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Application of Ultrasound Guided Air Enema Reduction in the Treatment of Intussusception at the Lao National Children's Hospital

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Abstract

The objective of research was to study the effectiveness of treating intussusception by pneumatic reduction enema using ultrasound guidance. A retrospective data study conducted over a period of 1 year and 3 months, from April 2021 to July 2022, focusing on cases of intussusception in a children's hospital. The sample consisted of 35 patients, selected using a random sampling method based on clinical symptoms and ultrasound findings indicative of intussusception. This study included cases where the duration of symptoms did not exceed 48 hours. All cases underwent pneumatic reduction enemas guided by ultrasound. Cases with signs of peritonitis, severe dehydration, or clinical symptoms lasting longer than 48 hours were excluded from the study. The Result found that:

Pneumatic intussusception reduction was successful in 31 patients (overall success rate 88.50%) followed by auscultation. Only 4 patients (11.42%) required surgical intervention due to unsuccessful pneumatic reduction. In our study, the 4 cases treated surgically involved manually reducing the intussusception without bowel resection. Within 3 months after successful pneumatic reduction, only 2 patients (5.71%) recurred.

We found that the technique of transrectal air reduction in the treatment of Intussusception in children, monitored by ultrasound, is easy to use and highly effective. The treatment has no complication, is convenient and safe, the success rate in our study is 88.57 % with a recurrence rate of 5.71% with no intestinal perforate during the procedure. It can prevent and reduce the need for surgical intervention in patients presenting with early symptoms and in patients without signs of peritonitis. We recommend this technique of transrectal air pressure reduction for treating intussusception be implemented in provincial and district hospitals throughout Laos.

Keywords: Enema, air insufflation technique, ultrasound, infant

1. Introduction:

Intussusception is one of the most common causes of acute intestinal obstruction in infancy and early childhood. If untreated it can lead to gangrene of the intestine and even death (Parashar et al., 2000; Daneman et al., 1998; Kaiser et al., 2007). It is often seen in children aged between 4 months to 2 years of age, while the peak incidence is found from age 4 to 10 months (Daneman et al.,1998; Daneman & Navarro, 2004). Intussusception was first described by Barbette in 1674 (Stein et al., 1992), and in 1977 sonographic features were described. Many researchers have since used ultrasound to diagnoses this condition with a

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specificity and sensitivity of nearly 100% (Stein et al., 1992; Lehnert et al., 2009 and del-Pozo et al., 1999)

The etiology of intussusception is unclear, though it may relate to a high incidence of infective diarrhea (Shiels et al., 1991; Davis et al., 2003).

Common signs and symptoms include intermittent crying with abdominal colicky cramping pain, vomiting, passage of red Currant jelly stools (Blood and mucus), a palpable sausage shaped mass and lethargy with dehydration.

Intussusception is managed by an initial attempt at non-operative reduction with either barium enema, air-insufflation, or saline water enema. Surgery is required for those patients in which non-operative reduction fails, a long duration of symptoms or in patients of peritonitis and gross abdominal distension (Daneman & Navarro, 2003; Van den Ende et al., 2005).

Laos, similar to Asia countries, has changed the use of barium enema to air enema reduction for non-operative treatment of intussusception. The Lao Children's Hospital was the first institution in Laos to perform air enema reduction by modification of a blood pressure device (Sphygmomanometer) and a urine catheter to measure the level of air pressure. The aim of this study is to demonstrate the success rate of air enema reduction at the Lao Children's Hospital, Health promotion is about making people physically and mentally healthy, not at risk of disease, and having resistance to disease Junpen, 2021; Khamkeo et al., 2026).

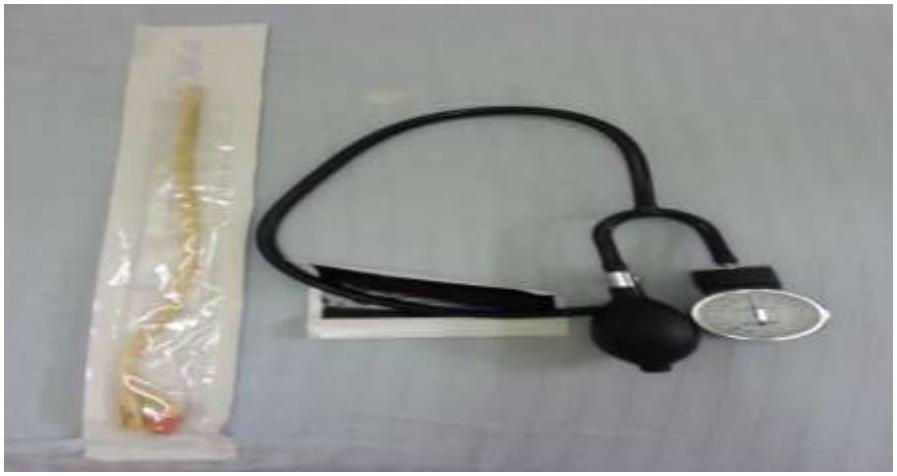
The objective of research was to evaluate and study the effectiveness of treating intussusception by pneumatic reduction enema using ultrasound guidance.

