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## Fibrin Glue versus Staple for Mesh Fixation in Laparoscopic Transabdominal Preperitoneal Repair of Inguinal Hernia

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### ABSTRACT

**Background:** Inguinal hernias are the most frequent type of hernia, accounting for 90% of all hernias. Furthermore, inguinal hernia surgery is the most common operation in general surgery.

**Aim of the work:** To evaluate the results of mesh fixation by fibrin glue versus staple in laparoscopic TAPP repair of inguinal hernia.

**Patients and methods:** This was a prospective randomized study included 40 adult patients of different age group presented with unilateral inguinal hernia who admitted and undergoing laparoscopic transabdominal preperitoneal inguinal hernia repair with mesh fixation divided into 2 equal groups group I involved 20 patients who underwent mesh fixation by fibrin glue, while group II involved 20 patients who underwent mesh fixation by staples. All patients were followed up at 1 month and 3-month intervals as outpatients, in order that early and late complications such as seroma, hematoma, infection, testicle edema, orchitis, hydrocele of the sac remnant and hernia recurrence could be assessed.

**Results:** This research included forty individuals ranging in age from 18 to 55 years. Operative time was comparable between both groups. Considering intraoperative complication, there was one case in group II had intraoperative surgical emphysema and oozing of blood during dissection. There was no significant difference between both groups as regard to operative time and intraoperative complication. Regarding postoperative pain in group, I and II, there 2 (10%) and 9 (45%) patients presented with mild pain, respectively while 2 (10%) patients presented with severe pain in group II only with high significant difference between both groups ( $p=0.00$ ). However, there was no significant difference between the two groups as regard to hospital stay, postoperative wound infection and recurrence.

**Conclusion:** Mesh fixation using fibrin glue is preferable to staples because it generates less post surgery pain and requires less analgesia.

**Keywords:** Fibrin Glue; Mesh Fixation; Laparoscopic Transabdominal; Preperitoneal Repair; Inguinal Hernia.

### INTRODUCTION

Inguinal hernias are accounting for 90% of all types of hernia. Furthermore, inguinal hernia surgery is the most common operation in general surgery <sup>1</sup>.

The conventional technique for inguinal hernia surgery, first documented by Bassini in 1889, is to suturing the inguinal canal. Because of the elevated recurrence rate with this approach, new methods for tension-free implantation of synthetic meshes were developed surgery <sup>1</sup>.

Endoscopic/laparoscopic procedures, in which the hernia canal is normally accessed from posterior, have also been developed <sup>2</sup>.

The two most frequently approved posterior procedures involving preperitoneal mesh implantation are the transabdominal preperitoneal patch plastic (TAPP) restoration and the total extraperitoneal (TEP) restoration <sup>3</sup>.

Despite laparoscopic repair is a less invasive and less painful method of repairing hernias, risks such as

hematoma, seroma, neuralgia, recurrence, mesh infection and hydrocele may be done <sup>4</sup>.

The technique of mesh fixation, mesh properties, nerve irritation or damage, and nerve trapping by fixation stitches or staples have all been investigated as possible reasons <sup>5</sup>.

Typically, the mesh is secured to the pubic tubercles and Cooper's ligaments with multiple titanium staples, that increases the mesh's resilience and, as a result, lowers the risk of recurrence of inguinal hernia <sup>6</sup>.

Fibrin glue is an adhesive substance that is often applied in laparoscopic inguinal hernia surgery due to its adhesion characteristics and wound healing effects <sup>7</sup>.

Our rational was to evaluate the results of mesh fixation by fibrin glue versus staple in laparoscopic TAPP repair of inguinal hernia.

## PATIENTS AND METHODS

This was a prospective randomized research conducted at General Surgery Department, Faculty of Medicine, Al-Azhar University, during the period from March 2019 to May 2021. This study included forty adult patients of different age group presented with unilateral inguinal hernia who admitted and undergoing laparoscopic TAPP inguinal hernia repair with mesh fixation divided into 2 equal groups group I involved twenty cases who underwent mesh fixation by fibrin glue, while group II involved twenty cases who underwent mesh fixation by staples.

### Ethical approval:

The study was approved by the Ethics Board of Al-Azhar University. Each individual in the research provided informed written permission.

### Inclusion criteria:

Age ranged from 18 to 60 years.

Unilateral direct or indirect Inguinal hernia.

