



Surgery

A COMPARATIVE STUDY ON SUBCUTANEOUS ONLAY LAPAROSCOPIC APPROACH VS LAPAROSCOPIC IPOM FOR PARAUMBILICAL HERNIAS.

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ABSTRACT **Background:** Paraumbilical hernias are common abdominal wall defects. Minimally invasive techniques like Subcutaneous Onlay Laparoscopic Approach (SCOLA) and Intraperitoneal Onlay Mesh (IPOM) repair are widely used, but comparative data are limited. **Objective:** To compare clinical outcomes, cost-effectiveness, postoperative recovery, and complications between SCOLA and IPOM in paraumbilical hernia repair. **Methods:** A prospective randomized study was conducted on 60 patients with paraumbilical hernia (<3 cm, reducible, ASA I–II) at Alluri Sitarama Raju Academy of Medical Sciences. Patients were randomized into two groups: SCOLA (Group A, n=30) and IPOM (Group B, n=30). Parameters analyzed included operative time, postoperative pain (VAS), hospital stay, time to return to normal activity, complications, and recurrence. **Results:** Mean operative time was longer in the SCOLA group (99.13 ± 8.7 min) than IPOM (71.87 ± 9.3 min; $P < 0.001$). SCOLA had lower postoperative pain on POD 3 ($P = 0.01$). IPOM showed shorter hospital stay (4.07 vs. 8.2 days; $P < 0.001$) and faster return to normal activity (1.6 vs. 5.2 days; $P < 0.001$). Seroma formation was more common in SCOLA, while wound infections were more frequent in IPOM, though not statistically significant. **Conclusion:** SCOLA is a safe alternative with reduced intra peritoneal trauma and long-term mesh-related complications. However, IPOM offers shorter operative time and faster recovery. Technique selection should be individualized based on patient and institutional factors.

KEYWORDS : Paraumbilical hernia, SCOLA, IPOM, laparoscopic repair, mesh, postoperative outcomes.

INTRODUCTION

Paraumbilical hernias occur near the umbilicus when abdominal contents protrude through a defect in the linea alba and can be quite large. The predisposing factors includes increase in abdominal pressure, multiparity, obesity, ascites, heavy work lifting and chronic cough. In the laparoscopic repair, the mesh is placed in an intraperitoneal location or in the preperitoneal / retromuscular space or subcutaneous space. However it is still not clear which technique is superior. This study provides the details of the surgical techniques, post operative complications, analyzing and comparing the outcomes of Subcutaneous Onlay Laparoscopic Approach (SCOLA) And Laparoscopic Intraperitoneal Onlay Mesh Repair (IPOM) of paraumbilical hernia to determine the benefits, cost effectiveness & feasibility of one laparoscopic procedure over the other.

AIMS AND OBJECTIVES :

AIM :

SCOLA repair is a safer technique than laparoscopic IPOM approach to paraumbilical hernia repair with regard to minimize the amount of intraperitoneal trauma and post operative pain, can avoid expensive mesh, reduced risk of late post-operative complications and reduced risk of recurrence.

OBJECTIVES:

To compare the benefits of SCOLA & Laparoscopic IPOM and to evaluate in relation to:

Duration of Hospitalization

Cost effectiveness

Operating period

Post operative pain

Post operative complications

Speed of recovery and returning to routine activity and recurrence.

METHODOLOGY

MATERIAL AND METHODS :

A Hospital based prospective randomized study among 60 patients admitted with clinical diagnosis of "Paraumbilical Hernia" under General Surgery care in ALLURI SITARAMA RAJU ACADEMY OF MEDICAL SCIENCES.

Study Design: Hospital based Prospective Randomized Comparative Study.

Study Setting: The study is being conducted in the Department of General Surgery, ALLURI SITARAMA RAJU ACADEMY OF MEDICAL SCIENCES

Study Duration: 18 Months

Place Of Study: ALLURI SITARAMA RAJU ACADEMY OF MEDICAL SCIENCES

Study Population: All patients admitted with clinical diagnosis of "Paraumbilical Hernia" under General Surgery care in ALLURI SITARAMA RAJU ACADEMY OF MEDICAL SCIENCES, willing to participate in the study, would be taken as study participants.

Sample Size Calculation: All patients attending General Surgery OPD in the study period for paraumbilical hernia shall be encouraged to participate in the study, and based on the previous year's statistics, it is estimated that 30 patients in each group shall be studied.

Sample Size = 60 patients, 30 in each group

Group A: Patients shall undergo laparoscopic SCOLA repair

Group B: Patients shall undergo laparoscopic IPOM repair

Study Eligibility: Inclusion and exclusion criteria

Inclusion Criteria :

1. Participants included in the study were of both sexes and from all age groups, presenting with a clinically evident and radiologically confirmed diagnosis of paraumbilical hernia.
2. Eligible patients had hernia defects measuring less than 3 cm in diameter and were classified having reducible hernias.
3. Only those individuals who were medically fit to undergo general anaesthesia, falling within Grades I and II of the American Society of Anesthesiologists (ASA) physical status classification, were considered for inclusion.

