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Synchronous open hernioplasty of primary bilateral inguinal hernia

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Abstract
Background: Bilateral inguinal hernia occurs in 12% of patients. Simultaneous or sequential repair has been debated especially after tension free repairs.
Aim: This study was conducted to compare Stoppa procedure with bilateral Lichtenstein hernioplasty for the treatment of primary bilateral inguinal hernia.
Patients and Methods: This study included forty patients with primary bilateral inguinal hernias. They were divided randomly into two equal groups. Group A were operated by bilateral Lichtenstein hernioplasty. Group B were operated by Stoppa repair. Recording of preoperative, operative, and postoperative data was performed for each patient in the study. Patients were assessed postoperatively, and 3, 6, and 12 months after the procedure at the outpatient clinic.
Results: All patients were men. There was no statistically significant difference between both groups in preoperative data. The Stoppa procedure took a significantly shorter time than bilateral Lichtenstein repair; the mean operative time for Stoppa and bilateral Lichtenstein was 78.0 ± 6.40 and 86.80 ± 8.65 min, respectively. Postoperative pain scoring using the visual analogue score at 12 h postoperatively was significantly lower with the use of the Stoppa procedure than bilateral Lichtenstein repair. No significant difference was detected between both groups in operative complications, postoperative complications, hospital stay, return to normal daily activities, and inguinodynia. No recurrence was detected in any of the patients after 1 year of follow-up.
Conclusion: Bilateral inguinal hernias can be repaired simultaneously in the same setting safely and effectively without an increase in morbidity or recurrence rate. The Stoppa procedure can be a good alternative to bilateral Lichtenstein repair for the treatment of bilateral inguinal hernia, with comparable outcome.

Keywords: bilateral, inguinal hernia, lichtenstein, stoppa, hernioplasty

Introduction

Inguinal hernia repair is the commonest operation in general surgical practice. Hernias occur in about 1-5% of the general population. Hernias are usually unilateral and about 5-10% of the groin hernias are bilateral [1].

The term hernia is derived from the Greek hernios (means budding). A hernia is defined as weakness of the fibromuscular tissues of the wall from which contents of the cavity underlying it arise from the wall. The strengthening of the posterior aspect of the inguinal canal remain the major objective in inguinal hernia repair. Bassini pioneered the surgical repair of inguinal hernia (he performed his first operation in 1884 and published its outcomes in 1889) [2].

Hernias can occur anywhere, but it is common in the anterior abdominal wall, in particular, the inguinal, femoral, and umbilical regions, linea alba, and sites of previous incisions. The inguinal, femoral, and umbilical hernias constitutes about 75% of all cases. The inguinal region (lying between the lower abdomen and the thigh) is the weakest point in the anterior abdominal wall where hernia commonly occurs. Hernia can occur in any condition increases the intra-abdominal pressure. In childhood, whooping cough is an important predisposing factor. In adults powerful muscular effort of chronic cough, and straining during micturition or defecation may precipitate a hernia [3].

The definitive surgery for inguinal hernia have first described by Marcy, Joseph Lister student, who stressed the importance of transversalis fascia integrity and internal ring closure. He used carbolised catgut to narrow the internal ring. Eduardo Bassini, an Italian in 19th century predict that two reasons were responsible for the failure of the procedures performed for inguinal hernia repair (non-anatomic repair and the wide internal ring). He recommended the triple layer technique incorporating internal oblique, transversus abdominis muscle and transversalis fascia and approximating it with inguinal ligament [4].

For decades, it was believed that simultaneous repair of bilateral inguinal hernias could be associated with a high morbidity and recurrence rate. The introduction of tension free repair techniques led to a change in this concept. Placement of a prosthetic mesh is needed in all types of open or laparoscopic tension free repair. The most common performed open techniques include Lichtenstein's and Stoppa's hernioplasties. The advantages of simultaneous repair of bilateral inguinal hernia is patient satisfaction, and cost effectiveness, as the patient is subjected to one anesthesia, single hospital stay, and only one period of recovery [5].

