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# Outcomes of Triceps Rupture in the US Military: Minimum 2-Year Follow-up

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**Abstract**

**Background:** The objective of this study was to examine the subjective and objective midterm functional clinical outcomes of surgically repaired triceps injuries in a moderate- to high-demand population. **Methods:** The US Military Health System was queried to identify all surgically treated triceps tendon ruptures between 2008 and 2013. Primary endpoints included rates of rerupture, perioperative complications, or significant persistent elbow dysfunction; Disability of the Arm, Shoulder and Hand (DASH) score, Mayo Elbow score, and ability to do push-ups were also extracted. **Results:** Thirty-seven patients underwent triceps tendon repair with a mean follow-up of 49.8 ± 17.3 months (range: 26.8-80.2). The most common mechanisms of injury were military duties (27%), sporting activity (24%), or fall-related (21.6%), with most injuries occurring during an eccentric movement (54%). While 45% experienced occasional elbow pain postoperatively, only 1 patient (2.7%) had a rerupture. Despite this, at 2 years, 31 patients (84%) were able to return to full military duty. While 6 patients were discharged from military service, only 1 underwent medical separation while 5 retired for reasons unrelated to their triceps tendon rupture. Patient-reported outcomes were available for 14 patients at final follow-up. The average DASH and Mayo Elbow scores were 4.7 (SD ± 4.7, range: 0-15.9) and 85.4 (SD ± 11.7, range: 60-100), respectively. The cohort could perform mean 54.2 (range: 9-90) push-ups. In additional, 12 of 14 (85.7%) were satisfied with their elbow function. **Conclusions:** The active duty cohort experienced excellent postoperative results with a high rate of return to military duty, despite nearly half of the patients recognizing some degree of activity-related, elbow pain.

**Keywords:** military, tendon rupture, triceps

## Introduction

Rupture of the triceps tendon is a rare clinical entity, accounting for less than 1% of tendon injuries of the upper extremity.[1,19,35] Eccentric movements while lifting heavy loads are the most common mechanism of injury.[13,38] In addition, reports of tendon ruptures have been associated with corticosteroid injection,[28] anabolic steroid use,[27] olecranon bursitis,[4] insulin-dependent diabetes,[32] rheumatoid arthritis,[9] and renal failure.[5,12,25] Surgical repair is typically recommended for all triceps tendon ruptures,[3,13,15,37] particularly among more active demographics. However, the diagnosis of these injuries may be elusive, with long delays in treatment and frequent misdiagnosis, while it is well known that earlier surgical repair, as compared with late, is associated with improved clinical outcomes.[31]

In addition to isolated case reports[6,7,22,29,30,36,39] and limited case series,[14,15,21] some larger studies exist,[21,31] although these often lack long-term follow-up and objective outcome scores.[21,37] The lone study reporting on clinical results with objective outcome scores featured only 5 patients.[2] The purpose of this study is to analyze midterm functional subjective and objective outcomes of surgical repaired triceps tendon injuries in a high-demand, military population. We hypothesize that surgically treated triceps tendon ruptures have excellent functional outcomes, low retear rates, and high rates of active duty retention.

## Methods

Upon institutional review board approval, a retrospective review was performed to identify all US military service members who experienced traumatic triceps tendon ruptures

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with subsequent surgical repair (Current Process Terminology [CPT] codes 24341). Data were confirmed using International Classification of Diseases 9 (ICD-9) codes 841.3 (sprain or strain of ulnohumeral joint; includes rupture of tendon; excludes open laceration of tendon) and 881.21 (open wound of elbow with tendon involvement) between 2008 and 2013. The data were queried using a military medical database, the Management Analysis and Reporting Tool (M2), which has been employed in multiple other studies evaluating other traumatic conditions of the upper extremity.[16,33,34] Demographic and procedural data were initially extracted followed by an analysis of the military electronic medical record (Armed Forces Health Longitudinal Technology Application [AHLTA]) to confirm the primary diagnosis, procedure, date of surgery, and injury-related data (ie, mechanism of injury, concomitant pathology). Postoperative, patient-reported outcome scores were obtained via telephone interview after final follow-up, to include the quick Disability of the Arm, Shoulder and Hand (DASH) score, Mayo Elbow score, and number of push-ups the patient was presently able to perform. In addition, patients were asked to respond "yes" or "no" to the following question: Are you satisfied with the outcome of your surgery?

