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COMPARATIVE STUDY OF CLINICAL OUTCOME OF SINGLE INCISION TAPP VS CONVENTIONAL TAPP

General Surgery

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ABSTRACT

Introduction: Inguinal hernias are one most common problem dealt by general surgeons and have statistically significant morbidity and mortality. In India, the estimated annual incidence of inguinal hernias is 1,957,850.

Aim: To evaluate the safety and feasibility of SILS-TAPP compared with TAPP technique.

Material and Methods: Patients older than 18 years of age underwent TAPP or SILS-TAPP between December 2018 to June 2020 in the department of surgery, Maharani Laxmi Bai Medical College, Jhansi, After the patients were informed about the surgical procedure and potential complications of the surgery, written informed consents were obtained from all the participants.

Result: The study was done on 60 patients. Out of which 30 patients were included in group A (TAPP) and 30 patients were included in Group B (SITAPP). The mean operating time in our study was TAPP group 31.13±8.7 and SITAPP group 42.4±13.4. No major intraoperative complications were observed in our study such as vessel, intestine or bladder injury. Long term complications like mesh infection, post site hernia and recurrence were not detected in both the groups TAPP and SITAPP.

Conclusion: In the experienced laparoscopic surgery center SITAPP inguinal hernia repair is a feasible and safe technique with remarkable cosmesis.

KEYWORDS

Inguinal hernia repair, laparoscopy, single-incision laparoscopic surgery

INTRODUCTION

Utilization of industrial waste products in Inguinal hernia repair is the most frequently performed surgical procedure worldwide[1]. Many different surgical procedures have been described, and tension-free repair using a prosthetic mesh became the mainstay of hernia surgery. Laparoscopic inguinal hernia repair has a number of advantages over conventional open repair. Therefore, laparoscopic transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) techniques are frequently preferred[2-4]. When comparing the two techniques, TAPP is easier to learn and may be associated with a shorter learning curve[5].

This is related to the large working space in TAPP repair. Recent studies have been focused to minimise further the invasiveness of laparoscopy by reducing the number of incisions and the port size. In this way, pain and complications associated with incisions were decreased. Single-incision laparoscopic surgery (SILS) was developed with the aim of reducing the invasiveness of conventional laparoscopy, and has been successfully performed by many surgeons[6-8].

AIM

- The aim of this study was to evaluate the safety and feasibility of SILS-TAPP compared with TAPP technique.

MATERIAL AND METHODS

Patients older than 18 years of age underwent TAPP or SILS-TAPP between December 2018 to June 2020 in the department of surgery, Maharani Laxmi Bai Medical College, Jhansi, After the patients were informed about the surgical procedure and potential complications of the surgery, written informed consents were obtained from all the participants. Surgical techniques were selected based on the patient's request only. The data include age, gender, body mass index (BMI), operative time (placement of ports to skin closure), length of hospital stay (defined as operation day to discharge day from the hospital), visual analogue scale (VAS) score 24 h after the surgery, operative complications, and short-term and long-term outcomes obtained from hospital charts and office records. Patients with complicating diseases resulting in ASA classification score IV, contraindications to laparoscopic surgery such as previous laparotomy or huge chronic scrotal hernia were also were excluded from the study.

All operations were performed by the same surgeon who had experience in single-port surgery. After standard preoperative preparation, a single intravenous dose of antibiotic prophylaxis (cefazolin 1 g) were administered before induction, and all the patients underwent surgery under general anaesthesia. A similar surgical technique through a single umbilical port with conventional instruments was done to perform SILS-TAPP repair.

A standard postoperative analgesic protocol was followed with intravenous petidine hydrochloride 50 mg after operation, intravenous paracetamol 500 mg every 6 h. Postoperative pain scores were determined on a visual analogue scale 24 h after surgery. Patients were asked to rate their pain in the range of 0 (no pain) to 10 (most pain) that most closely expressed their level of postoperative pain.

