

Fixation of distal biceps ruptures using the Endobutton. A modified technique



Ken Cutbush MBBS FRACS (Orth), Chris Roberts FRCS (Tr and Orth), Phil Duke MBBS FRACS (Orth), Mary Mitchell, BPhgy, Dip Hand & UL Rehab, Mark Ross MBBS FRACS (Orth), Princess Alexandra Hospital Hand and Upper Limb Unit



INTRODUCTION

Distal biceps ruptures are an uncommon injury. They represent approximately 3% of all biceps ruptures. They most commonly occur in middle aged men from 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.

METHOD

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.

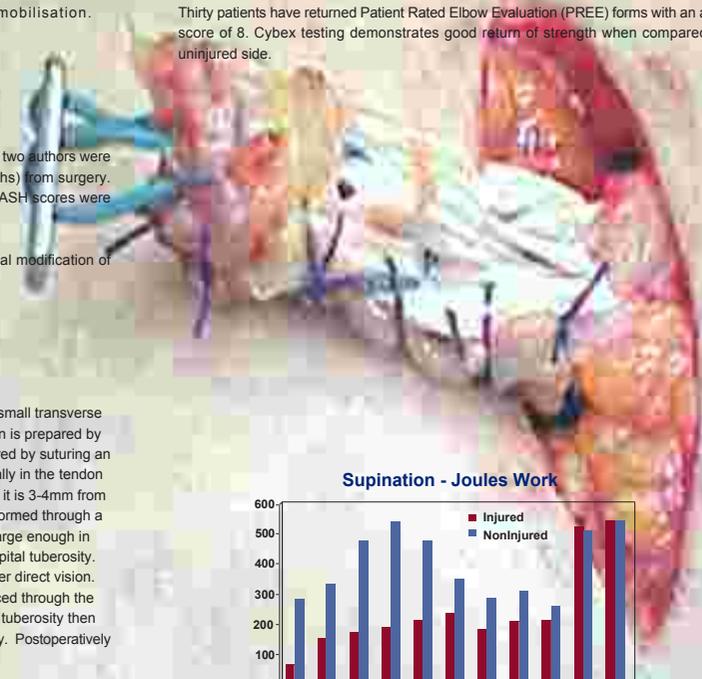
OPERATIVE METHOD

The operations were performed under general anaesthetic. The first step is to perform a small transverse incision over the distal end of the biceps muscle to retrieve the biceps tendon. The tendon is prepared by excision of scar tissue 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. 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. Next a proximal Henry's approach to the bicipital tuberosity is performed through a short longitudinal incision. A Burr is used to create an opening in the bicipital tuberosity large enough in diameter to accept the biceps tendon. A 4.5mm drill hole is then drilled opposite the bicipital tuberosity. Supinator is elevated 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 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.



Incision



Intraoperative biceps tendon retrieval



Intraoperative - biceps tendon preparation with endobutton



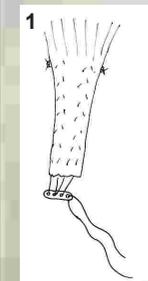
Intraoperative - biceps tendon retrieval



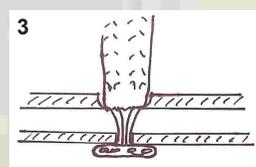
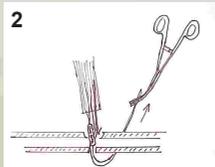
Post operative scar



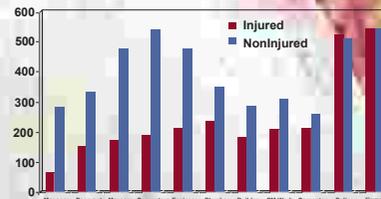
Post operative xray



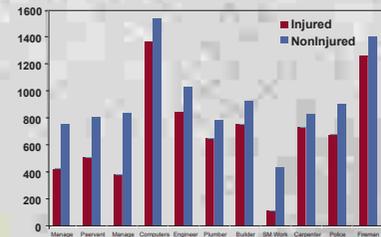
BICEPS PREPARATION



Supination - Joules Work



Flexion - Joules Work



DISCUSSION

This technique utilises some significant modifications from the original technique described by Dr Greg Bain. 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 the 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 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 more 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 Indocid 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 reconstruct biceps avulsions up to two years following initial injury with good results. Our endobutton construct is biomechanically similar to that used by Dr Bain and we believe that our modification aids in deployment of the endobutton-tendon construct.

REFERENCES

Bain GI, Prem H, Hepinstall 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.