INCIDENCE OF SCROTAL SWELLING AFTER HERNIA AND HYDROCELE SURGERIES IN PEDIATRIC PATIENTS

Keerthana Rajasekaran[1], Dr. A.N. Uma[2*], Dr. Aniruthan[3], Akila Mohan[4], Sourav Das[5], Yuvasri Pandurangan[6], Lavanya B[7]

1 Intern student, Department of Physician Associate, School of Allied Health Sciences, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, India

2 Professor of Medical Genetics & Principal, School of Allied Health Sciences, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, India

3 Assistant Professor, Department of Pediatric Surgery, Mahatma Gandhi Medical College & Research Institute, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, India

4 Tutor, Department of Respiratory Therapy, School of Allied Health Sciences, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, India

5 Assistant Professor, Department of Microbiology, School of Allied Health Sciences, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, India

6 Tutor, Department of Physician Associate, School of Allied Health Sciences, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry, India

7 Assistant Professor, Department of Community Medicine, Shri Sathya Sai Medical College and Research Institute, Sri Balaji Vidyapeeth, (Deemed to be University), Chengalpattu District, Tamil Nadu, India.

*Corresponding Author: Dr. A. N. Uma

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ABSTRACT

Background:

Postoperative scrotal edema is a commonly observed complication following hernia and hydrocele surgery in children, often causing considerable concern for caregivers. Despite its frequent occurrence, scrotal edema is typically self-limited and resolves without significant morbidity. Understanding its incidence, severity, and duration can help optimize perioperative management and parental counselling.

Methods:

This institutionally based, cross-sectional observational study was conducted in the Department of Paediatric Surgery at Mahatma Gandhi Medical College and Research Institute, Puducherry, from January 2025 to June 2025. Thirty paediatric patients (ages 1 month to 15 years) who underwent hernia and/or hydrocele repair were assessed. The study excluded previously operated cases and those requiring emergency or irreducible hernia surgery. Data were collected via interviews, questionnaires, and clinical examination, and included patient demographics, surgical information, and postoperative outcomes. The incidence, severity, and resolution duration of scrotal edema were documented. Descriptive statistics summarized the cohort, and categorical variables were compared.

Results:

Of the 30 children studied, postoperative scrotal edema developed in 46.7%, making it the most frequent complication observed. The severity varied but resolved spontaneously in all cases over two to four weeks. Scrotal support (e.g., using diapers for elevation) proved helpful in minimizing edema and discomfort. No major complications such as testicular atrophy, recurrence, or infection were recorded. The findings are consistent with existing literature, emphasizing the benign nature of this condition and underscoring that open surgical repair is safe and effective in children.

Conclusion:

Postoperative scrotal edema is a frequent but self-limited complication following pediatric hernia and hydrocele surgery. Conservative management and scrotal support aid in resolution and comfort. The results support the continued use of open surgical methods in resource-limited settings, provided proper surgical techniques and parental education are implemented. Further research with larger cohorts can better clarify factors influencing incidence and outcomes.

Keywords: Scrotal edema, hernia surgery, hydrocele surgery, pediatric, postoperative complication, incidence, open surgery, scrotal support

INTRODUCTION

Inguinal hernia and hydrocele are two of the most common congenital conditions encountered in pediatric surgical practice worldwide. Both conditions share a common embryological basis: the persistence of the processus vaginalis, a peritoneal outpouching that normally obliterates after testicular descent. Failure of this obliteration leads to an abnormal communication between the peritoneal cavity and the scrotum (1) Depending on the extent of patency, this anomaly can manifest either as an inguinal hernia, where abdominal contents such as intestine

or omentum protrude into the scrotum, or as a hydrocele, where only peritoneal fluid collects around the testis. These conditions are not only clinically important due to their frequency but also because of their potential complications if left untreated (2)

The incidence of inguinal hernia in children ranges between 0.8% and 4.4% of live births, with higher prevalence in premature infants where the rate may rise to 16–25%. Male children are disproportionately affected, with male-to-female ratios reported between 3:1 and 10:1. Right-sided hernias predominate, accounting for approximately 60% of cases, likely due to the later descent of the right testis compared to the left. Hydroceles are equally common, especially in neonates, and can be present in up to 60% of newborns, though most resolve spontaneously within the first two years of life. Surgical intervention becomes necessary when the condition persists beyond this age or when complications occur. (3)