The inclusion criteria were the following: military service member with triceps tendon laceration or rupture, active duty service at time of injury and surgical repair, and minimum of 2 years follow-up. The exclusion criteria were incomplete tears, incomplete medical record documentation, less than 2-year follow-up, nonmilitary or retired patient status at time of surgery, or patients with allograft tendon reconstruction.

The primary outcomes for the current study were: (1) the ability to return to duty; and (2) surgical failure secondary to rerupture or requirement for revision reoperation. Secondary outcome measures were: (1) complications; (2) DASH score; (3) Mayo Elbow score; (4) number of push-ups able to perform; (5) satisfaction with function (Yes vs No); and (6) ability to deploy postoperatively.

### Surgical Technique

The operative reports were available for 12 cases. A posterior longitudinal incision was taken down through the skin and subcutaneous tissue to the level of triceps fascia at which point the tear was encountered. At this point, high tensile, nonabsorbable, braided suture was utilized in Krackow fashion to secure the proximal tendon. The sutures were then either passed through two drill holes made at the footprint of the triceps tendon and tied over a bone bridge (n = 9) or secured via suture anchors (n = 3). The fascia and overlying tissue were closed in the typical manner. The postoperative protocol was reported for 21 of 37 patients, which generally followed that which has previously been described.[13] Briefly, patients were immobilized at 30° of elbow flexion for 1 to 2 weeks. Active elbow flexion with gravity-assisted extension is started after the second week when the splint is discontinued. Active elbow extension is started at 4 weeks and strengthening begins at 6 weeks. Heavy lifting and push-ups are initiated between 4 and 6 months.

### Statistical Analysis

Averages with standard deviations and percentages were calculated for demographic variables, mechanism of injury, injury characteristics, and complications. Time to surgery was determined as a median to exclude any significant outliers.

## Results

### Demographics, Comorbidities, and Injury Characteristics

A total of 37 patients underwent operative repair of triceps tendon with a mean follow-up of 49.8 ± 17.3 months (range: 26.8-80.2 months). The average age was 38.4 ± 8.7 years (range: 19-54 years), and 36 (97%) patients were male.

Tobacco use was seen in 8 (22%), and steroid use was seen in 3 (8%). The majority (43%) of the patients were in the US Army, followed by the Navy (32%), Air Force (22%), and Public Health (3%). The most common injury-precipitating events were military training (27%), sporting activities (24%), and fall-related mechanisms (21%). Most triceps tendon ruptures occurred during a sudden eccentric load (54%) (Table 1).

All of the injuries were visualized via magnetic resonance imaging (MRI), and most occurred at the tendinous insertion (88%). The tears retracted an average of 1.6 ± 1.3 cm (range: 0-4.1 cm). Retraction was measured on a calibrated MRI, which was measured by the senior author. Associated injuries were rare but included ulnar collateral ligament injury (6%) and flexor-pronator mass injury (6%). No additional injury needed to be addressed surgically. The median time from injury to surgical repair was 13 days (Table 2).

