BIO-BYWORD SCIENTIFIC PUBLISHING PTY LTD

Journal of Clinical and Nursing Research

Analysis of the Effect of Serum Procalcitonin (PCT) Index Test Combined With Restrictive Fluid Resuscitation in Traumatic Shock of Craniocerebral Trauma

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ARTICLE INFO

Article history:

Published online: 15th July, 2017

Key words:

craniocerebral traumatic shock

serum procalcitonin

restrictive fluid resuscitation

intervention

ABSTRACT

Objective: To study the effect and clinical value of serum procalcitonin (PCT) markers combined with restrictive fluid resuscitation in traumatic shock combined with intracranial infection. **Method:** 33 patients with craniocerebral trauma admitted in our hospital from May 2015 to July 2016 were divided into control group (65 cases) without intracranial infection. The study group (cranial) Infection, 68 cases). The levels of serum PCT, WBC and C-reactive protein (CRP) in the two groups were measured and the working curve (ROC) of the subjects was drawn to evaluate the diagnostic value of each index. To give traumatic shock combined with intracranial infection in patients with restrictive fluid resuscitation intervention, to explore clinical efficacy. **Results:** The serum PCT (4.71 ± 1.06) μg/L, CRP (41.42 ± 4.98) mg/L and WBC (13.56 ± 3.43) × 109/L were higher than those in the control group [(0.27 ± 0.05) μg/L (0.97 ± 0.88) mg / L, (8.21 ± 2.15) × 109/L], the difference was statistically significant ($P < 0.05$); CRP, WBC, PCT under the ROC curve area were 0.887,0.760 and 0.934. The specificity and sensitivity of PCT were 0.99μg/L, the specificity and sensitivity were 90.00% and 93.40% respectively. When CRP = 9.98mg/L, the specificity and sensitivity were

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76.25% and 88.68% respectively when WBC = 8.56 × 109/L, the specificity and sensitivity were 72.12% and 76.04%, respectively. The Glasgow coma score (GCS) was significantly better than that before treatment (P < 0.05). **Conclusion**: The detection of serum PCT markers has a high sensitivity in traumatic shock combined with intracranial infection, which can improve the diagnostic accuracy. Restricted fluid resuscitation can improve the prognosis quality of patients with traumatic shock and have higher feasibility.

0 Introduction

In the increasingly perfect medical technology and treatment of continuous regulation, the prognosis of patients with traumatic brain injury improved, but the occurrence of intracranial infection not only aggravate the patient's condition and endanger its life and health [1]. Traumatic intracranial infection is one of the more common complications of clinical neurosurgery and rapid onset. Patients often accompanied by disturbance of consciousness, intracranial hypertension and many other clinical manifestations. If the patient has not been timely diagnosis and treatment, the mortality rate of up to 20% and easily lead to paralysis, dementia, road nerve palsy, epilepsy and other sequelae [2,3]. Therefore, early and timely treatment of patients with correct diagnosis and treatment in improving their survival rate and reduce the risk of complications is of great significance. In the past, often through the detection of WBC count, CRP levels of infection diagnosis, although a certain diagnostic effect, but there is a high misdiagnosis rate [4]. PCT belongs to a hormone-free calcitonin precursor material that can be used as an early marker of bacterial infection with high specificity and sensitivity. Based on this study, PCT, WBC and CRP were detected in patients with traumatic intracranial infection. The aim of this study was to analyze the diagnostic value and clinical significance. Specific information is as follows.

1 Materials and methods

1.1 General information. The study object for our hospital in May 2015 to July 2016 treated 133 cases of traumatic brain injury patients, according to whether the occurrence of intracranial infection grouped. The average age (48.36 ± 3.12) years old; the causes of injury: 18 cases of fall, 25 cases of traffic accidents, 5 cases of surgery, 13 cases of sharp, 4 cases of other cases; craniocerebral injury: closed injury in 41 cases, open injury in 24 cases. The average age (47.63 ± 3.25) years old; the causes of injury: 16 cases of fall, 26 cases of traffic accidents, 8 cases of surgery, 13 cases of sharp objects, the average age of 47.63 ± 3.25 years, Other 5 cases; craniocerebral injury: closed injury in 45 cases, open injury in 23 cases. Statistical analysis of the two groups of general information, the difference was not statistically significant (P> 0.05).

