

Early Surgical Outcomes of Non Complicated Laparoscopic Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair Using Suture Technique

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Abstract

Background: Groin hernia repair is considered to be one of the most commonly performed operations by general surgeons but; there is no "gold standard" operation for treatment of inguinal hernias. The optimal surgical approach must be selected individually for the patient, considering age, hernia size, unilaterality or bilaterality, primary or recurrent, and type of anesthesia, occupation, and leisure activities.

Aim of Study: In this study we will determine the early surgical outcomes and morbidity after laparoscopic Transabdominal preperitoneal inguinal hernia repair with mesh fixation by suture technique and tacker technique.

Patients and Methods: The type of study is a randomized prospective study. It has been done in Nasser Institute for Medical Research and Treatment Hospital on 30 patients who will be operated from September 2018 to December 2021 with minimal follow-up to 6 months. An informed consent was taken from all patients who accepted to join our study.

Results: We found that both surgical approaches had almost the same Postoperative Hospital stay where the mean postoperative hospital stay was 1.5 days versus 1.6 days in Group A and Group B, respectively and all patients returned to normal activity with mean time (7 ± 2) versus (8 ± 2) days in Group A and Group B respectively. We found that no statistically difference as regard the recurrence between the use of mesh fixation by using sutures techniques versus fixation by absorbable tacks.

Conclusion: After this prospective study, both the use of mesh fixation by using sutures techniques and fixation of mesh by absorbable tacks approaches are similarly effective in terms of operative time, the incidence of recurrence, complications and chronic pain coinciding with all the available literature.

Key Words: *Early surgical outcomes – Non Complicated laparoscopic Transabdominal Preperitoneal (TAPP) – Inguinal Hernia repair Using Suture technique.*

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Introduction

GROIN hernia repair is considered to be one of the most commonly performed operations by general surgeons however; there is no "gold standard" operation for treatment of inguinal hernias. The optimal surgical approach must be selected individually for the patient, taking into account patient age, hernia size, unilaterality or bilaterality, primary or recurrent status, and type of anesthesia, occupation, and leisure activities.

An inguinal hernia is a protrusion of a sac of peritoneum often containing intestine or other abdominal contents through a weakness in the abdominal wall in the groin. It usually presents as a lump, with or without some discomfort that may limit daily activities and the ability to work. Around 98% of inguinal hernias are found in men because of the vulnerability of the male anatomy to the formation of hernias in this area of the body.

Inguinal hernias can occasionally be life-threatening if the bowel within the peritoneal strangulates or becomes obstructed, or both. Inguinal hernia repair is one of the most commonly performed general surgical operations [1].

An inguinal hernia is repaired by placing or suturing a prosthetic mesh in one of the layers of the abdominal wall to cover the weakness; this can be performed either by open surgery or by a minimal access key-hole (laparoscopic) approach [2].

Laparoscopic repair, which involves performing surgery through small incisions, is associated with less postoperative pain and a more speedy return to normal activities of daily life [3].

Such repairs can be performed via total extra peritoneal (TEP) or transabdominal preperitoneal (TAPP) methods. In TAPP the surgeon enters the peritoneal cavity and places a mesh through a peritoneal incision. TEP is different in that the peritoneal cavity is not entered, but the mesh is positioned at the same place; behind the muscles of the abdominal wall and in front of the peritoneum. Although most laparoscopic inguinal hernia repairs are now performed as day-case procedures and have a very satisfactory outcome, morbidity in the form of chronic groin pain and hernia recurrence continues to be a significant problem.

The overall incidence of moderate-to-severe postoperative chronic pain is (10% to 12%), and may significantly affect a person's quality of life [4].

The incidence of recurrence after laparoscopic hernia repair has been reported to be 2.5% [5].

During the repair of an inguinal hernia, sutures or tacks are generally used to secure the prosthetic mesh in place. In TAPP repairs the peritoneum is closed using sutures or tacks. These mesh fixation or peritoneal closure techniques may contribute to postoperative chronic pain presumably due to nerve irritation or entrapment [6].

Intraoperative strategies to reduce pain include the non-fixation of mesh or the use of non-mechanical methods of mesh fixation other than tacking or suturing, which may be less traumatic to the local tissue and less likely to cause local nerve entrapment. These non-mechanical methods include glue. Similarly, closing the peritoneum with sutures may be less traumatic than the use of tacks, thus resulting in less postoperative pain [7].

