Single Incision Bilateral Open Herniotomy Versus Laparoscopic Inguinal Herniotomy in Pediatric Inguinal Hernia: A Comparative Study.

Ab Hamid Wani[1], Abhimanyu Singh Manhas[2], Gurbir Singh[3] , Jatin Malhotra[4], Javid Iqbal[5].

[1]Assistant Professor, Department of General Surgery, Government Medical College, Jammu.

[2]Senior Resident, Department of General Surgery, Government Medical College, Jammu.

[3]Assistant Professor, Department of General Surgery, SMVDIME Kakryal, Jammu and Kashmir.

[4]Postgraduate, Department of General Surgery, Government Medical College, Jammu.

[5]Assistant Professor, Department of General Surgery, Government Medical College, Jammu.

***Address for Corresponder:** Gurbir Singh, Assistant Professor, Department of General Surgery, SMVDIME Kakryal, Jammu and Kashmir. (email: khalsagurbir2510@gmail.com)

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Abstract

Introduction: Pediatric inguinal hernia is commonly treated through surgical intervention. Minimally invasive techniques, such as laparoscopic inguinal herniotomy (LIH), are gaining popularity. However, the single incision bilateral open herniotomy (SIBOH) offers an alternative with smaller single incision and potentially similar outcomes. This study compares the safety, efficacy, operative time, and cosmetic outcomes of SIBOH and LIH.

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Materials and Methods: A prospective randomized study was conducted involving pediatric patients with bilateral inguinal hernia. Patients were allocated into two groups: Group A underwent SIBOH and Group B underwent LIH. Primary outcomes included operative time, complications, recurrence rate, postoperative pain, and cosmetic satisfaction.

Results: SIBOH demonstrated a significantly shorter operative time (32.4±5.8 minutes) as compared to LIH group (47.9±7.3 minutes) ($p<0.001$). Complication and recurrence rates were comparable between both groups. Hospital stay was shorter in SIBOH group as compared to laparoscopic group ($p< 0.05$). Parents reported comparable cosmetic outcomes in both the groups, but differences were not statistically significant. Postoperative pain was similar in both groups.

Conclusion: SIBOH is an effective and safe alternative to LIH for bilateral inguinal hernia in children. It offers shorter operative times with similar outcomes, making it a viable technique where laparoscopic resources are limited.

Keywords

- Pediatric inguinal hernia
- Single incision open herniotomy
- Laparoscopic inguinal herniotomy
- Bilateral hernia
- Cosmetic outcome

Introduction

Inguinal hernia is a common congenital condition in the pediatric population, with an incidence ranging from 0.8% to 5% in full-term infants, and up to 30% in premature neonates.[1] The condition results from a patent processus vaginalis, which fails to obliterate, leading to protrusion of abdominal contents into the inguinal canal. Prompt surgical repair is advocated due to the risk of complications such as incarceration or strangulation.[2] Traditionally, open herniotomy via an inguinal incision has been the gold standard for pediatric inguinal hernia repair. This technique is well-established, cost-effective, and associated with low

recurrence and complication rates when performed by experienced surgeons.[3] However, over the past two decades, minimally invasive approaches—most notably laparoscopic inguinal herniotomy (LIH)—have gained popularity due to their advantages in terms of cosmesis, postoperative recovery, and the ability to explore the contralateral internal ring.[4] LIH provides a panoramic view of the abdominal cavity and allows for simultaneous diagnosis and repair of a contralateral patent processus vaginalis (CPPV), which is not possible with the standard open approach unless a second incision is made.[5] Additionally, LIH is associated with reduced trauma to the vas deferens and testicular vessels, potentially minimizing the risk of future infertility or testicular atrophy.[6] Despite these benefits, LIH requires general anesthesia with pneumoperitoneum, specialized instruments, and greater technical expertise, which can limit its use in resource-constrained environment. On the other hand, single-incision bilateral open herniotomy (SIBOH) is minimally invasive technique with single suprapubic transverse incision for bilateral inguinal hernia in children. This technique remains widely practiced, particularly in settings where laparoscopic infrastructure is limited. Some surgeons have also adopted modifications to the traditional open technique to enhance cosmetic outcomes such as transverse skin creases and subcuticular closure making it comparable in appearance to laparoscopic results in some cases.[7]

Materials and Methods

Study Design: A prospective randomized study conducted at Government Medical College, Jammu since January 2021 till December 2024. This study was approved by the Institutional Ethics Committee of the authors (IEC/XXX/2021/374). The aim of study is to evaluate and compare the outcomes of SIBOH and LIH in terms of operative time, postoperative pain, complications, recurrence, and cosmetic satisfaction in pediatric patients with bilateral inguinal hernias.

