Journal of Paediatric Surgeons of Bangladesh (2012) Vol. 3 (2): 61-64
Official organ of the Association of Paediatric Surgeons of Bangladesh

Journal of Paediatric Surgeons of Bangladesh

Original Article

ROLE OF ULTRASOUND-GUIDED HYDROSTATIC REDUCTION OF INTUSSUSCEPTION IN CHILDREN WITH EARLY PRESENTATION

SHAKHAWAT HOSSAIN[1], ASHRAF-UL HUQ[2], JAFRUL HANNAN[3], KANIZ HASINA[4], R N SARKER[5]

Abstract

General objective: To study the efficacy of Ultrasound-guided hydrostatic reduction of intussusception in children with early presentation.

Methods: The study group included children aged 03 months to 02 years with early case of intussusception confirmed on ultrasonography. One litre of normal saline bag was suspended at 100 cm height from the patient's level. After connecting the saline bag with Foley's catheter introduced in the rectum, gradual distension of colon and retrograde movement of intussusceptum towards the caecum monitored by real time ultrasound.Successful reduction was assumed once mass was disappeared and passage of saline into the small intestine. If 1st attempt failed but there is some movement of the mass was present and child had no abdominal signs, 2nd and 3rd attempts were taken at least 30 min interval.

Result: The overall success rate of US-guided hydrostatic reduction of intussusception in children with early presentation was about 90%, with no immediate recurrence and no perforation.

Conclusion: Ultrasound guided hydrostatic reduction should be the first line of the treatment in patients with early presentation of intussusceptions aged between 3 months and 2 years old. In cases with failed initial reduction, a second or even third attempt may provide successful reduction.

Key words: Intussusception, Intussusceptum, Intussuscepiens, Hydrostatic reduction.

1. Dr. Md. Shakhawat Hossain, Senior Major, Bangladesh Army Medical Core
2. Dr. Md. Ashraf Ul Huq, Professor &Head, Department of Pediatric Surgery, Dhaka Medical College & Hospital, Dhaka
3. Dr. Jafrul Hannan, Head, Department Paediatric Surgery, Maa-O-Shishu Hospital, Chittagong
4. Dr. Kaniz Hasina, Associate Professor, Department of Pediatric Surgery, Dhaka Medical College & Hospital, Dhaka.
5. Dr. RN Sarker, Associate Professor, Department of Radiology & Imaging, Dhaka Medical College Hospital,Dhaka

Correspondence to : Dr. Md. Shakhawat Hossain, Email: dr.saku74@gmail.com

Introduction

Intussusception was first described by Barbette in 1674,[1] sonographic features were described in 1977.[2] Many researchers have since used ultrasound to diagnose this condition with a high specificity and sensitivity of nearly 100%.[3] In 1982, Kim and his group did the first ultrasound guided hydrostatic reduction (USGHR) with normal saline.[3] Sonography has now been accepted as a method for hydrostatic reduction of intussusception with normal saline .[2,4] Intussusception is the most common cause of bowel obstruction in children under two years of age. Most intussusceptions are ileocolic. The diagnosis can be confirmed by ultrasound. Sonography demonstrates so called "Target.sign"and"Pseudo-kidney.sign".

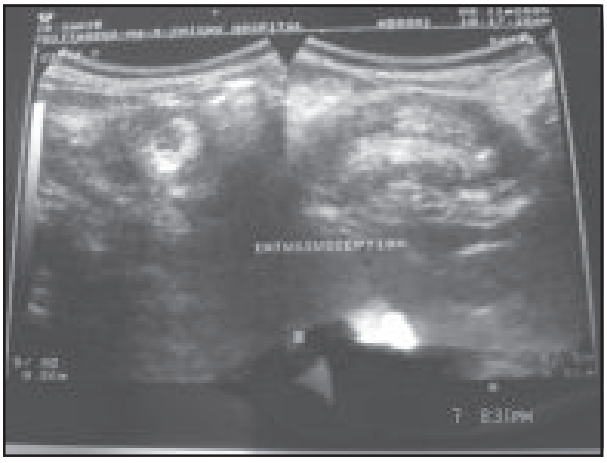

Fig.-1: *Ultrasound features of intussusception*

Ultrasound guided hydrostatic reduction of childhood intussusception is a non-invasive, simple, safe, reproducible, less time consuming, cost effective, shorter hospital stay, high success rate and no

radiation exposure.[4] In cases where partial reduction is achieved, the operating time is markedly reduced. Despite these enormous benefits, USGHR of intussusception had not been a common part of the management of intussusception in Bangladesh. Definitive treatment of intussusception in our country is operative, though it is long procedure, increases morbidity, mortality and prolonged hospitals stay.

