ORIGINAL ARTICLE

SONOGRAPHIC GUIDED HYDROSTATIC REDUCTION OF INTUSSUSCEPTION-OUTCOME AND ITS DETERMINANTS

Sajjad Ali, Tahir Naeem, Mohammad Imran, Muhammad Uzair

[1]Department of Paediatric Surgery Khyber teaching hospital Peshawar - Pakistan

ABSTRACT

Objective: The objective of this study was to determine the success rate of hydrostatic reduction of intussusception and its determinants by using saline enema under ultrasound guidance.

Material and methods: This descriptive study was carried out in the Department of Pediatrics Surgery, Khyber Teaching hospital, Peshawar. A total no of 55 patients, meeting the inclusion criteria were included in the study and sonographic guided reduction was attempted with a saline enema. The outcome was labeled successful in cases where intussusception got reduced without complications and unsuccessful in case of failure or complications. Age, duration of symptoms, procedure time and number of attempts being continuous data were reported as mean and standard deviation. Gender, palpable abdominal mass, bleeding per rectum and air-fluid levels on x-rays were expressed in frequencies and percentages.

Results: In this study, the mean age was 1 year with SD of ± 1.24. Sixty-two percent of patients were male and 38% of patients were female. Moreover, the success rate of hydrostatic reduction of intussusception by using saline enema was 78%.

Conclusion: In selected patients, the success rate of hydrostatic reduction of intussusception is a non-invasive acceptable option.

Keywords: Hydrostatic reduction of intussusception, Saline enema, Ultrasound guidance.

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INTRODUCTION

Intussusception is intestinal obstruction resulting from the invagination of a portion of the intestine into an immediately adjacent part of gut in continuity. This mechanical condition affects the infants but the age of presentation may vary anywhere between 3 months and 6 years[1]. Cosmopolitan in distribution, it occurs everywhere sparing no race. Approximate incidence of intussusception is 1 in 2000 children though 1.5 to 4 per 1000 live births have also been reported.[2] Predominantly affecting the males, it is the leading cause of acute intestinal obstruction in children as far its incidence is concerned[3,4]. Anatomically ileoileal, ileocolic, and colocolic variants have been described where ileocolic is the commonest anatomical type[5,6]. History of episodic pain abdomen, bilious vomiting and sometimes bleeding per rectum are classic. The examination may reveal a palpable mass per abdomen and a prolapsing mass or empty rectum on per rectal examination. In case of complete obstruction, abdominal distention is a frequent finding[7, 8].

Correspondence
Dr. Mohammad Imran
Department of Paediatric Surgery Khyber teaching hospital Peshawar - Pakistan
Email: drmi1971@gmail.com
Cell: +92-334-9080767
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In majority of cases, intussusception is idiopathic but it may be secondary to a disease or pathologic lead point. A specific lead point that draws the proximal intestine and its mesentery inward and propagates it distally through peristalsis, is identified in only 5% of cases and is most commonly found in cases of ileoileal intussusception. Specific lead points are more commonly found in children older than 3 years and almost always in adults with intussusception. Meckel diverticulum is the most common lead point, followed by polyps, such as are seen with Peutz-Jeghers syndrome, and intestinal duplications or lymphomas. Postoperative jejunoileal or ileoileal intussusception, which has no specific lead point in most cases, accounts for approximately 1% of intussusceptions in children of all ages.[3,9,10,11]

Regarding investigations, a plain abdominal radiograph is recommended for all patients suspected of having intussusception. Plain abdominal radiography reveals signs that suggest intussusception in only 60% of cases[12]. However, ultrasound is the standard diagnostic investigation for intussusception, with sensitivity and specificity reaching up to 97.9% and 97.8%, respectively.[13]

Depending on presentation and workup findings intussusception is either treated surgically or via non-surgical maneuvers. Non-surgical methods include hydrostatic reduction with saline or barium enema and pneumatic[14] reduction guided by ultrasound. Fluoroscopic reduction

is also a type of non-surgical techniques[15]. Hydrostatic reduction with sonographic guidance is an established and successful intervention for the reduction of intussusceptions and has been widely accepted and adopted in the recent past. Literature has reported different experiences of different centers but the overall success of sonographic reduction technique ranges from 75%[16] to 96%[17].

Previously intussusception was treated surgically everywhere and surgical exploration is still the most commonly practiced treatment in this part of the world. We initiated the sonographic guided hydrostatic reduction with saline enema and observed acceptable results with the benefit of less cost and less trauma, thus limited morbidities in selected patients. This study was initiated to evaluate the success rate of hydrostatic reduction of intussusception with saline enema under ultrasound guidance. In selected cases, the causes of failed attempts of reduction were also observed and noted per operatively for future reference.

MATERIAL AND METHODS

This descriptive study was initiated in the department of paediatric surgery Khyber Teaching Hospital, Peshawar, after formal ethical approval from institutional review board. Through non-probability consecutive sampling 55 patients of either sex in age range of 3 months to 6 years were included. Patients with signs and symptoms of peritonitis like fever, generalized tenderness, guarding, and abdominal distension (which may indicate/suggests gangrene or gangrene of the gut and needs open surgical treatment) or those with radiographic evidence of complications like perforation were excluded. All data were analysed by using SPSS Version 20. Age, duration of symptoms, procedure time and number of attempts was reported as mean and standard deviation. Palpable abdominal mass, bleeding per rectum and air-fluid levels on x-rays were expressed in frequencies and percentages. The success rate was stratified among the age, gender, duration of symptoms, palpable abdominal mass, bleeding per rectum, air-fluid levels on x-rays, number of attempts, to see the effect modifiers. All the results were presented as tables.

