



A Study Of Incidence And Patterns Of Adrenal Hemorrhage In Autopsy Cases

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Abstract

Introduction : Adrenal haemorrhage is an unusual condition with a variable and non-specific presentation. It could be fatal when it results in adrenal crisis. Adrenal gland haemorrhage could be either microscopic or macroscopic and unilateral or bilateral. The mortality rate associated with Adrenal haemorrhage depends on the severity of the underlying illness and age of the individual.

Aim of the study: A Study Of Incidence And Patterns Of Adrenal Hemorrhage In Autopsy Cases Methods :In this study, the incidence and pattern of adrenal haemorrhage is studied in 100 medicolegal autopsy cases to correlate with the age and sex of the person, cause of death and manner of death.

Results : The incidence of Adrenal haemorrhage was highest in cases of death due to trauma. Of the 24 cases in which adrenal haemorrhage was detected, 8 cases were death due to trauma which included Road traffic accidents, Train traffic accidents and fall from height; 3 of the traumatic deaths had associated kidney injuries. The predominant age group in which traumatic adrenal haemorrhage is noted is 21 – 30 years (5 cases). There is a male preponderance in adrenal haemorrhage in traumatic deaths with 7 male cases and 1 female case.

Conculsion : This study shows that trauma is the major cause of adrenal haemorrhage and poisoning by numerous compounds are potent contributor to this rare condition.

Keywords: Adrenal haemorrhage; medicolegal autopsy; Trauma

Introduction

Bleeding within the adrenal glands is known as adrenal haemorrhage. The haemorrhage could be either unilateral or bilateral based on the cause. It could be either microscopic or overt haematoma. Based on the severity of the haemorrhage and the involvement of one or both adrenal glands, this rare condition presents with variable symptoms which makes it difficult to be diagnosed. Bilateral adrenal haemorrhage leads to acute Adrenal insufficiency which leads to death. [1].The mortality rate associated with adrenal haemorrhage is approximately 15% while that detected in autopsy

cases is 0.14% to 1.8% [2] [3]. Hence, it is necessary to make an early diagnosis of this least suspected condition.

The various causes associated with this rare condition can be classified as traumatic and non-traumatic. The traumatic causes include direct impact on the abdomen as in blunt injuries in Road traffic accidents, Train traffic accidents, fall from height etc. and traction injuries affecting the kidneys; The non-traumatic causes includes conditions associated with stress such as pregnancy and septicaemia and

bleeding diathesis associated with Anti – phospholipid syndrome, Essential thrombocytosis, Use of blood thinners and Coagulopathies [4][5][6][7].

The adrenal glands have rich arterial supply through the adrenal arteries, but venous drainage is through single adrenal vein. This disparity in arterial flow and venous drainage is a predisposing factor for adrenal haemorrhage. [8] Whenever there is excessive arterial flow and defective venous drainage, there is a probability of haemorrhage. Although the precise mechanisms leading to adrenal haemorrhage in non-traumatic cases is not clear, available evidence substantiates thrombosis of Adrenal vessels. Increased Adrenocorticotrophic hormone (ACTH) secretion in stressful situation causing increased adrenal blood flow compounded with Adrenal vein spasm, predisposes to adrenal haemorrhage.

Unilateral adrenal haemorrhage is usually an incidental finding, as the unaffected adrenal gland compensates. However, bilateral adrenal haemorrhage results in sudden adrenal crisis which is fatal if not treated promptly. There is a male predilection in the incidence of extensive, bilateral Adrenal haemorrhage with a male to-female ratio of 2:1..

The most consistent presentation of adrenal haemorrhage is a dull pain which is vague in location which delays the diagnosis. It can occur predominantly in the precordium, flanks and epigastric region. Other associated symptoms include Fatigue, weakness, dizziness, arthralgia, myalgia, anorexia, nausea, vomiting, and diarrhoea, which are present in approximately 50% of extensive, bilateral adrenal haemorrhage cases. These are indicative of acute adrenal insufficiency. [9]

It is essential to know the incidence and cause of fatal adrenal haemorrhage to identify the high risk group among the patients and to devise a screening protocol. It is necessary to ascertain the incidence of adrenal haemorrhage as a cause of death and associated effect of other fatal causes. In this study, 100 autopsy cases are studied to determine the incidence of adrenal haemorrhage, the age and gender predilection and its relation to cause and manner of death.

