

AVULSION OF THE DISTAL BICEPS BRACHII TENDON

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A review of the operative treatment of avulsion or rupture of the distal biceps brachii tendon is presented. Five cases are described. One patient had bilateral avulsion. All were operated on using the technique described by Thomsen or Boyd & Anderson.

Key words: biceps injury; tendon avulsion; tendon rupture

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Avulsion or rupture of the distal attachment of the biceps brachii tendon is a rare condition. The incidence of this tendon injury varies from 3 (Biancheri 1925, Gilcreest 1934) to 10 per cent (Witvoet et al. 1966) of the total number of ruptures of the three biceps tendons. Less than 200 cases have been reported, the first in 1843 by Starks in the *Lancet*, cited by Hempel & Schwencke (1974). Bilateral avulsion is extremely rare. Only three such cases have been reported in the literature (Wiesmann 1906, Hamsa 1942, Duè 1961). Acquaviva (1898) reported the first successful operative treatment of this condition.

The lesion is traumatic. In most cases, there are some recognizable degenerative changes (Postacchini & Puddu 1975). Avulsion can occur in connection with a powerful contraction or during unexpected violent extension of the flexed forearm.

Clinical findings

The patient is often a middle aged male with well developed musculature. At the time of the trauma a snapping sound is heard and there is a tearing sensation in the antecubital fossa.

The history reveals a sudden pain of short du-

ration. There is absence of the biceps tendon in the antecubital fossa, diminished forearm flexion and supination, a superficially palpable brachialis artery, a drawn-up spherical biceps contour, and often a local haematoma. Pain is usually slight.

Treatment

The treatment is always operative. There are two fundamental methods of surgical treatment: (i) to provide the ruptured tendon with a new point of attachment and (ii) to restore the original anatomy. In the first mentioned method the biceps tendon is sutured to the tendon of the brachialis muscle or to adjacent structures (Dobbie 1941, Kron & Satinsky 1954, Meherin & Kilgore 1960, Daftary 1973, Aldegheri et al. 1977). This procedure is said to involve a smaller risk of damaging the radial nerve, but it ignores the fact that the biceps is the most powerful supinator of the forearm.

The tendon should be reattached at its original insertion to restore full supination (Campbell's *Operative Orthopaedics* 1971). Many different techniques have been advocated for fixation of the tendon (Leavitt & Clements 1935, Björkroth 1943, Bunnell 1944, Lee 1951, Michele &

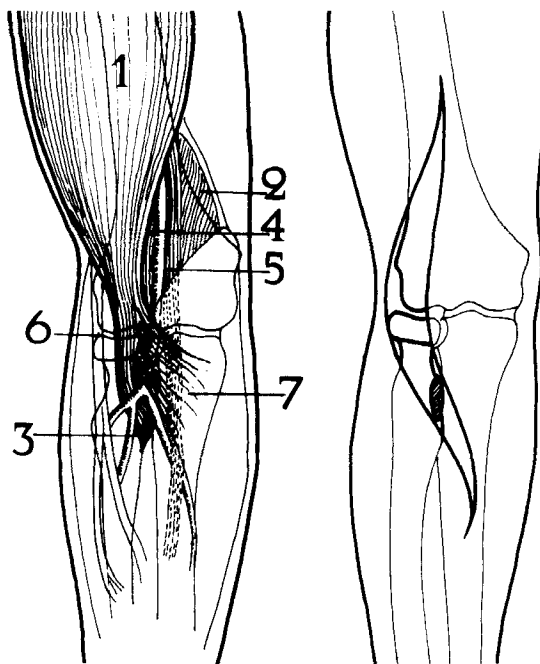


Figure 1. Volar approach. Schematic anatomy. 1. *M. biceps*, 2. *M. brachialis*, 3. *Tuberositas radii*, 4. *A. brachialis*, 5. *N. medianus*, 6. *N. radialis*, 7. *Lacertus fibrosus*.

Krüger 1951, Schjelderup 1952, Astrup 1953, Sandahl 1953, Johnston & White 1971, Hovelius & Josefsson 1977, Müller et al. 1977).