The myopectineal orifice was first elucidated by a Fruchard (French surgeon), which consists of medial, lateral, and femoral triangles, which are potential sites for groin hernias.

Stoppa and Rives (students of Fruchard), developed the preperitoneal approach to hernia repairs. The laparoscopic techniques (TAPP and TEP) follows the principle of pre peritoneally mesh placement described by Stoppa. This method is not followed by many surgeons because of long learning curve. This may be the ideal repair for bilateral inguinal hernia and recurrent inguinal hernia [6].

Stoppa great prosthetic reinforcement of the visceral sac (GPRVS) was performed in 1975. Stoppa wrapped the lower part of the parietal wall with wide mesh that covers myopectineal orifice. This requires dissection of the preperitoneal space, cord structures, identification and reduction of the sac and placing a wide mesh between the peritoneum and anterior abdominal wall [7].

Tension free repair standardized by Lichtenstein still the gold standard in the management of unilateral inguinal hernia repair. Lichtenstein used mesh to strength the posterior wall of the inguinal canal and fixed it over the conjoint concept and inguinal ligament. He tailored the mesh to accommodate to the cord structures [3].

The debate on the management of bilateral inguinal hernias led us to conduct the present study aiming to compare Stoppa procedure with bilateral Lichtenstein tension-free hernioplasty for the management of bilateral inguinal hernia in terms of operative time, intraoperative and postoperative complications, postoperative pain, hospital stay, return to normal daily activities, chronic groin pain, and recurrence.

Patients and Methods

This prospective study involved forty patients who attended the General Surgery department, Faculty of Medicine, Al-Azhar University. Inclusion criteria were patients with primary bilateral inguinal hernias in patients aged from 20 to 60 years. Exclusion criteria were complicated hernia (obstructed or strangulated), patients with associated intraperitoneal pathology, and abdominal wall infections. Informed consent will be taken from each respondent. Patients were assigned to two groups of 20 patients each. Patients were classified by Nyhus classification. One group underwent hernia repair by simultaneous Lichtenstein mesh hernioplasty and the other group underwent Stoppa's repair. They underwent routine investigations and those found fit for surgery were operated upon. The operative time (from skin incision to wound dressing) was recorded.

The primary endpoint is evaluation of chronic groin pain and hernia recurrence in both groups. The secondary endpoints are perioperative parameters (operative time, intraoperative, and postoperative complications), hospital stay, postoperative pain scoring, timing of return to normal daily activity, and follow-up details.

Lichtenstein tension-free hernioplasty [8]. Inguinal skin incision made 1/2 inch above and parallel to the inguinal ligament from above and lateral to the pubic tubercle to below and medial to the anterior superior iliac spine. The indirect sac was dissected, ligated using Vicryl 0, and sectioned. The large direct sacs were invaginated and plicated using Vicryl 0. Prolene mesh of 6×11 cm was used in all cases. The mesh was fixed in place using polypropylene 2/0. The mesh was fixed down to the inguinal ligament and up to the conjoint tendon (from the pubic tubercle to beyond the orifice of the internal ring).

Stoppa Procedure

The technique developed by Stoppa was used [9]. Patients received spinal anesthesia with antibiotic prophylaxis. Abdomen opened by Pfannensteil incision. Subcutaneous fat, and rectus sheath were opened. Both recti separated in the midline. Dissection of the preperitoneal space was performed from the retropubic space of Retzius to the rectus abdominis muscles and epigastric vessels laterally, extending to the retroinguinal space. Spermatic cord and gonadal vessels were identified. Superior pubic rami, obturator foramens, and iliac vessels were visualized. Small direct sacs were dissected and reduced. Large sacs were ligated with a purse-string suture and removed. Indirect sacs were divided, the proximal part was sutured, and the distal part was left in situ attached to the cord. If indirect hernia was sliding, dissection of the sac from the cord structures was performed. Parietalization of the spermatic cord and gonadal vessels was performed by dissection of their peritoneal attachment. The chevron shaped polypropylene mesh of size 30x30 cm placed over the peritoneum and fixed inferiorly to the pubic symphysis, Cooper's ligament and superiorly to the arcuate line. Wound closed in layers with drain.