Materials and Methods:

Patients who presented at the Pediatric Surgery Department of Dhaka Medical college Hospital and Pediatric Surgery Department of Maa-Shishu-O-General Hospital, Agrabad Chittagong from June 2011 to October 2012 with a clinical suspicion of intussusception were admitted if the following criteria were met:

- Children more than three months and less than two years.
- History of intussusception less than 48 hours.
- No features of peritonitis or intraperitoneal free gas

An intravenous line was given, blood samples were taken for serum electrolytes and blood grouping & cross-matching. Then the patient adequately resuscitated and a nasogastric tube was introduced. In addi-tion, intravenous antibiotics (cefuroxime & metronidazole) given and all the other preparations necessary for surgery was made as a safeguard in case of emergency, when the procedure failed. Informed written consent was taken from the patient's guardian. Vital signs were recorded. A Foley's catheter of size 12 Fr.-16 Fr. used according to the age of the patient. Catheter was lubricated with 2% lignocaine gel and introduced into the rectum (5 cm. from the anal verge).

Fig.-2: *Materials for hydrostatic reduction of intussusception*

The balloon of Foley's catheter was inflated with 10-15 ml distilled water and its appropriate position was confirmed by USG.Catheter was connected with saline bag and flow of saline was allowed into the rectum. The saline bag was suspended at 100 cm from the patient's bed level. Gradual distention of colon and retrograde movement of intussusceptum towards the caecum were monitored by real time ultrasound.

Fig.-3: *During procedure at the ultrasound suite*

Complete reduction was assumed once intussusceptum was disappeared and passage of saline through the ileo-caecal valve into the ileum seen. In unsuccessful cases, if some movement of the mass was present and child had no abdominal signs 2nd or even 3rd attempt was taken after minimum 30 min interval. Afterwards, Foley's catheter was removed and saline drained through the anus. Clinical condition of the patient was closely and carefully monitored throughout the procedure. After procedure patient

shifted to the observation room. After 24 hours review US was done for follow-up.

Results

Table-I

Age group distribution of the study population (n=47)

Age group	Number	Percentage
03-06 months	02	4.25
06-12 month	33	70.25
12-24 months	12	25.5
Total	47	100.0
Mean (SD)	11.17(±4.92)	Range 03-24 months

Table -II

Presenting complaints of the study population (n=47)

Presenting complaints	Number	Percentage
Intermittent colicky abdominal pain	47	100
Vomiting	40	85.11
Fever	29	61.70
Blood mixed mucoid stool	34	72.34

Table-III

USG findings of the study population (n=47)

Investigations	Number	Percentage
Intra-abdominal mass	47	100
Target sign	47	100
Pseudo-kidney sign	47	100

Table-IV

Volume of fluid needed for reduction

Vol. of Fluid	Number	Percentage
100-200 ml	01	2.13
200-300 ml	06	12.77
300-400 ml	11	23.40
400-500 ml	22	46.81
> 500 ml	02	4.26
Total	42	89.36

Table-V

Association between duration of presenting symptoms with result of reduction (Fisher Exact test)

Duration of presenting symptoms	Result of reduction: Reduction failed	Successful reduction	Total	P value
up to 24 hrs	00(0%)	23 (100%)	23(100)	0.04
24-48 hrs	5(20.83%)	19(79.16%)	24(100)	
Total	5(10.6%)	42(89.4%)	47(100)	

Table-VI

Duration of hospitalization after reduction

Duration of Hospitalization after reduction	Number	Percentage
Within 24 hours	01	02.13
24 – 48 hours	12	25.53
48 -72 hours	29	61.70
After 72 hours	05	10.64
Total	47	100.00

Results

Out of 47 patients, majority age group were within 6-12 months . Mean (±SD) age was 11.17(±4.92) months, minimum age was 06 months and maximum was 24 months. Male female ratio (M:F=1.27:1). All patients 47(100%) came with intermittent colicky abdominal pain, followed by vomiting was in 40(85.11%) cases, fever was in 29(61.7%) cases and blood mixed mucoid stool was in 34(72.34%) cases, 41(87.23%) patients was average body build and 06(12.77%) patients was below average body build. USG findings of all 47(100%) patients had intra-abdominal mass; Target sign and pseudo-kidney signs were positive. Twenty two (46.81%) cases were reduced after introducing about 400 to 500 ml of normal saline, 11(23.40%) cases were reduced about 300 to 400 ml, 06(12.77%) cases were reduced about 200 to 300 ml, 02(4.26) cases were reduced above 500ml and 01 (2.13%) case was reduced after introducing about 100 to 200 ml of normal saline. Height of the fluid level was 100 cm (73.5 mm of Hg)for all cases. Thirty six (76.60%) cases were reduced within 05 to 10 min, 5(11.90%) cases were reduced >10 min and 01(02.38%) case was reduced within 03 to 05 min. But remaining 05(10.6%) cases were not reduced even after 10 min. Out of 47(100%) patients 42(89.4%) cases were successfully reduced. Majority of successful reduction was done by single attempt.This indicates high success rate. Patients who came within 24 hours of onset of symptoms, 23(100%) were successfully reduced, came within 24-48 hrs 19(79.16%) were successfully reduced

and 05(20.83%) were failed to reduction. Forty two (89.4%) patients were discharged within 72 hours and 5(10.6) patients (who were operatively treated) were discharged after 72 hours.