Operative techniques:

The patient is placed in a supine position on the operating table and the surgeon stood on the opposite side of the hernia. The first 10-mm trocar introduced through the umbilicus closed veress needle technique. Additionally, two 5-mm ports were placed on the right and left sides of the camera port. The 10-mm camera port used to introduce the mesh and a 30-mm curved needle for peritoneal suturing. The peritoneal cavity insufflated with CO2 to a pressure of 12 mmHg, and a 30° laparoscope s inserted. The patient is placed in a Trendelenburg position with the hernia site rotated up to allow slipping of the bowel. The peritoneum is incised using hook electrocautery from the upper edge of the inguinal floor toward the medial umblical ligament, and the preperitoneal plane developed with sharp and blunt dissections. The hernia sac was carefully separated from the epigastric vessels and vas deferens. A 10 × 15 cm-sized polypropylene mesh (introduced through the 10-mm trocar, placed over the inguinal floor. All potential hernia areas were covered with meshes such as Hesselbach's triangle, inguinal ring, and femoral ring. The mesh tacked to the transversus abdominis, iliopubic tract, and Cooper ligament using absorbable tackers. The peritoneal flap is then closed with running sutures or tackers. The pneumoperitoneum was released, and skin closure was performed with absorbable cutaneous sutures.

SILS-TAPP was performed with a similar technique to the standard TAPP repair through a single umbilical port. A single 2.0-3.0 cm transverse transumbilical skin is made after averting the umbilicus and than one 10 and two 5mm ports inserted to facial sheath and facial incision. After creation of pneumoperitoneum at pressure of 12 mmHg, two 5-mm working ports and a 10-mm camera port was

inserted. The peritoneal flap was prepared.. A mesh was placed, and the peritoneum was closed with standard laparoscopic instruments or tackers. After releasing the pneumoperitoneum, the umbilical fascia was routinely closed with vicryl suture and the skin was sutured with 4-0 absorbable intradermic sutures (Monocryl, Ethicon).

STATISTICALANALYSIS:

The evaluation of patient data is performed by using Statistical Package for the Social Sciences (SPSS) version 20.0 program (SSPS, Inc., Chicago, IL, USA). Continuous variables were presented as mean ± standard deviation and categorical variables as the number (%). Continuous variables will be compared using the Student's t-test.

RESULT

Table 1: Age distribution

Age (in years)	Group A [TAPP]		Group B [SITAPP]	
	Number of patients	Percent	Number of patients	Percent
18-30	10	33.33%	11	36.67%
31-40	07	23.33%	01	3.33%
41-50	05	16.67%	07	23.33%
51-60	05	16.67%	05	16.67%
>60	03	10.00%	06	20.00%

Table 2: Mean age distribution

Mean age (in years)	Group A [TAPP]	Group B [SITAPP]	p value
Mean±SD	39.97±16.108	43.27±18.309	0.4616 (NS)

Table 3: Sex distribution

Sex distribution	Group A [TAPP]		Group B[SITAPP]	
	Number of patients	Percent	Number of patients	Percent
Male	30	100%	30	100%
Female	0	0.00%	0	0.00%

Table 4: Preoperative diagnosis distribution

Preoperative diagnosis	Group A [TAPP]		Group B [SITAPP]	
	Number of patients	Percent	Number of patients	Percent
Bubonocele	19	63.33%	15	50.00%
Funicular	12	40.00%	14	46.67%
Scrotal	02	6.67%	03	10.00%

Table 5: Mean operating time

Mean operating time (in minutes)	Group A [TAPP]	Group B [SITAPP]	p value
Mean±SD	31.13±8.661	42.40±13.421	0.0003 (S)

Table 6: Mean visual analogue scale (VAS)

Mean visual analogue scale	Group A [TAPP]	Group B [SITAPP]	p value
1st 24hours	3.57±0.728	3.10±0.584	0.0078 (S)
Next 24hr	2.13±0.681	2.10±0.481	0.8445 (NS)

Table 7: Postoperative complication

Postoperative complication	Group A [TAPP]		Group B [SITAPP]	
	Number of patients	Percent	Number of patients	Percent
Seroma	02	6.67%	01	3.33%
Hematoma	00	0.00%	00	0.00%
Urinary Retention	02	6.67%	03	10.00%
Ileus	01	3.33%	02	6.67%
Superficial wound infection	01	3.33%	02	6.67%

Table 8: Mean hospital stay

Mean hospital stay (in days)	Group A [TAPP]	Group B [SITAPP]	p value
Mean±SD	2.87±0.571	2.07±0.521	0.0001 (S)

Table 9: Long term postoperative complication

Long term postoperative complication	Group A		Group B	
	Number of patients	Percent	Number of patients	Percent
Mesh infection	00	0.00%	00	0.00%
Chronic pain	02	6.67%	00	0.00%
Port site hernia	00	0.00%	00	0.00%
Recurrence	00	0.00%	00	0.00%

Table 10: Mean Cosmesis

Mean cosmesis	Group A [TAPP]	Group B [SITAPP]	p value
Mean±SD	3.73±0.450	2.33±0.479	0.002 (S)

DISCUSSION

SILS procedures require modification in technique as compared to the standard laparoscopic approach. This is because of the very close proximity of the fulcrums of the instruments to each other (1.5 to 2.0 cms apart), which naturally results in clashing of instruments both inside and outside the body. The problem of clashing of ports was partly offset by using two 5 mm simple tube trocars instead of the flap valve trocars flanking the 10 mm trocar.

