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COMPARATIVE STUDY BETWEEN IPSILATERAL PORT POSITIONING VERSUS CONTRALATERAL PORT POSITIONING IN ETEP FOR INGUINAL HERNIA SURGERY

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ABSTRACT

Background: Enhanced-view totally extraperitoneal (eTEP) repair is an increasingly used minimally invasive approach for inguinal hernia surgery. Port positioning is an important technical consideration that may influence ergonomics, visualization, operative efficiency and postoperative recovery. This study compares ipsilateral and contralateral port positioning during eTEP repair of inguinal hernias.

Methods: A retrospective cohort study was conducted on 60 patients undergoing laparoscopic eTEP repair for inguinal hernia. Patients were divided into two groups of 30 each according to port placement: ipsilateral and contralateral to the hernia. Operative time, conversion, postoperative pain, ergonomic score, postoperative complications and time to return to work were compared between the groups. Statistical analysis was performed using the chi-square test, with a p-value <0.05 considered statistically significant.

Results: The mean operative time was 68.5 minutes in the ipsilateral group and 72.1 minutes in the contralateral group, with no statistically significant difference ($p=0.18$). Patients undergoing contralateral port placement had a significantly shorter mean time to return to work (4.0 vs. 5.5 days, $p=0.001$) and higher ergonomic scores (8.4 vs. 6.9, $p<0.001$). Postoperative pain scores were significantly lower with contralateral port positioning ($p=0.03$). Conversion rates were comparable between the groups ($p=0.27$), and postoperative complications did not differ significantly ($p=0.064$).

Conclusion: Both the port positions are efficient in performing the surgery. Contralateral port positioning during eTEP repair provides superior ergonomics and is associated with reduced postoperative pain and earlier return to work without increasing operative time or postoperative complications. Triangulation of instruments is especially useful in huge inguinal and complex hernias. It represents an useful alternative to ipsilateral positioning, particularly in anatomically challenging cases.

KEYWORDS: eTEP; inguinal hernia; port positioning; ipsilateral; contralateral; minimally invasive surgery; ergonomics.

INTRODUCTION

Minimally invasive techniques have revolutionized inguinal hernia surgery, with the enhanced-view totally extraperitoneal (eTEP) approach emerging as a preferred method of treatment for inguinal hernia. A crucial technical factor in eTEP is port positioning, which directly impacts surgical ergonomics, dissection ease, and procedural outcomes.Two main strategies are employed, Ipsilateral port positioning and contralateral port positioning.

Ipsilateral port positioning

In Ipsilateral port positioning, where trocars are placed on the same side as the hernia - the camera port is placed on the same side as the hernia 3cm lateral and 5cm cranial to umbilicus with the 2nd working port placed 1cm below the umbilicus in midline and the 3rd working port in the right iliac fossa. This gives a straight line configuration and so triangulation is lost.

