



## Clinical Characteristics of Intussusception in Children Admitted to Prof. Dr. R. D. Kandou Hospital

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**Abstract:** Intussusception is a medical condition in which a part of the intestine folds into an adjacent section, causing obstruction, vascular compromise, and potential bowel necrosis if left untreated. This study aimed to analyze the characteristics of intussusception cases at Prof. Dr. R. D. Kandou Hospital, Manado. This was a retrospective and descriptive study using medical records of pediatric intussusception cases treated in the division of pediatric surgery, Prof. Dr. R. D. Kandou Hospital, Manado, from January 2019–December 2024. The information collected included age, gender, onset from obstruction syndrome until the patient was brought to the emergency department, type of surgery, ventilator use, length of stay in PICU, length of nutritional parenteral, and length of hospitalization. All calculations were executed using Microsoft Office Excel 2021 and SPSS 25.0. The results obtained 32 cases; the dominant gender was female (51.5%). Most of the patients were  $\leq 2$  years (63.6%), with the highest age being 204 months or 17 years old and the lowest age being 2 months. The most frequent cases had onset of obstructive syndrome of  $\leq 24$  hours (51.5%). All patients underwent exploratory laparotomy; 16 patients (50%) required milking, while 16 patients (50%) required resection anastomosis. Follow up after surgery revealed that most patients used ventilator (72.7%), stayed in PICU  $\leq 7$  days (69.7%), got  $\leq 7$  days of parenteral nutrition (78.8%), and were hospitalized for  $> 7$  days (69.7%). In conclusion, intussusception mainly affects children  $< 2$  years old, predominantly female, abdominal pain as the prominent chief complaint, and hospitalized for more than seven days after undergoing surgery.

**Keywords:** intussusception; management; laparotomy; outcome

## INTRODUCTION

Intussusception occurs when a proximal segment of the bowel folds into a distal section, resulting in obstruction, strangulation, reduced blood flow (ischemia), and, if untreated, eventual bowel necrosis. In children, intussusception has been ranked as the second most common cause of acute abdominal pain.<sup>1</sup> It is the leading cause of acute intestinal obstruction in children younger than two years old. Spontaneous resolution occurs in less than 5% of cases, but with early intervention, nearly all instances can be successfully treated using an enema or surgery.<sup>2</sup> In children, the clinical presentation of intussusception is diverse and often nonspecific. The classic triad of intussusception is vomiting, abdominal pain, and bloody currant jelly stool, or a palpable abdominal mass is observed in fewer than half of the cases.<sup>3</sup>

A study conducted by Chang Gung University found that, over the past five years, their hospital treated 584 patients with intussusception, with an average age of  $27,2 \pm 20,3$  months. The most frequently reported symptom was abdominal pain (68.2%), followed by vomiting (15.4%), bloody stool (6.0%), and fever (7.4%). The study also identified key risk factor for surgery, including hyponatremia, hypochloremia, and bloody stool, while the absence of abdominal pain was linked to more severe cases. Children who had symptoms for two or more days experienced a long intussusception segment, had a pathological lead point, or required ICU admission were at a significantly higher risk of bowel resection. These findings could help develop targeted strategies to increase awareness of bowel resection risks among patients visiting the pediatric emergency room (PER).<sup>3</sup>

Data from WHO Indonesia show that urban pediatric hospitals report higher case numbers than rural hospitals, with 17.2 cases per 1,000 live births. However, despite the larger patient volume, the proportion of total hospital admissions was lower in urban hospitals compared to rural hospitals (0.6% and 1.2%, respectively). At Dr. Hasan Sadikin General Hospital Bandung, Indrisari reported that 55 intussusception cases were treated from 2005 to 2008 and 47 intussusception cases from 2009 to 2011<sup>4</sup>. Therefore, based on this background, our study aimed to obtain the characteristics of intussusception patients at Prof. Dr. R. D. Kandou Hospital, Manado, from January 2019–December 2024.

## METHODS

This retrospective descriptive study used medical records of children's intussusceptions cases treated in the division of pediatric surgery, Prof. Dr. R. D. Kandou Hospital, Manado, from January 2019–December 2024. The study population was all patients with intussusceptions treated in the division and getting surgery. Other inclusion criteria included patients who agreed to be subjects in this study and provided confirmation of this based on informed consent. The exclusion criteria were patients who did not undergo surgery. The entire study was carried out by adhering to the principles of medical research involving human subjects according to the 2008 Helsinki Declaration and the research ethics rules applied at Prof. Dr. R. D. Kandou Hospital.

