

Epidemiological analysis of 210 cases of surgically treated traumatic extradural hematoma

Análise epidemiológica de 210 casos de hematoma extradural traumático tratados cirurgicamente

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A B S T R A C T

Objective: To assess the epidemiology, clinical and radiological presentation of patients with traumatic extradural hematoma (EDH) undergoing neurosurgical procedures. **Methods:** We performed a chart review of 210 patients admitted to the emergency department with EDH diagnosed by CT scan and surgically treated between August 1998 and January 2008. Variables analyzed were: age, gender, clinical and radiological presentation, mechanism of injury and neurological status at discharge from hospital. **Results:** In 49.2% trauma mechanism was fall; 89.2% of patients were male, 49.7% of cases had a Glasgow Coma Scale (GCS) between 13 and 15; 61% of patients had age between 20 and 49 years; the location of EDH was the temporo-parietal and temporal in 26.5% and 19.6% of the cases, respectively; 32.8% had associated intracranial lesions, with skull fractures seen in around 45% of cases; 76.2% of surgically treated patients were discharged with minimal or no neurologic deficit. **Conclusion:** We observed that, in the study population, EDH appears more often in males, in the fourth decade of life, and is more related to falls. On admission, GCS was observed between 13 and 15 and it is appropriate to mention the involvement of the temporo-parietal region in most cases. We believe that knowledge of the epidemiology of traumatic epidural hematoma can assist in developing public health measures aimed at prevention and early identification of this disease in the population.

Key words: Hematoma. Hematoma, epidural, spinal. Glasgow coma scale. Craniocerebral trauma, Surgical procedures, operative.

INTRODUCTION

Among the major injuries resulting from traumatic brain injury (TBI), the extradural (or epidural) hematoma (EDH) is one of the most lethal¹⁻⁵. EDH classically occurs by disruption of the middle meningeal artery, causing arterial bleeding, which dissects the dura from the inner bone plate of the skull. The presence of the hematoma promotes increased intracranial pressure, causing cell lesion and brain damage.

The continuous development of means of transport associated with the disregard for traffic laws and an increasingly aggressive society are responsible for the increase in the number of cases of traumatic extradural hematomas^{2,3}, which have a high mortality rate when the diagnosis is performed later. The mortality of patients in the early twentieth century was about 80%, thus constituting a true neurosurgical emergency⁶. In the 70s,

with the advent of angiography and the improvement of diagnostic methods, the mortality rate was greater than 30%¹. The introduction of computed tomography (CT) allowed early diagnosis, leading to a decrease in its mortality and morbidity caused^{3,4}.

Currently, EDH represents about 1% to 5.5% of intracranial lesions in patients with traumatic brain injury, its mortality reaching 20%¹. Despite the small percentage of patients with head trauma developing EDH, the rapid neurological deterioration observed is often dramatic^{1,4,5}. Early diagnosis and neurosurgical intervention in a timely manner promote the reduction of morbidity and mortality, so it is vital that people who deal with trauma patients are familiar with and trained to manage this type of injury⁵.

The objective of this study is to analyze some aspects of epidemiology, clinical presentation and radiological diagnosis of patients with traumatic extradural hematoma who underwent neurosurgical procedure.

Work performed in the Emergency Department of Holy House of São Paulo, São Paulo State – SP, Brazil.

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METHODS

We included patients admitted to the Emergency Department of the Holy House of São Paulo during the from August 1998 to January 2008 with a diagnosis of traumatic extradural hematoma by computed tomography (CT) and were surgically treated. The selected patients had their charts reviewed.

We evaluated: age, gender, mechanism of injury, neurological status on admission, brain and head injuries diagnosed on CT, location of EDH, hospitalization and neurological status at discharge from hospital. All patients were initially treated according to the protocol of the Advanced Trauma Life Support (ATLS). On admission, neurological status was assessed using the Glasgow Coma Scale (GCS) and at discharge we used the Glasgow Outcome Scale (GOS).

We excluded from this study: patients not undergoing neurosurgical treatment, patients with spontaneous epidural hematoma and patients with medical records lost or which had conflicting information.