Materials And Methods:

This study analyses both adrenal glands for haemorrhage in 100 medicolegal autopsy cases chosen randomly. Apart from recording the nature and pattern of injuries in trauma cases, data regarding the site of primary impact, period of survival etc., was obtained from the investigating officers.

The study sample consisted of 100 pairs of adrenal glands which were subjected to gross and histopathological examination. Ethical clearance was obtained from the Institutional Ethical Committee (IEC) before starting the study.

Autopsy dissection was started with I shaped incision and organ removal was done by Virchow's method of organ by organ removal of viscera. Kidneys were removed along with the Adrenal glands. The adrenal glands were inspected on the surface for congestion and gross haemorrhage. It is then separated from the kidneys and incomplete vertical slices were made at about 0.5 cm apart thus retaining continuity at one border to keep the gland intact. The cut surfaces can now be examined for haemorrhages and focal lesions and then sent for histopathological examination.

Photo 1: Removal of both kidneys by virchows method and separation of both adrenal glands from the kidneys



Subject Selection:

The prospective study was conducted on Medico Legal autopsy cases in the Institute of Forensic Medicine, Madras medical college, Chennai.

Inclusion Criteria:

All medicolegal cases subjected to autopsy to determine the cause of death.

Exclusion Criteria:

All cases with advanced decomposition changes.

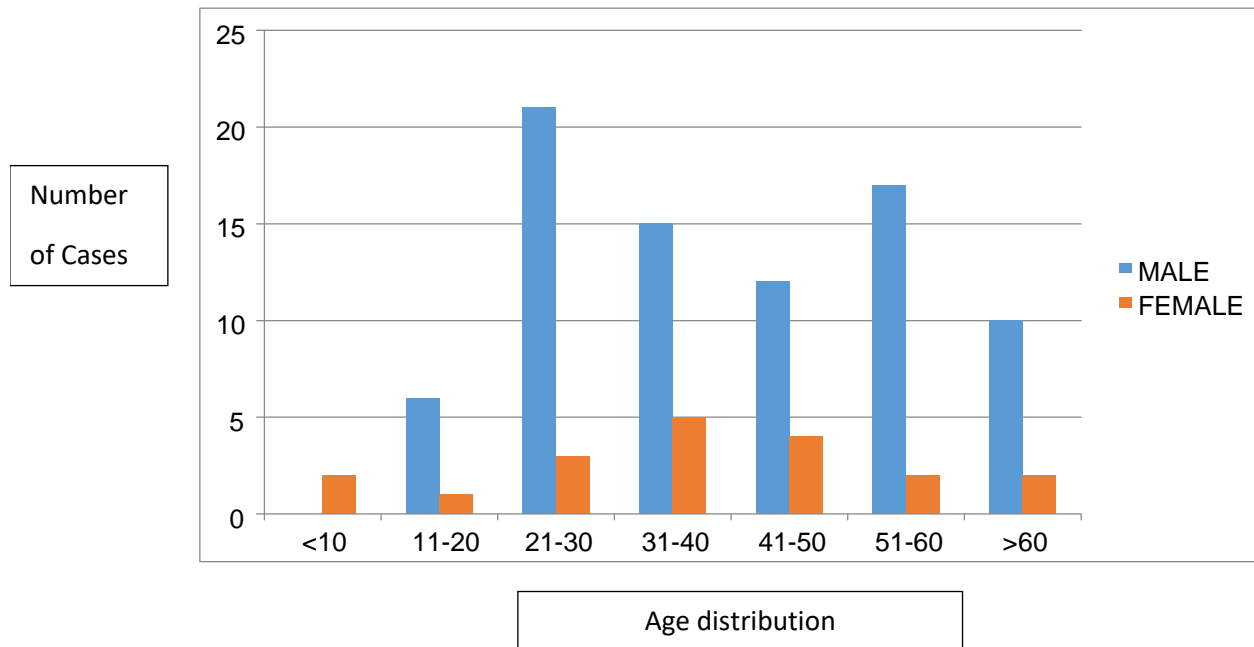
Result:

This is a prospective study conducted with the aim of establishing the incidence of adrenal gland hemorrhage in medicolegal autopsy cases and

determine the incidence of adrenal hemorrhage, its age and gender predilection and relation to cause and manner of death

