Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 28s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

A Comparative Study On Conventional Inguinal And High Scrotal Approach For Herniotomy In Pediatric Populations. A Prospective Hospital - Based Observational Study

Dr. Puneet Srivastava[1], Dr. Prashant Lavania[2], Dr. Richa Jaiman[3], Dr. Sagar Garg[4]

[1]Professor , Department of General surgery, Sarojini Naidu Medical College, Agra, Uttar Pradesh, India

[2]Professor, Department of General Surgery, Sarojini Naidu Medical College, Agra, Uttar Pradesh , India

[3]Professor, Department of General Surgery, Sarojini Naidu Medical College, Agra, Uttar Pradesh , India

[4]Post Graduate Student, Department of General Surgery, Sarojini Naidu Medical College, Agra, Uttar Pradesh, India

***Corresponding Author:**

Dr. Sagar Garg,

Post Graduate Student, Department of General Surgery, Sarojini Naidu Medical College, Agra, Uttar Pradesh, India.

Cite this paper as: Dr. Puneet Srivastava, Dr. Prashant Lavania, Dr. Richa Jaiman, Dr. Sagar Garg, (2025) A Comparative Study On Conventional Inguinal And High Scrotal Approach For Herniotomy In Pediatric Populations. A Prospective Hospital - Based Observational Study. *Journal of Neonatal Surgery*, 14 (28s), 210-215.

ABSTRACT

Introduction: Inguinal hernia, commonly seen in paediatric population, results from a persistent patent processes vaginalis. Surgical repair is typically performed using either the conventional inguinal approach or the high scrotal approach. The selected technique can affect operative duration, complication rates, and recovery outcomes. This study aims to compare the two methods to evaluate their relative effectiveness and overall impact on paediatric patient care and postoperative recovery.

Objective: To compare the conventional inguinal and high scrotal approaches for paediatric herniotomy in terms of operative time, postoperative pain, anaesthesia duration, scrotal induration, vascular injury, and overall impact on the patient's quality of life.

Methods: A prospective observational study was conducted at Sarojini Naidu Medical College, Agra, over two years. The study included 80 paediatric patients under five years of age, divided into two groups: 40 underwent the high scrotal approach and 40 underwent the conventional inguinal approach. Patients with large, obstructed, or bilateral hernias, as well as those with undescended testes, were excluded. Data were collected on operative time, intraoperative complications, and postoperative recovery, with statistical significance determined using chi-square and t-tests.

Results: The high scrotal approach resulted in significantly shorter operative time and fewer postoperative complications, such as vascular injury, wound infection, and testicular atrophy. Compared to the conventional method, it also showed lower pain scores, while scrotal induration was more frequently observed with the conventional approach.

Conclusion: The high scrotal approach provides a safer, more efficient alternative to the conventional inguinal method, with fewer complications and a faster recovery period. It should be considered a preferred technique for herniotomy in paediatric population.

Keywords: *Paediatric hernia, herniotomy, high scrotal approach, inguinal approach, surgical outcomes*

1. INTRODUCTION

Paediatric hernias are a frequent and clinically significant condition in children, varying in severity from harmless to life-threatening. A hernia arises when an organ or tissue pushes through a weak point in the surrounding muscle or connective tissue. In the paediatric population, the most common hernia types are inguinal, umbilical, diaphragmatic, epigastric, and occasionally femoral hernias. Inguinal hernias are the most prevalent, particularly among male infants, due to the incomplete closure of the processus vaginalis during foetal development. Umbilical hernias are also common, especially in new-borns and preterm infants, and often resolve spontaneously. Diaphragmatic hernias, though less frequent, are more serious, as they can result in respiratory distress from pulmonary underdevelopment. While femoral and epigastric hernias are rare, they still warrant attention as they may necessitate surgical intervention. The general incidence of paediatric hernias ranges from 3–5%, spiking up to 30% in premature infants. Boys are more affected than girls, with inguinal hernias showing a male-to-

female ratio as high as 6:1. Contributing risk factors include prematurity, genetic predisposition from family history, and connective tissue disorders such as Marfan and Ehlers-Danlos syndromes. Environmental and geographic influences have also been noted but remain under study [1-4].

Certain paediatric hernias are asymptomatic and resolve on their own, but others can escalate into severe complications. A critical concern is incarceration, where the protruding tissue becomes trapped and cannot return to the abdominal cavity, which may then lead to strangulation—a condition where the blood supply is compromised, resulting in tissue death. Inguinal hernias are a common cause of bowel obstruction in children, presenting symptoms such as vomiting, abdominal swelling, and irritability, all of which require urgent treatment to avoid serious outcomes. These complications can significantly impact the child's quality of life and cause considerable anxiety for parents. Fortunately, hernia repair surgery is generally safe and effective, offering excellent results with minimal risk of recurrence. For symptomatic hernias, particularly inguinal and umbilical types, surgery allows children to return to normal activities quickly and without lasting effects [5].