RESULTS

During the period studied, 210 patients were admitted to the Emergency Department with diagnosis of epidural hematoma. Our series included patients with six months of life until 79 years of age, EDH being more frequent in patients in the fourth decade (Table 1).

Men were more affected than women, 89.2% and 10.8%, respectively. The main mechanisms of injury observed in our study were: falls, running over, motorcycle accidents, assaults, car accidents and unknown mechanisms (Table 2).

On admission, 102 patients (49%) presented with GCS between 13 and 15, 41 (19%) had GCS between 9 and 12 and 32% had severe TBI, with GCS between 3 and 8.

Skull fractures were observed in 45% of cases, the temporal bone being the most affected (Table 3).

The most common location of EDH was the temporo-parietal region, with 26.5%, followed by temporal region, which represented 19.6% of cases (Figure 1). In 33% of patients there were associated intracranial injuries, and concussion was responsible for 46.9% of these lesions, acute subdural hematoma by 42.0%, subarachnoid hemorrhage by 9.9% and diffuse axonal injury by 1.2%.

Eighty-six patients (40.7%) were discharged after seven days of hospitalization, 32% of patients between 7 and 14 days and 28% after 14 days; 65.6% of patients showed no deficits after surgery. The mortality in this study was 15.5% (Table 4).

Table 1 – Distribution of patients according to age group.

Age group	N	%
0-9	19	9%
10-19	31	14%
20-29	38	18%
30-39	57	27%
40-49	34	16%
50-59	21	10%
60-69	5	2%
>70	3	2%
Unknown	2	1%
Total	210	1.0

Table 2 – Mechanism of trauma.

Mechanism	N	%
Fall	99	48%
Running Over	57	28%
Assault	26	12%
Motorcycle Accidents	10	4%
Car Accidents	6	2%
Unknown	12	6%
Total	210	1.0

Table 3 – Location of cranial fracture.

Location	%
Temporal	16
Temporo-parietal	12
Frontal	6
Occipital	4
Parietal	3
Other locations	4
Total	45

DISCUSSION

Traumatic epidural hematomas are neurosurgical lesions of greater severity, as affected by them presented with death hazard^{4,7}. The delayed diagnosis and treatment of EDH are related to increased mortality and worse functional outcome³⁻⁵.

In our department we observed that EDH is more prevalent in male patients, suggesting a greater exposure of men to traumatic injuries such as falls and assaults in our midst.

The most affected age group in our study was the fourth decade of life. These results are in agreement

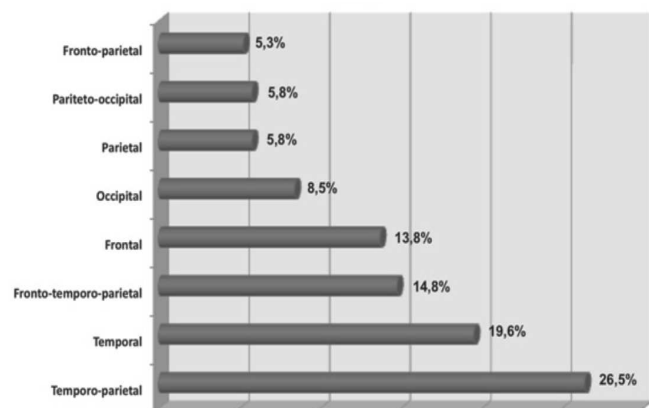


Figure 1 - Distribution of patients according to the location of the extradural hematoma.

Table 4 - Distribution of patients according to Glasgow Outcome Scale (GOS).

GOS	N	%
1	32	15.5%
2	1	0.5%
3	17	8%
4	22	11%
5	139	65%
Total	210	1.0

with literature data^{1-5,7}. These patients have a higher exposure to risk situations such as driving at high speed without the use of safety belts or riding motorcycles without a helmet, making them more vulnerable to head injuries and epidural hematomas. In elderly patients EDH is less frequent because of strong adhesion of the dura to the skull, hampering the detachment and accumulation of blood³. In children, as the osseous groove that houses the middle meningeal artery is not yet fully formed, injury of this artery is less frequent³.

