

Ultrasound guided reduction of intussusception by use of saline enema in children-our experience in 58 cases in eastern India

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Abstract

Background: Our aim of study is to evaluate the reduction of ileo-colic intussusception by ultrasound guided saline enema in children. **Methods:** This is a retrospective study of 58 cases of pediatric ileo-colic intussusception from September 2012 to September 2015 in which USG guided hydro reduction was attempted. **Results:** The success rate was 94%. Three cases underwent surgery. No bowel perforation is seen. No aspiration is seen. **Conclusion:** USG guided hydro-reduction of intussusception is a safe and effective method for reduction of intussusceptions. It has no radiation risk and has very minimal complication and can be used as routine procedure.

Key Words: USG, , lymphoma, Meckel's diverticulum.

Introduction

Intussusceptions results when a segment of intestine invaginates into adjacent intestine lumen. It is the most common cause of intestine obstruction in infants and can cause bowel gangrene and even death if left untreated [1]. In 90 percentage of cases, it is related to idiopathic lymphoid hyperplasia in children while secondary causes due to pathological lead point such as polyp, lymphoma and Meckel's diverticulum are relatively rare [2].

Intussusception presents with triad of symptoms such as abdominal pain, vomiting and bloody stool but complete triad of symptoms are seen in 45% cases [3]. Non-operative enema reduction in pediatric group is the current initial preferred modality than surgery [4]. As there are various studies with disagreement regarding the best non-operative modality for enema reduction using air, saline, we conducted our study to find out the efficacy of saline enema reduction under USG guidance.

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Material and Methods

We reviewed the medical records of about 58 cases of pediatric ileo-colic intussusception between September 2012 to September 2015 at IMS and SUM hospital, SOA University, Bhubaneswar, Odisha, India. All clinically suspected cases of intussusception underwent abdominal ultrasonography in GE logic machine by use of linear probe with 5 to 10 MHZ frequency. Diagnosis of intussusception was made in USG by demonstration of "target sign" of bowel. Inclusion criteria were patient with symptoms of intussusception less than 72 hours, absence of general toxicity, high fever and severe dehydration, patient with no sign of peritonitis, no radiological evidence of bowel perforation, or gangrene and no previous history of abdominal surgery.

Color doppler was used to find out the bowel wall vascularity. The patients were admitted in pediatric surgery ward and were taken to radiology procedure room for saline reduction accompanied by pediatric surgeon. Written informed consent for the procedure was obtained from the patient's parent/guardian. Most of the patients were sedated with midazolam following nasogastric tube insertion. Foley catheter with three channels was inserted into the rectum of patient in left lateral position using 2% Xylocaine lubricating jelly. The Foley balloon is inflated within rectum with 20 to 30

cc room air under USG guidance. Both thighs of patient were placed close to each other to make anal seal around the catheter. Sphygmomanometer is connected to outer end of Foley catheter (Figure-1). Normal saline bottle with room temperature was connected with the Foley catheter outer end by intravenous infusion set and the saline bottle was kept at about 4 feet above the patient level. The saline was allowed to run into the rectum under gravity and the pressure within the bowel was kept below 100 mm Hg. The distension of colon, retrograde saline flow was monitored under ultrasound guidance. The disappearance of the mass and retrograde flow of saline into terminal ileum was considered to be complete reduction of intussusception. (Figure-2). In case of failure of reduction, the saline was evacuated through Foley catheter and repeat attempt of saline infusion was made after 3 minutes of gap. Maximum

three attempts were tried in 3 to 5 minutes interval in case of unsuccessful reduction. A delayed attempt was sometimes made after 6 to 8 hours in case of partial reduction in child with stable vital parameter. The Foley catheter was removed after evacuation of saline enema after successful reduction. Patient was given intravenous fluid, antibiotics with nil oral status for 12 hours. Ultrasound of abdomen was done after 24 hours to confirm complete reduction and exclude recurrence of intussusception. Then patients were discharged at home. If the reduction fails, the procedure was repeated three times before the patient was considered for surgical reduction. The repeat attempts were made after 6 to 8 hours. Children with symptoms of intussusception lasting more than 72 hours, poor health, less than four months of age are observed for another one or two days after hydro-reduction.

Result

A total 58 children with ileocolic intussusception were included in the study after confirmation of diagnosis in ultrasonography 55 cases (94%) was managed successfully by normal saline enema reduction. About three fourth cases were male (Table-1). Most common symptom was intermittent colicky abdominal pain noted in all cases. The symptoms distribution of children was listed in Table-2. Three cases were managed surgically as hydro reduction failed due to large mesenteric lymph node as lead point of intussusception and long segment ileo-ileocolic intussusception (Figure-3). Rest 55 cases were managed successfully with hydro reduction (Table-3). No patient showed recurrence within 24 hours. Most of the children became calm and went to sleep after the successful reduction of intussusception. Mesenteric enlarged lymph nodes are noted as the lead point of intussusception in about one fifth cases (Table-4). Most of the cases did not show pathological lead point. The average saline used for enema was about 600 to 1000 ml.

