Pain and quality of life after laparoscopic unilateral inguinal hernia repair

Ahmed Azam, Waleed Borham, Ashraf Abbas, Magdy Basheer

Faculty of Medicine, Mansoura University, Mansoura, Egypt

Correspondence to Magdy Basheer, Department of General Surgery, Faculty of Medicine, Mansoura University, Mansoura, Egypt. Tel: +01003707093; fax: +20502202666; e-mail: magdymogazy@mans.edu.eg

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Introduction
Surgical repair of inguinal hernias is one of the most frequently performed operations. Transabdominal preperitoneal (TAPP) and Total extraperitoneal (TEP) methods are the two commonly employed laparoscopic methods for herniorrhaphy.
Objective
To evaluate the pain and quality of life (QoL) following laparoscopic inguinal hernia surgery utilizing the TAPP and TEP methods.
Patients and methods
One hundred individuals with unilateral inguinal hernias who had received a clinical diagnosis participated in this prospective trial. The research population was randomly split into two groups by computer-generated software: group A, which consisted of 50 inguinal hernia patients who experienced laparoscopic TAPP surgery, and group B, which consisted of 50 inguinal hernia patients who were treated with laparoscopic TEP surgery.
Results
After one week and one month postoperatively, the TAPP group had a higher median pain VAS score than the TEP group, which was significant statistically (*p* values 0.001 and 0.001, respectively). The two groups' VAS scores did not differ significantly after three- and six-months follow-up. In terms of preoperative and six-month postoperative QoL related domains, the TAPP versus TEP patients showed insignificant difference. Cases involving TAPP and TEP showed an increase of statistical significance in QoL domains from preoperative to six months following surgery.
Conclusion
According to our investigation, TEP is superior to TAPP. When performed by skilled hands, it appears to be the best method for repairing inguinal hernias.

Keywords:
inguinal hernia, pain, quality of life, transabdominal preperitoneal, total extraperitoneal

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Introduction

A common surgical issue known as an inguinal hernia is frequently accompanied by unfavorable changes in the patient's life that have a negative impact on their productivity at work and result in a significant socioeconomic burden [1,2].

Surgical repair of inguinal hernias is one of the most frequently performed operations. An estimated 20 million hernia are repaired every year worldwide [3,4].

TAPP and TEP are the two commonly employed laparoscopic methods for herniorrhaphy [5]. The approach is easier for TAPP repair, and it also has a big workspace and high-quality diagnostic tools. Another benefit is that TAPP repair has a shorter learning curve [6,7].

The indirect comparisons among TAPP and TEP techniques have brought to light some questions regarding whether the two procedures yield comparable or dissimilar outcomes as regards immediate pain, complications, rate of recurrence, and chronic groin pain after operations. The relative profits and drawbacks of the two procedures are still unknown because there is now insufficient data in order to properly compare them [5,8–10].

Nevertheless, few prior studies have examined the QoL following TEP versus TAPP surgery. Sufficient evidence was reported, concluding that TAPP and TEP are both successful approaches for laparoscopic inguinal hernia repair, making both procedures suitable choices for treating inguinal hernia [8].

This study was conducted to evaluate both pain and QoL before and after surgery to compare TAPP and TEP laparoscopic procedures for the repair of the inguinal hernia.

Patients and methods

In this prospective study, 100 patients with clinically proven unilateral inguinal hernias at the hospital of Mansoura University within the ages of 18 and 60 who matched the eligibility criteria were admitted to the general surgery ward between February 2021 and February 2022. All patients received signed permission when the protocol was explained to them. A computer-generated method was used to randomly split the research population into two groups: group A had 50 patients who had inguinal hernias and treated with laparoscopic TAPP surgery, and group B involved 50 patients who had inguinal hernias and treated with laparoscopic TEP surgery. We didn't include individuals with inguinal hernias that were bilateral, recurring, or complicated.

Preoperative assessment

Every patient had a thorough medical history review, clinical examination, anesthetic fitness assessment, and standard preoperative blood testing (CBC, test of renal function, test of liver function, prothrombin time, and random blood sugar). It was claimed that preoperative discomfort was evaluated using a visual analog scale (VAS) that ranges from zero (no pain) to 10 (the most extreme pain conceivable) [11]. Moreover, Qol evaluation was performed on patients prior to surgery and six months following surgery using the MOS SF-36 questionnaire, which is a 36-item short-form general health survey [12].

