

CASE REPORT

Subacute subdural hematomas associated with macrocephaly: Should we suspect non-accidental trauma?

Núria Visa-Reñé, Fernando Paredes-Carmona

Department of Pediatrics. Hospital Universitari Arnau de Vilanova. Lleida

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Aumento benigno de los espacios subaracnoideos
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Abstract

Introduction: The etiological diagnosis of subacute subdural hematomas can be challenging for the pediatric emergency physician. In children, subacute subdural hematomas may be the result of non-accidental trauma. However, the presence of subdural collections has been associated with the benign enlargement of subarachnoid spaces that some infants with macrocephaly may experience. This association is infrequent and poorly reported in the literature.

Case reports: We present two patients with macrocephaly who were referred to the emergency department because of a progressive and rapid increase in head circumference. They had a normal neurological examination and neuroimaging studies were compatible with multiple subacute subdural hematomas.

Conclusion: In pediatric patients with subdural hematomas, non-accidental trauma should be ruled out as the cause before considering other diagnoses. Nevertheless, there are other etiologies associated with the presence of these hematomas, such as accidental trauma or spontaneous occurrence. Expanding the etiological investigation and understanding these potential associations is important, as it enables appropriate and timely diagnosis, which may significantly impact the child's future.

HEMATOMAS SUBDURALES SUBAGUDOS ASOCIADOS A MACROCEFALIA. ¿ESTAMOS ANTE UN TRAUMA NO ACCIDENTAL?

Resumen

Introducción: El diagnóstico etiológico de los hematomas subdurales subagudos puede suponer, en ciertos escenarios, un reto para el médico de Urgencias. En niños, en ocasiones es el resultado de una lesión craneal no accidental. Sin embargo, la presencia de colecciones subdurales se ha relacionado con el aumento de espacios subaracnoideos que pueden presentar algunos lactantes con macrocefalia. Esta asociación es poco conocida y poco reportada en la literatura.

Casos clínicos: Exponemos los casos clínicos de dos pacientes con macrocefalia que fueron derivados a Urgencias por un aumento progresivo y rápido del perímetro cefálico. Presentaban exploración neurológica normal y estudios de neuroimagen compatibles con hematomas subdurales subagudos múltiples.

Conclusión: Es necesario excluir la causa de traumatismo no accidental antes de plantear otros diagnósticos en pacientes pediátricos ante el hallazgo de hematomas subdurales. Aun así, existen otras etiologías relacionadas con la presencia de estos hematomas, como traumatismos accidentales o aparición espontánea. Es importante ampliar el estudio etiológico y conocer estas posibles asociaciones, así como realizar un diagnóstico adecuado y precoz dado que puede condicionar el futuro del niño.

Corresponding author:

Dra. Núria Visa-Reñé

E-mail: nvrene.lleida.ics@gencat.cat

INTRODUCTION

Children with subdural hematomas (SDH) often present to the emergency department with nonspecific signs or symptoms, which makes diagnosis challenging. These may include lethargy, feeding difficulties, altered levels of consciousness, or progressive macrocephaly without other associated symptoms. Diagnosis is usually made based on neuroimaging, including transfontanellar ultrasound, brain computed tomography (CT), or magnetic resonance imaging (MRI)⁽¹⁻³⁾.

These findings should always raise suspicion of possible non-accidental trauma (NAT), indicating potential child abuse or maltreatment. In addition, investigations should be conducted to explore accidental trauma and other potential causes of SDH⁽⁴⁾.

We describe two asymptomatic patients who consulted for macrocephaly, and who were diagnosed with spontaneous subacute SDH with different treatments and outcome.

