Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

A Prospective Observational Study of Incidence and Predictors of Contralateral Patent Processus Vaginalis in Children Presenting with Unilateral Inguinal Hernia.

Kavita Tirkey[1], Jitendra Kumar Chaudhary[2], Kriti Lata Paramba[3]*, Shital Malua[4]
[1]Senior Resident, Department of Paediatric Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India
[2]Senior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India.
[3]Junior resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India.
[4]Professor & HOD, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

Abstract

Background:
Pediatric inguinal hernia is among the most common surgical conditions in children and is associated with persistence of the processus vaginalis. Contralateral patent processus vaginalis (CPPV) may progress to metachronous contralateral inguinal hernia requiring additional surgical intervention. Identifying predictors of CPPV may help reduce unnecessary contralateral exploration.

Aim:
To determine the incidence and predictors of contralateral patent processus vaginalis in children presenting with unilateral inguinal hernia.

Methods:
A prospective observational study was conducted in the Department of Pediatric Surgery, Rajendra Institute of Medical Sciences (RIMS), Ranchi, from January 2022 to December 2023. One hundred children aged below 14 years with unilateral inguinal hernia were included. Patients with bilateral, recurrent, or complicated hernias were excluded. Diagnostic laparoscopy was performed intraoperatively to assess the contralateral internal ring. Variables studied included age, sex, hernia side, prematurity, family history, and demographic characteristics. Data were analyzed using the Chi-square test, with $p<0.05$ considered statistically significant.

Results:
Among the 100 participants, male children were the majority, and most were aged 2–5 years. CPPV was identified in 32% of cases. A significantly higher incidence was observed in children younger than 2 years, those with left-sided hernia, and premature infants ($p<0.05$).

Conclusion:
CPPV showed a considerable incidence among children with unilateral inguinal hernia.

Recommendation:
Younger age, prematurity, and left-sided hernia were significant predictors. Selective laparoscopic assessment of high-risk children is recommended to reduce future metachronous hernia and avoid repeated surgery.

Keywords: *Second surgery, metachronous contralateral hernia, vaginalis, predictors, unilateral inguinal hernia.*
Submitted: ***February 20, 2026*** ***Accepted:*** ***March 30, 2026*** ***Published:*** *June 30, 2026*

Corresponding Author: *Kriti Lata Paramba*
Email: ***kritiparamba@gmail.com***
Junior resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

Introduction

In paediatric medicine, inguinal hernias are among the most frequent surgical disorders. When the testis descends into the scrotum, the processus vaginalis, an embryological outpouching of the peritoneum, fails to be obliterated. If this processus vaginalis persists, it can cause a communicating sac, hydrocele, or indirect inguinal hernia. The incidence of paediatric inguinal hernia is between 1 to 5% in full-term children, and it is more common in preterm infants. The process of testicular descent affects male children more frequently than female children.

The potential for a contralateral patent processus vaginalis (CPPV) is a significant clinical issue in children who present with a unilateral inguinal hernia. Despite being clinically quiet at first, CPPV may eventually progress to a metachronous contralateral inguinal hernia, requiring additional surgery and repeated anaesthesia exposure. Historically, routine contralateral exploration was advocated in children with unilateral hernia to prevent future contralateral hernia development (1). However, as not all CPPVs develop into clinically significant hernias, frequent investigation may expose many children to needless surgery and possible problems.

Advances in minimally invasive surgery have enabled laparoscopic evaluation of the contralateral internal ring during unilateral hernia repair. Laparoscopy is considered a safe and reliable method for detecting CPPV and helps identify children who may benefit from simultaneous contralateral repair. Several studies have reported varying incidences of CPPV ranging from 20% to 50%, depending on age, side of hernia, prematurity, and study population. Younger age, female sex, left-sided hernia, and prematurity have been identified as possible predictors (2).

