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Original Article

Frequency of Postoperative Surgical Site Infection in Inguinal Herniotomy with or without Peri-operative Antibiotic in Children

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Abstract

Background: Overuse of antibiotics is worldwide concern. Although, Surgical site infection (SSI) is uncommon following clean surgeries and prophylactic antibiotics aren't recommended for them, it is still used widely leading to super infection, higher cost, and antibiotic-resistant microorganisms in healthcare settings. The aim of this study was to compare the frequency of postoperative surgical site infection in inguinal herniotomy with or without peri-operative antibiotic in children.

Methods: This quasi-experimental study was conducted in the Department of Pediatric Surgery at Chittagong Medical College Hospital from October, 2023 to March, 2025. A total of 176 patients were divided into two groups: Group A received peri-operative anti Cephradine intravenously as single dose preoperatively, after induction and before incision. Then oral Cephradine 50 mg/kg/day orally in 4 divided doses for 7 days) (88patients) and group B were not given any peri-operative antibiotic (88 patients). Patients were monitored on the 1st, 7th, and 30th post-operative days for SSI evaluation. Infections were assessed throughserous discharge culture, and antibiotics were prescribed based on sensitivity results.

Result: The mean age was 5.10 ± 2.88 years in Group A and 4.65 ± 3.05 years in Group B, (p>0.05).. 84.1% males in Group A and 83.0% in Group B (p>0.05). Right-sided hernia was more common in both groups (73.9% in Group A vs 67.0% in Group B, p>0.05). At the 1st and 3rd follow-ups, no cases of superficial surgical site infection (SSI) were reported in either group. At the 2nd follow-up, minimal signs of SSI were observed with no significant difference (p>0.05).

Conclusion: Peri-operative antibiotic use in children undergoing inguinal herniotomy did not significantly influence the frequency of postoperative surgical site infections. Routine use of peri-operative antibiotics is unnecessary in uncomplicated pediatric inguinal herniotomy.

Keywords: Peri-operative antibiotics, inguinal herniotomy, elective clean surgery, children.

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Introduction

SSI is one of the most common surgical complications. In the case of clean-contaminated and dirty surgeries, the risk of SSI strongly exceeds the potential ill effects of antibiotic usage. It has been recommended by some preliminary studies that antibiotics need not be given in clean surgeries [1,2]. The appropriate administration of antibiotics in patients undergoing surgery is necessary, and misuse of antimicrobials leads to super infections and colonization of highly resistant bacteria in surgical wards, as well as high healthcare costs [3]. In cases of clean surgery, no antibiotic is required, but it is frequently used in practice [1]. For this reason,

study was conducted to compare the frequency of postoperative surgical site infection in inguinal herniotomy with or without peri-operative antibiotic in children.

Materials and Methods:

Study settings

It was a quasi-experimental study was conducted in the Department of Pediatric Surgery at Chittagong Medical College Hospital from October, 2023 to March, 2025. Patients of unilateral inguinal hernia admitted in the department during this study period were divided into two groups as Group A- Patients with peri-operative antibiotic (Inj. Cephradine 25 mg/kg/dose intravenously as a single dose preoperatively, after induction and before incision. Then oral Cephradine 50 mg/kg/day orally in 4 divided doses for 7 days) and group B was not given any peri-operative antibiotic. The general objective was to compare the postoperative surgical site infection in inguinal herniotomy with or without peri-operative antibiotic in children. The specific objectives were to compare the type of surgical site infection, discharge from wound, the post-operative wound dehiscence and the need for readmission between two groups. Inclusion criteria were age <12 years and unilateral Inguinal Hernia, Exclusion criteria were irreducible, obstructed, recurrent, strangulated, incarcerated inguinal Hernia; presence of systemic infection at the time of surgery, presence of other major congenital anomalies and previous surgeries.

Study procedure

A detailed history was obtained. A complete physical examination was performed. No routine investigations except those required by the anesthesiologist were carried out. The principle of surgery and aseptic surgical technique were followed in all cases, such as minimum tissue handling, maintaining adequate homeostasis and minimum use of cautery. Inguinal herniotomy was done through a lower inguinal crease line incision. The wound was covered with adhesive dressing after closing the wound by intradermal suture with polyglactin. The antibiotic dose and timing of administration was strictly maintained in Group A. Follow-up was ensured on the 1st post-operative day (POD), 7th POD and 30th POD for wound examination. In infected cases, oral antibiotics started (Cephradine 50 mg/kg/day orally in 4 divided doses). Group allocation was done randomly.

Data collection and analysis

All relevant information for each individual study subject was recorded on a pre-tested case record form. All data were collected by the first author to avoid inter-observer variation. Data was processed and analyzed by using computer-based software SPSS-27 (Statistical Package for Social Science). For presentation of quantitative data, mean ± SD and for qualitative data, frequency and percentage were used. The difference between the groups was analyzed by the Student t-test. Categorical variables were compared with Chi-square test. p-value was considered statistically significant when it was less than 0.05.

