ORIGINAL ARTICLE

Prosthetic repair of incarcerated inguinal hernias: is it a reliable method?

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Abstract

Background and aim It is generally accepted that most inguinal hernias should be operated on electively using synthetic grafts. However, limited information is available on the usage of these materials in patient with incarcerated and strangulated hernias. The objective of this study is to compare the outcomes of incarcerated inguinal hernia repair with or without graft.

Materials and methods One hundred-thirteen patients with incarcerated inguinal hernia that underwent surgery were included in this study. Patients who underwent Lichtenstein repair were assigned to group I; those who underwent primary repair were assigned to group II. Demographics and characteristics of patients in each group were compared. Chi-square and Student's *t*-tests were used.

Results No statistical difference was found between patients who did and did not receive anastomosis in both groups in terms of surgery duration, length of hospital stay, postoperative morbidity, and mortality. Recurrence was found in 4.0% and 20.8% patients in group I and group II, respectively (*P*=0.036).

Conclusions Mesh repair can be preferred in incarcerated inguinal hernia patients because recurrence rate was significantly lower in patients who underwent Lichtenstein repair in this study.

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Introduction

Incarcerated inguinal hernias comprise a significant portion of surgical emergencies, and 5–15% of inguinal hernia surgery are interventions for incarceration [1–3]. Besides managing the patient's emergency state, a major objective of surgery is to repair the defect using the most appropriate technique with the least possibility of recurrence. Several studies have reported beneficial outcomes of monofilament polypropylene mesh application in elective hernia repair [4–6]. On the other hand, limited information is available on the usage of such synthetic materials in emergency surgical interventions for incarcerated and strangulated hernias [7–9]. Controversial results have been reported with the application of such grafts on an infected surgical field in patients with intestinal necrosis. When such postoperative problems as infection and rejection were ignored, recurrence rates following surgery with graft were lower compared with those after surgery without graft [10].

The objective of this retrospective study is to compare the outcomes of incarcerated inguinal hernia repair with or without graft in terms of postoperative morbidity, mortality, and recurrence after long-term follow-up.

Materials and methods

Emergency surgical interventions for incarcerated inguinal hernia were performed in 143 (10.5%) out of 1,362 patients who underwent surgery for inguinal hernia in 3rd and 4th surgery clinics in our hospital between January 1998 and

February 2007. The study was designed as a retrospective, nonrandomized study. We included 131 patients with available records. Patients with incarcerated recurrent inguinal hernias were excluded.

Patients were divided into two groups; patients who underwent Lichtenstein (tension free) repair were assigned to group I, and those who underwent primary hernia repair (Bassini or Andrews technique) were assigned to group II. No preference criterion was employed for the repair method to be used. The surgeon decided the type of surgery and the anesthesiologist decided the type of anesthesia. The tension-free hernioplasty was performed as described by Lichtenstein et al. [11], using a polypropylene mesh (Prolene, Ethicon) and a 2/0 prolene suture to fix mesh in the desired position. A silk suture between the transversalis fascia and the inguinal ligament was used to tighten the ring in the Bassini repair group. All patients received antibacterial prophylaxis with a second generation cephalosporin preoperatively. Patients with intestinal necrosis received antibiotic treatment for an additional 2–5 days.

Patients in group I and group II were investigated retrospectively by browsing the hospital archives, and comparisons were made in terms of age, sex, accompanying diseases, American Society of Anesthesiologist (ASA) classification, type of anesthesia, development of strangulation or necrosis, postoperative morbidity and mortality, length of hospital stay, and recurrence. Physical examinations were performed for long-term reevaluation of patients. Recurrence of the hernia was defined as an apparent swelling or a palpable defect at the previous surgery site in the groin. If the physician that performed the physical examination was not sure of a recurrence, ultrasonography of the groin was performed.

Statistical analyses Demographics and characteristics of patients in group I and group II were compared. Patients who did or did not receive anastomosis in both groups were investigated in terms of duration of the operation, length of hospital stay, and postoperative mortality and morbidity rates. For comparisons, Chi-square and Student's *t*-tests were used. A *P* value less than 0.05 was considered significant. Statistical Package for Social Sciences 11.5 (SPSS Inc., Chicago, IL, USA) for Windows (Microsoft) was used to perform the statistical analyses.

Results

Twenty-nine patients (22.1%) received tension-free repair with monofilament polypropylene mesh (group I), while 102 patients (77.9%) received primary hernia repair (group II). Males and females comprised 108 (82.4%) and 23

(17.6%) of all the patients, respectively. Mean age of all patients was 58.4±18.7 (range 15–92) years and patients in group I were significantly older than those in group II (*P*= 0.005). Fifty-three (40.5%) patients had such accompanying diseases as chronic obstructive lung disease, congestive heart failure, hypertension, coronary artery disease, and diabetes mellitus. Mean ASA score was 2.27±1.11 (Table 1).

