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## Case report

### Rupture of the triceps tendon – A case series

Atin Jaiswal<sup>a,\*</sup>, Naiman Deep Kacchap<sup>b</sup>, Yashwant Singh Tanwar<sup>c</sup>, Devendra Kumar<sup>b</sup>, Birendra Kumar<sup>b</sup>

<sup>a</sup> Department of Orthopaedics, Maya Hospital, India

<sup>b</sup> Department of Orthopaedics, Bokaro General Hospital, Bokaro, India

<sup>c</sup> Department of Orthopaedics, PGIMER & Dr R.M.L Hospital, New Delhi, India

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#### ABSTRACT

Triceps rupture is the least common among all tendon injuries. The usual mechanism of injury is a fall on an outstretched hand, although direct contact injuries have also been reported to cause this injury. The diagnosis of acute triceps tendon rupture may be missed, which can result in prolonged disability and delayed operative management. We presented three cases of acute triceps tendon rupture each at different site showing the spectrum of injury to the muscle and mechanism of injury and management were also discussed.

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#### Introduction

Avulsion or rupture of the triceps tendon is very rare injury and it can be graded as the least common among all tendon injuries thus accounting for usual occurrences of misdiagnosed and neglected cases leading to long term functional disability.<sup>1</sup>

In a large series of 1014 muscle and tendon injury cases at Mayo Clinic, Anzel et al<sup>2</sup> reported its incidence to be 0.78%. The most common site of rupture as stated in the literature is at the osseous insertion of the triceps on olecranon along with a bony chip, whereas rupture at the musculotendinous junction and the intramuscular substance had been found infrequently.<sup>3</sup> This injury most commonly occurs in middle aged males but incidences have been reported in all ages including children before epiphyseal fusion and geriatric age groups.<sup>4,5</sup> We presented three cases of triceps rupture in this case series. The first case was ruptured at the osseous insertion, second at the osseous insertion but the aponeurosis was spared and the third case at the musculotendinous junction. All the 3 cases were treated by primary repair of the triceps and resulted in good functional outcome.

#### Case report

##### Case 1

A 25 years old male patient presented with complaints of sudden pain and swelling in left elbow while doing some extension exercises of the elbow in the gym. On clinical examination, left elbow was tender, there was minimal swelling at the triceps insertion and no appreciable palpable gap, and active extension of the affected elbow was painful. Lateral elbow radiographs revealed the characteristic flake sign suggesting acute triceps tendon rupture (Fig. 1A). Operative repair of the triceps tendon was planned and the patient was shifted to the operating room after routine investigations. Triceps was explored through posterior incision and near complete rupture of the triceps aponeurosis was seen at the insertion (Fig. 1B). A small piece of avulsed bone fragment was also seen at the distal end of the proximal portion of the triceps aponeurosis. Aponeurosis was repaired with No.2 Ethibond suture using Krackow's method, and holes were drilled in olecranon and suture ends were passed through holes in olecranon and tied (Fig. 1C). Direct bone to bone repair of the avulsed bony fragment with olecranon was also done with No.2 Ethibond suture (Fig. 1D). Elbow was immobilised in plaster cast for three weeks, followed by progressive active flexion in a controlled motion brace. Active strengthening of the triceps was started at about three months. At 1 year follow up, patient had full triceps strength but with 10° terminal restriction of elbow flexion and the Disability of Arm, Shoulder and Hand (DASH) score was 5.8 (Fig. 1E).

\* Corresponding author.

E-mail address: [atin.jaiswal@yahoo.com](mailto:atin.jaiswal@yahoo.com) (A. Jaiswal).

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**Fig. 1.** A: Lateral X rays of left elbow showing flake sign. B: Arrow showing site of rupture. C: Krackow suture in the aponeurosis passed through holes in olecranon. D: Final repair. E: Elbow range of motion at one year follow up.

