Commentary & Perspective

Outcomes of Pectoralis Major Tendon Repair: Does Study Design Matter?

Commentary on an article by Drew W. Nute, MD, et al.: "Return to Function, Complication, and Reoperation Rates Following Primary Pectoralis Major Tendon Repair in Military Service Members"

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Nute et al. are to be congratulated for this retrospective study comprising a large cohort of 257 U.S. active-duty military patients following primary pectoralis major tendon repair performed by 152 surgeons at 57 medical treatment facilities between 2008 and 2013, with a minimum follow-up of 2 years. The patients were identified from the Military Health System utilizing the Management Analysis and Reporting Tool (M2).

Historically, pectoralis major tendon tears have occurred infrequently. A systematic review identified only 365 cases in the literature since Patissier's description of the injury in 1822 through 2010[1]. Pectoralis major tendon tears have occurred with increasing frequency in more recent years. Changing demographic characteristics with increased participation in contact sports and weight-training activities are likely responsible.

Previous studies have demonstrated that improved outcomes can be anticipated with surgical repair compared with nonoperative treatment and that acute repair is preferable[2-4]. Recent publications have begun to provide more information on anticipated functional outcomes, adduction strength following surgical repair, complications, and second surgical procedure rates[5].

The strengths of this study from Nute et al. include the large cohort of patients and the information provided with regard to functional outcomes, complications, reoperation rates, and risk factors for failure. A total of 242 patients (94%) were able to return to full duty at a mean time of 7.1 months following the surgical procedure. Despite excellent functional outcomes, the authors note atypically high surgical site morbidity with an overall complication rate of 23%. Forty-one major complications occurred in 31 patients (12%), and these included rerupture following repair (5.4%) and wound complications requiring a return to the operating room (5.1%). Altogether, 21 patients (8.2%) required 29 additional surgical procedures. Fifteen reruptures occurred in 14 patients (5.4%), and 8 of these patients underwent revision repair. Thirteen (5.1%) of these patients required 21 surgical procedures for wound complications including infection. Although the cohort is large, so are the numbers of surgeons (n = 152) and medical treatment facilities (n = 57). The authors have not presented the number of cases per surgeon, and it is likely that few surgeons in this study treated a high volume of patients. This is an additional strength of the study in that it may represent the outcome that a surgeon can expect in a setting in which few cases are performed per year.

This also represents one of the weaknesses of the study. Surgical volume has clearly been associated with better outcomes and fewer complications[6]. Nute et al. acknowledge the additional weaknesses, which are related to the inherent limitations of health-care management databases with data pooled from multiple surgeons across multiple medical centers. These weaknesses include that the surgical approach (such as deltopectoral or axillary) could not be determined in many of the cases because it was inconsistently reported and, as a result, the relatively high infection and wound complication rates could not be correlated with the approach selected by the individual surgeons; it lacks a quantitative assessment of strength and function using handheld dynamometers, isokinetic testing, or bench-press data, which would be more rigorous than the Medical Research Council Muscle Strength Grading Scale; the data were inconclusive with respect to acute compared with chronic repair outcomes; and quantitative measures of adiposity (percentage of body fat), which would be more thorough to consider with respect to body mass index, were not evaluated.

This study has several similarities to another recent publication that identified 291 patients with pectoralis major tendon repairs in an active-duty military population[7]. Balazs et al. utilized a similar military database (Military Health System Data Repository [MDR]) to identify all active-duty personnel who were surgically treated by multiple surgeons at multiple facilities between 2012 and 2014. The database was mined to obtain demographic information, injury characteristics, and postoperative complications and outcomes. The authors concluded that white race and a surgical procedure occurring >6 weeks from injury were significant risk factors for a complication. Among the 214 patients with a minimum follow-up of 12 months, 95.3% were able to return to military duty and junior personnel were at the highest risk of being unable to return to duty after surgical treatment[7].

Those two large health-care management database studies added a total of 548 patients following pectoralis major tendon repair to the world literature. The relatively high complication and second surgical procedure rates described above can be compared with those of two of the larger single-surgeon series[5,8].

Garrigues et al. performed a retrospective study of 24 patients (19 patients with follow-up) with pectoralis major tendon repair between 2005 and 2011. Using the Bak criteria, the results for 96% of patients were rated good to excellent. The mean preoperative bench press of 318 lbs. (144 kg) was restored to 264 lbs. (120 kg) at the time of follow-up. There were no incidents of a second surgical procedure or postoperative wound complications[8].

Our group has reported on a consecutive series of 40 athletes with pectoralis major tendon repair at minimum 2-year follow-up among a larger cohort of 82 athletes treated between 2008 and 2016[5]. The repairs were performed using a previously published surgical technique[9]. The mean postoperative Single Assessment Numeric Evaluation (SANE) score was 93.6 points and patient satisfaction was 9.6 of 10. All athletes returned to the pre-injury level of function approximately 5.5 months postoperatively. Isokinetic strength evaluation revealed an average decrease of <10%. The mean pre-injury bench press of 396 lbs. (180 kg) was restored to 241 lbs. (109 kg) postoperatively. Three athletes (7.5%) required a second surgical procedure; 2 had reruptures within 3 weeks of the surgical procedure secondary to noncompliance and trauma. Excluding these 2, there were no reruptures and the second surgical procedure rate would be 2.5% (1 athlete required a long-head biceps tenodesis 5 months after pectoralis major tendon repair). There were no postoperative wound complications or infections among the entire cohort of 82 athletes. We also identified a relationship between tear type (complete compared with isolated sternocostal head) and tear location (Tietjen Type IIID [tendon] compared with Tietjen Type IIIC [myotendinous junction])[5]. That finding had implications with regard to preoperative imaging and indications for a surgical procedure. It might not have been recognized if not for careful observation at the time of the surgical procedure and might have been missed in a large, database-generated study.

Both meta-analyses and health-care management databases with data pooled from multiple surgeons and medical centers as well as single-surgeon, high-volume studies have merit for different reasons and may be used to inform decision-making by patients, practicing surgeons, and entities responsible for the delivery of services.

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