

# Effect of closed drainage system on prevention of seroma after laparoscopic total extraperitoneal repair in primary M3 and L3 inguinal hernia

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## ABSTRACT

**Introduction:** Seroma that can be seen after endoscopic completely extraperitoneal inguinal hernioplasty (TEP) is a major problem in patients who are concerned about recurrence. In this study, a prospective study design was prepared in our clinic in order to see the incidence of seroma after TEP and the effect of closed system negative pressure drainage, which is one of the methods thought to reduce it.

**Materials and Methods:** Primary M3 and L3 unilateral inguinal hernias were randomly divided into two groups. Group I was the group in which a drain was placed after TEP, and Group II was the group in which no drain was placed after TEP. In Group I patients, a hemovac drain was placed behind the mesh and the perforated end of the drain was placed in the preperitoneal space. Anatomical 3D mesh (3DMax™ Mesh, BD, USA) was applied to all cases.

**Results:** There were 41 patients in Group I and 39 patients in Group II. 73 of the patients were men and 7 were women. According to the EHS classification, 47 of the hernias were L3 type and 33 were M3 type. Seroma was detected in 5 patients in Group I and 13 patients in Group II on the 7<sup>th</sup> postoperative day ( $p < 0.024$ ). There was no difference between the groups in the seromas seen in the 3<sup>rd</sup> month after surgery.

**Conclusion:** Seroma is common after TEP, especially in M3 and L3 hernias. This situation is confused with hernia recurrence in the patient. This may cause fear and panic in the patient. The drainage system installed in large hernias in the early postoperative period reduces the development of seroma and these concerns are eliminated. In addition, having patients come to the team performing the surgery for check-ups at regular intervals is effective in relieving patients' concerns.

**Keywords:** Drain, Extraperitoneal space, Laparoscopic hernia, TEP

## Introduction

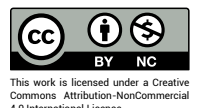
Inguinal hernia repairs are one of the most common procedures performed in general surgical departments. Approximately 20 million hernia repairs are performed

annually all over the world.<sup>[1,2]</sup> Since the 90s, when laparoscopic repair began, minimally invasive surgical techniques have evolved, and laparoscopic transabdominal preperitoneal (TAPP) repair and total extraperitoneal re-



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pair (TEP) have emerged.<sup>[3]</sup> The European Hernia Society recommends laparo-endoscopic hernia repair for patients (all sexes) with primary unilateral inguinal hernia due to the lower incidence of postoperative pain and reduced incidence of chronic pain.<sup>[4]</sup> The increase in the number of surgeries causes an increase in complications. Although hernia recurrence remains at low levels upon learning the technique, groin pain is more prominent today. One of the factors of pain is the complications that may occur after surgery. Patient comfort is also very important after laparoscopic hernia surgery. Especially, the swelling that may occur in the patient's groin area after surgery suggests early recurrence, which increases patient distress. Seroma or hematoma is one of the causes of swelling in the groin area after surgery. The main reasons for the development of seroma are intraoperative bleeding and large dissection areas. Seroma often affects the quality of life of patients after surgery and presents with pain and an inguinal or scrotal mass. There are studies in the literature that prevent the development of early and late seroma, and that drains placed in the preperitoneal area during surgery reduce the development of seroma.<sup>[5-7]</sup> In this prospective study, the effect of closed system preperitoneal space drainage on seroma was investigated in unilateral hernia patients undergoing laparoscopic total extraperitoneal hernia repair. The clinically detected seroma formation in the inguinal region on the 7<sup>th</sup> day after laparoscopic TEP hernioplasty for inguinal hernia was compared. Clinical seroma sizes in the inguinal region were measured 7 days and 3 months postoperatively. Total operative time, total drain output, urinary retention, wound complications, early and late postoperative pain scores, and recurrence were also evaluated.

