

## Presentation and Management Outcome of Children with Intussusception at Tenwek Hospital, Kenya.

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**Background:** *Intussusception, a common cause of Intestinal obstruction in infants and young children, occurs when one segment of the bowel invaginates into a distal segment. While non-operative reduction has been well described, surgery remains the predominant mode of therapy in many developing countries due to delayed presentation. This study aimed to describe the presentation, management and outcome of children with intussusception at a single institution.*

**Method:** *A retrospective review of patients aged 16 years and below with intussusception managed at Tenwek hospital from January 2009 through December 2014 was undertaken. Diagnosis was based on the presenting signs, symptoms, physical findings and plain upright or supine abdominal X-rays, and confirmed via ultrasonography, barium enema or at surgery.*

**Results:** *A total of 45 cases (24 boys, 21 girls) of intussusception were noted, with a mean age of 2.6 years (range 1 month-15 years). The mean duration between symptom onset and presentation was 4.4 days (range 1-14), and the classic triad (vomiting, bloody mucoid stools and abdominal pain/distension) was noted in 27 (60%) cases. Abdominal ultrasound was diagnostic in 7 of the 11 cases ordered, with the rest diagnosed clinically. Non-operative reduction was undertaken in 4 cases and successful in 3. Surgery was performed in 42 cases with bowel gangrene and perforation noted in 20 (47.6%) and 15 (35.7%) cases respectively. The main types of intussusception were ileocolic (23, 51.1%), colocolonic (10, 22.2%) and ileocecal (7, 15.6%). Five (11.1%) mortalities and 4 (8.8%) morbidities were noted at discharge, most commonly being surgical site infection in three cases.*

**Conclusion:** *Intussusception, in this series, was primarily diagnosed clinically and managed surgically, with a majority of the patients having gangrenous or perforated bowel at laparotomy.*

**Key words:** Intussusception, children, management, outcome, Kenya.

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### Introduction

Intussusception is the pathological invagination of a proximal segment of the intestine into a distal segment, leading to obstruction of bowel passage, constriction of the mesentery, venous congestion and bowel wall edema<sup>1-3</sup>. It is not only one of the most common causes of acute intestinal obstruction, but also an important cause of bowel resection in infants and children within the developing world<sup>3,4</sup>.

The diagnosis of intussusception can be challenging due to a wide variety of clinical presentations which overlap with other abdominal conditions<sup>2</sup>. While the presence of at least three of the four classic symptoms (abdominal pain and vomiting) and signs (rectal bleeding and abdominal mass) may increase the index of suspicion of intussusception, relying only on these classic signs and symptoms may result in delayed diagnosis and/or intervention<sup>3,5,6</sup>. In experienced hands, abdominal ultrasonography has a sensitivity and specificity of over 97% in the diagnosis of intussusception<sup>7,8</sup>. In many developing countries, however, most cases are

diagnosed clinically or at surgery<sup>2</sup>. Non-operative reduction of intussusceptions has been described as the initial treatment of choice for intussusception due to decreased the length of hospitalization, faster recovery and reduced the risks of complications associated with major abdominal surgery<sup>1,2</sup>. In many resource limited settings, surgery is the main or sometimes the only mode of management of children with this condition either due to lack of non-operative reduction and/or delayed presentation<sup>2,4,9</sup>. The aim of this study was to describe the demographics, presentation, management and outcome of children aged 16 years and below with intussusception at a single institution in western Kenya.

## Patient and Methods

This was a retrospective chart review of children aged 16 years and below who were managed for intussusception at Tenwek Hospital, in Bomet County, Kenya over a 6 year period (January 2009-December 2014). Cases were defined as patients with a discharge diagnosis of intussusception. Those with unclear diagnosis or with incomplete records were excluded. Diagnosis was based on the presenting signs, symptoms, physical findings and plain upright or supine abdominal X-rays, and confirmed via ultrasonography, barium enema or at surgery. The primary outcome was death or morbidities at discharge and the duration of hospitalization. Data extracted from the individual case records and analyzed included the patient's age, gender, presenting complaints, physical examination findings, investigations, operative and non-operative procedures, complications, outcome (alive or dead) and duration of stay. The data were abstracted using a standardized data collection sheet and the results entered into an excel spread sheet and summarized using descriptive statistics. Approval for the study was obtained from the Tenwek Hospital Ethics Committee.

