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Original Article

Impact of single dose versus multidose prophylactic use of antibiotics in elective inguinal herniotomy in children: A prospective study

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Abstract

Aim: to compare the difference of outcome from single dose versus multidose of prophylactic antibiotics use in elective herniotomy in children.

Introduction: There are lot of studies to find out the role of using prophylactic antibiotics in clean surgery, but still there is controversies whether it is necessary or not for preventing post operative surgical site infection. Irrational use of antibiotics in surgery is a major problem in our country and it also increases the total treatment cost. This study will help our surgeons to take decision about the use of prophylactic antibiotic in clean surgery like herniotomy.

Methodology: This prospective comparative study was conducted in the Department of Paediatric Surgery, Shaheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh.

Results: Out of 100 patients of group A (single dose antibiotic) only four patients developed serous wound discharge (seroma 4%) and none of them developed wound infection. In 100 patients of group B (multiple dose antibiotic) single patient developed seroma and none of them developed wound infection.

Conclusion: In this study we found that the difference of postoperative outcome in terms of surgical site infection between single dose versus multiple doses antibiotic use in herniotomy is minimum and statistically insignificant. We conclude that single dose antibiotic prophylaxis is sufficient in clean surgery like herniotomy that is also cost effective.

Key words: Single dose, multiple doses, prophylactic antibiotic, wound infection, haematoma, herniotomy.

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Introduction:

Surgical site infection is a common problem encountered by the surgeons that results from several risk factors, although some of them are related to patients and others are related to operation theatre environment and perioperative wound care.[1] In case of clean surgery like herniotomy, where there is almost no entry of organism, expected rate of infection is less than 2%. Most of the surgeons in our country use preoperative single dose injectable antibiotic followed by post-operative 7 days oral systemic antibiotic after inguinal herniotomy. These oral antibiotics can be avoided by practicing good surgical technique, strict aseptic measures taken during operation and post operative wound care.[2] Meta analysis of similar studies recommended use of preoperative single dose injectable antibiotic only.[3] Inguinal herniotomy is a very common routine operation in paediatric surgery ward of a tertiary hospital in our country. Inguinal herniotomy is done for indirect inguinal hernia and congenital hydrocele for male children and hernia of

canal of Nuck for female children. Use of prophylactic antibiotic is a common practice in anysurgical procedure, because post-operative surgical site infection increases morbidity of the patient.[4] Operation theatre (OT) sterilization, autoclaving of instruments and linen, technical expertise of the operating surgeon, post-operative wound care all have a major role in surgical site infection.[5] Risk of post-operative wound infection is lowest in clean surgical procedure like inguinal herniotomy.[6] But still, antibiotics are used irrationally for unduly long periods in an attempt to reduce surgical site infection that increase the financial burden to the hospital and probable emergence of drug resistance and drug related adverse effects. Our study is aimed to compare the impact of single dose versus multiple doses of antibiotics in inguinal herniotomy in children in terms of post operative infection.[7]

American Society of Health System Pharmacist has published therapeutic guidelines on anti-microbial prophylaxis in surgery.[8] The guidelines are intended to provide practitioners with a standardized approach to the national safe and effective use of anti-microbial agents for prevention ofsurgical site infections (SSIs) based on currently available clinical evidence and emerging issues. According to the guidelines, an anti-microbial agent should be active against the pathogens most likely tocontaminate the surgical site, given in an appropriate dose and at the time before giving incision that ensures adequate serum and tissue concentration during the period of potential contamination.[4]

Materials and methods:

This prospective observational study was conducted in the Department of Paediatric Surgery at Shaheed Ziaur Rahman Medical College Hospital Bogura from July 2020 to June 2023. Total 200 patients were included in this study who were admitted in ward for elective inguinal herniotomy. Patients were randomly assigned to two groups, group A: 100 patients for preoperative single dose injectable antibiotic and group B: 100 patients for multiple dose antibiotics.

Inclusion criteria:

- patients undergoing elective inguinal herniotomy
- age range from 3 months to 12 years (144 months) from both sexes.

Exclusion criteria:

- obstructed and strangulated inguinal hernia
- patients with scabies and other skin diseases

Informed written consent was taken from parents or legal guardians after proper counselling for operation under general anesthesia. Both groups were homogenized in terms of age. Institutional ethical review committee approval was taken for conducting the study. In a structured data sheet, all information of the patient including clinical examination, investigation reports, operative findings and follow up findings were recorded.

Group A (n=100): Received prophylactic preoperative single dose prophylaxisinjectionceftriaxone (100mg/kg) intravenously prior to making the incision of operation.

Group B (n=100): Received preoperativeprophylactic singledose injectable ceftriaxone followed by oral cefixime (10 mg/kg/day) twice daily for 7 days.

Surgical procedure:

All patients were operated under general anesthesia. Skin preparation of the operating field was done with 10% povidone iodine solution. Injection ceftriaxone was given to all the patients at a dose of 100 mg/kg/day before incision of the operation. Incision was made over lower inguinal crease line. Surgery was done with autoclaved instruments and linens. Standard surgical protocol was followed, like meticulous dissection, minimum tissue handling and proper hemostasis.Woundclosedintradermally with polyglactin suture. Oral cefixime was given to all patients of group B from first post operative day to 7th post operative day. Patients were discharged on 3rd post operative day and advised to come on 7th and 14th post operative day for follow up. If any patient had discharge from the wound, it was sent for culture and sensitivity test and antibiotic was given accordingly. Findings of both follow up report was recorded in data sheet that included wound discharge and hematoma forcomparison.