Table 1: Distribution of age and sex of patients

Sex/Age	No. patients (%)
Sex	
Male	42(72.4 %)
Female	16(27.6%)
Age	
2-12 months	31 (53.4%)
1-2 years	21 (36.4%)
>2 years	6 (10.2%)
Total	58

Table 2: Clinical feature of intussusception

Clinical feature	Frequency	% AGE
Abdominal Pain	58	(100%)
Vomiting	50	(86%)
Bleeding per rectum	35	(60%)
Mass in right iliac/hypochondrium	20	(34%)

Table 3: Distribution of successful hydro-reduction and surgery

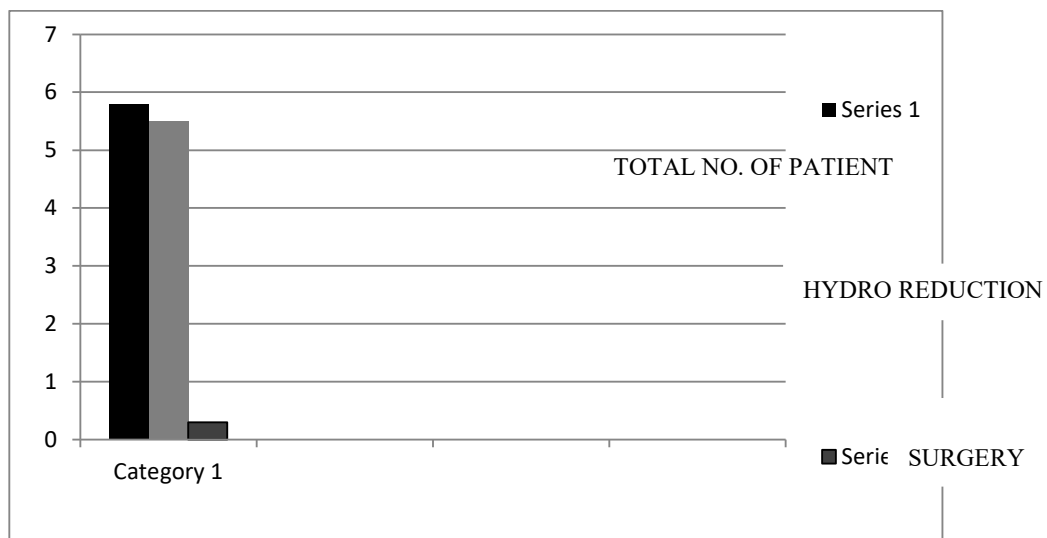


Table 4: Type and etiological distribution of Intussusception

Type		Number of patient
Intussusception	Ilio-colic	55(94.6%)
	Ilio-ileo-colic	3(5.4%)
Etiology	idiopathic	48(83%)
	Pathological lead point	10(17%)
	Total	58(100%)



Figure 1: shows attachment of three channeled Foley catheter with sphygmomanometer, infusion set before hydro reduction.

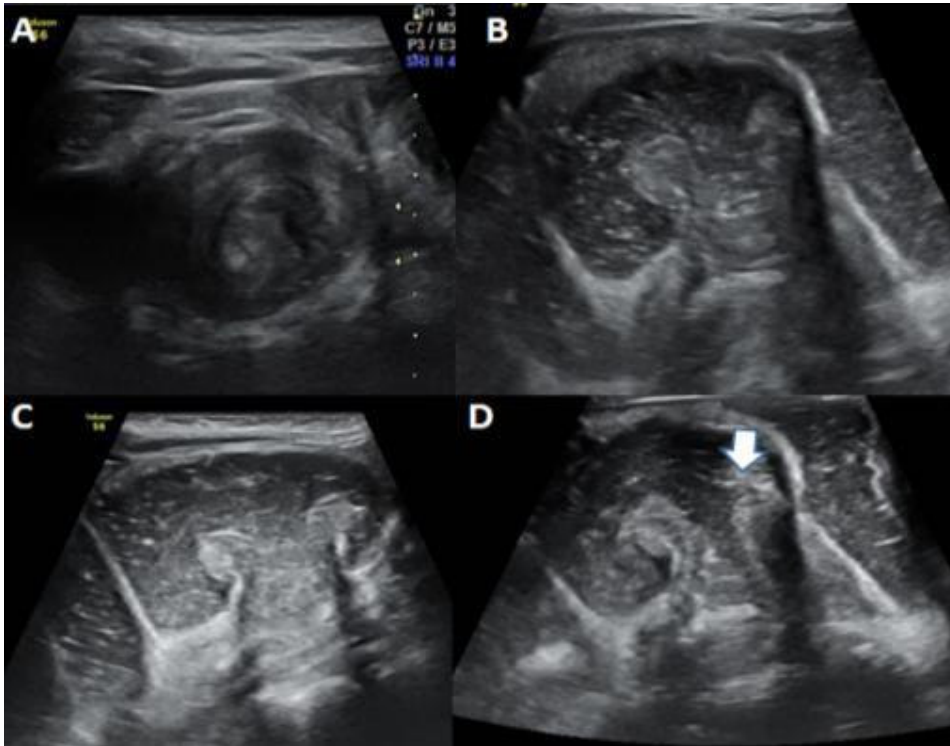


Figure 2: shows typical “target sign” of intussusception (A), partial reduction of intussusception (B), opening of edematous ileo-cecal valve (C) and retrograde flow of saline through opened ileo-cecal valve (arrow marked) suggestive of complete reduction of intussusception.



