

Evaluation of Trans Rectus Sheath Extra-Peritoneal Mesh Repair: Our Early Results

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Abstract

Background: An inguinal hernia is a protrusion of the content of the abdominal cavity or preperitoneal fat through a hernia defect in the inguinal area. Inguinal hernia repair is considered one of the most common surgical procedures done all over the world. The Lichtenstein technique, introduced in 1984, is the best evaluated and the most common open tensionless mesh repair of different open mesh techniques with low morbidity and low recurrence rates ($\leq 4\%$) in the long-term follow-up.

Objectives: Evaluation of our results of Trans Rectus Sheath Extra-Peritoneal Procedure (TREPP) considering the data available from the literature of the standard Lichtenstein method for the treatment of primary adult inguinal hernia.

Patients and Methods: A clinical study was conducted at Qena University Hospital over 6 months period, between 1/9/2019 to 1/3/2020 for patients with hernia visiting the outpatient clinic. We operated on 52 patients using the TREPP technique with a follow-up period at 6 months duration post-operative.

Results: We operated on 52 patients using the TREPP technique; all of them were males with a mean age of 33.3 ± 10.2 years. Intra-operative complications occurred in 1.9% of cases. No cases showed recurrence during the first 6 months post-operative. No cases had CPIP (chronic post-operative pain).

Conclusion: The TREPP technique is a good alternative to the standard Lichtenstein tension-free mesh repair with a low recurrence rate as in Lichtenstein repair, but with a less incidence of CPIP and scrotal edema with shorter operation time.

Keywords: Inguinal; Hernia; Preperitoneal; TREPP.

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Introduction

Several techniques have been employed in the treatment of inguinal hernias since Bassini first described his method in 1887 (Manyilirah et al., 2012). The Lichtenstein technique, introduced in 1984, is the best evaluated and the most common open tensionless mesh repair of different open mesh techniques with low morbidity and low recurrence rates ($\leq 4\%$) in the long term follow up (Amid and Shulman, 1996). Although low recurrence rates with The Lichtenstein technique other alternatives in inguinal hernia correction are needed because of the considerable proportions of chronic pain (15–40%) after Lichtenstein technique (Koning et al., 2009).

The different Laparoscopic hernia repair techniques popularized the preperitoneal mesh position, which is due to the promising results concerning less chronic pain. However, severe adverse events, long learning curves, and added costs have to be taken into account as a big challenge for laparoscopic hernia repair. Therefore, open preperitoneal mesh techniques may have more advantages (Koning et al., 2012).

In 2006, a novel technique was introduced combining the advantages of both The Lichtenstein technique (open) and TEP (laparoscopic): The Trans Rectus Sheath Extra-Peritoneal Procedure (TREPP). It differs from other preperitoneal techniques due to its medial approach which avoids dissection or injury to the course of all (three) inguinal nerves through the lateral abdominal wall (Lange et al., 2014).

The TREPP mesh repair might be a promising method because of the complete preperitoneal view, the short learning curve, and the stay-away-from-the-nerves principle (Koning et al., 2012).

This clinical study aimed to evaluate the short-term outcomes of the Trans Rectus Sheath Extra-Peritoneal Procedure (TREPP) with the standard open mesh-based Lichtenstein method for the treatment of primary inguinal hernia among adult people.

Patients and Methods

A prospective clinical study was conducted at Qena University Hospital over 6 months period between 1/9/2019 to 1/3/2020 for patients with hernia visiting the outpatient clinic of general surgery department.

Inclusion criteria were age between 15 and 65 years old, patients with unilateral hernia and denovo cases.

Exclusion criteria were patients with hemorrhagic diseases, patients unfit for surgery and patient refusal.

All patients were admitted a day before surgery. Routine investigations as pelvi-abdominal ultrasonography, complete blood picture, coagulation profile, hepatitis marker, renal function tests and random blood sugar were done. Patients were kept on fasting for 6 hours before surgery and an informed written consent from all patients was obtained.

All surgeries were performed under spinal anesthesia with a single shoot of prophylactic antibiotic given before starting the procedure.

Surgical technique: An incision is made following Langer's lines one finger fold above the line between the pubic tubercle and the anterior superior iliac spine. The incision starts about 1 cm laterally to the midline, with a total length of about 6 cm.



