



‘MANAGEMENT OF PAEDIATRICS INTUSSUSCEPTION IN TERTIARY CARE CENTRE’

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Abstract

Background- Intussusception is a medical emergency that occurs in children when a part of the bowel 'telescopes' (folds) into another part of the bowel. This causes pain, vomiting, and obstruction, preventing passage. If left untreated, the bowel can perforate, resulting in passage of its contents into the abdominal cavity, causing further complications. In rare cases, these events can cause death. Prompt diagnosis and management reduces associated risks and the need for surgery.

Aims and objective- ‘Management of paediatrics intussusception in tertiary care centre’.

Methods- This prospective study included paediatric patients with acute intussusception admitted to the Department of Paediatric Surgery, SMS medical college and hospital Jaipur, from January 2023 to June 2023 for six months periods. The inclusion criteria were- age 0–10 years, diagnosed with intussusception. The exclusion criteria were- combined with other surgical acute abdominal conditions, history of previous abdominal surgery and missing data. All children were diagnosed by abdominal ultrasound, showing a “target ring sign” or a “concentric circle sign” in the transverse section and a “sleeve sign” in the longitudinal section. The clinical data of all children were prospectively collected from historical medical recorders, including sex, age, month of onset, disease duration, etiology, clinical symptoms, intussusception depth, treatments, outcomes, and relapses. Statistical analysis SPSS 19.0 (IBM, Armonk, NY, USA) was used for data analysis. Continuous data were expressed as means±standard deviation and analysed using Student’s t-test. Categorical data were expressed as n (%) and analysed using the chi-square test. Two-sided P-values 5 years old.

Results- total 100 patients included in this study, males are most commonly affected than female, M/F =3/1 in this study. Most of the patient affected in age group of 12-24 months of age group. Most of the patient’s hospital visit time after symptoms are 12-24 hours. The disease onset was most frequent in April (25%), but it occurred throughout the time without an obvious central tendency. Among the 100 children, 86 (86%) had abdominal pain (young infants presented as paroxysmal crying), 50% have vomiting, and 10 patients (10%) had a typical triad of intussusception (abdominal pain +bloody stools +abdominal mass). Most of the patient have no any etiology for disease found, 10% have history of diarrhoea, 15% have vaccination history, 10% have infection history found. The average intussusception depth was 4.0±1.4 cm, with the shortest being 1.1 cm, the longest being 9.0 cm, and the median being 3.9 cm. 15% were treated with enema reduction, and those not relieved by the initial enema were given repeat air enema. Those who still could not be reduced by delayed enemas were

considered as cases of reduction failure. The cases of reduction success were 15%. There were 5 cases of reduction failure, which were all successfully reduced by conversion to surgical reduction. Among them, one case of jejuno-ileal, 10% ileo-ileal and 9% colo-colic types. Most cases are ileo-colic types. No significant abnormalities were found during the intraoperative probing from the ileocecal to the proximal intestinal canal 1.5 cm in length. out of 100 patients, 2 patients come with recurrence of disease within one years. out of surgically repaired patients, two patients have wound infection and one patient goes into paralytic ileus, which managed conservatively.

Conclusions- Paediatric acute intussusception is common. There was no obvious etiology. The clinical manifestations are mostly atypical. Abdominal pain is the most common complaint. Air enema reduction is an effective treatment.

Keywords- Air enema, Clinical manifestations, Epidemiology, Intussusception.

Background

Intussusception is a condition in which part of the intestine folds into the section next to it. Intussusception usually involves the small bowel and rarely the large bowel. In another word, Intussusception is an invagination of a proximal segment of the intestine into a distal segment of the intestine that may result in bowel obstruction, venous congestion, and bowel wall edema [1, 2]. It is a common cause of acute abdominal emergencies in infants and children. It is most common in infants and children aged 3 months to 3 years, with a peak incidence between 5 and 9 months of age [1–3]. More than 90% of the cases of intussusception in children are idiopathic, but about 5% have a pathological lead point, such as from lymphoid hyperplasia, Meckel diverticulum, duplication cyst, intestinal polyps, mesenteric nodes, lymphoma, surgery, or trauma, that initiates the problem [1, 2, 7]. Most cases are ileo-colic, but small bowel and colonic intussusceptions can also occur [1, 2].