## Results

A total of 49 children had a discharge diagnosis of intussusception, but four cases were excluded due to inadequate documentation, thus leaving the 45 cases that formed the basis of this review. This group comprised of 24 boys and 21 girls (ratio of 1.4:1). The mean age was 2.6 years (range 1 month-15 years), with the cases distributed as 51% aged one year or less, 33% aged 2-5 years, 11% aged 6-10 years, and 5% aged 11-15 years. The mean duration of symptoms was 4.4 days (range 1-14), with the majority (46.7%, n=21) of patients reporting symptoms for 4 days or more (Table 1).

**Table 1.** Duration of Symptoms on Admission (N=45).

Symptom duration	Cases	Percentage
≤ 1 day	6	13.3%
2 days	8	17.8%
3 days	7	15.6%
4 days	5	11.1%
>4 days	16	35.5%
Unknown	3	6.7%
<b>Total</b>	<b>45</b>	<b>100%</b>

**Table 2.** Distribution of Signs and Symptoms (n=45).

Symptom	Cases (%)	Signs	Cases (%)
<b>Vomiting</b>	39 (86.7%)	Dehydration	32 (71.1%)
<b>Bloody mucoid stool</b>	38 (84.4%)	Abdominal distension	30 (66.7%)
<b>Abdominal pain</b>	27 (60%)	Tenderness	25 (55.6%)
<b>Diarrhea</b>	20 (44.4%)	Palpable mass	14 (31.1%)
<b>Constipation</b>	8 (17.8%)	Rectal mass	11 (24.4%)
<b>Abdominal mass</b>	1 (2.2%)	Peritonitis	4 (8.9%)

A plain abdominal X-ray was ordered in all patients, but the results were recorded in only 13 cases, with the most common findings being dilated bowel loops (n=6) and multiple air fluid levels (n=7). An abdominal ultrasound was diagnostic of intussusception in 7 (63.6%) out of the 11 cases ordered, while a barium enema was diagnostic in the one case. A total of 35 (77.8%) cases had an accurate preoperative diagnosis of intussusception.

Non-operative reduction using barium was successful in 3 out of the 4 patients in which it was undertaken, all of whom had symptoms for 1 day or less prior to presentation. The patient who had an unsuccessful reduction had symptoms for 7 days prior to presentation, but no lead point at laparotomy. Surgery was performed in 42 (93.3%) patients, with gangrenous, viable or perforated bowel noted in 20 (47.6%), 15 (35.7%) and 7 (16.7%) cases respectively. The procedures performed included resection and stoma (n=2), resection and primary anastomosis (n=18) in patients with gangrenous bowel, manual reduction (n=12) and resection and primary anastomosis (n=3) in patients with viable bowel, and resection and anastomosis (n=7) in all patients with bowel perforation.

The site of intussusception was ileo-ileal in 2 (4.4%) cases, ileo-cecal in 7 (15.6%) cases, ileo-colonic in 23 (51.1%) cases, and colo-colonic in 10 (22.2%) cases. In 3 (6.7%) cases, the site of intussusception was not indicated. A lead point was noted in 7 (15.6%) cases, noted in 3 cases with ileo-cecal intussusception, 2 cases with ileo-colic intussusception, and one case with ileal-ileal intussusceptions, and one case where the site of intussusception was not indicated. The lead point was indicated in one case as a Merkel's diverticulum, but attempts to trace the pathology reports of the rest of the cases were unsuccessful.

At discharge, a total of 5 (11.1%) patients, all who had gangrenous bowel at laparotomy, died secondary to severe sepsis, septic shock or multi-system organ failure (2 cases had a stoma, while 3 cases had a primary anastomosis after bowel resection). Four morbidities were recorded in three patients including surgical site infection in 3, and fascial dehiscence in one. The mean duration of hospitalization was 6.8 days (range 1-24), with the majority of patients (46.7%) being discharged within 5 days, 42.2% within 6-10 days, and 11.1% after 10 days.

## Discussion

Intussusception remains an important cause of intestinal obstruction in children, but also of bowel resection, particularly in resource limited settings<sup>4,10</sup>. Similar to other published series, the highest incidence of the disease was noted in children aged one year and below<sup>3,8,9</sup>.