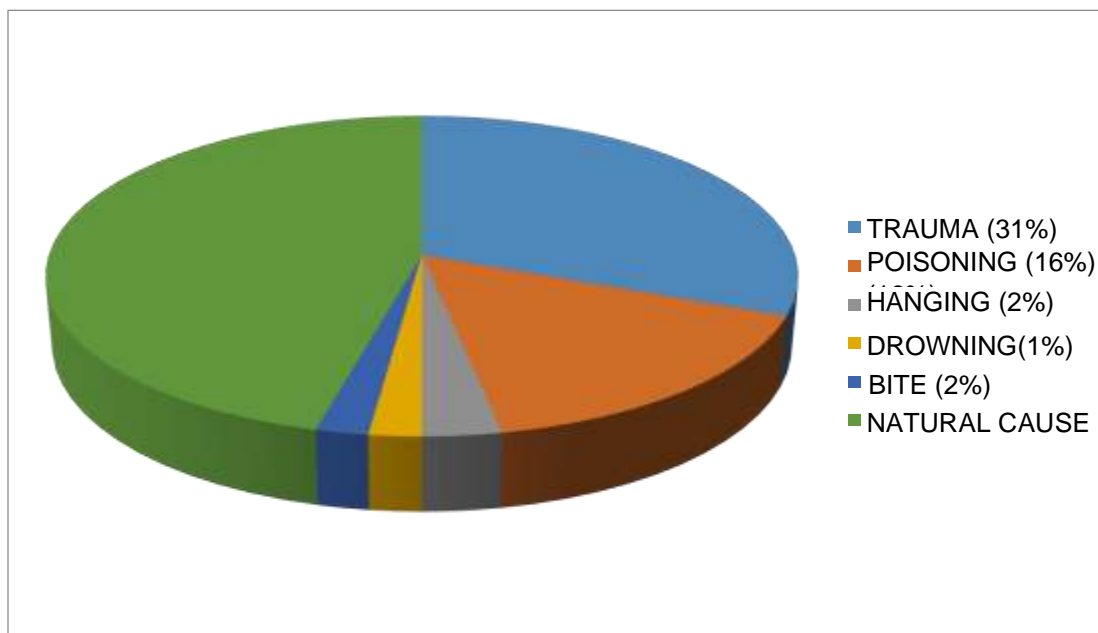
In the study group, 81 cases were male (81 %), 19 cases were female (19%) and there were no transgender individuals. The age distribution among the study sample is 2% cases were in the age group of 1-10 years, 7% were in age group of 11-20 years, 24 % were in the age group of 21-30 years, 20% were in the age group of 31-40 years, 16 % were in the age group of 41-50 years, 19% were in the age group of 51 to 60 years and 12 % were in the age group of more than 60 years.

Fig.1 Age And Sex Distribution Of Study Population



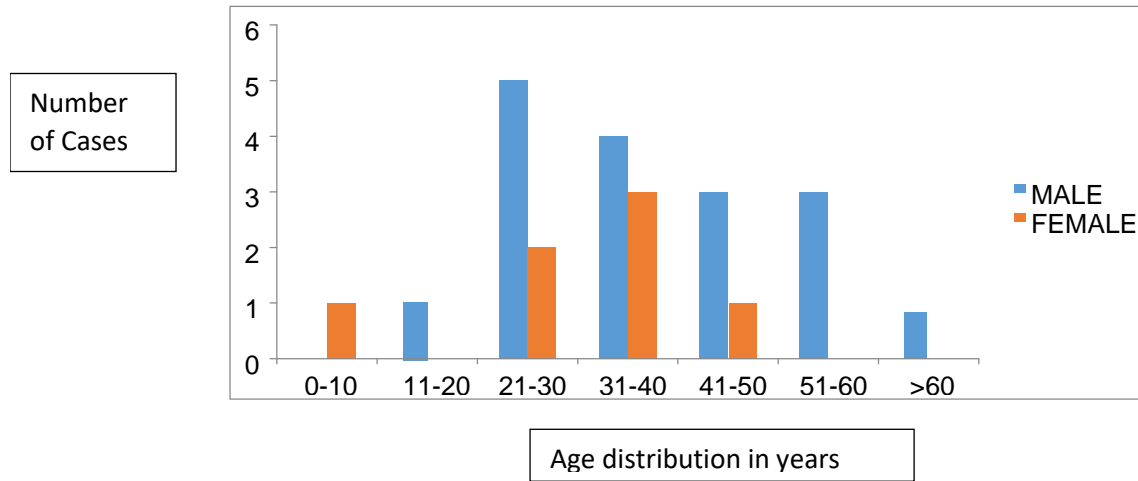
The various cause of death among the sample cases include Trauma due to Road traffic accident, Train traffic accident and fall from height, natural cause including acute cardiac events, pulmonary edema, aspiration pneumonitis and pneumonia, asphyxia due to hanging and drowning, poisoning and unknown bites. It included 46 cases of natural cause, 31 cases of trauma including Road traffic accident, Train traffic accident and fall, 16 cases of various poisoning, 2 cases of hanging and 2 cases of death due to unknown venomous bite.