Post-operative period

Patients were assessed for intra-operative difficulties, blood loss, early post-operative pain using the Visual Analogue scale and the need for post-operative analgesia. Minor complications include neurovascular injury, scrotal hematoma, retention of urine, seroma formation, cord edema, wound infection, and testicular pain were noted. Major complications as bladder and bowel injury were looked for. The sutures were removed after one week and the patients were discharged.

Follow up

Patients were followed up every month for the first 3 months and then after 3 months in outpatient clinic to look for recurrence. Patients were totally followed up for a period of one year.

Statistical Analysis

Was performed using the statistical package for the social sciences, version 20.0 software (SPSS Inc., Chicago, Illinois, USA). Significance level was set at $p < 0.05$. Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, SD, and median. Comparison between different groups in terms of categorical variables was performed using the χ^2 - test.

Results

The present study included forty male patients with primary bilateral inguinal hernias who were divided into two groups. Group A included 20 patients who underwent bilateral Lichtenstein tension-free hernioplasty. Group B included 20 patients who underwent Stoppa repair. All patients were males. As regard to preoperative data (age, smoking, comorbidities, body mass index, and type of hernia (Fig. 1)) there were no statistically significant difference between both

groups (Table 1).

The operative time was significantly shorter in group B patients (Stoppa repair); it ranged from 55 and 90 min, with a mean of 78.0 ± 6.40 min, whereas in group A (bilateral Lichtenstein tension-free hernioplasty), it ranged between 60 and 105 min, with a mean of 86.80 ± 8.65 min, $p < 0.001$. There were no intraoperative complications (visceral or vascular injury) in either group. As regard to postoperative complications (wound seroma and hematoma, urine retention, wound infection, and scrotal swelling); chronic groin pain; postoperative hospital stay; and return to work there were no statistically significant difference (Table 2). No recurrence occurred in any patient after 1 year of follow-up in either group.

As regard to postoperative pain scoring measured by visual analogue scale at 12 hours postoperatively, there were statistically significant difference between both groups in favors group B patients, but there was no statistically significant difference between both groups in pain at 24 h and 7 days postoperatively (Table 3).

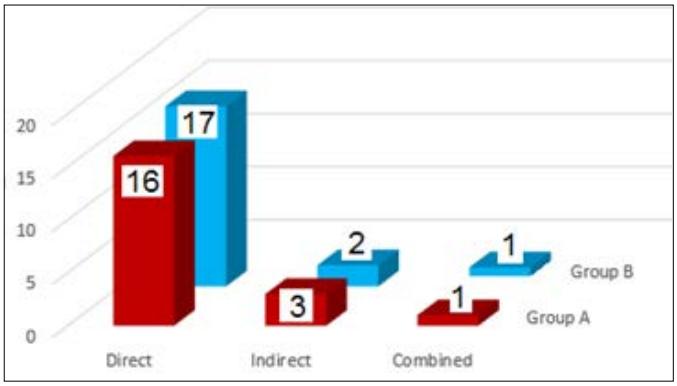

Fig 1: Distribution of Hernia

Table 1: Preoperative assessment.

Preoperative data	Group A (bilateral Lichtenstein tension-free hernioplasty) (n = 20)	Group B (Stoppa repair) (n = 20)
Age		
Min-Max	20-60	22-58
Mean ± SD	42.4 ± 6.0	40.8 ± 8.6
Smoking (n, %)	8 (40%)	7 (35%)
Comorbidities (n, %)		
Hypertension	2 (10%)	3 (15%)
Diabetes	2 (10%)	3 (15%)
COPD	4 (20%)	5 (25%)
BPH	3 (15%)	2 (10%)
BMI		
Min-Max	24.0-36.10	25.20-37.20
Mean ± SD	28.20 ± 3.10	29.10 ± 2.28
Type of hernia (n, %)		
Direct (Bilateral)	16 (80%)	17 (85%)
Indirect (Bilateral)	3 (15%)	2 (10%)
Direct (unilateral)+ Indirect (Bilateral)	1 (5%)	1 (5%)

COPD, chronic obstructive pulmonary disease; BPH, benign prostatic hypertrophy; BMI, body mass index.

