

Treatment of a Complex Distal Triceps Tendon Rupture With a New Technique: A Case Report

Ismael Aunon-Martin,^{1,*} Alfonso Prada-Canizares,¹ Veronica Jimenez-Diaz,¹ Carlos Vidal-Bujanda,¹ and Jose Luis Leon-Baltasar¹

¹Orthopedic Trauma Section, Orthopedic Surgery Department, October 12 Hospital, Madrid, Spain

*Corresponding author: Ismael Aunon-Martin, Orthopedic Trauma Section, Orthopedic Surgery Department, October 12 Hospital, Madrid, Spain. Tel: +35-913908227, E-mail: ismaelaumartin@hotmail.com

Received 2015 August 8; Accepted 2015 September 3.

Abstract

Introduction: The distal triceps tendon rupture is an uncommon injury. The acute treatment is well-defined, but when a delayed diagnosis is made or when a tendon retraction is present the alternatives or reconstruction are limited and sometimes complex.

Case Presentation: In this case, we report on a 28-year-old man who presented with a chronic disruption of the distal triceps tendon with a gap of approximately 15 cm. The patient was diagnosed in another center with an inveterate breakage of the distal triceps tendon and was initially treated with an Achilles allograft that was complicated by a wound infection and required more than ten surgeries. Nearly 22 months after the initial trauma, and 12 months after the first surgery, we performed a reconstruction with an Achilles tendon allograft using the new technique of distal attachment. At the 12-month follow-up the patient presented a joint balance from -5° to 110° and presented with no pain.

Conclusions: The use of an Achilles tendon allograft provides excellent results in complex distal triceps tendon ruptures. We report the use of a new technique to anchor a distal Achilles allograft.

