neither wound infection nor any other mesh-related complications were reported. Throughout the duration of their 18-month mean follow-up period, no mesh had to be removed [6]. Papaziogas et al. [7] compared the tension-free repair with the use of a polypropylene mesh to the Andrew's technique for the management of strangulated inguinal hernias. Resection of nonviable intestine was carried out in four of 33 patients (12.1%) treated by the mesh and in ten of the 42 patients (23.8%) of the patients treated by the Andrew's technique. There were no mortalities. The postoperative complication rate was not significantly different between both groups [7]. No statistically significant difference was found between both groups in terms of the rate of wound infection (2/33, 6.1% vs. 2/42, 9.5%). In the mesh group, only two patients (6.1%) developed seroma. No other mesh-related complications were reported. Throughout the duration of their nine-year mean follow-up period, no mesh had to be removed [7]. Finally, Pans et al. [8] treated 35 patients with strangulated groin hernias by the insertion of a preperitoneal prosthetic mesh. Resection of nonviable intestine was carried out in nine patients. There were two postoperative wound infections. Throughout the duration of their 4.2 mean follow-up period, only one recurrence (1/35, 2.9%) was encountered, and no mesh had to be removed [8].

Similar successes with the use of prosthetic repairs in the laparoscopic management of strangulated groin hernias have also been reported by others [9, 10]. Ferzli et al. [9] reported on eleven patients with acutely incarcerated inguinal hernias treated by the laparoscopic totally extraperitoneal approach (TEP). The procedure was completed laparoscopically in eight patients. Complications were encountered in two of the three patients in whom the laparoscopic procedure was converted to an open one [9]. The first complication was an infected mesh, which was successfully treated by continuous irrigation and was thus salvaged, while the second complication was a midline wound infection [9]. Throughout the duration of their follow-up period, which ranged from nine to 69 months, no recurrences were encountered and no mesh had to be removed [9]. Leibl et al. [10] reported on 194 patients with incarcerated inguinal hernias (158 chronically incarcerated and 36 acutely incarcerated) treated by the laparoscopic trans-abdominal preperitoneal approach (TAPP). All procedures were completed laparoscopically. In the acutely incarcerated group (36 patients), resection of nonviable small intestine was carried out in one patient. Neither wound nor mesh-related complications were encountered. After a median follow-up of 26 months, only one recurrence (1/194, 0.5%) was encountered and no mesh had to be removed [10].

In the present study, the Lichtenstein tension-free repair using a polypropylene mesh was utilized in the management of 25 patients with strangulated inguinal hernias. There were neither mortalities nor major systemic complications. Furthermore, there were no wound infections despite the fact that resection of nonviable intestine was carried out in four patients (16%). Similar findings were reported by Pans et al. [8], where none of their nine patients (25.7%) in whom resection of nonviable intestine was carried out developed wound infection. The use of perioperative antibiotics, meticulous preparation of the operative field, and adequate hemostasis have probably contributed to the acceptable rate of wound infection following bowel resection and mesh implantation, as described by others [11]. Finally, there were no mesh-related complications. A scrotal hematoma developed in only one patient (4%), which could be attributed to imperfect hemostasis following the dissection of a large recurrent inguinoscrotal hernia. Throughout the present study period, no mesh had to be removed.

Two conclusions were drawn from the abovementioned studies and from the present study as well. The first conclusion was that it was safe to use a prosthetic

repair in the emergency management of groin hernias. The second conclusion was that the presence of nonviable intestine in the setting of strangulation cannot be considered a contraindication to the use of a prosthetic repair. Further support for the second conclusion can be supplied from the studies reporting the successful use of prosthetic repairs in potentially contaminated fields where a stoma was present or bowel resection has been performed [12–15]. Campanelli et al. [12] performed ten prosthetic repairs after laparotomy and bowel resection in nine patients and after cholecystectomy in one patient. Throughout their 21-month follow-up period, neither minor nor major complications were encountered [12]. Vix et al. [13], in a retrospective study, compared the outcomes of 47 patients following the performance of a prosthetic repair in a potentially septic operative field where small bowel resection or colonic surgery had been performed (group A) to an equal number of patients where prosthetic repair was performed in an aseptic operative field (group B). There was no significant difference in the rate of surgical complications between both groups, and only one patient in group A developed prosthetic infection requiring revision [13]. Geisler et al. [14] reported on 29 patients in whom prosthetic repair was performed in the presence of a stoma or in conjunction with bowel resection. Removal of the mesh was performed in only one patient following parastomal hernia repair [14]. Finally, Stringer and Salameh [15] concluded that although the incidence of wound complications seemed higher following mesh herniorrhaphy during elective colorectal surgery, mesh excision was not usually required.

Although a longer follow-up is required to draw more definite conclusions regarding recurrence rates following the Lichtenstein tension-free repair in the setting of strangulation, the absence of recurrence throughout the 11.4-month mean follow-up period of the present study seems encouraging. In the study by Wysocki et al. [6], they encountered no recurrences throughout their 18-month mean follow-up period. Papaziogas et al. [7] reported only one recurrence in their 33 patients (1/33, 3%) treated by the mesh throughout their nine-year mean follow-up duration.

The fact that the management of strangulated groin hernias with any technique other than the "gold standard" tension-free technique would leave patients at a higher risk of recurrence necessitating a second operation to deal with this recurrence, should it occur, highlights the benefits of the Lichtenstein tension-free repair in the management of strangulated groin hernias. Although larger numbers and longer follow-up durations are still required to draw more definite conclusions, however, the good short-term results of the present study in terms of absence of wound infection, mesh-related complications and recurrence suggest that the Lichtenstein tension-free repair can be successfully used in the management of strangulated groin hernias.

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