### Functional Outcomes and Complications

At 2 years postoperatively, 97% of service members either remained on active duty or underwent a routine, nonmedical separation from the military. Of the 6 patients (16%) who were separated from the military within 2 years of the surgery, only 1 (3%) had a triceps-related medical separation, while 5 (14%) underwent a routine, nonmedical separation. While 46% reported some degree of pain with activity at terminal follow-up, 8% of patients experienced postoperative complications, including one 44-year-old

**Table 1.** Mechanism of Injury.

| Variable | n (%) |
|---|---|
| Activity | |
| Sports | 9 (24.3) |
| Chronic injury | 3 (8.1) |
| Lifting | 7 (18.9) |
| Military duty | 10 (27.0) |
| Sustained fall | 8 (21.6) |
| Mechanism | |
| Eccentric moment | 20 (54.1) |
| Direct blow | 7 (18.9) |
| Fall | 7 (18.9) |
| Chronic | 3 (8.1) |

**Table 2.** Injury Characteristics.

| Variable | n (%) |
|---|---|
| MRI | |
| Study obtained | 37 (100) |
| Access for review | 34 |
| Tendon | |
| Complete tear | 25 (73.5) |
| Retraction (cm) | 1.6 ± 1.3<br>Range: 0-4.1 |
| Location | |
| Insertion | 30 (88.2) |
| Myotendinous junction | 4 (11.8) |
| Associated injuries identified on MRI | |
| Ulnar collateral ligament | 2 (5.9) |
| Flexor-pronator mass injury | 2 (5.9) |
| Lateral ulnar collateral ligament | 1 (2.9) |
| Radial head fracture | 1 (2.9) |
| Ulnar nerve transient neuropraxia | 1 (2.9) |
| Median time from date of injury to date of surgery | 13 days<br>Range: 1-204 days |

*Note.* MRI = magnetic resonance imaging.

male patient (3%) who sustained a retear requiring surgical revision and an otherwise unremarkable follow-up (Table 3). This 44-year-old male patient was injured while performing bench press, 7 months after the primary repair. Primary repair without allograft was completed using suture anchors.

### *Phone Interview*

A total of 14 (38%) patients were available for phone interview during final follow-up at 52.4 months (range: 29.7-84.9 months). The average postoperative DASH score was 4.7 (SD 4.7, range: 0-15.9). The average postoperative Mayo Elbow score was 85.4 (SD ± 11.7, range: 60-100) On average, patients were able to perform 54.2 (SD ± 26.1, range: 9-90) push-ups at terminal follow-up. In total, 12 (86%) patients were satisfied with their function and 9 (62%) patients deployed postoperatively.

**Table 3.** Selected Patient-Reported Outcome Measures (n = 14).

| Variable (average) | Value (± SD, range) |
|---|---|
| Follow-up | 52.4 months (range: 29.7-84.9 months) |
| DASH | 4.7 (± 4.7, 0-15.9) |
| Mayo Elbow | 85.4 (± 11.7,60-100) |
| Push-ups | 54.2 (± 26.1, 9-90) |
| Deployed | 9 (62.3%) |
| Satisfied (Yes vs No) | 12 (85.7%) |

*Note.* DASH = Disability of the Arm, Shoulder and Hand.

## Discussion

Triceps tendon ruptures are a remarkably uncommon injury[1,19,35] and the known cases are reported within a handful of case reports and short case series. This analysis offers the largest report of surgically treated triceps tendon tears with validated outcome measures. In addition, the present examination reports specific outcome measures, complications, and return to duty rates following triceps repair in young, physically active patients. The cohort demonstrated excellent clinical and functional results as 97% of patients either remained on active duty service or underwent a routine, non-medial separation from the military at 2 years. In addition, the complication (8%) and retear (3%) rates were low.

One previous study uniformly reported specific validated outcome scores following triceps tendon repairs.[2] Among 5 patients, Bava et al[2] reported a DASH score of 1.4 and Mayo Elbow score of 95.8 following repair of triceps tendon rupture (Table 4). The difference in outcome scores between this cohort and that reported in the present analysis (DASH: 4.7, Mayo Elbow: 85.4) is likely secondary to the high physical demands required of active duty service members. Those performing regimented rigorous daily physical training, including push-ups and bench press, may be more likely to report pain with exertion as compared with a sedentary cohort. Active duty service members may also expect a higher level of postoperative function and therefore report lower function on subjective outcome scores. Although the present DASH and Mayo Elbow scores are slightly lower to that which has been reported following triceps tendon repairs, the present cohort was still functional. Nearly two-thirds of patients deployed postoperatively, 84% were still on active duty at 2 years, and patients could perform an average of 54 push-ups.