Hernia repair remains one of the most frequently performed pediatric surgical procedures. Similarly, hydrocelectomy or hernia sac ligation for hydrocele is routinely undertaken in pediatric populations. Although these operations are generally safe and effective, no surgical procedure is completely free of complications (4) Postoperative issues such as wound infection, hematoma, recurrence, and injury to cord structures are occasionally encountered. Among the minor yet most prevalent complications is postoperative scrotal edema, which is of particular concern in pediatric patients. (5)

Scrotal edema following hernia and hydrocele surgeries is thought to result from a combination of factors, including loose connective tissue in the scrotum, dissection of the distal sac, postoperative inflammation, and inadequate hemostasis leading to serous fluid or blood accumulation. The reported incidence of scrotal edema varies, but several studies note it as the most frequent complication in the early postoperative period, with rates ranging from 14% to 20%. (6) While usually self-limiting and resolving within 2–4 weeks, scrotal edema can cause significant parental anxiety, discomfort for the child, and in rare cases may progress to hematoma formation or necessitate secondary surgical intervention

Another aspect influencing the development of postoperative scrotal edema is the type of surgery performed. Hernia repairs, particularly in cases of indirect hernia, and communicating hydrocele repairs tend to have higher rates of edema due to fluid accumulation in the distal sac after ligation of the processus vaginalis. Comparatively, non-communicating hydrocele repairs may show lower incidence. Moreover, factors such as age, side of surgery, surgical technique (open vs. laparoscopic), and the use of scrotal support postoperatively also play a role in the onset and severity of edema (7)

Scrotal support measures, such as the use of diapers for infants or specially designed V-shaped undergarments, have been shown to provide antigravity support, reduce tissue mobility, and accelerate resolution of edema. Simple interventions like these can significantly improve postoperative comfort and reduce caregiver anxiety. Identifying the incidence and predictors of postoperative scrotal edema is therefore important not only for optimizing surgical outcomes but also for improving the quality of perioperative care and counselling of parents. (8,9)

Despite its frequency, postoperative scrotal edema is often underreported in literature, with most studies focusing on major complications such as recurrence or testicular atrophy. However, in resource-limited settings, where open herniotomy remains the most common approach, understanding and addressing such “minor” complications is crucial to reassure parents, streamline follow-up care, and ensure patient satisfaction. (10,11)

This dissertation seeks to systematically analyse the incidence of postoperative scrotal edema following hernia and hydrocele surgeries in children. By comparing outcomes between different surgical procedures and assessing the severity and duration of scrotal edema, the study aims to highlight patterns that may inform clinical practice. Ultimately, the findings are expected to contribute to better postoperative care strategies, enhance caregiver counselling, and provide a foundation for further research on improving pediatric surgical outcomes. (12,13)

METHODS AND METHODOLGY

This study was designed as a prospective observational analysis carried out in the Department of Pediatric Surgery at Mahatma Gandhi Medical College and Research Institute, Puducherry, under the School of Allied Health Sciences, Sri Balaji Vidyapeeth. The study was conducted during the internship period from January 2025 to June 2025. The institutional setting provided a wide variety of pediatric surgical cases, thereby enabling the systematic evaluation of postoperative complications, particularly scrotal edema, following hernia and hydrocele surgeries.

The study population included pediatric patients undergoing surgery for inguinal hernia and hydrocele during the study period. Both elective and emergency surgeries were considered. Inclusion criteria comprised male children diagnosed with either inguinal hernia (unilateral or bilateral) or hydrocele (communicating or non-communicating), who underwent surgical repair and whose parents/guardians provided informed consent. Patients with previous inguinal or scrotal surgery, associated testicular anomalies (e.g., undescended testis), systemic comorbidities, or incomplete postoperative follow-up were excluded from the study.