Operations

Usually, general anaesthesia was employed. Unasyn 1.5 gm IV, a single dose of peri-operative antibiotics, was administered at induction. In a supine posture, the patient was positioned. For the visceral organs to move away from the inguinal areas, about 30 to 45 degrees little Trendelenburg posture was often recommended. We positioned the patient arm on the side with the hernia at a 90 degree, and the other arm was tucked beneath the torso.

TAPP procedure

A Veress needle was inserted in Palmer's Point (closed approach) to induce pneumoperitoneum, which was then maintained at 15 mmHg. One 10 mm port was positioned in the midline supra umbilical region (a 30-degree scope) to accommodate the camera. Additional two openings, one 10 mm and one 5 mm, were positioned 5-7 cm distant along the same umbilicus transverse plane. A transverse peritoneal incision is created from the anterior superior iliac spine (ASIS) inner edge to the medial border of the ipsilateral medial umbilical ligament using curved scissors. The dissection started medially at the level of Bogros' retro-inguinal space, moved laterally to Retzius' retro-pubic space, and finally extended to the symphysis pubis and ilio pubic tract back, exposing the cooper's and pectineal ligament. The hernial sac's spermatic cord sections were dissected for examination. A 15×10 cm polypropylene mesh was folded and introduced into the abdominal cavity via the right 11 mm trocar. A 15×10 cm polypropylene mesh with a tapered medial end and a cigarette-like form was inserted using an 11 mm trocar. The mesh was placed across the femoral ring, indirect inguinal, and direct inguinal regions (Hesselbach's triangle). To maintain the mesh's position, an endoscopic multi fire hernia tucker was employed. Finally, zero Vicryl sutures were used to stitch the fascia at the port site of the supra umbilical to prevent port site hernias. After that, 2-0 proline sutures were used to seal the skin.

TEP procedure

Just below the umbilicus, which was slightly moved toward the side of the hernia, a 1 to 2-cm skin incision was performed. We sharply divided the subcutaneous fat tissue to access the anterior rectus sheath, which was then excised, and by blunt dissection for the 1st Trochar administration, a gap was first made between the muscle of the rectum and the posterior rectal fascia. A 10 mm trochar is inserted in front of the sheath of the posterior rectus. In order to make this area larger, CO2 was inhaled, and the camera was then placed there to conduct a telescopic dissection. In most cases, the direct hernia was decreased even before anatomic landmarks were identified following a good balloon dissection. Oblique hernia sacs that were tiny and incomplete were entirely reduced, whereas larger hernias might be split and ligated. The mesh was then inserted into the umbilical port and fastened using absorbable tackers. Vicryl 0 was used to stitch the fascia of the camera port, and Proline 2-0 was used to close the skin.

In both procedures, the operative time and any intraoperative complications were recorded.

Postoperative assessment

All patients received standard postoperative care, which included mobilization and resumption of a normal diet as soon as possible. All patients had

early postoperative examinations for any early problems, including postoperative discomfort, bleeding, infection at the site of the incision, scrotal edema, and seroma development. Follow-up visits were accomplished after one week, 1 month, 3 months, and 6 months. In all follow up visits pain assessment via VAS after operation [11], while after 6 months, QoL assessment via MOS SF-36 questionnaire were recorded [12].

Statistical analysis of data

Data was fed into the computer and analyzed using IBM SPSS Statistics for Windows, version 22.0. IBM Inc., Armonk, New York. The terms used to define qualitative data were number and percentage. The median (minimum and maximum), mean, and standard deviation were used to summarize the data after the Kolmogrov-Smirnov test established that the quantitative data were regularly distributed. Using qualitative data, Chi-Square and Fischer exact tests were applied. To compare quantitative data between groups, Wilcoxon signed Rank tests, Mann-Whitney U tests, paired t-tests, and student t-tests were utilized. The significance of the gathered data was assessed using the (0.05) threshold.

Results

The TAPP group age mean±SD is 43.84±12.88 years versus 39.78±13.64 years for the TEP involved group, demonstrating that there was a difference, that was not significant statistically, in the mean age of the groups under study. Also, there is a difference of no statistical significance in preclinical data among the groups that were evaluated (Table 1).

There were significantly higher means operative time for TAPP group versus TEP group (97.58±9.17 vs. 71.48±9.32, $P<0.001$). The amount of time needed to complete an operation, from skin incision to skin closure is so-called the operative time (Table 1).