CASE REPORTS

Case 1. A 13-month-old boy was referred to the emergency department due to a sudden increase in head circumference (HC) from -1 standard deviation (SD) to +1 SD over the last 6 months. The neurological examination was normal, psychomotor development was according to age, and there was no history of previous trauma. Transfontanellar ultrasound did not reveal any alterations and it was decided to admit the patient to complete the investigations. The MRI showed subacute SDHs, one in the right frontoparietal region, with a maximum thickness of 8 mm and another in the left parietooccipital region with a maximum thickness of 5 mm, and enlargement of the subarachnoid spaces ([Figure 1](#)).

After evaluation by social services and considering that the skeletal X-rays and fundoscopy were normal, it was concluded that there was no evidence of NAT. Based on the patient's asymptomatic condition, the neurosurgery team opted for watchful waiting. Follow-up neuroimaging studies conducted 3 months later revealed complete resolution of the hematomas.

Case 2. A 5-month-old male infant with a 2-month history of progressive macrocephaly (46 cm, > 2 SD) was referred to the emergency department for evaluation. The infant had sustained head trauma from a fall off the sofa when he was pushed by his older brother, which occurred one month earlier. The patient was asymptomatic and his neurological development was normal. Transfontanellar ultrasound and fundoscopy showed no abnormalities. However, the MRI revealed bilateral cerebral hemispheric subdural collections of varying density, measuring up to 2 cm in size, with a mass effect on the adjacent parenchyma and enlargement of the subarachnoid spaces ([Figure 2](#)). He underwent neurosurgical intervention for drainage of the hematomas. Skeletal x-rays yielded normal results, and evaluation by social services did not reveal any signs of NAT. Nevertheless, two months after the initial procedure, urgent surgical drainage was necessary due to an 8-mm, right-sided displacement of the midline, secondary to a left frontotemporo-parietal hematoma with both subdural and epidural components, measuring 113 x 40 x 61 mm in diameter, resulting in the mass effect.

Both patients underwent coagulation tests and metabolic studies with normal results.

DISCUSSION

The incidence of SDH, regardless of the etiology, is estimated at 12 cases per 100,000 children under 2 years of

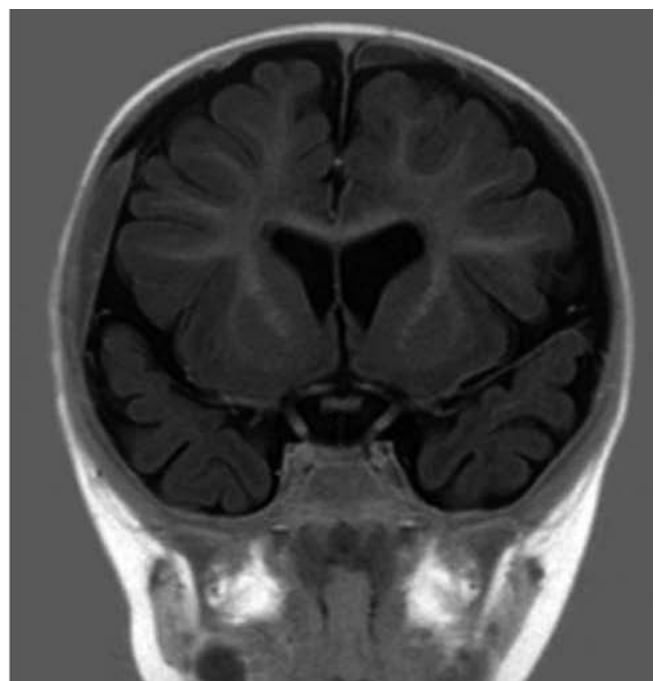
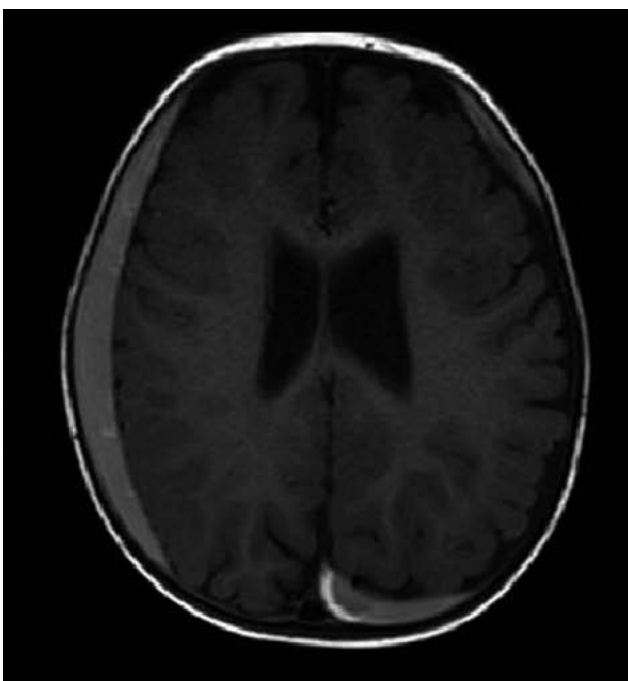