**Table 4.** Existing Case Series of Triceps Tendon Rupture.

| Author | Repairs | Mean follow-up (range) | Average age (years) | Mean time to surgery (range, days) | Study findings | Complications |
|---|---|---|---|---|---|---|
| Van Riet et al (2003)[31] | 23 | 93 mo (7-264 mo) | 47 | 63 d | Peak strength of 82% as compared with contralateral side (range: 75%-106%)<br>ROM: 10°-136°<br>All patients had 4-5/5 strength testing | 3 (13%) reruptures<br>1 patient had olecranon avulsion, ulnar neuropathy, and required HWR<br>Average 10° loss ROM |
| Mirzayan et al (2015)[21] | 150 | NR | 49 | 19 d | Neither outcome scores, strength, nor ROM | BT fixation : Anchor fixation<br>• Reoperation rate (2.1% vs 9.4%)<br>• Infection rate (0% vs 5.2%)<br>• Not Statistically significant |
| Mair et al (2004)[18] | 11 | 36 mo (range NR) | 29 | NR | All regained full ROM without weakness<br>10/11 returned to professional football | 1 (9%) rerupture |
| Bava et al (2012)[2] | 5 | 32 mo (18-49 mo) | 47 | NR | Postoperative:<br>DASH: 1.4<br>ASES: 99.2<br>Mayo Elbow: 95.8<br>Oxford Elbow (pain): 96; (function):100; (social):96 | NR |
| Kokkalis et al (2013)[14] | 11 | 21 mo (12-40 mo) | 53 | NR (8-21 d) | Preoperative → Postoperative VAS: 8.5 → 2.4<br>Preoperative → Postoperative Strength: 1.6 → 4.8<br>Postoperative arc of motion: 136°<br>9/11 patients "very satisfied" and returned to full work | Loss of 7° arc of motion<br>1/11 (9%) had postoperative pain over suture knot |
| Farrar and Lippert (1981)[6] | 3 | 10 mo (9-12 mo) | 48 | NR | 3/4 (75%) had 4/5 strength<br>1/4 (25%) had 5/5 strength | NR |
| Sierra et al (2006)[26] | 11 | 17 mo (7-168 mo) | 50 | 12 days (1-45 d) | 10/11(91%) in follow-up returned to preinjury activity<br>2/11(18%) had 4/5 strength<br>9/11 (82%) had 5/5 strength | 1 (6%) rerupture<br>1 (6%) radial nerve palsy<br>1 (6%) ulnar neuropathy |
| Sollender et al (1998)[27] | 4 | NR | 42 | NR | 1 patient suture repair<br>3 patients—NR<br>4/4 patients were weight lifters using anabolic steroids<br>2/4 patients had local steroid injection | 1 (25%) rerupture—early return to aggressive weight lifting<br>1 (25%) contralateral triceps rupture |
| Kose et al (2015)[15] | 8 | 19 mo (12-26 mo) | 25 | 12 days (1-75 d) | All patients satisfied, all returned to previous level of function<br>6/8 (75%) excellent Mayo, 2/8 (25%) good Mayo<br>5/5 strength in all | 1 (13%) ulnar nerve entrapment, required release<br>1 (13%) PIN palsy |
| Yoon et al (2012)[38] | 2 | 19 mo (5-60 mo) | 21 | NR | 3/4 (75%) had ROM 0°-140° with full strength | 1 (25%) 10° loss of extension |
| Neumann et al (2015)[23] | 7 | 12 mo NR | 49 | NR | Mean DASH: 10.3<br>6/7 (83%) had full ROM | 1 (14%) had loss of flexion (110°) |
| Total | 235 | Weighted Average: 45.8 month | Weighted Average: 46.9 years | Weighted Average: 23.6 days | | |

*Note.* ROM = range of motion; HWR = hardware removal; BT = bone tunnel; NR = not reported; ASES = American Shoulder and Elbow Surgeons Shoulder Score; VAS = visual analogue scale; PIN = posterior interosseous nerve; DASH = Disability of the Arm, Shoulder and Hand.