Fig. 1. Overview of important anatomical landmarks for TREPP (Lt Side).

After dividing the subcutaneous tissue and Scarp's fascia, the aponeurosis of the external oblique muscle and the anterior rectus sheath are exposed and divided parallel to the incision.



Fig.2. Rectus muscle retracted showing fascia transversalis and inferior epigastric vessels (arrows).

The muscle fibers of the rectus abdominis muscle are swept away medially. The transversal fascia is identified and is divided. Identification of the inferior epigastric vessels, which are kept away medially.

The preperitoneal cavity is opened, at first behind the pubic bone (Retzius' space). Then, the preperitoneal space is opened more

laterally (Bogros' space). Between both created cavities. Hernia reposition is achieved in a direct hernia by gently pulling. In more adherent hernias, traction applied to the hernia sac, using two dissecting forceps. This can be achieved under direct vision.

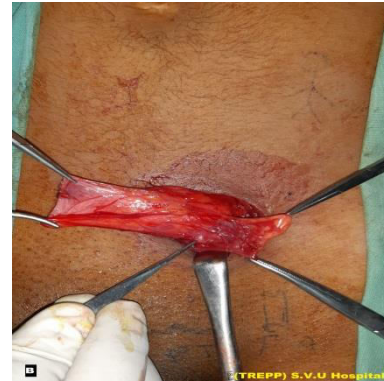


Fig.3. Dissection of the hernial sac.

A tailored polypropylene mesh is pushed into the preperitoneal space, covering the orifices of all possible hernias (as in TEP). As the spermatic cord and vessels all run dorsally on the psoas muscle, the mesh is positioned anteriorly to the cord.



Fig. 4. Mesh in the preperitoneal space.

It is safely secured between the peritoneum and the transversal fascia by intra-abdominal pressure only. After hemostasis, the fascial layers and skin are closed.

Diclofenac sodium 1mg/kg was given 8th hourly orally. Patients were maintained in the inpatient ward for 1 day post-operative then

discharged to home with scheduled outpatient follow-up.

Evaluation: Patients were evaluated clinically at the outpatient clinic weekly for 1 month. Then they were evaluated monthly for 6 months postoperative. Evaluation and follow up were for:

- 1- Operation time, intraoperative complications, hospital stay, time to return to normal activity and foreign body sensation.
- 2- Short-term recurrence of inguinal hernia, postoperative pain and postoperative complications (seroma, hematoma, scrotal edema and wound infection).

Ethical Approval

The study protocol was approved by the Ethical Committee of Faculty of Medicine, South Valley University and written informed consent was taken from each patient.

Results

We operated on 52 cases using the TREPP technique at the period between 1/9/2019 and 1/3/2020, all of them were males with a mean age of (33.3±10.2) years. The eldest case was 57 years old and the youngest case was 19 years old. Cases presented with right side hernia were (67.2%).

As regards the Intra-operative parameters, the mean time of operation (skin to skin) by minutes was 30±5.8, while Intra-operative complications occurred in 1.9% of cases.

As regards the post-operative parameters, the mean time of hospital stay by days was 2 ±0.19. The mean time of return to usual activity by days was 8.7±1.9, but we

recommend workers to avoid heavy works for 6 months post-operative.

Recurrence doesn't occur in any case at the first 6 months post-operative. We depend on history taking and clinical examination at the follow-up period post-operatively to evaluate recurrence. Patients were evaluated clinically at the outpatient clinic weekly for 1 month. Then they were evaluated monthly for 6 months postoperative.

No case had CPIP, the mean of pain score according to visual analogue score (VAS) at 48 hours post-operative was (1.28 ± 0.9).

Seroma, Hematoma occurred in 3.8% and 1.9% of cases respectively. Scrotal edema and wound infection occurred only in 3.8% and 1.9% of cases respectively.

Table 1. Complications of TREPP.

