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Mesh Displacement After Bilateral Inguinal Hernia Repair With No Fixation

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ABSTRACT

Background and Objectives: About 20% of patients with inguinal hernia present bilateral hernias in the diagnosis. In these cases, laparoscopic procedure is considered gold standard approach. Mesh fixation is considered important step toward avoiding recurrence. However, because of cost and risk of pain, real need for mesh fixation has been debated. For bilateral inguinal hernias, there are few specific data about non fixation and mesh displacement. We assessed mesh movement in patients who had undergone laparoscopic bilateral inguinal hernia repair without mesh fixation and compared the results with those obtained in patients with unilateral hernia.

Methods: From January 2012 through May 2014, 20 consecutive patients with bilateral inguinal hernia underwent TEP repair with no mesh fixation. Results were compared with 50 consecutive patients with unilateral inguinal hernia surgically repaired with similar technique. Mesh was marked with 3 clips. Mesh movements were measured by comparing initial radiography performed at the end of surgery, with a second radiographic scan performed 30 days later.

Results: Mean movements of all 3 clips in bilateral nonfixation (NF) group were 0.15–0.4 cm compared with 0.1–0.3 cm in unilateral NF group. Overall displacement of bilateral and unilateral NF groups did not show significant difference. Mean overall displacement was 1.9 cm versus 1.8 cm in the bilateral and unilateral NF groups, respectively ($P = .78$).

Conclusions: TEP with no mesh fixation is safe in bilateral inguinal repairs. Early mesh displacement is minimal. This technique can be safely used in most patients with inguinal hernia.

Key Words: Bilateral inguinal hernia, Inguinal hernia, Laparoscopy, Mesh fixation, Total extraperitoneal

INTRODUCTION

Inguinal hernia repair is one of the most frequent elective operations performed in general surgical practice.[1] Approximately 20% to 30% of patients with inguinal hernia present bilateral hernias at diagnosis.[2,3] Although the indications of laparoscopic treatment of inguinal hernia remain controversial, most surgeons agree that patients with bilateral or recurrent inguinal hernia are those who benefit most from the laparoscopic approach, which is considered the gold standard for treating such cases.[4–6]

Recently, the need for and best way of fixing the mesh have been questioned. Mesh fixation with staples or tacks is traditionally used and may reduce the risk of mesh displacement, and consequently, decrease hernia recurrence.[7,8] However, fixation is associated with higher costs and may increase the rate of acute and especially chronic pain.[9,10]

Several authors, in clinical trials, have shown no increased risk of recurrence in patients who underwent laparoscopic inguinal hernia repair (LIHR) with no mesh fixation.[11–13] This finding is similar to our radiological study for unilateral hernias that showed minimal mesh displacement after total extraperitoneal (TEP) repair with no fixation, comparable to TEP with mesh fixation.[14] However, there are few specific data in the literature regarding the necessity of mesh fixation in patients with bilateral inguinal hernia.[15] In these cases, the wider dissection of

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preperitoneal space could lead to a higher risk of mesh displacement.

To answer this question, we designed a prospective and radiological clinical trial to assess mesh displacement in bilateral inguinal hernia repairs—TEP—with no mesh fixation. We also compared the results with those of non-fixed unilateral repairs.

METHODS

From January 2012 through May 2014, 20 consecutive patients with bilateral inguinal hernia underwent TEP repair without mesh fixation. Results were compared with 50 consecutive patients with unilateral hernia who underwent totally extraperitoneal repairs without mesh fixation, during the same period. The results of these 50 patients have been published previously.[14]

The Medical Ethics Committee of Positivo University, Curitiba, Brazil, approved the study protocol. All patients signed the informed consent.

Patients with contraindications for general anesthesia, prior pelvic surgery, coagulopathy, inguinoscrotal hernias, or incarcerated or large hernias (lateral or medial defects larger than 3 cm— L3 or M3 according to the European Hernia Society classification) were excluded from the study.

Surgical Technique

After preinsufflation of the preperitoneal space with CO_2 with a Verres needle placed in the suprapubic position, an infraumbilical incision was made to insert an 11-mm port for a 30° scope. Blunt dissection of the preperitoneal space was performed, including the right and left inguinal region, with 2 auxiliary 5-mm ports/graspers. The hernia was completely dissected and the cord structures exposed.

