ORIGINAL ARTICLE

Frequency of Intracranial Hemorrhages in Medicolegal Death Cases: A Cross Sectional Study

MUHAMMAD FAHEEM ASHRAF[1], MUHAMMAD IMRAN KHAN[2], MEHAK KHALID[3], SAMINA KANWAL[4], SHAMS MUNIR[5]
[1,4]Assistant Professors, [3]Demonstrator, Department of Forensic Medicine & Toxicology, [5]Assitant Professor of Radiology, Khawaja Muhammad Safdar Medical College, Sialkot
[2]Assitant Professor of Neurology, Gujranwala Medical College, Gujranwala
Correspondence to Dr. Muhammad Faheem Ashraf, Email: faheemashraf206@gmail.com Cell 0300-7771362

ABSTRACT

Aim: To examine the frequency of intracranial hemorrhages in medicolegal death cases.
Study Design: Cross-sectional
Place and duration of study: Department of Forensic Medicine & Toxicology and Department of Radiology, Khawaja Muhammad Safdar Medical College Sialkot from 1st January 2019 to 30th June 2020.
Methodology: Total one hundred and ten patients were enrolled which include, dead bodies directly landing in dead house for postmortem or after death in wards for autopsy. Patient's complete demographics were recorded. Histopathology performed by tissue specimens of patients in which it is required. Blood sample was taken for alcohol and toxicological analysis. Cases were examined by using X-rays, CT Scans and MRI (where needed) complete autopsies were carried out. The decomposed bodies were excluded.
Results: Mean age of patients was 33.18±16.68 with BMI 23.52±17.65. Intracranial lesions accounted for 12.68% of the total deaths. Mostly patients aged >23-35 were mainly affected by intracranial lesions. Percentage of traumatic (road traffic accidents) cases were greater than non-traumatic (cerebro-vascular accidents). Ratio of males was excess than that of females. Intracranial lesions separate were seen in 29(26.36%) patients. Subarachnoid hemorrhages were the commonest intracranial lesions. Pneumonia represents the commonest complication in delayed death.
Conclusion: Intracranial cause of death was minimum in number but they showed majority of sharing injuries in other anatomical sites.
Keywords: Medico legal deaths, Intracranial lesions, Forensic

INTRODUCTION

The head is the preferred target for criminal acts and is a favorite place for various pathological lesions[1]. According to the WHO deaths related to the head, whether traumatic or non-traumatic, represent about 17% depending on global studies from different countries; in the United States of America (USA) cerebrovascular diseases represent the third cause of death[2]. The basic traumatic head injury (THI) is an insult to the head due to an external mechanical force, possibly leading to a temporary or permanent impairment of cognitive, physical, and psychosocial functions, associated with a diminished or altered state of consciousness. There are two types of THI: closed head injury (or non-penetrating) and open head injury (or penetrating)[3].

Intracranial haemorrhage forensically diagnosed traumatic or not traumatic death is hard to be rotten. It requires a detailed analyses and a precise explanation of all variables. Magnetic resonance imaging (MRI) is a good technique for rising forensic autopsy, especially when combined[4], but anticipating findings on post mortem imaging of the brain can imitate pathological processes in the living brain, which lead to a possible misdiagnosis[5].

Blood build up in the intracranial side is a cerebral haemorrhage. It can be epidonal if the blood is in the skull and the dura mater, subdural if it is in the dura mater or arachnoid, subarachnoid if it is in the brain or intra-brain if it is intra-parenchymal. The location of the lobar (frontal, temporary, parietal, occipital) or of the blood collection in the brain ventricles will further differentiate between intraparenchymal brain haemorrhage[6]. Autopsy diagnosis calls for a thorough examination of the brain and intra-cranial structures, with a careful depiction of the various sections.

However the diagnosis of the existence of a cerebral haemorrhage that is necessary in order to distinguish whether a natural death is or is not a traumatism, is complicated by the rottenness of the pathology as a result of changes in the organ's macroscopic study which render it completely unusable.[7] As shown by an investigation carried out in the national energy x radiography study[8], the prevalence of intracranial damage is 8.3 percent. The most common result of all brain injuries is intracranial haemorrhage[9]. We conducted present study to examine the frequency and types of intracranial lesions in medico-legal death cases.