Hernia pouch was simply reduced in 66 cases (50.4%) as the contents of the sac were normal in terms of blood circulation during surgery. However, strangulation was detected in 65 cases (49.6%); blood circulation of intestines was recovered after a while (5–20 min) in 40 patients (61.5%) with strangulated inguinal hernias, while intestinal resection and anastomosis were performed in 25 patients (38.5%) due to necrosis. No significant difference was found in terms of intestinal resection in patients in group I and group II (*P*=0.495). Resections and anastomoses were performed in 21 (84%) patients using the inguinal incision, while a separate abdominal midline incision was performed in four (16%) patients. No statistical difference was found between patients in group I and group II in terms of mean length of hospital stay (*P*=0.304), and mean duration of operation (*P*=0.814).

Postoperative morbidity and mortality were recorded in 28 (21.4%) and 10 (7.6%) cases, respectively. Major complications included pneumonia (n=6), heart failure (n=4), myocardial infarction (n=1), and anastomosis failure (n=1), while minor complications included wound infection (n=9), scrotal ecchymosis (n=5), urinary retention (n=4), testicular edema (n=3), and testicular atrophy (n=1). Relaparatomy and Mikulicz stoma were performed in a patient in group II who had an anastomotic leak identified. Wound infections were successfully managed with drainage and local wound care. Other complications were medically treated. The reasons of mortality were heart failure, acute hepatic failure and pulmonary embolism in three, two, and two patients, respectively. Other causes of mortality were myocardial infarction, sepsis following anastomosis and Acute Respira-

Table 1 Demographics and characteristics of patients

Parameters		Group I (*n*= 29), *n* (%) or mean (±SD)	Group II (*n*= 102), *n* (%) or mean (±SD)	*P*
Age (mean)		69.4+14.1	52.1+22.7	0.005
Gender	Female	7 (24.1)	16 (15.7)	0.214
	Male	22 (75.9)	86 (84.3)	
Accompanying disease	Present	12 (41.4)	41 (40.2)	0.537
	Absent	17 (58.6)	61 (59.8)	
ASA score	I–II	18 (62.1)	60 (58.8)	0.463
	III–IV	11 (37.9)	42 (41.2)	

tory Distress Syndrome after pneumonia in one case for each. No statistical difference was found between patients in group I and group II in terms of postoperative morbidity ($P=0.247$) and mortality ($P=0.153$). Mean follow-up period for group I and group II were 48.7±31.3 and 42.6±26.6 months, respectively ($P=0.335$). Recurrence was found in 1 (4.0%) and 20 (20.8%) patients in group I and group II, respectively ($P=0.036$; Table 2).

Significantly higher rates for mean length of hospital stay ($P<0.001$), postoperative morbidity ($P<0.001$), postoperative mortality ($P<0.001$) and recurrence ($P<0.001$) were found in patients who received intestinal resection and anastomosis (Table 3).

Table 2 Operative findings and postoperative outcomes

Parameters	Group I (n=29), n (%) or mean (±SD)	Group II (n=102), n (%) or mean (±SD)	P
Type of anesthesia			
General	4 (13.8)	26 (25.5)	0.141
Spinal	25 (86.2)	76 (74.5)	
Strangulation			
Present	14 (48.3)	51 (50.0)	0.519
Absent	15 (51.7)	51 (50.0)	
Intestinal resection and anastomosis			
Performed	6 (20.7)	19 (18.6)	0.495
Not performed	23 (79.3)	83 (81.4)	
Mean duration of operation (hours)	70.7±12.3	70±17.3	0.814
Postoperative complication[a]	8 (27.6)	20 (19.6)	0.247
Major	4 (13.8)	8 (7.8)	0.258
Pneumonia	2	4	
Heart failure	2	2	
Myocardial infarction	–	1	
Anastomotic leak	–	1	
Minor	5 (17.2)	17 (16.7)	0.586
Wound infection	3	6	
Scrotal ecchymosis	1	4	
Urinary retention	1	3	
Testicular edema	–	3	
Testicular atrophy	–	1	
Mortality	4 (13.8)	6 (5.9)	0.153
Mean length of hospital stay (days)	5.10±4	4.27±2.9	0.304
Mean follow-up (months)	48.7±31.3	42.6±26.6	0.335
Recurrence[b]	1 (4.0)	20 (20.8)	0.036

[a] Some patients had more than one morbidity
[b] Calculated for living patients.

