Original Article

Medicolegal Implications of Vascular Trauma: An Institutional Experience

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How to cite this article: Ambrish Kumar, Amit Chaudhary. Medicolegal Implications of Vascular Trauma: An Institutional Experience. Medico Legal Update 2023;23(3).

Abstract

Background: Vascular trauma is one of the devastating types of injuries . Despite this fact, there is an obvious deficiency in the educational sessions for vascular surgeons concerning the appropriate medicolegal dealing with such injuries. **Aim**: To highlight the role of vascular limb trauma during present scenario with the medicolegal and clinical findings.

Methods: A 5 -years retrospective study with a follow up period of 2 years studying the data of peripheral vascular injuries at three specialized trauma centre with special emphasize on the cause, the type, and the outcome of this trauma . Obtained data were statistically analysed using the SPSS computer program (version 23).

Results: This study included 1550 trauma patients (987 males and 563 females) who presented with peripheral vascular injuries. The patients' age ranged from < 3 years to >70 years. There was a significant association between the age and the circumstances of trauma. The most encountered causative mechanisms were traffic accidents (45.7%) and firearms (21.7%). There was no significant association between outcome and age ($p = 0.114$) or circumstances of trauma ($p = 0.208$). There was a highly significant association between the outcome and the duration of hospital stay ($p < 0.001$). Lower limb injuries were higher in frequency than upper limb injuries (n = 286 and 123) respectively. Upper and lower limbs arterial injuries had a significantly higher frequency rate than the venous injuries. Ulnar artery and brachial vein injuries was the most frequently encountered upper limb arterial and venous trauma, while the femoral artery and the deep femoral vein were found to be the most affected lower limb vessels. Bone injuries were the most frequently accompanying injuries (44.6% of total cases).

Conclusion: As any sort of injury may possess medical and lawful perspectives, medicolegal investigations have very important position when studying trauma cases, going hand in hand with the clinical aspect.

Keywords: vascular trauma; Medicolegal aspects; Road Traffic accidents, Bony Injury

Introduction

Trauma is accused of 10% of all deaths worldwide, and the fifth leading cause of expressed disabilities (Puanachandra et. al. 2012) remains the most important public health problem). The the main cause of mortality and disability through the first four decade of life[18].

The implication of trauma varies from threatening

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life to destruction of mental and physical health as well as, the negative impacts on both frugal and social up growth[16].

The influence of undue mechanical forces on the body tissues may result in compression, traction, and torsion as well as shearing (Ding et al., 2016). Factors affecting the consequent damage implicate the type of the imposed mechanical force and the nature of the targeted tissues[17].

One of the important categories of any wound is its inflection's manner whether suicidal or accidental[19].

They are usually classified into; abrasions (grazes or scratches), contusions (bruises), lacerations (cuts or tears) and incised wounds (slashes or stabs)[21].

By 2020, injuries are anticipated to exceed communicable diseases on a secular standard as the prime reason of inability.

Developing countries still have a defect in injury prevention programs. This may be caused by many factors such as; the imperfect information for studies, lack of accuracy in detecting trauma bearding and nevertheless, in other areas such as Egypt and according to the World Health Organization (WHO) report, road-related injuries mortality accounts for 2.37% of the total death cases annually. The death rate is 14.46 per 100.000 of population[1,2]

These injuries are one of the grave causes for morbidity and mortality. They are believed as the fifth leading cause of death and the main occasion for hospitalization for approximately one-quarter of all in patients[4,5].

Vascular trauma whether arterial, venous, and/or blood- rich organ injuries are among the life threating conditions. They may be due to blunt trauma leading to crushing or stretching to the blood vessel or a penetrating injury resulting in puncture, torning or severing of a blood vessel[9].

Vascular trauma may cause clot formation or life-threatening haemorrhage that interrupts. The normal blood flow to the body organs and/or extremities[6]

On the other hand, wall defects, complete or partial transections, as well as arterio-venous fistulae (AVF) may accompany penetrating trauma[10]

Arterial spasm may be caused by blunt or penetrating trauma to the extremities.

A traumatic false aneurysm is formed when the surrounding tissues encapsulate The aim of this study was to retrospectively analyse the cases of limbs' vascular trauma in a period of 5 years with a follow up period of 2 years. It also aimed to describe the available medicolegal aspects beyond such injuries in those cases.

Patients and Methods

This five years - retrospective study took place from January 2015 to December 2020 with a follow up period of 2 years. It included all patients presented with sustained extremities vascular injuries who were treated at KGMU Trauma Centre After obtaining the approval of the institute ethical committee with regard to the ethical issues of the study, demographic and clinical data, as well as laboratory and radiological findings were reported through each patient's file. Data was analysed and the following relationships were studied:

A) Circumstances of the injuries in relation to age, sex of the studied patients and the origin of trauma.

B) Age and sex in relation to the time they asked medical advice as well as the period of hospital stay after the intervention.

