

# TRAUMATIC SUBDURAL HYGROMA

## Five cases with changed density and spontaneous resolution

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**ABSTRACT** - Thirty-four consecutive adult patients with subdural traumatic hygroma were analysed for clinical evolution, serial computed tomography scan (CT), and magnetic resonance imaging (MRI) over a period of several months. Five of the patients presented CT scan and MRI evolution data showing increasing density over a period of 11 days to 6 months post trauma. In these five patients, final clinical and CT scan data were benign, with complete spontaneous resolution. Descriptions in literature of evolving traumatic subdural hygroma have presented CT scan density modifications changing into chronic subdural hematoma. Our patients show another possibility, density transformation, which sometimes show as subdural hematoma in CT scan and MRI, but with final evolution where clinical condition and CT scan return to normal.

**KEY WORDS:** traumatic subdural hygroma, evolution, head injury, CT scan .

### **Higroma subdural traumático: a propósito de cinco casos com modificação de densidade e resolução espontânea**

**RESUMO** - Analisamos 34 pacientes adultos com higroma subdural traumático quanto à evolução clínica, tomografias seriadas e ressonância magnética. Observou-se aumento da densidade do higroma subdural em cinco dos pacientes durante período que variou de 11 dias a 6 meses após o trauma. Nestes cinco pacientes, a evolução clínica foi favorável e os higromas apresentaram resolução espontânea. Há vários relatos na literatura de modificação da densidade dos higromas subdurais traumáticos, transformando-se em hematoma subdural crônico. Esta casuística apresenta outra possibilidade, ou seja, modificação da densidade, que pode ser apresentada como hematoma subdural pelas imagens de tomografia ou ressonância magnética, mas com resultado final das condições clínicas e de imagem retornando ao normal.

**PALAVRAS-CHAVE:** higroma subdural traumático, traumatismo crânio-encefálico, evolução, tomografia computadorizada.

Post-traumatic subdural hygroma is common, but its natural history is not well defined because there are few reports of clinical and computed tomography scan (CT) evolution data. These reports lack a uniform approach to method and segment time<sup>1-19</sup>. Some authors have reported traumatic subdural hygroma presenting density modifications in the CT scan with change to chronic subdural hematoma<sup>4,7,9,10,12,13,15-18</sup>.

This study reports a series of South American adult patients with traumatic subdural hygroma, with emphasis on the evolution of clinical and CT scan data.

### **METHOD**

Thirty-four 34 consecutive adult patients with subdural traumatic hygroma were analyzed; they were analyzed with emphasis on patients who presented density modifications over a follow-up time segment. Each patient was studied for clinical evolution, serial CT scan and magnetic resonance imaging (MRI) data for several months.

This study was approved by our University Hospital Ethics Committee for Human Research.

### **RESULTS**

There were 34 patients, with ages ranging from 16 to 85 years (mean 40), seventeen between 16 and

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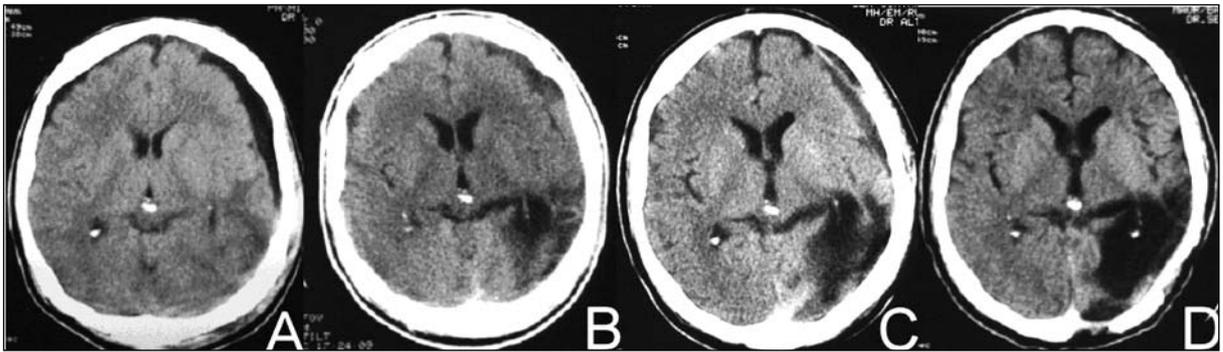


Fig 1. Case 1. (A). CT scan showing left frontal subdural hygroma (9<sup>th</sup> day). (B) Enhanced density and heterogeneous appearance (53<sup>rd</sup> day). (C) Reduction of the hygroma, with probable neomembrane (117<sup>th</sup> day). (D) Resolution of the subdural collection (730<sup>th</sup> day).

