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Analysis of Biceps Tenodesis With Interference Screw Fixation

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SENIOR PROJECT - APPROVAL

Name: WES DOTY

College: ENGINEERING  Department: BIOMEDICAL ENGINEERING

Faculty Mentor: DR. JACK WASSERMAN

PROJECT TITLE: ANALYSIS OF BICEPS TENODESIS WITH INTERFERENCE SCREW FIXATION

I have reviewed this completed senior honors thesis with this student and certify that it is a project commensurate with honors level undergraduate research in this field.

Signed: DR. JACK WASSERMAN, Faculty Mentor

Date: 5/15/03

Comments (Optional):
Analysis of Biceps Tenodesis with Interference Screw Fixation
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Senior Honors Project
J. Wesley Doty
May 5, 2003
Analysis of Biceps Tenodesis with Interference Screw

Abstract

Biceps tenodesis is the surgical repair and attachment of the biceps tendon to the proximal head of the humerus. There are many different methods to tenodese the tendon to the humerus, each with their own advantages and disadvantages. The interference screw method of tenodesis was analyzed through two-year post-operative examinations of 9 patients who had undergone the procedure. All 9 patients had good long-term results. The interference screw method works and yields good results but with the increased risk of nerve damage, a modified method is recommended.

Materials and Methods

Patient Selection

Patients selected for the interference screw method of tenodesis were chosen randomly. This randomization was the result of performing the interference screw method on all potential candidates for the time period between September 2000 and February 2001. Patients were explained the risks involved with the surgery and consented to the procedure.
Operative Technique

Interscalene nerve block was used and the patient was placed in the beach chair position (see fig. 1). A 1-2 inch incision was made in the anterior axilla centered on and perpendicular to the lower border of the pectoralis tendon. Hohmann retractors were used to open the surgical site and allow visualization of the biceps tendon attachment site. The ruptured biceps tendon is retrieved and placed back in its original position. A marker suture is placed about 7 cm from the proximal end of the biceps tendon. A corresponding mark is placed on the humerus in the biceps groove. This mark serves as a guide in setting the tension in the tendon during the tenodesis. The frayed end of the biceps tendon is removed resulting in about 4-5 cm being excised. The remaining tendon above the marker suture was double-whip stitched with #2 non-absorbable braided suture. A central hole is drilled in the biceps groove previously marked. A hole is placed on the posterior side of the humerus extending to meet the central hole. The tendon is guided into the central hole with suture material through the posterior hole. The interference screw is passed through the posterior hole and is used to secure the tendon in the central hole. The elbow is extended to ensure the marker suture corresponds to the mark in the biceps groove. This ensures that the resting length of the biceps tendon remains physiologic. (personal communication, Dr. W. David Hovis, February 12, 2003)

Figure 1. Beach Chair Position

Postoperative Protocol

The arm was placed in a neutral rotation sling immobilizer, gentle biceps range of motion exercises were begun within a day of surgery post operatively. Full activity was delayed for three months to allow the tenodesis to mature.

Patients were examined several weeks post operatively to ensure they were progressing as expected according to the normal timetable. The patients were examined 2 years post operatively to determine the long-term outcome of the procedure.

Results

Prior to the 2-year post operative examination a questionnaire was issued inquiring into what normal activities the patient could complete and with what level of pain. During the examination the speeds test was performed to evaluate pain associated with the biceps tendon, point tenderness was evaluated, biceps deformity was noted, return to activity was noted as well as return to work.

The 9 patients in the study all had favorable outcomes. The speeds tests were negative for all patients as was the point tenderness test. The biceps deformity was eliminated for all patients and all but one patient returned to their previous level of activity, both recreationally and work related.
Discussion

All patients had favorable outcomes in terms of level of pain and level of activity. This indicates that the interference screw technique provides adequate anchor strength for the tendon in the long-term. The objective outcome of the procedure in terms of range of motion etc. indicates that the procedure was a success and continuing to use the method is justified. While the end results support the use of the interference screw technique there is an increased risk of damage to the radial nerve from the proximal hole. The technique requires increased knowledge of the anatomy and location of the nerves of the upper arm. One patient’s radial nerve was touched during the placement of the proximal hole causing the entire arm to jerk. Obviously this had no long-term affects for the patient, but it demonstrates the risk involved with this type of interference screw method. The overall conclusion is that while the technique provides adequate stability for the tendon and good long-term results the increased risk for nerve damage is too great.

This study examined the long-term results of only 9 patients, which does not lend statistical significance to the results. The results are anecdotal but provided the physician that performed the procedures with enough information to come to the conclusion that the procedure incurs too much risk to justify continuing using it.
References


