

TRAUMATIC PROXIMAL DISRUPTION OF THE BRACHIORADIALIS AT ITS HUMERAL ORIGIN IN A FATAL ROAD TRAFFIC ACCIDENT

Forensic Medicine

Dr. Kevin Herald V L	Junior Resident Academic, Department of Forensic Medicine, Maulana Azad Medical College New Delhi
Dr. Vishnu Kumar Saini	Junior Resident Academic, Department of Forensic Medicine, Maulana Azad Medical College New Delhi
Dr. Rajaganesh SK	Junior Resident Academic, Department of Forensic Medicine, Maulana Azad Medical College New Delhi
Dr. Sunil Naagar	Director Professor & Head, Department of Forensic Medicine, Maulana Azad Medical College New Delhi
Dr. Neha Gupta	Associate Professor, Department of Forensic Medicine, Maulana Azad Medical College New Delhi
Dr. Pavan*	Senior Resident Academic, Department of Forensic Medicine, Maulana Azad Medical College New Delhi *Corresponding Author

ABSTRACT

Background: Traumatic injuries of the brachioradialis are uncommon. Proximal disruption at its humeral origin is particularly rare and may be overlooked during routine forensic autopsy. **Objective:** To report an unusual case of proximal brachioradialis disruption identified during medicolegal autopsy following a road traffic accident. **Materials and Methods:** A medicolegal autopsy was conducted on a 20-year-old male who reportedly sustained injuries as a pillion rider after being struck by a truck. The deceased had extensive blunt-force injuries involving the left shoulder, chest and arm, along with multiple thoracoabdominal injuries. Detailed dissection of the upper limb was performed to identify associated musculoskeletal injuries. **Results:** The proximal attachment of the brachioradialis at its humeral origin was found to be disrupted, while the muscle belly remained intact within the forearm. The findings were consistent with blunt-force trauma. The cause of death was haemorrhagic shock due to blunt-force injuries. **Conclusion:** Proximal disruption of the brachioradialis is a rare injury that may be missed during routine autopsy examination. Careful dissection and detailed musculoskeletal examination are important for identifying uncommon muscle injuries in forensic cases.

KEYWORDS

Brachioradialis; Proximal Disruption; Road Traffic Accident; Blunt-Force Trauma; Medicolegal Autopsy

INTRODUCTION

Road traffic accidents are an important cause of fatal blunt-force trauma and may result in a combination of abrasions, contusions, lacerations, fractures, and extensive soft-tissue disruption. Detailed examination of the musculoskeletal system during autopsy may occasionally reveal unusual injuries that provide valuable insights into the mechanism and severity of trauma.

The brachioradialis is a superficial muscle located on the radial aspect of the forearm. It originates from the proximal two-thirds of the lateral supracondylar ridge of the humerus and extends distally to insert on the radius near the radial styloid process^[1,2]. It is an important flexor of the elbow and also contributes to positioning the forearm during pronation and supination^[2,3].

Traumatic injury to the brachioradialis is rare. Previously reported injuries include closed muscle rupture^[4], complete tendon rupture^[5], and avulsion fracture at its proximal humeral origin^[6-9]. An avulsion fracture of the brachioradialis origin following a road traffic accident has also been reported^[8].

The present case describes an unusual proximal disruption of the brachioradialis identified during a medicolegal autopsy of a fatal road traffic accident and discusses its possible mechanism and forensic significance.

Case Report

A medico-legal autopsy was performed on an adult male with an alleged history of road traffic accident and sustained multiple injuries to head, left upper limb, chest and back. He was taken to hospital, where he was declared brought dead.

Autopsy Finding

Postmortem examination was conducted on the same day. The body was that of an adult male measuring 177 cm in length and of average build.

Postmortem Changes

Rigor mortis was well developed throughout the body and postmortem

staining was faintly present over the back and fixed. There were no signs of decomposition.

External Examination

Multiple external injuries were present. These included an avulsed lacerated wound over the left external ear (Figure 1) and, most significantly, a vertically placed avulsed lacerated wound measuring 20 × 10 cm and extending to bone depth over the left side of the chest (Figure 2). The wound involved the left shoulder joint and was associated with crushing of underlying muscles and neurovascular structures. Contusion and blood infiltration were present in the surrounding tissues (Figure 3). Another avulsed lacerated wound measuring 9 × 5 cm and extending to muscle depth was present over the posterior aspect of the left arm (Figure 4).