Table 2: Operative and postoperative parameters.

Perioperative parameters	Group A (bilateral Lichtenstein tension-free hernioplasty) (n = 20)	Group B (Stoppa repair) (n = 20)
Operation time (min)		
Min-Max	60-105	55-90
Mean ± SD	86.80 ± 8.65	78.0 ± 6.40
Postoperative complications [n (%)]		
Wound seroma and hematoma	2 (10%)	1 (5%)
Urine retention	1 (5%)	1 (5%)
Wound infection	1 (5%)	1 (5%)
Scrotal swelling	2 (10%)	3 (15%)
Chronic groin pain [n (%)]		
Absent	17 (85%)	18 (90%)
Present	3 (15%)	2 (10%)
Postoperative hospital stay (days)		
Min-Max	1-2	1-2
Mean ± SD	1.10 ± 0.30	1.00 ± 0.20
Median	1	1
Return to work (days)		
Min-Max	14.0–20.0	15.0–28.0

Mean ± SD	15.00 ± 2.80	18.00 ± 4.60

Table 3: Postoperative pain in both groups.

Groups	Postoperative pain		
	12 h	24 h	7 days
Group A			
Min-Max	6-9	3-5	0-3
Mean ± SD	6.80 ± 1.60	3.80 ± 1.20	1.20 ± 1.04
Group B			
Min-Max	5-8	3-5	1-3
Mean ± SD	6.10 ± 0.88	4.20 ± 0.82	1.40 ± 0.44
P-value	0.020*	0.466	0.628

Discussion

Inguinal hernia has maximum incidence in between 30 – 60 years. Studies done by Fernandiz and Tartas showed that mean age of presentation was 52.7 years [10]. In the present study mean age of presentation was 42.4 years in group A, and 40.8 years in group B which is younger than Fernandiz and Tartas study. This may be due to that most of the patient in the present study are laborers. In the present study all the patients studied were males.

Study done by Hemmat and Ali had 100% men in their study [11]. Most of their patients had risk factors for development of hernia most common being smoking 76.6%, obesity 10%, chronic obstructive pulmonary disease 20% and benign prostatic hypertrophy 20% which is comparable to the results of the present study.

For many years, it was believed that simultaneous repair of bilateral inguinal hernias should not be performed because this approach would cause increased postoperative complications (pain, wound complications, and recurrences). Today, it is known that the simultaneous repair of bilateral hernia is safe and effective.

The European Hernia Society guidelines for the management of bilateral inguinal hernias recommended a one-stage procedure (Lichtenstein or laparoscopic) [12]. The Stoppa procedure can be another alternative for bilateral inguinal hernia treatment, but only for the surgeons familiar with it [13, 14]. This led us to perform this study to compare Stoppa procedure with Lichtenstein technique for surgery of bilateral inguinal hernias.

The Stoppa procedure or giant prosthetic reinforcement of the visceral sac is a preperitoneal repair for bilateral inguinal hernias. This procedure entails wide dissection of preperitoneal space. The classical Stoppas repair is performed by wrapping lower part of the parietal peritoneum with a large chevron shaped polypropylene mesh. Pelissier *et al*. suggested that all recurrences occur through the myopectineal orifice so a mesh covering only this area is effective as done in Rives procedure [15].

A recent clinical trial assessed the results of bilateral inguinal hernia repair in patient undergoing conventional Stoppa repair with a single mesh and without staple fixation and laparoscopic total extraperitoneal repair. This study concluded that laparoscopic approach causes less trauma but has longer operative time. The quality of life during early postoperative period was equal in both techniques [16]. In simultaneous bilateral inguinal hernia repairs, Lichtenstein and laparoscopic repairs are the commonly used. The Lichtenstein technique proved to have increased risk of mesh inguinodynia. The laparoscopic technique needs special equipment and training.

