

Intussusception: A Three-Year Review

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Abstract

Introduction: Intussusception is the commonest cause of intestinal obstruction in infants and young children. **Materials and Methods:** This report reviews the clinical presentation, investigations and outcomes of patients with intussusception treated at the KK Women's and Children's Hospital between 1 May 1997 and 30 April 2000. **Results:** The study population comprised 160 consecutive patients treated for intussusception at our hospital over this 3-year period. The commonest symptom was vomiting; present in 135 patients (84.4%). A palpable abdominal mass was present in 90 patients (56.3%). The classical features of vomiting, abdominal pain, abdominal mass and rectal bleeding were present together in only 12 patients (7.5%). Abdominal ultrasonography was performed in 155 patients. One hundred and fifty-two patients (98.1%) had the classical target lesion on ultrasonography. Air enema reduction was attempted in all except 6 patients. In the majority of patients (130 or 84.4%), the intussusception was reduced successfully by air enema reduction. There was no association between the duration of symptoms before radiological reduction and the outcome of radiological reduction. **Conclusions:** As the four classical features of intussusception were present together in only 7.5% of our patients, a high index of suspicion is necessary when any of the signs and symptoms are present in an infant or young child. Abdominal ultrasonography is the diagnostic investigation of choice. Air enema reduction was successful in 84.4% of patients and the duration of symptoms did not reduce the success rate. Thus, air enema reduction should be attempted in most patients unless they have absolute contraindications.

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Key words: Air enema reduction, Intestinal obstruction, Target lesion

Introduction

Intussusception is the most common cause of intestinal obstruction in infants and young children.^{1,2} It occurs when one segment of the intestines telescopes into another. This leads to venous compression and bowel wall oedema. If untreated, it may progress to arterial obstruction, bowel necrosis, gut perforation and even death.

The aim of this study was to describe the epidemiology of intussusception-related hospitalisations over 3 years in the KK Women's and Children's Hospital (KKWCH).

Various epidemiological and clinical factors have been cited in the literature to be associated with intussusception. These include male sex, age younger than 1 year, vomiting, abdominal pain, abdominal mass and rectal bleeding. The 4 classic symptoms and signs described in patients with intussusception are vomiting, abdominal pain, abdominal mass and bloody stool. However, they are present together in fewer than half of patients with the disease.¹

The criterion standard for diagnosis of intussusception has been considered to be contrast enema (air or barium). However, abdominal ultrasonography is gaining popularity as the diagnostic investigation of choice because it is highly sensitive, less time-consuming and less invasive than contrast enema, and most importantly, it does not involve the use of ionising radiation.^{1,2}

Although intussusception was first described accurately by John Hunter only in 1793, Hippocrates (born 490 BC) was recorded to have recommended the treatment of "ileus" to consist of connecting a bellows to the anus and inflating the bowel with air if hydrostatic reduction, possibly with oil, failed. The first successful surgical reduction was performed in 1871 by Dr Jonathan Hutchinson. Subsequently, in 1876, Hirschsprung was the first to describe hydrostatic reduction of intussusception and in 1905, he described 107 patients successfully treated with this method. In 1959, the use of air enema reduction was first described

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and became widely practised especially in China.² Air enema reduction is now favoured over barium enema reduction because of the shorter fluoroscopic time resulting in lower radiation exposure. It is also associated with less morbidity and less colonic perforation.^{2,3}

Materials and Methods

We did a retrospective study of a consecutive sample of patients admitted to KKWCH for intussusception over a 3-year period (1 May 1997 to 30 April 2000).

Inclusion Criteria

All children who were admitted to KKWCH over a 3-year period from 1 May 1997 to 30 April 2000, and had an International Classification of Diseases, Clinical Modification code for intussusception (560.0) listed on their hospital discharge form were included in the study.

Data Collection

Each case record was systematically reviewed by one of two paediatric registrars. Demographic and clinical data were noted on a standard data sheet. In cases where there was more than one physical examination, the data from the physical examination closest to any diagnostic investigation done were recorded. The results of plain abdominal X-rays were recorded if they were interpreted by the radiologist, paediatrician or paediatric surgeon. The X-rays were categorised as:

- i) Highly suggestive of intussusception—soft tissue mass, evidence of bowel obstruction or a visible intussusceptum;
- ii) Moderately suggestive of intussusception—abnormal but non-specific bowel gas pattern, no obvious mass or obstruction;
- iii) Normal;
- iv) Done but not reported—if the X-ray was not interpreted by a radiologist, paediatrician or paediatric surgeon.