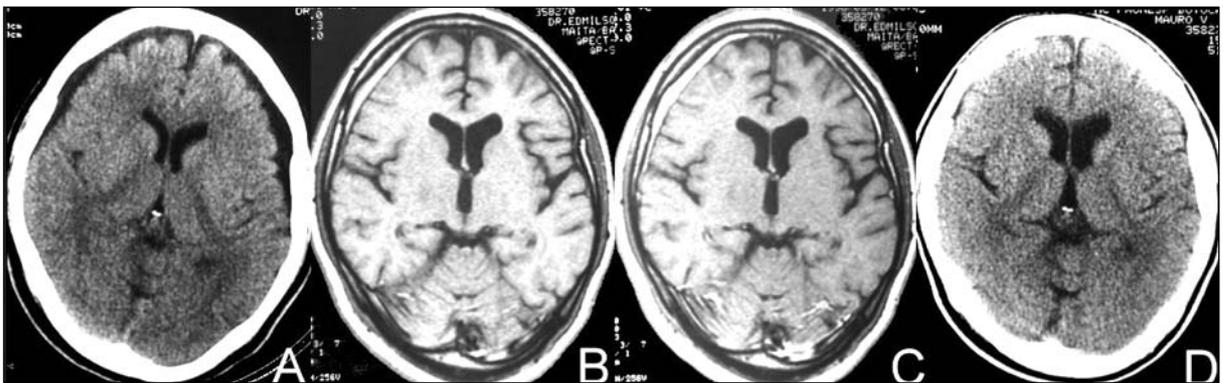


Fig 2. Case 2. (A) CT scan showing bilateral frontal subdural hygroma (12<sup>th</sup> day). (B) MRI (T1-weighted, no contrast) showing laminar subdural hematoma, without compression on the underlying brain (191<sup>th</sup> day). (C) MRI (T1-weighted, with contrast) showing peripheral enhancement (191<sup>th</sup> day). (D) CT scan showing disappearance of the subdural collection (300<sup>th</sup> day).

40 years. Mean evolution time was 249 days. Road traffic accidents were the main cause of head injury. The mean evolution time for subdural hygroma diagnosis was 9 days. Twenty-one patients (61.8%) underwent conservative treatment and 13 (38.2%), surgical treatment. Modifications in density on CT scan or MRI were observed in 5 patients (14.7% - mean evolution time 665 days).

*Patient 1* – A 35-year-old male patient was admitted with head injury after physical assault. He was confused (Glasgow Coma Scale score 10). On admission, the CT scan showed left parietal hemorrhagic contusion that required surgery. The CT scan on the 9<sup>th</sup> day showed bilateral frontal subdural hygroma, mainly on the left side (Fig 1A), which presented progressive enlargement and compression of the cerebral parenchyma. On the 18<sup>th</sup> day he was submitted to simple burr hole aspiration and irrigation of the left frontal collection. A slight xanthochromic high-pressure subdural fluid was observed. On the 53<sup>rd</sup>

day, CT scan showed the hygroma with enhanced density and heterogeneous aspect (Fig 1B). The patient presented progressive clinical improvement and a conservative approach was chosen. The CT scan on the 117<sup>th</sup> day showed reduction in hygroma size, with probable neomembrane, and without compression on the underlying cerebral parenchyma (Fig 1C). The CT scan on the 370<sup>th</sup> day showed cerebral expansion and spontaneous resolution of the subdural collection (Fig 1D).

*Patient 2* – A 35-year-old male patient was admitted with head injury after being hit by a car. He was comatose with right midriasis (Glasgow Coma Scale score 7). On admission, the CT scan showed probable cerebral edema. The CT scan on the 12<sup>th</sup> day showed bilateral frontal subdural hygroma (Fig 2A). On the following days he presented slow and progressive neurological improvement. MRI on the 191<sup>st</sup> day showed laminar subdural hematoma, without compression on the cerebral parenchyma (Fig 2B).