(1) Inclusion criteria: the purpose of this study, the content informed and signed consent; study group were diagnosed with intracranial infection: WBC> 10 × 109 / L, cerebrospinal fluid turbidity; patients with meningeal irritation symptoms, and Body temperature was continued to rise [5]; Cerebrospinal fluid bacterial culture positive for the same two consecutive bacteria [6]. (2) Exclusion criteria: the existence of immune dysfunction, combined with severe liver, kidney, lung, heart and other diseases; pregnancy or lactation; malignant tumors [7].

1.3 Detection method. Early morning patients with fasting blood 4ml, using miniVIDAS automatic enzyme-linked fluorescence analyzer (France Merière) on the detection of serum PCT levels; the use of immunoturbidimetric method for detection of CRP levels, the instrument for the Japanese Toshiba TBA- 2000 biochemical analyzer; using XE2100 automatic blood analyzer to detect the WBC. Normal reference value: WBC: 4 × 109 / L-10 × 109 / L; CRP: <8 mg / L; PCT <0.5 μg / L [8, 9].

1**.4 Treatment method.** to give patients to restrict the liquid input therapy, in the process of various types of liquid close monitoring blood pressure, so that it maintained at 50 ~ 70 mmHg.

1.5 Statistical method. SPSS 18.0 software for data processing, normal distribution of measurement data to ($\bar{x} \pm S$) said, using t test; count data expressed as a percentage, using χ^2 test, P <0.05 for the difference was statistically significant. Draw the subject's working curve

(ROC), the sensitivity is the ordinate, the specificity is the abscissa.

2 Results

2.1 Serum-related indicators. The study group of patients with serum PCT, CRP, WBC levels were higher than the control group, the difference was statistically significant (P <0.05). See Table 1.

2.2 PCT, CRP, WBC sensitivity and specificity. When PCT = 0.85μg / L, the specificity and sensitivity were 90.00%, 93.40%; when CRP = 9.98mg / L, the specificity and sensitivity were 76.25 %, 88.68%. When WBC = 8.56 × 109 / L, the specificity and sensitivity were 72.12% and 76.04%, respectively. Serum PCT in traumatic intracranial infection in the sensitivity and specificity than CRP, WBC high. See Table 2.

2.3 ROC curve CRP, WBC, PCT under the curve of the area were 0.934, 0.887 and 0.760, which can be a higher diagnostic value of the PCT. see picture 1.

The GCS score (13.71 ± 1.42) after GCS score before and after treatment was significantly higher than that before intervention (4.27 ± 1.04), the difference was statistically significant (P <0.05).

3 Discussion

Traumatic intracranial infection is a more serious clinical complications, including bacterial infections are more common, including brain abscess, ventriculitis, bacterial meningitis, etc. [10]. Common risk factors include cerebrospinal fluid leakage, whether the prevention of antibiotics, external drainage, but the clinical manifestations of patients with atypical, to a certain extent, increased the difficulty of diagnosis [11].

At present, clinical often through clinical symptoms, laboratory tests and other methods of diagnosis of intracranial infection, but there is a certain misdiagnosis rate and missed diagnosis which delayed treatment of patients[12,13]. It is important to explore an effective indicator and diagnostic tool in improving the prognosis

Table 2 Analysis of the PCT sensitivity and specificity of the study group (%)

Index	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Diagnostic efficiency
PCT	93.40	90.00	89.20	92.45	90.60
CRP	88.68	76.25	80.05	86.88	83.54
WBC	76.04	72.12	74.00	75.55	74.68

Table 1 Two groups of patients' serum PCT, CRP, WBC levels ($\bar{x} \pm S$)

Group	PCT（μg/L）	CRP（mg/L）	WBC（×10⁹/L）
Control group (n = 65)	0.27±0.05	3.97±0.88	8.21±2.15
Study group (n = 68)	4.71±1.06	41.42±4.98	13.56±3.43
t	33.729	59.734	10.721
P	＜0.05	＜0.05	＜0.05