In the bilateral group, 2 meshes (Parietene; Medtronic, Minneapolis Minnesota, USA) were positioned crossing each other at the midline. Because of a possible difficulty in defining the clips, especially medially where the meshes intersect each other, we chose to mark only 1 of the meshes (the right side) with clips. The mesh was marked with 3-mm clips at its lateral inferior, medial inferior, and medial superior corners, the same marking technique that was used in the unilateral NF group (**Figure 1**). A mesh overlap of at least 3 to 4 cm was observed in relation to potential weakness areas. Mesh fixation was not employed in any patient. Under direct visualization, while graspers held the mesh in position, the CO_2 was removed, and the preperitoneal space was deflated.

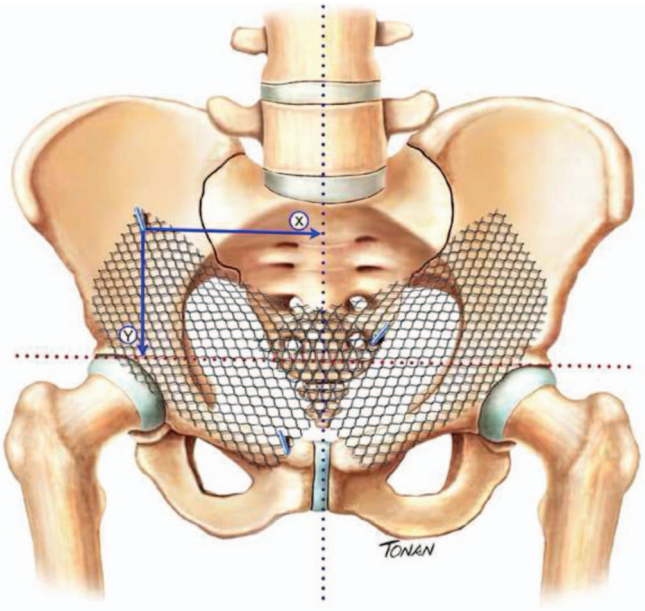

Figure 1. Mesh positioning and clips placed in one of the meshes. The indicators *x* and *y* represent the distances of the clips relative to the vertical and horizontal axes, respectively. Medical illustration by Rodrigo Tonan.

Radiological Evaluation

Distances of each clip in relation to 2 lines representing the vertical and horizontal axes (*x* and *y*) were measured (**Figure 2**). Differences in the distances between the first (performed at the end of procedure) and second (obtained 30 days later) x-rays represent the displacements of the clips: d*x* and d*y*. The same radiologist reviewed the x-rays.

Detailed surgical and radiological techniques performed have been described.[14]

Statistical Analysis

Mann-Whitney and Student *t* tests, Pearson's Chi square test, and Fisher's exact test, were used when appropriated. $P < .05$ was considered significant.

RESULTS

Twenty patients presenting with bilateral inguinal hernias, and 50 patients with unilateral inguinal hernia underwent TEP repairs without mesh fixation. The mean ages of the bilateral and unilateral NF groups were 47.3 ± 10.8 and

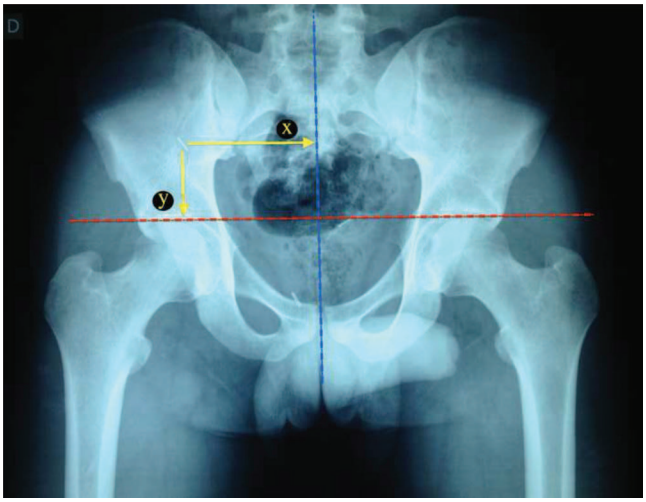

Figure 2. Pelvic radiograph showing the clips and performed measures, *x* and *y* in relation to the vertical and horizontal axes, respectively.