Fig 2. DISTRIBUTION OF STUDY POPULATION BASED ON CAUSE OF DEATH



In our study population, 24 cases (24%) had adrenal gland haemorrhage while 12 cases had adrenal gland congestion. Among the cases with adrenal gland haemorrhage 19 cases were male and 5 cases were female. The age distribution among the positive cases were 1 (female) belonged to 0-10 age group, 1 (male) belonged to 11-20 age group, 7 (5 male and 2 female) belonged to 21-30 age group, 7(4 male and 3 female) belonged to 31-40 age group, 4 belonged to 41-50 age group 3 (male) belonged to 51-60 age group, and 1 (male) belonged to .>60 age group.

Fig 3. Age and sex distribution of cases with adrenal haemorrhage in sample population

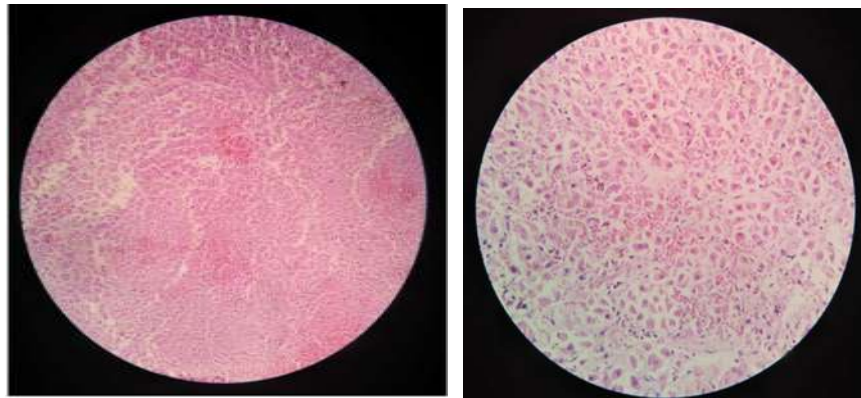


The incidence of Adrenal haemorrhage was highest in cases of death due to trauma. Of the 24 cases in which adrenal haemorrhage was detected, 8 cases were death due to trauma which included Road traffic accidents, Train traffic accidents and fall from height; 3 of the traumatic deaths had associated kidney injuries. The predominant age group in which traumatic adrenal haemorrhage is noted is 21 – 30 years (5 cases). There is a male preponderance in adrenal haemorrhage in traumatic deaths with 7 male cases and 1 female case.

PHOTO 2: EXTENSIVE HEMORRHAGIC INFARCT OF ADRENAL GLAND IN A CASE OF SUDDEN DEATH DUE TO CORONARY ARTERY DISEASE



PHOTO 3: ADRENAL PARENCHYMA WITH TINY FOCI OF HEMORRHAGE IN A CASE OF FATAL POLYDOL POISONING



In some cases, the adrenal glands were found congested which were confirmed with histopathology and in some cases the gross congested appearance was due to tiny foci of hemorrhages confirmed by microscopy. This is consistent with previous studies stating adrenal gland congestion as early sign of adrenal gland injury and impending adrenal gland hemorrhage (9)

Among the 15 poison cases, adrenal hemorrhage was detected in 8 cases, of which 1 case of multiple tablet poison presented as hemorrhagic infarction. Of the 24 cases of adrenal gland hemorrhage 3 cases presented as hemorrhagic infarction of the gland – Myocardial infarction, multiple tablet poison and a Road Traffic accident with fatal head injuries.