Keywords: Tendon, Tendon Injuries, Achilles Tendon

1. Introduction

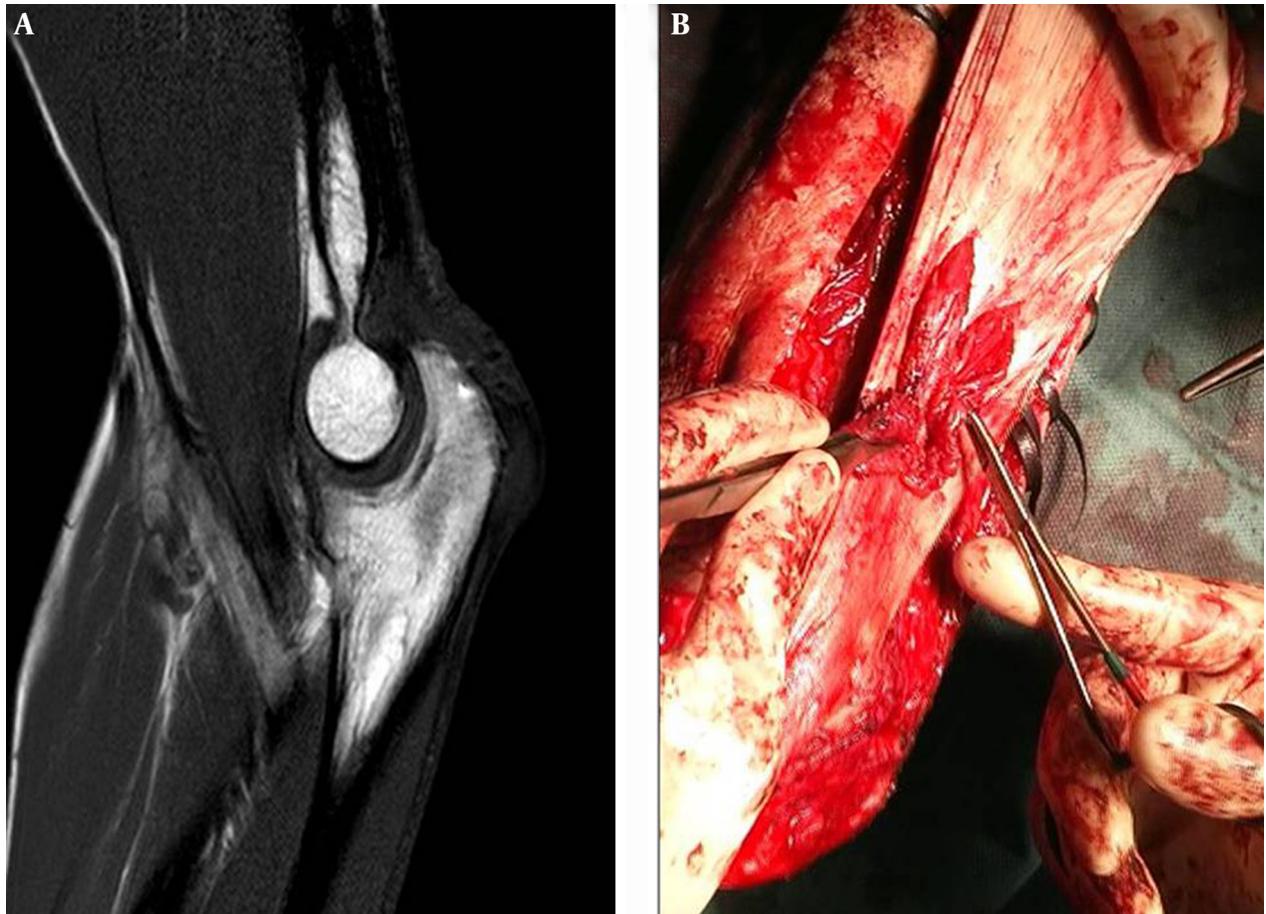
The distal triceps rupture is an uncommon injury and the most injured site is the avulsion of the bony insertion of the tendon (1, 2). A history and physical examination are the basis of the diagnosis, but the intensity of these findings is variable, depending on whether it is a complete or partial rupture, and high rates of initial misdiagnosis (3) have been described. The treatment of these injuries, when diagnosed and treated in the acute phase, is well defined (4, 5). When major muscle tendon retraction is caused by delayed diagnosis or when the remaining available tissue is limited because of previous surgery or infection, the usual techniques are not feasible. Therefore, different techniques have been developed, called augmentation, which allow for the reconstruction of the elbow extensor mechanism (6-12). There is little quality evidence on the use of these techniques and their results.

2. Case Presentation

In January 2014, a 28-year-old patient with whom we

had no previous personal history arrived at our center. He suffered an accidental fall nearly 22 months previous and was initially evaluated at another center and diagnosed with contusion, after a period of ten months, he was diagnosed with an inveterate breakage of the distal triceps tendon. He received a first surgical treatment of reconstruction with Achilles allograft with a bone flake. However, the patient developed a surgical wound infection, which required reoperation up to nine times. About one year after the initial surgery, the patient was referred to our center presenting with signs of infection and disruption of the elbow extensor mechanism. A new surgery was performed with lavage, debridement, and fistulectomy. The patient received antibiotic therapy and an MRI was performed (Figure 1). Over the following months, the patient normalized CRP and ESR values and the antibiotic treatment was suspended after four months.

Prior to the definitive surgery the patient had a clinical hiatus of 15 cm, a complete deficit for active extension and a range of movement from -15° to 120°. General anesthesia

