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Transient versus surgically managed small bowel intussusception in children: Role of ultrasound

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ABSTRACT

Background: To evaluate and compare the ultrasound (US) features of transient small bowel intussusception (SBI) with those which required surgical management. **Materials and Methods:** US features of 26 children with 32 intussusceptions from January 2014 to August 2014 were recorded and compared with follow-up imaging or surgical findings. **Results:** Transient SBI when compared to surgically managed intussusception has shorter length of intussusception (mean 2.25 cm, range 1.8-4.5 cm vs. mean 5.6 cm, range, 2.3-7.8 cm), smaller transverse diameter (mean, 1.2 cm, range 0.8-2.3 cm vs. mean, 3.3 cm, range 2.9-5.4 cm) and thin wall (mean, 3.3 mm, 2.3-4.9 mm vs. mean, 6.8 mm, range, 4.3-11.2 mm). Four out of five surgically managed intussusceptions were associated with the lead point while none of the transient SBI had any lead point. Peristalsis was absent in all surgically managed intussusceptions. **Conclusion:** Transient SBI is associated with a shorter length of intussusception, smaller transverse diameter, thin walls, absence of the lead point and visible peristalsis. All these findings may help in distinguishing it from those requiring surgical management.

Key words: Children, surgically managed small bowel intussusception, transient small bowel intussusception, ultrasound

INTRODUCTION

Intussusception is defined as an invagination of one bowel segment into another. Clinical presentation of intussusception is varied and includes abdominal pain, nausea, vomiting, lethargy and 'currant jelly' stools. The majority of intussusceptions in the paediatric population are ileocolic type.[1] Ultrasound (US) has high sensitivity of (98-100%) and specificity (88-100%) for diagnosis of ileocolic intussusception.[2,3] Small bowel intussusception (SBI) on the other hand is less common and is difficult to detect on US.[4,5] Management of SBI differs from ileocolic intussusception as a hydrostatic or pneumatic reduction is not effective in most of the cases, and patients may require surgical intervention.

With wider availability and better resolution of US, an increasing number of cases of SBI are being diagnosed. However, not all of these require surgical intervention as many SBI tend to reduce spontaneously.[6-8] Conversely, a delay in surgical treatment could lead to severe morbidity in others. Since the clinical presentation of transient SBI and those requiring surgical intervention are often variable and overlapping it cannot be used as a reliable guide for distinguishing between the two. US, owing to its easy availability, cost effectiveness and absence of radiation hazard can thus prove a valuable tool in decision-making process.

The study aimed to evaluate and compare the US features of transient SBI with those which required surgical management.

MATERIALS AND METHODS

The study was conducted in a Tertiary Care Center in North India from January 2014 to August 2014. All patients in the paediatric age group (<12 years) who had SBI on US were included in the study.

Ultrasound examination was performed by a radiologist using Hitachi HiVision Preirus. Convex probe with frequency 2-5 MHz was first used for evaluation of the solid organs. Linear transducers with frequency 3-7 MHz and 5-18 MHz were then sequentially

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employed for assessment of bowel and mesentery. All patients were also evaluated by Color Doppler (CD). SBI showed target sign or crescent in doughnut sign on transverse section and short segmental sandwich sign on longitudinal scan [Figures 1 and 2]. US parameters assessed were: transverse diameter of the lesion, length of involved segment, thickness of outer rim, peristaltic motion of invaginated bowel loop, lymph nodes, bowel dilatation and thickening, presence of lead point and free fluid collection between walls of invaginated bowel.

Patients who were severely symptomatic (with abdominal distension, blood in stools, excessive crying) underwent surgical exploration. Rest of the patients underwent imaging follow-up by US or computed tomography (CT) next day. Those who remained symptomatic or in whom intussusception persisted on follow-up imaging studies were taken for surgical exploration. The clinical and initial US findings of all patients were compared with the postoperative findings and follow-up imaging studies.

RESULTS

On the basis of US 15 boys and 11 girls with age ranging from 3 months to 12 years (mean age: 3.5 years) were found to have SBI. A total of 32 intussusceptions were detected in 26 infants and children with the use of US. Four children had multiple intussusceptions (3 had 2 intussusceptions each and one had four intussusceptions).

In 22 children with single intussusception (22 intussusception segments), spontaneous reduction was confirmed by imaging in 13 children (10 patients on follow-up US and three patients on CT scan). Nine of the 22 children underwent surgical exploration (9 intussusception segments); of which 4 children were found to have spontaneous reduction intra-operatively while 5 had to be reduced. Initial US examination in these five patients showed absent vascularity on CD in 2 out of 5 patients and mesenteric lymph nodes as the lead point in 4 out of 5 patients.

In the remaining four children with multiple intussusceptions (10 intussusception segments), follow-up US showed spontaneous reduction of 6 intussusception segments while the remaining four segments showed a significant decrease in size and improvement in clinical symptoms. Two of them were diagnosed with celiac disease and one with Henoch-Schonlein purpura while no diagnosis could be made in one child. US and CD features of transient SBI and surgically reduced SBI are shown in Table 1.