MATERIALS AND METHODS

This interventional comparative study was carried out at Department of Forensic Medicine & Toxicology and Department of Radiology, Khawaja Muhammad Safdar Medical College Sialkot from 1st January 2019 to 30th June 2020 and comprised of 110 cases. Detailed information (age, sex, mode of death and medical history) of all patients was carried by police reports, relatives of patients and by medical reports. Blood samples of all patients were taken for toxicology and alcohol investigations using a mixture of NaF or KFl and potassium oxalate. Alcohol gas chromatography (ALC) was used for detection of alcohol

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and for toxicology thin layer chromatography was used (TLC). Digital photography was done for interesting and unique injuries and pathologies. Digital photography was done for interesting and unique injuries and pathologies.

External examination of the bodies to locate and mark all external injuries and their anatomical sites and types was carried out. X-ray examination was performed on some cases when needed, then a complete classical autopsy was performed starting with the head region. After removing the bony window, the meninges and the brain were examined for any hematomas, hemorrhages or any other lesions and abnormalities. The brain was removed and examined thoroughly; the base of the skull was examined after removing the dura to detect any fractures or pathological state. Separating the cerebellum from the cerebrum by single swap movement at its junction, the brain was sliced in two parts by the brain knife in the sagittal section to examine the ventricles and both the white and gray matter; then a coronal incision with one centimeter slices was carried out starting from the frontal lobe. The cerebellum and the brainstem were also sliced and examined. The autopsy was completed by dissecting the chest and abdominal regions to reveal any internal organ injury associated with the intracranial pathology. Data was analyzed by SPSS-24.0

RESULTS

There were 72(65.5%) male patients and 38(34.5%) female patients with mean age of 33.18±16.68. Mostly patients 25(22.72%) aged >23=35 years were mainly affected by intracranial lesions and the least common age group affected by those injuries was > 65 years accounting for 4(3.6%) from the total number of all cases. Total 84(76.36%) cases were seen traumatic and non-traumatic cases was 19 (17.27%) rest of cases 7(6.36%) were unknown (Table 1).

Road traffic accident was the most common cause of death, 33(39.35) cases were observed. In traumatic category, we found 18(21.45%) cases of bullet injuries, 12(14.29%) cases of traumatic wounds,4 cases by bomb explosion, 2 patients were crushed by heavy objection the head, railway injuries calculated in 4 cases, death caused by electric shock in 1 case, FFH and RTA in 3 cases and stab wound found in 2 cases and in non-traumatic cases 3 cases of tumors were observed, 4 patients due to sudden death, cerebrovascular diseases found in 7 cases. Convulsions in 1 case and meningitis were in 4 cases (Table 2). Intracranial lesions alone were seen in 29(26.36%) cases and mixed intracranial and extra-cranial lesions were seen in 83 cases (75.45%), while intracranial lesions with extra-cranial lesions that accompanied other body lesions were seen in 59 cases [49.09%] (Table 3).

Fifty eight (52.72%) patients were admitted to hospital while 52(47.27%) patients died instantly. Complications were seen in 17(15.45%) cases. Pneumonia represents the commonest complication in delayed death and was seen in 7 cases (41.18%), myocardial infarction found in 4(23.53%) cases, gastric ulcer found in 2(11.76%), gastroenteritis in 2(11.76%), pancreatitis and Atrophied internal organs found in 1(5.88%) cases of each. Among intracranial lesions, subarachnoid hemorrhage was the commonest finding during autopsy and was found in 10(34.49%) cases; subdural hemorrhages were found in 9(31.03%) cases, 6(20.69%) patients had epidural hemorrhages and 4 (13.79%) patients had parenchymal hemorrhages respectively (Table 4). All toxicological laboratory tests were negative for drugs, including benzodiazepines, barbiturates and antiepileptic drugs, as many victims might be under their effect during driving.