Statistics

We examined the patients with intussusception with respect to their age, sex, race, presenting signs and symptoms, investigation results and outcome. The data collected were collated using SPSS software. The chi-square test was used when comparing 2 groups, and results demonstrating probability levels of less than 0.05 were considered significant.

Results

Between 1 May 1997 and 30 April 2000, a total of 164 patients were discharged from KKWCH with a diagnosis of intussusception. The case records of 4 patients could not be retrieved; the other 160 patients formed our study cohort.

Among our study cohort, 99 out of 160 patients (61.9%) were boys and 61 (38.1%) were girls. One hundred and thirteen patients (70.6%) were Chinese, 32 patients (20%) were Malay, 13 patients (8.1%) were Indian and 2 patients belonged to other races.

The age at diagnosis ranged from 1 month to 8 years 5 months (median 13 months). Seventy-seven patients (48.1%) were under 1 year of age at diagnosis.

Only 1 patient (0.6%) had a recent episode of gastroenteritis documented to be caused by rotavirus.

The presenting signs and symptoms of our patients are shown in Figure 1. One hundred and thirty-five patients (84.4%) had vomiting on admission, with a mean duration of vomiting of 1.4 days. The incidence of bilious vomiting was lower, with only 23 patients (14.4%) having this complaint. The mean duration of bilious vomiting before admission was 1 day. Abdominal pain was a symptom in 93 patients (58.1%), and the mean duration of abdominal pain was 2.1 days.

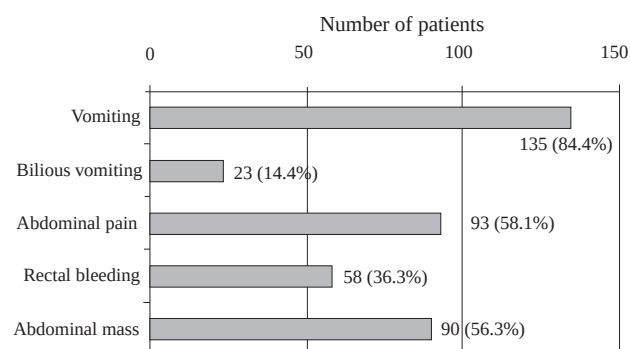


Fig. 1. Presenting signs and symptoms.

Seventeen patients (10.6%) had a previous history of intussusception, and 2 patients (1.3%) had a sibling who had had intussusception before.

The typical clinical finding of a palpable abdominal mass was present in 90 patients (56.3%). Of these, 54 patients (33.8%) had a classical right upper quadrant mass. The next most common locations of the abdominal mass were epigastric (9 patients, 5.6%), right flank (8 patients, 5%) and right iliac fossa (7 patients, 4.4%). This is shown in Figure 2.

The number of patients with rectal bleeding was 58 (36.3%). Thirty-seven of these patients had a history of rectal bleeding prior to admission for a mean duration of 1.1 days. Only 6 patients were recorded to have had classical red currant jelly stools (3.8%). The rest (52 patients, 32.5%) were recorded to have bloody stools which were not otherwise described.

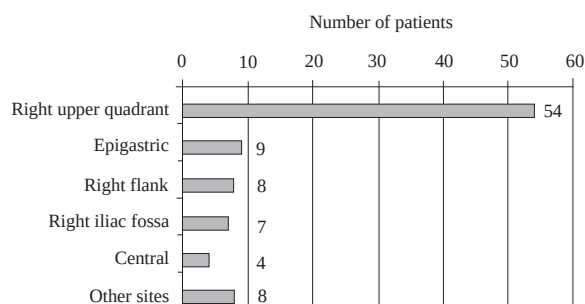


Fig. 2. Site of abdominal mass.

The classical features of vomiting, abdominal pain, abdominal mass and rectal bleeding were present together in only 12 patients (7.5%).

In our series of patients, only 1 boy (0.6%) had intussusception as a complication of concomitant Henoch-Schonlein purpura.