Exclusion Criteria :

Patients were excluded from the study if they had a hernia defect size greater than 3 cm, as larger defects often require alternative surgical approaches.

Irreducible hernias and those that were recurrent, incarcerated, obstructed, or strangulated were also excluded due to their complexity and the increased risk of complications.

Individuals who were medically unfit for general anaesthesia specifically those classified as ASA Grade III or IV were not eligible for participation.

Furthermore, patients who declined to undergo laparoscopic surgery or who did not provide informed consent were excluded.

METHODOLOGY:

All patients attending the General Surgery outpatient department who fulfilled the predefined inclusion and exclusion criteria were considered eligible for enrollment in the study. Informed and written consent was obtained from each participant after a thorough explanation of the study objectives, potential risks, benefits, and the surgical procedures involved. Patients were then allocated into either Group A (SCOLA) or Group B (IPOM), based on their affordability and willingness. A comprehensive clinical evaluation was performed, including detailed medical and surgical history, physical examination, and baseline investigations such as complete blood count, coagulation profile, liver and renal function tests, serum electrolytes, serology, and blood grouping. A contrast-enhanced CT scan of the abdomen was conducted in all cases to assess the hernial defect size and sac contents. Cardiac evaluation and anaesthetic fitness were ensured prior to surgery. All patients were counselled preoperatively regarding possible intraoperative and postoperative complications, including infection, bleeding, recurrence, and potential conversion to open hernioplasty.

Group A patients underwent the Subcutaneous Onlay Laparoscopic Approach (SCOLA) under general anaesthesia. The patient was placed in a supine split-leg position. A 2 cm transverse infraumbilical incision was made approximately 2 cm above the pubic symphysis, and a 10 mm camera port was introduced after blunt dissection up to the anterior rectus sheath. CO₂ was insufflated to maintain a pressure of 15 mmHg. Two 5 mm working ports were inserted bilaterally at the midclavicular line. Subcutaneous flaps were raised, the hernial contents reduced, and the defect closed with Prolene 1 sutures. A 15×15 cm Prolene mesh was fashioned and placed in an onlay position, secured with 1-0 Prolene sutures to the anterior rectus sheath. The umbilicus was anchored to the anterior rectus sheath, and two 16 French suction drains were inserted over the mesh through the lateral ports. The pneumo-peritoneum was reversed, and skin closure was performed using 3-0 Ethilon. Drains were retained postoperatively until daily output was less than 50 mL.

Group B patients underwent Laparoscopic Intraperitoneal Onlay Mesh (IPOM) repair under general anaesthesia in the supine position. Pneumoperitoneum was created via Palmer's point using a Veress needle, and a 10 mm camera port was inserted. Two additional 5 mm working ports were introduced in the left lumbar region and left iliac fossa. After thorough diagnostic laparoscopy, any adhesions were released and hernia contents reduced. The defect was approximated using transfascial sutures. A 15×15 cm dual-layer mesh was deployed intraperitoneally and fixed with approximately 20 circumferential tackers. After achieving haemostasis, ports were removed under direct vision, and skin incisions closed with 3-0 Ethilon sutures.

Postoperatively, all patients were monitored daily until discharge, with assessments focused on surgical site healing, pain levels, and early complications. Pain was evaluated using the Visual Analog Scale (VAS) on postoperative days 1, 3, and 5. Follow-up visits were scheduled biweekly for a period of three months to document wound healing, seroma formation, infections, recurrence, and return to routine activities. All collected data were entered into a structured database and subjected to statistical analysis for outcome comparison between the two groups.

Statistical Analysis

The data will be entered using software Microsoft excel, analysed using SPSS version 20.0. The categorical data will be expressed as frequency and percentage. Whereas continuous variable in terms of mean and standard deviation. Descriptive statistics (mean, standard deviation, and frequency) will be included to compare quantitative data, chi-square test will be used. The results will be expressed in 95% confidence interval. A value of $p < 0.05$ will be considered to be statistically significant.

Ethical Clearance will be obtained from ASRAMS BHR ETHICS COMMITTEE

Informed and written consent will be obtained from the patient and patient's attender.

Patient will be given the option of quitting from the study if desired

All the patient's data will be kept confidential

OBSERVATIONS AND RESULTS:

The mean age in laparoscopic Scola group is 37.50 and in laparoscopic Ipom group mean age is 37.87. The two groups are comparable with respect to age. The two groups are comparable with respect to sex.

