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ORIGINAL ARTICLE

Cord blood procalcitonin in the assessment of early-onset neonatal sepsis☆,☆☆

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Abstract
Introduction: Early diagnosis of early-onset neonatal sepsis (EONS) is essential to reduce morbidity and mortality. Procalcitonin (PCT) in cord blood could provide a diagnosis of infected patients from birth.
Objective: To study the usefulness and safety of a procedure for the evaluation of newborns at risk of EONS, based on the determination of PCT in cord blood.
Patients and methods: Neonates with infectious risk factors, born in our hospital from October 2013 to January 2015 were included. They were processed according to an algorithm based on the values of cord blood procalcitonin (<0.6 ng/mL versus ≥0.6 ng/mL). They were later classified as proved infection, probable, or no infection.
Results and conclusions: Of the 2.519 infants born in the study period, 136 met inclusion criteria. None of 120 cases with PCT <0.6 ng/mL in cord blood developed EONS (100% negative predictive value). On the other hand, of the 16 cases with PCT ≥0.6 ng/mL, 10 were proven or probably infected (62.5% positive predictive value). The sensitivity of the PCT against infection was 100%, with a specificity of 95.2% (area under the receiver operator curve 0.969). The incidence of infection in the study group was 7.4%, and 26.1% in cases with maternal chorioamnionitis. 21 newborn (15.4%) received antibiotic therapy.

The studied protocol has shown to be effective and safe to differentiate between patients with increased risk of developing an EONS, in those where the diagnostic and therapeutic approach was more interventionist, versus those with less likelihood of sepsis, who would benefit from a more conservative management.

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PALABRAS CLAVE
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Corioamnionitis

Procalcitonina en sangre de cordón en la valoración del riesgo de sepsis neonatal precoz

Resumen
Introducción: El diagnóstico precoz es esencial para disminuir la morbimortalidad en la sepsis neonatal precoz (SNP). La procalcitonina (PCT) en sangre de cordón permitiría identificar al nacimiento a los pacientes infectados.
Objetivo: Estudiar la utilidad y seguridad de un protocolo de valoración de recién nacidos con riesgo de SNP, basado en los valores de procalcitonina en sangre de cordón.
Pacientes y métodos: Se incluyeron los nacidos en nuestro hospital de octubre de 2013 a enero de 2015, con factores de riesgo infeccioso. Se procedió según un algoritmo basado en los valores de procalcitonina (<0,6 ng/ml frente a ≥0,6 ng/ml). Posteriormente se clasificaron como infección comprobada, probable o no infección.
Resultados y conclusiones: De 2.519 nacidos en el periodo de estudio 136 cumplieron criterios de inclusión. De 120 casos con PCT <0,6 ng/ml ninguno desarrolló SNP (valor predictivo negativo 100%). Por el contrario, de 16 casos con PCT ≥0,6 ng/ml, diez presentaron infección comprobada o probable (valor predictivo positivo 62,5%). La sensibilidad de la PCT frente a infección fue 100% y la especificidad 95,2% (área bajo la curva operador receptor 0,969). La incidencia de infección en el grupo de estudio fue de 7,4%; en RN de madre con corioamnionitis 26,1%. Recibieron antibioterapia 21 recién nacidos (15,4%).
El protocolo clínico estudiado ha demostrado ser efectivo y seguro para diferenciar entre pacientes con mayor riesgo de SNP, en los que la aproximación diagnóstica y terapéutica fue más intervencionista, frente a aquellos con menor probabilidad de sepsis, que se beneficiaron de un manejo más conservador.

Introduction

The incidence of early-onset neonatal sepsis (EONS) has decreased drastically since the introduction of maternal prophylactic antibiotherapy.[1] However, it continues to be a frequent reason for admission in neonatal units in newborns (NBs) at risk of infection, as reducing the morbidity and mortality associated with EONS requires an early diagnosis.[2]

There is still no clearly defined diagnostic scheme for this condition. Its clinical manifestations are subtle and nonspecific and develop at a late stage, so it must be diagnosed while the patient is still asymptomatic. Such a diagnosis would rest on the identification of NBs at risk of early-onset sepsis based on factors that are neither sensitive nor specific[2–4] and performance of laboratory tests that are painful, reduce blood volume and are costly, and which are particularly harmful to newborns.[5–7] The use of diagnostic tests is neither systematic nor definitive and requires repeated testing, including a complete blood count (CBC) with white blood cell (WBC) differential, blood culture, and determination of acute phase reactant levels, especially C-reactive protein (CPR), whose levels start to increase at 6–12 h from birth in cases of sepsis.[3,5,6] The use of other inflammation markers (interleukins IL-6, IL-8, IL-1 and TNF-α) has been studied with variable results and little applicability to clinical practice.[8–12]

A definitive diagnosis can only be obtained by a positive central line blood culture. This standard is less than ideal, as it offers a low yield in the neonatal period due to various factors (small sample volumes, intermittent bacteraemia, intrapartum administration of antibiotics to the mother, etc.) and due to the delay in obtaining its results, which often results in the empirical treatment with antibiotics of patients without infection.[6,13]

Procalcitonin (PCT) is a prohormone secreted by most parenchymal tissues. Its usefulness as an inflammatory marker has been studied in children and adults.[10–14] It exhibits a physiological elevation in healthy NBs in the first days of life that peaks at 24 h; this peak is higher, occurs earlier and lasts longer in preterm NBs.[14–16] Several systematic reviews have provided evidence of its usefulness in the diagnosis of neonatal infections, although its interpretation as a marker of EONS is complicated by the physiological variations that take place in the first hours of life.[16–21] Recent studies demonstrate that cord blood PCT levels could be used to discriminate between infected and not-infected patients at an early stage using a cut-off point of 0.6 ng/mL.[22,23]

Objective

Our aim was to analyse the usefulness and safety of a protocol for the assessment of NBs with risk factors for EONS in which the initial diagnostic and therapeutic approach would be based on cord blood PCT levels and patient symptoms.

The establishment of an algorithm could be useful in the care of NBs, so that those at low risk could be managed more