Despite multiple international studies, limited data are available from Eastern India regarding the incidence and predictors of CPPV in pediatric patients. The results of this study could assist surgical decision-making in the treatment of paediatric inguinal hernias and help develop guidelines for selective contralateral exploration (3).

Therefore, the present study aimed to determine the incidence of contralateral patent processus vaginalis (CPPV) and identify its predictors among children presenting with unilateral inguinal hernia at the Department of Pediatric Surgery, Rajendra Institute of Medical Sciences (RIMS), Ranchi.

Materials and Methods

Study design

This was a prospective observational study conducted among pediatric patients presenting with unilateral inguinal hernia.

Study setting

The study was conducted in the Department of Pediatric Surgery, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, India, between January 2022 and December 2023. RIMS is a tertiary care teaching hospital that serves as a major referral center for Jharkhand and neighboring regions. The hospital provides pediatric surgery services, including congenital anomaly management, neonatal surgery, gastrointestinal surgery, urological procedures, trauma care, and minimally invasive surgery.

Participants

A total of 100 pediatric patients aged below 14 years with clinically diagnosed unilateral inguinal hernia were recruited using consecutive sampling. Children undergoing elective herniotomy during the study period who met eligibility criteria were included.

Inclusion criteria

- Children aged below 14 years
- Clinically diagnosed unilateral inguinal hernia
- Patients undergoing elective herniotomy

Exclusion criteria

- Bilateral inguinal hernia
- Recurrent hernia
- Previous inguinal surgery
- Critically ill children

Variables

Dependent variable:

- Presence or absence of CPPV

Independent variables:

- Age
- Gender
- Side of the hernia
- Prematurity
- Family history

CPPV was diagnosed by laparoscopic visualization of a patent contralateral internal inguinal ring during surgery.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

Data sources/measurements
Data were collected from patient clinical records, parental interviews, and intraoperative findings. Age was recorded in years, prematurity was defined as birth before 37 weeks of gestation, and family history was recorded from parents or guardians.

Bias
Selection bias was minimized using consecutive patient recruitment. Measurement bias was reduced using standardized clinical assessment and laparoscopic diagnosis. Data entry and statistical analysis were independently verified.

Sample size
Sample size was calculated using:
$n = Z^2P(1-P)/d^2$
Where:
n = required sample size
Z = 1.96 at 95% confidence interval
P = estimated prevalence of CPPV (0.32)
d = margin of error (0.09)
Calculated sample size was approximately 93; therefore, 100 participants were included.

Quantitative variables
Age was analyzed both as a continuous variable and categorized into <2 years, 2–5 years, and >5 years to facilitate interpretation and comparison with previous studies.

Statistical analysis
Data were analyzed using SPSS version 25. Categorical variables were presented as frequencies and percentages. Associations between CPPV and predictive factors were analyzed using the chi-square test. Statistical significance was considered at $p<0.05$.

Ethical considerations
Ethical approval was obtained from the Institutional Ethics Committee of Rajendra Institute of Medical Sciences, Ranchi.

Results
A total of 126 pediatric patients were assessed for eligibility during the study period. Twenty-six patients were excluded due to bilateral hernia (n=12), recurrent hernia (n=8), previous surgery (n=4), and critical illness (n=2). Finally, 100 participants were included for analysis.

Table 1: Age Distribution and CPPV

Age Group	Total Cases	CPPV Present	CPPV Absent	P value
<2 years	30	15	15	
2–5 years	40	12	28	
>5 years	30	5	25	0.01

Table 2: Side of Hernia and CPPV

Side	Total Cases	CPPV Present	CPPV Absent	P value
Right	65	17	48	
Left	35	15	20	0.02

Table 3: Prematurity and CPPV

Prematurity	Total Cases	CPPV Present	CPPV Absent	P value
Premature	19	11	8	
Full-term	81	21	60	0.003

Table 4: Family History and CPPV

Family History	Total Cases	CPPV Present	CPPV Absent	P value
Present	25	12	13	
Absent	75	20	55	0.04