Main clinical features are sudden, intermittent abdominal pain, abdominal mass [palpable], usually in right upper quadrants, bilious vomiting, red currant jelly stool [blood or mucous mixed] and altered mental status like irritability, crying, lethargy, apathy and profound listlessness [1, 2, 8]. The presence of normal bowel sounds does not exclude intussusception [8]. Less common clinical features include painless intussusception, hypovolemic shock, visible peristalsis, diarrhoea or constipation, tenesmus, fever, obstruction, sepsis, syncope, and transient hypertension [1, 4, 8].

Intussusception always treated without any delay because higher risk of ischemia and perforation of these patients [1, 2]. When patients come, firstly Intravenous hydration given, and urgent paediatrics surgery consultation done before any attempt [1, 2]. Most of the cases relived after giving fluid and steroid. Image guided pneumatic enema is the preferred first treatment in most cases of intussusception. Hydrostatic enema can also be used for both diagnosis and treatment. Delayed repeat enema can be indicated in cases where the patient remains clinically stable, and the initial enema partially reduces the intussusception, or the intussusception is recurrent.

In some cases, surgical intervention is indicated, including peritonitis, free air, shock, sepsis, perforation, repeat enema failure, and persistent symptomatic small-bowel obstruction [1, 2]. Small bowel intussusceptions are not common in children and are often associated with a spontaneous reduction [4]. The risk of mortality following successful treatment of intussusception is low [2].

Recurrent intussusception occurs in up to 10% of cases following enema reduction and 1% of cases following surgical reduction. A recurrence is seen within 48 h in 2.5% of the patients after initial successful air enema reduction [9].

The cause is typically unknown in children, while in adults, a lead point due to cancer is often present. Risk factors in children include infections, cystic fibrosis, and intestinal polyps. Risk factors in adults include endometriosis, bowel adhesions, and intestinal tumors. Medical imaging often supports a diagnosis. In children, ultrasound is a preferred method to diagnose, while in adults, a CT scan is preferred.

Intussusception requires rapid treatment. Treatment in children is typically by an enema with surgery if not successful. In adults, removal of part of the bowel is more often required. Intussusception occurs more commonly in children than adults.

Intussusception occurs more commonly in children than adults; in children, it is more common in males than females. The usual age of occurrence is six to 18 months old.

The rate of intussusception significantly increases over the viral gastroenteritis seasons in some populations. Due to a statically significant increase of intussusception following some forms of rotavirus vaccine, (RRV-TV: Rotashield) form was removed from the market. History of upper respiratory tract infection, otitis media, and flu-like symptoms are present in one-third of the patients before the onset of intussusception. The adenoviral infection has been associated with an increased risk of intussusception. Moreover, in up to two out of five patients with intussusception, positive history of a recent viral enteric or non-enteric infection is present. In a solid population-based study, species C of the adenovirus was established as the strongest predictor of intussusception. However, in the same population, rotavirus infection and poliovirus vaccine were not associated with intussusception. Another study recognized an association with the human herpesvirus 6.

A sub-type of intussusception, called pyloro-duodenojejunal intussusception is one of the extremely rare variants of intussusception. Moreover, it is extremely rare in the paediatric population and is predicted in up to 10% of adult patients with intussusception. The underlying causality of pyloro-duodenojejunal intussusception, includes pedunculated polyps, Menetrier disease, hamartomas, and gastrointestinal stromal tumors.