Table 1.
Demographics and Operative Details

	Bilateral NF Group (n = 20)	Unilateral NF Group (n = 50)	*P*
Sex (M/F)	20/0	44/6	.14*
Age (years)	47.3 ± 10.8	51.1 ± 15.7	.60**
X-ray interval (days)	34.1 ± 9.6	38.3 ± 12.3	.36**
Previous hernia repair	1/20	3/50	.86*
Nihus classification, n			
II	3	14	.79***
IIIa	7	13	
IIIb	10	22	
IIIc	0	1	
Operative time (minutes)	48.7 ± 10.2	38.7 ± 8.8	**<.001****
Postoperative complication	3/20	3/50	.35*

$P < .05$, by *Fisher's exact test, **Student's *t* test, and ***Pearson's χ^2 test. Bold denotes statistically significant difference.

51.1 ± 15.7 years, respectively. All patients in the bilateral NF group were men; in the unilateral NF group, 6 patients (12%) were women. The results and surgery-related parameters are given in **Table 1**.

Mean operative time for the bilateral NF group was 48.7 ± 10.2 minutes and for the unilateral NF group, 38.7 ± 8.8 minutes ($P < .001$). There was no intraoperative complication and no conversion. The mean length of hospital stay was ≤24 h in all patients.

Table 2.
Mesh Displacement After LIHR

Clip/Axis	Bilateral NF Group (n = 20)	Unilateral NF Group (n = 50)	*P**
Clip 1: d*x*	0.15 (0–0.50)	0.10 (0–0.70)	.84
Clip 1: d*y*	0.20 (0–0.60)	0.20 (0–0.60)	.99
Clip 2: d*x*	0.30 (0–0.70)	0.30 (0–1.0)	.59
Clip 2: d*y*	0.40 (0–1.0)	0.30 (0–1.20)	.19
Clip 3: d*x*	0.30 (0–1.20)	0.30 (0–1.0)	.53
Clip 3: d*y*	0.40 (0–1.30)	0.30 (0–1.30)	.41

*$P < .05$, by Mann-Whitney test. All are nonsignificant.

The postoperative surgical complication rate was similar in both groups. Only 3 patients in each group presented seroma/hematoma on postoperative day 7 (15% vs. 6%; $P = .35$). Seroma was reabsorbed spontaneously in all cases during the first month. There were no major postoperative complications. The mean interval between the 2 x-rays was 34.1 ± 9.6 and 38.3 ± 12.3 days for the bilateral and unilateral groups, respectively. Patients were observed for at least 3 months, and none of them had a recurrence.

Mesh Displacement

Minimal changes in the position of the clips were observed when comparing the first and second x-ray. Mean displacement of all 3 clips in the bilateral NF group was 0.15 to 0.4 (range, 0–1.3) cm, whereas in the unilateral NF group was 0.1–0.3 (range, 0–1.3) cm. No significant difference of any individual clip movement was observed, on vertical (d*y*) or horizontal (d*x*) directions between the bilateral and unilateral group (**Table 2**). As well, no differences were observed between the groups when d*x* + d*y* of each clip was analyzed (**Table 3**). The overall clip displacement (d*x* + d*y*: clips 1 + 2 + 3) in the bilateral NF and unilateral NF groups did not show a significant difference (**Figure 3**). Mean overall displacement was 1.9 (range, 0.9–3.7) cm versus 1.8 (range, 0.7–3.3) cm in bilateral and unilateral NF groups, respectively ($P = .78$; Mann-Whitney test).

Table 3.
Mesh Displacement After LIHR: dx + dy*

Clip/Axis	Bilateral NF Group (n = 20)	Unilateral NF Group (n = 50)	*P***
Clip 1	0.50 (0–1.10)	0.40 (0–1.0)	.91
Clip 2	0.60 (0–1.40)	0.60 (0.10–1.80)	.91
Clip 3	0.85 (0.10–2.20)	0.60 (0–1.80)	.15

*dx + dy = horizontal + vertical displacement (in centimeters).
**$P < .05$, by Man-Whitney test. All are nonsignificant.