The learning curve especially with conventional instruments is also not very long. However, the same cannot be said for the use of special instruments which require a long learning curve.

Having said that it must be acknowledged that the success of advanced SILS procedures is in large part because of the advent and availability of transumblical ports, like triport and airseal port, which have multiple entry points. The procedures have been further facilitated by the recent introduction of rotating instruments and curved instruments. Single incision repair of groin hernias, either as single incision totally extraperitoneal repair (SITEP) or SITAPP is now being, successfully, carried out more and more frequently.While SITEP is usually done through an extraumbilical incision SITAPP is also possible through a transumbilical approach giving it a cosmetic advantage. SITEP cannot be done through a transumbilical approach because accessing the preperitoneal space through an umbilical approach would be difficult and the skin incision would have to be infraumbilical and thus the cosmetic advantage would be lost. So to retain the cosmetic advantage of an umbilical incision, TAPP appears to be a better option.

The placement of the incision differs across various reports, being supra umbilical, infraumbilical or transumbilical. The only approach in all our patients was the transumbilical approach with mobilization of the lower flap. The incision size in all the reports varies between 2.0 cm-3.0 cms. Our incision size also varied between 2.5-3.0 cms. It is obvious that the transumbilical incision, rather than a supra or infraumbilical incision, will result in a more cosmetic scar and a nearly normal looking umbilicus. Routine ports suffice for the SILS approach although most of the reports mention SITEP repairs with special ports. In this study, we have evaluated conventional three-port TAPP and single-incision TAPP repair with respect to perioperative events and postoperative outcomes.

Series reports for SITAPP repair for inguinal hernias, too, are very few and interspersed with case reports. Menenakos reported on a patient with B/L inguinal hernia in whom they performed a SITAPP. The incision was supraumbilical and Triport access was used, however type of instruments has not been mentioned. **Pesta et al**[9] used the Coviden port for SITAPP, **Ishikawa et al**[6]. reported on a patient of inguinal hernia where SITAPP repair was done with the aid of Radius Surgical system for suturing. A series of 15 patients, in whom SITAPP had been carried out, has been reported recently. Routine ports and rigid instruments have been used in this study. We too perform all our procedures with routine one 10 mm and two 5 mm tube ports and routine rigid instruments.

The peritoneal closure in SITAPP is routinely performed using tacks and very rarely by intracorporeal suturing. **Norihiko Ishikawa et al**[6] closed the peritoneal flap with a suturing system. The other studies do not specifically mention the method of closure of the peritoneal flap and it probably means that it was with the conventional method of using tacks. Preference for tacks is because of the technical difficulty of performing intracorporeal suturing in SITAPP.

The suturing in the initial stages was demanding but once we learned to do it right, we could accomplish it fairly easily. But the comparative time as compared to when tacks were being used was significantly more although the cost was significantly less.

Age:

Age (in years)	Group A [TAPP]		Group B [SITAPP]	
	Number of patients	Percent	Number of patients	Percent
18-30	10	33.33%	11	36.67%

31-40	07	23.33%	01	3.33%
41-50	05	16.67%	07	23.33%
51-60	05	16.67%	05	16.67%
>60	03	10.00%	06	20.00%

Many studies support the fact that the inguinal hernia are more common in male and middle age people are the commonly seen. In our study all 60 patient were males.

There was a statistically significant difference between the two groups regarding age. The mean age of patients was 39.97±16.10 in the TAPP group and 43.27±18.30 years in SILS TAPP group. In our study most of the younger age population of 18-30 (TAPP-10 and SITAPP 11) year mostly prefer laparoscopic hernia repair because of cosmetic results. SITAPP demanded more than TAPP.

Sex:
This cloud further justified by the fact that men have more tendency to inherent weakness along the inguinal canal due to different anatomical features. Usually in the early post natal period. The inguinal canal closes almost completely but due to some congenital abnormality or due to idiopathic reasons some time it does not close properly, leaving a weakened area especially in males. In females there is less chance that the inguinal canal will not close after birth.

Thus in our study since all patients are male it can be concluded that hernia is more common in males.