Figure 1. Patient MRI and Open View

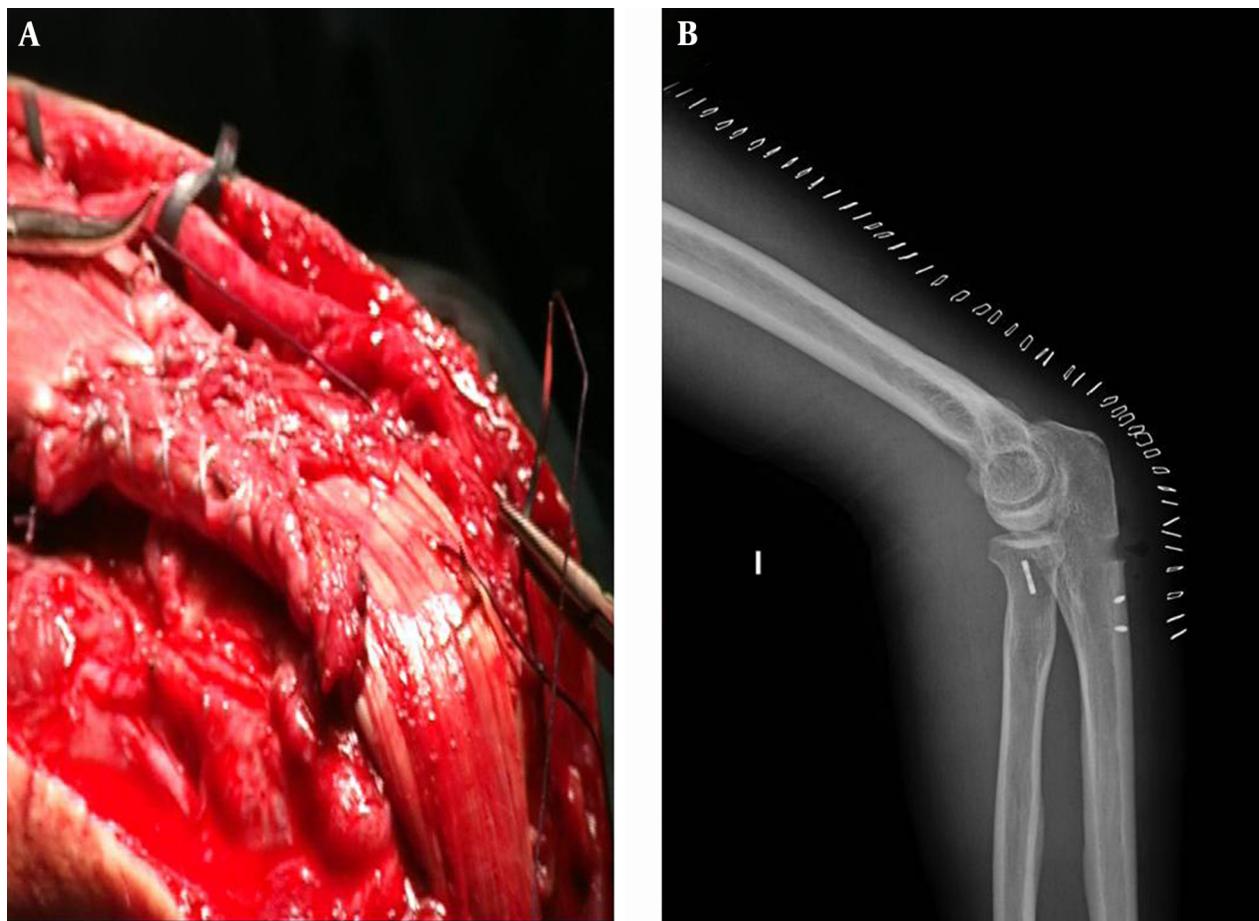
A, Magnetic resonance image of the distal tendon of the triceps is not visible; B, proximal suture of the allograft, pulvertaft technique, the radial nerve is referenced.