A. Left side inguinal hernia

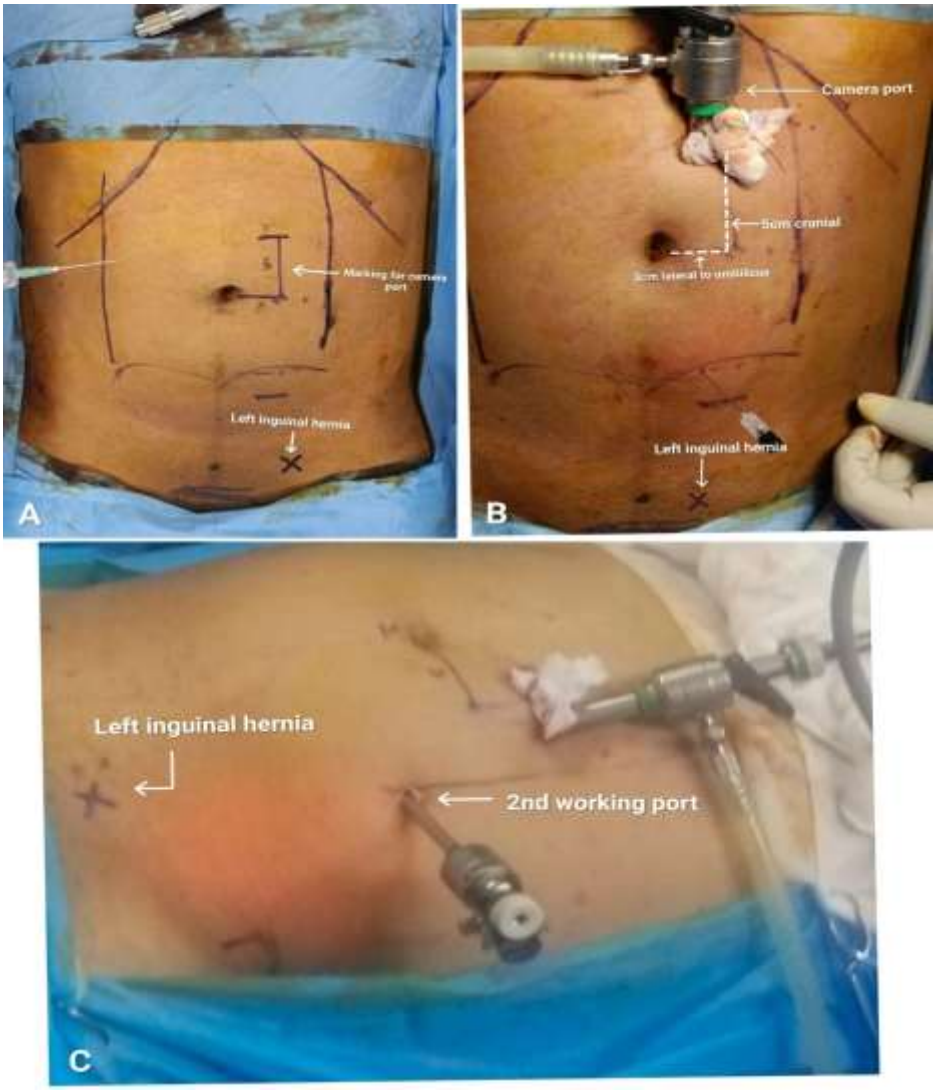

Fig. 1: (A) Left sided inguinal hernia with markings for camera port (B) Camera port positioning same side as the hernia i.e. left (Ipsilateral) (C) 2nd working port

B. Right side inguinal hernia

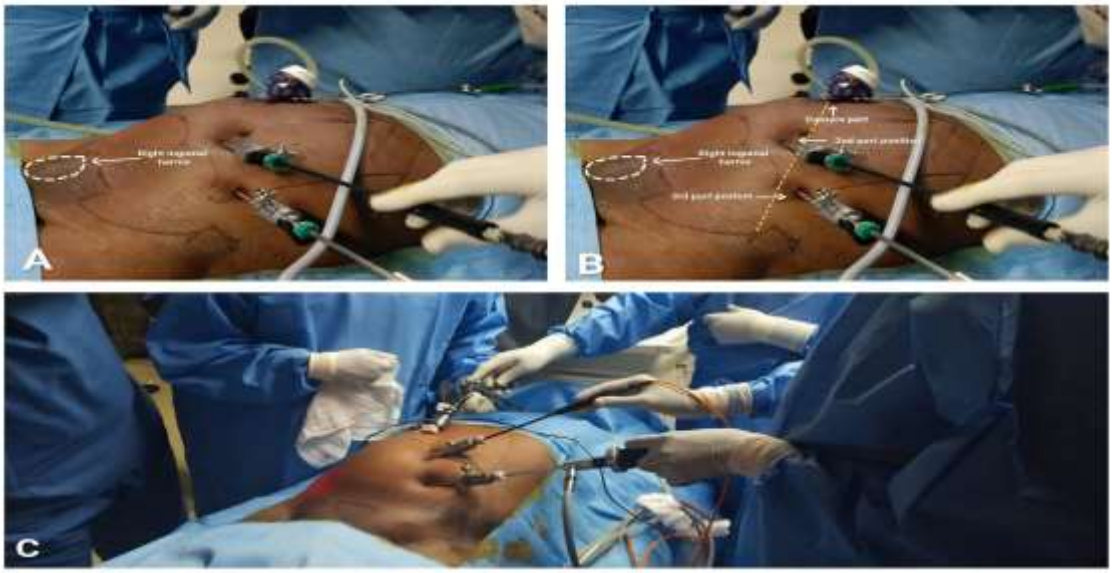

Fig. 2: (A) Right sided inguinal hernia (B) Camera port positioning same side as hernia i.e. right (Ipsiralateral), with 2nd and 3rd working port. All 3 trocars are in a straight line (yellow dotted line) (C) Operating team (on left) positioned opposite to the site of (right) hernia