Delayed presentation, defined by a time interval of 24 hours or more between onset of first symptom and presentation, is very common in many series from the developing world<sup>7</sup>. The mean and/or median duration of symptoms before presentation has been reported at 4-5 days, with the majority (63-88%) of patients presenting > 48 hours after symptom onset<sup>2,3,6-8,11</sup>. Similar findings were noted in this review. The delayed presentation has been attributed mainly to a delay in arrival to the appropriate level facility and/or delay in diagnosis. Delay in arrival may be secondary to low socio-economic status, logistical problems, long referral protocol from lower level of care to higher level of care, misconceptions or ignorance, while delay in diagnosis may be due to lack of awareness of the disease by the primary physician, the variability in symptoms and signs of intussusception, poor access to tertiary health care and unequal distribution of expertise<sup>2,4,7-9</sup>. The delayed presentation may play a significant role in the predominance of bowel resection, and higher morbidity and mortality rates seen in series from developing countries<sup>3,5,6</sup>.

The diagnosis of intussusception can be challenging, particularly in limited resource settings due to a wide variety of clinical presentations that may overlap with other abdominal conditions and the limited availability of ultrasound technology and expertise<sup>2</sup>. A large proportion of patients are diagnosed or referred in the late stages of the disease when absolute intestinal obstruction has set in<sup>2,6</sup>. It is important to note that diarrhea was more common than constipation in this series (20 vs 8 cases). While an ultrasound machine and an ultrasound technician are available for most of the time at Tenwek Hospital, an ultrasound was diagnostic in seven of the 11 (24%) cases. This may highlight the delayed presentation with absolute onset of IO or poor overall condition of the patient where ultrasonography may not significantly influence the course of surgical therapy<sup>2</sup>.

The presence of at least 3 of the 4 classic symptoms (abdominal pain and vomiting) and signs (rectal bleeding and abdominal mass) may be found in 40-80% of cases, however, relying only on these findings to make a diagnosis may result in delayed referral or intervention.<sup>3,6</sup>

While surgery has been recommended as the treatment of choice in patients presenting with shock, bowel perforation, generalized peritonitis, trans-anal prolapse of the intussusception, pathological lead points or failed enema reductions, it remains the mainstay (80-100%) or sometimes the only treatment option in many hospitals within the developing world, with up to 70% of cases having bowel resection<sup>2-4,6-9,11</sup>. Similarly, in this series, 93% of patients had a laparotomy, with 71% undergoing bowel resection for bowel gangrene, perforation or failed manual reduction. Delayed presentation, poor general condition of the patients, intraoperative diagnosis, and less experience with, lack of enthusiasm for or lack of facilities for non-operative reduction have all been stated as reasons for the predominant use of surgery to manage intussusceptions<sup>2-5,9,11</sup>.

The percentage of patients, as a proportion of all patients managed for intussusception, undergoing successful non-operative reduction in studies from Africa is low at 6-7%<sup>8,9</sup>. Similar findings were noted in this review. The number of patients having successful manual reduction of viable bowel at surgery (12 cases in this review) may indicate the need for increased use of, and possibly increased success rates of non-operative reduction. Use of air enema under general anaesthesia in the operating theatre can lead to an increase in the success rate of non-operative reduction whether following failed standard enema reduction in patients presenting early or as the first line of management in patient with delayed presentation without symptoms of peritonitis<sup>12</sup>.

The mortality rate at 11% and the median duration of stay at 6 days, were similar to other reports from the developing world at 3-28% and 4-14 days respectively<sup>2,3,5,6,9,11</sup>. However, the morbidity rate at 7%, is much lower than the reported 35-41%<sup>3,6</sup>. This may be explained by underreporting of the complications in the files or poor documentation.

This study has various limitations. First as case capture relied upon accurate recording of the diagnosis in the registry book or the discharge summary. Thus inaccurately recorded diagnosis or cases of misdiagnosis were missed. In addition, the data extracted relied on accurate recording of the events on the patients chart, thus facts not recorded could not be assessed.

### Conclusion

Intussusception, in this series, was primarily diagnosed clinically and managed surgically, with a majority of the patients having gangrenous or perforated bowel at laparotomy. Late presentation continues to be a challenge in the management of the condition, and there needs to be an increased use of ultrasonography in the diagnosis of the condition, and increased use of non-operative reduction in similar settings.

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