SURGICAL TREATMENT OF ACUTE BICEPS TENDON RUPTURES WITH A SUTURE ANCHOR

E. VERHAVEN, J. HUYLEBROEK, W. VAN NIEUWENHUYSEN, J. VAN OVERSCHELDE

Fixation of acute proximal and distal biceps tendon ruptures can be facilitated by the use of suture anchors. Originally designed for open Bankart procedures, suture anchors provide adequate fixation for soft tissue healing, limit the extent of dissection, reduce the incidence of frozen shoulder and damage to neurovascular structures and allow early postoperative rehabilitation. Four consecutive patients were successfully treated by this method with a minimum follow-up period of 1 year.

Keywords : biceps tendon ; ruptures ; suture anchors.
Mots-clés : tendon du biceps ; ruptures ; ancrage de suture.

INTRODUCTION

Reinsertion of proximal and distal acute biceps tendon ruptures can cause problems in terms of adequate fixation, proper site of fixation, extent of dissection and related injury to neurovascular structures.

Various surgical techniques have been described (1-14). To the best of our knowledge, surgical treatment of acute biceps tendon ruptures using suture anchors so far has never been described in literature.

Mitek suture anchors are small titanium alloy implants with a nitenol wire arc, designed to anchor or reattach ligaments, tendons or joint capsules to bone. The wire arc straightens during insertion through a drill hole in the cortical bone. Then it immediately returns to its original curves shape within the cancellous bone. Various anchor sizes are available. In this study, we used the Mitek GII anchor (Mitek Surgical Products, Norwood, MA) (12).

The suture anchor provides excellent bony fixation due to the shape memory properties from the wire arc, and it limits considerably the extent of dissection due to its small size and its concept. Using this device, the original anatomy can be restored.

CASE REPORTS

Case 1 — Case 2

A 43-year-old gym teacher experienced a sharp pain in the right shoulder during bench-press exercises. A "Popeye" deformity of the upper arm and weakness of elbow flexion were noted. Surgical exploration revealed a tear of the long head of the biceps tendon at the top of the bicipital groove.

A 52-year-old heavy laborer suddenly felt a burning sensation in the left shoulder during work. Surgery also showed a tear of the proximal part of the long head of the biceps tendon.

Surgical technique

Using a limited deltopectoral incision, the tendon of the long head of the biceps is exposed. The transverse humeral ligament is divided. It may be necessary to expose the distal stump of the tendon by a separate counterincision. The intraarticular part of the biceps tendon is excised, and

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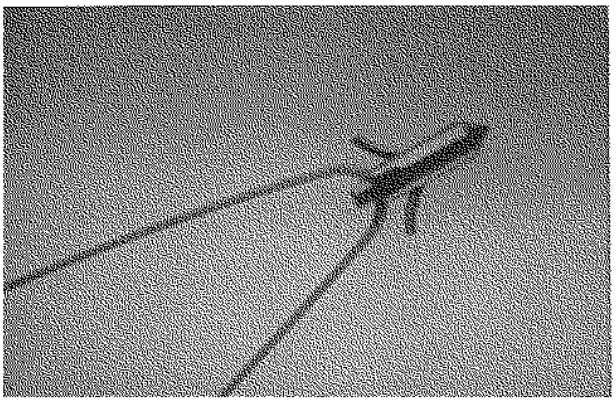

Fig. 1. — A Mitek GII anchor is a small titanium alloy implant with a nitenol wire arc. A suture is attached to the anchor through a drill hole in the body of the anchor.

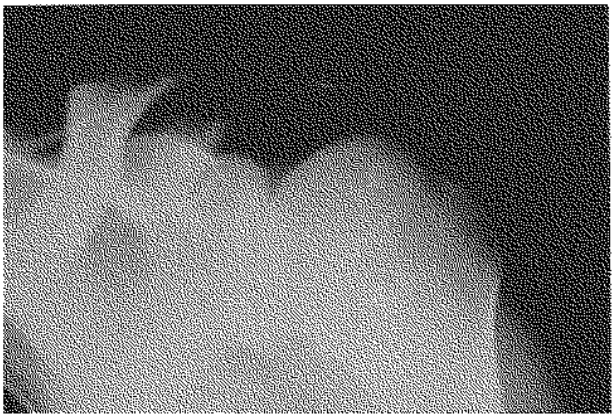

Fig. 2. — AP radiograph showing a Mitek GII anchor at the site of the bicipital groove, for fixation of an acute rupture of the proximal biceps tendon.