Contralateral port positioning

Whereas in Contralateral port positioning access is gained from the opposite side - the camera port is placed in the opposite side to the hernia, 5cm lateral and 3cm cranial to the umbilicus. The second port is placed medial to the linear semilunaris at the level of umbilicus and the third port is placed just below the umbilicus and so triangulation is obtained.The surgeon stands opposite to the side of hernia

A. Left side inguinal hernia

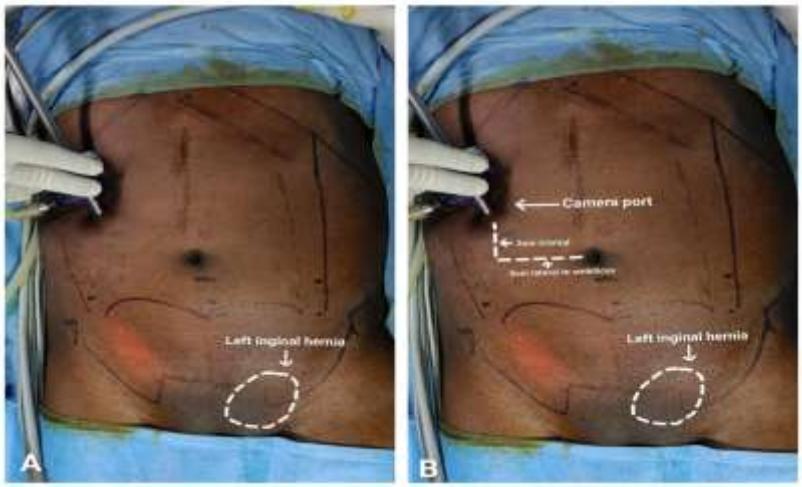

Fig. 3: (A) Left sided inguinal hernia (B) Camera port positioning opposite to the side of hernia i.e. right (Contralateral)

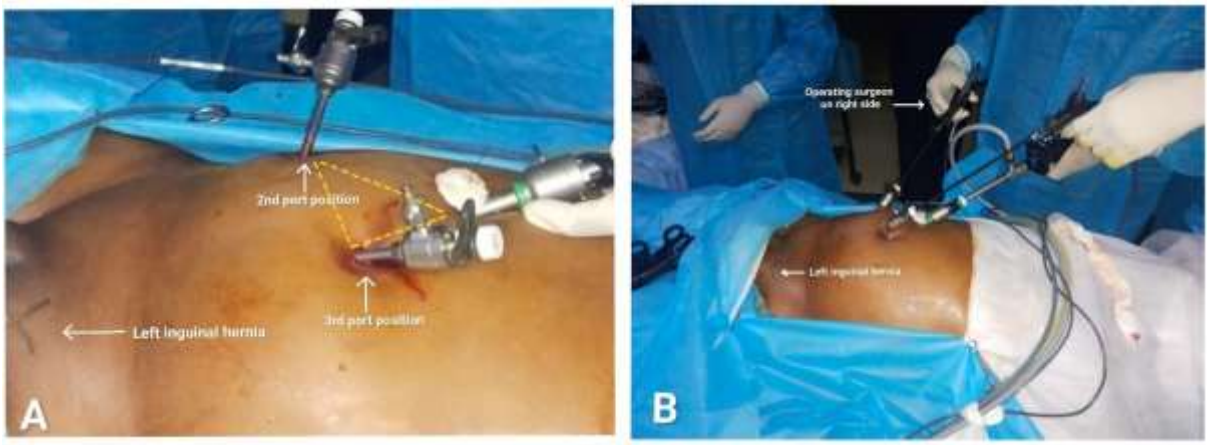

Fig. 4: (A) 2nd and 3rd working port position in contralateral port positioning with triangulation of instruments (yellow dotted line) (B) Position of the operating team - opposite to the side of hernia