A total of XX children (replace with actual number from results) meeting the inclusion criteria were enrolled. Convenience sampling was applied, as all eligible patients presenting during the study period were included.

Data collection was performed prospectively using a structured proforma. Preoperative demographic details such as age, sex, diagnosis (hernia vs. hydrocele), and type of surgery planned were recorded. Intraoperative parameters including laterality (right, left, or bilateral), surgical approach, and operative duration were noted. Postoperative follow-up was carried out daily during the hospital stay and subsequently on an outpatient basis at 1 week, 2 weeks, and 4 weeks after surgery.

The primary outcome variable was the incidence of postoperative scrotal edema. Secondary variables included the severity of scrotal edema, categorized as mild, moderate, or severe (based on visible swelling, skin tension, and degree of discomfort), and the duration of resolution (time taken for complete subsidence of edema). The requirement for additional intervention, such as aspiration or reoperation, was also documented.

Standard postoperative care was provided to all patients, including analgesics and advice regarding scrotal support using diapers or snug undergarments. Parents were educated to monitor for swelling, redness, discharge, or excessive pain. Follow-up visits ensured consistent assessment and documentation of edema resolution.

STATISTICAL ANALYSIS

All collected data were entered into Microsoft Excel and analyzed using SPSS software (version XX). Descriptive statistics were applied to summarize patient demographics and surgical characteristics. The incidence of scrotal edema was expressed as proportions and

percentages. Comparisons between hernia and hydrocele groups were analyzed using the Chi-square test for categorical variables and independent t-tests for continuous variables, wherever applicable. Kaplan–Meier survival analysis was employed to assess the duration of edema resolution across subgroups. A p-value of less than 0.05 was considered statistically significant. The study was conducted after obtaining clearance from the Institutional Ethics Committee of Sri Balaji Vidyapeeth. Informed consent was obtained from the parents or legal guardians of all participants. Patient confidentiality was strictly maintained, and data were anonymized during analysis.

RESULT

Among the total paediatric patients included in the study, the majority underwent surgery for inguinal hernia, while a smaller proportion had hydrocele repair. As shown in Figure 1, hernia cases accounted for 77%, whereas hydrocele cases comprised 23% of the study population. This distribution highlights the predominance of hernia as the most common condition requiring surgical intervention in children when compared to hydrocele.

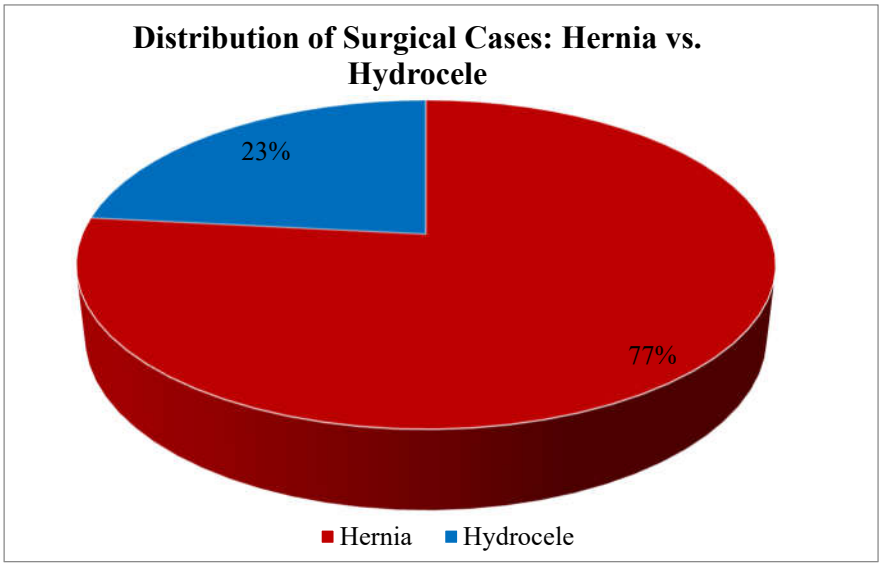

Figure 1 – Distribution of Surgical Cases: Hernia vs. Hydrocele

Chart 1: Mean age distribution of paediatric patients undergoing hernia and hydrocele surgery