In TAPP repair, titanium tacks also have traditionally been used to fix the mesh and can also be used to close the peritoneal flap. However, a 2011 report showed that acute pain was increased when more than 10 tacks were placed. A number of surgeons have now switched to using absorbable tacks to fix the mesh and close the peritoneum. Sutures or hernia stapling devices can also be employed [8].

Some authors have advocated the use of fibrin glue to fixate the mesh [9].

Aim of the work:

In this study we will determine the early surgical outcomes and morbidity after laparoscopic-Transabdominal preperitoneal inguinal hernia repair

with mesh fixation by suture technique and tack technique.

Patients and Methods

1- Patients:

Type of study is a randomized prospective study. It has been done in Nasser institute for medical research and treatment Hospital on 30 patients who will be operated from September 2018 to December 2021 with minimal follow-up to 6 months. An informed consent was taken from all patients who accepted to join our study.

Inclusion criteria:

- Adults (aged 18 years old and over) undergoing laparoscopic inguinal hernia repair with mesh placement for a primary inguinal hernia.
- Patients with recurrent inguinal hernia after open approach.
- Patients with bilateral inguinal hernia.

Exclusion criteria:

- Recurrent inguinal hernia after previous laparoscopic repair either TEP or TAPP.
- Absolute contraindication for Laparoscopic TAPP like cardiovascular disease, pulmonary diseases, coagulopathies and end stage liver disease.
- Patients aged less than 14 years with primary inguinal hernia.

2- Sampling Method:

All patients attempting surgical management of non-complicated inguinal hernia. Study Tools: All patients will be followed-up postoperatively for 3 months for the following outcomes:

Primary outcomes:

Length of surgery (in minutes), immediate postoperative pain (visual analogue scale (VAS)/ pain score), vascular/visceral injury at operation, haematoma/seroma development in postoperative period, length of hospital stay (in days), urinary retention in immediate postoperative period, wound infection/mesh infection at any time point and recovery time to normal activity (in days).

Secondary outcomes:

Hernia recurrence (clinical or radiological at any time point), Chronic pain: Pain persisting beyond three months, postoperatively (categorical outcome: yes/no), persisting numbness: numbness in the groin or testicle, persisting beyond three months postoperatively.

Preoperative assessment:**• Clinical history:**

Personal history, history of present illness, past history of medical issues, allergy to drugs, prior blood transfusion, and previous operations done before, with special concern to complications of the hernia or prior attempts of treatment, family history of inguinal hernia and other common diseases in the family.

• Clinical examination:

General examination, local examination of the inguinal region and scrotum to confirm the diagnosis of inguinal hernia and its type, and for the presence of complications.

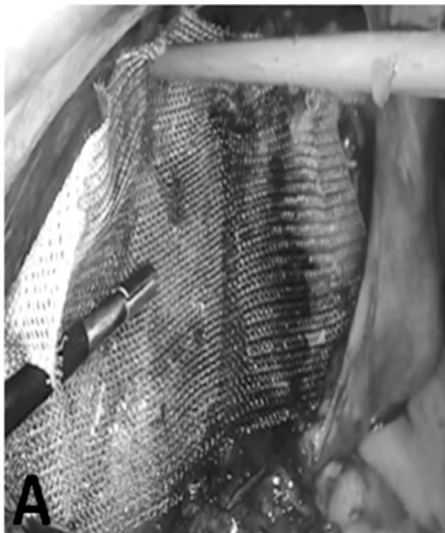
• Routine investigations:

All patients were requested the routine investigations, including complete blood picture, coagulation profile, liver and kidney function tests, fasting blood sugar, chest X-ray and pelvi-abdominal U/S. Special investigations were requested for patients with specific problems as pulmonary function tests for patients with mani-

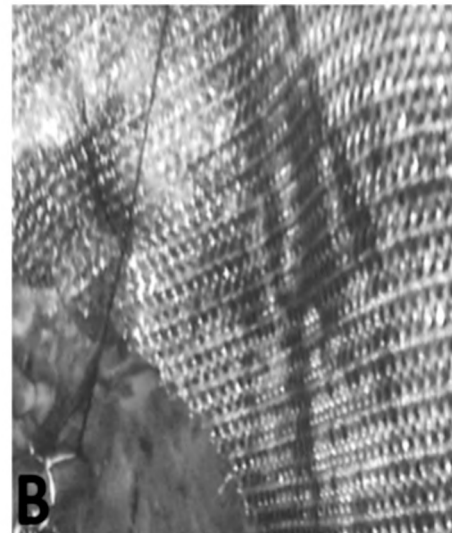
festations of chronic obstructive airway disease; ECG for patients above the age of 40.

