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Intussusception in children: Comparison between ultrasound diagnosis and operation findings in a tropical developing country

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ABSTRACT

Background: Intussusception is one of the more common causes of intestinal obstruction in children. The diagnosis may be based mainly on clinical features; however, there are no classic signs and symptoms that are common to all cases. This study reports our experience at US diagnosis and operation findings of children with intussusceptions in a tropical developing economy. **Materials and Methods:** This was an 8 years retrospective review of intussusceptions in children in a tertiary health facility in a tropical developing country from January 2004 to December 2011. **Results:** Twenty-five out of 41 children (M:F = 2.2:1) admitted with intussusceptions within the period were studied. The median age was 6.0 ± 5.57 months (range 3 months-7 years). US positively diagnosed intussusceptions in 20 (80%) cases. **Conclusion:** US can increase diagnostic confidence in intussusceptions.

Key words: Children, intussusception, operation findings, tropical developing country, ultra-sonography

INTRODUCTION

Intussusception is one of the more common causes of intestinal obstruction in children. Recognising and treating this condition rapidly is important to prevent potentially fatal complications.[1,2]

The diagnosis may be based mainly on clinical features,[3] which could be quite challenging. This is, because, there are no classic signs and symptoms that are common to all cases of intussusception, a situation that often leads to delay in diagnosis. The classic triad of vomiting, abdominal pain and passage of blood per rectum occurs only in a third of cases.[4-7] It implies that this classic triad cannot be wholly relied upon in making a diagnosis. Furthermore, atypical presentation of cases of intussusception is seen in up to 16% of children.[8,9] Therefore, ultrasound scan (US) of the abdomen has been used to aid diagnosis and is said to be very reliable in experienced hands.[10,11]

We sought to evaluate the value of US in increasing the diagnostic confidence in patients with suspected intussusceptions by determining the accuracy of US diagnosis and operation findings in cases of suspected intussusception in children in our centre. These findings may be useful to paediatric and other surgeons involved in the care of children with intussusception in similar settings as ours where late presentation is frequent and non-operative reduction is infrequently performed.

MATERIALS AND METHODS

The medical records of children aged 0-15 years consecutively admitted with intussusception to UCTH, Calabar from January 2004 to December 2011 were retrospectively studied. The data extracted from the case notes included patient's age, sex, symptoms and signs on presentation in hospital, clinical, US and barium enema diagnoses, status of sonographer and operation findings. Data analysis was carried out with descriptive statistics using SPSS version 14 for windows.

Children with clinical diagnosis of intussusception without US diagnosis as well as those who had prolapsed intussusceptions were excluded from the study. Institutional consent was obtained from the UCTH Research/Ethics committee.

The sensitivity, specificity, positive and negative

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predictive values of the US scan were determined.

RESULTS

Forty-one patients with intussusception were seen during the 8years period. Ten of them did not have US diagnosis while six children had prolapsed intussusceptions and hence were excluded from the study. The age range at presentation was 3 months to 7 years with a median age of 6.0 ± 5.57 months. There were 21 (84%) infants and 4 (16%) older children made up of 17 (68%) males and 8 (32%) females (M:F = 2.13:1) [Table 1]. The peak incidence of intussusception was in the 3-7 months age group.

Table 2 summarises the sources of the US results. More than half (n = 14; 56%) of them were generated by private US outfits whose experiences in diagnostic US could not be ascertained. The remaining scans were carried out in the UCTH Radiology Department by resident doctors in 8 (32%) and consultant radiologists in 3 (12%) patients respectively. The US reports produced by the resident doctors were also reviewed by their consultants who countersigned them. All the 11 (100%) reports generated from the Teaching Hospital became truly positive at the end, one, which also had double contrast barium enema, which diagnosed intestinal polyp as cause of the intussusception. Of the 14 (56%) results from the private outfits, 9 (64.3%) were truly positive for intussusception. None in this patient group had barium enema study.

In all, there were 21 (84%) positive US results and 4 (16%) negative US results. Out of the 21 positive results, 20 (80%) of them were truly positive for intussusception at operation while 1 (4%) was falsely positive [Table 3]. Here, an obstructed and dilated segment of bowel caused by an adhesive band produced US features of intussusception leading to misdiagnosis of the actual condition.

Of the four negative results, 3 (12%) of them were falsely negative meaning that there was intussusception at operation while the remaining 1 (4%) was truly negative, meaning that there was no intussusception at operation.

The total accuracy of US was 84% while the sensitivity and specificity were 87% and 50% respectively. The low specificity was probably due to inability to identify all of the patients who were referred and subsequently were proven not to have an intussusception. Similarly, the positive and negative predictive values were 95.2% and 25% respectively.