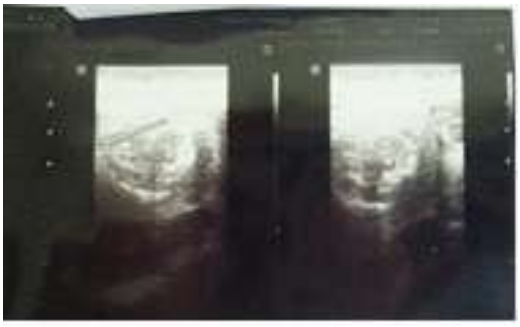
2. Materials and Methods

Clinical feature: This retrospective study was done by collecting the patients of intussusception at the Lao Children's Hospital, Vientiane Capital City, LAO, PDR, from April 2012 through July 2013. 35 patients were diagnosed with intussusception according to clinical presentation and confirmed by ultrasound. In all case the duration of symptoms was not more than 48 hours. Air enema reduction was performed in all patients; Patients with signs and symptoms of peritonitis, severe dehydration, symptoms more than 48 hours, and massive abdominal distension were excluded from this study.

Air enema reduction instruments and devices: Modified of sphygmomanometer, use the bulb and manometer, the Foleys size 26 or 28 French catheter to connect with the Y-shaped plastic tube. Ultrasound machine 1 set. Picture 1.

Procedure: Each patient's intravenous line is established and sometimes sedation with diazepam 0.3 mg/kg is needed to relax the patient. A Foley catheter is passed per rectum about 5 cm and the balloon inflated, while the patient's arm and knee are immobilized. Before the procedure, review the abdominal ultrasound to see the image of the intussusception, gradually increase air pressure in the colon while monitoring with the external sphygmomanometer. Keep air pressure at 100-120mmHg, for 1-3 minute, and then review the abdominal ultrasound again. If the ultrasound demonstrates a successful reduce of intussusceptions (Picture 2;3). The Foleys catheter is removed and the jelly stool comes out. Finally, continue to observe the patient for 4-6 hours post procedure or until the patient has passed stool, and has no signs and symptoms of intussusception.





Picture 2. Target sign of intussusception Picture 3. Successful of air reduction

During the procedure the operation theatre is ready in case of failure to reduce or in case of perforation

3. Results

In our retrospective study of 35 patients, 20 patients were male (57.14%), 15 patients were female (42.86%). The most common age group were 7-12 months (13 patients, 37.14%) and 3-6 months (12 patients of 34.28%) age group. see table 1. and graphic 1.

The most common clinical sign and symptoms were intermittent abdominal cramping pain with intermittent crying, vomiting, and presence of red currant jelly stool. See in table 2.

In 31 patients (88.57%) were successful by ultrasound guided air enema reduction. 4 patients (11.42%) required surgical intervention, and all of surgery patients were reduced manually without the need for resection and anastomosis. Recurrant intussusceptions after 3 months were 2 patients (5.71%). Can not see in this paper please recheck

All of surgery patients were reduced manually, none of patients required resection and anastomosis were present in our study.

4. Discussion

Intussusception is one of the most common emergencies in infant and children. In our retrospective study there was no significant in the incidence between males and females, but some articles have reported that it's more common in males than females.

The study was demonstrated that the common age group to present with intussusception is 3-6 months and 7-12 months, which is consistent with other studies (Daneman & Navarro, 2004).

Some articles reported the success rate of the air enema technique as high as 95% (Daneman & Navarro, 2004). In this study were found the success rate of 88.57%. which may be due to a smaller sample size in our study.

Various sonographic signs like “target” sign, “pseudo kidney” sign, and “doughnut” sign are described for the diagnosis of intussusception. If during the procedure there is no sonographic sign of intussusception, the procedure is considered successful. Other signs that the procedure is successful include passing stool when the Foleys catheter is removed post procedure and no more intermittent crying.

Surgical intervention is need when the patient’s failure of air enema reduction, during procedure there is perforation; suspect that the intestine has been damaged and needs to repair, massive abdominal distention. In our study there is 4 patients needed for surgery treatment, A surgery it was noted that the intussusceptions were ileo-ileo-colic, cecum-colic type which are difficult to reduce by air pressure. None of patients required resection and anastomosis in our study.