Table 3 Affects of intestinal resection and anastomosis on postoperative outcomes

	Intestinal resection and anastomosis		P
	Performed (n=25) n (%) or mean (±SD)	Not performed (n=106) n (%) or mean (±SD)	
Mean length of hospital stay(days)	6.4±4	4±2.8	<0.001
Postoperative morbidity[a]			
Developed	13 (52.0)	15 (14.2)	<0.001
Not developed	12 (48.0)	91 (85.8)	
Postoperative mortality			
Developed	8 (32.0)	2 (1.9)	<0.001
Not developed	17 (68.0)	104 (98.1)	
Recurrence[b]			
Detected	10 (58.8)	11 (10.6)	<0.001
Not detected	7 (41.2)	93 (89.4)	

[a] Some patients had more than one morbidity
[b] Calculated for living patients

Discussion

Synthetic grafts have been used for over 30 years in hernia surgery. Polypropylene graft is one of those which is considered an appropriate synthetic graft because polypropylene is a durable, inert and monofilament material which stimulates fibroplasia but does not trigger infections and is not readily rejected [4, 11]. When they were first introduced, hernia repair using synthetic grafts had only been considered in patients with advanced age, in those with weak anatomical architecture and in those with recurrent inguinal hernias. Later, most surgeons started to use this technique in all adult patients; many surgery centers reported beneficial outcomes of synthetic graft application in elective inguinal hernia surgeries [12, 13]. However, there was a common doubt about the application of synthetic materials in emergency surgery for incarcerated and strangulated hernias because of possibility of surgical field infection. Surgeons were worried about infection-related problems that could occur due to possible bacterial translocation in the presence of intestinal obstruction [14]. Nevertheless, polypropylene mesh application has been reported to be a safe approach in incarcerated inguinal hernia patients with intestinal necrosis [7, 9]. Birolini et al. [15] reported that when adequate surgical technique was used, polypropylene mesh repair of incisional hernias associated with simultaneous colonic operations with contaminated wounds was possible.

Morbidity rate of emergency incarcerated inguinal hernia reportedly varies between 19% and 41%, and mortality rate varies between 2.6% and 11% [2, 16–18]. We found, in our

study, morbidity and mortality rates of 16.03% and 7.63%, respectively. No significant difference was found between group I and group II in terms of postoperative morbidity and mortality. Papaziogas et al. [9] did not find any difference between inguinal hernia repair with mesh and without mesh with regard to postoperative complications and wound infection, either. They reported that intestinal resections were required in four cases in the group of mesh repair which included 33 patients and found no direct relation between postoperative complications and mesh application. The present study indicates that intestinal necrosis is not a counter-indication for mesh application. There was not any significant difference between the two groups with regard to other complications either.

Recurrence rate in incarcerated inguinal hernia repair reportedly varies between 1% and 22% [9, 19–22]. This broad range of variability depends in part on type of repair and the length of follow-up period. Hernia repair with Lichtenstein method has been reported to yield favorable outcomes after a long-term follow-up with a recurrence rate of 1% [23]. Papaziogas et al. [9] reported a recurrence rate of 4% after a mean follow-up period of 9±4.2 years in a study which included 75 patients, 44% of whom received hernia repair with mesh. On the other hand, long-term consequences of Bassini repair are not as favorable as those of Lichtenstein method. In different studies in which Bassini method was evaluated, Mittelstaedt et al. [24] reported a recurrence rate of 35.7%, Beets et al. [19] reported a recurrence rate of 33%, and Muckter et al. [25] reported a recurrence rate of 21.6% after 4, 12–15, and 4 years of follow-up period, respectively. In our study, when patients with mortality were excluded, only one (4.0%) recurrence was observed in any of the patients who received Lichtenstein surgery at a mean 48-month follow-up, while 20 out of 96 (20.8%) patients who received surgery without graft developed recurrence within a mean follow-up period of 42 months.

This is a retrospective and nonrandomized study, and we investigated little number of patients who received surgery with graft compared with those who received surgery without graft (29 vs. 102). When patients in the two groups were compared, we did not find any statistical difference in terms of strangulation, necrosis, morbidity, mortality, length of hospital stay, and duration of surgery. We detected that patients with advanced age received mesh repair more frequently, probably because mesh repair is preferred in elderly due to their weak anatomical architecture. Another striking finding of our study is the significantly lower recurrence rate in patients who received mesh repair compared with those who received repair without graft.

In conclusion, mesh repair is applicable in patients with incarcerated inguinal hernias with low morbidity and mortality rates. Intestinal resection is required in many patients, which is not a contraindication to placement of mesh. There was no difference in mesh-specific complications in those with and without intestinal resection. In addition, recurrence rates were found to decrease significantly in patients who received mesh repair. Significantly higher rates for mean length of hospital stay, postoperative morbidity, postoperative mortality, and recurrence were found in incarcerated inguinal hernia patients who received urgent surgical intervention during which intestinal resection and anastomosis were performed. Our data suggest that the reason for postoperative poor results in patients who received urgent surgical intervention due to incarcerated inguinal hernia is the presence of intestinal necrosis which requires intestinal resection and anastomosis but not mesh repair. We believe that Lichtenstein method can be reliably applied in patients with incarcerated inguinal hernias because this method is convenient; it causes a reasonable rate of infective complications, it does not extend length of hospital stay, and it does not cause recurrence even after a long-term follow-up.

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