Bacterial infections, especially bacterial enteritis, are also associated with intussusception. This association was documented for infection with Salmonella, Escherichia coli, Shigella, or Campylobacter. The intussusception is more common within the first month following the infection. Intussusception is not usually immediately life-threatening. It is usually successfully treated with barium, water-soluble, or an air-contrast enema, which both confirms the diagnosis and successfully reduces it. The success rate is more than 80%. However, up to 10% may reoccur within 24 hours

Aims and objective-

This prospective observational cohort study included paediatric patients with acute intussusception admitted to SMS medical college and hospital Jaipur Rajasthan from January 2023 to June 2023 in 100 children. The main aim of the study is- “Management of paediatrics intussusception in tertiary care centre”

Methods and materials

This prospective observational cohort study included paediatric patients with acute intussusception admitted to SMS medical college and hospital Jaipur Rajasthan from January 2023 to June 2023 in 100 children.

The inclusion criteria were

- (1) Age 0–10 years
- (2) Diagnosed with intussusception.

The exclusion criteria were

- (1) Combined with other surgical acute abdominal conditions
- (2) History of previous abdominal surgery
- (3) Missing data.

All children were diagnosed by abdominal ultrasound, showing a “target ring sign” or a “concentric circle sign” in the transverse section and a “sleeve sign” in the longitudinal section.

Data collection- the clinical data of all children were prospectively collected from historical medical recorders, including sex, age, month of onset, disease duration, etiology, clinical symptoms, intussusception depth, treatments, outcomes, and relapses.

Statistical analysis SPSS 19.0 (IBM, Armonk, NY, USA) was used for data analysis. Continuous data were expressed as means±standard deviation and analysed using Student’s t-test. Categorical data were expressed as n (%) and analysed using the chi-square test. Two-sided P-values5 years old.

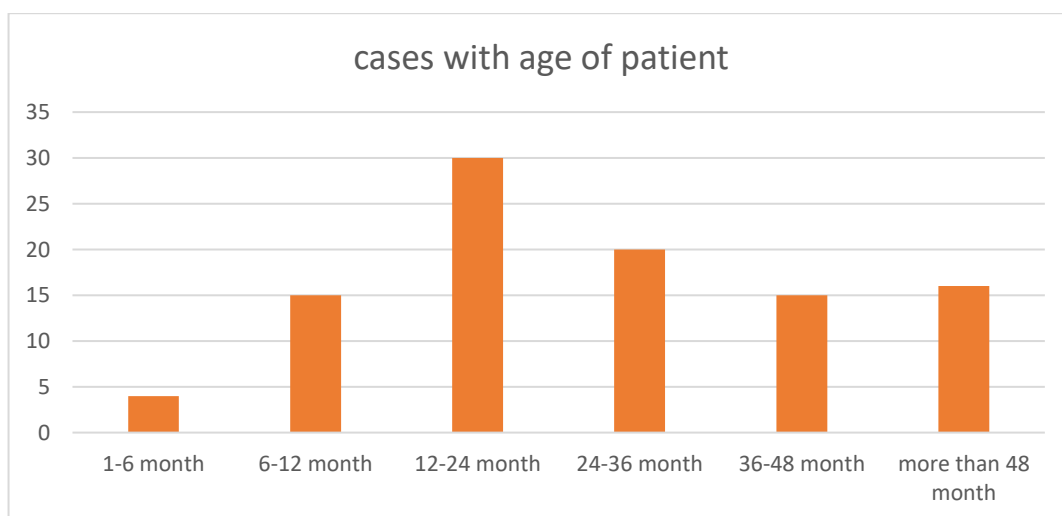
Observations and results-

From this study we observed that

Table- 1 Epidemiological characteristics

Epidemiological factors	No.	Percentages
Sex		
-Male	75	75
-Female	25	25
Age		
-1-6 months	4	4
-6-12 months	15	15
-12-24 months	30	30
-24-36 months	20	20
-36-48 months	15	15
-More than 48 months	16	16
Initial hospital visit		
-within 12 hr	30	30
-12-24 hr	50	50
-24-48 hr	15	15
-more than 48 hr	5	5
Monthly		
-January	10	10
-February	13	13
-march	20	20
-April	25	25
-may	20	20
-June	12	12
Religion		
-Hindu	70	70
-Muslims	30	30

- males are most commonly affected than female, M/F =3/1 in this study.
- most of the patient affected in age group of 12-24 months of age group.