Inclusion Criteria:

1. Age 0–14 years.
2. Diagnosed bilateral inguinal hernia.
3. ASA I or II

Exclusion Criteria:

1. Recurrent or incarcerated hernias
2. Unilateral hernia

Groups:

Group A (SIBOH): Single transverse suprapubic incision, bilateral open hernia sac ligation.

Group B (LIH): Standard three-port laparoscopic technique with peritoneal ring closure.

Parameters Evaluated:

1. Operative time.
2. Intraoperative and postoperative complications.
3. Hospital stays
4. Cosmetic score (parent-reported at 1 and 3 months).
5. Recurrence at 6 months

Surgical procedures:

Laparoscopic Inguinal Herniotomy (LIH)

All patients for laparoscopic bilateral inguinal herniotomy were operated under general anesthesia. Three ports technique was used. First 5mm umbilical port was made for 30^0 cameras. The other two 3mm ports were made at the lateral border of rectus abdominis muscle slightly below the umbilicus under direct vision. Findings were confirmed on both sides. Bilateral internal rings were closed intracorporeally using absorbable sutures. After completion of procedure all ports were closed and dressing applied.

Single incision, bilateral open herniotomy (SIBOH).

Single incision bilateral inguinal herniotomies were done under general anesthesia with the patient in supine position. A 1-1.5cm incision was made in the suprapubic region along the skin crease. Dissection was done deeper and camper and scarpa fascia were dissected with blunt dissection towards the external ring and hernia sac was identified and lifted along with cord structures with bibcock forceps on the surface of incision. Cord structures were separated from the sac. Then the sac was transected and ligated as high as possible. Distal sac was excised. The cord structures were then restored on the right side. **(Figure 1, a-d)** Then the same steps were done on the contralateral side through the same incision and procedure was completed. **(Figure 2, a-c)** In this way bilateral sides were addressed through the same single suprapubic transverse incision.

Statistical Analysis: SPSS Version 22 used. Data analyzed via t-tests and chi-square tests. Significance set at $p<0.05$.

Result

A total of 100 pediatric patients with bilateral inguinal hernia were included in the final analysis, divided equally between both the open (n=50) and laparoscopic (n=50) group, (Group A: Single transverse suprapubic incision, bilateral open hernia sac ligation, Group B: Standard three-port laparoscopic technique with peritoneal ring closure). The mean age in the SIBOH group was 3.8± 2.5 years, while in the Laparoscopic group, it was 4.1 ± 2.7 years. Gender distribution was comparable, with 40 males and 10 females in each group. SIBOH group had significantly shorter operative times (32.4±5.8 minutes) as compared to LIH group (47.9±7.3 minutes) ($p<0.001$).

The mean hospital stay in open group was 0.84 ±0.3 days while laparoscopic group was1.12 ±0.4 days, with p=0.02, which was statistically significant. Parents rated cosmetic (Parental Satisfaction Score -1to 5 Likert scale) with open group: 4.72 ±0.41 and laparoscopic group: 4.68±0.44. The results were comparable in both the groups, but difference was not statistically significant ($p = 0.76$). No recurrence noted in each group during 6-month follow-up. **(Table 1)**

No significant difference in postoperative pain scores between groups at 6 and 24 hours. Minor complications (e.g., scrotal edema, superficial infection) occurred in both groups, lower in open group as compared to laparoscopic group but were not statistically significant ($p=0.21$). No major complications or conversions in either group. **(Table 2)**

Table 1: Parameters compared in both open and laparoscopic groups.

