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## RESEARCH ARTICLE

# THE RELATIONSHIP OF MODIFIED-LRINEC SCORE WITH INTESTINAL VIABILITY IN INTUSSUSEPTION PATIENTS AT HAJI ADAM MALIKGENERAL HOSPITAL, A TERTIARY CARE HOSPITAL IN MEDAN INDONESIA

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**ABSTRACT**

**Introduction:** Intussusceptionisan emergency pediatric surgical cases that are common encountered. The most common complications are necrosis and perforation on Intussuseption. Intussuseption that occurs in premature infants often leads to misdiagnosed with necrotizing enterocolitis (NEC), that results in incorrect or delayed surgical intervention. We tried to replaced CRP parameters with NLR, take the consideration that NLR is sensitive to inflammation or infection, and many reports a positive correlation was found between CRP and NLR. This is the basis of our research to replace the C-Reactive Protein test with the routine Neutrophil to lymphocyte ratio. The purpose of this study is to determine the relationship between modified-LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score with intestinal viability in Intussuseptioncases in H. Adam Malik General Hospital, Medan. **Method:** This research is an analytic observational study with cross sectional design, which was carried out in the Pediatric Surgery Division of the Department of Surgery at the Haji Adam Malik General Hospital Medan, by collecting samples from the medical records of Intussuseption patients starting from January 2016 to December 2018 that met the inclusion and exclusion criteria. Data processing was carried out using statistical tools of the SPSS program followed by the Komogorov-smirnov test. Descriptive analysis was performed to see the mean values and standard deviations of several parameters with numeric scales and percentages for categorical scale data. **Results:** Our research showed the relationship between the modified-LRINEC score in the viable intestine group there were 9 patients in a viable intestine, while the modified-LRINEC score 6-7 there were 2 patients with viable intestine and 5 patients with non viableAnd in the modified-LRINEC score ≥8 there were 8 patients were nonviable intestine. This data obtained statistically significant results, with p value <0.005. Hypothesis 0 was rejected in this study. **Conclusions:** There was a correlation between LRINEC score modification and intestinal viability in Intussuseption patients atH. Adam Malik General Hospital Medan.



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## INTRODUCTION

Intussuseptionis an emergency pediatric surgical cases that often encountered. Necrosis and intestinal perforation in children can be found in the initial diagnose or during surgery. Intussusceptionoccurs in premature babies often lead to a misdiagnosis with necrotizing enterocolitis (NEC) that caused delayed management (Bothara, 2018). The incidence of intussusception in children in the world was 1-8% of all pediatric patients in emergency unit (Jangra, 2010).

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LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score was a diagnostic tool to determine the risk ofnecrotizing fasciitis in softtissue infection case. LRINEC score consists of C-Reactive Protein (CRP), Leukocyte, Hemoglobin, Sodium, Creatinine, and blood glucose. CRP and Neutrophil-Lymphocyte Ratio (NLR) was known as acute inflammation predictor. Recent studies have shown that NLR is a good parameter in predicting bacteremia. Kristiani S, *et al*. study showed a moderate positive relationship ($r = 0.598$; $p = 0.00$) between CRP levels and NLRon neonatal infections (Kristiani *et al*., 2017). Researchers tried to replace the C-Reactive Protein (CRP) parameters with NLR because many study reports a positive correlation between CRP and NLR.

Our study replace the CRP test with the routine NLR test. Therefore, the authors would like to analyze modified-LRINEC score as a diagnostic tool to determine the risk of necrotizing fasciitis and assessing intestinal viability in intussusception patients.Based on the description above, researchers are interested in analyzing the relationship of modified-LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score with intestinal viability in intussusceptionpatients at Haji Adam Malik Hospital, Medan.

## MATERIALS AND METHODS

This cross sectional design study was done from January 20016 to December 2018 after ethical approval. Twenty four patients meet criteria of inclusion and excluded if there was found the exclution criteria. Data was collected from medical records. Pediatric patients are diagnosed with intussusception and have been operated with complete medical record were included to the study. The analysis were done by using SPSS 24 edition program. Descriptive analysis were done to obtain mean, percentage and standard deviation in every parameter. Kolmogorov-Smirnov test were done to assess the relationship of modified-LRINEC score with intestinal viability in intussusception patients.