From a public health standpoint, paediatric hernias pose a considerable challenge, especially in preterm infants who require timely diagnosis and treatment. Early intervention is key to preventing complications and ensuring favourable outcomes. Although many umbilical hernias resolve naturally, awareness of risk factors and careful monitoring are crucial for identifying cases that need surgical repair. With proper management, the prognosis for paediatric hernias is excellent, allowing affected children to grow and thrive normally [6].

Surgical treatment—specifically herniotomy—is the gold standard for managing paediatric hernias, especially inguinal ones. This procedure is essential to avoid dangerous complications like strangulation and incarceration. Timely surgery prevents irreversible damage, such as bowel ischemia or testicular atrophy, which could have long-term health consequences, including fertility issues. Herniotomy is a reliable and straightforward procedure when performed by skilled surgeons and carries a low risk of recurrence. It provides parents with reassurance and significantly improves the child's quality of life. Advances in surgical techniques have further enhanced outcomes by minimizing pain and reducing recovery times, allowing children to resume normal activities quickly [7,8].

Over the years, paediatric hernia surgery has evolved significantly. Initially performed through open surgery with a small incision, the technique has been refined to improve recovery and reduce complications. The high scrotal approach offers better visualization for complex cases but may cause scrotal swelling. The introduction of laparoscopic surgery marked a major advancement, offering reduced scarring and faster healing. More recently, robotic-assisted surgeries have enhanced precision, although cost and complexity limit their use. Minimally invasive techniques are now increasingly favoured, especially for bilateral or recurrent hernias, and future developments will likely focus on improving surgical tools and outcomes [9,10].

Different surgical approaches, such as the conventional inguinal and high scrotal techniques, offer varied benefits. The high scrotal approach often requires less operating and anaesthesia time and causes less postoperative pain, but it may lead to temporary scrotal swelling. The conventional method, though slightly longer, is preferred for larger or more complex hernias. Choosing the right technique depends on patient-specific factors, surgeon experience, and case complexity [11].

Finally, both the high inguinal and scrotal approaches affect post-operative quality of life. While the high inguinal approach may result in more noticeable discomfort during recovery, it usually yields better cosmetic outcomes. Conversely, the scrotal approach may cause more visible swelling but is often associated with a shorter recovery period. Overall, paediatric herniotomy—when tailored to the patient—offers excellent long-term results with minimal disruption to quality of life [12].

The aim of this study is to conduct a comparative analysis of the conventional inguinal approach and the high scrotal approach for herniotomy in paediatric populations. The objectives include comparing the two surgical approaches in terms of operating time, postoperative pain duration, anaesthesia time, incidence of scrotal induration, and occurrence of vascular injury. Additionally, the study seeks to evaluate the impact of each approach on the quality of life of the patients.

2. MATERIAL AND METHODS

This study is a prospective observational comparative study was conducted at Sarojini Naidu Medical College, Agra, Uttar Pradesh for a period of two years (2023–2025). Ethical approval has been obtained from the Ethical Approval Committee of Sarojini Naidu Medical College, Agra, Uttar Pradesh.

Study Population

The study population consisted of paediatric patients under five years of age diagnosed with inguinal hernia requiring surgical intervention. Eligible participants included those with reducible hernias whose guardians provided informed consent. Excluded from the study were patients with large hernias exceeding 5 cm, cases of obstructed or incarcerated hernia, bilateral large hernias, and hernias associated with undescended testis. The study aimed to compare outcomes of conventional inguinal and high scrotal herniotomy approaches.

Data Analysis

Study data were collected using a structured data sheet and analyzed with SPSS software version 26.0. Continuous variables were compared using the Student's t-test, while categorical variables were assessed using the Chi-square test, with a p-value of less than 0.05 considered statistically significant. Ethical guidelines per the Declaration of Helsinki were followed, with written informed consent obtained from parents or guardians, and strict confidentiality of patient information was ensured throughout the study.

3. RESULTS

This comparative study evaluated conventional inguinal (CI) and high scrotal (HS) approaches for paediatric herniotomy, focusing on operative time, postoperative pain duration, anaesthesia time, scrotal induration, vascular injury, and patient quality of life. Age distribution analysis showed the CI group had more patients in the 49–60-month range, while the HS group was more common in the 25–48-month range, with a statistically significant difference ($p = 0.044$). Hernia type distribution was similar in both groups—CI with 34 unilateral and 6 bilateral cases, HS with 33 unilateral and 7 bilateral—with no significant difference ($p = 1.0$), indicating that surgical approach selection is independent of hernia type.