The information collected included age, gender, onset of the occurrence of obstruction syndrome until the patient was brought to the emergency department, type of surgery, ventilator use, length of stay at PICU, length of nutritional parenteral, and length of hospitalization. All calculations were executed using Microsoft Office Excel 2021 and SPSS 25.0. The results were then presented in tables.

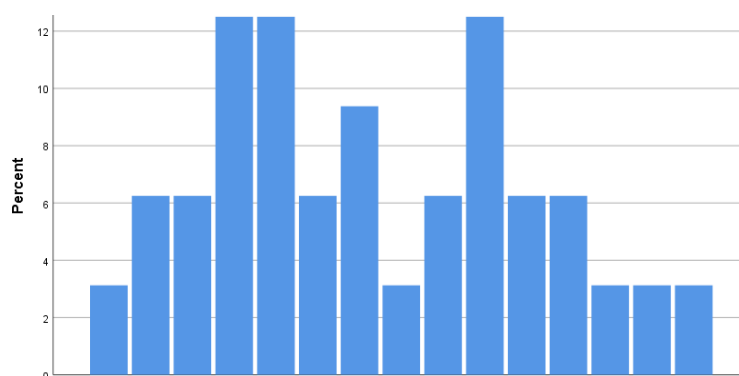
## RESULTS

This study involved 32 treated intussusception patients undergoing treatment in Prof. Dr. R. D. Kandou Hospital and the network hospital from 1 January 2019 to 31 December 2024, revealed some key findings. The dominant gender was female, with 18 patients (51.5%). Table 1 and Figure 1 showed that the age of most patients was  $\leq 2$  years (mean  $26,41 \pm 44,66$  months), with the highest age being 204 months or 17 years old and the lowest age being two months. Related to the onset of the obstructive syndrome in this study, 15 patients (45.5%) complained about an

obstructive syndrome >24 hours before hospitalization and 17 patients (51.5%) complained  $\leq 24$  hours. The mean onset of the patients was  $1 \pm 2.03$  days, with the longest onset being six days and the short onset being one day.

**Table 1.** Characteristics of patients

Characteristics of patients		Total	Min	Max	Mean	SD
Gender	Male	15 (45.5%)	-	-	-	-
	Female	17 (51.5%)				
Age	>2 years old	11 (33.3%)	2	204	26.41	44.66
	$\leq 2$ years old	21 (63.6%)				
Chief complaints	Vomiting	17 (53.1%)	-	-	-	-
	Bloating	3 (9.4%)				
	Abdominal pain	12 (37.5%)				
Onset until hospitalization	>24 hours	15 (45.5%)	1	6	2.03	1.307
	$\leq 24$ hours	17 (51.5%)				



**Figure 1.** Distribution of patients according to age (months)

Table 2 showed that from 32 cases in this study, all of them underwent exploratory laparotomy; 16 patients (50%) required milking, while 16 patients (50%) required resection anastomosis. Follow up after surgery revealed that most of the patients used ventilator (72.7%), stayed  $\leq 7$  days (69.7%), with a mean length of stay in PICU was  $9.375 \pm 3.87$  days with the longest time of stay in PICU was 19 days, had  $\leq 7$  days got nutritional parenteral (78.8%) with a mean of  $4.22 \pm 3.386$  days, and were hospitalized for >7 days (69.7%), with a mean of  $9.375 \pm 4.9366$  days, and the longest inpatient stay was 25 days.