Despite these positive clinical and functional results, nearly half of patients reported having some degree of pain at follow-up, all occurring during either the push-up or bench press activity. In addition, half required some degree of physical limitations during mandated physical fitness or military duties. The military's emphasis on physical training, particularly exercises involving the triceps such as the push-up, may precipitate some residual pain that a more inactive patient may not experience. Other than pain, the complication (8%) and retear (3%) rates were relatively low. The retear rate is similar to that which has been previously reported (6%-25%) (Table 4). Sollender et al[27] reported on 4 "middle-aged" powerlifters who used anabolic steroids and subsequently sustained triceps tendon ruptures. One patient sustained a rerupture after early return to powerlifting, while a second sustained a contralateral triceps rupture in the postoperative period. While 3 (8%) of our patients disclosed a history of steroid use, none of these patients sustained a rerupture. While steroid use is known to damage tendon quality,[17,20] these negative effects are reversible with steroid cessation in an animal model.[10] It cannot be indisputably determined whether the cause of their rupture was directly due to previous steroid use or the lack of rerupture was from steroid cessation. Likewise, tobacco use was seen in 8 (22%) injured patients. While no studies have been done correlating tobacco use with triceps tendon ruptures, other studies have shown that smoking tobacco is a risk factor for developing biceps tendon ruptures due to hypovascularity of the tendon.[24]

Furthermore, as many as 43% of triceps tendon ruptures are misdiagnosed,[31] and other accounts have reported a significant delay in treatment,[8,11] even as high as 609 days.[31] No note of misdiagnosis was made in the medical records reviewed in this analysis, although 100% of our patients received an MRI to confirm appropriate diagnosis and extent of tear. While prior studies have inconsistently used MRI, other authors have used the lateral elbow plain film radiographs in the diagnostic workup. The presence of an avulsion fracture on these plain films may serve as a harbinger of triceps rupture, although this has varied widely in the reported literature (21%-73%).[14,21,31] Despite this, the injury x-rays should be scrutinized and advanced imaging, including ultrasound, should be obtained in cases with a suspicious clinical examination and equivocal basic imaging. In addition, Van Riet et al[31] reported a palpable gap in the tendon in 80% of injuries. The combination of basic radiographs and a physical exam may serve to limit the rate of misdiagnosis. Although MRI may add in the diagnosis, routinely ordering MRI for triceps tendon ruptures is unncecessary.

The limitations are multiple. First, our small cohort is retrospective and is subject to reporting error and recall bias. This is especially pertinent, as we may lack the ability to definitively correlate medical conditions that may have contributed to the injury. In addition, chronic injuries were not adequately evaluated in comparison to acute injuries. Only a single patient with a time from injury to surgery of greater than 60 days was included in the telephone survey. Including primarily acute injuries in the telephone survey may have falsely inflated our results in this cohort. Second, given the rarity of this injury, the current analysis lacks power for further risk stratification. Our telephone survey response rate was 38%, which limits the power of our study and introduces potential for selection and nonresponder bias. However, our response rate was better than that the van Riet cohort (27%).[31] In addition, the limited number of patients in the present analysis is further impaired by retrospective chart review, and our complication rate may be underreported as a result. Similarly, there was a lack of postsurgical information in the patient charts such as splinting or postsurgical dressing. Finally, the nationwide telephone survey rendered the procurement and reporting of a reliable physical exam unattainable.

Despite these limitations, we present the largest series of surgically treated triceps tendon tears in a highly active population after a 50-month follow-up with both objective and subjective outcome measures. With a careful history and physical exam, these injuries may be diagnosed early and operative treatment offers excellent postoperative results. However, patients must be counseled about the potential for some activity-related elbow discomfort, particularly during weight bearing activities.

