Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i6.6475

EXTRADURAL HEMATOMA PREVALENCE IN PATIENTS HAVING HEAD INJURIES AND SKULL FRACTURES

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Abstract

Background: The fusing of several flat bones joined by cranial sutures results in the formation of the skull. Every flat bone consists of an inner table made up of dense fibrous Dura mater, an outside table, and a spongy diploe. The fragile arachnoid mater covering the inner surface of the brain is divided from the inner Dura surface by a thin subdural gap. When there is a trauma, like a direct hit, a car accident, or a fall, the continuity of the skull bone is broken, resulting in a skull fracture. It is predicted that 10 to 20 percent of patients who suffer head injuries may develop an extradural hematoma. After a head trauma, about 17% of the previously conscious individuals may go into a coma as a result of the formation of an extradural hematoma. According to research, 8.53% of instances with head injuries revealed an extradural hematoma, while 31.09% of cases had skull fractures.

Objective: To determine the prevalence of extradural hematoma in patients having head injuries and skull fractures

Study design: A cross-sectional study

Place and Duration: This study was conducted in Jinnah Postgraduate Medical Center Karachi from Feburary 2023 to February 2024

Methodology: With a 95% confidence level, the study used the WHO sample size calculator to calculate the minimum sample size that was 350. Patients of any gender between the ages of 16 and 80 years who had head injuries within the previous 24 hours and an x-ray showing they had a fractured skull met the inclusion criteria. A total of 350 patients who fit this description were taken from the Emergency Ward. CT scans were used on patients with head injuries and verified skull fractures to check for extradural hematomas, which are defined as blood clots between the dura mater of the brain and the inner table of the skull. X-ray imaging was used to identify skull fractures.

Results: There were a total of 350 individuals enrolled in this research. The study included 80% males (n=280) and 20% females (n=70). The average age of the individuals was 41.32 years. The mean duration of the injury was 6.38 hours. Majority of the patients (n=108) had a depressed type of skull fracture. There were 113 patients who were diagnosed with extradural hematoma.

Conclusion: Even though this study indicated a low frequency of extradural hematoma in patients with head injuries, timely CT scan screening is still necessary to identify cerebral bleeding early and avert complications and death linked to traumatic head injuries.

Keywords: adults, extradural hematoma, skull fractures, CT scan brain, trauma

Introduction

The fusing of several flat bones joined by cranial sutures results in the formation of the skull [1]. Every flat bone consists of an inner table made up of dense fibrous Dura mater, an outside table, and a spongy diploe [2]. The fragile arachnoid mater covering the inner surface of the brain is divided from the inner Dura surface by a thin subdural gap [3]. When there is a trauma, like a direct hit, a car accident, or a fall, the continuity of the skull bone is broken, resulting in a skull fracture [4]. Localized impact can result in skull abnormalities that harm the cranial contents even in the absence of an outward fracture [5]. A fracture at or close to the impact site may arise from severe direct force. Simple skull fractures rarely result in neurological impairments, but they can have major neurological effects when they cause intracranial injuries [6].

Traumatic brain injury is one kind of hematoma that affects the brain and occurs inside the skull, usually as an extradural hematoma [7]. This is the consequence of blood pooling between the inner surface of the skull and the layers of the dura mater [8]. There is also an increased risk of hemorrhage in the spinal cord because it is encased in the dura mater [9]. Head trauma can make this disease worse by putting more pressure on the intracranial area. The fragile brain tissues are compressed by this high pressure, which results in brain displacement. Between one and three percent of head traumas have this condition.

It is predicted that 10 to 20 percent of patients who suffer head injuries may develop an extradural hematoma. After a head trauma, about 17% of the previously conscious individuals may go into a coma as a result of the formation of an extradural hematoma [10]. Overall 5,189 hospitalized extradural hematoma instances were found by a retrospective review of cases in the United States using the Nationwide Inpatient Sample [11]. The study found that 2.9 percent of patients experienced in-hospital problems, and 3.5 percent of patients died [12].

Complications from brain traumas can include extradural hematomas, which are frequently brought on by ruptures of the main meningeal artery near the temporal bone. Because of bone loss, skull vault fractures in the parietotemporal region are frequent. Temporal bone damage can result in temporal artery tears even in the absence of obvious skull fractures. After trauma, extradural hemorrhage, which builds up between the dura and skull, can appear suddenly or gradually. Radiographic imaging is required because clinical indicators are not trustworthy in diagnosing intracranial injuries. According to research, 8.53% of instances with head injuries revealed an extradural hematoma, while 31.09% of cases had skull fractures [13]. Even though there are not many cases reported, it is important to assess and treat individuals with head injuries right away, especially if there are concomitant skull fractures. Since extradural hematomas are often more common in individuals who had a skull fracture, we conducted this research in order to find out the prevalence of this issue.

Methodology

With a 95% confidence level, the study used the WHO sample size calculator to calculate the minimum sample size that was 350. Consecutive non-probability sampling was used. Patients of any gender between the ages of 16 and 80 years who had head injuries within the previous 24 hours and an x-ray showing they had a fractured skull met the inclusion criteria. A total of 350 patients who fit this description were taken from the Emergency Ward. Each patient's attendant gave their verbal assent, and demographic data was noted along with other pertinent information.