Sharma *et al*., carried out a study to determine clinical effectiveness and cost effectiveness of open preperitoneal mesh repair in comparison to Lichtenstein mesh repair in primary Bilateral inguinal hernia. They interpreted that inguinodynia in Lichtenstein repair is more as compared to open preperitoneal repair. They attributed it to dissection in the inguinal canal and mesh fixation. In open preperitoneal technique the mesh is placed in the preperitoneal plane and gets fixed in place by intra-abdominal pressure. Both have similar recurrence rates. They concluded that open preperitoneal repair is a safe, most efficient and cost-effective alternative to Lichtenstein mesh repair [17]. Askar *et al*., conducted a prospective randomized study for repair of bilateral inguinal hernia in 40 patients comparing Stoppa technique with simultaneous bilateral Lichtenstein repair. They concluded that Stoppa repair is a reliable technique for repair of bilateral inguinal hernia repair consuming less operative time, reduced postoperative pain, early return to routine activity, low recurrence rate and good patient satisfaction level [18]. These results are comparable to results of the present study.

Sajid *et al*., in a meta-analysis of published controlled trials compared laparoscopic versus open preperitoneal mesh repair in inguinal hernia. They evaluated 1286 patient of ten randomized trials and calculated that laparoscopic preperitoneal hernia repair takes longer operative time and has less postoperative pain as compared to open preperitoneal approach. Both open and laparoscopic preperitoneal hernia repairs were statistically was equivocal in terms of postoperative complications, recurrence and chronic inguinal pain [19]. Ates *et al*. suggested the use of Stoppa procedure whenever conversion is required in laparoscopic TEP hernia repair due technical difficulties. This procedure is advantageous especially in bilateral inguinal hernia repair as it mesh reinforcement is done in the same plane and avoids entering into the peritoneal cavity [20].

The open new simplified totally extra-peritoneal (ONSTEP) inguinal hernia repair" is a new technique using mesh in preperitoneal space by open surgery [21]. Andresen *et al*., in a recent review of open preperitoneal techniques of nine different techniques searched on data bases. In data base 67 studies describing nine different methods like Kugel, TREPP, TIPP, ONSTEP, Horton, Nyhus, Vgohavy, Read and Stoppa were found. They analyzed the results in reference to pain, recurrence and complications in one month follow up. They concluded that preperitoneal techniques with placement of mesh by open surgery seem to be promising as compared with standard anterior techniques [22, 23].

Maghsoudi *et al*., did a study on 234 patients with 420 inguinal hernias of which 186 were bilateral and 49 were unilateral. Out of these, recurrent hernia was present in 154 cases. Stoppa preperitoneal technique using a large polyester mesh was used for repair of these hernias. The mean operative time was 45 minutes and mean hospital stay was 2.2 days. There were occasional complications. On follow up recurrence rate was 0.71% which is very low per hernia

repaired [24].

Operating time is time gap between incision and last skin suture. In Wantz series, operating time of Stoppa was much shorter than laparoscopic repair and bilateral Lichtenstein repair done bilaterally. Operating time was not greatly increased even in cases of bilateral hernias and recurrent hernias. No major complications were found in the present study. No cases of major bleeding or bladder injury occurred. No conversion to other methods of repair was done. No cases of mesh infections were reported. There were 5 cases of scrota edema, and 5 cases of chronic groin pain were reported. No cases of ischaemic orchitis was reported. No recurrence was reported in both groups after one year of follow up. Recurrences reported in previous studies were occurred early in first year were due to mesh of lesser size, displacement of mesh, or wrong technique [25].

In the present study, all procedures were performed under spinal anesthesia to avoid any bias in terms of postoperative pain scoring. Present study results were comparable with those of Malazgirt *et al*. [26] in the operative time as the Stoppa technique took a shorter time than bilateral Lichtenstein repair. Gustavo *et al*. [27] study evaluated simultaneous bilateral inguinal hernia repair by Lichtenstein technique and found a mean operative time of 113 ± 19.33 min, which was significantly longer than the mean operative time of bilateral Lichtenstein repair in the current study (86.80 ± 8.65 min). Gustavo *et al*. [27] included recurrent and complicated hernias in their study; this may explain the prolonged operative time in their study. Fernandez-Lobato *et al*. [28] performed a large-scale study to evaluate Stoppa procedure in repair of bilateral inguinal hernia. Their trial included 210 patients who underwent surgical repair of bilateral inguinal hernia in nine years. They recorded that the operative time decreased significantly from 105 min in the first year to less than 61 min in 2001, with 73% of the cases operated in less than 60 min (P < 0.0001) and 62% in 2003. Stoppa *et al*. described a mean operative time of 51 min. This duration is also shorter than that required in the bilateral Lichtenstein technique. In the present study, the mean operative time for Stoppa repair was 78.0 ± 6.40 min, which is longer than what was reported by Stoppa.