## Materials and Methods

This study was approved by the Ethical Committee of the Fatih Sultan Mehmet Training and Research Hospital, Istanbul, Türkiye, on 25.10.2018 with registration number FSMEA-H-KAEK 2018/40. Written informed consent was obtained from each participating patient prior to the study. This study was conducted in a tertiary referral centre with a case volume of more than 300 per year.

Patients between the ages of 18 and 80 with a unilateral inguinal hernia who presented to our surgical outpatient clinic were eligible for inclusion in the study. Patients were excluded if they had bilateral or recurrent inguinal hernia, incarcerated hernia, irreducible hernia, or significant co-morbidities. From January 2021 to February 2022,

patients who would undergo unilateral TEP were randomly selected and divided into two groups (Fig. 1). The primary outcome was seroma size on postoperative day 7. Secondary outcomes included clinical seroma formation and seroma size on days 1, 7, 1 month, and 7 months postoperatively, length of postoperative stay, pain score, and recurrence. Group I was the group where a drain would be placed after TEP (n=41), and Group II was the group where no drain was placed after TEP (n=39). A hemovac drain was placed behind the mesh, with the perforated end of the drain entering the preperitoneal cavity, in the patients in Group I (Fig. 2). Anatomical 3D mesh (3DMax™ Mesh, BD, USA) was applied to all cases. Seroma was defined as painless swelling observed in the inguinal region on the side of the operated hernia, which is not displaced by coughing and/or cannot be reduced (Fig. 3). No objective imaging study such as ultrasound was used to define or measure the fluid collection.

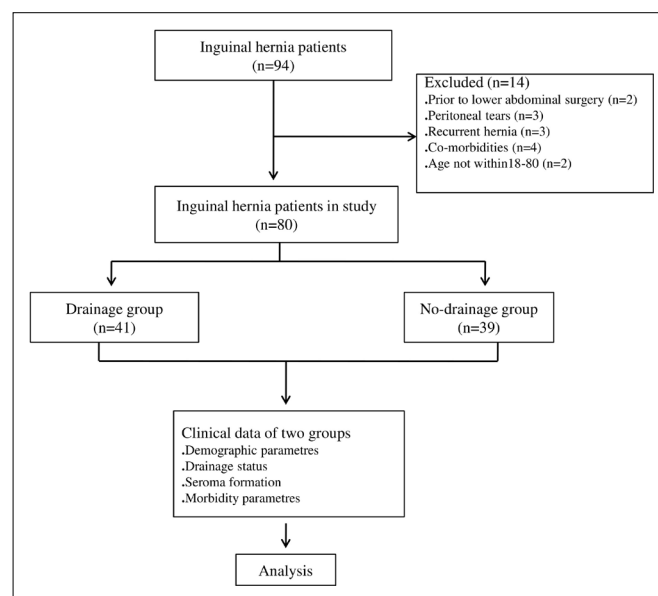


Figure 1. Flowchart.

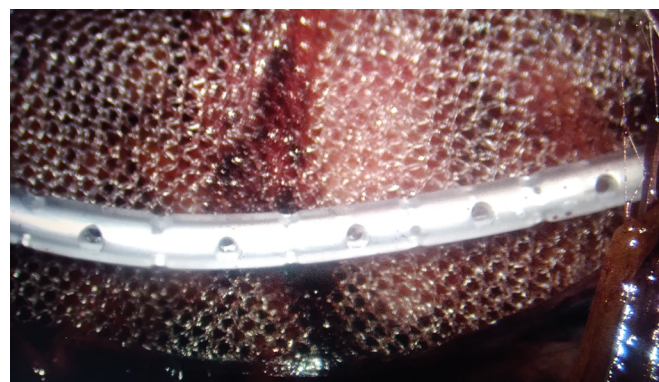


Figure 2. Drain behind the 3D mesh.