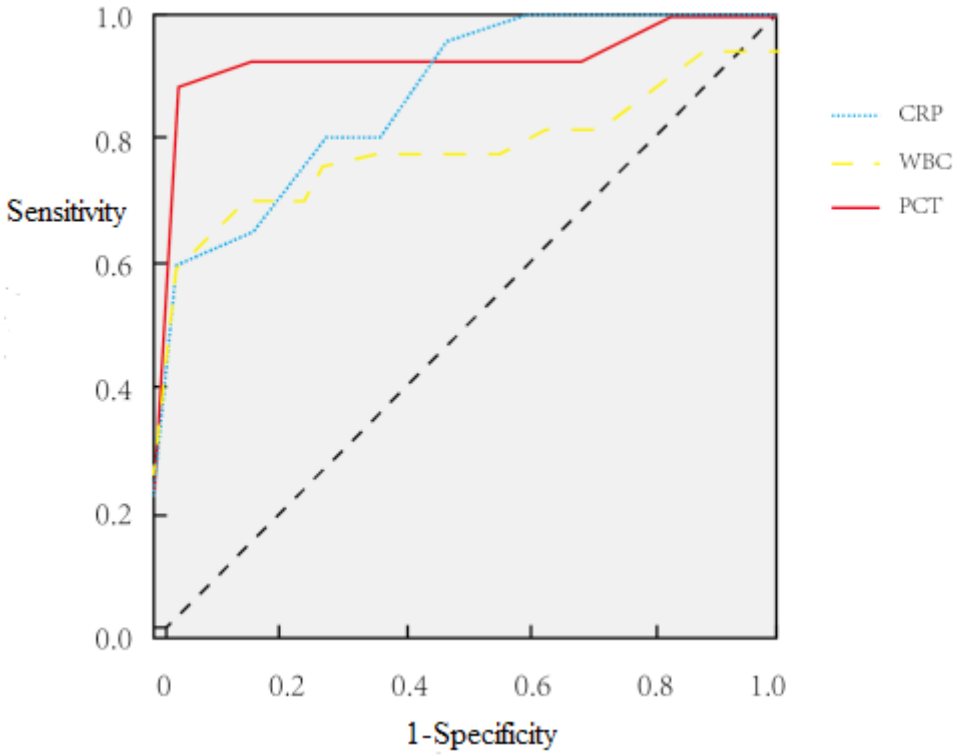

Figure 1 Study group of patients with serum CRP, WBC, PCT diagnostic ROC curve

of such patients [14]. CRP is an acute phase protein, is also often used in clinical non-specific inflammatory markers, mainly by the liver synthesis, in the acute rejection, cardiovascular disease and after surgery have increased the trend and involved in the body immune response, which can be activated complement; but the lack of specificity of CRP, when the body of other infections occur when the level also will rise, it is necessary to conduct joint testing with other indicators [15]. WBC count is also commonly used in clinical monitoring of inflammatory response. PCT is a human calcitonin precursor material whose genes are located in human chromosome 11, mainly through selective splicing [16]. PCT, as one of the new laboratory indicators, monitors systemic infection and systemic inflammatory response syndromes, with traditional clinical indicators (such as WBC counts, body temperature, neutrophil classification, etc.), other inflammatory cytokines IL-1, IL-6, IL-8, CRP, TNF-α, etc.), and its sensitivity and specificity are high, and the dynamic changes of PCT are positively correlated with the progression of systemic infection [17,18]. Clinical practice found that the level of PCT and the severity of the disease and the relationship between the close, the disease increased with the rise in PCT levels, if the continued increase in patients with poor prognosis; if the PCT level decreased, it shows that patients with improved condition, and infection And inflammation are basically under control [19]. The results of this study show that the serum PCT, CRP, WBC levels in the study group were higher than those in the control group, indicating that the above three indicators can be used as indicators of traumatic intracranial infection, intracranial infection in patients with higher levels of serum PCT , The reason is that the traumatic brain injury itself can lead to increased levels of PCT, combined with bleeding, cancer and other factors caused by blood-brain barrier damage, resulting in macromolecules PCT through the blood-brain barrier more difficult to further improve the level of PCT [20]. In this study, further analysis, compared with CRP, WBC indicators, PCT in intracranial infection diagnostic efficiency, diagnostic specificity and sensitivity are obvious advantages. Bacterial culture of cerebrospinal fluid is to detect the gold standard of intracranial infection, but the pathogen culture time is longer (3-7d), cannot timely assessment of infection [21]. Therefore, clinicians should be a comprehensive analysis of patients with clinical laboratory tests, signs, symptoms, the PCT can be used as an early diagnosis of intracranial infection auxiliary indicators, and thus effectively alleviate the patient's disease, the correct guidance of doctors rational use of drugs.

Limit the amount of liquid infusion strict input speed, the blood pressure maintained at 50 ~ 70 mmHg range, not only help patients with improved prognosis, but also to avoid the rapid excess of liquid into the human body, the adverse effects on the body, which can effectively control the treatment and the process of stress response, the effect is obvious [22].

In summary, serum PCT markers in the traumatic intracranial infection has a high sensitivity, which will help improve the diagnostic accuracy, high feasibility, restrictive fluid resuscitation can effectively improve the prognosis of patients with traumatic shock quality , Worthy of clinical promotion and application.

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