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

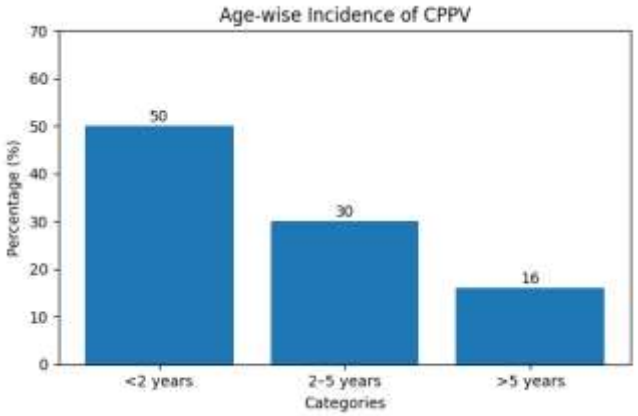

Figure 1: Age-wise incidence of CPPV

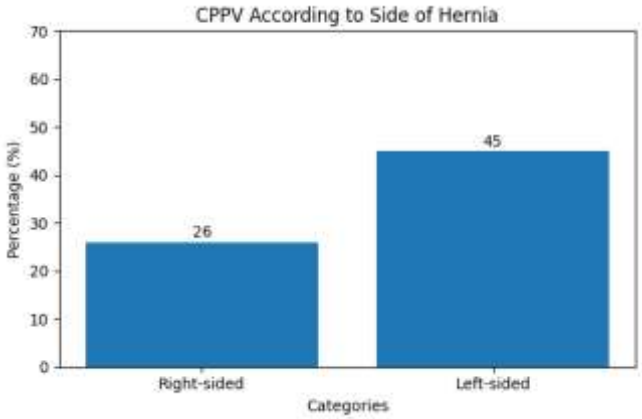

Figure 2: CPPV according to the side of the hernia

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

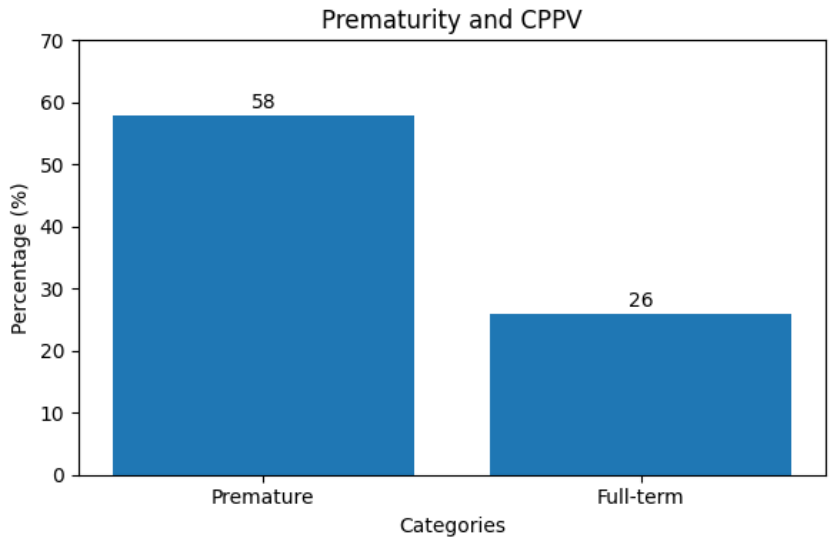

Figure 3: Prematurity and CPPV

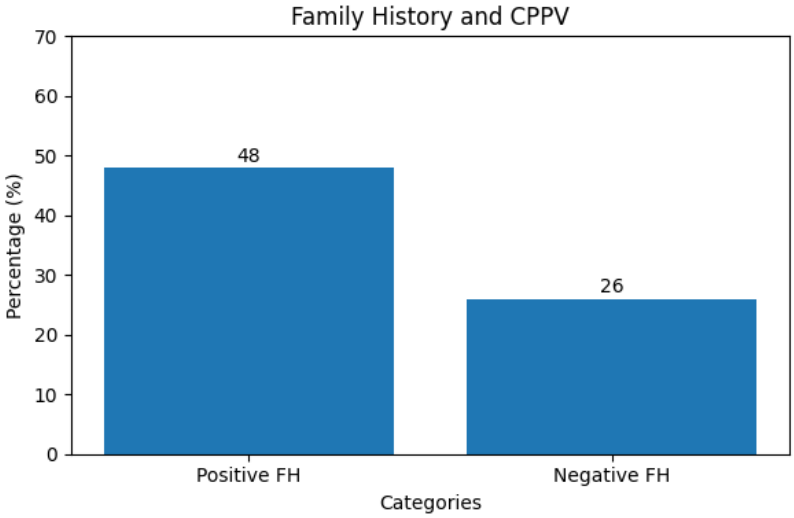

Figure 4: Family history and CPPV

Discussion

The present study demonstrated an overall CPPV incidence of 32%. Younger age (<2 years), left-sided inguinal hernia, prematurity, and family history were identified as significant predictors of CPPV. Children younger than 2 years showed the highest prevalence (50%), suggesting persistence of the processus vaginalis in early childhood. Similar findings have been reported by Yang et al., who observed decreasing CPPV incidence with increasing age. Premature infants also demonstrated significantly greater CPPV rates, likely due to incomplete obliteration of the processus vaginalis during fetal development. Left-sided hernia was associated with greater CPPV occurrence, possibly because

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

embryological closure of the left processus vaginalis occurs later than the right side.

In children who presented with a unilateral inguinal hernia, the incidence and predictors of contralateral patent processus vaginalis (CPPV) were assessed in this study. The overall incidence of CPPV in this study was 32%, which is similar to earlier research that reported incidences ranging from 20 to 50%. The reported incidence of CPPV in Kittle H, Geng AL, 2025, was observed as 52.6% incidence. (4). Differences in the study population, age distribution, and diagnostic methods used can all contribute to variations in incidence. The current study indicated that age was a major predictor of CPPV. Compared to older children, children under the age of two showed the highest incidence (50%). Yang B *et al. (*2023 observed similar results, demonstrating a decrease in CPPV incidence as age increased. This increased incidence could be explained by the persistence of the processus vaginalis in younger children. (5).