Internal Examination

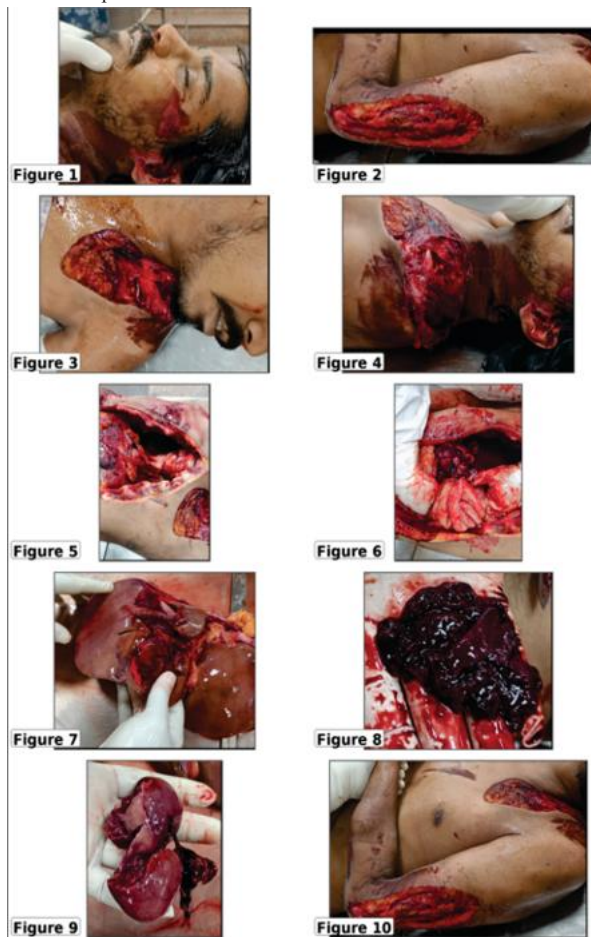
Internal examination revealed fractures of the fourth to ninth right ribs and first to tenth left ribs at the lateral aspect. A fracture of the lateral one-third of the left clavicle was also present. Approximately 400 ml of blood was present in each pleural cavity (Figure 5). Both lungs showed lacerations and multiple haemorrhagic contusions.

Approximately 1000 ml of blood was present in the peritoneal cavity (Figure 6). A laceration was present over the anterior surface of the right lobe of the liver (Figure 7), while the spleen showed a full-thickness laceration involving the hilum (Figure 8). A laceration was also present over the upper pole of the right kidney (Figure 9). During detailed dissection of the left upper limb, the brachioradialis was traced from its distal attachment towards its proximal origin. The proximal attachment of the muscle was found to be disrupted from the humerus, while the muscle belly remained within the forearm (Figure 10). The finding was present in association with the extensive traumatic disruption of the soft tissues of the left shoulder and arm.

The exact morphology of the disrupted attachment was examined in relation to the humerus and surrounding soft tissues. The finding was considered an antemortem traumatic injury in the context of the extensive blunt-force trauma.

The cause of death was opined as haemorrhagic shock consequent

upon blunt-force trauma to the head, chest and abdomen, possible in a road traffic accident. All injuries were considered antemortem and the force was opined to be blunt force.



DISCUSSION

Injury involving the proximal origin is particularly unusual. The brachioradialis originates from the proximal two-thirds of the lateral supracondylar ridge of the distal humerus. Avulsion fracture at this attachment has been described in only a small number of cases^[6-9]. Reddy et al. reported a patient who sustained an avulsion fracture of the brachioradialis origin after being struck by a lorry while riding a motorcycle^[10]. A pure proximal soft-tissue avulsion involving the brachioradialis origin has also been reported^[11]. Behera et al. reported a patient who sustained an avulsion fracture of the brachioradialis origin after being struck by a lorry while riding a motorcycle^[8]. The proposed mechanism involved the upper limb being placed in extension with the forearm pronated, resulting in forceful eccentric contraction of the brachioradialis. El Rassi et al. similarly emphasized the relationship between limb position, eccentric muscle contraction and avulsion at the proximal attachment^[9]. In our case there was disruption of the proximal brachioradialis attachment, while the muscle belly remained in the forearm.