Ethical clearance for the study was taken from the Ethical Review Board (ERB) of Chittagong Medical College, Chattogram (Appendix-IX (A)) (Memo No.: 59.127.1557.013.19.PG.2025./028, Date: 31.08.2025).6

Results:

The age distribution of children undergoing inguinal herniotomy was comparable between the two groups. In Group A (88 patients with peri-operative antibiotic), 50 (56.8%) were ≤5 years, 34 (38.6%) were 6–10 years, and 4 (4.5%) were 10–12 years, while in Group B (88 patients without peri-operative antibiotic), 59 (67.0%) were ≤5 years, 23 (26.1%) were 6–10 years, and 6 (6.8%) were 10–12 years. The mean age was 5.10±2.88 years in Group A and 4.65±3.05 years in Group B, with a range of 0.9–12 years and 0.5–12 years, respectively. (p=0.32). (Table 1)

Table 1: Distributions of study subjects according to age (n=176)

Age (in years)	Group A (n=88)		Group B (n=88)		*p* value
	n	%	n	%	
≤5	50	56.8	59	67.0	
6-10	34	38.6	23	26.1	
10-12	4	4.5	6	6.8	
Mean±SD	5.10±2.88		4.65±3.05		0.32
Range (min-max)	0.9-12		0.5-12		

Distribution of sex was similar between the two groups. In Group A (patients with peri operative antibiotic), 74 (84.1%) were male and 14 (15.9%) were female, whereas in Group B (patients without peri-operative antibiotic), 73 (83.0%) were male and 15 (17.0%) were female (p=0.84) (Table 2) 7

Table 2: Distributions of the study subjects according to sex (n=176)

Sex	Group A (n=88)		Group B (n=88)		*p* value
	n	%	n	%	
Male	74	84.1	73	83.0	0.839^{ns}
Female	14	15.9	15	17.0	

Among children with unilateral inguinal hernia, right-sided cases were more frequent in both groups. In Group A (patients with peri-operative antibiotic), 65 (73.9%) had right-sided hernia and 23 (26.1%) had left-sided hernias, whereas in Group B (patients without peri-operative antibiotic), 59 (67.0%) had right-sided hernias and 29 (33.0%) had left-sided hernias (p=0.32) (Table 3).

Table 3: Distributions of the unilateral inguinal hernia cases according to side (n=176)

Side	Group A (n=88)		Group B (n=88)		*p* value
	n	%	n	%	
Right-sided hernia	65	73.9	59	67.0	0.321^{ns}
Left-sided hernia	23	26.1	29	33.0	

At the 1st and 3rd follow-ups, no cases of superficial surgical site infection (SSI) were observed in either group, with all patients showing no signs of inflammation, discharge, or disruption of skin- Group A 88 (100.0%) vs. Group B 88 (100.0%). At the 2nd follow-up, superficial SSI was detected in a few cases: signs of inflammation in 1 (1.1%) from each group, discharge in 1 (1.1%) from Group A and 2 (2.3%) from Group B, and disruption of skin in 1 (1.1%) from Group B only. The difference between Group A and Group B at this stage was not statistically significant (p=0.72) (Table 4).

Table 4: Distributions of the study subjects according to superficial SSI at different follow-ups (n=176)8

Superficial SSI	Group A (n=88)		Group B (n=88)		*p* value
	n	%	n	%	
1st follow-up (1st POD)					
No	88	100.0	88	100.0	-
Sign of inflammation	0	0.0	0	0.0	
Discharge	0	0.0	0	0.0	
Disruption of skin	0	0.0	0	0.0	
2nd follow-up (7th POD)					
No	86	97.7	84	95.5	0.716^{ns}
Sign of inflammation	1	1.1	1	1.1	
Discharge	1	1.1	2	2.3	
Disruption of skin	0	0.0	1	1.1	
3rd follow-up (30th POD)					
No	88	100.0	88	100.0	-
Sign of inflammation	0	0.0	0	0.0	
Discharge	0	0.0	0	0.0	
Disruption of skin	0	0.0	0	0.0	

Throughout all follow-up visits, no cases of deep surgical site infection were detected in either group. At the first follow-up, all children in Group A 88 (100.0%) and Group B 88 (100.0%) showed no signs of inflammation, discharge, or disruption of skin. Similarly, at the second follow-up, all subjects in Group A 88 (100.0%) and Group B 88 (100.0%) remained free from deep infection. By the third follow-up, both groups continued to show no evidence of deep SSI, with all cases 88 (100.0%) in each group unaffected, indicating that peri-operative antibiotic use did not influence the occurrence of deep SSI in these patients.