## RESULTS

The frequency distribution of age, gender, hemoglobin, leukocyte, glucose, sodium, creatinine, neutrophil, and lymphocyte was shown in Table 1.

| Characteristic | N (%) | Mean ± SD or Median (Min-Max) |
|---|---|---|
| Age(Months) | | 6,00 (3-43) |
| Gender | | |
| Male | 16 (66.7%) | |
| Female | 8 (33.3%) | |
| Hemoglobin (gr/dL) | | 10,20 ± 1,89 |
| Leucocyte (/$mm^3$) | | 16.309,58 ± 8.377,67 |
| Glucose (mg/dL) | | 113 (50-250) |
| Sodium (mg/dL) | | 131,08 ± 5,29 |
| Creatinine (mg/dL) | | 0,48 (0,26-3,60) |
| Neutrophil (%) | | 66,89 ± 15,15 |
| Lymphocyte (%) | | 19,45 (10,30-47,20) |

The location of intussusception were found mostly in ileo-colica (25%) and non-viable intestinal were found in 50% patients in this study (Table 2). The mean of age, hemoglobin, leukocyte, glucose, sodium, creatinine, neutrophil, and lymphocyte with viable or non viable intestinal were showed in Table 3.

**Table 2. Frequency Distribution of Samples Based on Location and Viability**

| Location of intussuseption | N (%) |
|---|---|
| Ileo-colica | 16 (66.7%) |
| Ileo-colo-colica | 3 (12.5%) |
| Ileo-caecal | 2 (8.3%) |
| Colo-colica | 2 (8.3%) |
| Ileo-ileal | 1 (4.1%) |
| Bowel Viability | |
| Viable | 12 (50%) |
| Non-viable | 12 (50%) |

The mean of modified-LRINEC score with intestinal viability showed in Table 4. There were significant relationship of modified-LRINEC score with intestinal viability in intussusception patients at Haji Adam Malik General Hospital Medan ($p<0.005$) (Table 5).

**Table 3. The Mean value of the Samples based on Bowel Viability**

| Characteristic | Viable | Non-viable |
|---|---|---|
| Age (months) | 5,00 (3,00-16,00) | 6,50 (3,00-43,00) |
| Hemoglobin (gr/dL) | 10,31 ± 1,58 | 10,10 ± 2,23 |
| Leucocyte (/$mm^3$) | 9.900,00 (2.690-25.690) | 19.450 (12.690-41.590) |
| Glucose (mg/dL) | 121,00 (69,00-250,00) | 106,00 (50,00-229,00) |
| Sodium (mg/dL) | 130,25 ± 5,75 | 131,92 ± 4,89 |
| Creatinine (mg/dL) | 0,56 (0,26-3,60) | 0,40 (0,32-1,80) |
| Neutrophil (%) | 56,45 ± 11,51 | 77,33 ± 10,47 |
| Lymphocyte (%) | 36,40 (18,80-47,20) | 14,00 (10,30-31,00) |

**Table 4. The mean value of Modified-LRINEC Score of Bowel Viability**

| | Viable Bowel | Non-viable Bowel |
|---|---|---|
| Modified-LRINEC Score | 4,00 ± 1,28 | 8,25 ± 1,71 |

**Table 5. Relationship of Modified-LRINEC score on Bowel viability of patients with intussusception**

| Variabel | Viable | Non-viable | p value |
|---|---|---|---|
| Modified-LRINEC Score <5 | 9 | 0 | 0,001[1] |
| Modified-LRINEC Score 6-7 | 2 | 5 | |
| Modified-LRINEC Score >8 | 0 | 8 | |

## DISCUSSION

Intussusception is a condition of intestinal segment enters the intestinal lumen, causing obstruction of the gastrointestinal tract. About 75% to 90% intestinal intussusception cases are idiopathic, although lymphoid hyperplasia is often found. Peyer patches hyperplasia in lymphoid-rich terminal ileum can act as starting point ofintussusception. Intussusception caused abdominal pain, anxiety during colic and mucus with blood stool. Intussusception can cause strangulation, allowing peritonitis to occur and can be life threatening. Long duration ofintussusceptions will cause distended stomach and the signs of peritonitis can occur (Charles, 2015). Intussusception often occur in infants, this is in accordance with the study results in which ofthe 24 patients found, the average age were 6 months and the youngest and oldest age were 3 months and 43 months. This is the same with Trang (2014) study with 869 cases in which the average age were 8.6 months with the youngest age were 15 weeks. Intussusception often occur in children under 2 years but rarely under 3 months.