• Intraoperative assessment:

An infraumbilical incision is done, with placement of a 10-mm trocar, and the abdomen is insufflated. A 10-mm 30° scope is then placed through the trocar, allowing viewing the peritoneal cavity. Two lateral 5-mm trocars are placed at the level of the umbilicus and just lateral to the rectus at approximately the midclavicular line. After ports are placed, diagnostic laparoscopy of the whole abdomen is necessary to exclude other pathology or contraindications for surgery and identifying hernia defects and to confirm whether they are direct or indirect defects. During the dissection, we should take care to identify the triangle of doom, which contains the external iliac vessels and is bounded medially by the vas deferens and laterally by the gonadal vessels. If the hernia sac is not reduced in during the dissection of the peritoneal flap, it can usually be reduced by applying gentle traction on the peritoneal attachments within the defect. If there is a long indirect sac, we can transect the sac.



(A): Lap TAPP using tackers.



(B): Lap TAPP using suture technique.

Statistical analysis:

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 23. The quantitative data were presented as mean, standard deviations and ranges when their distribution found parametric. Also qualitative variables were presented as number and percentages. The p-value was considered significant as the following: $p > 0.05$: Non significant, $p < 0.05$: Significant, $p < 0.01$: Highly significant.

Results

No statistically significant difference could be detected between both groups.

None statistically difference between the two groups was found during the three months of follow-up. All the reported pain assessments had no effect on any patient's usual activity and did not require any therapy and no chronic post-operative pain of severe degree was reported.

The mean time to return to normal daily activities after surgery was 7 ± 2 days, versus 8 ± 2 days in Group A and Group B respectively. This difference wasn't statistically significant ($p=0.182$).

Table (1): Comparison between both groups as regard descriptive and preoperative data.

	Group A No.=15	Group B No.=15	Test value	p- value	Sig.
<i>Age:</i>					
Mean \pm SD	38.43 \pm 14.25	40.20 \pm 12.63	0.360	0.722	NS
Range	14-60	14-60			
<i>Sex:</i>					
Males	13 (86.70%)	15 (100.0%)	2.143	0.143	NS
Female	2 (13.3%)	0 (0.0%)			

Table (2): Comparison between both groups as regard type and side of inguinal hernia.

	Group A No.=15	Group B No.=15	Test value	p- value	Sig.
<i>Side of inguinal hernia:</i>					
Unilateral	13 (86.7%)	12 (80%)	0.240	0.624	NS
Bilateral	2 (13.3%)	3 (20%)			
<i>Type of inguinal hernia:</i>					
OIH	10 (66.7%)	11 (73.3%)	0.159	0.690	NS
Direct	5 (33.3%)	4 (26.7%)			

Table (3): Represents the difference between the operative time and intraoperative complications between the two groups.

	Group A No.=15	Group B No.=15	Test value	p- value	Sig.
<i>Operative time for unilateral:</i>					
Mean \pm SD	64 \pm 20	58 \pm 30	0.645	0.524	NS
Range	45-90	44-90			
<i>Operative time for bilateral:</i>					
Mean \pm SD	120.85 \pm 22.5	108.17 \pm 25.1	1.457	0.156	NS
Range	87-150	80-145			
<i>Intra op. complication:</i>					
None	15 (100%)	14 (93.3%)	1.034	0.309	NS
Bleeding	0 (0.0%)	1 (6.7%)			

Table (4): Comparison between both groups as regard post-operative pain.

	Group A No.=15	Group B No.=15	Test value	p- value	Sig.
<i>Wound pain:</i>					
No	0 (0.0%)	0 (0.0%)	0.000	1.000	NS
Yes	15 (100%)	15 (100%)			
<i>Scrotal and thigh pain:</i>					
No	15 (100%)	12 (80%)	3.333	0.067	NS
Yes	0 (0.0%)	3 (20%)			
<i>Pain after 2 months:</i>					
No	15 (100%)	15 (100%)	0.000	1.000	NS
Yes	0 (0.0%)	0 (0.0%)			

Table (5): Summarize the post-operative complications and recurrence occurrence among the two groups.

