

## Surgical treatment for partial rupture of the distal biceps tendon using palmaris longus tendon graft: A case report

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### ABSTRACT

We report a case of a partial rupture of the distal biceps tendon that was surgically treated using a palmaris longus tendon graft. A 58-year-old man complained of increasing pain with resisted elbow flexion and supination in the antecubital fossa. Magnetic resonance imaging revealed the irregularity of a distal attachment of the biceps brachii and peripheral signal changes. We diagnosed a partial rupture of the distal biceps tendon. Because conservative treatment failed, surgical treatment was performed through a single anterior approach. The insertion of the tendon was partially ruptured at the radial tuberosity. After the involved site was debrided, the palmaris longus tendon was grafted with suture anchors to reinforce the remaining tendon. Postoperative immobilization was not performed, and all moves were freed after 3 weeks. At the 6-year postoperative follow-up, the patient no longer experienced pain and returned to his original job without any limitations.

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### Introduction

Complete rupture of the distal biceps tendon is a relatively rare injury, comprising only 3% of entire biceps tendon ruptures<sup>1</sup> and with an incidence of 1.2 per 100,000 patients.<sup>2</sup> Partial distal biceps tendon ruptures are much rarer. Symptoms associated with a partial rupture are similar but are more subtle than those of a complete rupture, such as pain and tenderness in the antecubital fossa, swelling and weakness of elbow flexion, and forearm supination.<sup>3</sup>

Although conservative treatment is usually effective, if symptoms persist, surgical treatment is performed. Various surgical techniques have been reported, including different incision sites and fixation materials.<sup>4,5</sup>

Here, we present a first case of partial distal biceps tendon rupture that was surgically treated using a palmaris longus tendon autograft.

### Case report

A 58-year-old man experienced pain in the right antecubital fossa after lifting a heavy load. His occupation was a Newsdealer,

and his right hand was dominant. Initially, he saw how it goes for a while, but his pain remained symptomatic; he visited our hospital after 1 month.

On physical examination, the distal biceps tendon was palpable and no apparent defect was noted. The tenderness located in the antecubital fossa corresponded to the region of the distal biceps tendon. There was no ecchymosis or swelling in this area. He did not complain of pain at rest; however, anterior elbow pain presented with resisted elbow flexion and forearm supination. Active range of motion of the elbow and forearm was not restricted (extension/flexion, 0°/140°; pronation/supination, 90°/90°). Significant impairment of strength in flexion and supination was observed compared with that in the contralateral side.

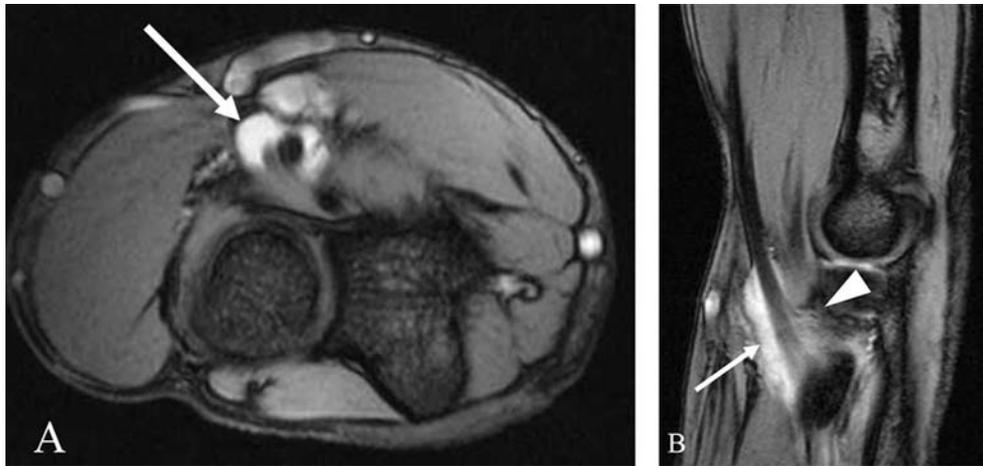
An X-ray showed no pathological findings, such as degenerative changes at the radial tuberosity. Magnetic resonance imaging (MRI) indicated an irregularity of the distal biceps tendon and a semi-circular cystic lesion along the insertion of the tendon (Fig. 1).