**Figure 3.** Seroma swelling after surgery.

### Operative Details

The procedure was carried out in a standard manner as described earlier. In all patients, the preperitoneal space was prepared with a balloon trocar. Anatomical mesh (3DMax™ Mesh, Large, 10.8 cm x 16.0 cm, BD, USA) was applied to all cases. The bleeding was controlled with the help of bipolar electrocautery. The mesh was fixed with either titanium tacks (ProTack™ Fixation Device, Covidien Medtronic®, US) over the superior and medial aspects. The mesh was placed without wrinkle, covering all the fascial defects in the groin—Hasselbach triangle, indirect ring, femoral triangle, and obturator ring. In the drain group, a standard closed suction drain (12F) was kept in the preperitoneal space and the space was deflated, taking care not to displace the mesh. In the non-drain group, no drain was put. The rest of the procedure was similar.

One dose of antibiotic injection, Ceftriaxone, was given in the preoperative period. Diclofenac intramuscular was given 4 hours after the procedure. The drain was taken out the next morning (range: 12 to 24 hours after the operation).

### Statistical Analysis

Statistical analysis was performed using SPSS version 27.0 (SPSS Inc., Chicago, Illinois). Quantitative parameters were presented as the arithmetic mean and standard deviation (SD) or median and interquartile range (IQR) depending on the normality of the distribution assessed

by the Shapiro-Wilk test. Categorical variables were reported as numbers. The relationship between qualitative variables was assessed by Chi-square test or Fisher's exact test. Differences between groups were compared using the Student's t-test for normally distributed variables.

### Results

There were 41 patients in Group I and 39 patients in Group II. Seventy-three of the patients were male (91.3%) and 7 were female (8.8%). According to the European Hernia Society (EHS) classification, 47 of the hernias were L3 inguinal hernias and 33 were M3 inguinal hernias (Table 1). The study started with ninety-four patients. Fourteen patients were excluded from the study. Eighty patients were included and randomized. There was no difference in the mean length of hospital stay between the two groups. The overall incidence of seroma formation was 5% (n=4). On the 7<sup>th</sup> postoperative day, seroma was observed in 5 patients in Group I and 13 patients in Group II (p<0.024). The average size of the seromas seen after the third month was two fingers (approximately 3 cm). There was no difference between the groups in the 4 seromas seen at the postoperative 3<sup>rd</sup> month (p>0.10). Percutaneous aspiration (n=2) and observation (n=2) were applied to patients who developed seroma. Seromas resolved spontaneously in a mean of 3.5 (mean) months. The postoperative complications of the two groups are shown in Table 2. Scrotal edema, urinary retention, and wound infection rates of the two groups were similar. Follow-up ranged from 9 to 45 months (median, 22 mo). The mean operating time in the drain group (30.43±6.0 min) was more than the non-drain group (28.07±6.8 min; p=0.027). The rate of seroma formation was significantly higher in the non-drain group (13/39 hernias, 33.3%) compared with the drain group (5/41 hernias, 12.19%; p=0.022). No recurrence was observed in

**Table 1. Patient demographics**

	Drain	No drain
Number of patients (n)	41	39
Mean age, years (SD)	52.8/12.7	52.8/12.9
Sex: male/female (n)	39/2	34/5
Smoker (n)	24	17
Co-morbidities(n)	2	3
Side of hernia: left/right (n)	19/22	20/19
Primary hernia type (M3/L3) (n)	16/25	17/22
SD: Standard deviation.		

**Table 2. Postoperative complications**

	Drain (n=41)	No-drain (n=39)	p
Day 7 clinical seroma formation, (n)	5	13	0.024
Mouth 3th clinical seroma formation, (n)	1	5	NS
Mean drain output, (ml/SD)	55±14.7	-	NS
Wound infection,(n)	0	0	
Range of drain output (ml)	10-80	-	
Urinary retention,(n)	4	3	NS
Early recurrence, (n)	0	0	
Aspiration after 3 <sup>th</sup> mouth, (n)	0	2	NS
Conversion to open, (n)	0	0	
Hospital stay, d (IQR)	1.0 (0-2)	1.1 (0-1)	NS
Return to normal activities, day (IQR)	8 (7-10)	8.1(7-9)	NS

NS: Not-significant; IQR (interquartile).

either group in the early follow-up of the patients. The two patients who underwent outpatient percutaneous needle aspiration of the seroma developed recurrence of the swelling after the procedure. Culture of the aspirated fluid was negative for microorganisms, and there was no superimposed infection.