	Group A No.=15	Group B No.=15	Test value	p- value	Sig.
<i>Recurrence:</i>					
No	15 (100.0%)	15 (100.0%)	0.000	1.000	NS
Yes	0 (0.0%)	0 (0.0%)			
<i>Pain:</i>					
No	15 (100%)	12 (80.0%)	3.333	0.067	NS
Yes	0 (0%)	3 (20.0%)			
<i>Post op complication:</i>					
No	13 (86.7%)	15 (100%)	2.143	0.143	NS
Wound infection	2 (13.3%)	0 (0%)			

Table (6): The statistical values as regards the difference between the two study groups.

	Group A No.=15	Group B No.=15	Test value	p- value	Sig.
<i>Post op. hospital stay in days:</i>					
Mean \pm SD	1.5 \pm 0.5	1.6 \pm 0.3	0.664	0.512	NS
Range	1-2	1-2			
<i>Return to normal activity (days):</i>					
Mean \pm SD	7.0 \pm 2.0	8.0 \pm 2.0	1.369	0.182	NS
Range	5-14	5-14			

Discussion

Appropriate surgical approach is difficult to choice in the treatment of inguinal hernia [10].

Laparoscopic hernia repairs provide very good outcomes as it has lower postoperative pain, less wound infection, and rapid return to daily activity [11].

A recent met-analysis comparing between the laparoscopic hernia repair versus open Lichtenstein technique showed that significantly less patients with chronic pain in the laparoscopic group, and they had a significantly earlier return to normal daily activities than patients with Lichtenstein group but the main disadvantage of laparoscopic repair has been the duration of the operation as significantly longer in the laparoscopic surgeries [10].

Laparoscopic TAPP hernia repair reproduce the concept of Stoppa by placing a large mesh in the pre-peritoneal space to cover all the weak areas (myopectineal orifice of Fruchaud) including area of internal ring, Hasselbach's triangle and the femoral ring [12].

The longstanding standard practice for TAPP was to use mesh fixation with tackers to prevent

recurrence but atraumatic mesh fixation methods are being increasingly employed to prevent chronic pain in the wake of traumatic fixation methods [13].

The current surgical options for mesh fixation include sutures, tacks or staples, self-fixing meshes and fibrin or other glues. However, there is no consensus on the best surgical technique and the choice of options often depends on surgeons' personal preference [14].

A recent meta-analysis studying the outcomes of using laparoscopic mesh fixation by suturing technique comparing to mesh fixation by absorbable tackers technique revealed that the outcomes are equivalent to those obtained with suture mesh in open inguinal hernia repair [15].

This study was conducted to compare laparoscopic inguinal hernia repair with mesh fixation by sutures technique with mesh fixation by absorbable tacks from different points of view including operation duration, postoperative pain that was assessed using the patient dependent Visual Analog Score (VAS), post-operative complications, post-operative hospital stay, and time needed to return to normal activity and the recurrence. We wanted also to present our experience in using this novel method of fixation and evaluate early outcomes of patients who had undergone TAPP inguinal hernia repair with suture and tackers techniques.

The study enrolled 30 patients with inguinal hernia who underwent laparoscopic transabdominal pre-peritoneal (TAPP) inguinal hernia repair for 6 months six from (September 2018 to December 2020), and the patients were divided into two groups: Group A: 15 patients with inguinal hernia who were operated upon by TAPP Laparoscopic inguinal hernia repair with fixation mesh using sutures technique, Group B: 15 patients with inguinal hernia who were operated upon by TAPP Laparoscopic inguinal hernia repair with (10x15cm) prolene mesh with fixation by absorbable taks.

The allocation of the patients in either group was made on the operation day by closed envelope method and choice of type of mesh fixation will be determined by the intraoperative opening of the next envelope in order. The patients were seen at the outpatient clinic for following-up the recurrence rate in both groups after one week, one month and three months by adequate history and physical examination. None of the patients recruited into the study was excluded, withdrew from or died during the course of the trial, and thus all patients were included in the analysis.