was performed with the patient in lateral decubitus, and the affected limb was placed on a pole. A posterior incision was made in the midline taking advantage of the previous incision site, expanding it as needed. A dissection was performed down to identify the muscle and the remaining triceps tendon. The ulnar nerve was isolated but not transposed; the radial nerve was identified in the groove torsion using an alternative posterior approach of the humeral diaphysis (13). The two edges of the triceps were debrided proximally, no tendon was identified, and the remaining muscle was found divided into two tails about 13 cm of the olecranon, with a significant loss of substance. Distally there was an olecranon with preserved bone architecture but no remnants of the triceps tendon. The Achilles allograft was prepared and the distal tendon was divided into three tails. Surgery proceeded to the distal attachment of the triceps, but given the history of multiple previous surgeries, some of them manipulating the olecranon, it was de-

cided to avoid using a piece of bone allograft. The central tail was anchored with a new device, BicepsButton® (Arthrex Inc., Naples, Italy), that allows a double anchor plate-type endobutton and an interference screw. The side tails were anchored with suture anchors and directly sutured to the antebrachial fascia. Thereafter the arm was placed at 30° extension and surgery proceeded to suture the proximal end, since the remaining muscle was divided into two tails, a suture tendon allograft band was performed on the two tails using a pulvertaft-type technique (Figure 2)

The stability of the fixation was checked from a 100° flexion to complete extension. A closure by planes was performed and the member was left in a bandage, with a recommendation of only progressive mobility, limiting flexion greater than 90° for four weeks (Figure 2B). At 12 months post-surgery, the patient presented with a joint balance from -5° to 110°, and the strength for extension was 4.5.

Figure 2. Patient MRI and Open View



A, Completed proximal suture of the allograft; B, radiologic control, lateral view.

3. Discussion

Chronic injury of the distal triceps tendon is uncommon and its management is not fully defined. A clinical history, physical examination, and laboratory tests should enable us to identify the cases of rupture of the distal triceps tendon that will not allow us to perform a routine treatment of primary repair, either by the presence of a too large hiatus between the fragments or because of the poor quality of the remaining tissues. In the case presented, all these facts were identified, and the diagnosis recognized the need for an augmentation technique. There are different options published in the literature about the treatment of chronic injuries of the extensor mechanism of the elbow. To date, there is no study comparing the treatment options, and only a few recommendations have been made on the use of these options (2, 4, 6). Among the different techniques where autografts are used, the rotational Anconeus flap (6), elongations VY (7, 8) rotational, hamstring tendons (9) and carpi radialis and palmaris longus have been

described (10, 11). Techniques where the use of an autograft is avoided are the Achilles allograft (6) and the use of an artificial polyester mesh (12). Each of the above-mentioned techniques uses a different postoperative rehabilitation protocol that is customized and does not exist in our knowledge studies comparing different techniques. The Achilles tendon allograft has a number of peculiarities. Being an allograft, it avoids morbidity in the donor site, and surgery time is decreased. It presents a wide proximal aponeurosis, and it allows various options for proximal fixation. The size of the allograft enables it to cover large losses of substance or replace large areas of devitalized tissue. The Achilles allograft has been used in a number of surgical techniques and its mechanical properties are widely known (2, 4, 6). One point of interest is the technique of anchoring of the Achilles allograft. In the available literature, the most common method was the use of a calcaneal bone fragment that was fixed into an olecranon osteotomy (6). In

the present study, it was determined that the use of a bone fragment was limited by the prior use of a failed procedure of re-embedding bone. So, it was decided not to use a bone anchor technique. Since a tendon allograft has a considerable size, it was decided to split it into three fascicles: a large fascicle in the center and two side fascicles simulating the aponeurotic expansions of the triceps. To reinsert the central bundle without using bone techniques, a double device was chosen that allows insertion of an interference screw and a plate for the endobutton technique. Both the interference screws and the plates have proven to be useful in multiple surgical techniques and to have excellent biomechanical properties (2, 4, 5). The rupture of the distal insertion of the triceps is an uncommon injury that can lead to significant disability. In patients with a rupture of the extensor mechanism of the elbow, where there is a significant loss of remaining triceps tendon and of the muscle, the use of an Achilles tendon allograft is a versatile, reproducible technique and provides excellent results. In this study, we report the use of a new technique to anchor a distal Achilles allograft.