B. Right side inguinal hernia

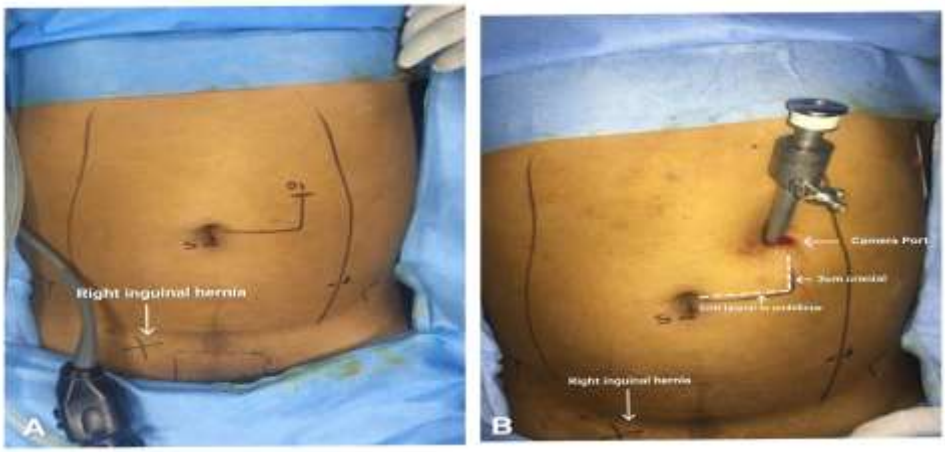

Fig. 5: (A) Right sided inguinal hernia (B) Camera port positioning opposite to the side of hernia i.e. left (Contralateral)

While ipsilateral positioning offers direct access to the defect, contralateral positioning may provide superior visualization and easier dissection in certain anatomical scenarios. Choice between these techniques remains largely based on surgeon preference,experience, and case-specific factors.
Aim of this study is to compare ipsilateral and contralateral port positioning in eTEP for inguinal hernia repair
The objective of the study is to compare the advantages and disadvantages of
ipsilateral port positioning and contralateral port positioning in eTEP hernia surgery by comparing various parameters such as peroperative factor like time for completing surgery, post operative complications, and postoperative pain score

MATERIALS AND METHODS

Study Design and Population

This retrospective cohort study included 60 patients who underwent laparoscopic eTEP repair for inguinal hernia performed between June 2023 to June 2025 . Patients were divided into two groups according to the port-positioning strategy used into - Ipsilateral port group and Contralateral port group consisting of 30 patients each
Group A - Ipsilateral port (n=30) - trocars placed on the same side as the hernia
Group B - contralateral port (n=30) - trocars placed on the opposite side to the hernia
Patients with unilateral inguinal hernias undergoing eTEP repair were included. Both direct and indirect inguinal hernias, including bubonocele and complete inguinal hernias, were considered.

Inclusion Criteria

Patients above the age of 18 with unilateral inguinal hernia undergoing laparoscopic eTEP repair, Direct or indirect inguinal hernia, Bubonocele or complete inguinal hernia

Exclusion Criteria

Patients with complicated hernias, including obstructed, incarcerated or strangulated hernias and gangrenous bowel, recurrent hernias, American Society of Anesthesiologists (ASA) physical status III or IV, Pantaloon hernia, Femoral hernia

Surgical Technique

All procedures were performed under general anesthesia with the patient in the supine position. The extraperitoneal space was developed using standard balloon or telescopic dissection, following which mesh placement and fixation were performed according to standard eTEP principles. The two groups differed specifically in port configuration as described above. In the ipsilateral configuration, the linear port arrangement results in loss of instrument triangulation, whereas the contralateral configuration achieves proper triangulation, which was hypothesized a priori to influence ergonomics, dissection ease, and downstream postoperative outcomes.