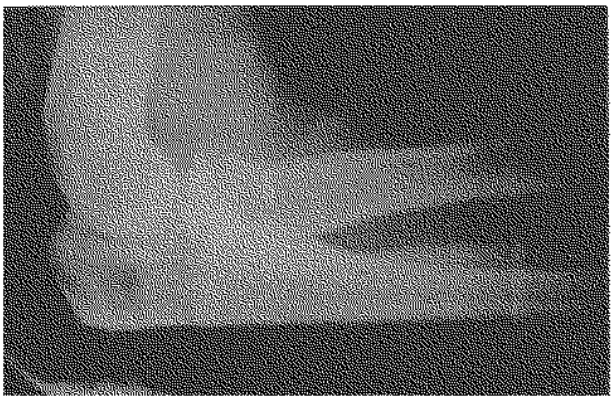

Fig. 3. — Lateral radiograph demonstrating a Mitek GII anchor at the radial neck for treatment of an acute rupture of the distal biceps tendon.

a drill hole is made at the top of the intertubular groove using a 2.4-mm drill. A Bunnell-type suture is placed within the distal stump using a Vicryl 2 or a Tycron 0 suture. One end of a second Vicryl 2 or Tycron 0 suture is slid through the Mitek GII anchor, in a way that both ends are of equal length. The anchor is mounted on top of the inserter and driven into the drill hole. Both suture ends at the distal stump are knotted to the ends of the Mitek suture.

A shoulder immobilizer is prescribed for 3 weeks, although gentle active and passive mobilization are allowed immediately postoperatively.

The first patient returned to work after 3 months and to competitive sports after 4 months. Fourteen months postoperatively, strength was fully recovered. The second patient resumed work after 4 months. Twelve months postoperatively, he had no residual complaints and nearly full recovery of strength.

Case 3 — Case 4

A 44-year-old gym teacher had sudden pain at the front of the right elbow while lifting a heavy load. An audible pop was heard.

A similar story was told by a 55-year-old manual worker. A rupture of the distal biceps tendon was found during surgery.

Surgical technique

A curvilinear incision, running from superomedial to inferolateral is used. The superficial fascia is incised. One can easily visualize the radial tuberosity by limited blunt dissection. A 2.4-mm drill hole is made at the radial tuberosity with the forearm in full supination. A Bunnell-type suture is used within the proximal stump with a Vicryl 2 or a Tycron 0 suture. One end of a second Vicryl 2 or Tycron 0 suture is slid through the anchor so that both ends are of equal length. The anchor is mounted on top of the inserter and driven into the drill hole. Both suture ends at the proximal stump are knotted to the ends of the Mitek suture with the elbow in 90° of flexion and the forearm in complete supination.

Postoperatively a cast with the elbow in 90° of flexion and the forearm in full supination is worn for 6 weeks.

The first patient returned to work after 4 months. After 6 months, he reached the preoperative level of physical activity. Twelve months postoperatively, no residual loss of strength was noted. The second patient returned to work after 6 months. At 13 months, a slight loss in supination and flexion strength was observed but did not alter the working capacity.

DISCUSSION

Over 50% of all acute biceps tendon ruptures involve the long head of the tendon (2). Most of them occur at the top of the intertubercular groove, in patients over 40 years of age (2, 11).

Acute ruptures of the proximal biceps tendon can be diagnosed by the typical "Popeye" appearance of the upper arm. The brachialis muscle being intact, no decrease in flexion strength can be observed. Loss of supination strength has been reported, with a decrease to 10 and 20% of the original strength (2, 11, 13, 14).