Discussion:

The main objective of this study is to estimate the incidence of adrenal haemorrhage in medicolegal autopsy cases and correlate them with the age and sex of the individual and the cause and manner of death. Presence of adrenal haemorrhage has been underreported in clinical practice due to its variable presentation. [4, 5, 6]. The pathophysiology attributed to the adrenal haemorrhage are trauma causing direct injury to adrenal glands and the surrounding structures and stress inducing factors like acute cardiac events, poisoning, sepsis and asphyxial death.

Adrenal gland trauma is underreported with an incidence rate that ranges from 0.03 to 4.95% of all trauma cases [11]. Most of the studies were done in live patients with history of blunt injury to abdomen or in retrospect based on mortality of patients with

adrenal gland trauma using various modalities like Computed Tomography. Adrenal gland trauma is associated with increased mortality when compared with trauma patients without adrenal gland injuries. [12,13]

In this study, adrenal gland haemorrhage is seen predominantly in death due to trauma as in the previous radiological study by Mayo-Smith et al (14) . Studies show that nearly one fourth of trauma cases have adrenal haemorrhage and is positively confirmed in our study. (15) There are few cases in which the gross congested appearing adrenal glands were indeed tiny foci of haemorrhages and were consistent with the case series by Tan GX et al. (9)

According to D.R.Rao et al[16] the incidence of extensive bilateral adrenal haemorrhage, although rare, were higher among individuals of 40 – 80 years of age . Previous studies show that, the incidence of traumatic adrenal haemorrhage is higher among individuals of 20 – 30 years of age and our study correlates well with the previous studies.

In an autopsy study of adrenal haemorrhage in 44 cases by YI XF et al shows that traumatic adrenal haemorrhage occurred mainly in male aged 20-40 years while non traumatic adrenal haemorrhage is seen in much older individual.[17] This study also substantiates the male preponderance and the age distribution of traumatic adrenal haemorrhage among the second to fourth decade individuals

Various causes were taken into consideration such as natural causes, trauma, hanging, poisoning and unknown bites. Adrenal haemorrhage was present in 8 cases of death due to natural cause, out of which 6

were due to acute cardiac event and 2 due to pneumonia and aspiration pneumonitis respectively. In a case of death due to myocardial infarction, there was haemorrhagic infarction of adrenal gland. This is in contrast to the study by J.M.Porter et al in which out of 262 deaths due to myocardial infarction, adrenal haemorrhage was detected in none [18]

Various case reports shows that numerous poisons result in adrenal injury and haemorrhage. [19, 20, 21]. In this study, adrenal haemorrhage was presented in 8 suicidal poisoning cases with ingestion of chemicals like Organophosphate compounds, Paraquat, Zinc Phosphide and multiple tablets. This shows that the poisons which causes coagulopathies and multi organ failure results in adrenal haemorrhage which is an effect of the poison rather than cause of death.

Conclusion:

According to the Journal of Royal society of medicine adrenal apoplexy has been termed the silent killer but forgotten would be more appropriate as it rarely figures in the differential diagnosis of shock. This proves the fact that the adrenal glands are of intrinsic importance in the physiological response to stress, responsible for maintenance of blood pressure and electrolyte homeostasis.

Trauma is the major cause of adrenal gland haemorrhage with a male preponderance and an age distribution of 20 – 40 years. Poisoning contributes to a considerable amount in the incidence of adrenal gland haemorrhage; sudden deterioration of patients with poisoning history should raise a suspicion of adrenal haemorrhage. Of various natural causes, cardiac events contribute to a higher incidence of adrenal haemorrhage. Incidence of adrenal haemorrhage in paediatric age groups should be studied further

According to this study, 24% of medicolegal autopsy cases presented with adrenal haemorrhage which concludes that adrenal haemorrhage has to be ruled out irrespective of mode and manner of death. The diagnosis of adrenal insufficiency resulting from adrenal haemorrhage is often overlooked because of the nonspecific nature of the clinical presentation. Most of the adrenal haemorrhage cases were diagnosed only at post-mortem examination. So a high degree of clinical suspicion is recommended.

Adrenal injury screening protocols should be followed in cases with history of blunt injury to abdomen and severe head injuries, poisoning, asphyxia and sepsis.

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