Mean duration of surgery of lap scola repair group is 99.13 minutes and in lap ipom repair group is 71.87 minutes. The two groups differ with respect to duration of surgery ($P = 0.00$). p

Mean pain score of lap SCOLA group is 5.94 in POD 1, 4.08 in POD 3 and 2.46 in POD- 5. In lap IPOM repair group is 6.73 in POD 1, 5.26 in POD 3 and 2.92 in POD 5.

The two groups differ with respect to Mean pain score (P value 0.45 in POD 1, 0.01 in POD 2 and 0.66 in POD 3).

Table 1: Comparison Of Intraoperative And Post Operative Parameters Between SCOLA And IPOM Groups.

Parameter	SCOLA Group (n = 30)	IPOM Group (n = 30)	P-value
Mean Age (years)	37.50 ± SD	37.87 ± SD	> 0.05
Male : Female Ratio	Comparable	Comparable	> 0.05
Mean Duration of Surgery (minutes)	99.13 ± 8.7	71.87 ± 9.3	0.00
Mean Pain Score – POD 1	5.94	6.73	0.45
Mean Pain Score – POD 3	4.08	5.26	0.01
Mean Pain Score – POD 5	2.46	2.92	0.66
Mean Hospital Stay (days)	8.2 ± SD	4.07 ± SD	0.00
Return to Normal Activity (days)	5.2 ± SD	1.6 ± SD	< 0.0001
Seroma Formation (n, %)	7 (23.3%)	1 (3.3%)	0.057
Wound Infection (n, %)	Less Frequent	More Frequent	1.00
Recurrence	0	0	—

Mean duration of hospital stay of lap scola mesh repair group is 8.2 days and in lap ipom repair group is 4.07 days. The two groups differ with respect to Mean duration of hospital stay ($P = 0.00$)

Mean duration of return to normal activity of lap ipom repair group is 1.6 days and in lap Scola repair group is 5.2 days. The two groups differ with respect to Mean duration of return to normal activity ($P < 0.0001$).

In lap ipom repair group, 1 patient had postoperative seroma and in lap scola repair group, 7 patients had postoperative seroma. The association is statistically significant ($P = 0.057$).

Postoperative wound infection is more in lap ipom repair compared to laparoscopic scola repair. ($P = 1.00$)

DISCUSSION:

Laparoscopic ventral hernia repair started in 1993 by LEBLANC. Later evolutions were done making laparoscopic surgery safest and easier for repair of ventral hernia. Large incisions, placement of drains is avoided by using laparoscopic IPOM repair.(7)

The mean age in laparoscopic Scola group is 37.50 and in laparoscopic Ipom group mean age is 37.87. The two groups are comparable with respect to age. The two groups are comparable with respect to sex.

Mean duration of surgery of lap scola repair group is 99.13 minutes and in lap ipom repair group is 71.87 minutes. The two groups differ with respect to duration of surgery ($P = 0.00$).

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Mean duration of return to normal activity of lap Ipom repair group is 1.6 days and in lap Scola repair group is 5.2 days. The two groups differ with respect to Mean duration of return to normal activity ($P < 0.0001$).

In lap ipom repair group, 1 patient had postoperative seroma and in lap

scola repair group, 7 patients had postoperative seroma during the follow up period. The association is statistically significant ($P=0.057$). Patients were reassured and application of abdominal binder is encouraged.

Postoperative wound infection is more in lap ipom repair compared to laparoscopic scola repair. ($P=1.00$)

The subcutaneous onlay laparoscopic approach (scola) for ventral hernia is a relatively newer technique for ventral hernia repairs.

Laparoscopic repair of ventral hernias is of late accepted as a standard procedure. The advantages of such an approach include less pain, less scar formation, minimal recurrence rate and overall improved quality of life for the patient.

The only disadvantage of laparoscopic ventral hernial repair is the over-dependence on the intraperitoneal plane, which theoretically opens the door to many intra peritoneal complications as a possibility.

Hence, the advent of SCOLA, which is done in the same extraperitoneal plane as an open onlay meshplasty should theoretically be a more viable alternative in terms of eliminating the possibility of intraperitoneal complications while at the same time, retaining all the above mentioned advantages of laparoscopic meshplasty.

PLACE OF SCOLA IN SIMILAR STUDIES

The SCOLA technique is a safe, reproducible and effective alternative for patients with abdominal wall hernia associated with DMRA, as first described in 2018. (1)

One study done in Chennai in 2019 had mean operative time as 150 minutes with seroma being the most common complication. (2)

A study in the US elicited higher rates of post-operative complication in patients with an increased BMI and hence patient selection and pre-operative counselling will prevail on the final patient outcome. (3)

A few studies have also approached the use of SCOLA in diastases of abdominal wall with varying success rates, and concluded that it is a promising alternative if suitable results can be obtained. (4)

An important study published in 2022 shows that "SCOLA is an efficient procedure for the treatment of umbilical/epigastric hernia with divarication of rectus with minimal complications and postoperative morbidity. The technique gives an acceptable cosmetic result to patients."