### Case 2

A 35 years old male patient presented to the emergency department with complaints of pain swelling and inability to extend left elbow after a slip from motorbike and landing on outstretched hand. Clinical examination revealed tenderness at left elbow as well as swelling and ecchymoses at the triceps insertion site. Some degree of active extension of the elbow was possible but was extremely painful. X rays of the patient revealed flake sign in lateral radiographs (Fig. 2A). Ultrasonography of the left elbow revealed rupture of the triceps at the insertion. Operative repair

was planned. In the operating room triceps was explored and aponeurosis was found intact, but a bony flake was palpable under the aponeurosis 2 cm proximal to insertion. Aponeurosis was split in the midline and rupture was seen deeper to aponeurosis (Fig. 2B). Repair was done with Krackow's method using No.5 Ethibond suture in the detached deeper portion of triceps, and suture was passed through drill holes in the olecranon and secured with multiple knots (Fig. 2C). Then aponeurosis was again reinforced with Krackow sutures through holes in the olecranon (Fig. 2D). Midline split of the aponeurosis was sutured with interrupted vicryl sutures.



**Fig. 2.** A: Lateral X rays of left elbow showing flake sign. B: Arrow showing site of rupture. C: Krackow suture in the substance of triceps passed through holes in olecranon. D: Figure after closure of triceps aponeurosis. E: Elbow range of motion at one year follow up.

Postoperative protocol was the same as for the first patient. At one year follow up patient developed full triceps strength and range of motion at elbow and had a DASH score of 5 (Fig. 1E).