Parameter	SIBOH Group (n=50)	LIH Group (n=50)	P-value
Mean operative time	32±5.8 min	47.9 ± 7.3minutes	<0.001
Hospital stay	0.84 ± 0.3 days	1.12 ± 0.4 days	0.02
Reoccurrence	None	None	-
Cosmetic score	4.72± 0.41	4.68 ± 0.44	0.76

P<0.05 statistically significant.

Table 2: Comparison of complications in both the groups.

Complications	SIBOH Group (n=50)	Laparoscopic Group (n=50)
Seroma	2(4%)	4(8%)
Superficial infection	2(4%)	2(4%)
Scrotal edema	4(8%)	2(4%)
Port site erythema	0(0%)	6(12%)
Total	8(16%)	14(28%)

Discussion

Inguinal hernia is one of the most common surgical conditions in pediatric patients, and the optimal technique for repair continues to be debated. Although laparoscopic herniotomy has gained popularity due to its bilateral access, diagnostic capability, and favorable cosmesis, our findings suggest that the single-incision bilateral open transverse approach (SIBOH) offers several advantages in terms of efficiency, recurrence, with no compromise in outcomes. Our data showed a significantly shorter operative time for the SIBOH group compared to the laparoscopic group (32.4 vs. 47.9 minutes; $p < 0.001$). This is consistent with previous studies that identified laparoscopic herniotomy as more time-consuming due to port placement, pneumoperitoneum, and intracorporeal suturing.[6-8] The SIBOH technique allows direct, rapid dissection of both hernia sacs via a single transverse incision, eliminating the need for repositioning or specialized instruments. The SIBOH group experienced fewer postoperative complications (16%) compared to the laparoscopic group (28%), including a lower incidence of seroma formation and no port-site complications. Similar trends have been observed in previous literature, with some studies reporting increased risk of hydrocele, seroma, or port-site infections following laparoscopic repair.[4-9] The open technique's limited tissue handling and avoidance of pneumoperitoneum likely contribute to its lower complication rate. No recurrence was seen in patients in both groups. A meta-analysis by Esposito et al. found that laparoscopic repairs had slightly higher recurrence rates, especially in centers with limited experience.[10] This may be attributed to variability in intracorporeal knot-tying techniques and tension at the internal ring closure. In contrast, the SIBOH technique allows high ligation of the sac under direct vision, reducing the risk of incomplete closure. Cosmetic satisfaction scores were comparable in both groups, supporting findings from prior studies that both approaches provide excellent aesthetic outcomes.[11] The SIBOH technique uses a single transverse crease incision, typically concealed in the inguinal fold, which rivals the small trocar scars of laparoscopy in visibility and parental satisfaction. This difference stems from the need for general anesthesia, laparoscopic towers, ports, and longer operative times. Shorter hospital stays (mean 0.84 days for

SIBOH vs. 1.12 for laparoscopy) further reinforce the logistical advantages of the open approach, especially in low-resource settings.[12-13] Our findings add to growing evidence that SIBOH herniotomy represents a safe, efficient, and accessible alternative to laparoscopic repair in pediatric bilateral inguinal hernia. It can be performed with standard surgical instruments and minimal operative setup, offering broad applicability without compromising cosmetic or clinical outcomes.

The primary limitations of this study include its single-center design, relatively small sample size, and limited follow-up of 6 months. Larger, multicenter randomized trials with long-term surveillance are needed to validate these findings and assess the true recurrence and complication rates. Future research should include long-term functional and cosmetic outcomes, standardized pain scoring, and multicentric collaboration. Exploring hybrid minimally invasive open approaches may also offer new paradigms in pediatric hernia repair.

Conclusion

Single-incision bilateral open herniotomy is a superior alternative to laparoscopic hernia repair in pediatric patients with bilateral inguinal hernias. It is an effective, safe, and efficient surgical technique with excellent cosmetic outcomes and economic advantages for pediatric bilateral inguinal hernias. It provides comparable outcomes to laparoscopic herniotomy with reduced operative time and does not require advanced laparoscopic infrastructure, making it an optimal choice, particularly in resource- limited settings.

Ethical Consideration

Study was approved by Institutional ethics Committee of Government Medical College, Jammu no: IEC/GMC/2021/374- dated 09/01/2021.

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Conflict of interests

There is no conflict of interest

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