Preoperative diagnosis:
Depending on relationship to inferior epigastric vessels; an inguinal hernia can be direct or indirect. It has been well established that indirect inguinal hernia is most common abdominal hernia.

In our study we also observed that the indirect inguinal hernia was more common than direct; seen in 24 (80%) patient in TAPP group in which 2 (6.67%) patient are bilateral indirect inguinal hernia and 26 (86.7%) patient in SITAPP group in which also 2 (6.675) patient are bilateral indirect inguinal hernia.

In our study group patients with bubonocele underwent TAPP in 63.33% cases and SITAPP 50.00% cases, those with funicular underwent in TAPP 40.00% cases and SITAPP 46.67% cases and those with scrotal underwent in TAPP 6.67% cases and SITAPP 10.00% cases.

In our study majority of patient presented with bubonocele.

Mean operating time:
The range of operating time in our study was 22-55 minute in TAPP group with a mean of 31.13±8.7, while as in SILS TAPP range was 25-75 minutes and the mean 42.4±13.4. So the operating time was significantly less in TAPP, In study by **Ilhan Ece et al (2017)**[10] showed that there is no significant statistical difference in operating time between TAPP and SITAPP. Our study does not follow this result.

Mean Visual analogue score:
One of the major advantages of laparoscopic repair of inguinal hernia is a substantial reduction in post operative pain.

The post operative pain score at all intervals was much less in SITAPP, which in 1st 24 hours is 3.1±0.58 and Next 48 hours is 2.10±0.48 as compared to TAPP 1st 24 hours 3.57±0.73 and next 24 hours 2.13±0.68 procedure. This pain free interval again shifts the scenario towards SITAPP.

In the study by **Ilhan Ece et al (2017)**[10] showed that there is no significant difference in VAS score of patient between TAPP and SITAPP 24 hour after the operation . our study does not follow this result.

Mean hospital stay:
In our study mean hospital stay in TAPP is 2.87±0.57 and SITAPP is 2.07±0.52 so it is significantly less in SITAPP group. In study by **Ilhan Ece et al (2017)**[10] showed that there is no significant difference in length of hospital stay between TAPP and SITAPP patients. Our study does not follow this result .

Early post operative complication:
No major intraoperative complications were observed in our study such as vessel, intestine or bladder injury. All TAPP and SITAPP procedures were completed successfully without conversion to open.

In our study TAPP group seroma in 2 (6.67%) patients, urinary retention in 2 (6.67%) patient, ilieas in 1 (3.33%) patient, superficial wound infection in 1 (3.33%) patient and no hematoma was found and SITAPP group seroma in 1 (3.33%) patients, urinary retention in 3 (10%) patient, ileus in 2 (6.67%) patient, superficial wound infection in 2 (6.67%) patient and no hematoma was found.

Seroma formation include old age, a large hernia defect, an extension of the hernia sac into the scrotum as well as the presence of a residual indirect sac. In our study seroma in TAPP due to scrotal hernia and older age group but in SITAPP is bilateral indirect inguinal hernia.

Post operative urinary retention which is failure to void spontaneously after surgery thus requiring bladder catheterization is a well recognized complication of laparoscopic hernia repair. In our study PUR is more common in SITAPP compared to TAPP. In our study superficial wound infection is more common is SITAPP compared to TAPP and treated with oral antibiotics. All the short term complications resolved with conservative treatment.

Long term postoperative complication:
Long term complications like mesh infection, post site hernia and recurrence were not detected in both the groups TAPP and SITAPP, 2 (6.67%) patient in the TAPP group experienced chronic pain on long term follow up from 3 month up to 1-5 years. Post operative prevalence of chronic pain seems to decline 1-5 years after laparoscopic groin hernia repair.

CONCLUSION

- In our study inguinal hernia was more common in patients with age 18-30 years.
- Majority of the patients were male.
- Majority of patients presented with bubonocele and funicular.
- Most of patients operated under spinal anesthesia.
- All the patients presented with swelling in the inguinoscrotal region.
- Mean time of surgery was significantly less in TAPP.
- Immediate 1st 24 hour postoperative pain was significantly less in SITAPP.
- Mean time to discharge was significantly less in SITAPP.
- Post operative randomized studies with long term follow up are necessary to evaluate mesh infection, port site hernia, recurrence and potential benefits associated with these approaches.
- In the experienced laparoscopic surgery center SITAPP inguinal hernia repair is a feasible and safe technique with remarkable cosmesis.

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