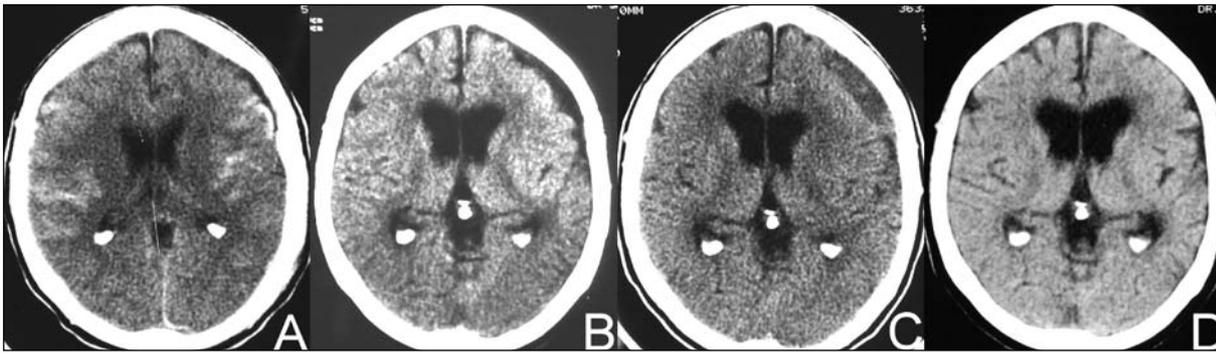


Fig 3. Case 3. (A) CT scan on admission showing diffuse subarachnoid hemorrhage and small subdural effusion in the left frontal region (1<sup>st</sup> day). (B) CT scan showing subdural hygroma with probable compression on the underlying brain (4<sup>th</sup> day). (C) CT scan showing enhanced density and increased volume, with probable ipsilateral compression on the underlying brain (77<sup>th</sup> day). (D) CT scan showing disappearance of the subdural collection (2 years later).

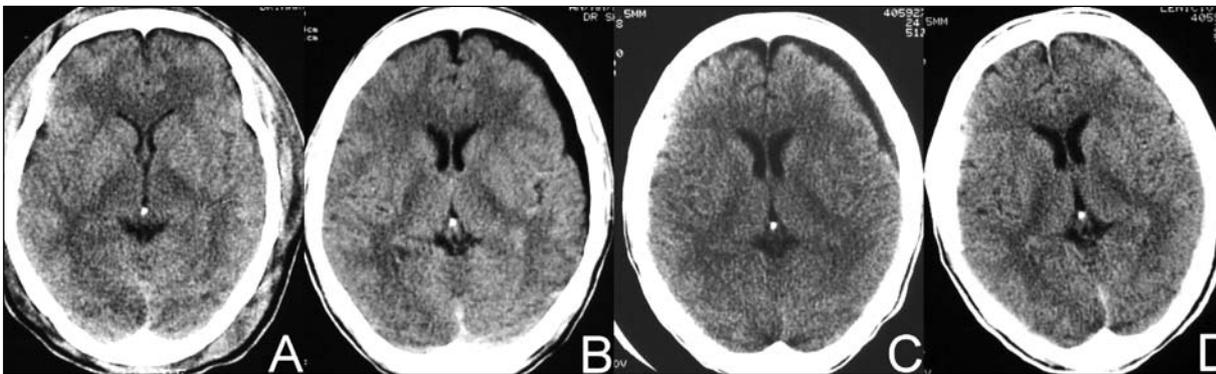


Fig 4. Case 4. (A) CT scan on admission showing subarachnoid hemorrhage and cerebral edema (1<sup>st</sup> day). (B) CT scan showing left frontoparietal subdural hygroma with probable compression of the underlying brain (26<sup>th</sup> day). (C) CT scan showing enhanced hygroma density (50<sup>th</sup> day). (D) CT scan showing reduction in the subdural collection, with probable neomembrane and septation (240<sup>th</sup> day).

The image was enhanced after endovenous injection of paramagnetic contrast, mainly on the right side (Fig 2C). The CT scan on the 300<sup>th</sup> day showed complete resolution of the subdural collection (Fig 2D). On later examination the patient was asymptomatic.

**Patient 3** – A 69-year-old male patient was admitted with head injury after falling over. He presented a transient decreased conscience state and later reported headache (Glasgow Coma Scale score 14). On admission, the CT scan showed diffuse subarachnoid hemorrhage and small subdural effusion in the left frontal region (Fig 3A); on the 4<sup>th</sup> day this had evolved into subdural hygroma, with probable compression of the underlying brain (Fig 3B). For the next 10 days, he presented with headache and somnolence, with subsequent improvement. The CT scan on the 77<sup>th</sup> day showed enhanced density and increased volume of the hygroma, with probable ipsilateral compression of the cortical sulci and ventri-

cles (Fig 3C). As his clinical examination was good, a conservative approach was chosen. Two years later he was asymptomatic, and the subdural collection had disappeared (Fig 3D).