Mayo Elbow Performance Score (MEPS) and Disability of the Arm, Shoulder and Hand (DASH) score were 70 and 48.3, respectively.

The diagnosis of a partial rupture of the distal biceps tendon was made. The patient was initially conservatively treated with rest and nonsteroidal anti-inflammatory drugs administration. However, pain and functional difficulties did not improve after 6 months; hence, surgical treatment was performed.

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**Fig. 1.** T2-weighted magnetic resonance image of a partial distal biceps tendon rupture (A, axial view; B, sagittal view). The image demonstrates a high signal-intensity lesion (arrow) surrounding the distal biceps tendon. The insertion of the tendon is blurred (arrow head).

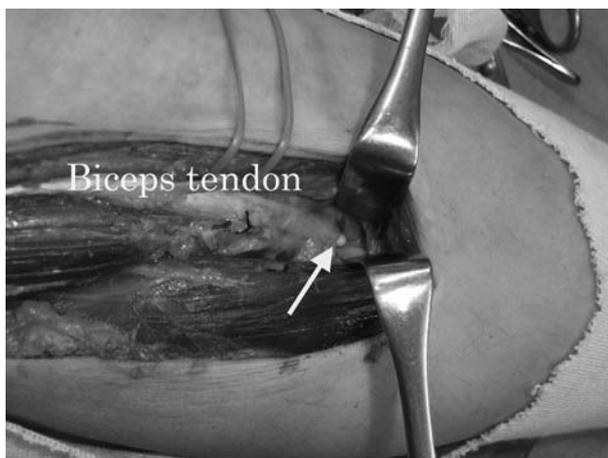
The patient was placed in the spine position, and a sterile tourniquet was used. An antecubital S-shaped single incision was made, and the radial nerve was preserved. The distal biceps tendon was identified; approximately 50% of the tendon was ruptured at the insertion of the radial tuberosity (Fig. 2). The pathological tissue was debrided, leaving the normal portion intact. The ipsilateral palmaris longus tendon was harvested, folded in half, and then the distal part of the graft was secured using suture anchors (TWINFIX Ti 3.5, Smith & Nephew, Andover, MA) with number 2 non-absorbable sutures, which were inserted into the decorticated radial tuberosity. The proximal part of the graft was sutured side-to-side and interlaced to reinforce the remaining tendon (Figs. 3 and 4).

An arm sling was applied for a few days after the surgery to prevent pain and swelling, and assisted flexion exercise was initiated from postoperative day 1. After 3 weeks, all active and passive movements were free. Heavy labor was permitted after 3 months.

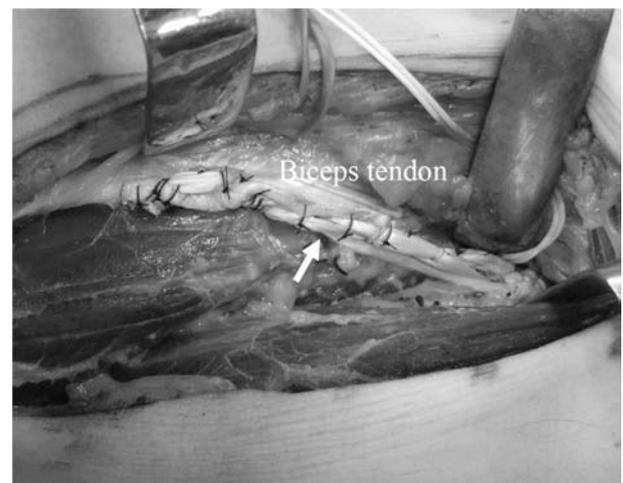
At the 6-year postoperative follow-up, the pain had disappeared with no complications, weakness, sensory disturbance, or limitation of motion. MEPS and DASH score improved to 100 and 0, respectively.

