

Full Length Research Paper

A three-year study on childhood intussusception in Jimma University Medical Center

Y. Yilma^{1*}, M. Akmel¹ and A. Workicho²

¹General surgeon at Surgical Department, Jimma University Medical Center, Ethiopia.

²Public Health Specialist at Jimma University Public Health Faculty, Ethiopia.

Received 26 September, 2017; Accepted 11 December, 2017

Intussusception is the leading cause of intestinal obstruction in the young child and refers to the condition whereby a segment of intestine becomes drawn into the lumen of the more proximal bowel. The process usually begins in the region of the terminal ileum, and extends distally into colon. Rarely, an intussusception may prolapse through the rectum. Although it is a common entity, no research was done in Jimma. The aim of this research was to assess the incidence and management outcome of childhood intussusception in Jimma University Medical Center. A retrospective descriptive study was done on all admitted cases with a diagnosis of intussusception from 2012-2015 at Jimma University Medical Center. Intussusception accounted for 15.7% of acute abdomen in children with yearly incidence rate of 25 patients of whom 66.2% were male. Peak age of occurrence was between 6 to 24 months. Seventy-five percent of the cases occurred between the seasons of February and May. The clinical triad of abdominal pain, abdominal mass and bloody stool occur in 70% of patient. Eighty percent of cases visit the hospital after 2 days of illness. There was strong statistical association between duration of illness and viability of bowel as well as mortality. 94.3% of patients were treated with antibiotics in primary health care center before referral to our hospital. The most common types of intussusception were ileo-colic and ileo colo-colic type and open surgery was the only means of offering definitive management. The mean hospitalization stay was 8.1 ± 4.7 days and 12.7% death. Incidence of intussusception was seasonally variable with peaks between February and May. The early symptoms of intussusception would seem to be missed by primary healthcare workers with consequently high morbidity and mortality. There is an urgent need to re-emphasize these symptoms to first line healthcare providers.

Key words: Acute abdomen, intussusception, ileo-colic, open reduction.

INTRODUCTION

Intussusception is the leading cause of intestinal obstruction in young children. It refers to the condition whereby a segment of intestine becomes drawn into the lumen of the more proximal bowel. The process usually

begins in the region of the terminal ileum, and extends distally into the ascending, transverse, or descending colon. Rarely, an intussusception may prolapse through the rectum (Maki and Fallat, 2014; Hackam et al., 2015).

It is described by the proximal, inner segment of intestine first (intussusceptum) and the outer distal, receiving portion of intestine (intussusciens) last. Eighty to 95% of pediatric intussusceptions are ileocolic. As the mesentery of the proximal bowel is drawn into the distal bowel, it is compressed, resulting in venous obstruction and oedema of the bowel wall. If reduction of the intussusception does not occur, arterial insufficiency will ultimately lead to ischemia and bowel wall necrosis. The natural history of an intussusception is to progress to a fatal outcome as a result of sepsis unless the condition is recognized and treated appropriately (Maki and Fallat, 2014; Hackam et al., 2015).

Majority of cases of intussusception does not have a pathologic lead point and are classified as primary or idiopathic intussusceptions. The lead point is generally attributed to hypertrophied Peyer's patches within the ileal wall. Adenoviruses, and to a much lesser extent rotaviruses, have been implicated in up to 50% of cases. Most cases of primary intussusception occur in children between the ages of 6 to 36 months of age and are uncommon below three months of age. Most patients are well-nourished, healthy infants. Approximately two thirds are male appropriately (Maki and Fallat, 2014; Hackam et al., 2015; Chung, 2007).

An intussusception may have an identifiable lesion that serves as a lead point, drawing the proximal bowel into the distal bowel by peristaltic activity called secondary intussusception. These anatomic lead points tend to increase in proportion to age, especially after 2 years of age. The incidence of a definite anatomic lead point ranges from 1.5 to 12%. The most common pathologic lead point is a Meckel's diverticulum appropriately (Maki and Fallat, 2014; Chung, 2007).

The classic presentation of intussusception is a young child with intermittent, crampy abdominal pain associated with bloody diarrhoea, "currant jelly" stools and a palpable mass on physical examination, although this triad is seen in less than a fourth of children. Ultrasound aid for the diagnosis, a transverse sonographic image of the bowel consists of alternating rings of low and high echogenicity representing the bowel wall and mesenteric fat within the intussusceptum. This characteristic finding has been referred to as a "target" or "doughnut" lesion. The "pseudo kidney" sign is seen on a longitudinal section and appears as superimposed hypo echoic and hyper echoic layers (Maki and Fallat, 2014; Hackam et al., 2015).

Patients with intussusception should be assessed for

the presence of peritonitis and for the severity of systemic illness. Following resuscitation and administration of intravenous antibiotics, the child is assessed for suitability to proceed with radiographic versus surgical reduction. In the absence of peritonitis, the child should undergo radiographic reduction (pneumatic or Hydrostatic). If peritonitis is present, or if the child appears systemically ill, urgent laparotomy is indicated (Maki and Fallat, 2014; Chung, 2007).

MATERIALS AND METHODS

Design

A retrospective descriptive study was done on all admitted cases with a diagnosis of intussusception from 2012 to 2015. All the cases found in the study period and who are eligible were included in the study.

Data quality control

Data collectors were trained on each item included in the questionnaire, its meaning and how to complete the questionnaire. During data collection, the principal investigator checked the completeness, ambiguous suspicions and was checked on the spot and corrected by cross checking the card.

Data collection

Questionnaire was prepared by the principal investigator and it was commented by the senior supervisor then card numbers of children with intussusception were retrieve from log books at operation room, daily morbidity and mortality sheet and discharge book at the ward. The card numbers were given to record office people and the charts retrieved and data were collected by trained data collectors. The charts were collected from record room for 5 days. The number of charts expected was 76 and out of them 71 cards were reviewed. The filled questionnaires were rechecked by the principal investigator.

Data processing and analysis

Data were cleaned, entered and analyzed using computer software SPSS version 20.1. Then data analysis was made with descriptive statistics using frequency tables, pie chart. Chi-square test and P-value were used to check the association.

Ethical consideration

Letter of support was obtained from College of Public Health and Medical Science. Permission was obtained from the hospital for

*Corresponding author. E-mail: yoyisurg@gmail.com.

Author(s) agree that this article remain permanently open access under the terms of the [Creative Commons Attribution License 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

Table 1. Socio demographic characteristics of patients with intussusception.

Parameter	Number	%
Age(months)		
<6	0	0
6-24	44	62
25-36	8	11.3
37-60	5	7
>60	14	19.7
Total	71	100
Ethnicity		
Oromo	55	77.5
Keffa	10	14.1
Gurage	2	2.8
Missed	3	5.6
Total	71	100
Address		
Rural	64	90.1
Urban	7	9.9
Total	71	100

retrieval of individual records. Confidentiality was kept throughout the study and charts returned back to the record office after the research was completed.

RESULTS

From the expected 76 intussusception patient's cards, 71 cards were retrieved and analyzed giving card retrieval rate of 93.4%. The magnitude of intussusception out of the acute abdomen in paediatrics seen in Jimma University Medical Center during the study period was 15.7% giving an annual hospital incidence rate of 25.7%. The study population was composed of Oromo's (55, 77.5%), Keffa (10, 14.1%), Gurage (2, 2.8%) and 4 patients ethnicities were not recorded on their cards. Forty seven (66.2%) of them were male with 2:1 male sex preponderance. Majority of this patient were of the age group of 6 to 24 month which accounts for 44 (62%) and no case was seen below 6 months of age. The mean age of children with intussusception was found to be 32.7 ± 34.5 (range 6 -144, mode 6 months) and 64 (90.1%) live in rural area (Table 1).

Seventy five percent of the cases occurred between the seasons of February and May (Figure 1). Vomiting (67 cases; 94.3%), pain in the abdomen (71 cases; 100%), bloody diarrhea (54 cases; 76.1) abdominal mass (63 cases; 88.7%), rectal mass (53; 74.6%) and red currant jelly stool (56 cases; 78.9%) were the most frequently recorded clinical signs and symptoms. 25(35.2%) of

patients were shocked and there was statically significant association between shock and outcome of the patient (Table 2). Three cases (4.2%) showed mass per anus. The clinical triad of abdominal pain, abdominal mass and bloody stool occurred in 70% of patient.

Eighty and 51% of the cases were in the hospital beyond 2 and 5 days from the onset of symptoms respectively (Figure 2). Thirty nine (54.9%) and 56 (78.9%) of patient had preceding history of upper respiratory tract infection and watery diarrhea respectively. Sixty seven (94.3%) of patient were treated by antibiotics in primary health care center before referral to our hospital.

There was statistically significant association between the viability of bowel and duration of illness (Table 3).

Forty-two percent of the patient were underweight, 40(56.3%) of patient had some type of wasting and 32(41.7%) of the patient were stunted. The study also showed that for confirmation of the case, 41(57.7%) of the patient needed ultrasound, no radiograph taken. The most common type of intussusception was ileo-colic 30(42.3%) followed by ileo-colo-colic accounts (27, 38%) (Figure 3). Of the 71 cases recorded, 68 (95.8%) resulted from non-specific lymphadenitis. Two (2.8%) cases were seen post-operatively, they were ileo ileal whereas solitary polyps formed the lead point in one (1.4%) case. Sixteen (22.5%) patients had gangrenous bowel and only one patient had leading point. The study also showed that there was statically significant association between viability of the bowel and death of the patient (Table 4).

Table 2. Association of hypotension and outcome.

Shocked	Outcome		Total	P-value
	Improved	Death		
Yes	18	7	25	0.04
No	44	2	46	
Total	62	9	71	

$\chi^2=8.186$, $df=1$, $p<0.004$.

Table 3. Association of duration of illness with viability of bowel.

Duration of illness (h)	Viability of bowel		Total	P-value
	Viable	Gangrenous		
< 48	14	0	14	0.036
49-120	17	4	21	
>120	24	12	36	
Total	55	16	71	

$\chi^2 = 6.624$, $df = 2$, $p < 0.036$.

Table 4. Association of viability of bowel and outcome.

Viability of bowel	Outcome		Total	P-value
	Improved	dead		
Viable	55	0	55	0.001
Gangrenous	7	9	16	
Total	62	9	71	

$\chi^2=35.42$, $df=1$, $p<0.001$.

Intravenous fluid resuscitation, correction of electrolytes derangements, antibiotics therapy, and early surgical exploration were the main thrusts of management. The main stay of treatment was open surgical exploration. The most commonly performed surgery was manual reduction (54 cases, 76.1%), the rest were bowel anastomosis and stoma and there was one patient (1.4%) that had recurrence after manual reduction (Figure 4).

The average operation time for the surgeries was 73.24 ± 34.28 min (range 45 to 150). The pre-operative and post-operative hematocrit levels were 35.85 ± 5.62 (range 21-52) and 30.0 ± 4.96 (range 16 to 44) respectively. The post-operative stay for the study group was $8.1 \text{ days} \pm 4.7$ days (range 1 to 30). Nine (12.7%) patients died. All these patients died because of septic shock. One patient was re-operated for recurrent intussusception (ileo ileal), while one patient developed lung abscess on the

fourteenth post operation day.

DISCUSSION

Intussusception is one of the most common causes of acute abdomen in pediatrics, although little is known about the epidemiology and causes of significant morbidity and mortality. The study revealed that the annual Jimma University Medical Center incidence rate of intussusception is 25.6 patients which are comparable with study in Lagos, Nigeria (25 patients). Of them 66.2% were male with preponderance of 2:1 M: F ratio which is comparable with Lagos group (1.4:1) (Bode, 2008).

The study also showed that 44(62%) of patient were between the age group of 6 to 24 months which is consistent with the Indian result which is 61.2% in the age group 6 to 24 month. The mean age of these patients

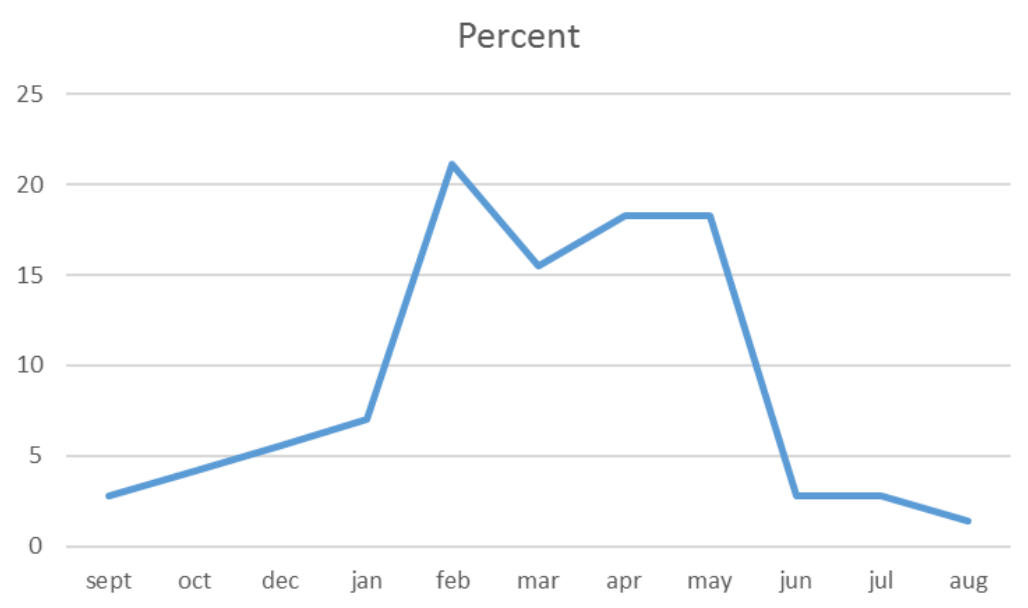


Figure 1. Seasonal distribution of intussusception.

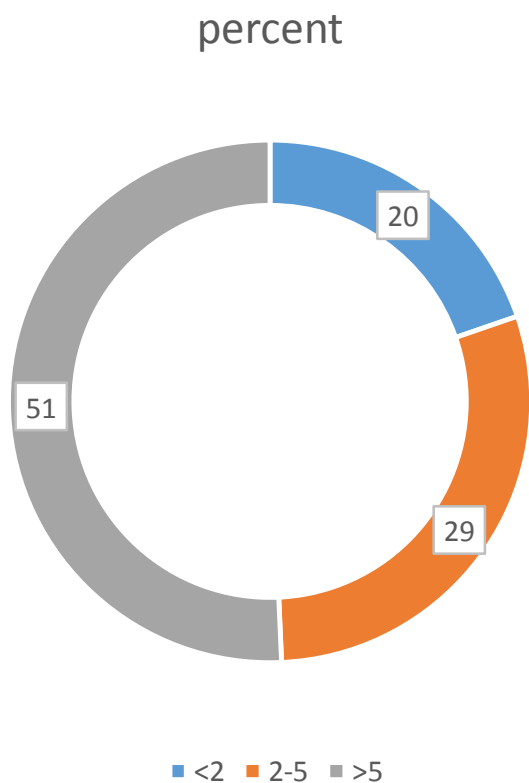


Figure 2. Duration of illness of patients range (12-360 h) with intussusception.

was 32.7±34.5 months which is comparable with the Switzerland study (33 months) (Buettcher et al., 2007).

Peak seasonal presentation (70%) occurred from February to May coinciding with the periods when the rain/dry seasons interchange and where there is rampant case of upper respiratory tract infection and diarrhea, which is similar with Lagos study (Bode, 2008).

The most frequently recorded symptom and sign of intussusception patient in the study group were vomiting, abdominal pain, bloody diarrhea and abdominal mass which is similar with other studies conducted in Lagos and Newzealand (Raudkivi and Smith, 1981; Bode, 2008). The study also showed that 70% of the patient presented with the clinical triad of abdominal pain, bloody stool and abdominal mass which is consistent with the Lagos study (61%) but much higher than the study in Switzerland and other developed countries which may be due to delayed presentation. The study also showed that 31% of the children were shocked during presentation which is comparable with Lagos study (38.5%) (Buettcher et al., 2007; Raudkivi and Smith, 1981; Bode, 2008).

The study also revealed that majority of the patients (94.3%) were treated inappropriately with antibiotics in health center which is a bit higher than the Lagos study which was 77.6% which contribute to the higher morbidity and mortality (Bode, 2008).

The most common type of intussusception were ileo colic (42.3%) and ileo-colo-colic type (38%) both were 81% which is comparable with the Lagos (78.7%) and

Frequency

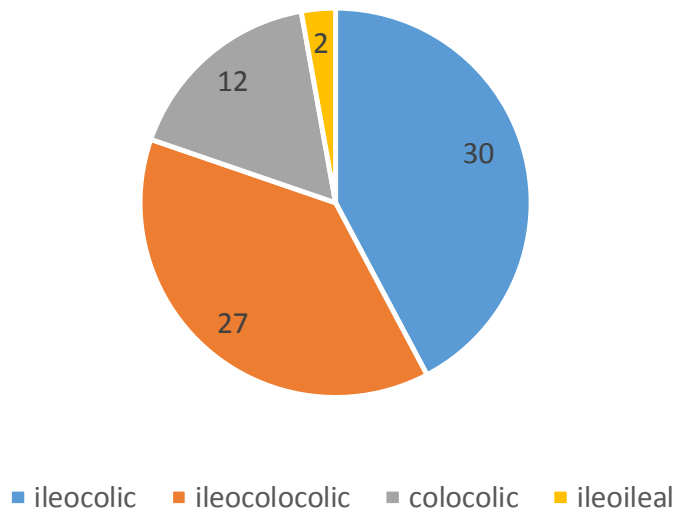


Figure 3. Type of intussusception.

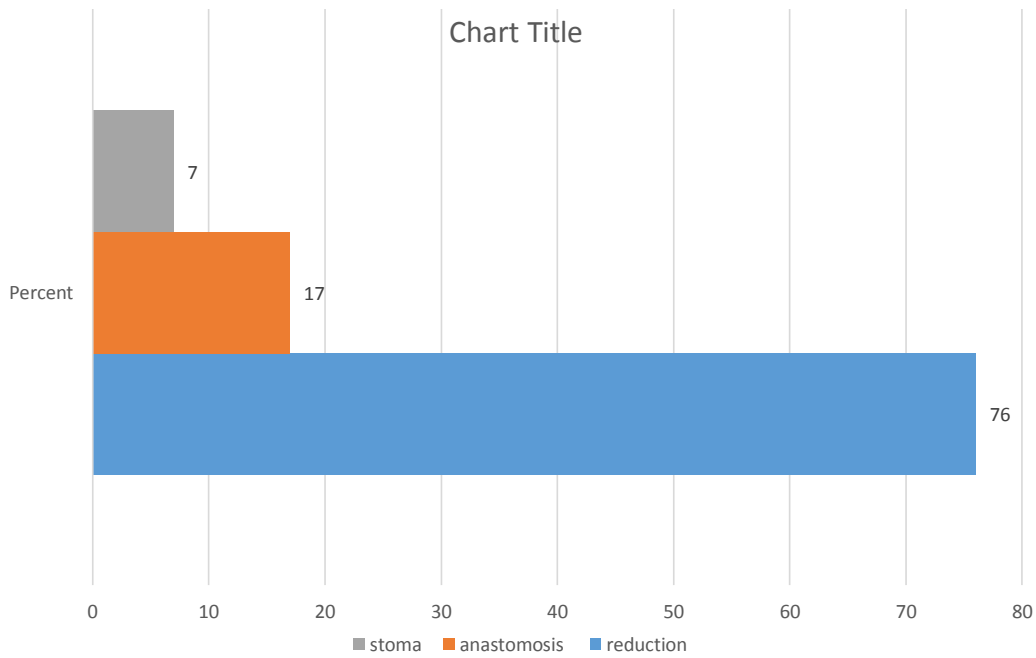


Figure 4. Type of surgery performed for patient with intussusception.

Indian studies. Ninety six percent resulted from non-specific lymphadenitis which is consistent with the Lagos (94.3%), Indian and Port Harcourt studies (Bhowmick et al., 2009; Mangete and Allison, 1993; Bode, 2008).