Cases according to age distribution

- most of the patient’s hospital visit time after symptoms are 12-24 hours.

- The disease onset was most frequent in April (25%), but it occurred throughout the time without an obvious central tendency.

Etiological and clinical presentation

Parameters	Numbers	Percentages
Etiology		
-Diarrhoea	10	10
-post vaccination	15	15
-Post infection	10	10
-history of cold and cough	5	5
-not known	65	65
Clinical presentation		
-abdominal pain	86	86
-vomiting	50	50
-URTI	10	10
-Triad	10	10

-Among the 100 children, 86 (86%) had abdominal pain (young infants presented as paroxysmal crying), 50% have vomiting, and 10 patients (10%) had a typical triad of intussusception (abdominal pain +bloody stools +abdominal mass).

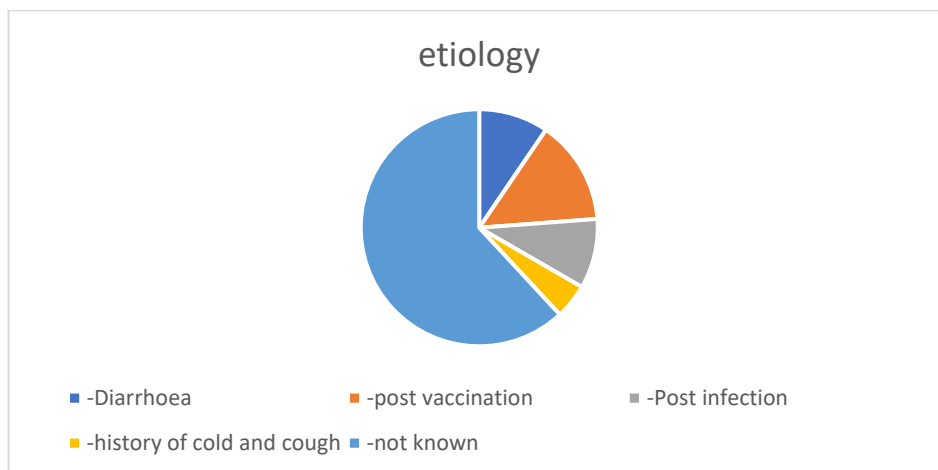


Figure – ileo-colic intussusception



Figure- intussusception causing bowel obstruction

- most of the patient have no any etiology for disease found, 10% have history of diarrhoea, 15% have vaccination history, 10% have infection history found.

