

## **Biceps Tenodesis in 30-Year-Old and Younger Military Servicemembers: Trends and Longer-Term Follow Up**

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**INTRODUCTION:** The frequency of performance of open subpectoral biceps tenodesis (OBT) has risen, including in younger, active patients. This retrospective review sought to determine trends in the use of OBT in active duty servicemembers aged 30 years and younger, identify rates of postoperative complications and return to duty rates, and evaluate longer-term outcomes of OBT in this young, active population.

**METHODS:** A retrospective review utilizing the Military Health System Data Repository (MDR) was performed to identify all active-duty military personnel aged 30 years and younger who underwent open biceps tenodesis (Current Procedural Terminology [CPT] code 23430) from January 2010 to December 2015. Patients with concomitant or prior treatment of shoulder instability, rotator cuff tear, or distal clavicle arthrosis were excluded from full review, as were patients with less than 1 year of follow up. Patients who underwent concomitant labral or rotator cuff debridement and superior labrum anterior to posterior (SLAP) repair were included. Incidence rates were calculated from population counts obtained from the MDR. Electronic medical records were reviewed for demographic information, postoperative complications (including tenodesis failure, infection, neurovascular injury, and continued pain), and return to duty outcomes. Analyzed outcomes data included further physical therapy, injections, additional surgery, and other longer-term complications of the operative shoulder. Late postoperative shoulder radiographs were evaluated of glenohumeral joint radiographic changes.

### **RESULTS:**

Between 2010 and 2015, 1,779 (1,607 male, 172 female) active duty servicemembers aged 30 years and younger underwent open biceps tenodesis. Average age was 26 years (18-30 years). The overall incidence of open biceps tenodesis was 29.1 per 100,000 person-years. A 6.8-fold increase in the incidence of OBT was present by 2015 as compared to 2010. OBT without concomitant shoulder stabilization or rotator cuff repair was performed in 563 patients and 317 patients had one-year follow up. Prior surgery had been done in 21% (65/317). The overall acute/subacute complication rate was 5.4% (17/317): tenodesis failure comprised the majority (7 cases, 2.2%), followed by superficial wound infections (5 cases, 1.6%). Return to duty rate was 85%. Medical separation from the military due to the operative shoulder occurred at a higher rate in patients with a history of previous superior labral anterior to posterior (SLAP) repair (29%) compared to those who underwent primary open biceps tenodesis (12%) ( $p=.01$ ).

Median captured available follow up was 9.7 years (IQR 8.6-11.0). Overall, 57% (182/317) of patients sought some form of further shoulder care past 6-month routine follow up, of which 81% (149/182) received some form of intervention (to include injection, physical therapy, medication). In total, 21% (66/317) experienced a subsequent injury and 13% (41/317) underwent additional surgery. Surgery occurred for subsequent labral tear in 7% (21/317), of which 29% (6) were anterior, 24% (5) were posterior, 5% (1) pan-labral, 29% (6) superior, and 5% (1) unspecified. Later recurrent shoulder pain occurred in 43% (135/317), while 14% (43/135) of this group also reported contralateral shoulder pain, thus isolated operative-sided recurrent shoulder pain occurred in 29% (92/317) of patients. Median VAS of patients with recurrent pain was 4 (IQR 3-6).

Postoperative radiographs taken at least 2 years postoperatively ( $n = 140$ ) and at a mean follow-up date of 6.3 years demonstrated a 16% (22/140) prevalence of at least mild glenohumeral osteoarthritis (GH OA), of which 41% (9/22) also had acromioclavicular osteoarthritis. Controlled for acromioclavicular arthritis, there was a 9% (13/140) prevalence of glenohumeral arthritis that was isolated or higher grade than the acromioclavicular joint. As compared to preoperative radiographs, 95% (21/22) of those with GH OA had progression of OA from prior to OBT.

OBT was the initial surgery on the SLAP-biceps complex in 272 patients, in which 58% (157/272) had at least one additional encounter for subsequent shoulder pain. In total, 24% (65/272) had subsequent injury and 13% (35/272) had additional surgery. Some 42% (113/272) had recurrent shoulder pain, of which 13% (36/113) also reported contralateral shoulder pain, for a prevalence of isolated recurrent pain of the operative shoulder of 28% (77/272).

In the subgroup of patients who underwent initial SLAP repair prior to OBT, 56% (25/45) had at least one additional encounter for subsequent shoulder pain, while 33% (15/45) had recurrent pain isolated to the operative shoulder ( $p=.55$  vs. initial OBT). In total, 13% (6/45) had additional shoulder surgery (at least 3 surgeries).

### **DISCUSSION AND CONCLUSION:**

Use of open biceps tenodesis in patients younger than 30-years-old rose significantly from 2010-2015, with a low short-term complication rate. At longer follow up, further shoulder care was common, and a minority demonstrated progressed glenohumeral degenerative changes. Those who underwent OBT after prior SLAP repair were more likely to be medically separated from the military though they had a similar prevalence of recurrent shoulder symptoms over longer term follow up.

