A Rare Case of Triceps Brachii Injury after Electrocution

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Abstract

Injuries of the triceps brachii muscle are a rare entity and mostly concern its distal tendon. These represent the least common of all muscle and tendons injuries. The most common reported causes are repeated strong physical efforts, a fall on an outstretched forearm when a sudden deceleration is put on contract triceps, or a direct trauma. High-dosed and prolonged corticosteroid therapies, repeated local steroid injections, chronic renal failure, diabetes, rheumatoid arthritis, hyperparathyroidism, and osteogenesis imperfecta are reported as systemic causes. Even rarer are lesions of muscle fibers and avulsions or rupture at its musculotendinous junction, and these can be caused by direct trauma or by forced elbow flexion during triceps contraction. To the best of our knowledge, there is no article in the literature describing this type of injury that occurred after electrocution. In this article, we report an uncommon case of intramuscular tear associated with insertional distal tendon injury occurred in a man survived to high-voltage electric discharge.

Keywords

- electrocution
- muscle
- injury
- triceps brachii

Introduction

Injuries of the triceps brachii are less frequent between muscle and tendons lesions and mostly concern its distal tendon.^{1–4} The musculotendinous junction, or the muscle substance, could be involved in decreasing order of frequency.^{1,3,5–8} According to Tarsney, these are respectively defined as avulsion,¹ the first one, and “rupture,” the latter one.⁹ The most common mechanisms of injury have been reported to be a fall on the outstretched hand with the elbow in midflexion, a forced flexion on a contracted triceps, or direct trauma. Other reported causes are systemic diseases, such as hyperparathyroidism, diabetes mellitus, and chronic renal failure.^{1,3–5,10,11}

In the literature, we have found a few articles describing intramuscular triceps brachii lesions. The first reported case of intramuscular rupture was by Penhallow in a 35-year-old man struck by a large box above the elbow.¹ Other reported cases are related to repeated physical effort⁸ and diabetes.¹² We have not found any paper reporting such kind of lesion occurred after electrocution.

In this report, we describe the rare case of survival in a 49-year-old man hit by high-voltage electric discharge, who reported an intramuscular lesion of the distal part of his left triceps brachii muscle, associated with its distal tendon insertional injury.

Case Report

A 49-year-old electrician was electrocuted during his usual work activity of electric implant maintenance. The electric beam crossed his left arm completely and the power of the electric shock overturned him against the edge of the cage, determining a high-energy trauma of the distal part of the left arm. Before losing consciousness, he was able to perceive the smack of the triceps brachii fibers rupture caused by the electric discharge and the functional impairment of its left arm.

He reported a complete triceps muscle lesion with avulsion of its distal tendon from the olecranon (► **Fig. 1**) and a second-degree burn, with partial necrotic lesion of the apex of the distal phalanx of fourth finger of the left hand.

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Fig. 1 The wound compromising all tissues from skin to the distal third of the triceps brachii muscle.

Surprisingly, the patient did not need resuscitation and underwent surgical exploration of the lacerated and contused wound. The ulnar nerve was isolated and did not appear injured along its whole course.

The distal tendon of the triceps was interrupted near the tenomuscular junction, so we decided to perform a suture of the fascia that covers the triceps muscle at the proximal stump with three fiber wires 2.0 wires, using a Krakow technique for each wire. At the distal part of the triceps brachii, three TiCron wires were used at the insertion of the triceps where fortunately part (ca. 4 cm) of the tendon was present. Complementary sutures with TiCron were performed around

the triceps fascia to reduce the possible adhesions between the muscle and the subcutaneous tissue.

A real reinsertion of the distal triceps tendon to the olecranon with anchors or transosseous drill holes was not performed in this single case due to the presence of ca. 4 cm of the distal tendon. However, because part of the muscle was lost during the injury, the suture resulted in a shortening and a consecutive limitation of approximately 30 degrees of flexion range of motion (ROM) during the intraoperative control after the suture (► **Fig. 2**).

After hospital discharge, the arm was cast for 2 weeks. No kinesiotherapy was suggested and performed. At the first clinical evaluation, 9 days after surgery, the patient presented a pitting edema at the distal part of his left arm and outcomes of second-degree burns on the back of the left hand in phase of advanced epithelialization, with no limitation of the ROM at the flexion–extension of the fingers. Stitches were removed 2 weeks postoperatively, and the valve cast was replaced by elastic bandage. Then the patient started a passive mobilization of the elbow. One month after surgical treatment, the complete extension of the elbow was restored. A 10-degree limitation from complete elbow flexion was reported, while the burn lesions were resolving. The patient was allowed active mobilization of the arm and elbow. At the last clinical follow-up, 45 days after surgery, the patient did not complain any pain and complete ROM of the elbow was regained (► **Fig. 3**). The only complications observed were the shortening of approximately 1.5 cm of the left arm and slight hypoesthesia over the olecranon region.

Discussion

Distal triceps muscle injuries are a rare entity and mostly involve its distal tendon.^{1,3,5} Intramuscular tears and musculotendinous junction lesions are extremely rare.^{1–3,5–8,12} In the literature, there have been some published articles reporting cases of intramuscular tears occurred in patients affected by diabetes¹² or after repeated sport efforts,⁸ but we have not found any article examining triceps brachii muscle injuries reported after electrocution. Till date, no established

Fig. 2 Surgical procedure: The ulnar nerve isolated by the blue lace on the medial side with the full thickness wound including the distal third of the triceps brachii muscle. On the right side, the restored profile muscle after suture.

Fig. 3 The patient at the last clinical follow-up: The complete range of motion of the elbow was restored.

guidelines for the treatment of such lesions are described. Generally, the tendency is to treat distal tendon injuries with surgical repair only in cases of total lesions and reserve conservative treatment with immobilization in a cast to partial lesions, with the exception of highly demanding and young patients.^{5,11} The most reported surgical techniques describe the use of Bunnel or Krakow whipstitches techniques, passing the suture through transosseous drill holes in the ulna. Other techniques purpose the use of suture anchors and direct tendon repair to a periosteal flap raised from the olecranon.¹¹ For what concerns intramuscular tears, the common treatment is a direct suture of muscular belly. However, there is a concern about the treatment of burn muscle lesions: the loss of substance, due to mechanism of injury, which does not permit to restore the complete initial length of the arm. The only possible treatment, in these cases, is a tendon-shortening suture, with a consequent reduced length of the arm. This is the case of our patient too, who presented a shortening of about 1.5 cm of left triceps, nevertheless with no referred functional impairment.

Conflict of Interest

None.

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