## Ethical Approval

This study was approved by the William Beaumont Army Medical Center Institutional Review Board—Package 399155-4.

## Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects.

## Statement of Informed Consent

This study involves no human participants, so informed consent was not sought or required.

## Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Some authors are employees of the US Federal Government and the United States Army. The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or reflecting the views of William Beaumont Army Medical Center, the Department of Defense, or United States government.

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## References


1. Anzel SH, Covey KW, Weiner AD, et al. Disruption of muscles and tendons; an analysis of 1,014 cases. *Surgery*. 1959;45:406-414.
2. Bava ED, Barber FA, Lund ER. Clinical outcome after suture anchor repair for complete traumatic rupture of the distal triceps tendon. *Arthroscopy*. 2012;28:1058-1063.
3. Bennett JB, Mehloff TL. Triceps tendon repair. *J Hand Surg Am*. 2015;40(8):1677-1683.
4. Clayton ML, Thirupathi RG. Rupture of the triceps tendon with olecranon bursitis. A case report with a new method of repair. *Clin Orthop*. 1984;184:183-185.
5. de Waal Malefijt MC, Beeker TW. Avulsion of the triceps tendon in secondary hyperparathyroidism. A case report. *Acta Orthop Scand*. 1987;58:434-435.
6. Farrar EL, Lippert FG. Avulsion of the triceps tendon. *Clin Orthop Rel Research*. 1981;161:242-246.
7. Garcia-Fernandez P, Quero Martin P, Mayenco A, et al. Surgical management and follow-up of triceps tendon avulsion after repeated local infiltration of steroids: two cases. *Vet Comp Orthop Traumatol*. 2014;27(5):405-410.
8. Herrick RT, Herrick S. Ruptured triceps in a powerlifter presenting as cubital tunnel syndrome. A case report. *Am J Sports Med*. 1987;15(5):514-516.
9. Ikavalko M, Lehto MU. Fractured rheumatoid elbow: treatment with Souter elbow arthroplasty—a clinical and radiologic midterm follow-up study. *J Shoulder Elbow Surg*. 2001;10:256-259.
10. Inhofe PD, Grana WA, Egle D, et al. The effects of anabolic steroids on rat tendon. An ultrastructural, biomechanical, and biochemical analysis. *Am J Sports Med*. 1995;23(2):227-232.
11. Inhofe PD, Moneim MS. Late presentation of triceps rupture. A case report and review of the literature. *Am J Ortho*. 1996;25(11):790-792.
12. Jorgensen F, Solgaard S. Bilateral rupture of the triceps tendon in a patient receiving long-term hemodialysis. *Ugeskr Laeger*. 1982;144:2723.
13. Keener JD., Sethi PM. Distal triceps tendon injuries. *Hand Clin*. 2015;31(4):641-650.
14. Kokkalis ZT, Mavrogenis AF, Spyridonos S, et al. Triceps brachii distal tendon reattachment with a double-row technique. *Orthopaedics*. 2013;36(2):110-116.
15. Kose O, Kilicaslan OF, Guler F, et al. Functional outcomes and complications after surgical repair of triceps tendon rupture. *Eur J Orthop Surg Traumatol*. 2015;7:1131-1139.
16. Kusnezov N, Dunn JC, DeLong JM, et al. Sternoclavicular reconstruction in the young active patient: risk factor analysis and clinical outcomes at short-term follow-up. *J Orthop Trauma*. 2016;4:e111-e117.
17. Maffulli N, Renstrom P, Leadbetter W. *Tendon Injuries: Basic Science and Clinical Medicine*. New York, NY: Springer; 2005.