Outcome Measures and Definitions

The following perioperative and postoperative parameters were recorded and compared between groups:

Operative time: total duration from skin incision to closure, recorded in minutes.
Ergonomic score: surgeon-reported comfort and ease of instrument handling, scored on a 0–10 scale (0 = poorest ergonomics/most difficult instrument handling, 10 = optimal ergonomics/triangulation) using an institution-specific single-item ergonomic rating scale, recorded immediately postoperatively by the operating surgeon.
Postoperative pain: assessed using the Visual Analogue Scale (VAS, 0–10), recorded at 24 and 48 hours postoperatively, with additional trend data collected through postoperative day 3.
Time to return to work: number of days from surgery to resumption of the patient's routine occupational activity, as recorded during follow-up.
Postoperative complications: seroma, hematoma, surgical site infection, accidental pneumoperitoneum and conversion to TAPP, each recorded as present or absent during the inpatient stay and at follow-up.

Data collection and Statistical Analysis

Operative notes and case records provided the data for this study, covering patient demographics, hernia type, procedure type (TEP or eTEP), intraoperative parameters (total operative duration, timing of the tear, ease and completeness of decompression, need for conversion, and other intraoperative findings), and postoperative outcomes (VAS pain scores at 24 h and 48 h, complications, and length of hospital stay). Continuous variables were compared using Student’s t-test and categorical variables using the Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 60 patients were included, with 30 patients in each group. The demographic distribution was comparable between the two groups. There was a statistically significant difference in age distribution between the groups ($p=0.02$), whereas gender distribution was comparable ($p=0.40$).

Table 1. Age and gender distribution

Characteristic	Ipsilateral (n=30)	Contralateral (n=30)	P value
Age distribution, n (%)			0.02*
20–30 years	2 (6.7)	1 (3.3)	
30–40 years	4 (13.3)	2 (6.7)	
40–50 years	18 (60.0)	20 (66.7)	
50–60 years	6 (20.0)	6 (20.0)	
70–80 years	0 (0.0)	1 (3.3)	
Sex, n (%)			0.40
Male	19 (63.3)	21 (70.0)	
Female	11 (36.7)	9 (30.0)	

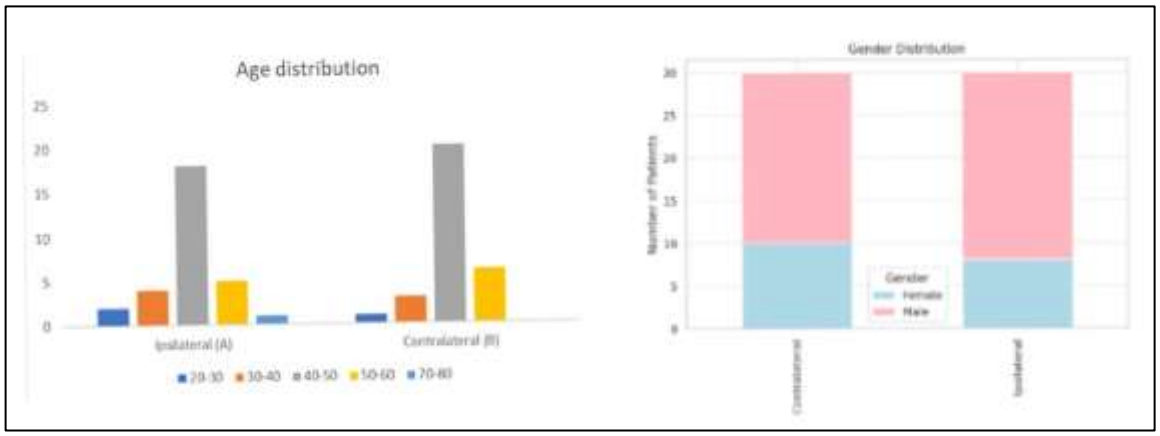

Fig.6 Age distribution of patients by port-positioning.

Fig.7 Gender distribution of patients by port-positioning

Perioperative and Functional Outcomes

The mean operative time was 68.5 minutes in the ipsilateral group compared with 72.1 minutes in the contralateral group. Although the ipsilateral group demonstrated a numerically shorter mean operative time, this difference did not reach statistical significance (p=0.18), indicating that the additional working space and triangulation afforded by contralateral positioning did not come at the cost of a materially longer procedure.

