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ORIGINAL

Usefulness of procalcitonin for diagnosing infection in critically ill patients with liver cirrhosis☆

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Abstract
Objective: To evaluate the usefulness of procalcitonin (PCT) for diagnosing infection in patients with liver cirrhosis admitted to an Intensive Care Unit.
Design: A retrospective study was carried out.
Scope: Intensive Care Unit. Versatile, twenty-four beds.
Participants: Patients with liver cirrhosis admitted to our Intensive Care Unit in the last 4 years with suspected infection and measurement of PCT.
Results: Among the 255 patients with cirrhosis admitted to our unit, PCT was determined for the differential diagnosis of infection in 69 cases (27%). Three patients were excluded from analysis due to a lack of clinical data. The average stay was 10.6 ± 9.2 days, with a mortality rate of 65%. The origin of cirrhosis was mainly viral (57%) or alcoholic (37%). The Child–Pugh and MELD scores were 9.5 ± 2 and 23 ± 8, respectively. Infection was diagnosed in 54 patients (82%). The most common infection was pneumonia (72%), followed by intraabdominal infections (18%) and bacteremia (5%). In patients without infection, the median PCT concentration was 0.57 ng/ml (range 0.28–1.14) versus 2.99 (1.31–9.4) in those with infection ($p < .001$). Diagnostic capacity was maintained in patients with intraabdominal infections. The diagnostic cutoff point was set at 0.8 ng/ml (sensitivity 83%, specificity 75%, AUC 0.82 [0.702–0.93]).
Conclusions: In patients with liver cirrhosis, PCT is useful for identifying bacterial infections, including intraabdominal processes.
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PALABRAS CLAVE
Procalcitonina;
Cirrosis hepática;
Infección;
Peritonitis

Utilidad de la procalcitonina para el diagnóstico de infección en el paciente crítico con cirrosis hepática

Resumen

Objetivo: Analizar la utilidad de la procalcitonina (PCT) para el diagnóstico de infección en pacientes con cirrosis hepática ingresados en una unidad de cuidados intensivos.

Diseño: Estudio observacional retrospectivo.

Ámbito: Unidad de Cuidados intensivos. Polivalente, 24 camas.

Participantes: Pacientes con cirrosis hepática ingresados en nuestra unidad de cuidados intensivos en los últimos 4 años con diagnóstico de sospecha de infección y determinación de PCT.

Resultados: Entre los 255 pacientes con cirrosis ingresados en nuestra unidad; se determinó la PCT para el diagnóstico diferencial de infección en 69 casos (27%). Tres pacientes fueron excluidos del análisis por falta de datos clínicos. La estancia media fue de $10,6 \pm 9,2$ días y la mortalidad del 65%. El origen de la cirrosis fue vírico (57%) o enólico (37%), con una puntuación de $9,5 \pm 2$ en la escala de Child-Pugh y 23 ± 8 en la escala de MELD. En 54 pacientes (82%) se estableció el diagnóstico de infección. La infección más frecuente fue la neumonía (72%), seguida de la infección intraabdominal (18%), y la bacteriemia (5%). En los pacientes sin infección la mediana de PCT fue de 0,57 ng/ml (0,28-1,14) frente a 2,99 (1,31-9,4) $p < 0,001$ en aquellos con infección. La capacidad diagnóstica se mantuvo en los pacientes con infección intraabdominal. El punto de corte diagnóstico se estableció en 0,8 ng/ml (sensibilidad 83%, especificidad 75%, AUC 0,82 [0,702-0,93]).

Conclusiones: En los pacientes con cirrosis hepática la PCT es útil para identificar la presencia de infecciones bacterianas incluyendo las intraabdominales.

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Introduction

Bacterial infections are among the most frequent and serious complications in patients with liver cirrhosis.[1] In these individuals the presence of iatrogenic factors (diagnostic and therapeutic), and the alteration of different immune mechanisms, favor the development of infections.[1,2] On the other hand, the diminished intestinal motility that characterizes these patients, together with hypochlorhydria and lowered intestinal IgA levels, facilitate intestinal bacterial overgrowth.[2] This situation, together with disruption of the intestinal epithelium secondary to the increase in nitric oxide resulting from portal hypertension, allow bacterial translocation and ultimately bacteremia (or endotoxinemia) and spontaneous bacterial peritonitis.[3–5]

In patients with liver cirrhosis, infection is often accompanied by organ dysfunction (in many cases secondary to decompensation of cirrhosis itself), which increases the risk of a fatal outcome.

It is therefore very important to establish an early and firm diagnosis of bacterial infection in cirrhotic individuals. However, the signs and symptoms inherent to the infection are often missing or are difficult to identify in these subjects.[6,7] The use of infection biomarkers in the diagnostic algorithm of patients with cirrhosis is therefore particularly interesting.

C-reactive protein (CRP) is synthesized in the liver; as a result, its usefulness in patients of this kind is uncertain.[8,9] In contrast, procalcitonin (PCT) is produced in many tissues[10–13] and moreover appears to have a greater diagnostic capacity than CRP.[14] However, since PCT requires the existence of a systemic inflammatory response, it might prove ineffective in diagnosing localized infections such as spontaneous bacterial peritonitis.

With the purpose of determining the usefulness of PCT in diagnosing bacterial infections in patients with liver cirrhosis, we decided to review the information from all the patients with liver cirrhosis and PCT determinations that had been admitted to our Intensive Care Unit (ICU).

Material and methods

Type of study: A retrospective, consecutive cases study was carried out.

Inclusion criteria: Patients over 18 years of age with confirmed liver cirrhosis admitted to the ICU over the last four years, and who in the course of admission had undergone PCT determination within the first 12 h following the suspicion of infection. We excluded those patients in which the data contained in the case history could not firmly establish whether there had been infection during admission to the ICU or not.

Study variables: Demographic data were compiled, along with the medical history, information on the liver disease (etiology, Child–Pugh score, MELD score, treatments provided), other organ dysfunction, APACHE II score and SOFA score, and data related to infection (temperature, leukocyte count, neutrophil count, PCT).

Diagnosis of liver cirrhosis: The diagnosis was established by specialists in liver disease based on an algorithm including liver Doppler ultrasound and laboratory test parameters for determining the degree of liver dysfunction and its cause.