18. Mair SD, Isbell WM, Gill TJ. Triceps tendon ruptures in professional football players. *Am J Sports Med*. 2004;32(2):431-434.
19. McMaster PE. Tendon and muscle ruptures. Clinical and experimental studies on the causes and location of subcutaneous ruptures. *J Bone Joint Surg*. 1933;15:705-722.
20. Miles JW, Grana WA, Egle D, et al. The effects of anabolic steroids on the biomechanical and histological properties of rat tendon. *J Bone Joint Surg Am*. 1992;74(3):411-422.
21. Mirzayan R, Singh A, Acevedo DC, et al. Surgical treatment of 150 acute distal triceps tendon ruptures. *J Shoulder Elbow Surg*. 2015;4:e120-e121.
22. Naito K, Homma Y, Morita M, et al. Triceps tendon avulsion: a case report and discussion about the olecranon ossification nucleus. *Eur J Orthop Surg Traumatol*. 2013;2:S193-S196.
23. Neumann H, Schulz AP, Breer S, et al. Traumatic rupture of the distal triceps tendon (a series of 7 cases). *Open Orthop J*. 2015;9:536-541.
24. Safran MR, Graham SM. Distal biceps tendon ruptures: incidence, demographics, and the effect of smoking. *Clin Orthop and Relat Res*. 2002(404):275-283.
25. Seafoss R, Tripi J, Bowers W. Triceps brachii rupture: case report. *J Trauma*. 1976;16:244-246.
26. Sierra RJ, Weiss NG, Shrader MW, et al. Acute triceps ruptures: case report and retrospective chart review. *J Shoulder Elbow Surg*. 2006;15(1):130-134.
27. Sollender JL, Rayan GM, Barden GA. Triceps tendon rupture in weight lifters. *J Shoulder Elbow Surg*. 1998;7:151-153.
28. Stannard JP, Bucknell AL. Rupture of the triceps tendon associated with steroid injections. *Am J Sports Med*. 1993;21:482-485.
29. Tarallo L, Zambianchi F, Mugnai R, et al. Distal triceps tendon repair using Krakow whipstitches, K wires, tension band and double drilling technique: a case report. *J Med Case Rep*. 2015;9:36.
30. Tasoglu O, Ekiz T, Yenigun D, et al. Bilateral quadriceps and triceps tendon rupture in a hemodialysis patient. *Hemodial Int*. 2016;20:E19-E21.
31. van Riet RP, Morrey BF, Ho E, et al. Surgical treatment of distal triceps ruptures. *J Bone Joint Surg*. 2003;85(10):1961-1967.
32. Wagner JR, Cooney WP. Rupture of the triceps muscle at the musculotendinous junction: a case report. *J Hand Surg Am*. 1997;22:341-343.
33. Waterman BR, Chandler PJ, Tokish JT, et al. Anterior bone block augmentation for complex anterior shoulder instability in an active duty military population: a review of 77 patients at short-term follow-up. AAOS Annual Meeting; March 2, 2016; Orlando, FL
34. Waterman BR, Navarro L. Primary repair of traumatic distal bicep ruptures: effect of 1 vs. 2-incision technique. AANA Annual Meeting, March 4, 2016; Orlando, FL.
35. Waugh RL, Hatchcock TA, Elliot JL. Ruptures of muscles and tendons. *Surgery*. 1949;25:370.
36. Weistroffer JK, Mills WJ, Shin AY. Recurrent rupture of the triceps tendon repaired with hamstring tendon autograft augmentation: a case report and repair technique. *J Shoulder Elbow Surg*. 2003;12:193-196.
37. Yeh PC, Dodds SD, Smart LR, et al. Distal triceps ruptures. *J Am Acad Orthop Surg*. 2010;18(1):31-40.
38. Yoon MY, Koris MJ, Ortiz JA, et al. Triceps avulsion, radial head fracture, and medial collateral ligament rupture about the elbow: a report of 4 cases. *J Shoulder Elbow Surg*. 2012;21(2):e12-e17.
39. Zaidenberg EE, Gallucci GL, Boretto JG, et al. Simultaneous bilateral rupture of the triceps tendon in a renal transplant patient. *Case Rep Orthop*. 2015;903690.