C) The frequencies of the injured vessels in relation to the type and site of injury.

D) Vascular injuries in relation to other accompanied lesions such as musculoskeletal injuries.

Diagnosis was based on the essence of history and both the hard and soft clinical signs of arterial injury (e.g. progressively increasing hematoma, pulsatile bleeding, impalpable distal pulses, the presence of thrill, and bruit)[3].

Pearson's Chi-square test was applied to examine the association between two variables. Fisher exact or Fisher-Freeman-Halton Exact tests were employed if the expected count was less than five in any cell. Significance was adopted at $p < 0.05$ for interpretation of results of tests.

Results

In this study, 1550 victims with limb injuries were included; out of which 563 (36.3%) were women and 987 (63.6%) were men. They were of different ages ranging from 3 years up to 70 years with the mean of 28.27± 7.83 years. The most encountered causative mechanisms were road traffic accidents (45.7%) and firearms (21.7%). As the highest incidence of trauma was in age group 20-35 years (males 34.5%, females 8.5%) while the lowest incidence was encountered in age group < 4 with a statistically significant results.

Discussion

Extremity vascular injuries pose a challenge to most surgeons. It is considered to be a major cause of morbidity and mortality in the developing countries. They are usually due to street offenses, imperfect roads planning, firearms, and other weapons correlated. Trauma as well as self-inflection[7].

According to the tort classical deterrence theory, the probability of litigation enforces the health care providers to be more cautious in their practice based on the well established standards of patients care, thereby, enhancing patient outcomes [1,13]

Most of this study population was males (82%).

This can be supported by previously published reports in which number of males is higher than females by variable percentage[17,18,19]

The most affected age group was 20-35 years coinciding with data in the literature[12,14,20]

This might be attributed to the finding that this age category may be commonly exposed to high-risk events as it is considered the most productive age**.**

In our existing results, traffic accidents were reported as the most common mechanism of vascular trauma (45.7%) leading to either isolated vascular injuries or accompanying limb musculoskeletal fracture. Comparable data was notified in the literature with a variable degree[3,9].

On the other hand, (Ekimand Tuncer, 2009) had reported penetrating trauma as the main causative mechanism in their study on 49 patients with brachial artery injuries. The results of the current work revealed no significant association between the circumstances of trauma and sex or the causative mechanism. This may be attributed to the new development of the Saudi society where women are offered more freedom to share in the professional work life as a as well as the recent permission of car driving. One the other hand, (Mostafa et al., 2002) concluded that gender-specific trauma's frequencies, circumstances, and outcome in favour of males. In this work, most injuries occurred due to assault in 275 patients (78.57%), followed by accidental in (20 %), and self-inflicted in (1.43%). This data is contradicting to previously published reports that showed the prevalence of assault injuries to be 63% in Australian (Taylor and Cameron 1998**)**, and 35% in Indian populations (Swarnkar et al., 2016**)** respectively.

However, self-inflicted injuries were observed in the younger age group (i.e. < 20 years) with a higher incidence rate. This result coincides with that reported in an American study (Bukur et al., 2011; Minami et al., 2014**)** and with study from Canada **(**Kayssi et al., The highly significant association between the outcome and the duration of hospital stay proved in this study agreed with that reported in other work investigating the ordinarily applied measurement for quality of care inside the hospitals[11]**.**

The most encountered lesion in the current study was lower limb trauma (70%) with an injury to the superficial femoral artery coinciding with a previously published[13]**.**

Arterial injuries showed a significantly increased rate compared to those presented with the venous injury. Both upper and lower extremity arterial injuries accounted for (26.2% and 48.9%), respectively. This may be compared to those presented with venous injuries as it accounted for (3.9% and 21%) in the upper and lower limbs, respectively. Previous studies reported an increased incidence of lower extremity more than upper extremity vascular injuries that consistent with the report in this literature[9].

The second most encountered pathology following vascular injury in patients with multiple injuries was the bony fracture (44.6%). This result is approximately similar to a reported percentage of 37% in the literature[7].

The complications of traumatic extremity injuries were observed in most of our treated victims 50.85%

(n=178), while 46 cases (13.4%) had impaired limb function and disability. This functional disability was coinciding with that reported in others literature[19]. It may raise an important issue as regards the legal compensations and the quality of life.

Conclusion

Traffic accidents are the most accused reason for vascular limb injuries followed by gunshot either assault or self-inflicted. The current work had investigated numerous points of forensic interest in relation to vascular trauma but because it was conducted in a retrospective manner, the medicolegal data obtained from the patients' files are fewer if compared with those acquired from autopsy or recently injured cases. This might reflect the defects in forensic dealing with all cases of trauma and hence throw light on the importance of the proper forensic documentation with such injuries. This appropriate documentation might be of great significance for both patients and surgeons especially in cases liable to develop legal and/medicolegal consequences.

Source of funding: Self

Conflict of interest: Nil

Ethical Clearance: Taken from Institutional Ethical committee.

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