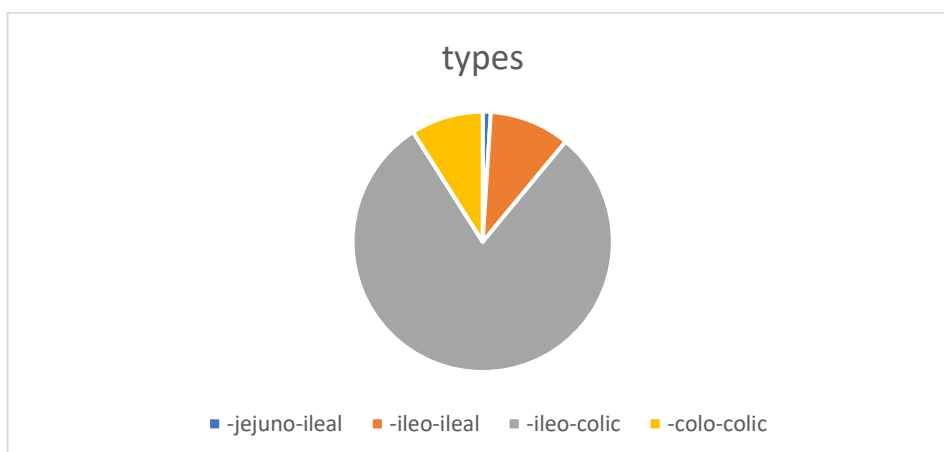


Types and treatment

Parameters	Numbers	Percentages
Types		
-jejuno-ileal	1	1
-ileo-ileal	10	10
-ileo-colic	80	80
-colo-colic	9	9
Treatment		
-conservative	70	70
-enema	15	15
-Manual reduction	10	10
-surgical repair	5	5
Reoperation		
	1	1
Complication		
-wound infection	2	2
-paralytic ileus	1	1

-The average intussusception depth was 4.0 ± 1.2 cm, with the shortest being 1.0 cm, the longest being 9.0 cm, and the median being 3.9 cm.

- Among the 100 patients, 15% were treated with enema reduction, and those not relieved by the initial enema were given repeat air enema. Those who still could not be reduced by delayed air enemas were considered as cases of reduction failure. The cases of reduction success were 15%. There were 5 cases of reduction failure, which were all successfully reduced by conversion to surgical reduction.



-Among them, one case of jejunio-ileal, 10% ileo-ileal and 9% colo-colic types. Most cases are ileo-colic types. No significant abnormalities were found during the intraoperative probing from the ileocecal to the proximal intestinal canal 1.5 cm in length.

- out of 100 patients, 2 patients come with recurrence of disease within one years.

- out of surgically repaired patients, two patients have wound infection and one patient goes into paralytic ileus, which managed conservatively.

Discussion

This study suggested that acute intussusception is common in infants and young children but is also not uncommon in older children. There is no obvious predisposing factor before the onset of the disease, and the clinical manifestations are mostly atypical, with paroxysmal abdominal pain/crying being the most common. Acute intussusception is generally considered to be more common in kids under 2 years old, especially in infants aged 4 to 9 months [1–3].

Males are most commonly affected than female, M/F =3/1 in this study. Most of the patient affected in age group of 12-24 months of age group. Most of the patient's hospital visit time after symptoms are 12-24 hours. The disease onset was most frequent in April (25%), but it occurred throughout the time without an obvious central tendency.

The etiology and pathogenesis of intussusception are still not fully understood.

In the present study, Among the 100 children, 86 (86%) had abdominal pain (young infants presented as paroxysmal crying), 50% have vomiting, and 10 patients (10%) had a typical triad of intussusception (abdominal pain +bloody stools +abdominal mass). Most of the patient have no any etiology for disease found, 10% have history of diarrhoea, 15% have vaccination history, 10% have infection history found.

Ntoulia et al [14]. found that around 75% of paediatrics acute intussusception cases have no clear predisposing factor.

In pediatrics patients, when strong suspicion of intussusception, abdominal ultrasound and abdominal x-ray should be done immediately to rule out this because ultrasound is a preferred methods for detecting intussusception. Ultrasound can provide insight into the site of intussusception and allow observation of blood flow changes, intestinal dilatation, and ascites [21]. It can also be used to observe the effect of reduction in real time. The sensitivity and specificity of ultrasonography by experienced operators approach 100% [22, 23].

In this study, an enema is the first choice for clinically stable children who had no evidence of intestinal perforation and shock. During the treatment, for children whose intussusception head moves but does not completely disappear with the initial enema and whose general conditions are stable, it may be considered to try again after some time (ranging from 30 min to several hours), which is called delayed repeated enema [25].

-The average intussusception depth was 4.0 ± 1.2 cm, with the shortest being 1.0 cm, the longest being 9.0 cm, and the median being 3.9 cm.