Discussion

Intussusception is a common cause of acute intestinal obstruction in children 03 months to 02 years of age. The mean age 11.7 months.[5] Majority of our patients were 06 to 12 months and mean age 11.17 months. Symptomatology included sudden onset of intermittent colicky abdominal pain, drawing up of legs, vomiting, blood mixed mucoid stool - the classically described red currant jelly stool.[6] In our study all patients 47(100%) came with intermittent colicky abdominal pain, vomiting was in 40(85.11%) cases and blood mixed mucoid stool was in 34(72.34%) cases. USG is a very useful examination for diagnosing intussusception with high sensitivity 98-100% and specificity 88-100%.[7] In this series USG findings of all patients 47(100%) had intra-abdominal mass, "Target sign" and "Pseudo-kidney sign" were positive. Ultrasound assisted techniques are far more superior, in case of an experienced radiologist is available.[8,9] US-guided hydrostatic reduction of intussusception is an alternative technique with a remarkable success rate and no radiation exposure.[9,10,11] In our study all reduction done by US guided and successful reduction rate was 89.4%. Reported saline pressures exerted during the procedure range from 75 to 125 mmHg with a constant pressure of 100 cm H_2O (73.5 mmHg) and we wait until the intussuscepted bowel reduces or the flow of saline stops.[11]. In our series height of the fluid level was 100 cm H_2O (73.5 mmHg) for all cases 47(100%). We have chosen the height of fluid level at 100 cm H_2O (73.5 mmHg) to lessen the risk of perforation during the reduction. Our success rate of reduction (89.4%) seems to be lower than those of the some other investigators, but it is actually very similar to the many of the similar case studies.[12] Out of 47 cases, 05(10.6%) cases were failed, which is similar to other study.[13]

Conclusion

Ultrasound guided hydrostatic reduction should be the first line of the treatment in patients with early presentation of intussusceptions aged between 3 months and 2 years old. In cases with failed initial reduction, a second or even third attempt may provide successful reduction.

References

1. Irish MS. Intussusception: Surgical Perspective. Etnedicine, 2006;26:733–44.
2. Peh WCG, Khong PL, Chan KL, Lam C, Cheng W, Lami WW, et al. Sonographically Guided Hydrostatic Reduction of Childhood Intussusception Using Hartmann's Solution. AJR: 1996;167:1237-1241.
3. Sarin YK, Rao JS, Stephen E. Ultrasound guided water enema for hydrostatic reduction of childhood intussusception –a preliminary experience. Gastrointestinal Radiology 1999;9(2): 59-63
4. Krislinakumar H, and Umamaheshwari S. Ultrasound Guided Hydrostatic Reduction in the Management of Intussusception Indian J Pediatr; 2006;73 (3):217-220
5. Mensah Y, Glover-Addy H, Etwire V. Appeadu-Mensah W, and Twum M. Ultrasound guided hydrostatic reduction of Intussusception in children at korle bu teaching Hospital: an initial experience, Ghana Medical Journal, 2011;45(3)128-31.
6. Marc CW.Intestinal Obstruction. In RG Russel, NS Williams, & CJK Bulstrode, eds. *Bailey & Love's Short Practice of Surgery, 23*th ed, London; Arnold Publishers, 2000: 1067-106.
7. del-Pozo G, Albillos JC, Tejedor D, Calero R, Rasero M, de-la-Calle U. et al. Intussusception in children: current concepts in diagnosis and enema reduction. Radiographics 1999;19:299-319.
8. Daneman A, Alton DJ. Intussusception: Issues and controversies related to diagnosis and reduction. Radio] Clin North Am 1996;34:743-756.
9. Chan KL, Saing H, Peh WC, Mya GH, Cheng W, Khong PL. et al. Childhood intussusception: Ultrasound-guided Hartmann's solution hydrostatic reduction or barium enema reduction? J Pediatr Surg; 1997.32:3-6.
10. Kim HR, Kim Y, Neuroûbromatosis of the colon and rectum combined with other manifestations of Von Reck1inghausen's disease: Report of a case. Dis Colon Rectum 1998;41:1187-1192.
11. Tander B, Baskin D, Candan M, Bafiak M, Bankolu M. Ultrasound guided reduction of intussusception with saline and comparison with operative treatment, Ulus Travma Acil Cerrahi Derg 2007; 13(4):288-293
12. Zambuto D, Bramson RT, Blickman JG. Intracolonic pressure measurements during hydrostatic and air contrast barium enema studies in children. Radiology : 1995;196:55-8.
13. Ein SH, Shandling B, Reilly BJ, Stringer DA. Hydrostatic reduction of intussusceptions caused by lead points. J Pediatr Surg: 1986.21:883-6.