Regarding the intraoperative, early postoperative, or late postoperative complications frequency, there was a difference that was not significant statistically between the groups analyzed. Regarding intra-operative complications, one case among TAPP group had intraoperative intestinal injury which repaired with vicryl 2/0. Regarding early postoperative complications, 5 cases involved within the group of TEP, and 2 patients involved in the group of TAPP experienced seroma. The seroma was clinically assessed and managed conservatively. Two patients among TEP group developed scrotal involved hematoma that was examined by US one week post operatively and managed conservatively. Regarding late postoperative complications, two cases among TAPP group developed hydrocele, one case developed cord edema and two cases complained of recurrence 3 months after the operation.

The median pain VAS score before surgery was not significant (P value=0.429). After one week and one month postoperatively, the median pain VAS score was greater in the TAPP group as compared to the TEP group. The difference found was significant statistically (P value<0.001) for one week and (P value=0.001) for one month postoperatively. The VAS score difference between the two groups was minor after 3 and 6 months of follow-up (Table 2).

Concerning QoL, a difference of no statistical significance was found between the cases of TAPP versus TEP cases regarding QoL domains preoperatively and after six months of the operation (Figs 1 and 2). While there was a statistically significant increase of QoL domains from preoperative to after 6 months postoperative in cases

Table 1 Demographic and preoperative data of both groups

	TAPP (n=50)	TEP (n=50)	Test of significance
Age/years (Mean±SD)	43.84±12.88	39.78±13.64	t=1.53 P=0.129
Side of Hernia n (%)			
Right	26 (52.0)	29 (58.0)	χ2=0.364
Left	24 (48.0)	21 (42.0)	P=0.546
Type of hernia n (%)			
Indirect	45 (90)	42 (84)	χ2=0.796
Direct	5 (10)	8 (16)	P=0.372
Medical history n (%)			
–ve	39 (78)	35 (70)	χ2=0.832
+ve	11 (22)	15 (30)	P=0.362
Operative Time/minutes			t=14.12
Mean±SD	97.58±9.17	71.48±9.32	$P<0.001$*

χ^2=Chi-Square test, t: Student t test. *Statistically significant.

of both TAPP and TEP (Figs 3 and 4). In TAPP and TEP cases, the highest percentage of improvement is detected for role limitations (134.2% vs. 114.1%, respectively) due to physical health with the lowest improvement is detected for physical functioning (26.4% vs. 29.6%, respectively).

Discussion

Nevertheless, few studies have evaluated QoL following TEP versus TAPP repair, despite the fact that there is enough evidence to suggest that both TAPP and TEP are efficient approaches for repairing inguinal hernia [1,8]. As a result, after either TAPP or TEP involved laparoscopic inguinal hernia repair, we assessed both pain and QoL.

The two groups in this investigation differed significantly in terms of the operative time.

Our findings are similarly in line with those of **Vinay and Balasubrahmanya** [13] who observed that the mean operating duration was substantially longer in TAPP than in TEP (P=0.001), with the TAAP's mean operative time being 68±5.4 min compared to 54 ±6.63 min for TEP. In the same line, **Günal *et al.*** [14] randomized controlled studies showed that TAPP significantly required more operational time than TEP. Additionally, **Krishna *et al.*** [15] discovered that the TAPP technique required more time during surgery (mean 72.32 min) than the TEP technique (62.13 min), but that difference was not significant statistically. They attributed this to the longer time needed to close the peritoneal flap over the mesh.