The method used in our series was to attach the tendon with non-absorbable sutures, using a dorsal approach to expose the radial tuberosity (Thomsen 1939, Boyd & Anderson 1961, Campbell's Operative Orthopaedics 1971, Adler 1971, Randone & Bergami 1975).

METHOD

The torn tendon is explored through a longitudinal bow-shaped incision over the antecubital fossa (Figure 1). The radial tuberosity is then exposed by means of a dorsal approach (Figure 2). With the forearm in maximal pronation the tuberosity is roughened and two holes are drilled through it. The biceps tendon is then attached to the tuberosity with non-absorbable sutures through the holes. The tourniquet is released and the wounds are closed. The arm is immobilized for 6 weeks in a plaster cast with the elbow in 100° flexion and the forearm in maximal supination.

PATIENTS

Four cases of unilateral and one case of bilateral avulsion of the distal biceps tendon have been operated on. The mean age of the patients was 50 years. All were male. One of them was operated on 12 months and one 3 years after the injury, the others within 2 months. The patients who were operated on at an early stage recovered completely. The other two developed slight weakness of elbow movement. The average follow-up time was 3 years.

CASE REPORTS

Case 1: A 50-year-old, well built dentist received his injury during slalom skiing. Surgery was performed a month later. Five years after the surgery the motions of the elbow were complete and the strength was normal.

Case 2: A 44-year-old carpenter experienced sudden pain in the left antecubital fossa when lifting a heavy load. Correct diagnosis was not made until a year after the injury and the lesion was repaired. Due to the degeneration of the tendon, the palmaris longus tendon was used as a free tendon graft. Four years later the motions of the elbow were complete and painless, but the strength of the biceps was somewhat diminished.

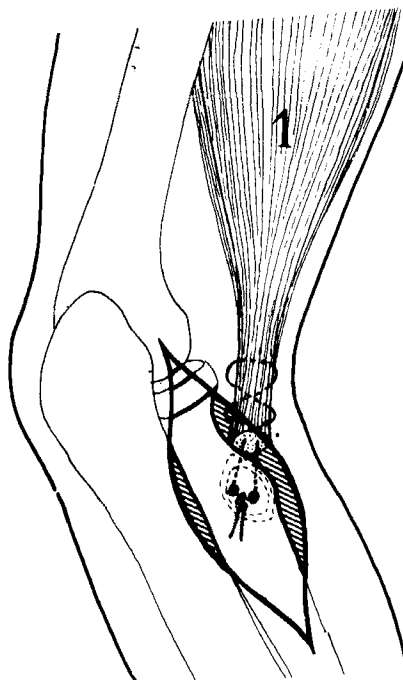


Figure 2. Dorsal approach. 1. *M. biceps*.

Case 3: A 40-year-old truck driver lost his grip on a heavy load which jerked his right forearm into extension. Three years later the ruptured and degenerated biceps tendon was attached to the radial tuberosity using a free tendon graft. The strength of flexion and supination improved considerably and pain decreased.

Case 4: A 37-year-old gymnastics teacher reached out with his left hand, receiving a pupil doing a stunt on the horizontal bar. The avulsed biceps tendon was repaired as described. Recovery was complete.

Case 5: A physically fit 64-year-old lieutenant general ruptured his right distal biceps tendon while exercising on a horizontal bar, taking his full weight solely on the right hand. The operation was performed 1 month later. After half a year the result was excellent.

Six years later while he was skiing downhill at a good speed the left arm was caught by a tree. Now the left distal biceps tendon was ruptured. Two months later the avulsed tendon was reattached using the plantaris longus tendon as a transplant. After 1 year the extremity was normal.

DISCUSSION

A careful history and a thorough clinical examination give the correct diagnosis of avulsed distal biceps tendon. The reattachment should be performed primarily. A free tendon graft may be needed. The two approaches obviate the difficulties of exposing the radial tuberosity and minimize the risk of damaging the radial nerve and other important structures.

An early and adequate repair results in normal biceps function. Late correction, even years after the injury, may give a beneficial result.

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