They further described seroma formation upto 80%, but also described a modification to reduce the seroma formation: change in the operating ports and also using spinal needles to limit the lateral dissection, thereby reducing the amount of dissection. (5)

Many researchers have noted the cost effectiveness of SCOLA in view of using a simple prolene mesh as compared to a dual side mesh in IPOM procedure. (2,5)

CONCLUSION:

On analysing the data, Our study clearly shows that SCOLA approach has a comparable outcome to the traditional laparoscopic approach like IPOM. The study was performed in a setting where all the patients were treated by the same group of doctors under similar circumstances. In terms of minimal recurrence and post-operative wound healing, the results are comparable.

Being a newer procedure that requires extensive dissection, the operating time was also higher for SCOLA.

There is a higher incidence of seroma formation, and since the drains are kept for prolonged periods, it leads to increased number of hospital days. This appears to be a challenge faced by most studies focusing on the SCOLA approach owing to the extensive dissection in the subcutaneous plane.

However, the elimination of the intra peritoneal exploration does exclude the possibility of rare complications like bowel perforation and the more common ileus or obstruction secondary to adhesions, and

hence SCOLA approach may be used more frequently in selected patients.

Moreover, a significant advantage is the cost effectiveness. In place of IPOM procedure which requires a dual side mesh and tackers, a simple prolene mesh was used in the SCOLA procedure being in the subcutaneous plane, almost coming to one-tenth of the cost of an IPOM procedure.

More feasible studies and long-term follow ups need to be done to truly assess the impact of SCOLA approach, and whether it can really be path breaking in the world of para-umbilical hernia repairs.

REFERENCES:

1. Claus CM, Malcher F, Cavazzola LT, Furtado M, Morrell A, Azevedo M, Meirelles LG, Santos H, Garcia R. Subcutaneous onlay laparoscopic approach (SCOLA) for ventral hernia and rectus abdominis diastasis repair: technical description and initial results. ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo). 2018 Dec 6;31.
2. Naidu PS, Pai V, Rahman K. Subcutaneous Onlay Laparoscopic Approach for Ventral Hernias-A Case Series.
3. Dong CT, Sreeramou P, Pechman DM, Weithorn D, Camacho D, Malcher F. SubCutaneous OnLay endoscopic Approach (SCOLA) mesh repair for small midline ventral hernias with diastasis recti: an initial US experience. Surgical endoscopy. 2021 Dec;35 (12):6449-54.
4. Coco D, Leanza S. Is subcutaneous laparoscopic recti abdominis repair (SCOLA) a safe approach to repair diastasis of the rectus abdominis muscles (DMRA)? A brief review. Medical Studies/Studia Medyczne.;38(3):221-5.
5. Shinde PH, Chakravarthy V, Karvande R, Mahadik K, Gandhi J. A Novel Modification of Subcutaneous Onlay Endoscopic Repair of Midline Ventral Hernias With Diastasis Recti: An Indian Experience. Cureus. 2022 Jun 16;14(6).
6. Miserez M, Penninckx F. Endoscopic totally preperitoneal ventral hernia repair. Surgical Endoscopy And Other Interventional Techniques. 2002 Aug; 16(8):1207-13.
7. De Maria EJ, Moss JM, Sugerman HJ. Laparoscopic intraperitoneal polytetrafluoroethylene prosthetic patch repair of ventral hernia. SurgEndosc. 2000;14:326-9.
8. Prasad P, Tantia O, Patle NM, Khanna S, Sen B. Laparoscopic ventral hernia repair: a comparative study of transabdominal preperitoneal versus intraperitoneal onlay mesh repair. Journal of Laparoendoscopic & Advanced Surgical Techniques. 2011 Jul 1;21(6):477-83.
9. LeBlanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafluoroethylene: preliminary findings. Surgical laparoscopy & endoscopy. 1993 Feb 1;3 (1):39-41. Bryan C.
10. The Ebers Papyrus. Geoffrey Bles, London. 1930. 2. Patino JF. A history of the treatment of hernia. Hernia. 1995;4:3-15.
11. Natarajan S, Meenaa S, Thimmaiah KA. A randomised prospective study to evaluate preperitoneal mesh repair versus onlay mesh repair and laparoscopic IPOM in incisional hernia surgery. Indian Journal of Surgery. 2017 Apr 1;79(2):96-100.
12. Heniford BT, Park A, Ramshaw BJ, Voeller G. Laparoscopic repair of ventral hernias: nine years' experience with 850 consecutive hernias. Annals of surgery. 2003 Sep;238(3):391.59