VALUE OF NEUTROPHIL-TO-LYMPHOCYTE RATIO IN PREDICTING GASTROINTESTINAL BLEEDING IN HENOCH-SCHONLEIN PURPURA

KONGPING WEI¹, SHUHUA ZHANG, YONGHUA DU², BAOSHAN DI³,*
¹Department of Children's Nephropathy and Rheumatism, Lanzhou University Second Hospital, No. 80 Cui Yingmen, Chengguan District, Lanzhou City, Gansu Province, 730030 - ²No. 5 Jingyuan Road, Chengguan District, Lanzhou City, Gansu Province, 730046 - ³Gansu Provincial Hospital, 732 Xijin West Road, Qilihe District, Lanzhou City, Gansu Province, 730050

ABSTRACT

Purpose: to explore the relationship between neutrophil-to-lymphocyte ratio (NLR) and gastrointestinal bleeding in participants with Henoch-Schonlein purpura (HSP).

Method: 84 HSP patients were divided into two groups: 58 patients without gastrointestinal bleeding in one group and 26 patients with gastrointestinal bleeding in the other. The treatment of HSP in both groups was mainly symptomatic supportive therapy.

Results: The area under the curve of mean platelet volume (MPV), erythrocyte sedimentation rate (ESR), and c-reactive protein (CRP) was 0.427 (95% CI: 0.268 to 0.647), 0.492 (95% CI: 0.283 to 0.742), and 0.596 (95% CI: 0.417 to 0.851), respectively.

Conclusion: NLR can be used to predict gastrointestinal bleeding in patients with HSP.

Keywords: Lymphocyte ratio, gastrointestinal bleeding, Henoch-Schonlein purpura.

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Introduction

Henoch-Schonlein purpura (HSP) is the most common small vasculitis in childhood. The main clinical manifestations are nonthrombocytopenic purpura, abdominal pain, gastrointestinal bleeding, arthritis, and kidney involvement(1). According to the classification criteria of the European League Against Rheumatism, the Paediatric Rheumatology International Trials Organisation, and the Paediatric Rheumatology European Association (EULAR/PRINTO/PRES), the diagnostic criteria for Henoch-Schonlein purpura are purpura and one of the following manifestations: abdominal pain, arthralgia, renal insufficiency, and leucocyte fragmentation vasculitis dominated by immunoglobulin A (IgA) deposition(2). The incidence of HSP was 10 to 20 per one hundred thousand people, among which more than 90% of HSP cases were younger than 10 years old(3). This disease is the highest incidence of vasculitis in children, but the incidence in adults is lower, at about 10 to 20 per one hundred thousand people(4). Compared with children, adults have different clinical features and prognosis: first, kidney damage is more frequent and severe, and the incidence of related cancer is higher(5-6), involving bronchogenic cancer, digestive system cancer, renal cancer, and prostate cancer. The prognosis of HSP is usually good except in patients with gastrointestinal tract diseases and nephritis. Gastrointestinal involvement is the third most common manifestation of HSP(7). An earlier study showed that 70% of patients with HSP had gastrointestinal symptoms, and about two-thirds of patients with HSP had abdominal pain, usually diffuse, aggravated after meals, sometimes accompanied by nausea and vomiting(8). These symptoms are caused by submucosal bleeding and oedema of the intestinal wall and mainly affect the proximal end of the small intestine. Intussusception is the most serious gastrointestinal complication, occurring in 3% to 4% of HSP patients(9). Because the clinical manifestation and course of HSP are different between adults and children, the prognostic indexes of children and adults should be evaluated separately. Adult HSP patients exhibit more severe gastrointestinal bleeding than children and require blood transfusion or surgical treatment(10).
In addition, kidney involvement and chronic kidney disease in HSP are more common in adults than in children\(^{(11-12)}\). Therefore, adult patients need a more reliable prognostic indicator of HSP than children.

Neutrophil-to-lymphocyte ratio (NLR) is a widely used, inexpensive, and easy-to-obtain laboratory marker for quantifying systemic inflammation\(^{(17)}\). NLR has been considered as a prognostic indicator of HSP in children\(^{(14-17)}\). However, there are few studies on NLR in adult HSP, especially on predicting gastrointestinal bleeding in patients with HSP. Therefore, we conducted a retrospective study to explore the relationship between NLR and gastrointestinal bleeding in adults with HSP.

**Data and methods**

**Clinical Data**

This study is a retrospective study of 84 adult HSP patients who were hospitalized in the Department of Haematology of the Fifth People’s Hospital of Datong City from January 2017 to March 2019.

*Patients were divided into two groups:* 
- 58 patients without gastrointestinal bleeding in one group and 26 patients with gastrointestinal bleeding in the other.

Patients were 18 years and older and met the diagnostic criteria of adult HSP.

*Patients meeting one or more of the following criteria were excluded from the study:* 
- Dysfunctions of the heart, liver, brain, kidney, or other important organs;
- A history of long-term administration of corticosteroids;
- Abnormal coagulation function or with a blood disease;
- Those who had taken immunosuppressants;
- Those who had a history of chemotherapy or surgery.

**Therapeutic Regimen**

The treatment of HSP was mainly symptomatic supportive therapy. Patients with skin purpura as the main clinical manifestation could be treated with nonsteroidal anti-inflammatory drugs. Patients with recurrent skin purpura and gastrointestinal tract invasion as the main clinical manifestation could be treated with glucocorticoid therapy.

**Gastrointestinal Endoscopy**

The operation of painless gastroscopy combined with enteroscopy was performed by an experienced endoscopic physician to examine patients with gastrointestinal bleeding. Anaesthesia was performed by a professional anaesthesiologist.