FIGURE 1. Brain MRI of case 1, axial and coronal T1-slices. Right frontoparietal and left parietooccipital subdural hematoma.

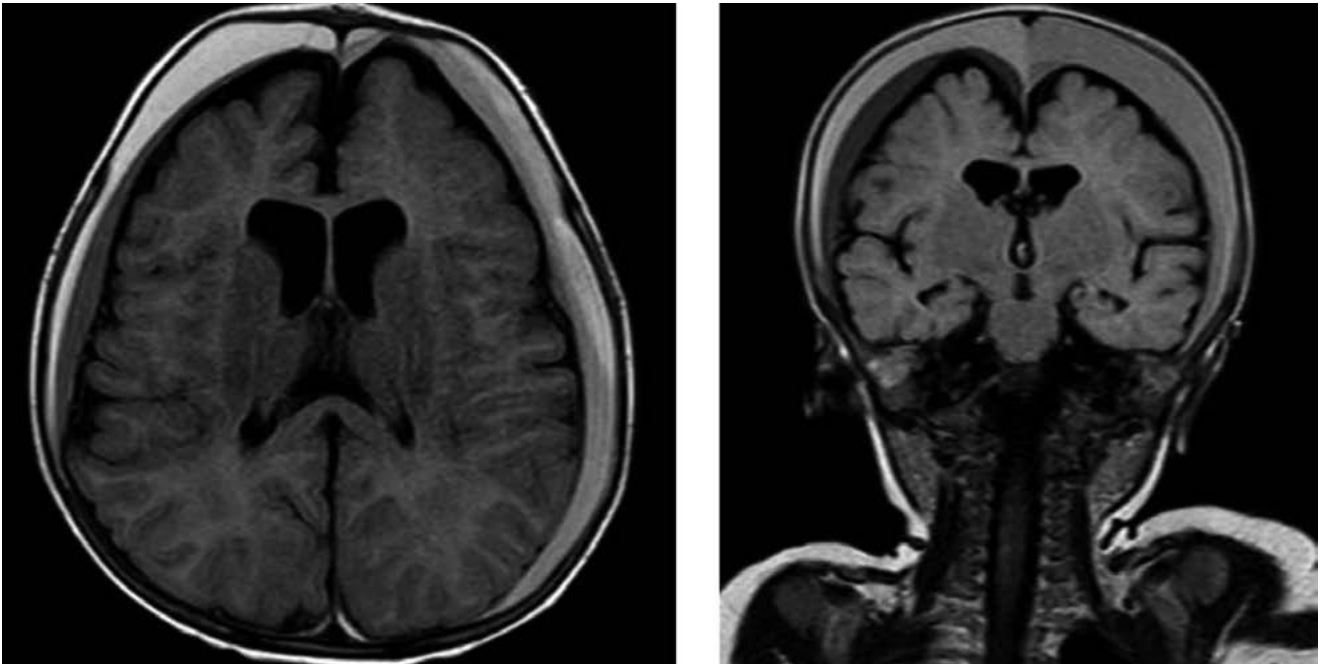


FIGURE 2. Brain MRI of Case 2, axial and coronal FLAIR sections depicting bilateral subdural hematomas.

age. The clinical presentation is often nonspecific, posing a challenge for pediatric emergency physicians in both diagnosing SDH and determining their underlying cause. While the cases described here represent an uncommon form of presentation, it remains crucial to consider the possibility of SDH in an infant with asymptomatic progressive macrocephaly due to the clinical and social implications associated with early detection^(3,5,6).