Patients in both groups were similar with respect to age, the patients ages ranged from 14 to 60 years, most of them were male patients with male to female ratio (28/2) with the 2 females in group A with no significant difference between both groups as regard gender with mean age 40 years in both groups, this age of presentation is noticed to be earlier than various studies assessing self-gripping mesh as in a recent study conducted by Birk et al. [16] over 220 hernias with mean follow-up at 23 months in Germany, the mean age of studied population was 54 years, the younger age of presentation in our study is surely explained by the heavy occupational nature of most of the studied cases adding to the value of our study in evaluating the procedure in different age groups.

The same age group was observed in an Indian study recently which studied inguinal hernia risk factors, it stated that the most common patients suffered from inguinal hernia ranged from 46-60 years old [17].

Most of the studied patients were males to matches the male predominance as regards the patient's flow for recruitments and This predominance of hernia in males was attributed to the fact that there was involvement of more strenuous exercises and lifting of weights by them and the anatomical differences between the two genders [18].

Different kinds of inguinal hernias were included as Primary indirect inguinal hernia was the most common type encountered in our study with 21 patients (70%) While primary direct inguinal hernia was encountered in 9 patients (30%), that coincides with the inguinal hernia distribution in a recent monocentric study with balanced randomization of 60 patients designed to compare the TAPP approach with self-gripping mesh to the TAPP repair with polypropylene mesh with biological fibrin glue fixation, the study population contained 85-90% primary indirect inguinal hernia and only 10-13% direct type confirming that OIH is the most common type of inguinal hernia [19].

The most common presenting symptom was the presence of a swelling in the inguinal or inguinoscrotal region. This was in accordance to a study by Kumar et al., where in 68% of the patients presented by swellings of less than 1 year duration [20].

Unilateral inguinal hernias represented 80% (12 patients) in group A and 86.7% (13 patients) in Group B while bilateral inguinal hernias were 20% in Group A and 13.3% in Group B, There was

right sided predominance and was said to be due to late fall down of the testis and more frequent failure of closure of right processus vaginalis [21].

Mean operative time in the Group A was 64 ± 20 minutes for unilateral cases and 120 minutes for bilateral and that's very close to the operation time taken during a prospective randomized trial conducted by University of Turin in Italy which assessed Self-gripping mesh in laparoscopic inguinal hernia repair in young and elderly patients as their operation time ranged from 74.4 (± 12.8) mins [19].

The same operation time was taken in a study included 96 patients comparing in a prospective manner between Sutures mesh fixation versus staple fixation in laparoscopic inguinal hernia where the mean duration of the procedures was 83 min in the group A [22].

No difference was found between the operation time length needed to mesh fixation by sutures techniques versus mesh fixation with tacks approach.

In our study, No cases of severe chronic pain in the Sutures mesh fixation group, similarly Ferrarese et al., also sees the same finding on assessment of chronic pain, after TAPP surgical repair with sutures technique over 142 patients [19].

Only 20 % of cases suffered from mild thigh and scrotal pain in Sutures mesh fixation group which improved after two months and no serious adverse event was reported.

In our study, a high percentage of people had a full return to a normal physical activity with no significant limitations as similarly resulted in an Italian study which assessed that a novel method of fixation with TAPP surgical approach among 100 patients [23].

Our mean time to return to normal daily activities after surgery ranged between 7-8 days in both groups, similarly noticed in a prospective study on 29 patients who had a TAPP repair; as their mean time to full activity return was 8.4 days [24].

Even though fixation of the mesh might have an impact on recurrence rates, surgical site infections, postoperative chronic pain or quality-of-life, no accepted gold standard exists on whether, when and how to fixate the mesh [25].

In the "Guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal Hernia" of the International Endohernia Society, it is stated

that "only one study compared fixation versus non fixation in TAPP repair and found no significant differences in the incidence of recurrence between different type of fixation [26].

Then the International Endohernia Society (IEHS) updated its guidelines for TEP and TAPP hernia repair in 2015 and concluded.

"In case of TAPP repair non-fixation should be considered in types LI, II, and MI, II hernias (EHS classification)" (Grade B recommendation) [27].

Kapiris, in reviewing his experience with 104 TAPP hernia repairs, using a selective staple-free technique, concluded that Stapling the mesh is not necessary in most cases, thus resulting in a remarkably lower cost and low recurrence rate [28].