In contrast, contralateral port positioning was associated with significantly better postoperative functional recovery. The mean time to return to work was 4.0 days in the contralateral group compared with 5.5 days in the ipsilateral group (p<0.001), a difference of 1.5 days that is both statistically and clinically meaningful for patients returning to routine activity. The mean ergonomic score — reflecting surgeon-reported comfort, instrument triangulation, and ease of dissection — was also significantly higher with contralateral positioning (8.4 vs. 6.9 out of 10, p<0.001), consistent with the restoration of proper instrument triangulation in this configuration (Table 2).

Table 2. Perioperative and Functional Outcomes

Outcome	Ipsilateral (n=30)	Contralateral (n=30)	P value
Mean operative time (min)	68.5	72.1	0.18
Mean time to return to work (days)	5.5	4.0	<0.001*
Mean ergonomic score (0–10)	6.9	8.4	<0.001*
Mean postoperative VAS pain score (overall)	—	—	0.03*

*Statistically significant (p<0.05).

Postoperative Pain Trend

Postoperative pain scores (VAS) were significantly lower in the contralateral group overall (p=0.03). When examined across the first three postoperative days, the contralateral group showed consistently lower mean pain scores at Day 1 and Day 2, converging with the ipsilateral group by Day 3 as acute postoperative pain resolved in both groups (Table 3, Figure

8). This pattern suggests that the ergonomic advantage of contralateral positioning translates into a meaningfully lower early pain burden in the immediate 24–48-hour postoperative window, when analgesic requirements and patient discomfort are typically greatest.

Table 3. Postoperative Pain Score (VAS) Trend, Day 1–3

Postoperative day	Ipsilateral, mean VAS	Contralateral, mean VAS
Day 1	2.0	1.0
Day 2	1.5	0.5
Day 3	0.5	0.5

Overall between-group comparison, p=0.03. Day-wise values represent mean VAS scores as recorded in the original dataset; day-specific p-values were not separately computed.

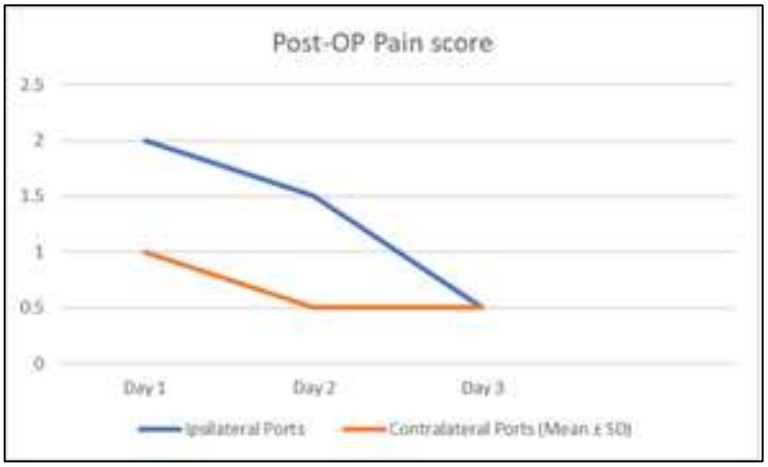

Figure 8. Trend in mean postoperative VAS pain scores over the first three postoperative days, by port-positioning group.

Postoperative Complications

Postoperative complications were recorded across five categories: seroma, hematoma, surgical site infection, accidental pneumoperitoneum, and conversion to TAPP. Numerically, seroma occurred more often in the ipsilateral group than the contralateral group (6.7% vs. 3.3%), though the difference did not reach statistical significance (p=1.000). No cases of hematoma, surgical site infection, or conversion to TAPP were recorded in either group. Accidental pneumoperitoneum was, in contrast, marginally more frequent in the contralateral group (20.0% vs. 16.7%), an unexpected finding given that improved triangulation and wider port spacing would typically be hypothesized to reduce inadvertent breaches rather than increase them; this difference was also not statistically significant (p=1.000). When all complications were considered together, the overall complication rate was identical between the two groups (23.3% each), indicating no meaningful difference in overall morbidity attributable to port-positioning strategy in this cohort. (Table 4, Figure 9)

Table 4. Postoperative Complications by Type

Complication, n (%)	Ipsilateral (n=30)	Contralateral (n=30)	P value
Seroma	2 (6.7%)	1 (3.3%)	1.000
Hematoma	0 (0.0%)	0 (0.0%)	
Surgical site infection	0 (0.0%)	0 (0.0%)	
Acc idental pneumoperitoneum	5 (16.7%)	6 (20.0%)	1.000
Conversion to TAPP	0 (0.0%)	0 (0.0%)	
Total (any complication)	7 (23.3%)	7 (23.3%)	1.000*

Individual complication categories were not independently powered for statistical comparison; the overall p-value refers to the composite “any complication” comparison.