**Patient 4** – A 42-year-old male patient was admitted with polytraumas and head injury after physical assault. He was confused and agitated (Glasgow Coma Scale score 10). On admission, the CT scan showed subarachnoid hemorrhage and cerebral edema (Fig 4A). The CT scan on the 26<sup>th</sup> day showed left frontoparietal subdural hygroma with probable compression of the underlying brain (Fig 4B). On the 27<sup>th</sup> day he was submitted to simple burr hole aspiration and irrigation of the left frontoparietal collection. A slight hemorrhagic clear subdural fluid was observed. He presented progressive clinical improvement. The CT scan on the 50<sup>th</sup> day showed enhanced hygroma density (Fig 4C). Conservative treatment was chosen. The CT scan on the 240<sup>th</sup> day showed a reduction in

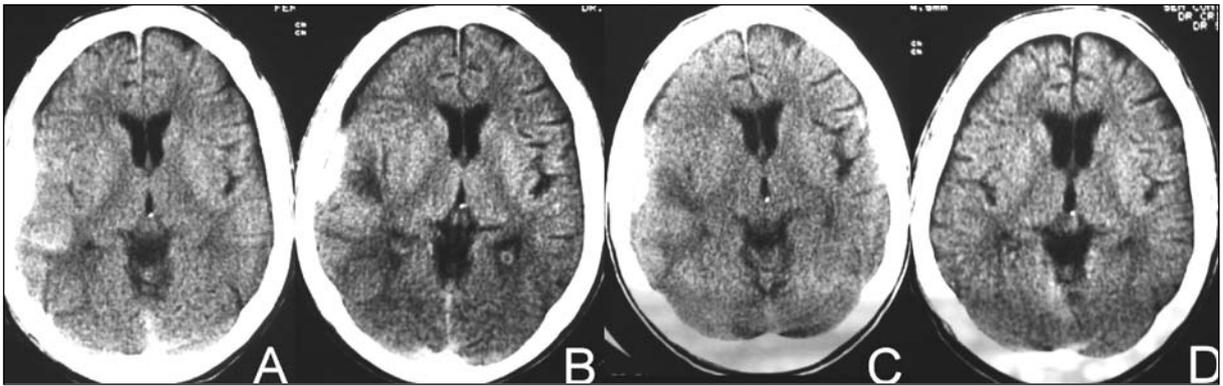


Fig 5. Case 5. (A) CT scan on admission showing laminar acute subdural hematoma on the right frontoparietal region (1<sup>st</sup> day). (B) CT scan showing right subdural hygroma adjacent to the subdural hematoma (7<sup>th</sup> day). (C) CT scan showing decreased volume and enhanced density (11<sup>th</sup> day). (D) CT scan showing cortical atrophy (2 years later).

size of the subdural collection, with probable neomembrane and septation (Fig 4D).

**Patient 5** – A 36-year-old male patient was admitted with head injury after falling over. He was confused and agitated (Glasgow Coma Scale score 10). On admission, the CT scan showed laminar acute subdural hematoma in the right frontoparietal region (Fig 5A). He was submitted to conservative treatment. The CT scan on the 7<sup>th</sup> day showed right subdural hygroma adjacent to the subdural hematoma (Fig 5B); on the 11<sup>th</sup> day, it presented decreased size and enhanced density (Fig 5C). There was a slow and progressive improvement in consciousness. Minimal cognitive deficits were observed on the 30<sup>th</sup> day. The CT scan 2 years later only showed cortical atrophy (Fig 5D).

## DISCUSSION

For different authors subdural hygroma is more prevalent in older patients with some degree of cerebral atrophy<sup>4,9,14,19</sup>. In our study, 50% of our traumatic subdural hygroma patients were between 16 and 40 years; this characterizes a younger and prevalent population. The mean age of 5 described cases was 43 years.

Transformations from subdural hygroma to chronic subdural hematoma are well documented<sup>4,7-9,13,15,18</sup>. These transformations occurred in between 0 to 58% of cases, depending on type of study and evolution time<sup>2,4,7,9,12,13,15,18,20-22</sup>. There were however few reports of mean transformation times: 65.8 days<sup>7</sup>, 68 days<sup>13</sup>, and 101 days<sup>8</sup>. In our 5 patients mean transformation time was 76.4 days. For these 5 patients with modified subdural collection after initial hygroma, enhanced density was a transitory phenomenon, and

not one of our patients needs surgery. Final clinical and imaging results presented resolution. It is not clear why our 5 patients did not develop chronic subdural hematoma from the enhanced density hygroma. This was more commonly seen in older patients<sup>4,9,14,19</sup>, where some degree of cerebral atrophy could provide the space for hematoma expansion. Four of our patients presented no cerebral atrophy.

Collection in the subdural space for more than a few weeks may induce the migration and proliferation of inflammatory cells, derived from the dural border cells, originating the chronic subdural hematoma outer membrane<sup>20,23,24</sup>. Our cases 1 and 4 presented septation inside the old and transformed hygroma delimiting areas with different densities. So, for us, the origin of these membrane cells is not clearly defined, but we agree that enhanced hygroma density could represent the bleeding of membranes formed in chronic phases of subdural hygroma<sup>25</sup>.

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