The main mechanism of injury found in our study was the fall from height, which is justified by the pathogenesis of epidural hematoma, most often associated with mild or moderate trauma, such as falls from small heights, assaults and other^{4,5}.

On admission, most patients had GCS between 13 and 15, demonstrating that the epidural hematoma is

often a consequence of low-energy trauma, with little effect on the brain parenchyma. In patients with EDH, about 22-56% are in coma on admission or immediately before the operation³. The classic "lucid interval", described as loss of consciousness followed by a lucid period and the quick deterioration into coma, was observed in 47% of patients^{2,4,7}. The majority of patients presents with no apparent neurological deficits on admission, making the proper assessment of trauma patients extremely important, as they may be affected by this neurosurgical emergency.

Skull fractures were present in 45% of cases, the involvement of the temporal region in most cases being worth mentioning; this confirms the importance of the anatomical relationship between the middle meningeal artery and the temporal bone in the pathophysiology of EDH^{2,3,6}.

The EDH may result from injury to the middle meningeal artery, middle meningeal vein, diploic veins or dural venous sinuses⁶. Historically, bleeding from the middle meningeal artery has been considered the main source of EDH³. However, it was only possible to identify a source for arterial bleeding in less than half the cases of EDH, which shows an important role of the venous origin³.

Consistently with other series, the most common location of EDH was temporo-parietal and temporal³⁻⁸. This fact is mainly due to the susceptibility of these regions to external traumas and due to their close anatomical relationship with the middle meningeal artery.

The length of hospital stay was less than seven days in 40.7% of cases and, at the time of discharge, about 76% of patients were in satisfactory clinical condition, with minimal or no neurologic deficits. The most important factors for good functional outcome of treatment of EDH are: GCS, age, pupillary abnormalities on admission, presence of associated intracranial lesions and time between neurological deterioration and surgery³. In our study, most patients were young adults with mild TBI operated early, explaining the good results.

We conclude that the EDH, in the studied population, appears more often in males, in the fourth decade of life and is more related to falls. On admission, we observed a GCS between 13 and 15 and is appropriate to mention the involvement of the parietal region in most cases. We believe that knowledge of the epidemiology of traumatic epidural hematoma can assist in developing public health measures aimed at prevention and early identification of this disease in the population.

R E S U M O

Objetivo: Analisar aspectos da epidemiologia, apresentação clínica e radiológica de pacientes com hematoma extradural traumático (HED) submetidos a procedimento neurocirúrgico. **Métodos:** Foi realizada a revisão de prontuários de 210 pacientes admitidos no Serviço de Emergência com HED diagnosticados através de tomografia computadorizada, tratados cirurgicamente no período de agosto de 1998 a janeiro de 2008. Foram analisados: idade, sexo, apresentação clínica e radiológica, mecanismo de trauma e status neurológico no momento da alta hospitalar. **Resultados:** Em 49,2% o mecanismo de trauma foi queda; 89,2% dos pacientes eram do gênero masculino; 49,7% dos casos tinham Escala de Coma de Glasgow (ECG) entre 13-15; 61% dos pacientes tinham idade entre 20-49 anos; A localização do HED em 26,5% e 19,6% dos casos foi têmpero-parietal e temporal, respectivamente; 32,8% tinham lesões intracranianas associadas, sendo a fratura craniana evidenciada em cerca de 45% dos casos; 76,2% dos pacientes tratados cirurgicamente tiveram alta com déficit mínimo ou ausência de déficit neurológico. **Conclusão:** Observamos que o HED, na população de estudo, apresenta-se mais frequentemente no gênero masculino, na quarta década de vida, mais relacionado às quedas. Na admissão, observamos uma ECG entre 13 e 15, sendo pertinente mencionar o envolvimento da região têmpero-parietal na maioria dos casos. Acreditamos que o conhecimento da epidemiologia do hematoma extradural traumático pode auxiliar na elaboração de medidas de saúde pública, visando à prevenção e identificação precoce desta doença em determinada população.

Descritores: Hematoma. Hematoma epidural espinal. Escala de coma de Glasgow. Traumatismos craniocerebrais. Procedimentos cirúrgicos operatórios.

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