**Table 2.** Patients' characteristics post-operative

Characteristics of patients		Total	Min	Max	Mean	SD
Using ventilator	Yes	24 (72.7%)	-	-	-	-
	No	8 (24.2%)				
Length of stay in PICU	>7 days	9 (27.3%)	0	19	5.69	3.987
	$\leq 7$ days	23 (69.7%)				
Length of parenteral nutrition	>7 days	6 (18.2%)	0	14	4.22	3.386
	$\leq 7$ days	26 (78.8%)				
Type of surgery	Milking	16 (50%)	-	-	-	-
	Resection anastomosis	16 (50%)				
Length of hospitalization	>7 days	23 (69.7%)	1	25	9.375	4.9366
	$\leq 7$ days	9 (27.3%)				

## DISCUSSION

Intussusception is a frequent emergency in infants and children. In this study, female patients with intussusception in Prof. Dr. R. D. Kandou General Hospital dominated the males (51.5% vs 45.5%). This was inconsistent with several previous studies, which indicated that intussusception is more common in males, with a reported male-to-female ratio of 2:1 or 3:1 in most studies.<sup>4</sup> In East Asian studies, such as in China, Taiwan, and Japan, the male-to-female ratio was reported to be 1.4 to 1.8, meanwhile in South Korea, the male-to-female incidence was 2.2 to 2.4.<sup>5</sup>

The mean age of the patients in this study was 26 months or 2.2 years, but most of the samples were  $\leq 2$  years, as many as 21 children (63.6%), meanwhile of  $>2$  years were 11 children (33.3%). The distribution of age showed that the most common age groups for intussusception patients were 6-7 months and 2 years old. These findings were consistent with previous studies, which identified the most common age group diagnosed with intussusception was between 6 to 11 months and under 12 months; however, other studies reported that the condition was more commonly observed in children aged 1 to 3 years.<sup>6,7</sup> A study conducted at Dr. Hasan Sadikin General Hospital, Bandung, further confirmed that the majority of cases occurred in infants under one year old, with the highest incidence at 8 months of age.<sup>4</sup> Wu et al<sup>8</sup> conducted a study on 584 intussusception patients, consisting of 205 girls and 379 boys, with an average age of  $27.2 \pm 20.3$  months at diagnosis. Among them, 24 patients (4.1%) were under 6 months old, 433 patients (74.1%) were between 6 and 36 months old, and 127 patients (21.7%) were older than 36 months. In another study of Li et al<sup>9</sup> it was found that the highest incidence occurred in children aged 1-2 years, with a proportion of 30%. Meanwhile, children over 3 years old and over 5 years old accounted for 36.1% and 9.5% respectively. This indicates that the occurrence of intussusception in older children should also be considered. Yap and Ganapathy<sup>10</sup> reported that around 10% of cases occurred in children over 5 years old, 3-4% in children over 10 years old, and 1% in infants under three months old, which aligns with the findings of this study. Savoie et al<sup>11</sup> found that about 10% of patients were older than 3 years.

The most common chief complaint of the patients was vomiting, followed by abdominal pain and bloating. Patients who came to Prof. Dr. R. D. Kandou General Hospital to be appearing within  $\leq 24$  hours. Chen et al<sup>12</sup> reported that the main complaint on their study was cramping abdominal pain.

Most of the patients (78.8%) got parenteral nutrition for  $\leq 7$  days, and six patients (18.2%) for  $>7$  days, with a mean of  $4.22 \pm 3.386$  days. Among 32 patients in this study, most patients (69.7%) were hospitalized for  $>7$  days, and nine patients (27.3%) for  $\leq 7$  days, with a mean of  $9.375 \pm 4.9366$  days, and the longest inpatient stay was 25 days. Another study reported that the median length of hospital stay was about 25.9 hours. There is a triad of classic signs and symptoms, as follows: abdominal pain, vomiting, and rectal bleeding.<sup>13</sup>

After surgery, we found that 24 patients (72.7%) were using ventilators. There were 23 patients (69.7%) stayed for  $>7$  days in PICU, with a mean length of stay in PICU was  $9.375 \pm 3.987$  days and the longest time of stay in PICU was 19 days. Other studies found that most infants recover if the intussusception was reduced in the first 24 hours, and most recurrences occurred within 72 hours of reduction.<sup>13</sup> In other study, children with intussusception with symptoms for  $>2$  days, long intussusception, pathological lead point, or intensive care unit admission had a significantly greater risk of bowel resection.<sup>14</sup>

## CONCLUSION

Intussusception is a frequently occurring emergency condition in infants and children. This study found a higher incidence in females, differing from previous research. Most cases occurred in children  $\leq 2$  years, with peak ages at 6-7 months and 2 years. Vomiting was the most common symptom, and most patients sought treatment within 24 hours. Postoperatively, most patient required ventilator support and were hospitalized for  $>7$  days. Early intervention is crucial, as

timely reduction within 24 hours improves recovery rates and minimizes recurrence. All clinical characteristic data in this study were obtained after the patients underwent surgery.