The defect diameter ranged 2-5 cm.

### Exclusion criteria:

Bilateral hernia.

Femoral hernia.

Huge inguinoscrotal hernia (sac size >5 cm).

Complicated inguinal hernias.

### Methods:

Medical history, clinical assessment, and standard preoperative investigations done for all participants.

Operations were performed under the same surgical principles by the same relevant teams, and the techniques have been previously described<sup>8</sup>.

Postoperative analgesia was given I.M. \12hours for one day followed by oral tablets on demand later on. Antibiotic like third generation cephalosporins injection in the first 24 hours was given followed by oral antibiotics for 2 days. Patients were discharged on the 2<sup>nd</sup> day post laparoscopic TAPP hernioplasty.

All patients were followed up at 1 month and 3-month intervals as outpatients, in order that early and late complications such as seroma, hematoma, infection, testicle edema, orchitis, hydrocele of the sac remnant and hernia recurrence could be assessed.

### Statistical Analysis:

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 20. The qualitative data were presented as number and percentages while quantitative data were presented as mean, standard deviations and ranges when their distribution found parametric. The following tests were used: Mann-Whitney test, Fisher exact test and Chi-square test. The p-value was considered significant if < 0.05.

## RESULTS

Group	Group I N=20		Group II N=20		U / FET	P value
	Mean / N	SD / %	Mean / N	SD / %		
Parameters						
Age (years)	27.4	8.8	35.4	11.6	2.4	0.217
Gender:					4.4	0.106
- Yes	20	100	16	80		
- No	0	0	4	20		

U: Mann-Whitney test, FET: Fisher exact test

**Table 1:** Demographic data of studied groups

This research included forty individuals ranging in age from 18 to 55 years. In terms of age and sex, there was no significance among groups (Table 1).

Group	Group I N=20		Group II N=20		Fisher exact test	P value
	N	%	N	%		
Type of hernia						
Direct	4	20	4	20	0.30	1.00
Indirect	16	80	16	80		

**Table 2:** Comparison between both groups regarding type of hernia.

Regarding to type of hernia, there were 4 (20%) patients presented with direct hernia and 16 (80%) patients presented with indirect hernia in both groups (Table 2).

Group	Group I N=20		Group II N=20		U / $\chi^2$	P value
	Mean / N	SD / %	Mean / N	SD / %		
Parameters						
Operative time (minutes)	46.8	5.3	47.0	4.4	0.45	0.68
Intra operative complication:					1.03	0.31
- Yes	0	0	1	5		
- No	20	100	19	95		

U: Mann-Whitney test,  $\chi^2$ : Chi-square test

**Table 3:** Comparison between both groups regarding operative data.

Operative time was comparable between both groups. Considering intraoperative complication, there was one case in group II had intraoperative surgical emphysema and oozing of blood during dissection. There was no significance among groups considering to operative time and intraoperative complication (Table 3).

Group	Group I N=20		Group II N=20		$\chi^2$	P value
	N	%	N	%		
<b>Parameters</b>						
<b>Post-operative pain:</b>					9.45	0.00**
– Severe	0	0	2	10		
– Mild	2	10	9	45		
– No	18	90	9	45		
<b>Hospital stays (day):</b>					3.24	0.07
– One	20	100	17	85		
– > one	0	0	3	15		
<b>Wound infection:</b>					1.03	0.31
– Yes	0	0	1	5		
– No	20	100	19	95		
<b>Recurrence:</b>					1.03	0.31
– Yes	0	0	1	5		
– No	20	100	19	95		

$\chi^2$ : Chi-square test

**Table 4:** Comparison between both groups regarding postoperative data

Regarding postoperative pain in group, I and II, there 2 (10%) and 9 (45%) patients presented with mild pain, respectively while 2 (10%) patients presented with severe pain in group II only with high significant difference between both groups ( $p=0.00$ ). However, there was no significant considering to hospital stay, postoperative wound infection and recurrence (Table 4).

## DISCUSSION

Laparoscopic TAPP has many advantages as the ability to treat bilateral hernia, easy access in recurrent hernia due to previous dissection of tissues was done, less postoperative pain and discomfort, short recovery time, ligation of the sac at highest point, and improved cosmeses. One of the controversies in TAPP is how to fix the mesh. Mesh can be fixed either by fibrin glue, tucker clips, or leaving the mesh without fixation<sup>9</sup>.