-Among the 100 patients, 15% were treated with air enema reduction, and those not relieved by the initial enema were given repeat air enema. Those who still could not be reduced by delayed air enemas were considered as cases of reduction failure. The cases of reduction success were 15%. There were 5 cases of reduction failure, which were all successfully reduced by conversion to surgical reduction.

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Out of 100 patients, 2 patients come with recurrence of disease within one years.

Out of surgically repaired patients, two patients have wound infection and one patient goes into paralytic ileus, which managed conservatively.

Children with advanced intussusception, like poor general conditions or failed air enemas, surgery should be performed promptly. Laparoscopic intussusception reduction is chosen as the surgical method, which has the advantages of less trauma and faster recovery compared with open surgery. This study showed that about 1% of the children suffered relapses, and the age distribution of the children with relapse was approximately the same as the overall age distribution of the children with the disease.

Some studies reported that about 10% of children would relapse after successful non-surgical reduction of intussusception, and the risk of relapse is higher in children >1 year old [27].

Conclusions

In conclusion, acute intussusception is a common acute abdominal disease in children, occurring in infants and young children but also in older children. There was no obvious aetiology. The clinical manifestations are atypical in most cases. Abdominal pain is the most common complaint from children presenting with intussusception. Air enema reduction is an effective treatment.

References

1. Loukas M, Pellerin M, Kimball Z, de la Garza-Jordan J, Tubbs RS, Jordan R. Intussusception: an anatomical perspective with review of the literature. *Clin Anat*. 2011; 24:552–61.
2. Edwards EA, Pigg N, Courtier J, Zapala MA, MacKenzie JD, Phelps AS. Intussusception: past, present and future. *Pediatr Radiol*. 2017; 47:1101–8.
3. Applegate KE. Intussusception in children: evidence-based diagnosis and treatment. *Pediatr Radiol*. 2009;39(Suppl 2):140–3.
4. Ko HS, Schenk JP, Troger J, Rohrschneider WK. Current radiological management of intussusception in children. *Eur Radiol*. 2007; 17:2411–21.
5. Tate JE, Simonsen L, Viboud C, Steiner C, Patel MM, Curns AT, et al. Trends in intussusception hospitalizations among US infants, 1993–2004: implications for monitoring the safety of the new rotavirus vaccination program. *Pediatrics*. 2008; 121:e1125–32.
6. Buettcher M, Baer G, Bonhoeffer J, Schaad UB, Heininger U. Three-year surveillance of intussusception in children in Switzerland. *Pediatrics*. 2007; 120:473–80.
7. Yang G, Wang X, Jiang W, Ma J, Zhao J, Liu W. Postoperative intussusceptions in children and infants: a systematic review. *Pediatr Surg Int*. 2013; 29:1273–9.
8. Waseem M, Rosenberg HK. Intussusception *Pediatr Emerg Care*. 2008; 24:793–800.
9. Simanovsky N, Issachar O, Koplewitz B, Lev-Cohain N, Rekhman D, Hiller N. Early recurrence of ileocolic intussusception after successful air enema reduction: incidence and predisposing factors. *Emerg Radiol*. 2019; 26:1–4.
10. Jung H, Kim HJ, Choi ES, Lee JY, Park KS, Cho KB, et al. Effectiveness of oral phloroglucinol as a premedication for unsedated esophagogastroduodenoscopy: a prospective, double-blinded, placebo-controlled, randomized trial. *PLoS ONE*. 2021;16: e0255016.
11. Yap Shiyi E, Ganapathy S. Intussusception in Children presenting to the Emergency Department: an asian perspective. *Pediatr Emerg Care*. 2017; 33:409–13.
12. Savoie KB, Thomas F, Nouer SS, Langham MR Jr, Huang EY. Age at presentation and management of pediatric intussusception: a Pediatric Health Information System database study. *Surgery*. 2017; 161:995–1003.
13. Justice FA, Auld AW, Bines JE. Intussusception: trends in clinical presentation and management. *J Gastroenterol Hepatol*. 2006; 21:842–6.
14. Ntoulia A, Tharakan SJ, Reid JR, Mahboubi S. Failed Intussusception reduction in children: correlation between Radiologic, Surgical, and pathologic findings. *AJR Am J Roentgenol*. 2016; 207:424–33.
15. Jain S, Haydel MJ. Child Intussusception. *StatPearls*. Treasure Island (FL)2022.