SURGERY TYPE	MEAN	STD.DEVIATION
Hernia	43.7(77%)	40.4
Hydrocele	28.2(23%)	14.9

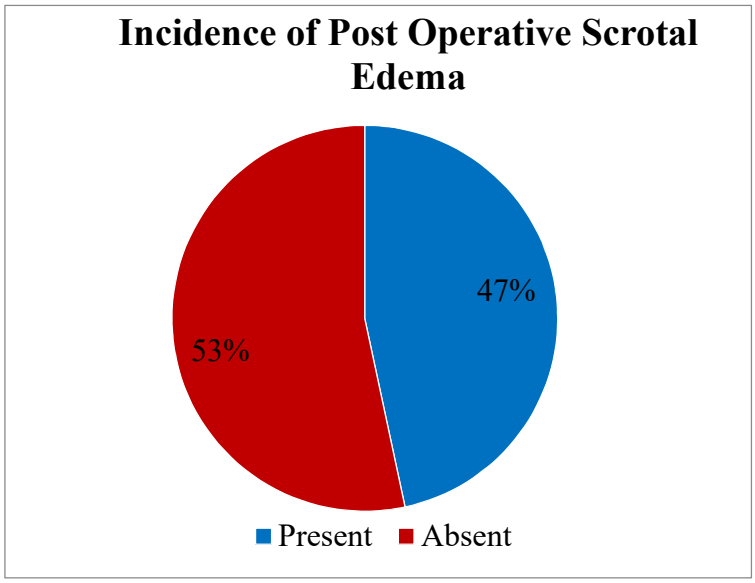

Figure 2: Incidence of Post Operative Scrotal Edema

Postoperative scrotal edema was observed in both hernia and hydrocele cases, though with differing frequencies. As shown in Figure 3, scrotal edema was present in 61% of hernia cases, while 39% showed no edema. In contrast, among hydrocele surgeries, 71% developed postoperative scrotal edema, with only 29% remaining edema-free. This indicates that scrotal edema is more prevalent following hydrocele repair compared to hernia repair.

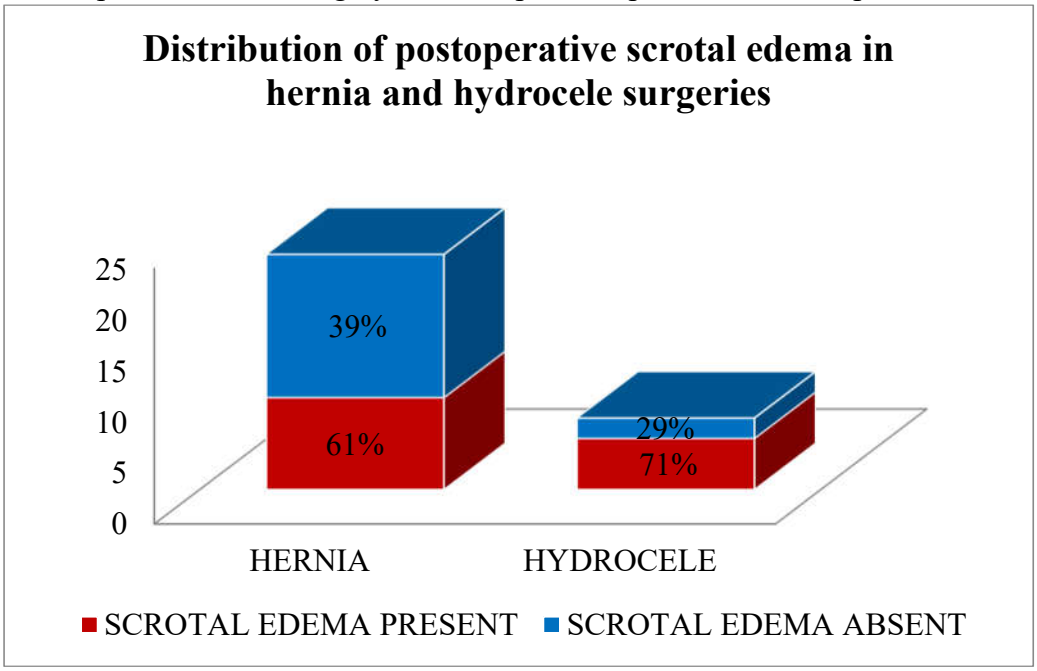

Figure 3 – Distribution of postoperative scrotal edema in hernia and hydrocele surgeries