## Discussion

Preperitoneal seroma, together with hematoma, is the most common complication after endoscopic TEP inguinal hernia repair.<sup>[8]</sup> The occurrence of seroma after laparoscopic inguinal hernia repair causes anxiety in patients. Especially, the perception of hernia recurrence brings with it anxiety that the patient will have surgery again. Therefore, the development of seroma should always be kept in mind, and the patient's anxiety should be eliminated by calling the patient for control by the surgery team. After TEP repair, most seromas disappear within 3 months, but the swelling in the groin area causes the patient to feel anxious and believe that the hernia is recurring.<sup>[5]</sup> The European Hernia Association defines and classifies seroma into types 0-IV.<sup>[9]</sup> Type 0 is no clinical seroma. Types I and II are known as incidents, which are often encountered in clinical practice and do not need to be dealt with. Types III and IV are called complications.<sup>[10]</sup> Type IV (seroma that needs to be treated) includes major seroma-related complications (need to puncture the seroma, seroma drained spontaneously, applicable to open approach, deep infection, recurrence, and mesh rejection).<sup>[11]</sup> In our study, type IV seroma was detected in two patients, and these patients were treated with nee-

dle aspiration under sterile conditions. Seromas seen in other patients resolved spontaneously after an average of 4 months. In our opinion, seromas observed after laparoscopic hernia repairs are a condition that should be taken seriously. Thus, Aravind and Cook's study found that aseptic surgery infection was mostly secondary to postoperative seroma, and when the time was prolonged and the effusion continued to develop, severe complications such as mesh displacement, local pain, and cellulitis might occur.<sup>[12]</sup> We think that preventing the development of seroma or keeping the duration of seroma short is important in this context. In our study, we found that drains placed in a closed system significantly reduced the development of seroma. Drains removed after 24 hours do not cause pain or a decrease in patient comfort.

In our study, the seroma formation was significantly lower in the drain group (n=5) than in the non-drain group (n=13; p<0.024). The rate of seroma formation in the non-drainage group (43%) was higher than the rates described in other studies (1.9% to 22%). The reason for this was interpreted as longer surgery times and wider dissection in the non-drainage group. Extensive dissection, mesh, and hernia type (direct or indirect) are effective in the development of seroma. Especially in large direct hernias, seroma accumulation in the defect area is an expected situation. Various techniques have been developed to prevent seroma formation. It suggests that closing or not closing the medial hernia defect in laparoscopic inguinal hernioplasty reduces the risk of recurrence and seroma formation without an increase in postoperative pain or

complications.<sup>[13]</sup> Pini et al.<sup>[14]</sup> suggest that suturing and fixing the transversalis fascia to the Cooper ligament in the treatment of direct inguinal hernia is a safe, feasible, and recommendable method to prevent postoperative seromas. In our study, it was determined that the type of hernia did not have a significant effect on the development of seroma in the group in which we used a drain. In 35 randomized controlled studies including a total of 3496 patients, no difference was found in the seroma incidence rates in patients undergoing laparoscopic repair and Lichtenstein repair.<sup>[15]</sup>

## Conclusion

Preperitoneal drainage for 23 hours after laparoscopic TEP hernioplasty for inguinal hernia can effectively decrease seroma formation in the early postoperative period and potentially improve postoperative pain. The frequent occurrence of seroma after TEP is confused with recurrence, especially after hernia surgery. This may cause fear and panic in the patient. It is effective for the patients to visit the surgeon who performed the operation at regular intervals for control to eliminate the concerns of the patients.

## Disclosures

**Ethics Committee Approval:** This study was approved by the Ethical Committee of the Fatih Sultan Mehmet Training and Research Hospital, Istanbul, Türkiye, on 25.10.2018 with registration number FSMEA-H-KAEK 2018/40.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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