Footnote

Authors' Contribution: All authors have actively participated in this study's realization as follows: Ismael Aunon-Martin has participated in all phases of the development of the study and assisted the main surgeon during the procedure. Alfonso Prada Canizares has assisted the main author in all the phases of the development of the study. Veronica Jimenez-Diaz has assisted the main author in all the phases of the development of the study. Carlos Vida Bujanda has been presented in the index surgery and has reviewed the development of the case. Jose Luis Leon-Baltasar has been the main surgeon in the index surgery, has reviewed the complete case and has invited the main author to complete the present study.

References

- Anzel SH, Covey KW, Weiner AD, Lipscomb PR. Disruption of muscles and tendons; an analysis of 1, 014 cases. *Surgery*. 1959;**45**(3):406-14. [PubMed: 13635217]
- Yeh PC, Dodds SD, Smart LR, Mazzocca AD, Sethi PM. Distal triceps rupture. *J Am Acad Orthop Surg*. 2010;**18**(1):31-40. [PubMed: 20044490]
- Sharma SC, Singh R, Goel T, Singh H. Missed diagnosis of triceps tendon rupture: A case report and review of literature. *J Ortho Surg*. 2005;**13**(3):307-9.
- Tom JA, Kumar NS, Cerynik DL, Mashru R, Parrella MS. Diagnosis and treatment of triceps tendon injuries: A review of the literature. *Clin J Sport Med*. 2014;**24**(3):197-204. doi: 10.1097/JSM.0000000000000010. [PubMed: 24157465]
- Kokkalis ZT, Mavrogenis AF, Spyridonos S, Papagelopoulos PJ, Weiser RW, Sotereanos DG. Triceps brachii distal tendon reattachment with a double-row technique. *Orthopedics*. 2013;**36**(2):110-6. doi: 10.3928/01477447-20130122-03. [PubMed: 23379659]
- Sanchez SJ, Morrey BF. Surgical techniques for reconstruction of chronic insufficiency of the triceps. Rotation flap using anconeus and tendo achillis allograft. *J Bone Joint Surg Br*. 2002;**84**(8):1116-20. [PubMed: 12463654]
- Weng PW, Wang SJ, Wu SS. Misdiagnosed avulsion fracture of the triceps tendon from the olecranon insertion: Case report. *Clin J Sport Med*. 2006;**16**(4):364-5. [PubMed: 16858225]
- Yazdi HR, Qomashi I, Ghorban Hoseini M. Neglected triceps tendon avulsion: case report, literature review, and a new repair method. *Am J Orthop*. 2012;**41**(7):E96-9. [PubMed: 22893888]
- 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**(2):193-6. doi: 10.1067/mse.2003.15. [PubMed: 12700576]
- Scolaro JA, Blake MH, Huffman GR. Triceps tendon reconstruction using ipsilateral palmaris longus autograft in unrecognized chronic tears. *Orthopedics*. 2013;**36**(1):e117-20. doi: 10.3928/01477447-20121217-30. [PubMed: 23276343]
- Singh D, Kumar KA, Dinesh M, Raj R. Chronic triceps insufficiency managed with extensor carpi radialis longus and palmaris longus tendon grafts. *Indian J Orthop*. 2012;**46**(2):236-8. doi: 10.4103/0019-5413.93689. [PubMed: 22448065]
- Gerwin M, Hotchkiss RN, Weiland AJ. Alternative operative exposures of the posterior aspect of the humeral diaphysis with reference to the radial nerve. *J Bone Joint Surg Am*. 1996;**78**(11):1690-5. [PubMed: 8934483]
- Sai S, Fujii K, Chino H, Inoue J, Ishizaka J. Old rupture of the triceps tendon with unique pathology: A case report. *J Orthop Sci*. 2004;**9**(6):654-6. doi: 10.1007/s00776-004-0820-5. [PubMed: 16228689]