DISCUSSION

Small bowel intussusceptions, which are generally less common than ileocolic intussusceptions, are usually

Table 1: Ultrasound features of surgically managed and transient SBI

Ultrasound features	Intussusception requiring surgical reduction (n = 5)	Transient SBI (n = 27)
Transverse diameter (mean, range) (cm)	3.3, 2.9-5.4	1.2, 0.8-2.3
Length (mean, range) (cm)	5.6, 2.3-7.8	2.25, 1.8-4.5
Thickness of outer rim (mean, range) (mm)	6.8, 4.3-11.2	3.3, 2.3-4.9
Peristaltic motion of invaginated bowel	0/5	22/27
Lead point	4/5	0/27
Lymph nodes	5/5	21/27
Bowel dilatation and thickening	3/5	2/27
Free fluid collection	1/5	3/27
Absent vascularity on Doppler	2/5	0/27

SBI: Small bowel intussusception

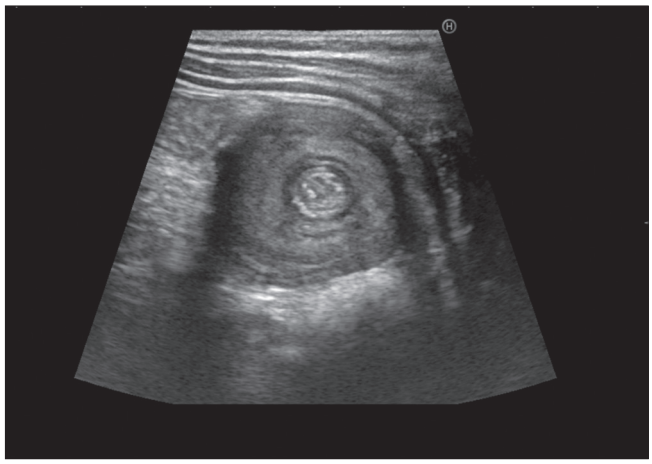

Figure 1: Ultrasound showing crescent in doughnut sign with edematous bowel wall on transverse view

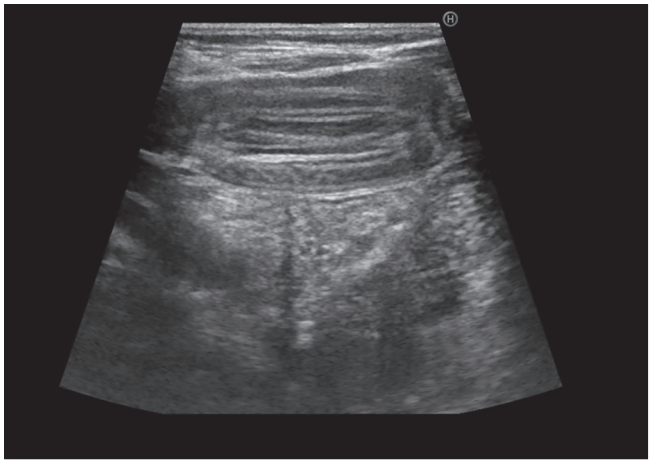

Figure 2: Ultrasound showing short segment sandwich sign on the longitudinal view

seen in older children. The diagnosis is usually made by imaging, as the usual symptoms which are seen with ileocolic intussusception like blood in stools are not seen in SBI.[4,5] Oedema of the bowel wall and abnormal motility of intestinal loops in children can also result in SBIs in children. These intussusceptions are transient and reduce spontaneously.

Four out of five surgically managed intussusceptions had enlarged mesenteric nodes as identifiable lead points. In contrast, none of the transient SBI was associated with the lead point. Similarly, no vascularity was seen in CD in two out five surgically managed SBI while all transient SBI showed appreciable vascularity. Thus, the presence of a lead point or absence of vascularity on CD is indicative of the need for surgical management. However, absence of lead point or presence of vascularity on CD does not necessarily rule it out.

Wall motion was absent in all surgically managed intussusceptions and five transient SBI. Presence of wall motion, if observed, thus safely excludes need for surgical intervention.

Our study also showed that compared to intussusception requiring surgical reduction transient SBI tends to have a shorter length of the intussusceptum, smaller transverse diameter and thinner walls. In surgically managed SBI, oedema of the bowel wall, greater amount of mesentery in invaginated bowel loop due to its longer length, associated lead point and free fluid, all may contribute to the increased transverse diameter.

In summary, findings which favour transient SBI are small length of intussusceptum, small outer diameter, thin walls, visible peristalsis and absence of the lead point. Conservative management is, therefore, warranted if the US findings are typical of a transient SBI. However, these patients must be carefully monitored and followed up by US or subsequent imaging to confirm the spontaneous reduction of intussusceptions. Follow-up US study can be compromised if the child becomes irritable, in which case other modalities such as barium meal or CT scan can be performed to evaluate the intussusception.

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