Table 1: Age and sex distribution of children with intussusception

*Age	Sex		Total (%)
	Male (%)	Female (%)	
0-3 months	3 (12)	0 (0)	3 (12)
4-7 months	8 (32)	6 (24)	14 (56)
8-11 months	2 (8)	2 (8)	4 (16)
1-2 years	2 (8)	0 (0)	2 (8)
3-7 years	2 (8)	0 (0)	2 (8)

*Age as at last birthday

Table 2: Distribution of the sources of US results

Source	Frequency	%
Private ultrasound outfits	14	56
Resident doctors	8	32
Consultant radiologists	3	12

Table 3: Ultrasound diagnosis of intussusception compared with operation findings

US result	Intra-operative diagnosis of intussusception			
	Present			Absent
	Ileo caecal	Ileo colic	Colo-colic	adhesive obstn
Positive (a)	4	15	1	(b) 1
Negative (c)	1	2	0	(d) 1

Ileocolic (n = 17; 68%) and ileocaecal (n = 5; 20%) intussusceptions were more commonly encountered at operation. There was no entry of cases of intussusceptions that had spontaneously reduced in the case notes. The causes of the intussusceptions were unknown in 23 (92%) patients as no specific lead points were found at operation. However, in 2 (8%) other older patients a sessile polyp and an enlarged hypertrophied ileal lymphoid patch were documented as causes of the intussusceptions leading to resection of the bowel segments.

DISCUSSION

The results of this study showed that infants were those commonly diagnosed with intussusception. This finding was in agreement with those of other studies in Nigeria and elsewhere.[12-15] It differed with earlier reports in Nigeria that associated childhood intussusception with the above 5 years age group.[16,17] This underscores the challenge in diagnosis that may be experienced. While the older child can appreciate his symptoms to some extent, the preverbal children cannot give any clue about their problem. Therefore, total reliance must be placed on the parents' history and the objective assessment of the surgeon. However, there

are no classic signs and symptoms that are common to all cases of intussusception. Even the classic triad of vomiting, abdominal pain and passage of blood per rectum is said to occur only in a third of cases.[4-7]

Recent studies have it that about 30%-68% of children with clinical findings suggestive of intussusception end-up with the condition.[18,19] This underscores the need for an additional diagnostic tool such as US scan, which has been said to be very reliable in experienced hands.[10,11]

The finding of the study showed that majority of the patients had their US investigations performed by private US outfits. The importance of this fact is that, the eventual result will depend on the experience of the sonographer.[10,11] This is likely to influence the accuracy of the investigation. Presumably, there may also be patients referred to the centre who had not been identified to be included in the study.

On the other hand, the scans performed by the Resident doctors were again reviewed by the consultants who were more experienced. This led to a 100% positive predictive value of the children with intussusception. On the contrary, higher frequency US imaging with better resolution were more likely to be available for use in specialist Teaching Hospital setting[19] than on private outfits.

The results of the study showed that US was highly accurate in the diagnosis of intussusception in experienced hands with a sensitivity of 87%. This is in line with earlier series in the developed economies.[19-21] However, the observed specificity of 50% appeared low and at variance with 88%-100% normally quoted in literatures.[10,18,19] Presumably this low value may be due to patients referred to our centre who were not identified to be included in the study. It could also be accounted for by the inexperience of the private sonographers who diagnosed a child with adhesive bands as having intussusception, leading to one false positive result. This agrees with the observation that thickened bowel wall in some acute gastrointestinal conditions in children may produce US features of intussusceptions.[22] This therefore calls for experience in US interpretation and a high index of suspicion on the part of the clinician. Where still in doubt, radiography with barium continued into non-operative management of the condition is performed except in late presentation with advanced symptoms, such as peritonitis indicating the presence of gangrenous intestine.

To perform barium enema reduction, the patient must be adequately prepared and theatre booked and ready for operative treatment should the procedure fail. A column of barium is retained at a level of 30 cm above the buttocks of the patient.[23,24] A higher level may result in an increased intra-luminal pressure with risk of perforation due to impaired viability of the intestine. Reduction is considered complete when barium refluxes freely into the small intestine for more than 5-10 cm. If this fails or if perforation occurs, immediate surgery is performed.

The realized accuracy rate of 84% was much lower than 94.4% reported by other series.[19,22] While relatively high positive predictive value comparable to those in published series was achieved, the negative predictive value was rather low and not in keeping with those of other studies.[19,22]

The types of intussusceptions found at operation also agreed with those commonly reported in children in our environment and world-wide.[4-7] Similarly, the causes of intussusceptions documented in the study were in keeping with those of other series.[25,26]

In conclusion, the accuracy of US diagnosis in experienced hands was high and could increase the diagnostic confidence in patients with suspected intussusceptions. Thickened bowel wall in other gastrointestinal conditions could produce US features of intussusceptions. Therefore, a high index of suspicion is recommended. If still in doubt after US diagnosis, we recommend a contrast enema, which can be continued into non-operative management. However, in the tropical developing countries, operative treatment may sometimes be expedient in averting grave consequences of the condition, which could be occasioned by poverty or non-availability of the required non-operative modality of treatment.

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