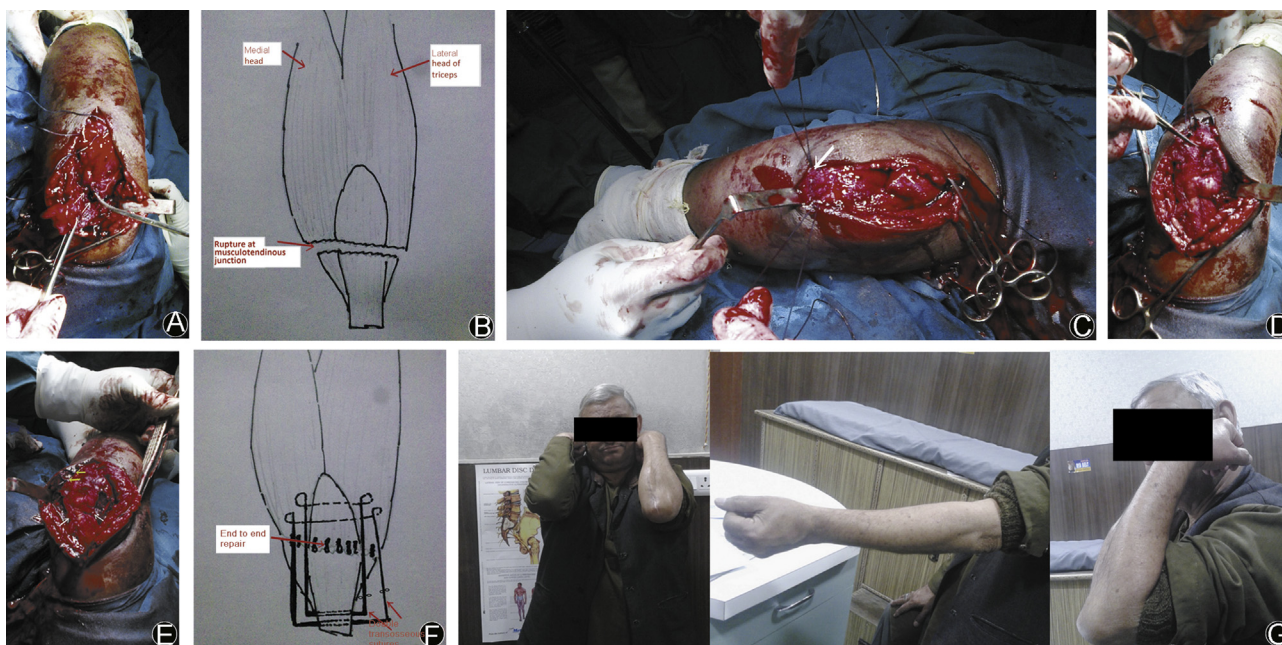
### Case 3

A 54 years male patient presented in outpatient department of Bokaro General Hospital with complaints of pain, swelling and inability to extend left arm against gravity. He gave a history of a fall on outstretched hand two days back. On examination a palpable gap was present in his left arm in posterior region along with swelling and ecchymoses. Movements of the left elbow especially extension was painful. X rays revealed no obvious bony injury while ultrasonography revealed avulsion of the triceps 5 cm proximal to insertion. Patient was taken to the operating room and triceps was explored through posterior approach. The findings on the operating table correlated with ultrasonography report. Tear in the triceps was found at the musculotendinous junction (Fig. 3A and B). Repair was done by passing two No.5 Ethibond sutures through drilling holes in the olecranon. The sutures were passed through distal portion of the triceps and taken out through the ruptured surface; then suture was passed through the rupture site in the proximal portion of triceps and repair was done by modified Kessler sutures (Fig. 3C–F). End to end repair was also done to reinforce the repair. A similar technique of triceps repair has been previously described by Levy,<sup>6</sup> using Mersilene strip and single transosseous suture but we have modified this technique by using double transosseous No.5 Ethibond suture. The stability of the repair was checked by passive movements of the elbow and skin was closed using suction drain. Postoperative protocol was the same as for other 2 patients. At postoperative 6 months patient achieved acceptable range of motion at elbow and sufficient strength in elbow extension (Fig. 3G) and at one year follow up patient had a DASH score of 4.5.

### Discussion

Avulsion or rupture of the triceps tendon is the least common amongst all tendon injuries.<sup>1</sup> This injury is often missed due to its rarity and usual absence of classical signs and symptoms of this injury in acute clinical settings unless high index of suspicion is present. Most common mechanism of injury is sudden deceleration force imparted to the arm during extension such as during a fall, but simple uncoordinated muscle contraction against flexed elbow may also result in such injury.<sup>7</sup>

In young healthy individual, this injury usually occurs with substantial trauma but in some systemic and local diseases that may weaken the structural integrity of the tendon, trivial trauma may result in triceps avulsion or rupture. Among systemic causes, chronic renal failure, secondary hyperparathyroidism, hypocalcemic tetany, rheumatoid arthritis, Marfan syndrome, chronic acidosis, osteogenesis imperfecta, anabolic steroid use, and, possibly, insulin dependent diabetes have been reported. Local factors associated with triceps disruption include local steroid injections, attrition changes from degenerative arthritis, and olecranon bursitis.<sup>8–13</sup> Clinical findings include pain and swelling at the elbow, inability to extend elbow against gravity and sometimes a palpable defect may be present at the rupture site. Radiological finding may show presence of small bony flake proximal to avulsion in cases of bony avulsion (flake sign) in lateral view. Ultrasonography and magnetic resonance imaging may help in diagnosis in suspected cases. Three sites of failure have been demonstrated experimentally as well as clinically: the muscle belly, the musculotendinous junction, and the osseous tendon insertion<sup>14</sup>; however rupture at the musculotendinous junction is least common.<sup>13</sup> Acute anatomic repair of complete injuries gives predictable good results. Conservative management is usually reserved for partial injuries involving less than 50% of the triceps. Various techniques of repair in acute injuries have been cited in literature such as open Transosseous suture techniques using nonabsorbable sutures in the



**Fig. 3.** A: White arrows showing site of rupture. B: Diagrammatic representation of site of rupture. C: White arrows showing 2 transosseous No.5 Ethibond sutures passed through olecranon. D: Sutures before tying knot. E: White arrows showing repaired rupture, and yellow arrows showing suture knots. F: Diagrammatic representation of repair. G: Elbow range of motion at 6 months.

olecranon as described by Tsourvakas et al,<sup>6,15</sup> K-wires reinforced with a circlage wire<sup>16</sup> and bone suture anchors.<sup>17</sup> In our case we used transosseous olecranon suture technique to repair triceps as described in literature.

Thus to conclude triceps rupture is a rare injury and classical clinical findings may not be always present. Classical flake sign may not be present in cases of rupture at musculotendinous junction. Palpable gap may not be present in the triceps in cases of near complete or incomplete rupture. However active extension is nearly always affected irrespective of site of rupture. Diagnosis may be easily missed in case of rupture at musculotendinous junction and muscle belly due to swelling, pain and absence of flake sign in radiographs. If diagnosis is in doubt after clinical examination, X rays and ultrasonography may be a useful to confirm the diagnosis. Once the diagnosis is made, immediate repair with nonabsorbable transosseous sutures may result in good functional outcome and early rehabilitation.

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