HYDROSTATIC REDUCTION WITH BARIUM ENEMA IS A PREFERRED TREATMENT OPTION FOR UNCOMPLICATED INTUSSUSCEPTION : FIVE YEARS EXPERIENCE IN CMCH

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Summary

Intussusception is a common cause of intestinal obstruction in young children and is a common emergency in infants and children. Hydrostatic reduction of intussusception is a less invasive procedure for both diagnosis and treatment of it. We describe our experience with hydrostatic reduction of intussusception. A retrospective review of the patients of Intussusception admitted in the department of Pediatric Surgery Chittagong Medical College Hospital (CMCH) Chittagong, Bangladesh from January 2009 to December 2013 was done. Patients underwent hydrostatic reduction were evaluated separately. Data were analyzed with regard to success and failure of hydrostatic reduction, necessitating laparotomy, complication and mortality. There were 231 patients of Intussusception. Age range was 1month to 15 years with median age of 8 months. Male to Female ratio was 2.9:1. Mean duration of presentation was 40 hours after onset of symptoms. Hydrostatic reduction was attempted in 142 patients and was successful in 107 patients, 35 patients needed surgery in whom per-operative manual reduction was done in 28 patients and intestinal resection anastomosis was done in in 7 patients. There were 2 cases of recurrence following hydrostatic reduction and no case of perforation due to hydrostatic reduction. 2 patients died following bowel resection-anastomosis after failed attempt of hydrostatic reduction. Hydrostatic reduction with Ba enema is an effective treatment for intussusception if presented early.

Key words : Uncomplicated Intussusception; Barium Emema; Hydrostatic reduction; Intestinal obstruction.

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Introduction

Intussusception is the most frequent cause of intestinal obstruction in infants and toddlers [1,2]. It is probably the second most common cause of acute abdominal pain in infants and preschool children after constipation [3]. World wide, the incidence is approximately 1 to 4 in 2000 infants and children [3]. Most series report more males than females with intussusception, usually at a 2:1 or 3:2 ratio[3]. 75% of cases occur within the first 2 years of life, 90% in children within 3 years of age, and >40% are seen between 3 and 9 months of age [3]. The etiology of intussusception is unknown, with an anatomic cause identified in only <10% of cases, however it is most frequently thought to be as a result of lymphoid hyperplasia serving as a lead point, which allows the bowel to telescope upon itself [2,4]. In older children, in whom occurrence is less frequent, intussusception may result from an anatomic abnormality that forms a “lead point” or predisposing condition (eg, lymph node, lymphoma, intestinal polyp or tumor, Meckel's diverticulum) [4]. World wide, the non-operative treatment of intussusception has a long and colorful history that is of interest to pediatric surgeons and radiologists. There are many types of contrast agents used during fluoroscopy, such as barium, water-soluble contrast medium like gastrografin, and gases like air and oxygen. Hydrostatic reduction of intussusception is a less invasive procedure for both diagnosis and treatment of it. Barium has been the gold standard for many decades. Liquid preparations, particularly those with barium, were the most frequently used contrast agents in Europe, the United

States, and Canada. Air has been used extensively in China and now in other countries also. Ultrasound-guided saline or Hartman's solution reduction has also been advocated [4]. We present our experience of hydrostatic reduction of intussusception with barium.

Materials & methods

Study design: Retrospective study.

Period of study: Study period was between Jan 2009- Dec 2013 (Total 05 years).

Place of study: This study was carried out in the Department of Pediatric Surgery, Chittagong Medical College Hospital (CMCH) Chittagong, Bangladesh.

Study Subjects: Patients admitted and diagnosed as Intussusception, with or without hydrostatic reduction, in the department of Pediatric Surgery, CMCH were evaluated. Within the study period in a total of 310 patients, provisional diagnosis of Intussusception was made. Among them 231 patients were finally diagnosed as Intussusception based on USG, Ba enema and operative findings. Other patients were excluded from the study.

Sample size: The sample size was 231.

Techniques of hydrostatic reduction: Hydrostatic reduction was done by keeping the patient in lithotomy position and introducing diluted Ba enema, keeping a slow sustained pressure under direct visualization of passage of dye through intestine by fluoroscope. No sedative or medication was used.

Data Collection: Hospital records of patients diagnosed as Intussusception were evaluated retrospectively. Help was also taken from yearly departmental audits of 2009 to 2013. Total number of patients in a year and during the study period was calculated.

Data analysis: Data were analyzed with regard to success and failure of hydrostatic reduction, necessitating laparotomy, complications and mortality. Although, Complete contrast enema reduction of intussusception is traditionally considered confirmed when contrast is seen refluxing into the terminal ileum, in this study success was defined as Ba reaching at least upto Caecum with improvement of clinical status; like, passage of yellow stool, no vomiting, decreased cry and willing to feed. Data were analyzed by Statistical Package for Social Sciences (SPSS) 17. Statistical analysis was performed by the chi-square test, and mean and percentage values were calculated. $P<0.05$ was considered to be statistically significant.