16. Kaemmerer E, Tischendorf JJ, Steinau G, Wagner N, Gassler N. Ileocecal intussusception with histomorphological features of inflammatory neuropathy in adenovirus infection. *Gastroenterol Res Pract.* 2009; 2009:579501.
17. Bogdanovic M, Blagojevic M, Kuzmanovic J, Jecmenica D, Alempijevic D. Fatal intussusception in infancy: forensic implications. *Forensic Sci Med Pathol.* 2019; 15:284–7. Li et al. *BMC Pediatrics* (2023) 23:143 Page 6 of 6
18. Guo WL, Zhang SF, Li JE, Wang J, Wang LJPO. Association of Meteorological Factors with Pediatric Intussusception in Subtropical China: A 5-Year Analysis. 2014;9: e90521-.
19. Kimia AA, Williams S, Hadar PN, Landschaft A, Porter J, Bachur RG. Positive guaiac and bloody stool are poor predictors of intussusception. *Am J Emerg Med.* 2018; 36:931–4.
20. Kimia AA, Hadar PN, Williams S, Landschaft A, Monuteaux MC, Bachur RG. Variation in the presentation of Intussusception by Age. *Pediatr Emerg Care.* 2020; 36:372–7.
21. Bartocci M, Fabrizi G, Valente I, Manzoni C, Specca S, Bonomo L. Intussusception in childhood: role of sonography on diagnosis and treatment. *J Ultrasound.* 2015; 18:205–11.
22. Hryhorczuk AL, Strouse PJ. Validation of US as a first-line diagnostic test for assessment of pediatric ileocolic intussusception. *Pediatr Radiol.* 2009; 39:1075–9.
23. Charles T, Penninga L, Reurings JC, Berry MC. Intussusception in children: a clinical review. *Acta Chir Belg.* 2015; 115:327–33.
24. Sadigh G, Zou KH, Razavi SA, Khan R, Applegate KE. Meta-analysis of Air Versus Liquid Enema for Intussusception reduction in children. *AJR Am J Roentgenol.* 2015;205: W542–9.
25. Lautz TB, Thurm CW, Rothstein DH. Delayed repeat enemas are safe and cost effective in the management of pediatric intussusception. *J Pediatr Surg.* 2015; 50:423–7.
26. Chassany O, Bonaz B, Bruley DESVS, Bueno L, Cargill G, Coffin B, et al. Acute exacerbation of pain in irritable bowel syndrome: efficacy of phloroglucinol/ trimethyl-phloroglucinol. A randomized, double-blind, placebo-controlled study. *Aliment Pharmacol Ther.* 2007; 25:1115–23.
27. Yu Y, Qin X, Yan S, Wang W, Sun Y, Zhang M. Non-leukemic myeloid sarcoma involving the vulva, vagina, and cervix: a case report and literature review. *Onco Targets Ther.* 2015; 8:3707–13.
28. Kim JH, Lee JS, Ryu JM, Lim KS, Kim WY. Risk factors for recurrent intussusception after fluoroscopy-guided Air Enema. *Paediatric Emerg Care.* 2018; 34:484–7.
29. Justice FA, Nguyen LT, Tran SN, Kirkwood CD, Thi NT, Carlin JB, et al. Recurrent intussusception in infants. *J Paediatric Child Health.* 2011;47: 802–5.