Variables		Frequency	Percent
Intraoperative Complications	No	51	98.1%
	Yes	1	1.9%
Seroma	Yes	2	3.8%
	No	50	96.2%
Hematoma	Yes	1	1.9%
	No	51	98.1%
Scrotal Edema	Yes	2	3.8%
	No	50	96.2%
Wound Infection	Yes	1	1.9%
	No	51	98.1%
F.B Sensation	Yes	0	0%
	No	52	100%

Discussion

In this study, we choose to evaluate the results of the cases we operated by the TREPP technique to the data available from the literature concerning the standard

technique of tensionless inguinal hernia repair, Lichtenstein mesh repair.

We choose different 6 clinical trials using Lichtenstein repair to provide much more variability and reliability to compare the results of our study with.

(1) Long-term follow-up of tension-free Lichtenstein hernioplasty: application of a qualitative-and-quantitative measurement instrument (**Beltrán et al., 2005**).

(2) A Prospective Randomized Controlled Study of Lichtenstein's Tension Free versus Modified Bassini Repair in the Management of Groin Hernias (**Harjai et al., 2007**).

(3) Laparoscopic (TEP) Versus Lichtenstein Inguinal Hernia Repair: A Comparison of Quality-of-Life Outcomes (**Myers et al., 2010**).

(4) Randomized clinical trial of Desarda versus Lichtenstein repair for treatment of primary inguinal hernia (**Youssef et al., 2015**).

(5) TEP versus Lichtenstein: Which technique is better for the repair of primary unilateral inguinal hernias in men (**Köckerling et al., 2016**).

(6) A comparative study of Desarda's technique with Lichtenstein mesh repair in treatment of inguinal hernia: A prospective cohort study (**Gedam et al., 2017**).

When we compared the results of our study with the published data of the other studies using the Lichtenstein repair concerning the percentage value of each item we found:

As regard Intra-operative parameters:

***Operative Time:** In our study, the meantime of operation (skin to skin) by minutes was 30 ± 5.8 . It should be declared that our hospital protocol for elective routine operative cases demands being admitted one day pre-operative and to be discharged one day post-operative if no complications or further conservation is needed.

In (**Harjai et al., 2007**) using the standard Lichtenstein technique, the mean operative time was $(55.34 \pm 12.15 \text{ minutes})$.

In (**Youssef et al., 2015**) using the Lichtenstein technique, the mean operative time was $(59.4 \pm 6.3 \text{ min})$.

In (**Gedam et al., 2017**) using the Lichtenstein technique, the mean operative time was $(73.89 \pm 12.63 \text{ min})$.

According to these data, the TREPP technique shows a shorter operation time than the Lichtenstein repair. This could be due to the technical fact that in the TREPP technique we don't have to make dissection of the inguinal canal and spermatic cord which is necessary in the Lichtenstein repair, also no need for mesh fixation in the TREPP technique like in the Lichtenstein repair. These two steps may be the cause for a longer operating time for the Lichtenstein repair.

***Intra-operative Complications:** In our study, only one case showed intraoperative complication which represents (1.9%). It was in the form of injury to the inferior epigastric artery during dissection of the preperitoneal space and it was ligated with no further damage.

In (**Kockerling study, 2016**) using the Lichtenstein technique, the rate of intraoperative complications was (1.26%).

In (**Youssef study, 2015**) using the Lichtenstein technique, the rate of intraoperative complications was (1.4%).

No clinical significance could be noticed as regards both techniques for intraoperative complications.

As regards postoperative parameters:

***Seroma and Hematoma formation:** In our study, the rate of seroma formation was (3.8%) and for hematoma formation was (1.9%) which all didn't need any secondary intervention.

In (**Beltran study, 2005**) using the Lichtenstein technique, the rate of hematoma formation was (3.8%).

In (**Harjai study, 2007**) using the Lichtenstein technique, the rate of seroma formation was (4.08%) and the rate of hematoma formation was (1.02%).

In (**Myers study, 2010**) using the Lichtenstein technique, the rate of seroma\hematoma formation was (2%).

In (**Youssef study, 2015**) using the Lichtenstein technique, the rate of seroma formation was (1.4%) and the rate of hematoma formation was (2.7%).

In (**Kockerling study, 2016**) using the Lichtenstein technique, the rate of seroma formation was (1.48%) and the rate of hematoma formation was (2.46%).