Table 1: Mean Duration of Operation by Surgical Approach

Approach	**Mean ± S.D.**
CI	45.0 ± 3.1
HS	30.3 ± 3.1
P value $=2.24*10^{-34}$	

The high scrotal approach significantly reduces operation time compared to the conventional inguinal approach (30.3 vs. 45.0 minutes, *p* < 0.0001), highlighting its efficiency and clinical advantage in paediatric herniotomy.

Table 2: Post operative complication (scrotal Hematoma and scrotal Edema) after 24 hr, 4 days and 7 days

Approach	**Scrotal Hematoma after 24 hr**	**Scrotal Edema after 24 hr**	**Scrotal Hematoma after 4 days**	**Scrotal Edema after 4 days**	**Scrotal Hematoma after 7 days**	**Scrotal Edema after 7 days**
CI	0	0	3	12	0	6
HS	0	0	4	24	0	12
p value= 1.0						

Postoperative complications such as scrotal hematoma were minimal and resolved by Day 7 for both surgical approaches, while scrotal edema was more common and persistent in the high scrotal group, though the differences were not statistically significant (*p* = 1.0).

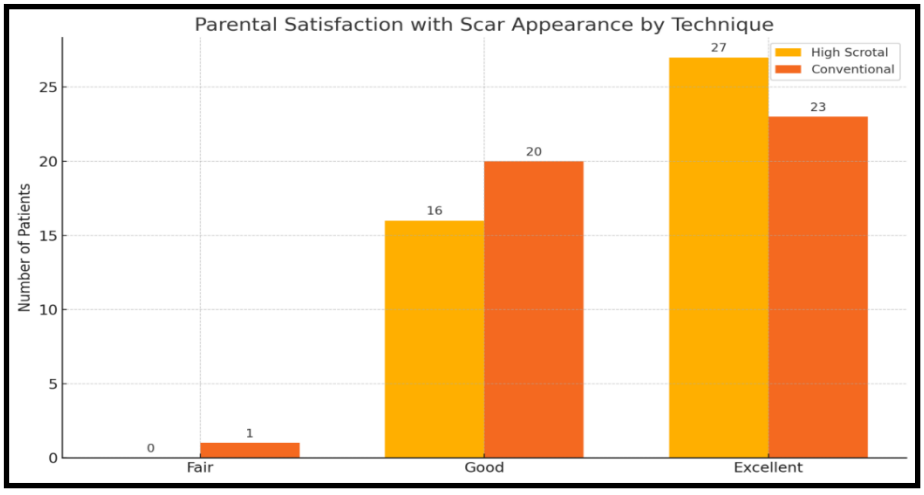

Figure 1: Patient quality of life via high inguinal and scrotal approach

Patient quality of life outcomes showed a slightly higher percentage of 'Excellent' ratings in the high scrotal group compared to the conventional group, but the difference was not statistically significant (*p* = 0.416), indicating both approaches are similarly well-accepted in terms of postoperative scar appearance.

TABLE 3: Number of Patients Reporting Pain in High Scrotal vs Conventional Inguinal

pain	HS	CI	Chi-square	p-value
No	21	16	0.804525	0.369744
Yes	19	24		

The analysis showed no statistically significant difference in postoperative pain between the high scrotal and conventional inguinal groups (*p* = 0.370), indicating that the type of surgical approach does not significantly affect the likelihood of pain after surgery.

Table 4: Vascular Injury and Wound Infection in HS and CI Groups

Group	vascular injury no	vascular injury yes	Wound infection no	Wound infection yes
Conventional Inguinal	38	2	38	2
High Scrotal	39	1	40	0
p-value= 1.00			p-value= 0.494	

The analysis of vascular injuries and wound infections between the high scrotal (HS) and conventional inguinal (CI) groups revealed no significant differences (p = 1.00 for vascular injury and p = 0.494 for wound infection). The high scrotal group reported 1 case of vascular injury (2.5%) and no wound infections, while the conventional inguinal group reported 2 cases of vascular injury (5%) and 2 wound infections (5%). Both complications were infrequent in both groups, suggesting that neither surgical approach significantly impacts the risk of these postoperative issues.