The extensive left-sided injuries provide evidence of high-energy trauma. The deceased had a large avulsed lacerated wound involving the left shoulder and chest, with crushing of muscles and neurovascular structures, a left clavicular fracture and a deep laceration over the posterior left arm. In this setting, sudden stretching, traction or eccentric loading of the upper limb could plausibly have contributed to disruption of the brachioradialis at its humeral attachment. The mechanical contribution of the brachioradialis during elbow flexion and loading provides a biomechanical basis for this possibility^[12].

From a forensic perspective, the finding is significant because extensive crushing injuries may be recorded simply as soft-tissue destruction unless the individual muscles are carefully identified and traced. Detailed assessment of blunt-force injuries is important in trauma forensics^[13]. In fatal road traffic accidents, systematic autopsy examination can help characterize injury patterns and their

relationship to the circumstances of trauma^[14]. The presence of surrounding haemorrhage and blood infiltration supports traumatic disruption occurring during life, consistent with the overall opinion that the injuries were antemortem.

The distinction between muscle-belly rupture, proximal avulsion and distal tendon rupture is also important. These represent anatomically different injuries and may result from different mechanisms^[5,6,11]. In the present case, the lesion was located at the proximal humeral attachment.

CONCLUSION

Traumatic proximal disruption of the brachioradialis at its humeral origin is an uncommon finding. The present case demonstrates this injury in a fatal high-energy road traffic accident associated with extensive left-sided blunt-force trauma.

Although the brachioradialis injury was not responsible for death, its recognition demonstrates the value of detailed musculoskeletal dissection during medicolegal autopsy. Documentation of unusual muscle and tendon injuries may provide additional information regarding the distribution and possible mechanism of blunt-force trauma.

REFERENCES

1. Lung B, Ekblad J, Bisogno M. Anatomy, shoulder and upper limb, forearm brachioradialis muscle. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2020.
2. Boland MR, Spiegelman T, Uhl TL. The function of brachioradialis. *J Hand Surg Am.* 2008;33(10):1853-9.
3. Cauffriez B, Dugaill PM, Brassine E, Schuind F. The role of the muscle brachioradialis in elbow flexion: an electromyographic study. *J Hand Surg Asian Pac Vol.* 2018;23(1):102-10.
4. Armstrong D, Arrowsmith J, Burke F. Closed rupture of brachioradialis during exercise. *J Hand Surg Eur Vol.* 2011;36(8):704-5.
5. Khan IA, Bonato LJ, Chhabra A. Complete closed brachioradialis tendon rupture: a case report. *Hand Surg.* 2015;20(1):141-3.
6. Vogels S, Debeij J, Hoencamp R, Ritchie ED. Rupture of the brachioradialis muscle following blunt trauma: a case report. *Trauma Case Rep.* 2022;42:100702.
7. Guettler, J. H., & Mayo, D. B. (2001). Avulsion fracture of the origin of the brachioradialis muscle. *American Journal of Orthopedics*, 30(9), 693-694.
8. Behera, G., Balaji, G., Menon, J., Sharma, D., & Komuravalli, V. K. (2016). Avulsion fracture of brachioradialis muscle origin: An exceedingly rare entity: A case report. *Malaysian Orthopaedic Journal*, 10(2), 50-52.
9. El Rassi G, et al. Traumatic avulsion fracture of the origin of the brachioradialis muscle: a case report and review of the literature. *Case Rep Orthop Res.* 2022;4(3):250-4.
10. Reddy KS, et al. Avulsion fracture of brachioradialis muscle origin: an exceedingly rare entity: a case report. *Med J Armed Forces India.* 2017;73(Suppl 1):S102-4.
11. Salazar, D., Hazel, A., & Marra, G. (2015). Isolated avulsion of extensor carpi radialis longus and brachioradialis origins: A case report and surgical repair technique. *American Journal of Orthopedics*, 44(10), E394-E397.
12. Tirrell TF, Franko OI, Bhola S, Hentzen ER, Abrams RA, Lieber RL. Functional consequence of distal brachioradialis tendon release: a biomechanical study. *J Hand Surg Am.* 2013;38(5):920-6.
13. Eze, U. O., & Ojifinni, K. A. (2022). Trauma forensics in blunt and sharp force injuries. *Journal of the West African College of Surgeons*, 12(4), 94-101.
14. Sacco, M. A., Verrina, M. C., Gualtieri, S., et al. (2025). The role of autopsy in diagnosing fatal chest injuries in road traffic accidents: A literature review. *Diagnostics*, 15(6), 778. <https://doi.org/10.3390/diagnostics15060778>