Some studies show that patients who had TAPP surgery with fibrin glue rather of staple fixation had superior short-term pain outcomes. Applying a tack in anatomy in the "no go" areas is extremely risky; this is illustrated by the triangles of doom and pain<sup>10</sup>. The use of fibrin glue was intended to avoid these problems.

In terms of age and sex, there was no significance among groups. Also, we found that the mean operating time was  $46.8 \pm 5.3$  in group I and for group 2 was  $47 \pm 4.4$  without significant difference. This is in agreement with Lau, (2018)<sup>9</sup> who mentioned that the mean operative duration for laparoscopic TAPP inguinal hernioplasty was about 45 min.

Regarding the type of hernia presented in this study, we found that about 20% of patients had direct hernia and 80% patients had indirect hernia without significant difference.

Considering intraoperative complication, there was one case in group II had intraoperative surgical emphysema and oozing of blood during dissection without significant difference. This agrees with McComark<sup>12</sup> who reported that, intraoperative

complications such as surgical emphysema was insignificant as expected after gas insufflation and resolved spontaneously in the two groups.

For the post-operative hospital stay, there was no significance among groups. However, in group II three cases stayed more than one day as they were complaining of pain and scrotal edema. This agree with the findings of Cheah<sup>13</sup> who revealed that postoperative hospital stay in group I whose mesh was fixed by using fibrin glue was 1 day, but in group II whose mesh was fixed by staples, two cases have stayed for more than 1 day.

In the current work, there was no significance among groups considering postoperative wound infection and recurrence. There was only one patient showed a recurrence in group II. This recurrence may be due to mesh migration or may be due to not fixing the mesh; this agrees with the result of Andersson<sup>11</sup> who reported that there was no recurrent case in group I (0%) in which the mesh was fixed by fibrin glue and one case recurrent in group II (10%) in which the mesh was fixed by staples.

Meta-analyses have also indicated that non-fixation of the mesh had no effect on recurrence incidence. Furthermore, the non-fixation approach eliminates the danger of vascular and nerve damage that is linked with tacker fixation. Within 2 weeks of surgery, mesenchymal cells proliferate in the mesh, and within 2 months, the tissue begins to integrate into the mesh and an acceptable quantity of collagen forms. This gradually enhances the mesh's persistent stability in the preperitoneal region<sup>14</sup>.

Various mesh fixation techniques have been documented and used, including surgical adhesives (Fibrin glue), self-fixating mesh, and mechanical

fixation (Tackers or sutures). Fixation is mostly used to avoid mobility and theoretical recurrences. Furthermore, the usage of fibrin sealant may result in fibrin glue responses, however several researches have demonstrated its usefulness as a safe product<sup>15</sup>.

Surgical fixation is rarely used since it is time-consuming and has not demonstrated any advantages over non-fixation or tacker fixation. Tackers are the most often used way of mesh attachment. They might be absorbable as well as non-absorbable. Because of the increased risk of nerve damage, the big issues are post-surgical acute and chronic pain<sup>16</sup>.

Fixation placed in the conjoint tendon or pubic tubercle might cause postsurgical discomfort and inhibit early mobility. After laparoscopic inguinal hernia repairs, around 2-16% of patients may have prolonged pain<sup>17</sup>.

A major finding in the current work was that mesh non-fixation did not result in higher recurrence. This is consistent with the findings of randomised trials and meta-analyses on mesh non-fixation<sup>18</sup>. Furthermore, the advantages of the non-fixation procedure in terms of minimising potential nerve injury and lowering surgical costs has been recognised.

According to post-surgical pain occurrence in this study, we found that two cases in group II presented with severe pain postoperative while no cases presented with severe pain in group I. On the other hands nine cases in group II had mild pain in comparison with two cases in group one with high significant difference ( $p=0.00$ ), which agrees with the study of Andersson<sup>11</sup> who reported that postoperative pain is less in fibrin glue fixation than with staples. While in disagreement with us, there is a study recorded an elevated incidence of chronic pain<sup>19</sup>.

### CONCLUSION

Laparoscopic TAPP repair for inguinal hernias is indicated for inguinal hernias because it is a safe operational method that allows for early recovery and return to regular activities. Mesh fixation using fibrin glue is preferable to staples because it generates less post surgery pain and requires less analgesia.

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