

# FIXATION OF DISTAL BICEPS RUPTURES USING THE ENDOBUTTON: A MODIFIED TECHNIQUE

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## SUMMARY

This paper reviews thirty-two patients who underwent operative fixation of distal biceps ruptures. All patients were clinically reviewed at a minimum of 6 months (average 29 months) from surgery. The operative technique utilised the Endobutton (Smith and Nephew) and is a substantial modification of that published by Bain, G et al<sup>1</sup>. Thirty of the thirty-two patients have returned Patient Rated Elbow Evaluation (PREE) forms with an average score of 8. Cybex testing demonstrates good return of strength when compared to the uninjured side. We believe that these modifications to Dr Bain's technique offer a viable alternative technique which has some benefits.

## INTRODUCTION

Distal biceps ruptures are an uncommon injury. They represent approximately 3% of all biceps ruptures. They most commonly occur in middle aged men following a heavy load on a flexed elbow.

Intervention was popularised by Boyd and Anderson who described a two-incision technique. Improved outcomes have been achieved with stronger fixation allowing earlier mobilisation.

## MATERIALS AND METHODS

Thirty-two patients who underwent operative fixation of distal biceps ruptures by the senior two authors were identified. All patients were clinically reviewed at a minimum of 6 months (average 29mths) from surgery. Functional outcome scores in the form of Patient Rated Elbow Evaluation (PREE) and DASH scores were assessed.

The operative technique utilised the Endobutton (Smith and Nephew) and is a substantial modification of that published by Bain, G et al<sup>1</sup>.

### **Operative Technique**

The operations were performed under general anaesthetic. The first step is to perform a small transverse incision proximal to the cubital fossa over the distal end of the biceps muscle to retrieve the biceps tendon. The tendon is prepared by excision of scar tissue, where necessary in delayed cases, from the tendon to regain tendon length. Next the tendon is prepared by suturing an endobutton to the distal end of the tendon using size 2 Fibrewire (Size 5 Ethibond, as used in the initial part of this series has a similar strength). The sutures are commenced proximally and weaved down the tendon in a Bunnell type pattern, through the central 2 holes in the endobutton and back up the tendon. Two sutures are used giving 4 strands. (figure 1) Knots are placed proximally in the tendon rather than between the endobutton and the tendon. The endobutton is positioned so that it is 3-4mm from the end of the tendon. Great care must be taken to ensure that the sutures are tensioned prior to knot tying otherwise the endobutton will end up too far from the tendon end when pulled on. Next a proximal Henry's approach to the bicipital tuberosity is performed through a short longitudinal incision. A 4.5mm drill hole is then drilled through the footprint of the biceps insertion and out the far cortex. A Burr is used to enlarge the proximal hole in the radius to accept the biceps tendon. Supinator is elevated along the anterior oblique line to expose the drill hole so as to allow flipping of the endobutton under direct vision. A suture passer is then used to retrieve the passing sutures that had previously been placed through the endobutton on either end. The endobutton is passed through the burr hole in the posterior part of the bicipital tuberosity then through the drill hole and then flipped securing the biceps tendon within the bicipital tuberosity. Postoperatively the patients begin an immediate active rehabilitation program.

### **RESULTS**

Thirty one patients were identified. All patients were male with an average age of 47. Average delay to surgery was 24 days. There were no post-operative complications and no repeat ruptures.

Thirty patients have returned Patient Rated Elbow Evaluation (PREE) forms with an average score of 8. Cybex testing demonstrates good return of strength when compared to the uninjured side.(figure 2,3) There only one case with loss of range of motion which was decreased supination due to a concomitant DRUJ injury.

## **CONCLUSIONS**

This technique utilises some significant modifications from the original technique described by Dr Greg Bain<sup>1</sup>. We believe that these modifications offer a viable alternative technique which has some benefits.

The first benefit relates to the use of two incisions. The proximal incision can be made very small and in fact this incision can be made before the tourniquet is inflated. This allows retrieval of the avulsed tendon and application of downward tension on the muscle tendon unit prior to inflation of the tourniquet. This decreases incarceration of the biceps muscle belly under the tourniquet and makes it easier to insert the tendon into the radius. In addition it is also easier in subacute/chronic cases to free up scar tissue around the biceps muscle tendon unit through this more proximally placed incision. Also the formation of the endobutton / suture / tendon construct is somewhat easier because the entire tendon is visible up to the muscle tendon junction and the suturing and positioning of the endobutton is done external to the patient rather than within the wound. It also allows placement of the suture knots in the proximal end of the tendon rather than between the tendon and the endobutton, which we believe is biomechanically more secure.

At the distal end the main difference is stripping of the supinator muscle to allow passage and seating of the endobutton under direct vision. This eliminates the need for intra-operative fluoroscopy and the use of a Beath pin. We have found that with an adequate release of the supinator along the anterior oblique line of the radius, as described in Henry's original approach with sub-periosteal elevation of the supinator, that there is minimal trauma to the supinator. We have used Indomethacin for prophylaxis against heterotopic ossification except when medically contra-indicated and we have not noted any significant problems with loss of rotation range due to formation of heterotopic ossification.

We believe that endobutton fixation is a major advance in the reconstruction of these biceps injuries and it has allowed us to reattach biceps avulsions up to two years following initial injury with good

results. Our endobutton construct may be biomechanically superior to that used by Dr Bain and we believe that our modification aids in deployment of the endobutton-tendon construct.

#### **REFERENCES**

1: BAIN G, PREM H, HEMPINSTALL RJ, VERHELLEN R, PAIX D. Repair of distal biceps tendon rupture: a new technique using the Endobutton. *J Shoulder Elbow Surg* 9(2):120-6, 2000.