Case Report

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Tear of the distal biceps branchii tendon: A new method of ultrasound evaluation

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SUMMARY

Tear of the distal biceps brachii tendon is an uncommon injury. Ultrasound evaluation of the distal tendon using an anterior approach is often difficult because of technical factors. We describe a new method of ultrasound evaluation of the distal biceps tendon insertion. This involves a posterior approach with the forearm pronated. With pronation of the forearm, the radial tuberosity faces posteriorly, bringing the distal biceps tendon insertion into view. A surgically proven case of distal biceps tendon tear is presented to illustrate our technique.

Key words: *injuries; tendon; ultrasonic diagnosis; ultrasound.*

INTRODUCTION

Ultrasound examination of the distal biceps brachii tendon is often quite difficult. We describe a method of examining the distal insertion of the biceps brachii tendon, using a posterior approach with the forearm pronated.

CASE REPORT

A 42-year-old man experienced sudden severe elbow pain while moving some heavy crates. The mechanism of injury was forced extension of the elbow during load bearing. Clinical examination revealed some local bruising in the antecubital fossa. There was weakness of elbow flexion and of supination of the forearm. Tear of the distal biceps brachii tendon was suspected. An ultrasound examination was requested to confirm the diagnosis and to outline the anatomy prior to surgical repair.

Ultrasound was first performed using an anterior approach in the sagittal plane. The biceps brachii tendon was thickened and irregular as it passed anterior to the elbow joint. As a result of a combination of haematoma and the size of the patient's arm, the distal end of the biceps brachii tendon could not be visualized using an anterior approach. The biceps brachii muscle was of normal appearance, as was the brachialis muscle. The musculotendinous junction was intact.

Ultrasound examination was then performed using a posterior approach with the transducer in the transverse plane. The patient was asked to slowly pronate and supinate his forearm repeatedly. Using this technique the radial tuberosity was well seen. There was absence of the distal tip of the biceps brachii tendon, indicating a full thickness tear with proximal retraction of the stump (Fig. 1).

Surgical repair was undertaken and this confirmed the ultrasound findings of a full thickness tear of the distal insertion of the biceps brachii tendon. The torn tendon end lay about 1 cm from the radial tuberosity.

DISCUSSION

Complete tear of the distal biceps brachii tendon is an uncommon injury. It usually occurs in men, particularly manual workers, athletes and weight-lifters.[1,2] The usual mechanism of injury is forced extension of a flexed load-bearing elbow.[3] The dominant arm is injured in the majority of cases.[4] The injury is almost always an avulsion of the distal insertion of the biceps brachii tendon at the radial tuberosity, with varying degrees of tendon retraction.[5] Tears of the musculotendinous junction and proximal tendon are rare.[5]

Ultrasound is an excellent modality for the examination of most tendons. Ultrasound of the distal biceps tendon, however,

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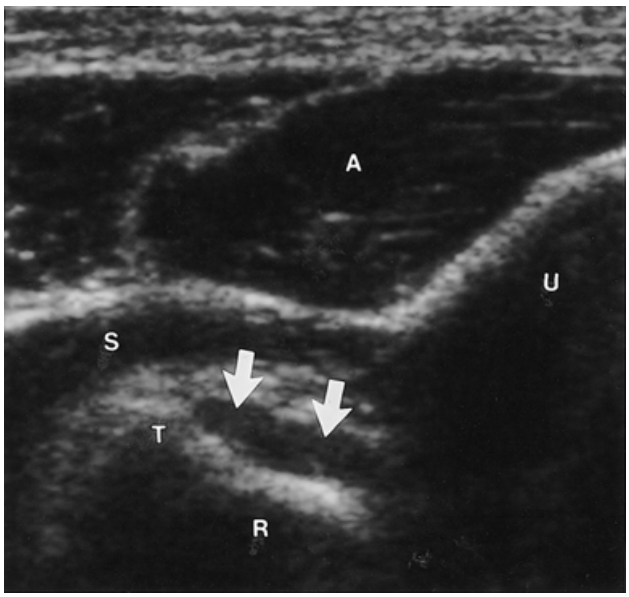

Fig. 1. A 42-year-old man with a tear of the distal biceps tendon. Sonogram of the posterior proximal forearm shows a hypoechoic gap (arrows) at the normal position of the distal biceps tendon. This gap is due to fluid and debris between the anconeus (A) and supinator (S) muscles and the underlying radius (R). The tip of the tendon was detached from the radial tuberosity (T) and lay within the acoustic shadow of the ulna (U). Compare this appearance with the normal anatomy shown in Figure 2b.

Fig. 2. A 30-year-old healthy volunteer. (a) Photograph showing the position of the ultrasound transducer for examination of the distal biceps tendon. The forearm is pronated and the tranducer is positioned posteriorly in the transverse plane 3–4 cm distal to the olecranon. (b) Sonogram corresponding to the transducer position shown in Figure 2a. Note that the distal biceps tendon is seen as a hyperechoic fibrillary structure (arrows) inserting into the radial tuberosity.

is often quite difficult. This is because of the anatomical course of the distal biceps tendon. As it passes distal to the elbow joint, the tendon angles posteriorly to insert into the radial tuberosity. The anisotropic effect is such that the distal biceps tendon is poorly visualized.[6] Attempts to angulate the transducer to insonate perpendicular to the tendon have varying degrees of success, depending on such factors as patient habitus, extent of local haemorrhage and local tenderness and pain. The transverse and longitudinal planes can be used with the forearm supinated.

Despite these limitations, the diagnosis of full thickness distal tendon tear can often be confidently made on ultrasound, particularly where the torn tendon is retracted to the antecubital fossa. Ultrasound signs of tendon rupture in such cases include a fluid-filled gap along the line of the distal tendon as well as direct visualization of the retracted tendon as a mass in the antecubital fossa.[5] In cases where the tendon is not retracted, the diagnosis can be inferred from signs such as tendon thickening and irregularity, as well as fluid along the course of the tendon. Lack of visualization of the torn tendon end in such cases, however, means that the diagnosis is uncertain.

We describe a method for examining the insertion of the biceps brachii tendon into the radial tuberosity. We are not aware of any previous description of this technique. This uses a posterior approach with the forearm pronated. The radial tuberosity lies deeply in the supinated arm but becomes more superficial as the forearm is pronated. The transducer is placed

in the transverse plane on the posterior forearm 3–4 cm distal to the olecranon (Fig. 2a). The radial tuberosity is well seen as a broad based bony projection. The distal biceps tendon is seen as a thin tapering hyperechoic layer of tissue inserting into the radial tuberosity (Fig. 2b).

There are a number of particular advantages to this technique. Pronation of the forearm pulls the distal end of the biceps brachii tendon posteriorly between the proximal radius and ulna. In maximum pronation the radial tuberosity faces posteriorly, bringing the distal few millimetres of biceps tendon into view. More proximal tendon fibres are obscured by the acoustic shadow from the ulna. In this position the fibres of the distal biceps brachii tendon lie parallel to the skin and therefore perpendicular to the ultrasound beam. As a result, anisotropy is not a problem and the tendon fibres appear strongly hyperechoic. Finally, the overlying muscles provide an excellent acoustic window to the biceps tendon. The anconeus muscle lies superficially on the lateral side of the ulna. Deep to this are the circular fibres of the supinator muscle.

CONCLUSION

Ultrasound examination of the distal biceps brachii tendon using an anterior approach is difficult because of the anatomical course of the tendon. The current case illustrates a new technique using a posterior approach with the forearm pronated. This method has the potential to be particularly useful for diagnosing cases of complete distal tendon tear without retraction.

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