Also in a meta-analysis examining the use of tacker fixation versus suture fixation of mesh in laparoscopic inguinal hernia repair Conducted by Sajid et al., He concluded, "Non mesh fixation in laparoscopic inguinal hernia repair does not increase the risk of hernia recurrence". And stated "based upon the results of this review non mesh fixation approach may be adopted routinely and safely in laparoscopic inguinal hernia repair [29].

Our data agreed with all that previously mentioned literature, no difference in terms of recurrence was detected between sutures fixation versus mesh fixation by absorbable tacks.

Studies have shown that suture fixation hernia repair is generally more cost effective than repair with mesh tacks fixation [30].

As confirmed by Fumagalli et al., the cost of the material used for mesh fixation by suture procedure was lower than the cost of the material for staples, making it also cost effective [22].

Our study demonstrates that laparoscopic inguinal hernia repair using the TAPP technique is a fast, effective and reliable method in experienced hands, which combines the advantages of laparoscopic approach with simple and according to our results, reduces the occurrence of chronic pain and the recurrence rate.

The current study has some limitation related to the relatively small number of pooled patients and to overcome this limitation, we recommend a further study on a larger scale with larger number of study population.

In conclusion, after this study, both type of mesh fixation by tacks and suture fixation approach-

es are similarly effective in terms of operative time, the incidence of recurrence, complications and chronic pain coinciding with all the available literature.

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دراسة النتائج الجراحية المبكرة أثناء إصلاح الفتق الإربي الغير معقد باستخدام المنظار الجراحي عبر تجويف البطن باستخدام تقنية تثبيت الشبكة بالخياطة

يعد الفتق الاربي من أكثر الإجراءات الجراحية شيوعاً في العالم الحدث ويتراوح بين ٧-٥٪، وتتضمن أساليب إصلاح الفتق جراحياً عدة طرق بدون شبكة (باسيني - شولديس - ماكفاير). وطرق باستخدام الشبكة منها الأمامي (ليخشتاين) والخلفي أمام البريتون (ريفيرا - ستويا). ودواعى إجراء الفتق الاربي بالمنظار هي مثل دواعى إجراء إصلاح الفتق الاربي جراحياً، وهناك دواعى خاصة لإصلاح الفتق الاربي بالمنظار عن الجراحة.

وبمقارنة تناقص الالم ما بعد إصلاح الفتق الاربي بالمنظار وإصلاحه بالجراحة جعل استخدام المنظار هو الأمثل في علاج الفتق المزدوج على الناحيتين معاً.

وتبقى الأساليب المستخدمة لتثبيت الشبكة والمواد المستخدمة موضوع جدلى خاصة مع ظهور أفكار جديدة. كما أن هناك موانع استخدام المنظار الجراحي في إصلاح الفتق الاربي داخل الغشاء البريتوني.

معايير المشاركة في البحث : مرضى الفتق الاربي الأولى والمرشد اللاتقنين لتحمل التخدير والذين يتصف الفتق بهم ب الفتق المباشر أو الغير مباشر، الفتق على الناحيتين أو ناحية واحدة، الرجال أو النساء من سن ١٤ إلى ٦٠.

معايير الاستبعاد : الفتق المختنق، الفتق الغير مرتجع، وجود فتق فخذي متزامن المرضى الذين لم يتم علاجهم من العوامل المساعدة على حدوث الفتق، المرضى أقل من ١٤ وأكثر من ٦٠، جراحات سابقة في البطن أو الحوض، مريض قابل للنزف.

وختاماً : فإن تثبيت الشبكة بواسطة الغرز الجراحية أو استخدام الدباسة بدبابيس قابلة للامتصاص في عملية إصلاح الفتق الاربي من خلال البطن ما قبل البيريتون بالمنظار هي طريقة سهلة وغير مستهلكة للوقت، وان هذه الطريقة تحسن من مستوى الانسان المعيشى بدون أى مضاعفات ناتجة من التدخل الجراحي.

ولقد اثبتنا أنه لا يوجد فرق كبير بين تثبيت الشبكة باستخدام دبابيس قابلة للامتصاص وتثبيت الشبكة بغرز جراحية أولية في عملية إصلاح الفتق الاربي من خلال البطن ما قبل البيريتون.