Compared to right-sided inguinal hernias, left-sided hernias were linked to a noticeably higher incidence of CPPV. This finding is in line with earlier research that suggested the left processus vaginalis closed later in embryonic development. There have also been more reports of metachronous contralateral hernia after left-sided hernia repair. In this investigation, prematurity turned out to be one of the best indicators of CPPV. Because the processus vaginalis was not completely obliterated at birth, premature babies had much greater rates of CPPV. Preterm infants have a higher incidence of CPPV and inguinal hernia, according to prior research(6). Another important element linked to CPPV was family history. The processus vaginalis may persist in these children due to connective tissue defects and genetic susceptibility. Intraoperative diagnosis of CPPV was found to be safe and successful with diagnostic laparoscopy. For many children, it prevented needless contralateral exploration while allowing for simultaneous repair when necessary. Instead of performing regular bilateral surgery in every situation, the results of this study recommend selective contralateral exploration depending on known risk factors. This strategy can lower the risk of further metachronous hernias while minimising surgical stress, anaesthesia exposure, and medical expenses. (7).

Generalizability

The study findings may be generalized to tertiary care pediatric populations with similar demographic and clinical characteristics.

Conclusion

A useful and minimally invasive method for identifying CPPV was discovered to be diagnostic laparoscopy. It prevents needless routine contralateral investigation and offers highly accurate direct visualisation of the contralateral internal inguinal ring. The formation of a metachronous contralateral inguinal hernia may be avoided by selectively identifying and repairing CPPV during the same surgical procedure. This would lessen the need for repeat surgery, anaesthesia exposure, hospitalisation, and the financial burden on families.