Results

Of the 310 patients with provisional diagnosis of Intussusception admitted in the department of Pediatric Surgery, CMCH during the 5 year period (Jan 2009-Dec 2013) 231 patients were finally recorded as cases of Intussusception based on USG, Ba Enema and per-operative findings. Age range was 1 month to 15 years with median age of 8 months. Mean age was 23.7 ±34.2 months. 154 patients were less than 1 year, 29 between 1 and 2 years, 12 between 2 and 3 years, and 36 patients were more than 3 years old. Male (172) suffered more than the female (59) with Male to Female ratio was 2.9:1. Mean duration of presentation was 40 hours (Range : 2 hours to 5 days) after onset of symptoms.

Hydrostatic reduction was attempted in 142 patients and was successful in 107 patients. In other 89 patients, hydrostatic reduction was not tried because of delayed presentation, moderate to severe anaemia, severe dehydration, signs of peritonitis or abdominal mass felt to be extended upto left hypogastric region. Fig-1 shows the number of hydrostatic reduction done in patients with intussusception with the numbers of success and failure.

There was yearly increase in the number of successful hydrostatic reduction except in 2012 when the total number of intussusception patients was also less. However, the yearly percentage gradually increased. Table-I represents yearly numbers of outcome of treatment.

Among the 142 patients of attempted Hydrostatic reduction, there was failure of reduction in 35 patients. Fig 3 shows outcome of patients not responded to hydrostatic reduction.

Total 124 patients needed Surgery irrespective of whether hydrostatic reduction attempted or not. Of them operative manual reduction was done in 62 patients, intestinal resection and anastomosis was done in 56 patients and ileostomy was done in 6 patients. Fig 4 shows the patients who have undergone surgery and Table II shows Surgery done in patients, not selected for hydrostatic reduction and not successful hydrostatic reduction. Fig 4 shows patients needed surgery and Table II shows operative procedures done.

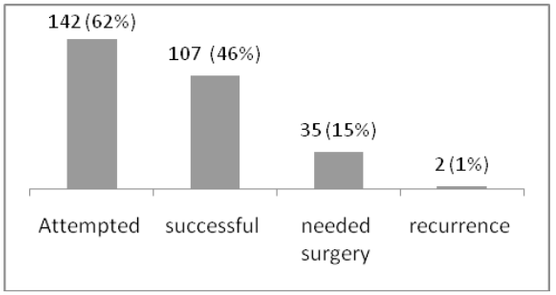

Fig 1 : Hydrostatic reduction with success and failure

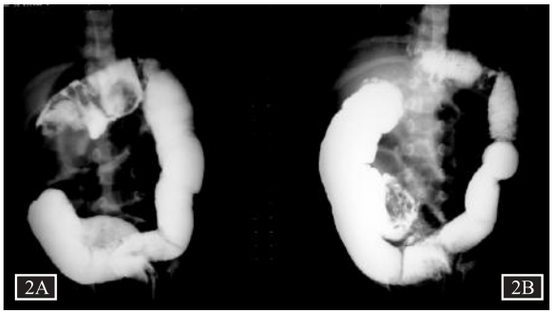

Fig 2 : Shows findings of Ba enema in an intussusception patient

Fig 2 : Findings of Ba enema in an intussusception patient. [2A: Ba could not pass beyond transverse colon due to intussusception, 2B: Ba passed beyond caecum after slow sustained enema pressure and reduction of intussusception].

Table I : Yearly numbers of outcome of treatment

Year	Hydrostatic reduction attempted	% (of that yr)	Successful Hydrostatic reduction	%(of that yr)	Failed hydrostatic reduction	% (0f that yr)	Manual reduction	% (of that yr)	Resection-anastomosis	% (of that yr)	Ileostomy	% (of that yr)	Total
2009	7	21.21	4	12.12	3	9.09	9	27.27	19	57.58	1	3.03	33
2010	25	60.98	16	39.02	9	21.95	12	29.27	11	26.83	2	4.88	41
2011	38	64.41	29	49.15	9	15.25	17	28.81	12	20.34	1	1.69	59
2012	33	80.49	24	58.54	9	21.95	9	21.95	6	14.63	2	4.88	41
2013	39	68.42	34	59.65	5	8.77	15	26.32	8	14.04	0	0	57
Total	142	61.47	107	46.32	35	15.15	62	26.84	56	24.24	6	2.6	231