### Conflict of Interest

The authors affirm no conflict of interest in this study.

### REFERENCES

1. Rajkamikar R, Singh S, Joshi MP, Kayastha A. Intussusception among children admitted in the Department of Pediatric Surgery of a tertiary care centre: a descriptive cross-sectional study. *Journal of the Nepal Medical Association*. 2023;61(258):150-3. Doi:10.31729/jnma.7994
2. Trotta F, Da Cas R, Bella A, Santuccio C, Salmaso S. Intussusception hospitalizations incidence in the pediatric population in Italy: a nationwide cross-sectional study. *Ital J Pediatr*. 2016;42(1):89. Doi:10.1186/s13052-016-0298-8
3. Wu TH, Huang GS, Wu CT, Lai JY, Chen CC, Hu MH. Clinical characteristics of pediatric intussusception and predictors of surgery and bowel resection in affected patients. *Front Surg*. 2022;9(2):926089. Doi:10.21203/rs.3.rs-1042649/v1
4. Kusmaheidi S, Diposarosa R, Nugraha HG. Pattern of intussusceptions on infants and children in Dr. Hasan Sadikin General Hospital Bandung from 2009 to 2011. *Althea Medical Journal*. 2015;2(3):458-62. Doi: 10.15850/amj.v2n3.502
5. Jo S, In LS, Soo AC, Sin WY, Na ML, Su YK, et al. Characteristics of intussusception among children in Korea: A nationwide epidemiological study. *BMC Pediatr*. 2019;19(1):211. Doi:10.1186/s12887-019-1592-6
6. Tiwari C, Shah H, Sandlas G, Bothra J. Paediatric intussusception: a clinical scoring system to predict the risk of operative intervention. *J Mother Child*. 2020;24(1):19-23. Doi:10.34763/jmotherandchild.2020241.1934.000002
7. Esteghamati A, Joulani M, Sayyahfar S, Salahi S, Babaie M, Shamshiri AR, et al. Incidence of intussusception in children less than five years of age: a pre-rotavirus vaccine survey from Iran, 2010-2015. *Med J Islam Repub Iran*. 2020;34(1):40. Doi:10.47176/mjiri.34.40
8. Wu TH, Huang GS, Wu CT, Lai JY, Chen CC, Hu MH. Clinical characteristics of pediatric intussusception and predictors of bowel resection in affected patients. *Front Surg*. 2022;9(2):926089. Doi:10.3389/fsurg.2022.926089
9. Yan L, Chi Z, Chao L, Chao S, Hao S, Xiang Li, et al. Epidemiology, clinical characteristics, and treatment of children with acute intussusception: a case series. *BMC Pediatr*. 2023;23(1):143. Doi:10.1186/s12887-023-03961-y
10. Yap Shiyi E, Ganapathy S. Intussusception in children presenting to the emergency department. *Pediatr Emerg Care*. 2017;33(6):409-13. Doi:10.1097/PEC.0000000000000548
11. Savoie KB, Thomas F, Nouer SS, Langham MR, Huang EY. Age at presentation and management of pediatric intussusception: a pediatric health information system database study. *Surgery*. 2017;161(4):995-1003. Doi:10.1016/j.surg.2016.09.030
12. Chen X, Chen Q, Wang X, Gao Z. Clinical characteristics of recurrent intussusception: a single-center retrospective study. *J Pediatr Surg*. 2021;56(10):1831-4. Doi:10.1016/j.jpedsurg.2021.03.051
13. Elliott BM, Wells JM, Naera S, Weston A, Copland J, Gosavi S, et al. Post-reduction observation and recurrence of pediatric intussusception in New Zealand: A national multicenter retrospective study. *Journal of Pediatric Surgery Open*. 2024;7(1):100155. Doi:10.1016/j.yjpso.2024.100155
14. Wu TH, Huang GS, Wu CT, Lai JY, Chen CC, Hu MH. Clinical characteristics of pediatric intussusception and predictors of bowel resection in affected patients. *Front Surg*. 2022;9(2):926089. Doi:10.3389/fsurg.2022.926089