Table 5: No. of patient reporting recurrence and Testicular Atrophy in HS and CI Groups

Group	No recurrence	Recurrence	No Testicular Atrophy	Testicular Atrophy
Conventional Inguinal	38	2	38	2
High Scrotal	40	0	40	0
P value = 0.494				

The analysis of recurrence and testicular atrophy between the high scrotal (HS) and conventional inguinal (CI) groups showed no significant differences (*p* = 0.494). The high scrotal group reported no cases of recurrence or testicular atrophy, while the conventional inguinal group had 2 cases each of recurrence and testicular atrophy, both with a 5% prevalence. These findings suggest that the high scrotal approach may offer a lower risk of recurrence and better preservation of testicular integrity compared to the conventional inguinal approach, though statistical significance was not reached in this comparison.

4. DISCUSSION

Inguinal hernias are a common paediatric surgical condition, especially in neonates and infants, with a higher prevalence in males. While many cases are uncomplicated, untreated hernias can result in serious complications such as bowel incarceration or strangulation, necessitating surgical intervention. The two primary surgical techniques for herniotomy are the conventional inguinal and the high scrotal approaches. The conventional technique, involving a low groin incision, has long been the standard. It allows for clear access to the hernia sac and is known for its familiarity and reliability. However, it may be associated with concerns such as post-operative pain, scarring, and wound infections, especially in scrotal hernias where complete sac ligation may be challenging [13,14].

The high scrotal approach represents a more recent technique where the incision is made higher in the scrotum, offering

direct access to the hernia sac. This method is especially beneficial for scrotal hernias, potentially resulting in reduced operative pain, quicker recovery, and better cosmetic outcomes due to its less visible incision. Despite these potential benefits, critics highlight its technical complexity, particularly in smaller children, and concerns about wound healing. There is ongoing debate regarding whether it offers superior long-term outcomes compared to the conventional method, especially in terms of recurrence and complication rates [15].

In a comparative study between the two techniques, patient age distribution showed significant variation. The conventional inguinal (CI) group had a higher concentration of patients in the youngest age group (0–12 months), whereas the high scrotal (HS) group had a more even distribution across age ranges. This difference was statistically significant. Regarding hernia laterality, both approaches showed a similar pattern, with most patients presenting with unilateral hernias. There was no significant difference between the two groups in this respect [16].

The operative duration significantly favoured the high scrotal approach, with a mean time of about 30 minutes compared to 45 minutes for the conventional approach. This supports the efficiency of the high scrotal technique due to more direct access. Post-operative complications, including scrotal hematoma and edema, were monitored at multiple time points. While the HS group experienced more instances of these complications initially, especially edema, the differences between groups were not statistically significant. These findings suggest that both approaches are generally safe and comparable in terms of early post-operative complications [17].

Patient-reported quality of life post-surgery was also similar across both groups. A slightly higher percentage of patients in the HS group rated their outcome as excellent, but overall, no statistically significant difference was found. This indicates that both surgical techniques provide satisfactory patient experiences. Pain, a common concern after surgery, was reported slightly more in the CI group, but again, the difference was not statistically meaningful. Both methods appear well-tolerated with respect to postoperative pain [18].

In terms of vascular injury and wound infection, both approaches showed low incidence rates. The CI group had marginally higher instances of both complications, but these differences did not reach statistical significance, underscoring the overall safety of both techniques. Finally, the study examined recurrence and testicular atrophy rates. While the CI group had two cases of recurrence and two of testicular atrophy, the HS group had none. However, the statistical analysis showed no significant difference, reaffirming that both approaches are equally effective and safe in preventing long-term complications [19].

This study demonstrates that while the high scrotal approach may offer certain advantages such as shorter operative time and better cosmetic outcomes, both surgical techniques for paediatric herniotomy are comparable in terms of safety, complication rates, patient comfort, and long-term efficacy [20].

5. CONCLUSION

Based on the study findings, the high scrotal approach proves to be a superior alternative to the conventional inguinal method for paediatric herniotomy. It offers key benefits such as shorter operative time, less postoperative pain, reduced risk of vascular injury, and faster recovery. With similar rates of long-term recurrence and testicular atrophy compared to the traditional approach, the high scrotal technique stands out as a safe and effective option. Overall, it presents a preferable choice for managing uncomplicated hernias in pediatric patients, enhancing surgical outcomes and patient comfort.

REFERENCES

[1] Hebra A, Cuffari C. Pediatric hernias. Medscape. https://emedicine. medscape. com/article/932680-overview. Accessed. 2018 Feb;23.

[2] Grosfeld JL. Current concepts in inguinal hernia in infants and children. World journal of surgery. 1989 Sep;13(5):506-15.