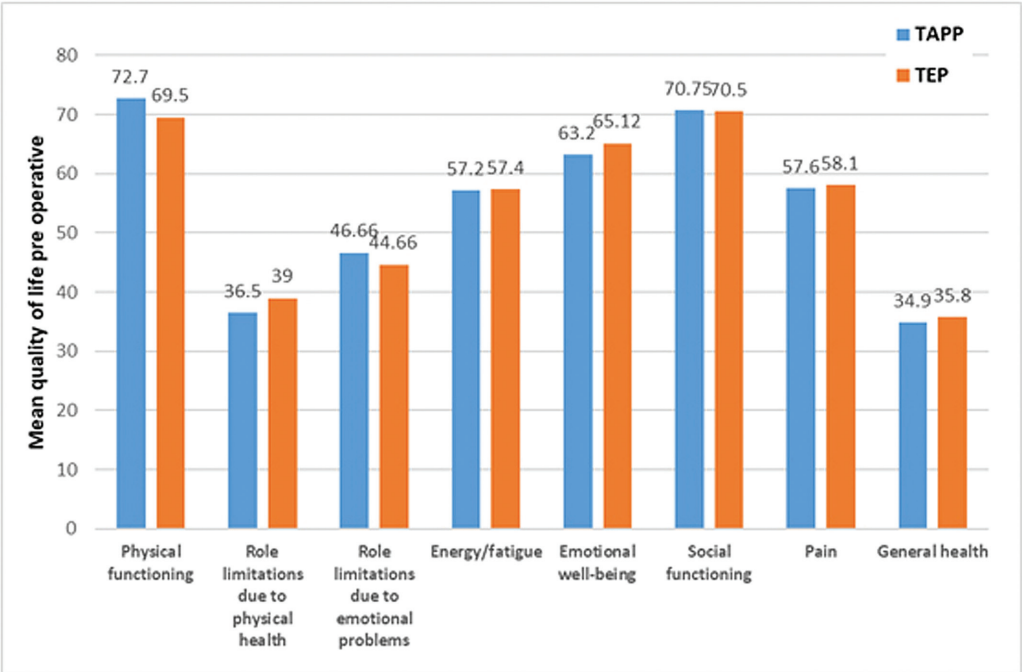
Contrary to our study, **Bracale *et al.*** [16] study, in contrast to ours, revealed a difference, that was not significant statistically, in the operation duration for either approach, however, TEP required a lengthy time of operation**. Moreover, Gong *et al.*** [17] who included simple unilateral inguinal hernia in their investigation, discovered that TEP required longer operating time

Table 2 Pre and post operative VAS scores for both groups

Pain	TAPP (n=50)	TEP (n=50)	Test of significance
Preoperative	5 (4–7)	6 (4–7)	Z=0.793
			P=0.429
1 week post operative	2 (0–3)	1 (0–3)	Z=6.74
			P<0.001*
1 month post operative	0 (0–1)	0 (0–0)	Z=3.32
			P=0.001*
3 months post operative	0 (0–0)	0 (0–0)	Z=0.0
			P=1.0
6 months post operative	0 (0–0)	0 (0–0)	Z=0.0
			P=1.0

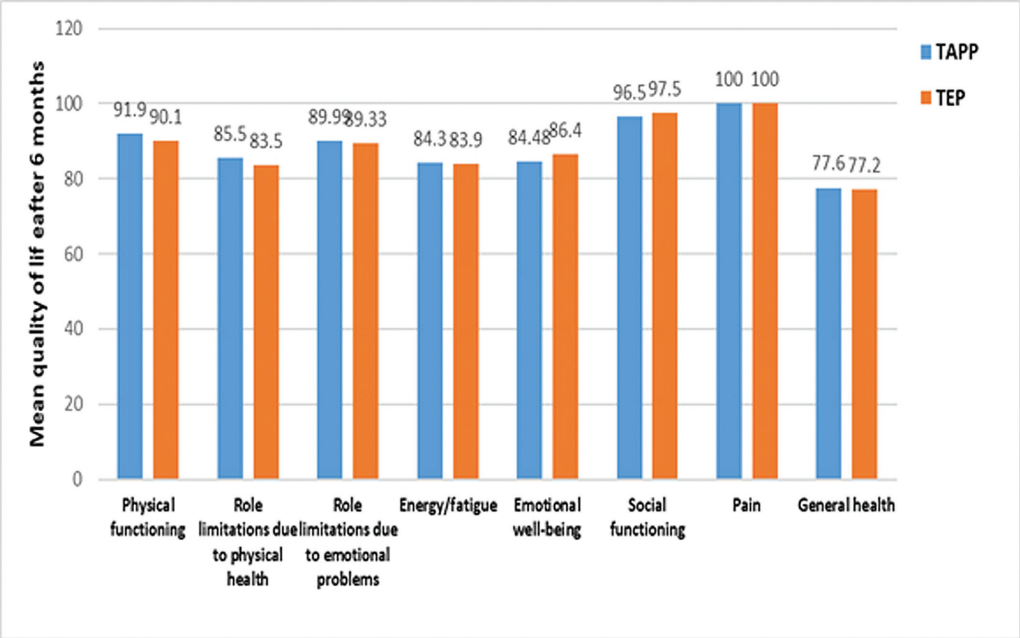
Z: Mann Whitney U test. *Statistically significant, pain is described as median (range).