DISCUSSION

Approximately 10% to 25% of all inguinal hernias are bilateral.[2,3] However, etiological mechanisms and the reasons for the development of bilateral rather than unilateral hernia remain unknown. In terms of evidence-based practice, specific data on bilateral inguinal hernias are sparse, and therefore many of the principles used to manage bilateral hernias rely on information obtained from the treatment of unilateral inguinal hernias.[16]

The best approach to fixing an inguinal hernia—open/anterior, open/posterior, plug, or laparoscopic/posterior—is still controversial. However, for bilateral inguinal hernia, there is a consensus in the guidelines of the main international surgical societies in recommending the laparoscopic approach as the best option, transabdominal preperitoneal (TAPP), or TEP.[5,6] Benefits are minor postoperative pain and complications, especially wound related, a lower risk of chronic pain, and improved recovery, as compared to open techniques.[17,18] Quality of life is often better after a laparoscopic approach and is usually the technique of choice from the patients' perspective.[19]

Postoperative outcomes after laparoscopic repair of bilateral hernias are similar to those in unilateral hernia repairs. In a large Swiss registry, the intra- and postoperative complication rate was 1.9% and 2.3% after unilateral TEP repairs versus 3.1% and 3.2% after bilateral TEP repairs ($P = .002$; $P = .026$, respectively).[20] However, the authors concluded that the absolute difference was small and of minor clinical relevance. In another multicenter TEP registry—Herniamed—no significant difference was found in the overall rate of intra- or postoperative complications.[21] In a large prospective TAPP trial, Wauschkuhn et al[4] also reported no significant differences in recurrence or complications.

Although there is no evidence in the literature comparing the 2 techniques, TAPP vs. TEP, specifically for cases of bilateral hernias, we agree with Feliu et al,[22] who believe that in such cases, TEP is superior. In TEP, both sides are operated on from the same access point and the medial dissection, either with balloon or not, greatly facilitate contralateral dissection. Meanwhile, in TAPP, the con-

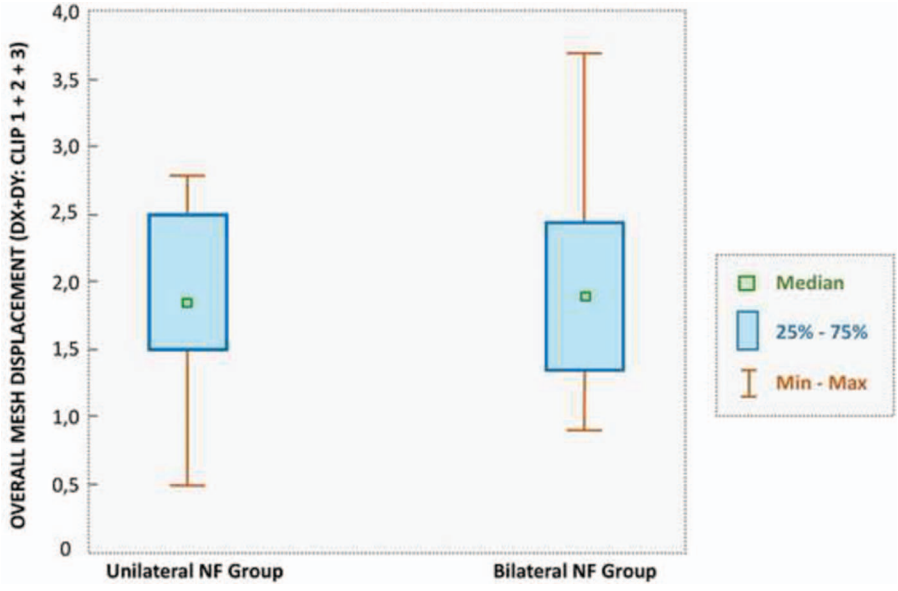

Figure 3. Overall mesh displacement (mean displacement, 1.9 cm vs 1.8 cm in the bilateral NF group and unilateral NF group, respectively. $P = 0.78$, unilateral group vs. bilateral group, by the Mann-Whitney test.

tralateral repair requires opening the peritoneum again, fixing the hernia defect, and then close the peritoneal incision on both sides.

