Multi-disciplinary Medico-legal Approach and Challenges in Interpretation of Injury from an Amputated Hand: A Case Report

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ABSTRACT

Among various duties of any medico-legal expert, responsibility of Injury Examination Report preparation is encountered routinely in his/her career. Among various challenges faced by the examiner, documenting the injuries becomes exigent when s/he is acquainted with artifact like therapeutic alteration of the injury produced in victim.

We report a case of a victim of electric injuries sustained over both his upper limbs. The requisition to prepare an Injury Examination Report was received from investigating officer a month after the incident. On examination of the patient, the challenge faced was that the injured limbs were amputated a day before the examination, and his body showed no other injuries. An urgent consultation with plastic surgeon revealed that the amputated body part was sent for histopathology analysis. A report was prepared from a formalin soaked amputated bilateral hands in pathology department and handed over to the investigating officer.

Keywords: amputation; electric injury; injury examination report; medico-legal.

INTRODUCTION

In medical fraternity, breach in continuity of any tissue was implied as an injury before concept of trauma introduced mental component.¹ However, the medico-legal understanding of injury has always been implicated as any harm done illegally to person’s body, mind or property; the manners of causation of injuries being self sustained, accidental or deliberate harm to others.

As per Article 296(1) of Nepal’s Constitution, the Legislature Parliament promulgated Muluki Ain 2074/ Criminal Code Act 2017 in Nepal on October 2017.² According to the Act, officers investigating legal aspect of injuries in Nepal are police who gathers the information from circumstances and requests medical examiners to examine the victim and provide Injury Examination Report for further investigation of the incident to administer justice. Following a complaint in police station by kin or victim of injury; a requisition letter to prepare an Injury Examination Report is issued to treating doctor by police officer; where a brief history on causation is explained. On receipt of such letter, the examining doctor should seek out for forensic examiners in their hospital or in case of their unavailability; s/he should examine the victim and provide report based on personal competency.³ Besides mentioning type, size, site and location of any injuries in the report; the examiner is liable to state grievousness and mechanism of causation each of the injuries in a predesigned format. The report thus provided, helps legal bodies to determine either punishment to assailant or compensation for victim.
We present an unusual condition, where an injury report was prepared by forensic medical examiner with consultation from treating surgeon and pathologist, from an amputated hand of a victim who allegedly sustained electric injuries, since no evidence pertaining to the incident was found on his body.

**CASE REPORT**

The information given in requisition letter to prepare injury examination report of a 36 year old, male stated that the victim was an electrician who while repairing some gadgets in an electric pole got electrocuted and sustained electric injury a month back. On reviewing the available hospital documents, it was known that he had sustained circumferential burn of bilateral hands, a month back. Fasciotomy was performed over both hands in a Plastic Surgery Centre and referred to National Trauma Centre for further management of complications; Acute Kidney Injury, Pulmonary oedema and coagulopathy. Patient after one month of treatment was sent to our centre for further management where below elbow amputation of both upper extremities was performed.

Series of debridement, blood transfusions and haemodialysis alongside ventilator support had improved the condition of victim at the time of medico-legal examination as evident by stable vitals and adequate Glasgow Coma Scale score. The victim could follow all commands but could not speak due to tracheostomy performed earlier. There were no injuries in the body except for therapeutically amputated and bandaged stumps of bilateral forearms; a therapeutic measure taken by plastic surgeons to avoid generalised sepsis. It was later known that the amputated body parts were sent for histopathology analysis to prevent delayed complications of gangrene/necrosis. Although the grievousness of injury could be answered, a need for examination of amputated hand could not be ignored in order to establish the mechanism and severity of the injury caused; vital for further legal proceedings.

A separate examination of amputated hand preserved in formalin was done the same day. The examination revealed left hand amputated at the level of mid 1/3rd of forearm with presence of linear joule burns over proximal 1/3rd of palmer aspect of all fingers of left hand and tip of left thumb [Fig.1]. Right hand was amputated at the level of wrist which revealed circular to oval joule burns over tip of thumb and tip of fore finger. The web space between right thumb and right fore-finger exposed underlying muscle tissue and bone as a result of therapeutic incision for debridement of a square portion of tissue [Fig. 2]. All the burn injuries were deeply grooved and charred at the centre with elevated pale crater like margins, consistent with joule/electric injury.

**DISCUSSION**
Majority of electric injuries are due to low voltage circuits caused accidentally at domestic or work settings. Such low voltage circuits conduct electricity within body thereby distorting cardiac rhythm resulting in fatal arrhythmias. In Nepal, 220-240 Volts is standard domestic supply of electricity.

High voltage electric injuries on the other hand cause definite burn injuries, severity of which is dependent on duration of contact and resistance offered by skin, bones and fat. During high voltage electrocution, heat is produced through an arc from voltage source in the form of a flash which results in severe burn injuries like muscle or bone deep splits and tears.\(^5\)\(^6\)

Histopathology findings revealing palisade shape elongated and stretched nuclei with or without vacuoles in the epidermal and dermal cells in contact site of the skin although believed to be specific for electric injuries initially, are controversial due to its in unexpected presence in reported burn injuries cases.\(^7\)

The superficial and deep tissues examined through histopathology from the contact site in this case only revealed findings confined to evidence of necrosis of tissues. This finding although confirmed an indication for amputation, the actual mechanism of causation was opined in Injury Examination Report based on vital external features of the wound supported by corroborating evident pulmonary oedema.

The injuries present over the frontal aspect of wrist and distal forearm resulting in necrosis was comprehended to be caused by flash burns produced from arcing of a high voltage electrocution and the joule burns over fingers as a result of gripping a wire with flowing high voltage electric current.

Based on the pattern of joule injuries on victim’s hands, the scene reconstruction supposed that the victim with fingers from left hand had held a wire with flowing current and had initiated use of his right hand with an intention to repair it. Frontal aspect of distal arm sustained arc/flash burns which had resulted in multiple fasciotomy incisions with necrosis of surrounding soft tissues as confirmed by pathology examination. The opinion was given as electrical burn resulting, complication of which resulted in amputation of both upper limbs; amounting to grievous and life threatening injuries.

The consequences of documented injuries on victim’s morbidity can get confusing during early hour. Hence, such victims need to be examined repeatedly at different duration before a detailed report is produced. Severity of the injuries produced determines punishment to assailant or compensation for victims. In order to prepare a science and fact based report, the examiner ought to seek help from experts of other departments of medical sciences for interpretation.

A multi-disciplinary medico-legal practice involving efforts from plastic surgeons, pathologists and forensic experts was used for the first time in our centre to prepare a medico-legal report in this case; an example of implication of diverse knowledge of all three (Clinical, Para-clinical and Basic sciences) aspects of medicine for administration of justice.

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