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# Low incidence of tendon rerupture after distal biceps repair by cortical button and interference screw

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**Background:** The use of cortical suspensory fixation in conjunction with an interference screw to treat distal biceps ruptures has yielded favorable results. However, literature examining the incidence of fixation failure in a large consecutive series of patients treated with this technique is lacking.
**Methods:** A retrospective review of electronic medical records identified 170 distal biceps ruptures in 168 consecutive patients (164 men and 4 women) treated using a cortical button in conjunction with an interference screw. The study group was an average age of 48 years (range, 20-71 years). Records were reviewed from the time of the initial clinic visit to the most recent follow-up. Early failures were defined as those that occurred within 12 weeks of the index procedure. Failed repair was defined as tendon defect, deformity, or significant weakness in supination.
**Results:** The early incidence of failure was 1.2%, with 2 of the fixations meeting the criteria for failure. One patient had significant brachial artery thrombosis. Other complications included posterior interosseous nerve palsy, lateral antebrachial cutaneous nerve-related complication, and numbness about the radial nerve.
**Conclusion:** The use of a cortical suspensory fixation device in conjunction with an interference screw is an effective method of repairing a distal biceps rupture, with a low early rate of failure.
**Level of evidence:** Level IV, Case Series, Treatment Study.


**Keywords:** Distal biceps repair; cortical button; cortical suspensory fixation; interference screw; complication rate; combined technique

Rupture of the distal biceps tendon typically occurs with a forced eccentric contraction, often in a middle-aged patient. Anatomic repair offers the potential for improved strength, function, and cosmetic appearance. In 1985, Morrey et al[22] demonstrated a 40% loss of supination strength and 30% loss of flexion strength in a cohort of patients treated nonoperatively and that strength was significantly improved by repair. Further studies have confirmed increased strength and endurance in patients after distal biceps repair.[3,17,25]

There are multiple methods for fixation of the distal biceps tendon, including suture through bone tunnels,

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suture anchors, interference screw fixation, and cortical suspensory fixation. Bain et al[1] first described the use of a cortical button in 2000. Multiple biomechanical studies have shown that cortical fixation has a higher load to failure than other methods of fixation.[15,20,33] In 2005, Mazzocca et al[19] described a technique using a cortical suspensory device in conjunction with an interference screw. Biomechanical studies have shown that suspensory cortical button fixation exhibits maximum peak load to failure. In addition, Sethi et al[30] demonstrated that the use of an interference screw significantly reduces gap formation at the repair site. Heinzelmann et al[13] were the first to report tendon failure with the use of this technique. In a consecutive series of 41 patients, they reported no failures of fixation, fractures, or reruptures. The purpose of this study was to determine the early incidence of tendon rerupture after distal biceps repair using a cortical button and interference screw in a large consecutive series.

## Materials and methods

A consecutive series of elbows that underwent primary distal biceps repair by 6 fellowship-trained physicians between October 2006 and February 2013 were retrospectively identified. Clinical and operative notes were retrospectively reviewed by 2 staff members (R.A.C. and B.J.C.), not directly involved in patient care, to isolate distal biceps repairs and to determine the technique used. Inclusion criteria included any patient aged older than 18 years in which the technique described by Mazzocca et al[19] was performed.

A single vertical incision is placed 2 to 3 cm distal to the elbow flexion crease. In all cases, the lateral antebrachial cutaneous nerve is identified and protected. Tenotomy scissors are used to complete the dissection and to identify the biceps tendon. The tendon is retrieved with an Allis clamp, and a heavy whipstitch is placed within the substance of the tendon. The tendon end is bulletized to facilitate docking into the radial tunnel.

The forearm is then maximally supinated to facilitate exposure of the radial tuberosity and prevent injury to the posterior interosseous nerve. Angled retractors are placed to expose the tuberosity. All traversing vessels are ligated with a bipolar cautery. We strongly discourage the use of a levered retractor radially to avoid traction injury to the posterior interosseous nerve. A 2.9-mm guide pin in placed centrally in the radial tuberosity, and the near cortex is opened with a 7.5-mm reamer. The tendon is repaired using a cortical button and tension-slide technique with the addition of a 7- × 10-mm interference screw (Arthrex, Naples, FL, USA; Fig. 1).

Patients are immobilized in a splint for approximately 1 week, followed by 1 month of application of a range of motion brace to prevent terminal extension (locked from 30°-130°). After 1 month, patients begin range of motion exercises as tolerated but are instructed to avoid lifting. Patients are permitted to do light lifting after 3 months. Our follow-up protocol involves a wound check visit at 7 to 10 days, and follow-up visits at 6 weeks, 3 months, and 6 months, at which time patients are told to follow-up as needed.

The 3-month follow-up was required to evaluate for failed repair of the distal biceps in the early postoperative period. Elbow radiographs were performed in all patients at the 3-month follow-up visit and reviewed by 3 independent reviewers for button placement, evidence of screw cut-out or fracture, osteolysis around the screw, and the presence of heterotopic bone. Heterotopic ossification (HO) was graded according to the classification of Graham and Hastings.[12] This classification system divides HO into 3 groups, with class I representing subclinical lesions, class II representing bone formation that limits functional motion in any plane, and class III lesions representing complete ankylosis of the elbow.[12]

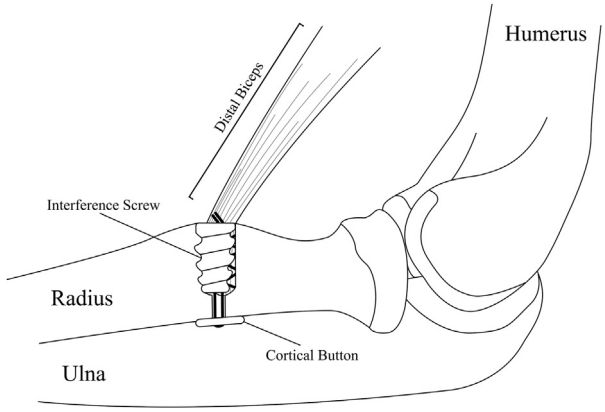


**Figure 1** Illustration shows the placement and orientation of the cortical button and interference screw implanted in the radial tuberosity.

Exclusion criteria included repairs that required the use of allograft material and revision biceps repairs. Clinical and operative notes were reviewed for complications. The focus of the study was on acute failure of fixation and immediate perioperative complications; however, all complications observed to date are reported.

Failed repair was defined as the clinical findings of a tendon defect, recurrence of deformity, or significant weakness of supination when compared with the contralateral side using the Medical Research Council grading system (0 to 5). Advanced imaging was only used in 1 patient with suspected failure to confirm the diagnosis.

## Results

This study identified 202 consecutive distal biceps repairs using the cortical button and interference screw. Of these, 170 repairs performed in 168 patients (164 men and 4 women) met the inclusion criteria. The average age at time of surgery was 48 years (range, 20-71 years). The average length of follow-up was 8 months (range, 3-61 months). Any complications that occurred outside of the minimum period of 3 months were also reported. The analysis excluded 32 patients (15.8%) whose follow-up was less than 3 months. According to the classification of Kelly et al,[14] there were 41 acute repairs, 47 subacute repairs, and 82 delayed repairs. Evaluation of 3-month radiographs revealed subclinical grade I HO only.

Two of the 170 elbows had an early failure of the repair for an incidence of 1.2%. There were no instances of early device failure in this study. In 1 patient, improper placement of the implant into the radial head resulted in