Discussion:

This study showed the mean age was 5.10 ± 2.88 years in Group A and 4.65 ± 3.05 years in Group B, with most children ≤5 years and no significant difference between groups (p>0.05).

This confirms that inguinal herniotomy is most common in early childhood. Napar et al. [4] similarly reported no age-related variation in SSI, while Usang et al. [5] and Vaze et al. [1] also found no significant association between age and infection risk. Across studies, age distribution is centered in younger children without influencing SSI frequency. Early herniotomy remains ideal to reduce risks of incarceration or obstruction. In Bangladesh, however, delays are common due to limited healthcare access, economic constraints, and parental misconceptions, as emphasized by García et al. [6], who underscored the need for surgical outreach in low-resource settings. García et al. [6] observed that the overall complication and SSI rates were markedly higher, and limited perioperative resources, hygiene challenges, younger age, and larger hernias may have influenced these outcomes.

In the present study, males predominated in both groups (84.1% in Group A and 83.0% in Group B), with no significant difference in sex distribution (p>0.05). The male-to-female ratios were 5.3:1 and 4.9:1 in Group A and Group B respectively. Napar et al. [4] also observed no correlation between sex and SSI, while Usang et al. [5] reported a male-to female ratio of 5:1 but no infection-related differences. Vaze et al. [1] and Goyal et al. [7] similarly confirmed male predominance but no significant impact on SSI risk. These findings reflect the well-documented male preponderance in pediatric hernias, but sex itself is not a determinant of postoperative infection.

In this study, right-sided hernias were more frequent (73.9% in Group A and 67.0% in Group B) with no significant difference between groups (p>0.05). Goyal et al. [7], Fazal et al. [8], and Masum et al. [9] likewise reported right-sided dominance but found no associa

tion with SSI. Fujii et al. [10] explained the embryological basis for right-sided prevalence yet also concluded that laterality does not influence infection outcomes. Right-sided inguinal hernia is more common because the right testis descends later, so the processus vaginalis closes later, leaving a higher chance of persistence and hernia formation. Thus, both present and previous works agree that the hernia side reflects anatomical patterns rather than infection risk.

In the present study, no superficial SSI was recorded at the first and third follow-ups, and only a few cases appeared at the second follow-up (e.g., inflammation in 1.1% of each group; discharge in 1.1% of Group A and 2.3% of Group B; disruption of skin 1.1% of Group B), with no significant difference between groups ($p>0.05$). Napar et al. [4] and Usang et al. [5] also reported very low superficial SSI rates in pediatric herniotomies, unaffected by prophylactic antibiotics. Kayani et al. [8], Fatema et al. [11], and Lightner et al. [12] further emphasized that aseptic surgical technique, rather than routine antibiotics, determines superficial SSI outcomes. These findings support the consensus that prophylaxis adds little benefit in clean pediatric hernia surgeries. While the current study limited follow-up to three specific time points, some external studies, like those by Napar et al. [4] and Usang et al. [5], included extended postoperative monitoring or additional environmental risk factor assessments, such as surgical duration or skin preparation type, which could provide broader insight.

In the present study, no deep SSI occurred in either group throughout all follow-ups, confirming the extremely low risk of deep infection in pediatric herniotomy. Napar et al. [4], Usang et al. [5], and Joda et al. [13] similarly documented zero deep SSI cases, with or 10 without antibiotics. Lightner et al. [12] and Cuschieri [2] also noted that deep SSI in clean elective pediatric procedures is rare and unrelated to prophylactic antibiotics. These findings consistently reinforce that deep SSI is virtually absent in uncomplicated herniotomy, and antibiotic prophylaxis does not alter this outcome.

Limitations:

The absence of microbiological cultures to identify the specific pathogens causing infections limits the ability to assess whether certain bacteria are more prevalent in cases with or without peri-operative antibiotics. Factors such as nutritional status, immune function, surgeon experience, and adherence to post-operative wound care protocols could influence infection rates but may not have been controlled in the study.

Conclusion:

Use of peri-operative antibiotics in children undergoing inguinal herniotomy did not result in a significant difference in the frequency of postoperative surgical site infections. Routine use of peri-operative antibiotic is not necessary in uncomplicated pediatric inguinal herniotomy, as it does not significantly affect postoperative infection outcomes.

Recommendations:

Antibiotics should not be routinely administered in clean pediatric surgeries unless specific risk factors, such as prolonged operative time, immunosuppression, or existing infections, are present. If new researchers conduct a multi-center RCT, the evidence will be even stronger. Policymakers can include in the best guidelines that antibiotics are not required in hernia surgery.

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Contribution of authors:

MASA- Concept, Protocol preparation, data collection, Manuscript writing

RK- Critical revision and final approval

MAMR- Concept, Protocol design, Critical revision and final approval

TKC- Concept, Literature search, Protocol design, Data analysis, Critical revision.

Disclosure:

All the authors declare no competing interest.

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