Whether the mesh should be fixed or not in laparoscopic repairs is a controversial topic yet. Surgeons are concerned about the potential risk of mesh migration or folding that might lead to recurrence. On the other hand, the use of staples or tacks to fix the mesh has been implicated as a possible cause of chronic pain and increased costs.[9,10]

Two meta-analyses of randomized controlled trials reported that LIHR without mesh fixation does not seem to increase the risk of hernia recurrence when compared with mesh fixation.[23,24] Most available studies comparing mesh fixation versus no fixation are related to TEP repair. In this technique, whenever the extrapneumoperitoneum is deflated, the peritoneum tends to return completely to its original position, fixing the mesh against the pelvic wall as a "sandwich." Zhang et al[25] recently described the same principle in TAPP repairs. With a 3-mm laparoscopic suction apparatus, placed in the preperitoneal space through a small hole, all residual CO_2 in this space and in the abdominal cavity was aspirated. The negative pressure in the preperitoneal space forced the peritoneum to adhere to the mesh and fascia transversalis instantly, as occurs in TEP. According to the International Endohernia Society guidelines, recurrence rates are equally low after fixed and nonfixed mesh repairs and nonfixation of the mesh should be considered, especially if the TEP technique is used.[6]

We reported, in a clinical prospective trial a minimal mesh displacement after TEP with no mesh fixation.[14] Radiological evaluation showed no significant difference in mesh displacement in comparing the 2 groups of unilateral inguinal hernia—mesh fixation versus no mesh fixation—up to 30 days after the operation. Choy et al,[26] in another clinical trial, analyzed the causes of mesh displacement during TEP procedures. The mesh did not move, regardless of fixation or not, in any patient during the intraoperative evaluation.

However, as in our previous study, in which only patients with unilateral hernia were included, there are few data on the risk of recurrence in patients with bilateral inguinal hernia with no mesh fixation. Zhang et al[25] described no difference in recurrence for bilateral repairs when vacuum suction fixation versus staple fixation was compared. Dehal et al[15] in a retrospective review of 343 patients who underwent bilateral TEP repair with no mesh fixation, reported a 2.9% recurrence rate (in 5.2% of patients), slightly higher than the rate in the overall literature.[15]

Two factors may increase the risk of recurrence in patients who underwent nonfixed laparoscopic repair in bilateral hernias. First, the extensive dissection of preperitoneal space could facilitate movements of the mesh. Second, in TEP repairs, we recommend deflation of the preperitoneal CO_2 under direct visualization. Laparoscopic forceps should keep the mesh in place, medially at the pubis and laterally along the iliopsoas muscle, until the space collapses and the peritoneum "fixes" the mesh against the pelvic floor. However, as only 2 working trocars were used, this maneuver may not be carried out with the same effectiveness as in unilateral hernias, since at least 3 points would be required, 2 laterals—right and left iliopsoas muscle–and another medial, where the meshes overlapped.

In our trial, radiological evaluation up to 30 days after surgery showed minimal movement of the mesh after TEP repairs in bilateral inguinal hernias with no mesh fixation. There was no significant difference in mesh displacement in bilateral group compared to the unilateral group. Moreover, minimal changes in mesh position should not affect the recurrence rate, because the mesh overlaps at least 3–4 cm at all potential hernia sites.

We agree with several investigators who believe that most recurrences occur during the learning curve as a result of inadequate dissection, missed lipomas and hernias, or placement of an inadequately large mesh.[27,28] Mesh fixation appears to play an important role in preventing recurrence especially in patients with large defects.[6,7,18] In this situation, particularly in direct hernias, in which higher recurrence rates are described, it seems essential to ensure a stronger adhesion of the mesh and abdominal wall by fixing the mesh.

A possible limitation of the study is the short follow-up/re-evaluation time of about 30 days, insufficient to evaluate recurrence. However, the risk of mesh migration in patients with nonfixation tends to occur early after surgery. In the long-term, mesh migration is uncommon because of mesh incorporation by surrounding tissues. During this period, mesh contraction may occur, which could interfere with our migration distance measurements.

The introduction of tension-free concept and laparoscopic techniques has intensified the discussion about new endpoints in inguinal hernia surgery. Currently, hernia surgeons focus on feasibility, costs, safety, recovery, and

postoperative pain, rather than on recurrence rate.[16] In the scenario, no mesh fixation appears to have important advantages over fixation methods. The challenge may be greater for bilateral inguinal hernias. The amount of staples/tacks or even glue tend to be higher, and therefore a higher risk of chronic pain or increase in costs is expected.[29,30]

TEP with no mesh fixation is safe even in bilateral inguinal hernia repairs. Early mesh displacement is minimal and not different from displacements in unilateral repairs. This technique can be considered for most patients with inguinal hernia.

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