The diagnosis is made based on neuroimaging. The use of MRI as the first option in the case of suspected NAT is controversial, as it is less sensitive than CT scan in the detection of acute hemorrhage. However, in an asymptomatic patient, MRI is preferable to CT scan because of its greater sensitivity in revealing parenchymal involvement and lesions in different stages of evolution⁽⁷⁾.

The differential diagnosis of an infant with SDH mainly includes accidental traumatic brain injury (TBI), NAT, and non-traumatic causes.

Minor head trauma is a common reason for emergency department visits. In most cases it is mild and patients can be discharged after a period of observation. Nevertheless, in children under 2 years of age, the risk of NAT is higher and may lead to death or severe neurological sequelae, often associated with the presence of SDH. Given the strong association with NAT, the pediatric emergency physician should be alert and consider this diagnosis as the first option upon consultation in the emergency department. The mechanism underlying SDH in these patients typically involves tearing of the bridging veins, resulting from the acceleration-deceleration forces caused by shaking the infant while being held by the trunk. In addition, these infants commonly exhibit other associated injuries such as retinal hemorrhages and rib or long-bone fractures^(3,8).

Spontaneous causes should also be investigated in the evaluation of children with SDH. Perinatal or birth-related trauma, congenital (e.g. enlarged subarachnoid spaces),

genetic (e.g. Ehlers Danlos syndrome), or metabolic (e.g. glutaric aciduria type I) diseases, infections, coagulopathies, congenital vascular malformations, dehydration, or excessive drainage of ventricular volume (overshunting) should be considered^(9,10).

To establish an etiologic diagnosis of SDH, the evaluation conducted by the pediatric emergency physicians should include a detailed history of possible accidental causes, ruling out underlying medical conditions that may cause spontaneous SDH, and a thorough assessment of the injuries. Physical examination of the skin and mouth, skeletal x-rays and fundoscopy are important to rule out NAT. In cases of suspected spontaneous SDH, studies to evaluate coagulation and metabolic disorders, as well as comprehensive neuroimaging assessment are essential.

The finding of benign enlarged subarachnoid spaces (BESS) is common in infants with macrocephaly. The incidence of SDH in patients with BESS has been estimated to range between 4-18% and they may manifest with minimal or no trauma. The association between BESS and SDH remains poorly understood, but several hypotheses have been proposed. The prevailing theory suggests that BESS may lead to easier displacement of the brain, resulting in more frequent stretching and injury to the bridging veins. Even so, individuals with BESS may remain asymptomatic, as the brain is protected by the enlarged spaces in which BESS develops^(9,11,12). Nevertheless, it has also been suggested that the occurrence of macrocephaly with the enlargement of the subarachnoid space might be the result of a previous hemorrhage that would cause an alteration in the arachnoid granulations and impedes the normal absorption of CSF. Therefore, Raissaki et al. have proposed a guideline for patients presenting with BESS and subdural collections, recommending that the investigations should be completed with skeletal x-rays, even when the fundoscopy, evaluation by social services, and clinical examination are inconclusive^(4,5,13).

CONCLUSIONS

The finding of SDH in the emergency department necessitates the exclusion of NAT in all cases. In the presence of an asymptomatic infant with macrocephaly and SDH, even if the infant presents an image compatible with BESS, the diagnosis of child abuse cannot be ruled out without performing other complementary studies.

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