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CASE REPORT PEER REVIEWED | OPEN ACCESS

Multiple upper and lower limb long bones fracture following electric shock

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ABSTRACT

Introduction: Electric shock occurs when human body reacts to the flow of current. Fractures following electric shock are due to musculoskeletal contraction or fall following the impact of the shock. Most skeletal injuries following electric shock could affect many bones of body especially the upper extremity as seen in this index patient.

Case Report: Herein, we present a case of a 61-year-old male who presented after two weeks following electric shock with multiple long bone affectation involving both upper and lower limbs.

Conclusion: Fractures following electric shock incidences though rare but could be severe enough to affect many bones in the body as seen in this patient with grave consequence.

Keywords: Electric shock, Fractures, Musculoskeletal contraction

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INTRODUCTION

Electric shock occurs when human body reacts to the flow of current while electrocution occurs when a human is exposed to a lethal amount of electrical energy and it is lethal [1].

Fractures following electric shock have been observed to be due to either musculoskeletal contraction or due to a fall as a result of the impact of the shock [2, 3]. Fracture after electrical shock due to musculoskeletal contractions is though a very rare occurrence [4].

Most skeletal injuries following electric shock occur in the upper extremities, especially the shoulders. Other bones that may be fractured during electric shock are the vertebral bodies, scapular, and femur [2, 5].

This is the case report of an individual with multiple long bone fractures following electric shock sustained in a domestic environment.

CASE REPORT

A 61-year-old man presented with a two weeks history of inability to move the right and left shoulder joints and inability to bear weight on the left lower limb. This followed electric shock while attempting to carry an ox fan. No loss of consciousness and no other noticeable injury to other parts of the body.

Initial treatment was at a private facility following which he presented at the traditional bone setter where he was treated by strapping the upper limbs to the trunk.

He has since been completely dependent on his relatives for upkeep and self-care. He sort further medical treatment and subsequently had investigations which included radiological investigations, electrocardiography.

Examination revealed a middle aged man who was not pale and anicteric. Glasgow coma scale score of 15 (Eye Opening Response – 4, Best Verbal Response – 5,

Best Motor Response – 6). The chest, cardiovascular, and abdominal findings were normal.

Musculoskeletal system examination of the right shoulder revealed inability to move the right shoulder joint with limitation of all range of movement in the joint. The left shoulder joint was mildly swollen with associated inability to move the left shoulder joint and limitation of all range of movement of the left shoulder joint as well. There was 3 cm shortening of the left lower limb which was externally rotated.

Radiological investigation showed comminuted fracture of the left humeral head (multi-fragmented) with extension to the surgical neck and dislocation of the shoulder joint (Figure 1). The right shoulder joint also showed comminuted fracture of the right humeral head (multi-fragmented) with involvement of the surgical neck and associated dislocation of the right shoulder joint (Figure 2).

There was a transcervical left femoral neck fracture (Garden's stage IV) (Figure 3). He was planned for computerized tomography scan of the humeral fractures to assess the fragments and determine the best modality of management. However due to financial constraint he is still sourcing for funds as such these fractures have not been fixed.

He is presently on analgesics and broad arm slings for the fracture dislocations of the shoulder joints. He was planned for left hip arthroplasty however he is still sourcing for funds.

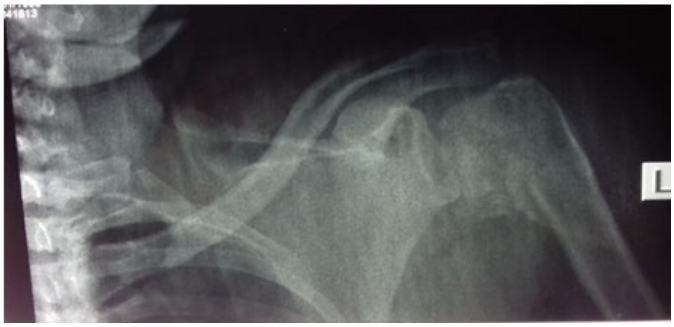

Figure 1: X-ray of the left shoulder joint.

