



## ORIGINAL ARTICLE

## Clinical observation: A safe alternative to radiology in infants with mild traumatic brain injury<sup>☆,☆☆</sup>

David Muñoz-Santanach, Victoria Trenchs Sainz de la Maza, Sara Maya Gallego, Adriana Cuaresma González, Carles Luaces Cubells\*

Servicio de Urgencias, Hospital Sant Joan de Déu Barcelona, Esplugues de Llobregat, Barcelona, Spain

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**KEYWORDS**

Head trauma;  
Infant;  
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**Abstract**

**Objective:** The protocol for the management of mild cranioencephalic trauma in the emergency department was changed in July 2013. The principal innovation was the replacement of systematic skull x-ray in infants with clinical observation. The aims of this study were to determine whether there was (1) a reduction in the ability to detect traumatic brain injury (TBI) in the initial visit to Emergency, and (2) a change in the number of requests for imaging tests and hospital admissions.

**Methodology:** This was a retrospective, descriptive, observational study. Two periods were established for the study: Period 1 (1/11/2011–30/10/2012), prior to the implementing of the new protocol, and Period 2 (1/11/2013–30/10/2014), following its implementation. The study included visits to the emergency department by children  $\leq 2$  years old for mild cranioencephalic trauma (Glasgow Scale modified for infants  $\geq 14$ ) of  $\leq 24$  h onset.

**Results:** A total of 1,543 cases were included, of which 807 were from Period 1 and 736 from Period 2. No significant differences were observed as regards sex, age, mechanism, or risk of TBI. More cranial fractures were detected in Period 1 than in Period 2 (4.3% vs 0.5%;  $P < .001$ ), without significant changes in the detection of TBI (0.4% vs 0.3%;  $P = 1$ ). However, there were more cranial x-rays (49.7% vs 2.7%;  $P < .001$ ) and more ultrasounds (2.1% vs 0.4%;  $P < .001$ ) carried out, and also fewer hospital admissions (8.3% vs 3.1%;  $P < .001$ ). There were no significant differences in the number of computerised tomography scans carried out (2% vs 3%;  $P = .203$ ).

**Conclusions:** The use of clinical observation as an alternative to cranial radiography leads to a reduction in the number of imaging tests and hospital admissions of infants with mild cranioencephalic trauma, without any reduction in the reliability of detecting TBI. This option helps

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<sup>☆☆</sup> Previous presentation: the results of this study were presented at the XX Meeting of the Sociedad Española de Urgencias de Pediatría, receiving the award to the best oral communication in the meeting.

\* Corresponding author.

E-mail address: [cluaces@hsjdbcn.org](mailto:cluaces@hsjdbcn.org) (C. Luaces Cubells).

**PALABRAS CLAVE**

Traumatismo craneal;  
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to lower the exposure to radiation by the patient, and is also a more rational use of hospital resources.

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### Observación clínica: una alternativa segura a la radiología en lactantes con traumatismo craneoencefálico leve

#### Resumen

**Objetivo:** En julio 2013 se cambió el protocolo de manejo del traumatismo craneoencefálico leve en urgencias, siendo la principal novedad la sustitución sistemática de las radiografías craneales en lactantes por la observación clínica. Los objetivos son determinar si este cambio ha implicado: 1) una disminución en la capacidad de detección de lesiones intracraneales (LIC) en la visita inicial de urgencias y 2) cambios en la solicitud de pruebas de imagen e ingresos.

**Metodología:** Estudio retrospectivo, descriptivo-observacional. Se establecen 2 periodos: periodo 1 (1/11/2011-30/10/2012), preimplantación nuevo protocolo, y periodo 2 (1/11/2013-30/10/2014), postimplantación. Se incluyen las consultas por traumatismo craneoencefálico leve a urgencias (escala Glasgow modificada para lactantes  $\geq 14$ ) de  $\leq 24$  h de evolución de niños  $\leq 2$  años.

**Resultados:** Se incluyen 1.543 casos, 807 del periodo 1 y 736 del periodo 2, sin observarse diferencias significativas en sexo, edad, mecanismo y riesgo de LIC. En el periodo 1 se diagnostican más fracturas craneales que en el periodo 2 (4,3 vs. 0,5%;  $p < 0,001$ ) sin cambios significativos en la detección de LIC (0,4 vs. 0,3%;  $p = 1$ ). Asimismo, se realizan más radiografías de cráneo (49,7 vs. 2,7%;  $p < 0,001$ ), más ecografías (2,1 vs. 0,4%;  $p < 0,001$ ) e ingresan más casos (8,3% vs 3,1%;  $p < 0,001$ ). No se hallan diferencias significativas en las tomografías computarizadas realizadas (2 vs. 3%;  $p = 0,203$ ).

**Conclusiones:** La observación clínica como alternativa a la radiografía craneal permite reducir las pruebas de imagen y los ingresos en los lactantes con traumatismo craneoencefálico leve sin disminuir la fiabilidad diagnóstica de LIC. Esta opción permite la reducción de irradiación al paciente y un uso más racional de los recursos sanitarios.

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## Introduction

Head trauma (HT) is one of the main causes of morbidity and mortality in children in developed countries.<sup>1-3</sup> Approximately 3%–5% of paediatric visits to primary care centres and emergency departments (EDs) are due to HT, which are mild in 90% of cases.<sup>1,2</sup> There are still several points of controversy in the management of HT,<sup>4</sup> one of which is the role of skull radiography. Historically, the presence of a skull fracture has been considered a risk factor for traumatic brain injury (TBI),<sup>2,3,5</sup> although the absence of the former does not rule out the latter. It is estimated that about 2% of children with HT may present with a skull fracture, a prevalence that increases in children aged less than 2 years,<sup>6-8</sup> which is why skull radiography is still recommended in Spain for specific cases of young children with mild HT.<sup>9,10</sup>

In 2013 we conducted a study in our ED<sup>11</sup> that included 800 children aged 2 years or less with mild HT and found a low prevalence of TBI in this group of patients that was independent of the concomitant presence of skull fracture. With the aim of reducing exposure to radiation in these children, and in the awareness that skull radiography was no longer

a recommended practice in the guidelines of countries with ample experience in the management of these patients,<sup>12-16</sup> the protocol for the management of mild HT in our hospital was updated in July of the same year. The main change consisted in replacing skull radiography in children aged less than 2 years with mild HT and moderate risk of TBI by inpatient observation, with performance of head computed tomography (CT) in case of unfavourable progression. Fig. 1 shows the protocol in place until July 2013 (1A) and the protocol that has been applied since (1B).<sup>17,18</sup>

The primary objective of this study was to assess whether the implementation of the new protocol led to a reduction in the ability to detect TBI in the initial ED visit, and the secondary objective was to determine the changes in the requests for imaging tests and in hospital admissions that have occurred.

## Methods

We conducted a study in the ED of an urban tertiary care maternity and children's hospital with 264 paediatric beds

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