Figure 3: shows long segment ileo-ileocolic intussusception during intra operative period.

Discussion

Hirschsprung first reported the technique of hydrostatic reduction in the year 1875 and found about 35% mortality rate in a series of 107 patients in 1905. Idiopathic intussusception is common in infant between

4 to 12 months of age and is rare in old children. [5] Intussusception is more in male patient with male-to-female ratio of 2:1 and accounts for the most common cause of bowel obstruction in patient less than 2 years [6]. About 90 percentage case of

intussusception is idiopathic. It presents with classic triad of vomiting, abdominal pain, and bleeding per anus in about one third of patient. The classical description of 'red currant jelly' stool results due to ischemia of intestinal mucosa, venous stasis complicated with bleeding and mucous outpouring. In about 60% cases, it presents with sausage shaped abdominal lump in right hypochondrium [6]. Digital rectal examination may reveals blood stained mucous and occasional palpation of apex of intussusception. Intussusception may lead to bowel gangrene, perforation, peritonitis and death if left untreated. Occasional it may be reduced automatically [7].

Image guided nonsurgical treatment of intussusception became possible after invention of X-ray in 1895, barium contrast enema in 1920s and ultrasonography in 1980s. Ultrasound guided hydrostatic reduction of intussusception is performed in most of the hospital /center and has got sensitivity ranges between 98-100% as reported in various series [8]. Diagnosis of intussusception in sonography is diagnosed when a segment of bowel loop invaginate adjacent bowel loop and is described by various sonographic sign such as 'target' sign, 'pseudo kidney' sign, 'doughnut' sign and 'frond' sign etc. Absent blood flow within mesenteric vessels in color doppler study of intussusception, free peritoneal fluid and loss of gut signature helps in diagnosis of intestinal gangrene and perforation. Hydro reduction should not be tried in case of bowel gangrene and perforation [8].

Ultrasound has got more advantage than fluoroscopy due to lack of radiation and identification of lead point of intussusception such as lymph nodes, polyp, duplication cyst or Meckel's diverticulum etc. The procedure can be repeated for many times under sonographic guidance in stable patient showing progressive reduction. The perforation of bowel during hydro reduction is rare and is diagnosed when large amount of free fluid noted in peritoneal cavity during the procedure. However in fluoroscopic guided pneumatic reduction of intussusception can be life threatening in case of tension pneumoperitoneum due to bowel perforation. Diagnosis of successful reduction under fluoroscopic guidance is difficult in case of severe obstruction and gaseous distension small bowel. Even residual ilio-ileal intussusception is not appreciated in fluoroscopy [9]. In addition to warm saline, tap water, urografin, or Gastrografin can be used for sonographic hydro reduction. Warm saline is like physiological body fluid and less harm full incase

of bowel perforation in comparison to other as they may cause severe peritonitis and infection [10]. We have used only normal saline with room temperature in our cases and have no case of bowel perforation during or after hydro reduction of intussusception. Though the procedure is simple and effective, it is often not possible to carry out at the earliest due to nonavailability and less number of radiologists during emergency hour in many of the hospital in our region which is the main constraint. Many of the cases are operated due to nonavailability of the facility. Availability of good motivated team of pediatric surgeon and radiologist in routine and emergency hour in our hospital has helped us providing this non-operative treatment (hydro reduction) of intussusception at the earliest.

Recurrence of intussusception after hydro reduction is uncommon and diagnosed when detected after 12 hours of reduction. But finding of intussusception before 12 hours is thought to be incomplete reduction. It is conventionally accepted that recurrence of intussusception is less after surgical reduction in comparison with hydro reduction. However there is overlapping epidemiological data in case of acute intussusception. Though surgery is indicated for recurrence of intussusception, many surgeons would only operate on second recurrence [11]. In our case, we have not encountered any recurrence within one year follow up.

In our series, we found the hydro-reduction of intussusception under sonographic guidance is safe, cheap and effective nonoperative method of treatment. The availability of team of pediatric surgeon and radiologist in routine and emergency hour during the procedure is essential for successful reduction. Training of pediatric surgeon about sonographic assessment and monitoring of the reduction will help more number of non-operative reductions than surgical reduction in resource limited setting.

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Conflict of Interest: None

Permission of IRB: Yes

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