Occasionally intussusceptions recur; one article reported that about 10% of intussusceptions recur after reduction with enema. In our study there were 2 patients (5.71%) recurrence after air enema reduction.

In our study have shown that abdominal ultrasound is suitable to diagnose intussusception and to help guide air enema reduction after confirming the diagnosis of intussusception; Our criteria for air enema reduction is: 1. The history is not exceeding 48 hours, 2. Time from currant jell stool does not exceed 24 hours, 3. The patient is clinical stable without severe dehydration and massive abdominal distention. Although in the previous century many researchers reported the success rate of air reduction guided by abdominal x-ray (Daneman & Navarro,2004), Currantly ultrasound is the preferred method of gudance because there is no risk of x-ray exposure and it’s relatively simple, effective, economical and quick (Munden et al., 2007).

Some studies have reported the successful use of ultrasound guided hydrostatic reduction of intussusceptions (Munden et al., 2007 and Simanovsky et al., 2007)., but we have no experience with this technique.

5. Conclusion

Ultrasound guide air enema reduction is safe and effective in treatment of intussusceptions in infancy and early childhood with a low rate of complication. The success rate in our study of 88.57% with a recurrence rate of 5.71%. We recommend this technique to be performed in the provincial and district hospital.

6. Conflict of Interest

I, as a scientific researcher, declare that all information contained in this academic article has no conflict of interest with any party and has not benefited any party. In case of any violation in any way, I am happy to take sole responsibility.

7. Reference

Daneman, A., Alton, D. J., Lobo, E., Gravett, J., Kim, P., & Ein, S. H. (1998). Patterns of recurrence of intussusception in children: a 17-year review. *Pediatric radiology*, *28*(12), 913–919. https://doi.org/10.1007/s002470050497

Daneman, A., & Navarro, O. (2004). Intussusception. Part 2: An update on the evolution of management. *Pediatric radiology*, *34*(2), 97–187. https://doi.org/10.1007/s00247-003-1082-7

Del-Pozo, G., Albillos, J. C., Tejedor, D., Calero, R., Rasero, M., de-la-Calle, U., & López-Pacheco, U. (1999). Intussusception in children: Currant concepts in diagnosis and enema reduction. *Radiographics : a review publication of the Radiological Society of North America, Inc*, *19*(2), 299–319. https://doi.org/10.1148/radiographics.19.2.g99mr14299

Davis, C. F., McCabe, A. J., & Raine, P. A. (2003). The ins and outs of intussusception: history and management over the past fifty years. *Journal of pediatric surgery*, *38*(7 Suppl), 60–64. https://doi.org/10.1016/s0022-3468(03)00080-0

Daneman, A., & Navarro, O. (2003). Intussusception. Part 1: a review of diagnostic approaches. *Pediatric radiology*, *33*(2), 79–85. https://doi.org/10.1007/s00247-002-0832-2

Daneman, A., & Navarro, O. (2004). Intussusception. Part 2: An update on the evolution of management.

Pediatric radiology, *34*(2), 97–187. https://doi.org/10.1007/s00247-003-1082-7

Daneman, A., & Navarro, O. (2004). Intussusception. Part 2: An update on the evolution of management. *Pediatric radiology*, *34*(2), 97–187. https://doi.org/10.1007/s00247-003-1082-7

Junpen, R. (2021). The effectiveness of the health promotion program for patients with hypertension in hypertension clinic Damnoen Saduak Hospital, Ratchaburi Province. *Journal of Research for Health Improvement and Quality of Life, 1* (2), 20-30.

Khamkeo, K., Sisoulath, A., Phimmasone, S., Keomany, V., Soundala, O., & Sikhotchounlamany, S. (2026). The Effect of Health Promotion on Self-Care Behavior of Hypertensive Patients Receiving Services at The Cardiovascular Department in Mahosot Hospital. *Souphanouvong University Journal Multidisciplinary Research and Development*, *12*(01), 01–08. https://doi.org/10.69692/SUJMRD1201

Kong, F. T., Liu, W. Y., Tang, Y. M., Zhong, L., Wang, X. J., Yang, G., & Chen, H. P. (2010). Intussusception in infants younger than 3 months: a single center's experience. *World journal of pediatrics : WJP*, *6*(1), 55–59. https://doi.org/10.1007/s12519-010-0007-4

Kaiser, A. D., Applegate, K. E., & Ladd, A. P. (2007). Currant success in the treatment of intussusception in children. *Surgery*, *142*(4), 469–477. https://doi.org/10.1016/j.surg.2007.07.015