Exclusion criteria: The study excluded patients with post-surgical extradural hematoma, vascular abnormalities of the dura mater, and bleeding disorders.
CT scans brain were used on patients with head injuries and verified skull fractures to check for extradural hematomas, which are defined as blood clots between the dura mater of the brain and the inner table of the skull. X-ray imaging was used to identify skull fractures. One senior radiologist performed CT scans, and data were methodically recorded. With SPSS version 24, statistical analysis was carried out. Descriptive statistics, such frequencies and mean values, as well as inferential statistics, like Chi-Square, were used to evaluate correlations between variables. All trauma patients who met the inclusion criteria were enrolled for evaluation by a senior neurosurgeon for appropriate care after receiving approval from the ethics committee.

Results

There were a total of 350 individuals enrolled in this research. The study included 80% males (n=280) and 20% females (n=70). The average age of the individuals was 41.32 years. The mean duration of the injury was 6.38 hours. Table number 1 shows the frequency of patients according to the type of skull fractures and site of skull fracture.

Table No. 1:frequency of patients according to the type of skull fractures and site of skull fracture.

	N	%
Type of skull fractures		
● **Linear**	70	20.0
● **Simple**	88	25.1
● **Depressed**	108	30.8
● **Compound**	84	24.1
Site of skull fracture		
● **Frontal**	62	17.7
● **Parietal**	121	34.5
● **Temporal**	98	28.0
● **Occipital**	69	19.8

There were 113 patients who were diagnosed with extradural hematoma. Table number 2 shows frequency of extradural hematoma in relation to effect modifiers.

Table No. 2:frequency of extradural hematoma in relation to effect modifiers**.**

	Extradural hematoma	
Modifiers	**Present (n=113)**	**Absent (n=237)**
Gender		
● **Male**	88	193
● **Female**	24	44
Age (Years)		
● **15-30**	71	59
● **31-40**	34	55
● **41-65**	8	123
Injury duration (Hours)		
● **1 to 4**	42	77
● **5 to 8**	40	88
● **9 to 12**	31	72
Type of skull fractures		
● **Linear**	25	45
● **Simple**	28	61
● **Depressed**	35	74
● **Compound**	25	57
Site of skull fracture		
● **Frontal**	16	45

• **Parietal**	59	61
• **Temporal**	26	71
• **Occipital**	12	60

Table number 3 shows the correlation among modifiers with presence of an extradural hematoma.

Table No. 3:correlation among modifiers with presence of an extradural hematoma

Modifiers	**Extradural Hematoma (P-value)**	**Significance**
Gender	0.425	Non-significant
Age	0.000	Significant
Type of skull fracture	0.945	Non-significant
Injury duration	0.672	Non-significant

Discussion

Adults with head injuries are disproportionately disabled and die from unnatural causes. For many head traumas, including subarachnoid hemorrhage and extradural hematoma, prompt neurosurgical surgery is essential to successful outcomes. After a head injury, an intracranial hematoma is a dangerous consequence that needs to be diagnosed and treated right away. However, diagnosis frequently depends on clinical history and the identification of skull fractures on standard x-ray images in underdeveloped nations like Pakistan, where access to CT scans is limited [14].

According to this study, 32.28% of patients with skull fractures had extradural hematomas. Two local investigations from Ayub Medical College and another from Peshawar, Pakistan, found that the frequencies of extradural hematoma in patients with head injuries were 29.8% and 38.88%, respectively [15,16]. Furthermore, Rehman et al. from Peshawar discovered that extradural hematomas affected 8.53% of patients with head injuries [17]. The incidence of intraparenchymal hemorrhage and extradural hematoma was reported by Perep et al. and colleagues to be 22% [18].

The frequency of extradural hematoma was higher in this study than in the earlier research, with the exception of one Peshawar study where the frequency was 38.88% [19]. The fact that 23.1% of patients had fractures in the temporal bone and 52.9% of patients had fractures in the parietal bone may be the cause of this increased incidence. Age and the presence of extradural hematoma were shown to be significantly correlated, as were parietal bone fractures and the presence of hematoma ($p = 0.000$ for both associations). The findings showed that extradural hematomas patient age were negatively correlated, with a higher incidence seen in younger age groups (16–32 years old). Similarly, a considerably greater frequency of extradural hemorrhage was observed in cases of parietal bone fractures.

According to Chattopadhyay et al., blunt force injuries to the temporal and parietal areas can cause fractures to the skull bones and subsequent rupture of brain blood vessels in the epidural space, which is why the incidence of extradural hematoma tends to increase after head trauma [20]. The younger age group in this study—those between the ages of 16 and 32—had a significantly greater frequency of extradural hematomas (62.5%, p-value = 0.000).

Conclusion

Even though this study indicated a low frequency of extradural hematoma in patients with head injuries, timely CT scan brain screening is still necessary to identify cerebral bleeding early and avert complications and death linked to traumatic head injuries.

Ethical approval:

It was taken from the review committee

Funding:
No funding source

Conflict
No conflict of interest

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