## Discussion

A complete distal biceps tendon rupture is relatively uncommon, and reports regarding partial distal biceps tendon ruptures are much rarer. Following the first reported case of a partial distal biceps tendon rupture by Nielson in 1987,<sup>6</sup> several cases have been reported. One reason for the limited reporting is diagnostic difficulties. Unlike a complete tear, symptoms are relatively mild and the distal end of the tendon is palpable from the surface. Therefore, distinguishing the condition from other diseases, such as soft tissue tumors and inflammatory diseases, based on physical findings alone is not easy. The utility of MRI for detecting tendon ruptures has been recently reported. Giuffrè et al recommends that MRI should be performed with the shoulder abducted, elbow flexed, and forearm supinated to obtain a longitudinal image of the distal biceps brachii tendon from the musculotendinous junction to its insertion on a single image.<sup>7</sup> While we did not perform MRI in this position, distal biceps tendon irregularity and peripheral cystic lesions were identified. From these observations and physical findings, such as tenderness located in the antecubital fossa and pain exacerbated with resisted elbow flexion and forearm supination,



**Fig. 2.** The distal biceps tendon showed an incomplete rupture with a synovial bursa (arrow).



**Fig. 3.** Bi-fold palmaris longus tendon autograft (arrow) is fixed to the radial tuberosity with a single suture anchor; the proximal part of the graft is sutured side-to-side and interlaced to the remaining normal distal biceps tendon.

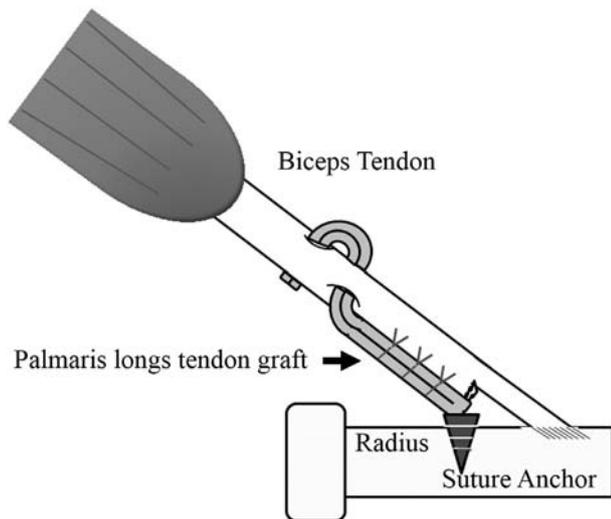


Fig. 4. Schematic drawing of the operative technique.

we were able to reach the diagnosis of a partial distal biceps tendon rupture.

Although it is generally accepted that complete tears should be surgically treated as soon as possible, there is no consensus on the treatment of partial tears.

Durr et al reported good results with 2 weeks of immobilization and subsequent physiotherapy for tears <50% of the insertion.<sup>8</sup> However, it might be challenging to determine what percentage of the tendon is preoperatively involved. Thus, when conservative treatment fails, we prefer surgical treatment, regardless of the amount of the damage.

Various surgical techniques have been reported, including debridement and tendon repair with a single or double incision. A distal biceps tendon endoscopy can provide a clear and magnified view and is useful for diagnosis, assessment of the extent of rupture, and debridement<sup>9</sup>; however, a high degree of skill is required. Furthermore, if a tear is >50% of the insertion, debridement alone has been reported to result in failure.<sup>3</sup> Hence, tendon repair or reconstruction is ideal. A technique with a single anterior incision and fixation with an internal button was described by Bain et al<sup>10</sup> All patients were satisfied, returned to normal activities, and regained muscle strength and normal range of motion. Vardakas et al reported seven cases of partial distal biceps tendon ruptures

that were repaired using suture anchors through an anterior S-shaped incision, followed by an extension blocking splint for 6 weeks. All patients reported a significant decrease in their pain without any complications.<sup>4</sup> Although most reports resulted in success, a limitation in the range of motion is possible because each technique requires long-term postoperative fixation as they have to completely detach the distal end of the biceps tendon. Dellaero et al presented the results of a consecutive series of seven patients with partial ruptures of the distal biceps tendon repaired with suture anchors. All patients were satisfied but had a slight active elbow extension, with a mean loss of  $-8.4^{\circ}$ .<sup>5</sup>

The greatest advantage of our technique is that patients can initiate postoperative exercise immediately without a fixation because the normal part of the distal end of the biceps tendon is preserved and reinforced with a palmaris longus tendon autograft. As a result, the range of motion is not impaired.

## Conclusion

In conclusion, although this is a mid-term follow-up and we cannot exclude the effect by debridement alone, the patient showed excellent results without pain, limitation of motion, or other complications. This technique should be considered as a treatment option for partial rupture of the distal biceps tendon.

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