[3] Chandrasekharan PK, Rawat M, Madappa R, Rothstein DH, Lakshminrusimha S. Congenital Diaphragmatic hernia–a review. Maternal health, neonatology and perinatology. 2017 Dec;3:1-6.

[4] Murphy-Ryan M, Psychogios A, Lindor NM. Hereditary disorders of connective tissue: a guide to the emerging differential diagnosis. Genetics in Medicine. 2010 Jun 1;12(6):344-54.

[5] Sofianos C, Oodit R, Bougard H, Folscher D, Koto Z, Grobler S. Inguinal hernia guidelines 2015: guideline. South African Journal of Surgery. 2015 Jan 1;53(2):73-80.

[6] Franky F, Handy H. Early vs Late Inguinal Hernia Repair in Preterm Infants. The International Journal of Medical Science and Health Research. 2024 Jul 12;2(7):14-21.

[7] Olesen CS, Mortensen LQ, Öberg S, Rosenberg J. Risk of incarceration in children with inguinal hernia: a systematic review. Hernia. 2019 Apr 1;23:245-54.

[8] Mutungi SM. Efficacy of post-operative analgesia practices for short stay open pediatric inguinal hernia repair

at Kenyatta national hospital (Doctoral dissertation, University of Nairobi).

[9] Dreuning K, Maat S, Twisk J, van Heurn E, Derikx J. Laparoscopic versus open pediatric inguinal hernia repair: state-of-the-art comparison and future perspectives from a meta-analysis. Surgical endoscopy. 2019 Oct 15;33:3177-91.

[10] Hatewar A, Mahakalkar C, Kshirsagar S, Sohan PR, Dixit S, Bikkumalla S, Hatewar Jr A, Sohan Jr PR. From Meshes to Minimally Invasive Techniques: A Comprehensive Review of Modern Hernia Repair Approaches. Cureus. 2024 Aug 5;16(8).

[11] Bryan N, Battersby C, Smart N, Hunt J. A review of biocompatibility in hernia repair; considerations in vitro and in vivo for selecting the most appropriate repair material. Hernia. 2015 Apr;19:169-78.

[12] Morsberger JL, Short HL, Baxter KJ, Travers C, Clifton MS, Durham MM, Raval MV. Parent reported long-term quality of life outcomes in children after congenital diaphragmatic hernia repair. Journal of pediatric surgery. 2019 Apr 1;54(4):645-50.

[13] Ohene-Yeboah M, Abantanga FA. Inguinal hernia disease in Africa: a common but neglected surgical condition. West African journal of medicine. 2011;30(2):77-83.

[14] Stabilini C, van Veenendaal N, Aasvang E, Agresta F, Aufenacker T, Berrevoet F, Burgmans I, Chen D, de Beaux A, East B, Garcia-Alamino J. Update of the international HerniaSurge guidelines for groin hernia management. BJS open. 2023 Oct;7(5):zrad080.

[15] Tanimola AG, Talabi AO, Sowande OA, Adejuyigbe O. Comparison of the Inguinal and High Scrotal Approaches for the Treatment of Inguinal Hernias in Boys. Ethiopian Journal of Health Sciences. 2021 Jul 1;31(4).

[16] Dogan I, Bozkurt M, Kahilogullari G, Yakar F, Zaimoglu M, Bakirarar B, Kircil C, Eroglu U, Ozgural O, Ucer M, Kilinc C. Is a unilateral surgical approach effective in patients with bilateral leg pain with unilateral lumbar disc herniation? A prospective nonrandomized clinical and surgical study. World Neurosurgery. 2018 Sep 1;117:e316-22.

[17] Patel SK. Clinical Study of Scrotal Swellings in Paediatric Age Group (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).

[18] Naik HS, Ghosh SN, Saha P, Biswas P. A prospective study of the relation of patient-reported outcome measures with lumbar disc surgery for herniated lumbar disc. Nepal Journal of Neuroscience. 2021 Sep 1;18(3):10-9.

[19] Ruf CG, Schmidt S, Kliesch S, Oing C, Pfister D, Busch J, Heinzelbecker J, Winter C, Zengerling F, Albers P, Oechsle K. Testicular germ cell tumours' clinical stage I: comparison of surveillance with adjuvant treatment strategies regarding recurrence rates and overall survival—a systematic review. World journal of urology. 2022 Dec;40(12):2889-900.

[20] Ibrahim M, Getso KI, Mohammad MA, Akhparov NN, Aipov RR. Herniotomy in resource-scarce environment: Comparison of incisions and techniques. African Journal of Paediatric Surgery. 2015 Jan 1;12(1):45-50.