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## ORIGINAL ARTICLE

# Rupture of the short head component of a bifurcated distal biceps tendon

Pramod B. Voleti, MD<sup>a</sup>, Jennifer L. Berkowitz, MD<sup>b</sup>, Gabrielle P. Konin, MD<sup>b</sup>, Frank A. Cordasco, MD, MS<sup>c,\*</sup>

<sup>a</sup>Department of Orthopaedic Surgery, Montefiore Medical Center, Bronx, NY, USA

<sup>b</sup>Department of Radiology and Imaging, Hospital for Special Surgery, New York, NY, USA

<sup>c</sup>Department of Orthopaedic Surgery, Sports Medicine and Shoulder Service, Hospital for Special Surgery, New York, NY, USA

**Background:** Rupture of the short head component of a bifurcated distal biceps tendon is a rare injury that may be difficult to diagnose and to treat.

**Methods:** Three cases of patients with selective disruption of the short head of the biceps distal tendon from a single institution are reported. The presenting history, physical examination, imaging studies, operative findings, and treatment strategies are described.

**Results:** In each case, the mechanism of injury was forceful flexion of the involved elbow against an eccentric load. Notable physical examination findings included a palpable tendon in the antecubital fossa, a “reverse Popeye” deformity, and pain and weakness with resisted forearm supination and elbow flexion. Careful review of the magnetic resonance imaging studies demonstrated the classic findings for this unique injury. All 3 patients successfully returned to their baseline level of activity after anatomic repair of the short head component with or without independent repair of the long head component (depending on the degree of partial tearing seen intraoperatively).

**Discussion/Conclusions:** Rupture of the short head component of a bifurcated distal biceps tendon is a rare injury that can be easily misdiagnosed and mistreated. A meticulous physical examination and evaluation of imaging is required to differentiate this injury from a partial or complete tear of a common distal biceps tendon. Clinicians should maintain a high index of suspicion for this unusual injury pattern. When it is diagnosed appropriately, selective disruption of the short head of the biceps distal tendon may be effectively treated with anatomic repair.

**Level of evidence:** Level IV; Case Series; Treatment Study

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**Keywords:** Bifurcated distal biceps; bifid distal biceps; distal biceps rupture; distal biceps tear; short head of biceps; long head of biceps

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\*Reprint requests: Frank A. Cordasco, MD, MS, Department of Orthopaedic Surgery, Sports Medicine and Shoulder Service, Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021, USA.

E-mail address: [CordascoF@HSS.edu](mailto:CordascoF@HSS.edu) (F.A. Cordasco).

The biceps brachii is composed of 2 heads: the short head and the long head. The muscle bellies of these 2 heads typically coalesce distally and give rise to a common distal biceps tendon, which inserts on the radius at the bicipital tuberosity. However, anatomic studies have demonstrated that the distal biceps tendon is bifurcated with a short head component and

a long head component in up to 25% of individuals, with the short head tendon inserting more distally on the bicipital tuberosity than the long head tendon.<sup>1,6</sup>

Distal biceps tendon ruptures are relatively rare injuries that result from forceful flexion of the elbow against an eccentric load. These injuries are often preceded by degenerative changes and decreased vascularity within the tendon.<sup>12</sup> Complete ruptures are typically treated with anatomic repair to optimize function and strength.<sup>2</sup> In contrast, conservative treatment is often recommended for partial tears, although favorable results have also been described with surgical repair.<sup>8</sup>

We present a series of 3 patients who sustained a rupture of the short head component of a bifurcated distal biceps tendon. These rare injuries may be difficult to diagnose as they can mimic partial or complete tears of a common distal biceps tendon. In each case, surgical treatment involving anatomic repair of the short head component with or without independent repair of the long head component (depending on the degree of partial tearing seen intraoperatively) was performed. All 3 patients ultimately went on to successful recovery with return to their baseline activity level.

## Case reports

### Patient 1

A 24-year-old right-hand-dominant professional football player (offensive guard) presented with pain and weakness in his right elbow after attempting to block another player with his right arm. Physical examination revealed an obvious reverse Popeye deformity that involved only the medial aspect of the biceps. An intact long head of the biceps distal tendon could be palpated in the antecubital fossa, with associated tenderness to palpation. The hook test was equivocal and painful. Speed and Yergason test results were both positive. Resisted forearm supination was painful with 4/5 strength, and resisted elbow flexion was painful with 5-/5 strength. Radiographs of the right elbow were negative for osseous abnormalities. A magnetic resonance imaging (MRI) scan revealed complete avulsion of the short head distal tendon and lacertus fibrosus with an intact long head distal tendon (Fig. 1).

Given the patient's level of pain and weakness and resulting inability to play football, the decision was made to proceed with surgical repair. Intraoperatively, the short head distal tendon was found to be completely torn and retracted proximally (Fig. 2, A). The long head distal tendon appeared grossly intact (Fig. 2, B), but careful evaluation demonstrated that the insertion was subperiosteally elevated with exposure of a large portion of the long head footprint. Therefore, the distal tendons of both heads were independently repaired by suture anchor technique.

Postoperatively, the patient's operative extremity was immobilized in a double upright hinged elbow brace locked in 90° of flexion with forearm supination for 2 weeks. Passive supination and pronation were encouraged immediately after

surgery. After 2 weeks, active extension and passive flexion exercises were initiated. The patient achieved full extension by 6 weeks; at this point, the brace was discontinued and active flexion and supination were permitted. Isokinetic strengthening exercises were subsequently initiated at 12 weeks. The patient made a successful return to professional football at 8 months and continues to play in the National Football League 2 years after surgery.

### Patient 2

A 58-year-old man presented after experiencing sudden pain and a popping sensation in his left nondominant upper extremity after lifting a heavy box. Physical examination demonstrated tenderness to palpation at the distal biceps insertion and a positive hook test result. Resisted forearm supination strength was 4/5, and resisted elbow flexion strength was 5-/5; both tests were painful. Elbow radiographs demonstrated no osseous abnormalities, and MRI revealed the presence of a bifurcated distal biceps tendon with a complete tear of the short head component and a partial tear of the long head component (Fig. 3). These findings were confirmed intraoperatively (Fig. 4, A), and both the short head and the long head distal tendons were independently repaired with suture anchor technique (Fig. 4, B). Following the aforementioned rehabilitation program, the patient achieved excellent functional recovery. He returned to full activity 5 months after surgery.

### Patient 3

A 33-year-old male primary care resident presented with acute onset of pain in his right dominant elbow after lifting another individual. Physical examination revealed ecchymosis along the distal aspect of the medial biceps with an obvious reverse Popeye deformity. Resisted forearm supination and elbow flexion were both painful with 4/5 strength. Elbow radiographs were negative for osseous abnormalities. MRI demonstrated an acute complete rupture of the short head distal tendon; the long head distal tendon was in continuity (Fig. 5). These findings were confirmed intraoperatively: the short head bundle was completely avulsed and retracted approximately 8 cm, and the long head bundle was intact but partially torn distally (Fig. 6). The short head component was mobilized and anatomically repaired with use of an intramedullary button. The long head component was left intact; sutures were passed between the 2 bundles to augment the short head repair. After completing the described progressive rehabilitation program, the patient achieved full range of motion and strength.

## Discussion

Distal biceps ruptures typically result from sudden flexion of the elbow against resistance. In the United States, the estimated incidence of these injuries is 2.55 per 100,000

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