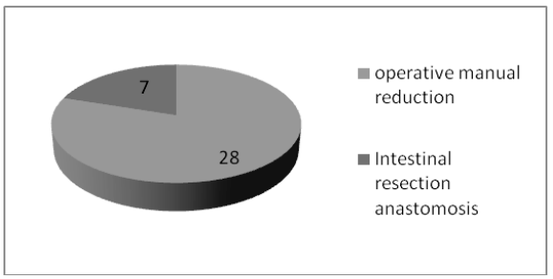

Fig 3 : Outcome of patients not responded to hydrostatic reduction

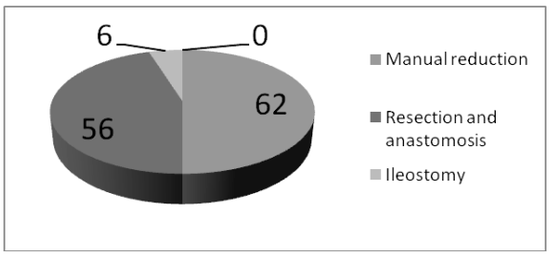

Fig 4 : Patients needed surgery (n: 124)

Table II : Operative procedures done in Intussusception patients

	Failed Hydrostatic reduction	%	Not selected for Hydrostatic reduction	%	Recurrence	%	Death	%	Total
Operative Manual reduction	28	45.16	34	54.84	0	0.00	0	0.00	62
Intestinal resection-anastomosis	7	12.50	49	87.50	0	0.00	1	1.79	56
Ileostomy	0	0.00	6	100.00	0	0.00	1	16.67	6
Total	35	28.23	89	71.77	0	0.00	2	1.61	124

There were 2 recurrences after hydrostatic reduction and 2 deaths after laparotomy.

Discussion

During the five years of study period, 231 patients of Intussusception were admitted which was 1.7% of all admissions in the department of Pediatric Surgery. The median age of 8 months means that most of the cases presented during their typical age of disease occurrence according to literature [3]. On the other hand, although only 36(15.6%) patients were more than 3 years old, it was more than the percentage seen in literature, which suggests an occurrence of less than 10% in this age group [3,5-10]. It was these older patients which shifted the mean age to 23.7 months while 66.7% patients were less than 1 year old. Interestingly there were 13 patients who presented before 6 months of age, before the age of weaning.

Male suffered more than the females with a male to female ratio of 2.9:1. It was statistically significant, although the number of admissions for other disease was also more in male with a male to female ratio approaching towards 2:1. This increase rate of occurrence in male is more than that reported in most of series which shows a male to female ratio of 2: 1 to 3:2, although Chalya reported a ratio of 3.3:1 [3-10].

Hydrostatic reduction was the most commonly performed (46.3%) procedure for the treatment of intussusception. Moore et al showed that in South Africa 40% of patients submitted to surgery underwent intestinal resection because of perforation, peritonitis, gangrenous bowel, or failure to reduce even at surgery [4]. This reflected a much higher incidence of surgery and bowel resection than seen in some international settings] but was more representative of what occurs in developing countries [11-13]. But in our series, only 62 (26.8%) patients underwent intestinal resection (56, intestinal resection-anastomosis and 6, ileostomy) and more patients were managed either by hydrostatic reduction (107 patients, 46.32%) or by operative manual reduction (62 patients, 26.8%). This is an important achievement given the socioeconomic condition of our patients. The death rate is still a worry which mostly represents the extremely delayed presenters.

Intussusception reduction rates with barium range from 53% to 85%, with most investigators reporting rates of 70% to 85%[5]. Reduction rates with air range from 27% to 96% [5]. Comparative, nonrandomized studies have shown reduction rates to be 1% to 32% higher with air than with barium [5]. Claims of greater efficacy, lower radiation exposure, and increased safety have resulted in the recent increase in the use of the air enema in the United States and Canada [14]. However, success rate with ultrasound-guided reduction ranges between 80% and 91% [15,16]. However, we have not found more recurrences than those observed with other nonsurgical methods of reduction (9.7%) [17]. Moreover, there was no case of perforation of gut in our patients.

The “rule of threes” traditionally has been used as the standard technique for intussusception reduction. The reservoir is placed at 3 feet of height, and reduction is attempted up to three times for a period of 3 minutes each. Currently, the method tends to be less strict and the number and duration of the attempts vary according to the clinical status of the child before and during the procedure. In our study, Ba enema was performed without sedation or premeditation because there exists great controversy about the convenience of using them as a general practice and the lack of conclusive data about its efficacy [5,18].

Conclusion

Hydrostatic reduction with Ba enema is an effective treatment for intussusception if presented early. However, newer technique with saline enema or air enema may be tried.

Disclosure

All the authors declared no competing interest.

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