In (**Gedam study, 2017**) using the Lichtenstein technique, the rate of seroma formation was (2.1%).

As regards these data no clinical significance could be noticed between the results of our study and other studies using the Lichtenstein technique.

***Scrotal edema and wound infection:** In our study, the rate of postoperative scrotal edema was (3.8%) and wound infection was (1.9%).

In (**Beltran study, 2005**) using the Lichtenstein technique, the rate of postoperative scrotal edema was (3.8%).

In (**Harjai study, 2007**) using the Lichtenstein technique, the rate of postoperative scrotal edema was (14.29 %) and the rate of wound infection was (9.18%).

In (**Myers study, 2010**) using the Lichtenstein technique, the rate of wound infection was (2%).

In (**Youssef study, 2015**) using the Lichtenstein technique, the rate of postoperative scrotal edema was (5.6 %) and the rate of wound infection was (0%).

In (**Gedam study, 2017**) using the Lichtenstein technique, the rate of postoperative scrotal edema was (11.57%) and the rate of wound infection was (1.05%).

As regards these results no clinical significance between the incidence of wound infection in the different studies, but decreased incidence of post-operative scrotal edema with the TREPP technique in comparison to the Lichtenstein technique. This may be explained by the technical fact that less dissection and manipulation of the spermatic cord is done in the TREPP technique.

***Return to normal activity:** In our study using the TREPP technique, the meantime to return to normal activity was (8.7± 1.9) days.

In (Harjai study, 2007) using the Lichtenstein technique, the meantime to return to normal activity was (10.2) days.

In (Youssef study, 2015) using the Lichtenstein technique, the meantime to return to normal activity was (8.54) days.

In (Gedam study, 2017) using the Lichtenstein technique, the meantime to return to normal activity was (6.2) days.

These results revealed no significant difference between the two techniques concerning the mean time to return to normal activity.

***Recurrence rate:** In our study which was performed on 52 cases with a postoperative follow-up period of 6 months, no inguinal hernia recurrence could be detected as regard history and clinical examination during the follow-up period.

In (Beltran study, 2005) which was performed on 236 patients using the Lichtenstein technique, the rate of recurrence was (0.4%).

In (Harjai study, 2007) which was performed on 98 patients using the Lichtenstein technique, the rate of recurrence was (5.1%).

In (Myers study, 2010) which was performed on 90 patients using the Lichtenstein technique, the rate of recurrence was (2%).

In (Youssef study, 2015) which was performed on 72 patients using the

Lichtenstein technique, the rate of recurrence was (0%).

In (Kockerling study, 2016) which was performed on 10555 patients using the Lichtenstein technique, the rate of recurrence was (0.83%).

In (Gedam study, 2017) which was performed on 95 patients using the Lichtenstein technique, the rate of recurrence was (1.05%).

According to these results, no clinical or statistical significance could be detected between the TREPP technique and the Lichtenstein technique as regards the recurrence rate.

***CPIP:** In our study, no cases reported CPIP.

In (Beltrán et al., 2005) using the Lichtenstein technique, (14.8%) of patients reported developing CPIP.

In (Harjai et al., 2007) using the Lichtenstein technique, (10.2%) of patients reported developing CPIP.

In (Myers et al., 2010) using the Lichtenstein technique, (10%) of patients reported developing CPIP.

In (Youssef et al., 2015) using the Lichtenstein technique, CPIP was reported in (4.8%) of cases.

In (Gedam et al., 2017) using the Lichtenstein technique, (1.05%) of patients reported developing CPIP.

By comparing these data from these different studies we could say that the TREPP technique causes less incidence of

developing CPIP than with the Lichtenstein repair.

This could be explained by the stay-away-from-the-nerves principle applied in the TREPP technique. Through the medial and preperitoneal approach, we avoid injury or direct contact with the mesh to the inguinal nerves.

Conclusion

The TREPP technique is a good alternative to the standard Lichtenstein tension-free mesh repair with a low recurrence rate like in Lichtenstein repair but with less incidence of CPIP and scrotal edema with shorter operation time.

The TREPP technique is a safe, feasible, easy to learn and effective technique for inguinal hernia repair in adults.

Conflict of Interest: The authors of this study have no conflict of interest related to this publication.

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