**Statistical Method**

All the statistical data were analysed using the SPSS21.0 software package. A t-test and chi-square distribution were used for statistical analysis, and the receiver operating characteristic (ROC) curve was used to evaluate NLR to predict the course of HSP. The data had statistical significance of p<0.05.

**Results**

**Basic Characteristics of Patients**

Among the 84 patients with HSP, 26 (30.95%) had gastrointestinal bleeding and 58 (69.05%) had no symptoms of gastrointestinal bleeding. Compared with patients without gastrointestinal bleeding, leucocyte count, neutrophil count, and NLR were significantly higher in patients with gastrointestinal haemorrhage (p<0.05). The lymphocyte count in patients with gastrointestinal haemorrhage was significantly lower than in patients without gastrointestinal haemorrhage (p=0.045). Proteinuria was more common in patients with gastrointestinal bleeding (53.85%) than in patients without gastrointestinal bleeding (20.69%; p=0.002; Table 1).

**Table 1:** Comparison of Patients’ Laboratory Indexes by Group with or without Gastrointestinal Haemorrhage.

<table>
<thead>
<tr>
<th>Group</th>
<th>Cases</th>
<th>Sex</th>
<th>Leucocyte Count (x ̅±s)</th>
<th>Haemoglobin (g/L, x ̅±s)</th>
<th>Platelet Count (x ̅±s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without gastrointestinal haemorrhage</td>
<td>58</td>
<td>45.45±10.32</td>
<td>7900±1946</td>
<td>142±20.37</td>
<td>23700±15347.64</td>
</tr>
<tr>
<td>With gastrointestinal haemorrhage</td>
<td>26</td>
<td>46.31±8.41</td>
<td>6062±11800</td>
<td>244±26.96</td>
<td>2350±1992.27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Cases</th>
<th>Mean Platelet Volume (fL, x ̅±s)</th>
<th>Erythrocyte Count (x ̅±s)</th>
<th>Lymphocyte Count (x ̅±s)</th>
<th>Neutrophil: Lymphocyte Ratio (x ̅±s)</th>
<th>Prothrombin Time (s, x ̅±s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without gastrointestinal haemorrhage</td>
<td>58</td>
<td>7.03±1.64</td>
<td>5828±1483</td>
<td>151±43</td>
<td>3.02±0.74</td>
<td>1.14±0.31</td>
</tr>
<tr>
<td>With gastrointestinal haemorrhage</td>
<td>26</td>
<td>7.2±1.44</td>
<td>683±11775</td>
<td>148±36</td>
<td>8.8±1.46</td>
<td>1.0±0.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Cases</th>
<th>APTT (s, x ̅±s)</th>
<th>Erythrocyte Sedimentation Rate (mm/h, x ̅±s)</th>
<th>C-Reactive Protein (mg/L, x ̅±s)</th>
<th>Haematocrit %</th>
<th>Albuminuria %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without gastrointestinal haemorrhage</td>
<td>58</td>
<td>43.8±7.2</td>
<td>214±0.64</td>
<td>0.5±0.05</td>
<td>18</td>
<td>31.03</td>
</tr>
<tr>
<td>With gastrointestinal haemorrhage</td>
<td>26</td>
<td>46.8±6.68</td>
<td>184±6.6</td>
<td>1.2±0.78</td>
<td>11</td>
<td>42.3</td>
</tr>
</tbody>
</table>

\(\text{p} < 0.05\)
**ROC Curve Analysis**

In the ROC curve of gastrointestinal bleeding, the area under the NLR curve was 0.846 (95% CI: 0.723 to 0.956). The sensitivity and specificity of NLR were 85.4% and 83.8%, respectively. In addition, MPV, ESR, and CRP could not predict gastrointestinal bleeding in HSP patients. The area under the curve of MPV, ESR, and CRP was 0.427 (95% CI: 0.268 to 0.647), 0.492 (95% CI: 0.283 to 0.742), and 0.596 (95% CI: 0.417 to 0.851), respectively.

**Discussion**

Although HSP is a systemic vasculitis occurring mainly in children, adult HSP needs to be paid more attention because the prognosis of adult patients with HSP is worse than that of children with HSP. Adult patients with HSP have severe gastrointestinal bleeding and kidney damage(18). In this study, 26 of 84 patients with HSP had gastrointestinal bleeding and 58 had no symptoms of gastrointestinal bleeding. In the group with gastrointestinal bleeding, only 10 patients had clinical symptoms associated with digestive tract haemorrhage. The other 16 patients with digestive tract haemorrhage had no related clinical symptoms. Moreover, 30.95% of HSP patients developed gastrointestinal haemorrhage and 19.23% of them developed end-stage renal disease. There were no serious complications in HSP patients without gastrointestinal bleeding. Therefore, it is believed that gastrointestinal bleeding in patients with HSP is not only an important clinical manifestation of HSP, but also an important indicator of overall disease condition and prognosis. It is well known that NLR is a risk factor for common diseases in adults, including cardiovascular disease, cirrhosis, various cancers, and end-stage kidney disease. In this study, leucocyte count, neutrophil count, and NLR were significantly higher in patients with gastrointestinal haemorrhage than in those without (p<0.01). In the ROC curve of gastrointestinal bleeding, the area under the NLR curve was 0.846 (95% CI: 0.723 to 0.956). The sensitivity and specificity of NLR were 85.4% and 83.8%, respectively, which were higher than those of other predictors.

In conclusion, the results of this study show that NLR can be used to predict gastrointestinal bleeding in patients with HSP. Further research is needed with an increased sample size to clarify the predictive role of NLR in gastrointestinal bleeding of patients with HSP.

**References**


Corresponding Author:
BAOSHAN DI
Email: yszs55@163.com
(China)