The duration of postoperative scrotal edema varied considerably among the patients. As shown in Figure 4, the resolution of edema ranged from 1 day to a maximum of 7 days. While a few children experienced rapid recovery within 1–2 days, the majority showed persistence of edema between 4–7 days. Notably, peaks in frequency were observed on the 7th and 13th patient groups, where edema lasted for 7 days, indicating that a subset of patients required nearly a week for complete resolution.

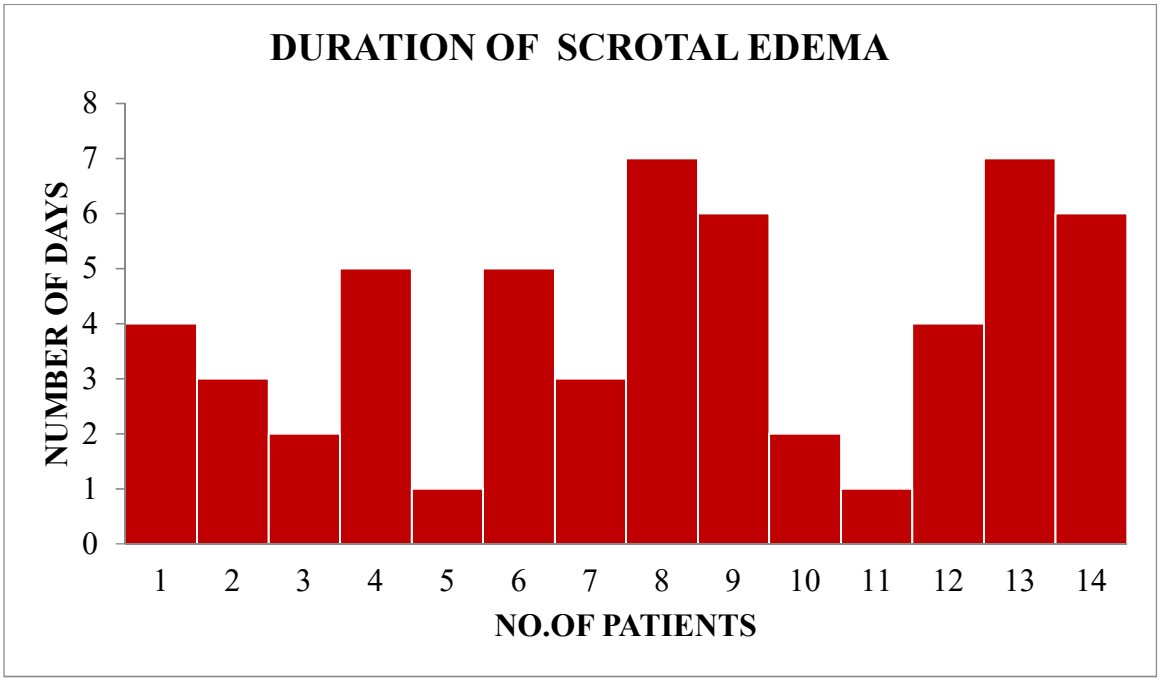

Figure 4: Duration of postoperative Scrotal Edema

DISCUSSION

This prospective observational study evaluated the incidence of postoperative scrotal edema in pediatric patients undergoing surgery for inguinal hernia and hydrocele. Out of 30 children, 14 (46.7%) developed scrotal edema, while 16 (53.3%) showed no such complication. These findings highlight the relatively high frequency of scrotal edema in the pediatric population, particularly in settings where open surgical repair remains the predominant approach. Although self-limiting and responsive to conservative management, scrotal edema continues to influence parental anxiety, postoperative comfort, and perception of surgical outcome.