In the present study, there was no significant difference between both groups in postoperative hospital stay, which was in agreement with the study by Malazgirt *et al*. [26]. Sasso *et al*. [27] reported a mean postoperative hospital stay of 1.55 ± 0.83 days for bilateral Lichtenstein repair (most of their patients were admitted for 1 day).

Malazgirt *et al*. [26] reported that there was no significant difference between Stoppa repair and bilateral Lichtenstein repair in the incidence of postoperative complications. A meta-analysis was carried out by Li *et al*. [29]. This meta-analysis pooled the effects of outcomes of a total of 2860 patients enrolled into 10 randomized-controlled trials and two comparative studies for comparison between preperitoneal and Lichtenstein repair for bilateral inguinal hernia and recorded that there was no significant difference between both groups in postoperative complications.

Results of the present study were comparable with those of Malazgirt *et al*. [26] and Fernandez *et al*. [28] as we did not find any significant difference between both groups in postoperative complications. In the present study, there was no significant difference between both groups in return to normal daily activities; the mean was 15.00 ± 2.80 and 18.00 ± 4.60 days for group A and group B, respectively. Our results were close to those of Malazgirt *et al*. [26], who reported that the time required for return to normal daily activities was 18, and 17 days, following Stoppa, and Lichtenstein respectively.

Malazgirt *et al*. [26] reported one recurrent case after Stoppa (1/22 patient) and no recurrence after bilateral Lichtenstein repair. Gustavo *et al*. [27] reported one recurrent case out of 59 patients operated by bilateral Lichtenstein repair after 2 years of follow-up. Kark *et al*. [30] observed less than 1% recurrence after Lichtenstein repair in 199 patients. Amid *et al*. [31] reported 0.1% recurrence in 1000 individuals and Hidalgo *et al*. [32] found no hernia recurrences in a total of 55 patients after Lichtenstein repair. The result of our study on recurrence following Lichtenstein was in agreement with other studies [26, 27, 30-32] as we did not find any recurrence after 1 year of follow-up. Fernandez-Lobato *et al*. [28] reported 3 cases of recurrence of 210 repairs following Stoppa for bilateral inguinal hernias. Two recurrences occurred in the first 30 cases and one recurrence in the remaining 140 cases. The total recurrence rate was 3/210 patients (1.4%) and 3/420 hernias (0.7%) (P<0.001). They explained recurrence because of the use of a small mesh, it did not cover the inguinal region correctly. After a mean follow-up of 24 months, Carmen *et al*. [33] reported a recurrence rate of 1% (1 of 124) per inguinal hernia repaired or 2% (1 of 64) per patient following Stoppa repair. In the present study, there was no recurrence following Stoppa repair after 1 year of follow-up. Our results of recurrence following Stoppa repair were similar to those of other studies [28, 33].

Conclusion

Simultaneous repair of bilateral Inguinal hernia is safe and effective, as it is associated with a better patient satisfaction, lower cost and the patient is subjected to only one hospital admission, anesthesia and needs only one period of recovery without an increase in morbidity or the recurrence rate. Stoppa's method of hernia repair is a good alternative to bilateral Lichtenstein's repair for the treatment of bilateral inguinal hernia with comparative operative and postoperative complications. Stoppa's repair can also be completed in a relatively shorter duration and hence could be the method of choice, especially in high risk patients with bilateral Inguinal hernia. Also, Stoppa's repair should be routinely incorporated in any healthcare system dealing with hernia patients and in the professional leaning curriculum of junior surgeons.

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