Intussusceptionmostly occur in male with a ratio of 3: 1 and incidence of 1-4/1,000 births, this study also showed that intussusception occurred more in male than girl (16 of 24 patients) (Maldonado *et al*., 2014; Van Trang, 2014). The results were in line with Chalya *et al*.(2014) study wherefrom 56 patients enrolled in the study, 43 (76.8%) were male and 13 (23.2%) were femalewith ratio of 3.3: 1 (Chalya, 2014). Location of intussusceptionis an important information and in this study, the location were found mostly in ileo-colica as many as 16 patients out of24 cases, while the least was in ileo-ileal (1 patient). The results of this study were the same with study by Uzair Yaqoob *et al*.(2018)where ileo-colica intussusception was one of the most common causes of acute abdomen in children (Yaqoob, 2018). This study aim to observe LRINEC scoring whether it could be used to assess intestinalviability in invaginated patients. Previous studies from Irwansyah in 2019 also used LRINEC scoring to assess outcomes in intestinaltissue, in which the study showed that LRINEC scores could be used as predictors of necrosis and perforation in children appendicitis cases.

As a result, there was a significant relationship between LRINEC score and intra-operative findings with p value = 0.031 (Irwansyah, 2019). The LRINEC scoring consists of several variables, namely hemoglobin, leukocytes, glucose, sodium, creatinine, and C-reactive protein (CRP). Because lack of CRP examination, our study substituted the CRP with a neutrophil-to-lymphocyte ratio (NLR). There are several studies that support the CRP value with positive correlation to NLR, this is the reason for the authors to modify LRINEC score by replacing CRP with NLR. Study from Kristiani and Hendrianingtyas in 2017 examined the relationship of NLR and CRP in neonatal infection. This study found a moderate positive correlation between NLR and CRP in neonatal infection, with a correlation coefficient (r) = 0.545 and this result was significant with a p value = 0.001 (El-Emshaty, 2017). Other studies from El-Emshaty *et al*.(2017)comparing NLR and CRP in some pathogens that caused community pneumonia, there were moderate positive correlation between NLR and CRP in all pneumonia patients with r = 0.71 and p value = 0.0001. The correlations of NLR to CRP in bacterial pneumonia patients also showed a moderatepositive correlation with r = 0.66 and p value = 0.0001 (El-Emshaty, 2017). Further research from Oh *et al*.(2013) attempted to observe the prognostic value of CRP and NLR in hepatoma patients, there were positive correlation between CRP values and NLR values with r = 0.57 with p values <0.001 (Oh, 2013). In this current study, the modified LRINEC related with intestinal viability in intussusception patients at Haji Adam Malik General Hospital Medan with p value <0.005. It was also proved by the mean of the viable intestinal group compared to the non-viable intestinal (4.00 ± 1.28 vs. 8.25 ± 1.71). This concluded that higher ofmodified LRINEC score, the prognosis was worsen. However, limitations in this study wasusing retrospective data and did not compare the LRINEC score against the modified-LRINEC score because the limitations of C-reactive protein testing at our institution. Furthermore, the assessment of modified-LRINEC score with the intestinal segments also needs to be considered, whether there are differences between fascia segments or other soft tissues. Length of time from the onset until come to ER, BMI of the infants, the degree of dehydration and the other factors that could affect the outcome were not preserved in our study, these are our limitation ofour study.

## Conclusion

Modified-LRINEC score were significant related with intestinal viability. This scoring could be a predictor of intestinal viability in intussusception cases. The higher of modified-LRINEC score worsen the prognosis.

## Conflict of Interest

The author stated that there is no conflict of interest in this study

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