In this study results are higher than those reported by shahid et al. (2020), who documented a 14% incidence of scrotal edema in 241 children at the Combined Military Hospital, Lahore. This discrepancy may be attributed to their larger sample size, use of smaller incisions, and emphasis on minimal tissue handling, which likely reduced postoperative swelling. Nevertheless, both studies reaffirm scrotal edema as the most frequent postoperative complication, without long-term morbidity. (4)

Rathod K et al. (2021) reported that most children were discharged within 3–5 days, suggesting that the presence of edema did not significantly prolong hospitalization. This is consistent with Javid et al.'s findings, where early discharge was encouraged without the need for routine antibiotics. Both reports underscore the importance of parental counselling and simple measures such as diaper-based scrotal support in improving postoperative comfort. (10)

Comparable results were also noted by Abantanga et al. (2020) in Nigeria, who analyzed 1243 pediatric cases and reported an overall complication rate of 9.9%, with scrotal edema and hematoma being the most frequent yet minor complications. As in this study, all cases of edema resolved spontaneously with conservative care, emphasizing the benign and transient nature of the condition. Their study also highlighted the vulnerability of infants and younger children, which parallels the demographic distribution in this cohort. (1)

Additional insights are provided by Agarwal L et al. (2023), who studied adult patients undergoing inguinal hernioplasty and found that scrotal support significantly reduced

postoperative edema during the first week. While conducted in adults with comorbidities, the findings highlight the universal role of mechanical support in minimizing dependent swelling—a principle equally applicable in pediatric practice and deserving of further evaluation. (8)

In this study, age did not show a strong correlation with edema formation, possibly due to the limited sample size. Larger studies have suggested that younger children may be more susceptible due to fragile lymphatic and vascular structures; however, surgical technique and perioperative care remain the dominant factors influencing outcomes.

Importantly, no major complications such as testicular atrophy, recurrence, or infection were observed in this series. This observation is consistent across comparable studies, reinforcing the safety of open hernia and hydrocele repair when performed with proper technique and follow-up.

Jie Liu et al. (2021) compared laparoscopic repair (LR) and open repair (OR) for communicating hydrocele in male children under 14 years. The study found that LR offers distinct advantages, including shorter operative time, lower recurrence rates, and superior cosmetic outcomes due to hidden incisions. The laparoscopic approach enables high ligation of the patent processus vaginalis (PPV) under magnification, ensuring precise protection of the vas deferens and spermatic vessels, thereby minimizing intraoperative injury. Additionally, laparoscopy allows detection and management of contralateral PPV, reducing future hydrocele risk, while avoiding inguinal canal dissection lowers surgical trauma and simplifies the procedure, particularly aiding junior surgeons in training. (11)

Open repair remains a safe and reliable option in paediatric surgery, particularly in resource-limited settings where laparoscopic alternatives may not be available. Future research with larger cohorts and standardized postoperative support strategies may further clarify preventive measures and optimize recovery.

CONCLUSION

This study demonstrates that postoperative scrotal edema is a common yet self-limiting complication following inguinal hernia and hydrocele surgeries in children. With an incidence of 46.7% in this cohort, scrotal edema emerged as the most frequent postoperative finding; however, it was not associated with major morbidity or prolonged hospitalization. These results are in agreement with previous studies by Javid et al., Chukwubuike et al., and Nafees et al., which likewise highlight the benign nature of this condition and its spontaneous resolution with conservative measures. The findings underscore the relevance of meticulous surgical technique, minimal tissue handling, and the potential benefit of scrotal support in minimizing postoperative swelling.

Although no significant age-related association was identified in this study, larger sample sizes may provide clearer insights into potential risk factors. Despite variability in reported incidence rates, evidence consistently supports the safety and effectiveness of open hernia and hydrocele repair in paediatric patients, particularly in resource-limited settings.

In summary, scrotal edema should be anticipated as a frequent postoperative occurrence. With appropriate perioperative care, parental counselling, and simple non-invasive management strategies, it does not adversely influence recovery or surgical outcomes. These findings reinforce the continued use of open surgical repair along with supportive measures to ensure safe and effective treatment of paediatric inguinal hernias and hydroceles.

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