A Simple and Safe Technique for Pneumatic Reduction of Intussusception

Mohan K. Abraham, M.G. Joy, Sunil S. Menon, S. Bindu and P. Ramakrishnan, Department of Pediatric Surgery, Amrita Institute of Medical Sciences, Kerala, India.

BACKGROUND: Pneumatic reduction has a higher success rate and lower incidence of complications compared to barium enema and hydrostatic reductions. What is deterrent to its common use is the cumbersome technique. Our aim is to develop a simple technique that can be used in any hospital with locally available facilities.
METHODS: An intercostal drainage bottle and an enema can were used to pass air into the rectum at a controlled pressure determined by the height of the enema can. Water running in from the enema can displaces the air in the intercostal drainage bottle into the rectum effecting the reduction of intussusception.
RESULTS: This system was tried in 12 patients. Successful air delivery was obtained in all cases. In two cases, the intussusception could not be reduced. Laparotomy revealed these to be ileoileal intussusceptions.
CONCLUSION: The technique described is easy to assemble, safe and effective. We recommend it for regular use in pneumatic reduction of intussusception. [*Asian J Surg* 2006;29(3):170–2]

Key Words: air enema, intussusception, pneumatic reduction

Introduction

Pneumatic reduction of intussusception is a well-established technique, with a higher reduction rate and lower complication rate compared to barium enema and hydrostatic reductions.[1,2] This is usually done with the help of sophisticated and costly equipment, which monitors the pressure and stops insufflation at the set pressure. More commonly a sphygmomanometer like the blood pressure apparatus is used;[1] the hand pump is used to pump air into the patient via a Foley catheter, and pressure is monitored in the pressure gauge of the apparatus. This technique has a problem. Inadvertent over-insufflation can cause perforation of the colon or reduction of a gangrenous segment. Our aim is to develop a simple, cheap and reliable technique that can be used in most hospitals.

Patients and methods

An enema can was hung from an intravenous fluid-hanging stand (Figure 1). The middle of the can (the average height of the water column) was positioned at 1 m above the patient. This height can be adjusted according to the discretion of the surgeon depending on whether or not he wants to increase the safety margin by starting at a lower pressure and then increase the height gradually. This will determine the height of the water column above the patient and thereby the pressure at which air will be displaced from the intercostal drainage bottle into the rectum of the patient.

The tube from the enema can is connected to the long tube of the intercostal drainage bottle (Figure 2). The short tube of the bottle is connected to a Foley catheter via a plastic tube. The bulb of the Foley catheter is inflated with 20–30 mL of water to prevent air leaking out.

Address correspondence and reprint requests to Dr Mohan K. Abraham, Department of Pediatric Surgery, Amrita Institute of Medical Sciences, Kochi 682026, Kerala, India.
E-mail: mohanabraham@hotmail.com • Date of acceptance: 28 February 2005

Water is allowed to flow from the enema can into the intercostal drainage bottle, which displaces the air from the bottle into the patient's rectum via the Foley catheter. The pressure with which the air flows into the rectum can be adjusted by adjusting the height of the enema can. Once the pressure in the rectum equals the set pressure, the flow of water stops.

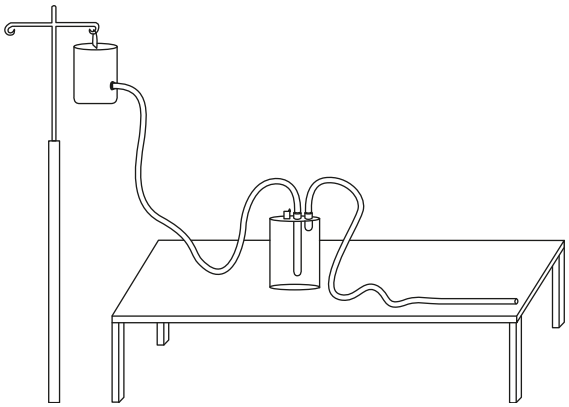

Figure 1. Line diagram showing the connections.

Figure 2. The connected system.

We had a total of 12 children, eight males and four females. Age range of our patients was from 5 months to 3 years. The maximum pressure used was 120 cmH_2O, and the minimum pressure was 100 cmH_2O. Duration of intussusception ranged from 6 to 46 hours. Duration of symptoms did not have any bearing on the outcome of reduction. Both the patients with 46 hours of symptoms were successfully reduced (Table).

Results

Set pressure could be achieved in all children. Failure of reduction occurred in two children with ileoileal intussusception, which was reduced by laparotomy.

Discussion

This simple system for pneumatic reduction is easy to assemble and use. Since adjusting the height of the enema can sets the pressure of reduction, it completely avoids accidental over-insufflation. Moreover, if the child cries or strains, the intra-abdominal pressure increases; in the usual system, since there is a non-return valve, air cannot escape from the colon, thereby giving rise to very high pressures in the colon. In the system we have described, there is no valve and in the event of increase in intra-abdominal pressure due to straining or crying, the air escapes back into the

Table. Overview of cases

No.	Age (mo)	Sex	Duration of intussusception (hr)	Pressure (cmH_2O)	Attempts (*n*)	Outcome	Laparotomy findings
1	9	M	22	120	2	Failed	Ileoileal
2	11	M	46	120	2	Successful	Not applicable
3	7	M	14	100	1	Successful	Not applicable
4	36	F	10	100	1	Successful	Not applicable
5	12	F	6	100	1	Successful	Not applicable
6	12	M	12	120	2	Successful	Not applicable
7	18	F	24	100	1	Successful	Not applicable
8	7	F	20	100	1	Successful	Not applicable
9	13	M	46	120	2	Successful	Not applicable
10	6	M	10	100	1	Successful	Not applicable
11	6	M	12	120	2	Failed	Ileoileal
12	5	M	18	100	1	Successful	Not applicable

intercostal drainage bottle, maintaining the set pressure at all times. It is cheap since no barium or saline is used and the apparatus can be reused. The only part that needs to be changed is the Foley catheter since it comes into contact with the patient. The rest of the system can be cleaned and reused. In older children, more air may be required than what the bottle initially contains (1 L). Once the intercostal drainage bottle is filled with water, the Foley catheter should be clamped to prevent air loss, the bottle should be emptied and reconnected and then the clamp on the Foley catheter removed. More water from the enema can should be allowed to run into the bottle, displacing more air into the rectum, accomplishing reduction.

The only problem we faced was air leak at the joints where the tubes were connected. Leaks should be checked before starting. This is easily done by clamping the Foley catheter and running in water from the enema can. Water should not flow if there are no air leaks. If water flows, the clinician should be able to feel or hear the site of the air leak and seal it. In all cases, the desired pressures (100–120 cmH_2O) were attained and maintained. Failure of reduction in two cases was due to the nature of intussusception (ileoileal) and not to technique failure.

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