Table 1: Success rate of Hydrostatic Reduction of Intussusception (n=55)

Succeess Rate	Frequency	Percentage
Yes	43	78%
No	12	22%
Total	55	100%

RESULTS

Among 55 patients 45(82%) patients were in the age range 3 months to 1 year and 10(18%) patients were in the age range 1-2 years. Thirty-four (62%) patients were male and 21(38%) patients were female.

Of sample 40(73%) patients had a duration of symptoms <72 hours and 15(27%) patients had a duration of symptoms >72 hours. The mean duration of symptoms was 72 hours with SD ± 4.88. Palpable abdominal mass was recorded in 39(71%) patients while 16(29%) patients didn't have palpable abdominal mass. Bleeding per rectum was reported in 47(85%) patients and 8(15%) patients didn't have bleeding per rectum. Air fluid levels were seen on x-ray erect abdomen of 42(76%) patients, while 13(24%) patients didn't have air-fluid levels on x-rays.

Intussusception reduced in 41(75%) patients with one attempt while 14(25%) patients had to undergo two attempts. The mean number of attempts was one time with SD ± 0.45. (Table No 2)

The success rate of hydrostatic reduction of intussusception by using saline enema was found 78% (43 patients). (Table No 1)

Stratification of success rate for age, gender, duration of symptoms, palpable abdominal mass, bleeding per rectum and air-fluid levels on x-rays, number of attempts is given in Tables.

Table 2:Stratification of success rate of hydrostatic reduction of intussusception with respect to the age, gender and number of attempts

		Number of patients (n=55)	Number of patients with Successful reduction (n=43)	Number of patients with unsuccessful reduction (n=12)	P-value.
Age	3 months to 1 year	45	37	8	0.199
	1-2 years	10	6	4	
Gender	Male	34	29	5	0.177
	Female	21	14	7	
Number of attempts	First attempt	41	34	7	0.259
	Second attempt	14	9	5	

*Test of significance: Fisher's Exact Test.

**Level of significance: P ≤ 0.05.

Table 3:stratification of success rate of hydrostaticreduction of intussusception with respect to the preoperative clinical and radiological features.

Duration of symptoms	**Less than 72 hours**	**40**	**36**	**4**	**0.001****
	More than 72 hours	15	7	8	
Palpable abdominal mass		39	32	7	0.300
Bleeding per rectum		47	36	11	0.670
Air fluid level on radiograph		42	32	10	0.709

*Test of significance: Fisher's Exact Test.

**Level of significance: P ≤ 0.05.

DISCUSSION

Our study shows that mean age was 1 year with SD ± 12.09. Sixty two percent patients were male and 38% patients were female. More over the success rate of hydrostatic reduction of intussusception by using saline enema was 78%. Similar results were observed in another study conducted by Mensah Y et al[18,] in which the ages of the patients ranged between two months and forty-one months. The mean age was 11.7 months and a standard deviation of 2.6 months. Eight patients (40%) were between ages seven and twelve months, followed by seven (35%) patients aged zero to six months, two patients (10%) each aged between 13 to 18 and 19 to 24 months and one patient aged more than 24 months. Two of the children had recurrent intussusception. One occurred a day after the procedure and the other was three and half months later. In eight of the patients (40%) the intussusception was seen at the transverse colon, five patients (25%) at the descending colon, four patients (20%) at the hepatic flexure, two patients (20%) at the sigmoid colon and only one patient (5.9%) had the intussusception in the ascending colon. The duration of the procedure ranged between two minutes and thirty minutes, with majority being under ten minutes from when the normal saline was infused. Seventy-five percent of the intussusception cases were reduced successfully.

Similar results were observed in another study conducted by Hameed S et al[19,] in which 24 out of 25 (96%) intussusceptions were successfully reduced. Average time taken was 15 minutes. All the patients were reviewed after 24 hours for recurrence. None of them showed recurrence within 24 hrs. No complications were observed.

Similar results were observed in another study conducted by (rephrase the sentence) Talabi AO et al[20,] in which the age range was 3 months to 48 months with a mean of 10.8 ± 9.1 months. Forty percent (N = 18) presented after 24 h of onset of symptoms. The success rate of hydrostatic reduction with saline enema was 84.4% (N = 38). Two (4.4%) perforations occurred during the procedure. Three (7.5%) patients had recurrent intussusception within six months. The duration of symptoms greater than 24 hours, age and sex of patients did not influence successful reduction $p > 0.05$. The duration of admission between those who had successful non-operative reduction and those who subsequently had operative reduction and or resection attained statistical significant difference, $p = 0.001$. There was no mortality. We achieved a 68% decrease in the operative reduction of intussusception using USGHR as the primary modality of treatment.

CONCLUSION

Our study concluded that the success rate of hydrostatic reduction of intussusception was 78% by using saline enema under ultrasound guidance.

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Following authors have made substantial contributions to the manuscript as under

Ali S:	Data collection, literature search, writing up.
Naeem T:	Data analysis
Imran M:	Conceived the idea
Uzair M:	Bibliography

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.