Diagnosis of an acute rupture of the distal biceps tendon is not always obvious. Weakness in supination and flexion strength of the elbow can be found on clinical examination (2, 11, 13, 14).

Whereas surgery in acute ruptures of the proximal biceps tendon is only advocated in active, young patients, surgery for acute distal biceps tendon ruptures has been recommended for all patients, regardless of age, because of the loss of elbow flexion strength (2, 13, 14).

Surgical treatment for acute proximal biceps tendon ruptures include end-to-end repair, tenodesis of the coracoid process or to the conjoined tendon (3, 7), tenodesis within the groove itself (3, 7, 8), and keystone (10) and keyhole tenodesis (6). End-to-end repair is not always possible and only feasible if the rupture is located at or near the musculotendinous junction (14). For fixation to the coracoid process or to the conjoined tendon (3, 7), a larger incision and wide dissection are needed and can be complicated by injury to the musculocutaneous nerve. Keystone (10) and keyhole tenodeses (6) require more extensive exposure at the anterior aspect of the shoulder. A higher incidence of frozen shoulder has been reported using this technique (13).

The anterior approach for acute distal biceps tendon rupture may be complicated by lesions of the neurovascular structures at the antecubital fossa. Permanent radial nerve damage has been described when screws or drill holes are used for fixation of the tendon on this side (4, 9). Therefore, some authors have suggested suturing the proximal end of the biceps tendon to the brachialis tendon to avoid deep dissection at the anterior elbow joint (4, 9). To avoid wide dissection, Boyd and Anderson recommended an anterior curvilinear and a second posterolateral incision to reinsert the tendon into a trapdoor at the radial tuberosity (1).

The Mitek GII anchor is a small metallic implant, composed of a titanium body and a nitenol wire arc. The wire arc has highly elastic shape memory properties that allow the arc to be straightened on passage through the drill hole. Within the cancellous bone it returns immediately to the original curved shape. A suture can be attached to the anchor through a drill hole in the body of the anchor (12).

CONCLUSION

The anchoring technique offers many important advantages. Biomechanical studies have demonstrated very adequate fixation strength to allow proper ligament or tendon healing (12). Early postoperative rehabilitation can be begun. The surrounding soft tissue elements are not compromised when the small suture anchors are buried in the bone. The small size of the implant and the technique of fixation require only limited dissection at the front of the shoulder or at the front of the elbow. Consequently, the incidence of frozen shoulder is considerably reduced. The radial nerve is in much less danger. The tendon may also be reinserted at or near the original insertion area.

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SAMENVATTING

E. VERHAVEN, J. HUYLEBROEK, W. VAN NIEUWENHUYSEN, J. VAN OVERSCHELDE. Heelkundige behandeling van akute bicepspeesrupturen met een sutuuranker.

Het gebruik van sutuurankers vergemakkelijkt de fixatie van akute proximale en distale bicepspeesrupturen. Sutuurankers voorzien in een adekwate fixatie van weke weefsels, beperken de dissektie, reduceren de incidentie van frozen shoulder, beperken de schade van neurovaskulaire strukturen en laten een vroegtijdige postoperatieve revalidatie toe. Vier opeenvolgende patiënten werden suksesvol behandeld met deze techniek, waarbij de minimale follow-up 1 jaar bedroeg.

RÉSUMÉ

E. VERHAVEN, J. HUYLEBROEK, W. VAN NIEUWENHUYSEN, J. VAN OVERSCHELDE. Traitement chirurgical des ruptures aigues du tendon bicipital par ancrage de suture.

L'usage des agrafes de suture facilite la fixation des ruptures aiguës de la partie proximale et distale du tendon bicipital. L'agrafe assure une fixation adéquate des tissus mous, limite la dissection et les dégâts aux structures neurovasculaires, réduit l'incidence de "frozen shoulders" et permet une rééducation post-opératoire précoce. Quatre patients ont été traités avec succès par cette technique, Le recul est de plus d'un an.