To ascertain the precise risk of CPPV development to a clinically noticeable hernia, more multicentric studies with larger sample sizes and long-term follow-up are advised. Standardised management guidelines for paediatric unilateral inguinal hernias may be developed with the aid of such studies. In general, paediatric patients with unilateral inguinal hernias can have better surgical results and lower morbidity with early detection, adequate laparoscopic assessment, and targeted therapy of CPPV.

Limitations

Single-center study design, relatively small sample size, and absence of long-term follow-up for the development of metachronous hernia were limitations.

Recommendation

Routine laparoscopic evaluation of the contralateral side may be considered in high-risk children, especially younger children and premature infants.

Acknowledgement

The authors express sincere gratitude to the Department of Pediatric Surgery, Rajendra Institute of Medical Sciences, Ranchi, and all participants and their families.

Funding

No funding was received for this study.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

Data supporting the findings are available from the corresponding author upon reasonable request.

Author Contributions

Kavita Tirkey: Study conception, data collection, manuscript preparation

Jitendra Kumar Chaudhary: Data analysis and interpretation

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.7 No. 2 (2026): June 2026 Issue
https://doi.org/10.51168/sjhrafrica.v7i2.2697
Original Article

Kriti Lata Paramba: Literature review and manuscript drafting
Shital Malua: Supervision and final approval

List of abbreviations

CPPV: Contralateral Patent Processus Vaginalis
RIMS: Rajendra Institute of Medical Sciences
SPSS: Statistical Package for Social Sciences

References

1. Valusek PA, Spilde TL, Ostlie DJ, Peter SDST, Iii WMM, Iii JWB. Laparoscopic Evaluation for Contralateral Patent Processus Vaginalis in Children with Unilateral Inguinal Hernia. J Laparoendosc Adv Surg Tech. 2006;16(6):650-3. https://doi.org/10.1089/lap.2006.16.650
2. Godosis D, Mouravas V, Theotokis P, Gargani S, Sfoungaris D. Current Perspectives on the Contralateral Patent Processus Vaginalis : What About the Other Side ? Cureus. 2026;18(2):1-8. https://doi.org/10.7759/cureus.103451
3. Rachman SP, Gunawan K, Hariastawa IGBA. Profile of Contralateral Patent Processus Vaginalis in Pediatric Patients with Unilateral Inguinal Hernia. Indian J Forensic Med Toxicol. 2021;15(1):1527-31.
4. Kittle H, Geng AL. Spontaneous Closure of a Patent Processus Vaginalis : A Case Report. Let us know how access to this document benefits you. J Pediatr Surg Case Reports. 2025;121:1-4. https://doi.org/10.1016/j.epsc.2025.103084
5. Yang B, Guo N, Wang X, Wang S. Analysis of Contralateral Patent Processus Vaginalis in Laparoscopic High Ligation of the Vaginal Process and Clinical Long-term Effect of Individualized Treatment. Iran J Pediatr. 2023;33(1):1-6. https://doi.org/10.5812/ijpediatr-123152 https://doi.org/10.5812/ijp-123152
6. Jinxiang L, Qingwei C, Shenghua Q, Yunqiang X, Haiyang L. Contralateral patent processus vaginalis repair in boys : a single-center retrospective study. Sci Rep [Internet]. 2022;12(12073):1-6. https://doi.org/10.1038/s41598-022-15435-9
7. Aboalazayem A, Seif H, Kaddah S, Elbarbary M, Wishahy AMK. Accuracy of ultrasonography in predicting contralateral patent processus vaginalis compared with laparoscopic findings in children. Egypt Pediatr Assoc Gaz [Internet]. 2024;72(22):1-5. https://doi.org/10.1186/s43054-024-00258-2

PUBLISHER DETAILS:

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa