

Etiological factors of Intussusception among children in a tertiary care hospital

M Rahman¹, MT Islam², H Rahman³, M Ahmed⁴

Abstract

Background: There are still dearth of knowlege of intussusception regarding its aetiology and predisposing factor among children.

Objectives: We attempted to find out per operatively the etiological factors responsible for intussusceptions in children and their association with predisposing factors in our context. We also intended to know peroperatively the specific role of hypertrophid Peyer's patches of mesenteric lymph adenitis as lead points.

Methodology: This prospective observational study was conducted in Khulna Medical College Hospital and other private hospitals in Khulna from November 2012 to April 2016. A total of 50 patients who underwent surgery for intussusception were included in the study. Seasonal influences, gastroenteritis and upper respiratory tract infections were evaluated as predisposing factors and presence of hypertrophied Peyer's patches and other lead points were evaluated as etiological factors. Peroperatively the causes were identified and their association with viral gastroenteritis and respiratory tract infection were intended to find out.

Results: seventy two percent of the patients were below one year. A male preponderance was observed (70%). Thirty two percent were affected in the spring and 36% in the summer. Half (54%) of the patients had a history of gastroenteritis, while 40% had a history of respiratory tract infection. Per operative findings, show that three quarter (76%) had ileo colic, 18% had ileo ileo colic and only 6% had ileo ileal variety of intussusceptions. Forty two (89.3%) patients had hypertrophied Peyer's patches or Mesenteric lymphadenities.

Conclusion: Hypertrophied Peyer's patches or Mesenteric lymphadenitis are the main etiological factor of intussusceptions in our children.

Keywords: Intussusception, Etiological factors, Predisposing factor.

Introduction

Intussusception is the invagination of a bowel loop with its mesenteric fold (intussusceptum) into the lumen of a contiguous portion of bowel (intussusceptien) as a result of peristalsis and ileo colic variety is the most common type. It is believed to be the second most common cause of intestinal obstruction in children.¹ It is encountered most commonly in children below 1 year with peak incidence at 3-9 months of age.²

Among children below one year, the cause of insussusception is not known, but there are multiple schools of thoughts in its pathogenesis. Most common theory is hyperplasia, of the lymphatic follicles (Peyer's patches) situated in the

wall of the terminal ileum is believed to be the etiology of intussusception. Hyperplasia, occurs as a result of viral gastroenteritis caused by rotavirus, adenovirus etc.

Upper respiratory tract infection (URTI) also may cause inflammation with enlargement of the Peyer's patches.³ The greater disproportion between the size of ileum and the ileocaecal valve (ICV) in infants compared to that in older children has been another suggestion as a contributing factor for intussusceptions.⁴

Majority of the intussusceptions occur in the ileo colic area (85%) and are said to have no pathological lead points (PLP), these are called idiopathic. Actually, all intussusceptions have a

1. Mizanur Rahman MS, Assistant Professor, Ped Surgery, Khulna Medical College, Khulna.

2. Md Tarikul Islam MS, Assistant Professor, Plastic Surgery, Khulna Medical College, Khulna.

3. Hamudur Rahman FCPS, Assistant Professor, Khulna Medical College, Khulna.

4. Masud Ahmed MS, Assistant Professor, Khulna Medical College, Khulna.

lead point of some kind, but in the vast majority (more than 90%) the lead points are thickened bowel wall lymphoid tissue (Peyer's patches).^{4,5} If treatment is delayed, cascade beginning with vascular congestion and edema of intussuscepted intestinal wall may demonstrate a highly morbid, even fatal course, with tissue ischemia, necrosis, and intestinal perforation.⁶

There are still gaps in our knowledge of intussusception with respect to its etiology and especially the mechanisms. Furthermore, there are lots of global publications regarding intussusception and its etiological factors but we have no study till date. The present study was intended to know the predisposing factors of intussusceptions and especially its mechanism. Peroperatively the types and causes were identified and their association with viral gastroenteritis and respiratory tract infection were intended to find out.

Methodology

This observational prospective study was conducted in the Department of Pediatric Surgery and General Surgery of Khulna Medical College Hospital and other private hospitals in Khulna metropolitan area.

Seasonal influences, gastroenteritis and upper respiratory tract infections were evaluated as predisposing factors and the presence of hypertrophied Peyer's patches and other lead points were evaluated as etiological factors. Every patient was examined per operatively. The intussusception mass was identified and manual reduction done if possible. Lead point if any was identified. Type of intussusceptions, gut status including ileal wall thickness and mesenteric lymph nodes all were recorded. On naked eye examination, thick and edematous gut wall was estimated to be the hypertrophy of the Peyer's patches in the ileal region. Mesenteric lymph nodes were examined and compared with those of other region of the mesentery. If gangrenous, the gut was resected and exteriorization or primary anastomosis done.

Data were processed and analyzed using descriptive statistics like frequency, corresponding percentage & mean etc. The summarized data were presented in form of table and were duly interpreted.

Result

Table I shows that 72% (36) of the children were below one year. Twenty percent (10) were between one and three years. Furthermore the table shows male predominance (7:3).

Table I

Distribution of patients by age and sex (n=50)

	Frequency	Percentage
Age group (years)		
0-1	36	72
1-3	10	20
3-12	4	08
Sex		
Male	35	70
Female	15	30

36% (18) of the children were affected in summer and 32% (16) in the spring season. (Table II)

Table II

Distribution of patients by seasonal variation (n=50)

Name of Season	Frequency	Percentage
Spring	16	32.0
Summer	18	36.0
Winter	10	20.0
Other seasons	06	12.0

Table III shows out of fifty patients 54% (27) had the history of gastroenteritis, 40% (20) had upper respiratory tract infection and 6% had no such association.

Table III

Presence of Gastroenteritis/URTI (n=50)

Disease	Frequency	Percentage
Gastroenteritis	27	54.0
URTI	20	40.0
None	03	06.0

Out of fifty patients, 76% (38) had ileo-colic, 18% (9) had ileo-ileocolic and 6% (3) had ileo-ileal variety (Table IV). Per-operatively the ileo-cecal gut was inflamed, thick and edematous that suggests hypertrophy of the Peyer's patches.

Table IV

Distribution of types of intussusceptions (n=50)

Type of intussusception	Frequency	Percentage
Ileocolic	38	76.0
Ileo-ileocolic	09	18.0
Ileo-ileal	03	06.0

Discussion

The etiology of intussusception in the majority of infants remains unclear. The popular theory at present suggests that there is a primary lymphoid hyperplasia in the distal small intestine, secondary to infective agents and that some of these enlarged lymphoid aggregates or hypertrophied Peyer's patches become entrapped in the intestine, serving as lead points for the intussusception.⁸ This causes thickening of the ileal wall and narrowing of the lumen for the oncoming peristaltic wave, thereby setting up the impending obstruction leading to ileo colic intussusception.⁹ Furthermore, the nearby enlarged mesenteric lymphnodes, as a result of viral infections may also act as lead point.⁴

We found the highest incidence of intussusceptions in infants who are in accordance with other studies.¹⁰⁻¹¹ The highest incidence (72%) of intussusceptions was below 1 year. In one study Guney¹² and his colleagues showed the mean age was 10.6 months which is similar to us.¹² But in another study Buettcher and his colleagues showed the mean age was 2.7 years which differs from our study.²

We have the consistent data regarding the seasonal influence on intussusceptions although controversies exist about seasonal variation. In most of the studies the highest number of cases tended to occur in the summer and spring season.¹² In our study more than one third (36%) of the patients were affected in the summer, 32% in the spring, 20% in the winter and 12% in other seasons. However, in the absence of a nation wide data on intussusception in Bangladesh, it can be assumed to be representative to seasonality of this disease among children.

Over half of patients (twenty seven-54%) had a history of recent gastroenteritis, while 40% had a history of respiratory tract infection. WHO in a document of 2002 showed that over 40% patients from Chandigarh of India in March or April had a history of viral gastroenteritis and nearly 45% had the history of upper respiratory tract infection.¹² It is hypothesized that viral gastroenteritis, and respiratory infections play role in the cause of intussusceptions.^{14,15}

Commonest variety of intussusception is ileo colic. We found that thirty eight (76%) patients had ileocolic type, 8 had ileo ileo colic type and 6 had ileo ileal type. Swelling of the lymphoid tissue of the intestine (the mesenteric lymph nodes and the Peyer's patches) is thought to act as a lead point for intussusception after infection or inflammation.⁴ In majority (89%) of the patients,

thick and edematous ileal wall and enlarged mesenteric lymphnodes, were found during operation. We found no structural lead point except in three cases. These can be described as idiopathic and having edematous ileal wall due to hypertrophy of the Peyers patches. Enlarged mesenteric lymph nodes have been suggested to act as lead point in intussusceptions.¹² They demonstrated that 60-100% had hypertrophy of the Peyer's patches/enlarged lymphnodes. There were three cases of intussusceptions having structural lead points. One had lymphoma, one Meckel's diverticulum and one Intestinal polyp.

Conclusion

The study concludes that the exact etiology of intussusceptions is unclear where no structural lead point found. Preceding or concomitant viral gastroenteritis or respiratory tract infection predisposes to the hypertrophy of the Peyer's patches that lead to the development of intussusception. Clear seasonality trend was observed in summer and spring season in our study.

References

- Lloyd, DA, Kenny, SE. The surgical abdomen. In: Pediatric Gastrointestinal Disease: Pathophysiology, Diagnosis, Management, 4th ed, Walker, WA, Goulet, O, Kleinman, RE, et al (Eds), BC Decker, Ontario, 2004. p. 604
- Buettcher, M, Baer, G, Bonhoeffer, J, et al. Three year surveillance of intussusception in children in Switzerland. *Pediatrics* 2007; 120: 473
- Russell RCG, Williams NS, Bulstrode CJK. Intestinal obstruction. In Bailey and Love's, short practice of surgery, 26th edn. Taylor & Francis group, 2013; pp. 1184-5
- Sigmound EH, Daneman A. Intussusception. In Grosfeld JL, O'Neill JA, Arnold G C, Fonkalsrud EW, editors. *Paediatric Surgery*, 6th edn. Philadelphia: Mosby, 2006; 1313-41
- Hutson JM, Brien MO, Woodward AA. In Jone's clinical paediatric surgery. edn. Blackwell Scientific Publications, 2008; 126-9
- Melanie H & Joe C. Intussusception. In: Spitz L, Coran A G: Rob and Smith's operative paediatric surgery. 6th edn. Arnold E, 2006; pp. 445-53
- Moser CA, Dolfi DV, Di Vietro ML, Heaton PA, Offit PA, and Clark BF 'Hypertrophy, Hyperplasia, and Infectious Virus in Gut Associated Lymphoid Tissue of Mice after Oral Inoculation with Simian Human

- or Bovine Human Reassortant Rotaviruses. *The Journal of Infectious Diseases* 200 1; 183: 1108-11
8. Cserni T, Paran S, Puri P, New hypothesis on the pathogenesis of ileocecal intussusceptions: *Journal of Pediatric Surgery*. 2007; 2: 40-43
 9. Fischer TK, Bihmann K, Perch M, et al. Intussusception in early childhood: a cohort study of 1.7 million children. *Pediatrics*. 2004; 114: 782-785
 10. Boudville IC, Phua KB, Quak SH et al. The epidemiology of paediatric intussusception in Singapore: 1997 to 2004. *Ann Acad Med Singapore*. 2006; 35: 674-679
 11. Guney L H, Fakioglu E, Acer T, Olgun I, Arlan E E, Akilli M S et al. Is every intussusception treatment an emergency intervention or surgery? *Ulus Travma Acil Cerrahi Derg*, March, 2016; 22: 139-144
 12. Julie E B, Bernard I. 'Acute Intussusception in infants and children incidence, clinical presentation and management: a global perspective' *WHO/V&B*.2002;19: 34
 13. O'Ryan M, Lucero Y, Pena A, Valenzuela M.T. Two year review of intestinal intussusception in six large public hospitals of Santiago, Chile. *Pediatr Infect Dis J* 2003; 22: 717-72
 14. West, KW, Grosfeld, JL. Intussusception. In: *Pediatric Gastrointestinal Disease: WB Saunders and Philadelphia* 5th edn. Wyllie, R, Hyams, JS, 2000. p.427
 15. Carneiro PMR, Kisusi DM. Intussusceptions in children seen at Muhimbili National Hospital, Dar Es Salam, *East African medical journal*. sep 2004; 8: 9
- 