Table 1: Mode of death with age (n=110)

Mode of death	No.	%
Traumatic	84	76.36
Non-traumatic	19	17.27
Unknown	7	6.36

Table 2: Differentiation of categories with traumatic and non-traumatic deaths

Categories	Traumatic	Non Traumatic	Un known	Total
Fall from height (FFH)	5	-	-	5
Tumor	-	3	-	3
Road traffic accidents	33	-	-	33
Bullet injury	18	-	-	18
Traumatic wounds	12	-	-	11
Sudden death	-	4	-	4
Unknown	-	-	7	7
Meningitis	-	4	-	4
Bomb explosion	4	-	-	4
Heavy object fall on head	2	-	-	2
Railway injury	4	-	-	5
Cerebrovascular diseases	-	7	-	7
Convulsions	-	1	-	1
Electric shock, fall from height	1	-	-	2
FFH and RTA	3	-	-	3
Stab wound	2	-	-	1

Table 3: Body lesions and types of cranial lesions

Variables	No.	%
Intracranial lesions	29	26.36
Intracranial lesions and extra-cranial lesions	83	75.45
Intracranial lesions with extra–cranial lesions with other body lesions (gastric ulcers, wounds, etc.)	59	49.09

Table 4: Types of intracranial hemorrhages (n=29)

Variables	No.	%
Subarachnoid	10	34.49
Subdural	9	31.03
Epidural	6	20.69
Parenchymal	4	13.79

DISCUSSION

This study was comparatively similar to many previous studies as intracranial injuries were found in 12.68% from the total deaths. The study coincides with results in which intracranial lesions represent 12% of all deaths[10].

Mean age of all the cases were similar to previous study done by d'Avella et al[11] and Al-Qazzaz et al[12]. Mostly

patients 25(22.72%) aged >23=35 years were mainly affected by intracranial lesions and the least common age group affected by those injuries was > 65 years accounting for 4(3.6%) from the total number of all cases, this was same to the previous study conducted by Chute et al[13].

In the present study the majority of cases were traumatic injuries referred to autopsy while non-traumatic cases were least in number. Mostly males were affected in traumatic and non-traumatic mode of deaths. These results were similar to many other previous retrospective studies on traumatic brain injuries[14-15].

Natural deaths were seen in minority in cases but fatal road traffic incidents were observed greater in number in traumatic mode and these results were very similar to other studies.[16] Majority of cases were found mixed intracranial lesions and extra cranial lesions due to traumatic mode. Subarachnoid hemorrhage followed by intracerebral hemorrhage in intracranial group. There were no any fractures found in half of the patients but skull fractures found by bullet injuries were mostly common.[17] In this study internal organ injuries were seen one third to the total numbers of injuries.

Complications were found in 15.45% from the total numbers and pneumonia was the commonest in delayed of death. This could be attributed to the longer duration of admission with dependence on parental feeding due to unconsciousness in addition to contamination making the victims more liable to pneumonia. Head injury was the most common which reflects severity of trauma (deaths due to brain laceration) while edema found naturally or traumatic in origin.[18] In our study half of the patients were died instantly and this was similar to previous results.[19] This resulted that mostly victims were died on the spot of accident and rest of cases due to delayed of admission to the hospital. Except this rest of patients died in hospitals because of complications such as pneumonia and delayed bleeding as a result of rupture of a cerebral artery which may happen after a variable period of time following trauma due to injury to its wall and the formation of post-traumatic aneurysm[20].

This study showed that nearly half of those died instantly, which is close to an earlier finding[21]. This represents the gravity and seriousness of injuries that resulted in a higher instantaneous mortality rate and the delay in transporting wounded patients to hospitals. More than half of these, on the other hand, died later in hospitals because of complications such as pneumonia and delayed bleeding from cerebra breakage which can occur after variable periods following trauma due to wall damage and post-traumatic aneurysm formation[22]. In the current study there was limited role of alcohol and toxicology and this was similar to previous studies[23].

CONCLUSION

Males of young age mostly affected and both genders were included in traumatic causes of deaths. In traumatic mode accidental injuries were reported, commonest pathology was found subarachnoid hemorrhage while brain and brainstem lesions found were lacerations.

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