

# Treatment of uncomplicated Intussusception in children: Saline enema without ultrasound guidance: A case series

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## Abstract:

### Introduction:

A retrospective study was done to assess the efficacy of saline reduction without radiological guidance for uncomplicated intussusceptions at a tertiary care children's hospital from April 2014 to May 2015.

### Methods:

Clinical records of consecutively admitted 103 children were analysed.

### Results:

85 children were successfully treated with a single attempt of saline reduction while another 11 patients were successfully managed with second or third attempt of saline reduction. Only seven children needed laparotomy. Overall success rate of the procedure in this sample was 93.2%.

### Conclusions:

Hydrostatic reduction can be used effectively and safely in the absence of ultrasound facilities to manage uncomplicated intussusceptions.

**Key words:** Intussusception, Saline reduction, Pneumatic reduction, Lead point, Ultrasonic guidance

## Introduction

Intussusception is considered the commonest emergency which requires the attention of a paediatric surgeon. This condition was first described in 17th century and involves one part of the bowel telescoping into another and non-operative approach has been advocated since. The condition is common between 3 months to 3 years of age (90%). However it has also been reported in utero, in neonates and in adults. Most of the time it is idiopathic, and a pathologic lead point account only

for 2-10% of cases. Clinical assessment and radiological evaluation lead to 100% accuracy of diagnosis of most intussusception cases.

Non-operative management of intussusception includes pneumatic reduction, barium enema and saline enema; all of which have significant success rates. Of these, ultrasound-guided saline enema reached a 95.5% success rate in a large-scale study.<sup>1,2</sup> Here we report a retrospective analysis of a sample of children from April 2014 to May 2015 who had undergone a saline reduction without ultrasound guidance to assess the success of this particular method.

## Materials and Method

We retrospectively analysed a sample of 103 children consecutively admitted to a surgical unit, one out of 4 such units at Lady Ridgeway Hospital for Children (LRH), the largest children's hospital in Sri Lanka, from April 2014 to May 2015 with a radiologically proven ileo-colic or colo-colic intussusceptions who had undergone a

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saline reduction as the first treatment method.

All children had presented within 48 hours from the onset of symptoms. The analysis was done using clinical information documented in bed head tickets obtained from the patient record repository at LRH.

Mean age of the sample was 20.7 months.

During the period of study, a total of 3 children had required emergency laparotomy on admission due to the acute abdomen with peritonitis.

Following initial resuscitation, all children were admitted to operation theatre. The procedure was performed under sedation (1 mg/kg IM pethidine) with an anaesthetic cover, after a period of six hours fasting. A naso-gastric tube was inserted prior to the procedure, and reduction started after child was fully sedated. Cardiac rhythm and pulse oxymetry were used to monitor the child during the saline enema. Hypothermia was prevented by using a warmer and warm saline for the procedure.

The procedure included placing the child in left lateral position. A 20 to 24 size Folly catheter was inserted into the rectum and catheter bulb was inflated with 20-30 ml of distilled water. Then the catheter was connected to a saline bottle which was placed 100cm above the patient's buttock level to create a 100cm saline pressure. The rate of saline bottle emptying was measured by marking the level of the saline column on the bottle by every 30 seconds. The total dose of the saline enema used was 100ml/kg. The procedures in all children were performed without ultrasound guidance. All patients were kept fasting for four hours following the procedure. Reduction was assessed both clinically and radiologically. If flow pattern of saline was peculiar, an urgent ultrasound scan was performed. A repeat reduction was performed 4 hours after the previous reduction if the scan showed persistent intussusception.

## Results

85 of 103 children were asymptomatic after the procedure and resumed feeding in 4 hours. Children who had persistent symptoms after fist saline reduction were subjected to ultrasound scan of the abdomen and 18 patients had persistent intussusception. Of these, 11 were successfully treated by the same procedure, seven(7) on the second attempt, and further 4 children on the third attempt. Seven (7) patients were confirmed as having persistent intussusception and needed laparotomy and open reduction. Two patients had a pathologic lead point (polyps), and three patients required bowel resection and anastomosis. There was no occurrence of perforation, and no

deaths in this case series.

Final outcome of 103 saline reductions was 96 children successfully treated with saline enema. The success rate of the sample was 93.2%.

## Discussion

The treatment of a child with intussusception depends on the stage at presentation. Most patients are amenable for non-operative management and a few require operative reduction. It is recommended that all children should receive fluid resuscitation and nasogastric decompression as soon as possible. The presence of peritonitis and any evidence of perforation are the only 2 contraindications for a therapeutic enema.<sup>3</sup> Therapeutic enemas can be hydrostatic, with either barium or water-soluble contrast, or pneumatic, with air insufflation and can be performed under fluoroscopic or ultrasound guidance.

Since Harald Hirschsprung's description of a systematic approach<sup>4</sup> to hydrostatic reduction of intussusception, many large scale studies had been conducted and safety and efficiency of the procedure is now well established.<sup>1</sup> The reported success rate of hydrostatic intervention has widely varied from 40% to more than 90%.<sup>1</sup>

Air enema has been used widely in many institutions.<sup>5</sup> The risk of perforation with air enema is small and shows equal success rate as with hydrostatic reduction.<sup>7</sup> The highest pressure can be used for pneumatic reduction is 120mmHg.<sup>6</sup> In hydrostatic or barium enemas, the column of fluid should not exceed 100 cm above the level of the buttocks.

The success of repeated attempts of non-surgical reduction, if the first attempt is failed, hasn't been evaluated. However, many believe that 1 or 2 subsequent attempts within a few minutes to a few hours after the first attempt would reduce intussusception.<sup>7,8</sup> Delay between the reduction attempts may place the patient in the "window" of spontaneous resolution, which has been reported with an incidence of 5-6%. In addition, the first attempt can reduce the intussusception partially, making the intussusception less oedematous, with improved venous drainage. 61.1% of non responding children to first attempt were successfully treated by the second and third attempt is comparable to success rate of air enema.<sup>7</sup>

Paediatric Units where ultrasonography is not readily available, hydrostatic reduction would not be easy as reduction of intussusception cannot be assessed objectively. However the method we have practised pro-

vides a significant success rate without radiological guidance. The result of our study is comparable with the results of large scale studies done with ultrasound guidance. Saline enema(100ml/kg) with 100cm persistent pressure is an effective solution for an uncomplicated intussusception in centres where ultrasonography is not readily available. Repeated attempts of saline reduction would reduce the conversion rate to laparotomy.

There are few shortcomings in this study that need to be considered when interpreting the findings. Firstly as this has been a retrospective case series, a control group was not possible, limiting the generalizations of the findings. As the details of the procedure and outcome was obtained from the case records, deficiencies in documentation could have excluded vital findings, though we made every attempt to minimize them. Finally we would like to suggest a prospective study with a control group to assess the success rate of this procedure in children to arrive at more firm conclusions.

## Conclusions

Intussusception is a common paediatric emergency. Although the ideal method of managing uncomplicated intussusception is image guided pneumatic or hydrostatic reduction, hydrostatic reduction can be used effectively and safely in the absence of ultrasound facilities by infiltrating 100ml/kg saline with 100cm saline pressure. Repeated attempts of saline enema increase the success rate.

Conflicts of interest

**Authors declare no conflicts of interests.**

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