Statistical analysis:

Data collected from both groups and statistical analysis was done by using statistical package for social science (SPSS 23) software and expressed in tables. To determine any significant associationbetween the two study groups was analyzed applying chi-square test and ‘p’ value less than 0.05 was taken as statistically significant.

Results:

The demographic profile of the patient in both group A (single dose) and group B (multiple doses) shows a similar distribution in terms of age and sex with no significantdifference.Theage distribution of participants in Table 1 ranged from 3 months to144months.

Table I: Age distribution of children (months) between two groups:

	Group A Single dose antibiotic (n=100)	Group B Multiple dose antibiotic	Total
		n=100	N=200
Age range in months	3-132	6-144	3-144

Out of 100 in group A, 86 were male (86%) and 14 were female (14%), and in group B, 82 were male (82%) and 18 were female (18%).

The difference in sex distribution between the study groups (Table II) was not statistically significant.

Table II: Sex distribution of children between two study groups:

Sex	Total (N=200)	Group A (single dose) (n=100)	Group B (multiple doses) (n=100)	*p* value
Male	170 (85%)	86 (86%)	84 (84%)	0.301
Female	30 (15%)	14 (14%)	16 (16%)	0.277

Scrotal swelling is observed in 3 male patients of Group A on 3rd POD and disappeared on follow up on 7th POD and 14th POD. Scrotal swelling is observed in 2 male patients of Group B on 3rd POD and disappeared on follow up on 7th POD and 14th POD. The difference of scrotal swelling between two study groups was statistically insignificant.

Table III: Comparison of scrotal swelling in male patients between two study groups:

Postoperative day (POD)	Scrotal swelling	Grouo A (single dose (n=86)	Group B (multiple dose (n=84)	'p' value
3rd	Present	3(3.5%)	2 (2.4%)	0.273
7th	Absent	100%	100%	
14th	Absent	100%	100%	

Wound discharge was found in 4 patients of group A and one patient of group B on third post-operative day (POD) that was serous in nature. But no discharge was found on follow up of 7th and 14th POD of both groups..

Serous discharge was sent for culture and sensitivity test and there was no growth of bacteria in culture. The difference between two groups was shown in Table IV and result was statistically insignifican

Table IV: Comparison of presence of post operative wound discharge (N= 200)

Post-operative day (POD)	Serous discharge from wound	Group A (single dose) (n=100)	Group B (multiple doses) (n=100)	'P' value
$_{3}$rd	Present	4 (4%)	1 (1%)	0.025
$_{7}$th	Absent	100%	100%	
$_{14}$th	Absent	100%	100%	

The average treatment cost of both study groups was shown in Table V. The difference in treatment cost between two groups was statistically significant.

Table V: Comparison of average treatment cost in BDT between two groups:

Average treatment cost in BDT (single dose user) n=100	Average cost in BDT (multiple doses user) n=100	'*p*' value
800 BDT	1500 BDT	<0.001

Discussion:

Antibiotic prophylaxis is still indicated in elective surgical procedures where prosthesis is implanted, anticipating chances of infection that can be fatal. But the benefit of antibiotic prophylaxis in clean elective surgical procedures such as inguinal herniotomy is considered debatable. Surgical site infection following hernia repair is associated with a high rate of recurrence.[8] Our study was done to compare the effectiveness of single-dose versus multiple-dose antibiotics in herniotomy surgery. [10] In both study group A and B, injectable antibiotic were given prior to the surgical incision, that is also recommendedin most of the studies. [11]

In our study, among single-dose applied male patients (n = 86), 3 patients developed scrotal swelling observed on the 3rd postoperative day but disappeared on subsequent follow-up on the 7th and 14th postoperative days (POD). Whereas, among multidose male patients (n = 84), 2 patients developed scrotal swelling observed on the 3rd postoperativeday but were absent on subsequent follow-ups at 7 & 14 POD. Although some difference was found up to 3rd POD but became self-limited and non-significant after the 3rd POD in both groups.In this study among the single dose group (n=100), only 2 patients developed postoperative discharge on the 3rd postoperative day, and no discharge was seen on the 7th and 14th postoperative days. On the other hand, the multi-dose group (n=100)single patient developed serous discharge at the 3rd POD and no discharge was found on follow up of 7th, and 14th postoperative days.

Although the difference was significant up to the 3rd POD, afterward discharge became absent and non-significant. The serous discharge was sent for culture and sensitivity study but revealed no growth of organism. The finding is similar to the study findings of Sajjad et al. (2005).[12]

In our study, the average cost of antibiotics in the single-dose group was significantly lower than the average cost of multiple-dose patients (Table 5). The difference of treatment cost between groups was found to be statistically significant. A similar observation was noted by the study of Arjuna et al.

Conclusion:

In this study, we observed that the rate of postoperative infection and events is almost similar for single-dose and multiple-dose users. So, we can conclude that single-doseantibiotic prophylaxis is sufficient in the case of clean surgery. In addition, single-dose antibiotic prophylaxis is cost-effective as well.

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