Figure 1



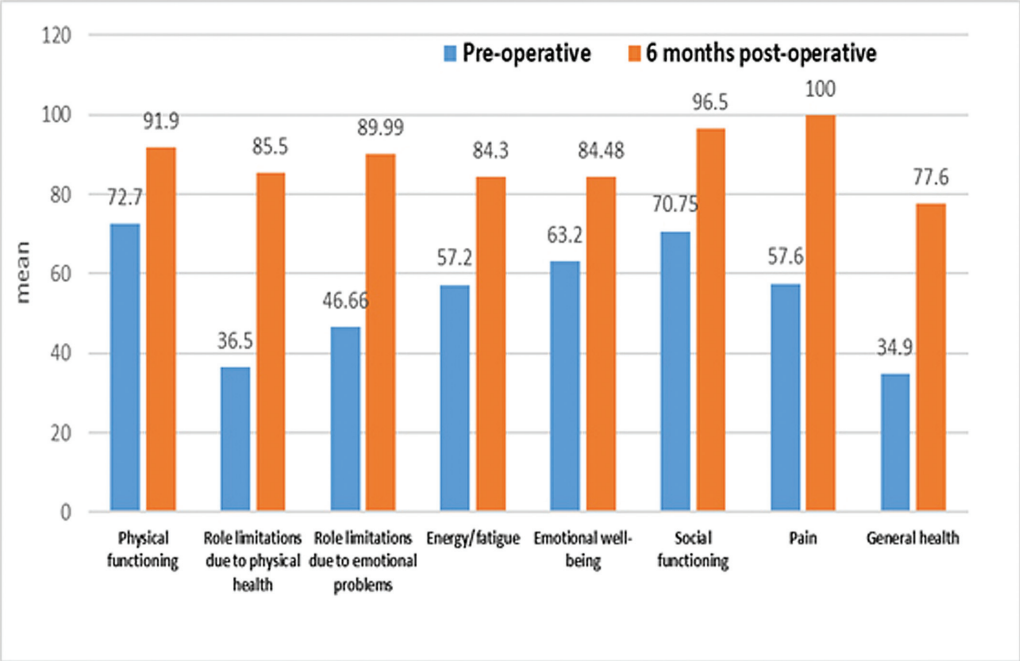
Mean quality of life between studied groups preoperative.

Figure 2



Mean QoL after 6 months between studied groups.

Figure 3

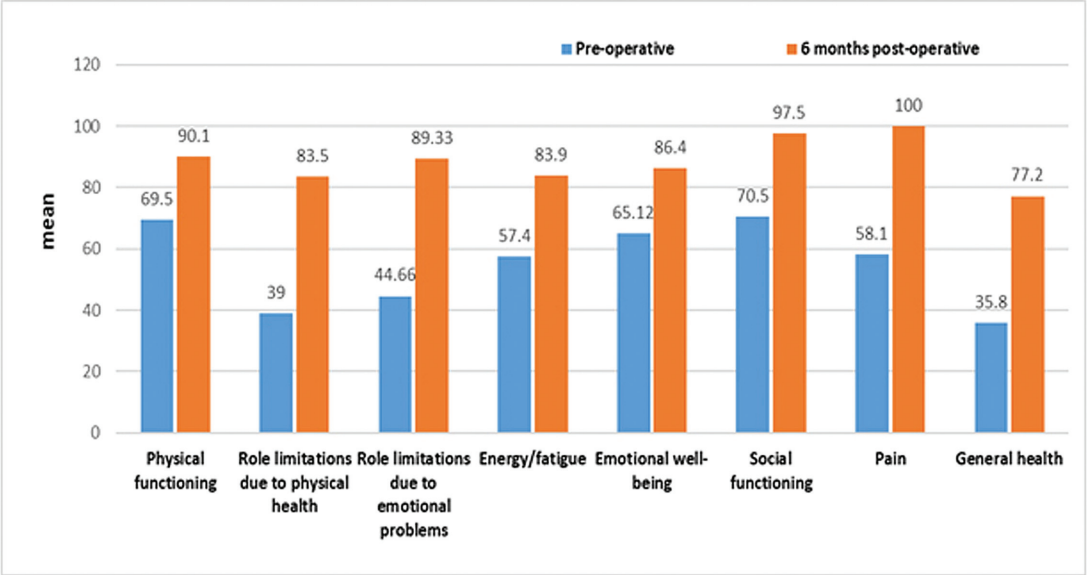


Mean QoL change between pre and postoperative after 6 months among TAPP group.

than TAPP. The prolonged procedure duration for TEP is attributable to the limited working area and difficulties in appreciating anatomical markers that are often observed during TAPP from inside the peritoneal cavity.