Lehnert, T., Sorge, I., Till, H., & Rolle, U. (2009). Intussusception in children--clinical presentation, diagnosis and management. *International journal of colorectal disease*, *24*(10), 1187–1192. https://doi.org/10.1007/s00384-009-0730-2

Munden, M. M., Bruzzi, J. F., Coley, B. D., & Munden, R. F. (2007). Sonography of pediatric small-bowel intussusception: differentiating surgical from nonsurgical patients. *AJR. American journal of roentgenology*, *188*(1), 275–279. https://doi.org/10.2214/AJR.05.2049

Parashar, U. D., Holman, R. C., Cummings, K. C., Staggs, N. W., Curns, A. T., Zimmerman, C. M., Kaufman, S. F., Lewis, J. E., Vugia, D. J., Powell, K. E., & Glass, R. I. (2000). Trends in intussusception-associated hospitalizations and deaths among US infants. *Pediatrics*, *106*(6), 1413–1421. https://doi.org/10.1542/peds.106.6.1413

Simanovsky, N., Hiller, N., Koplewitz, B. Z., Eliahou, R., & Udassin, R. (2007). Is non-operative intussusception reduction effective in older children? Ten-year experience in a university affiliated medical center. *Pediatric surgery international*, *23*(3), 261–264. https://doi.org/10.1007/s00383-006-1838-x

Shiels, W. E., 2nd, Maves, C. K., Hedlund, G. L., & Kirks, D. R. (1991). Air enema for diagnosis and reduction of intussusception: clinical experience and pressure correlates. *Radiology*, *181*(1), 169–172. https://doi.org/10.1148/radiology.181.1.1887028

Stein, M., Alton, D. J., & Daneman, A. (1992). Pneumatic reduction of intussusception: 5-year experience. *Radiology*, *183*(3), 681–684. https://doi.org/10.1148/radiology.183.3.1584919

Van den Ende, E. D., Allema, J. H., Hazebroek, F. W., & Breslau, P. J. (2005). Success with hydrostatic reduction of intussusception in relation to duration of symptoms. *Archives of disease in childhood*, *90*(10), 1071–1072. https://doi.org/10.1136/adc.2004.066332

Graphic 1. Success rate of ultrasound guided air enema reduction of intussusception

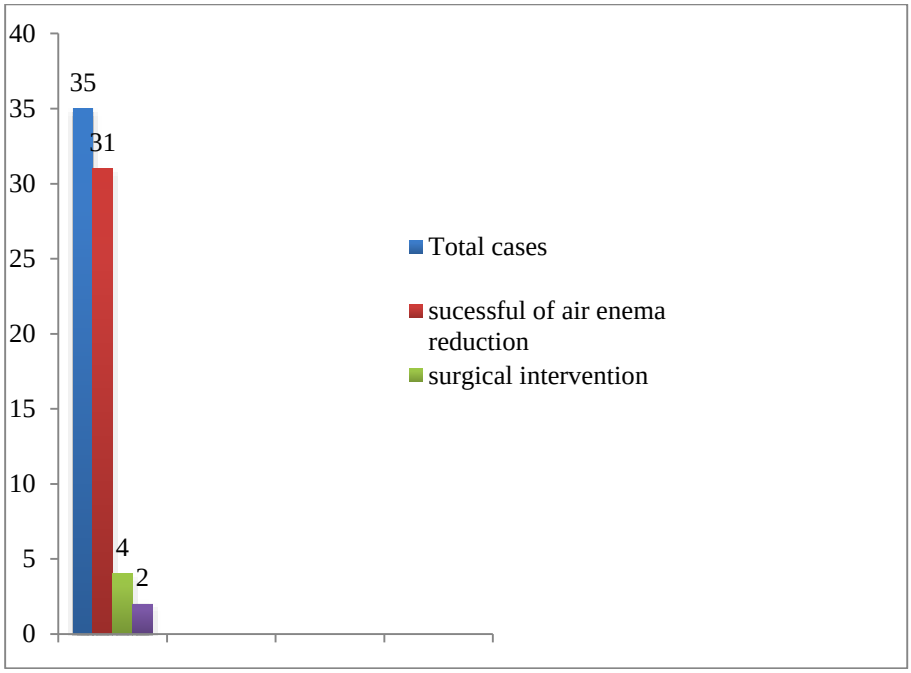


Table 1. Age Distribution

Age Group	Frequency	% age
3-6 months	12	34.28
7-12 months	13	37.14
13-24 months	7	20.00
>24 months	3	8.57

Table 2. Clinical feature

Clinical feature	Frequency	Percentage (%)
intermittent abdominal pain and crying	35	100
Vomiting	28	80
Mass in right iliac fossa	14	40
Currant jelly stool	13	37.14
Ultrasound diagnosis	35	100%