One hundred and eighteen patients had an abdominal X-ray done (73.8%). Of these, 44 (37.3%) had X-rays highly suggestive of intussusception, i.e. having a soft tissue mass, evidence of bowel obstruction or a visible intussusceptum. Twenty-four (20.3%) had X-rays moderately suggestive of intussusception with abnormal but non-specific bowel gas pattern, no obvious mass or obstruction. Thirteen patients (11%) had their X-rays reported as normal, and the rest (37 patients, 31.4%) had X-rays done but not reported.

Abdominal ultrasonography was performed in 155 of the patients. One hundred and fifty-two patients (98.1%) had the classical target lesion on abdominal ultrasonography, while 3 patients (1.9%) had their abdominal ultrasonograms reported as normal but were later confirmed to have intussusception by other means or at laparotomy.

Nine patients were found to have a pathological lead-point at surgery. These included Meckel's diverticulum in 3 patients, areas of lymphoid hyperplasia in 4 patients, and ileal duplication and colonic polyp in 1 patient each.

Nasopharyngeal aspirates were sent for 3 patients—2 were positive for adenovirus antigen, and 1 was positive for respiratory syncytial virus antigen by immunofluorescence.

Stool specimens were sent for 20 patients—only 1 was positive for rotavirus antigen.

The duration between onset of symptoms and radiological reduction was more than 24 hours in 78 patients (48.8%), less than 12 hours in 43 patients (26.9%) and between 12 and 24 hours in 39 patients (24.4%).

Air enema reduction was attempted in all except 6 patients. The reasons for not attempting air enema reduction in these 6 cases are shown in Table I. Among the 154

TABLE I: REASONS FOR NOT ATTEMPTING AIR ENEMA REDUCTION

There were 6 patients in whom air enema reduction was not attempted. The reasons were:

1. Inability to proceed with air enema reduction because the colon was collapsed at the start of the air enema.
2. History of 2 previous episodes of intussusception including one a month before; pathological lead-point suspected.
3. Suspected bowel gangrene from intussusception.
4. Suspected appendicitis; intussusception not suspected preoperatively.
5. Suspected Meckel's diverticulum; intussusception not suspected preoperatively.
6. Suspected severe intestinal obstruction; intussusception not suspected preoperatively.

patients in whom air enema reduction was attempted, the majority of patients [130 (84.4%)] had their intussusception reduced successfully by air enema reduction. Twenty-nine patients (18.1% of the total series) required surgical manual reduction and 1 patient (0.6% of the total series) had a spontaneously reduced intussusception. There were no deaths resulting from intussusception.

We compared the patients whose intussusception was reduced successfully by air enema reduction with those who required surgical reduction. There was no significant difference between the 2 groups in terms of sex, race or duration between onset of symptoms and attempted radiological reduction.

Discussion

In August 1998, a tetravalent rhesus-human reassortant rotavirus vaccine was licensed in the United States and was subsequently recommended by the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Pediatrics for routine vaccination of American infants.^{4,5} From 1 September 1998 through 7 July 1999, after administration of approximately 1.5 million doses of the vaccine, 15 cases of intussusception were reported among children who received the rotavirus vaccine. Subsequently, in November 1999, the use of this vaccine was suspended, pending further evaluation of the association between vaccine use and intussusception.^{5,6}

This study aims to describe the epidemiology of intussusception-related hospitalisations over 3 years in KKWCH. It serves as a baseline review before the proposed clinical trial of a new rotavirus vaccine in Singapore in 2001.

The demographic features of our patients are similar to previously described epidemiological factors associated with intussusception.¹ More than half of our patients were boys and almost half were younger than 1 year of age.

The occurrences of the classical symptoms and signs of intussusception in our patients were vomiting (84.4%), abdominal pain (58.1%), abdominal mass (56.3%) and rectal bleeding (gross or occult) (36.3%). In a thorough review of the literature by Stringer et al,^{2,7} the mean occurrences of symptoms were as follows: vomiting, 85%; abdominal pain, 83%; abdominal mass, 63% and blood in stool, 53%. The apparently lower incidence of abdominal pain in our patients may be explained by the fact that we limited the complaint of abdominal pain to those children who were old enough to verbalise that they had abdominal pain. We did not include persistent crying in the infants as an indication of abdominal pain. Although rectal bleeding is a classical feature of intussusception, it was present in only 36.3% of our patients, probably because our patients tend to present early before intestinal necrosis and mucosal sloughing occurs. The classical features of vomiting, abdominal pain, abdominal mass and rectal bleeding were present together in only 12 patients (7.5%). This is low compared with the incidence in other reports of 32% to 50%.^{1,2,7} Again, this is due to the low incidence of rectal bleeding among our patients.