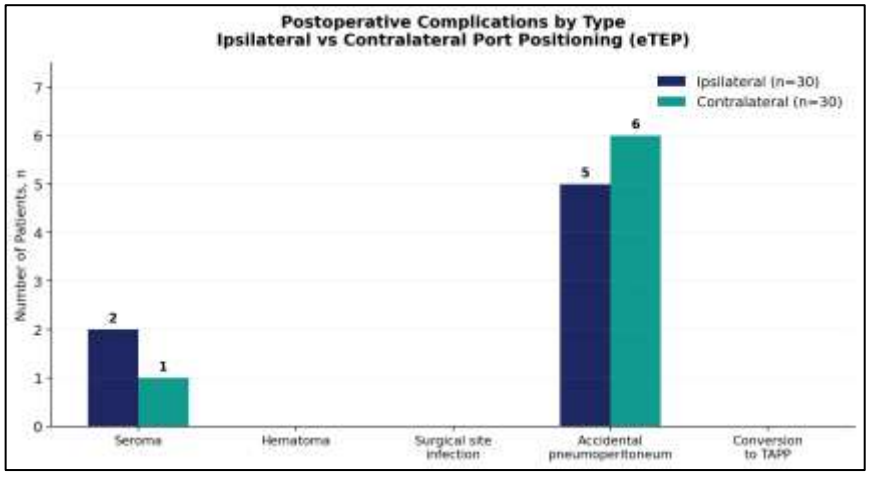

Figure 9. Postoperative complications by type and port-positioning group.

DISCUSSION

In this study, Contralateral port positioning demonstrated a trend toward improved ergonomics, better visualization of anatomical landmarks, and reduced postoperative pain. These findings align with the results from Singh et al. (2020), who compared triangular (TTEP) and midline (MTEP) port placements in TEP repair.

Singh et al. (2020) demonstrated that triangular port placement, which mimics contralateral access, resulted in significantly lower pain scores (VAS: 4.3 vs. 4.9, $p = 0.03$) and quicker return to work (4.0 vs. 5.5 days, $p = 0.001$) compared to midline ports in terms of Ipsilateral access, while ergonomically simpler for unilateral hernias and preferred during the early learning curve, may limit dissection angles and visualization. Daes (2012) emphasized that wider port spacing, akin to contralateral setups, enhances safety and reduces peritoneal breaches. Bittner et al. (2011) further supported this, noting that optimal port geometry improves operative efficiency

While operative time and complication rates were comparable, contralateral positioning consistently showed better ergonomic scores and surgeon satisfaction in huge inguinal hernias. Inadequate familiarity may lead to incomplete medial dissection, vascular injury (especially to inferior epigastric vessels), or difficulty in reaching the hernia defect.

Most studies—including Singh et al. (2020) and Bittner et al. (2011)—report low overall complication rates (<5%) in both techniques when performed by trained surgeons.

CONCLUSION

eTEP for inguinal hernia can be done with either of the port positions. Contralateral port positioning in eTEP inguinal hernia repair was associated with significantly better ergonomics, faster return to work, and lower postoperative pain compared to ipsilateral positioning, while operative time, conversion rate, and overall complications remained comparable between the two approaches. These findings suggest contralateral positioning may be preferable when ergonomic comfort with triangulation of instruments and faster recovery are priorities, whereas ipsilateral access remains a reasonable, simpler option for straightforward cases and surgeons early in the learning curve. Triangulation of instruments is especially useful in huge inguinal and complex hernias. Port choice in eTEP should therefore be individualized based on case complexity and surgeon experience, with larger prospective trials needed to validate these findings.

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