Eighty percent of the intussusception patient arrived at Jimma University Medical Center after two days of illness with mean duration of 3.9 ± 1.2 days which is comparable with Lagos study (2.8 ± 1.9 days) but much higher than the

Indian study which is 32% after 2 days (Bhowmick et al., 2009; Bode, 2008).

All patients were treated with open surgery in Jimma university medical center which is comparable with Lagos study (97.1%) and many other Sub Saharan African countries but much lower rate in Switzerland and other developed country (23% open and 62% radiographic reduction) which may be due to late presentation of the patient and scarce interventional radiologist in developing countries (Buettcher et al., 2007; Bode, 2008).

The study also demonstrated that 22.5% of the patient had gangrenous bowel which is similar to the New Zealand study (17.3%) but much higher than the Indian and Switzerland group (no recorded case). This might be due to late presentation which has a devastating effect on the morbidity and mortality of these poor African children. Thirteen percent of the children died during the study period which is comparable with the Lagos group which is still much higher than the Indian and Switzerland group (no death) as well as Costa Rica (no death) (Buettcher et al., 2007; Bode, 2008; Bhowmick et al., 2009; Mazariegos et al., 2010).

The study also showed that the mean hospitalization of the patient after operation was 8.1 ± 4.7 days which is a bit lower than the Lagos group (17.1 ± 10.6 days) but higher than the Indian group (5 days). This might be because of the above mentioned reasons and committing more invasive surgical approach than the less invasive radiologic approach (Bhowmick et al., 2009; Bode, 2008).

Conclusion

Intussusception is one of the common causes of acute abdomen in children with peak age between 6 to 24 months. Incidence of intussusception was seasonally variable with peaks between February and May. The most common presenting symptom of intussusception was vomiting and bloody stool. The early symptoms of intussusception would seem to be missed by primary health care workers. Duration of illness has an association with viability of bowel and mortality. The definitive management was open surgery and manual reduction.

RECOMMENDATION

The recommendation includes: to educate at risk populations during high occurrence seasons to prevent severe complications from intussusception. There is an urgent need to re-emphasize these symptoms to first line healthcare providers. To consider practicing radiographic reduction for appropriate patient is also recommended. Also, Jimma university medical center should improve patient's card recording and keeping system. Further

prospective study on similar topic is also recommended

Limitation of the study

Our data was a secondary data since the data was collected from patients chart and registration books, which was not completely documented. So, important data was not available. The sample size was small which made difficult to see the significance of some of the statistic.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

- Bhowmick K, Kang G, Bose A, Chacko J, Boudville I, Datta SK, Bock HL (2009). Retrospective Surveillance for Intussusception in Children Aged Less than Five Years in a South Indian Tertiary-care Hospital. *J. Health Popul. Nutr.* 27(5):660.
- Bode CO (2008). Presentation and management outcome of childhood intussusception in Lagos: A 5 year prospective study. *Afr. J. Paediatr. Surg.* 5(1):24-28.
- Buettcher M, Baer G, Bonhoeffer J, Schaad UB, Heininger U (2007). Three-Year Surveillance of Intussusception in Children in Switzerland. *Pediatrics* 120:473-480.
- Chung DH (2007). Pediatric surgery. Sabiston textbook of surgery. Townsend CM, Beauchamp RD, Evers BM 18th ed. Philadelphia, WB Saunders. pp. 1829-1871.
- Hackam DJ, Grikscheit T, Wang K, Upper man JS, Ford JS (2015). Pediatric surgery. Schwartz's principles of surgery. Brunicaardi FC. 10th ed.. New York, Mc Graw Hill. pp. 1409-1458.
- Maki AC, Fallat ME (2014). Intussusception. Aschraft, pediatrics surgery. Holcomb GW. 6th ed. New York, Elsevier. pp. 531-538.
- Mangete ED, Allison AB (1993). Intussusception in infancy and childhood analysis of 69 cases in Port Harcourt. *East Afr. Med. J.* 70(11):7346.
- Mazariegos G, Esquivel A, Jimenez AL (2010). Intestinal intussusception at Costa Rica's children's hospital: an 8-year study. *Pediatr. Res.* 68:140-140.
- Raudkivi PJ, Smith LH (1981). Intussusception: Analysis of 98 cases in New Zealand. *Br. J. Surg.* 68(9):6458.