It is widely known that pain is the most typical complaint post hernial surgery. In this study, TAPP patients had substantially higher postoperative pain equivalent VAS scores than TEP patients, who had lower VAS scores on the first postoperative day, the first week, and first month after operation ($P<0.001$, $P=0.001$, and $P=0.001$, respectively). This is explained by the fact that TAPP uses more tuckers for mesh attachment and peritoneal flap closure, that the procedure takes just a brief time, that the abdominal

Figure 4



Mean QoL change between pre and postoperative after 6 months among TEP group.

cavity is not accessible, and that the TEP approach does not use peritoneal sutures. Operative pain in TAPP patients was significantly prolonged than it was in the TEP group ($P< 0.0001$) according to **Krishna *et al.*** [15].

In **Bansal *et al.*** [18] comparative's study, patients who treated with TAPP technique had significantly more postoperative experienced pain 24 h ($P<0.001$) postsurgery than patients who endured TEP hernioplasty, whose need for parenteral analgesia was significantly lower than that of TAPP involved patients. The reason for these increased pain scores on the TAPP may be attributed to peritoneal incision, flapping, and subsequent closure by suturing or tacking.

In their study comparing TAPP with TEP, **Lepere *et al.*** [19] discovered that patients who received TAPP had significantly greater pain levels 24 h post operation than those who underwent TEP.

Similar postoperative pain levels were seen in patients who underwent TAPP and TEP on the first day post operation and also week one postsurgery in a study done by **Gong *et al.*** [17].

On contrary, in a recent work, **Rodha *et al.*** [10] stated in a recent study that the TAPP approach had reduced discomfort in the initial postoperative phase. At one week following surgery, there is no discernible difference between the two groups' levels of discomfort. According to the researchers, this is attributable to the extensive dissection that took place during the operation. Another potential explanation for the TEP group's higher degree of discomfort is that in TEP group, patients with indirect inguinal hernias were more than those in the TAPP group.

While **Bansal *et al.*** [18] revealed comparable results between TAPP and TEP in the chronic groin pain prevalence, sixteen patients (6.1%), at 1 and 3 months of follow-up, experienced across the upper region of the thigh and scrotum chronic discomfort and also numbness as well. Overall numbness incidence was almost the same among the two procedures (9 vs. 7 in TAPP and TEP, respectively).

The phrase 'perception of patient's everyday life with regard to the quality of well-being' can be used to describe the QoL in hernia sufferers. In a medical environment, a patient's (QoL) can be evaluated in relation to how any sickness or disability is affecting their well-being over time.

Both groups in our research significantly improved their QoL from before surgery to six months thereafter. In all areas, the TEP group showed a noticeable improvement. The highest percentage of improvement is detected for role limitations due to physical health (114.1%) with the lowest improvement is detected for physical functioning (29.6%). The TAPP group significantly improved in all areas, with the highest percent of improvement is detected for role limitations due to physical health (134.2%) while the

lowest improvement is detected for physical functioning (26.4%). Nonetheless, postoperatively, in terms of QoL, both groups were comparable.

In agreement to our study, post laparoscopic inguinal hernia surgery**, Bansal *et al.*** [18] showed that all QoL parameters significantly improved with no statically significant difference between both the TEP and TAPP involved groups. This was more likely brought on by the absence of sickness, the patients' perception of less discomfort, and their return to their regular daily activities.

According to **McCormack *et al.*** [20] open repair was outperformed by TAPP and TEP in terms of QoL years.

A research by, **Hosney *et al.*** [21] found that all Qol outcome parameters after TEP repair improved significantly, except for social interaction and mental health. The TEP group showed overall changes in physical and mental QoL measures that were considerably superior.

Nevertheless, owing to the short follow-up duration, and small size of sample that limited our work, longer-term studies are recommended. For the surgical community, we also recommend that research should concentrate on analyzing certain subgroups (e.g., gender-specifics, unilateral, bilateral, recurrence, individuals with high-risk, etc.), developing personalized methods, outcomes reported by the patients, and long-term follow-up (more than 5 years).

Conclusion

In the current study, TEP considerably outperformed TAPP in terms of much shorter operating times, immediate postoperative pain lasting up to 1month, resulting in more rapid return to regular daily activities. TEP surpasses TAPP in terms of these outcomes, however both techniques showed significant post operative improvement in terms of quality of life without significance of one technique over another. TEP appears to be the ideal method for repairing inguinal hernia when operated by qualified hands.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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