The plain abdominal X-ray can be helpful for diagnosis but it is rarely definitive. Previously, plain abdominal X-rays have been reported to identify intussusception only about 50% of the time.² In our patients, only 68 out of 118 patients (57.6%) who had plain abdominal X-rays done, had X-rays which were highly or moderately suggestive of intussusception. However, a plain abdominal X-ray is still useful to exclude complications of intussusception, such as intestinal perforation, which may influence the choice of management towards laparotomy instead of an attempt at non-operative reduction.

The characteristic findings of intussusception on abdominal ultrasonography include the target sign seen on transverse section and the pseudokidney sign seen on longitudinal section. Ultrasonography has been reported to be 97% to 100% accurate.² In addition, large prospective studies have shown a 100% negative predictive value. In our study, 98.1% of patients who had ultrasonography done had their intussusception diagnosed on ultrasonography. Three patients did not have the classical features of intussusception on ultrasonography.

It is now generally accepted that non-operative reduction should be attempted in most patients. Absolute contraindications include peritonitis, perforation or profound shock.² Air enema reduction is the method of choice in our hospital. In our series, the reduction rate with air enema reduction was 84.4% which is comparable to various papers which have reported reduction rates with air enema reduction to be generally between 81% and 91%.^{2,3,8,9} The perforation rate with air enema reduction is quoted to

be less than 1%.^{2,3} There were no perforations resulting from air enema reduction among our patients.

When we compared the patients whose intussusception was reduced successfully by air enema reduction with those who required surgical reduction, there was no significant difference between the 2 groups in terms of sex, race or duration between onset of symptoms and attempted radiological reduction. In particular, the success rate of radiological reduction was 81.8% (comparable with 84.4% for the whole cohort) in the group of patients who had radiological reduction more than 24 hours after onset of symptoms. Thus, air enema reduction is safe and effective regardless of the duration of symptoms, and should be attempted if there are no absolute contraindications.

Previous reviews have found that the overall mortality rate of intussusception is less than 1%.² In a study comparing the differences in outcome of intussusception among a primary care rural hospital in Jogjakarta, Indonesia, a secondary care urban hospital in Jakarta, Indonesia, and a tertiary care hospital in Amsterdam, The Netherlands, it was found that the mortality rates from intussusception were 20% in Jogjakarta versus 3% in Jakarta and none in Amsterdam. The authors of that paper attributed the high mortality rate in Jogjakarta to delayed arrival in hospital, worse clinical condition of the patients and the low socioeconomic status of the people there.¹⁰ In our study, there were no deaths resulting from intussusception. This is attributable to the fact that our patients present early, within 1 to 2 days of initial symptoms, and the easy availability of tertiary health care.

A variety of infectious agents have been associated with intussusception in previous studies, in particular adenovirus and rotavirus.¹¹ This association was not demonstrated among our patients. Unfortunately, as this was a retrospective study, this is likely to be an underestimation because nasopharyngeal aspirates and stool samples were not routinely sent for all patients.

Conclusion

This study describes the epidemiology and outcomes of patients treated for intussusception at our hospital over a 3-year period. The classical features of vomiting, abdominal pain, abdominal mass and rectal bleeding were present together in only 7.5% of our patients. Thus, a high index of suspicion is necessary when any of the signs and symptoms are present in an infant or young child. Abdominal ultrasonography successfully diagnosed the condition in 98.1% of patients; thus, it is the diagnostic investigation of choice. Air enema reduction was successful in 84.4% of patients and the duration of symptoms did not reduce the success rate. Thus, air enema reduction should be attempted in most patients unless they have absolute contraindications,

like peritonitis, perforation or profound shock. Finally, there was no mortality from intussusception among our patients. This can be maintained with early presentation, early diagnosis and easy availability of tertiary health care.

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