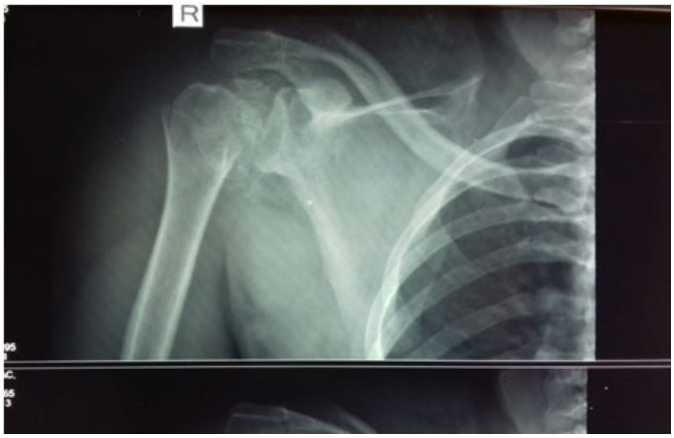

Figure 2: X-ray of the right shoulder joint.

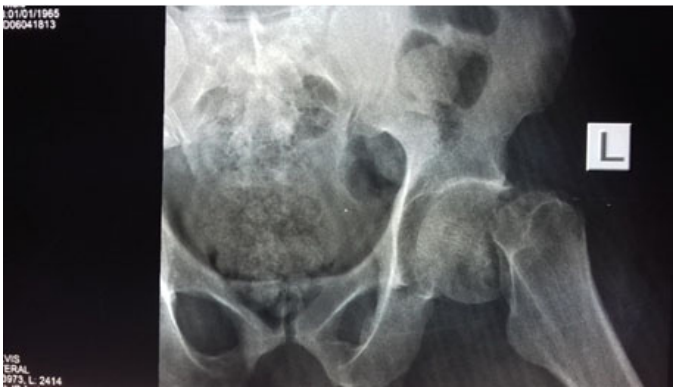

Figure 3: X-ray of the left hip joint.

DISCUSSION

Bone, tendon and fat, has the greatest electrical resistance of any tissue in the body, therefore, it generates the greatest heat when conducting an electric current [2].

Fractures after electric shock have been observed to occur in places with significant and bulky muscular bodies such as spine, hip, and shoulder [6] of which the hip and the shoulders were affected in this patient. They are thought to arise due to the effect of the tetanic pull of large muscle bulk on the bones [7].

The factors that influence the degree of electrical injuries are: the voltage of the current, the duration of the contact, the tissue resistance, and the pathway of the electrical current through the organism. Others are the type of circuit, the amperage, and the area of contact [8, 9].

Muscle contractions may result from contact with a direct current of at least 20 mA or with an alternating current of 10 mA [2]. Bilateral femoral neck fractures occurred following exposure to 440 V direct current [3] while scapular fractures have also been reported following electric shock [10].

In this index patient, the area of contact is the hand which he wanted to use to carry the fan and the duration which was described as short. The patient could not offer information about the other parameters at his presentation in the hospital.

Literature search did not show any article with this degree of severe bone involvement. This is the reason for this report in this patient with very severe bone involvement following electric shock.

Prevention of electric shock is the best way to avoid this type of injuries. Adequate electrical safety can be achieved by combining a good power distribution system, selection of well-designed equipment, periodic testing of power systems and equipment as well as training on how to handle electrical gadgets all of which will avoid the incidence such as we observed in this case [11].

CONCLUSION

Fractures following electric shock incidences though rare but could be severe enough to affect many bones

in the body as observed in this patient with grave consequence. Preventing electric shock through the knowledge of safe handling of electrical appliances will reduce the occurrence of this type of injury.

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Author Contributions

Tolulope O Ogunrewo – Conception of the work, Interpretation of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Olugboyega A Oyewole – Design of the work, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Oluwadayo A Magbagbeola – Acquisition of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Consent Statement

Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.