



Outcomes and Return to Sport After Pectoralis Major Tendon Repair: A Systematic Review

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Context: Pectoralis major tendon ruptures are becoming increasingly common due to the growing prevalence of active lifestyles. Studies investigating the efficacy of pectoralis major tendon repair have limited sample sizes and offer mixed results, while existing reviews do not explore postoperative activity outcomes for patients.

Objective: To summarize and synthesize the clinical outcomes and rate of return to activity after isolated pectoralis major tendon repair.

Data Sources: Four databases (MEDLINE, EMBASE, PubMed, and CINAHL) were searched from database inception through March 7, 2018.

Study Selection: Studies reporting outcomes of isolated pectoralis major tendon repair for pectoralis major tendon rupture were included.

Study Design: Systematic review.

Level of Evidence: Level 4.

Data Extraction: Data including patient demographics, intervention details, and clinical outcomes were extracted. The methodological quality of included studies was evaluated.

Results: Of 2332 retrieved articles, 18 studies were included, with a total of 536 patients. A majority (90%; 134/149) of patients undergoing pectoralis major tendon repair successfully returned to sport at a mean 6.1 ± 1.7 months postsurgery, of which 74% (95/128) successfully returned to their preinjury level of sport. The majority (95%; 269/284) of patients returned to work at a mean 6.9 ± 1 months. Postsurgically, 81% (83/102) of patients experienced complete pain relief after the surgery, and 19% (21/109) had cosmetic complaints after pectoralis major repair. Of the 10 studies that reported complications, 18% (75/423) of patients had postoperative complications, including reruptures and wound infections; 7% (30/423) of patients required reoperation for their complications.

Conclusion: Pectoralis major tendon repair is an effective treatment that results in a high rate of return to sport and work, pain relief, and improved cosmetic appearance, albeit with a significant rate of complication. The evidence supporting all outcomes was limited by the rarity of the injury, the variable surgical techniques, and outcome assessment criteria.

Keywords: pectoralis major; rupture; repair; return to sport

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Pectoralis major tendon rupture is a rare injury first recorded by Patissier in 1882.²⁹ Since then, pectoralis major tendon ruptures have become more common because of the increasing popularity of competitive sports, weight lifting, and particularly, bench pressing.³³ The pectoralis major muscle is responsible for adduction, flexion, and internal rotation of the humerus and is most commonly ruptured through indirect trauma from extensive tension on a maximally contracted muscle, leading to tendon avulsion.^{3,21,22} Direct trauma more commonly causes rupture at the musculotendinous junction and muscle belly.¹⁵ Given its mechanism of injury, pectoralis major tendon rupture most commonly occurs in 20- to 40-year-old males and has been associated with anabolic steroid use.^{1,10,33} Patients typically present with a “snap” sound at the time of injury, ecchymosis, swelling, cosmetic defects in the affected axilla, the formation of a ball in the chest on muscle retraction, and pain and weakness in the affected arm.^{33,40} Without treatment, rupture can be a source of pain and disability in athletic individuals.^{24,33}

Pectoralis major tendon repair is currently the recommended means of treatment, with improved outcomes with respect to pain and function compared with nonoperative treatment.^{3,42} Several published repair techniques exist, including bony tunnels, suture anchors, cortical buttons, and suture repair, and all have had positive results reported.^{8,34,37} Despite the consensus for repair, there is currently no accepted prognosis for return to sport, time to return to activity, functional scores, and general outcomes after surgery given the limited quality and availability of existing studies.³

Existing reviews of pectoralis major tendon repair do not explore objective postoperative activity outcomes of patients.^{3,5,9} Given the increasing incidence of ruptures due to the popularity of weight lifting and competitive sports, this systematic review aims to establish the impact of pectoralis major tendon repair on patients with respect to return to sport and work as well as cosmetic outcomes and patient satisfaction.

METHODS

This systematic review was conducted according to the methodology described in the *Cochrane Handbook for Systematic Reviews of Interventions*¹⁴ and is reported in accordance with the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).²⁵

Search Strategy

A literature search was conducted using 4 databases (MEDLINE, EMBASE, PubMed, and CINAHL) from database inception to March 7, 2018. Search terms such as *pectoralis major*, *rupture*, *tendon repair*, and *reinsertion* were used (see Table A1 in the Appendix for full search strategy, available in the online version of this article). Medical Subject Headings and Emtree headings and subheadings were used in various combinations in Ovid and supplemented with free text to increase sensitivity. The PubMed search included articles published online ahead of

print. A manual search of references of included studies and the gray literature was performed for the inclusion of any additional studies.

Eligibility Criteria

All inclusion and exclusion criteria were determined a priori. The following were the inclusion criteria: (1) level 4 evidence or higher, (2) minimum of 5 patients, (3) male and female patients of all ages, (4) studies published in English, (5) studies on humans, (6) studies reporting on the isolated use of pectoralis major tendon repair for the treatment of pectoralis major tendon rupture, and (7) studies reporting either return to sport, return to work, functional outcomes, or pain outcomes. The following were the exclusion criteria: (1) studies of level 5 evidence; (2) studies combining pectoralis major tendon repair with other surgical treatments for the shoulder; (3) studies using grafts of any sort for tendon reconstruction; (4) review articles, abstracts, cadaveric studies, or biomechanical studies; and (5) studies using the same patient population as another study already included to avoid duplication of patients in the data analysis. If a follow-up study of the same patient population was identified, the more recent study was included.

Study Screening and Data Abstraction

Two reviewers independently evaluated all titles and abstracts for eligibility using a piloted screening form. Duplicate articles were manually excluded. Both reviewers evaluated the full text of all studies after title and abstract screening. Disagreements at the full-text stage were discussed among the 2 reviewers. In the case that consensus could not be reached, the input of a third senior reviewer was used to determine the article's final eligibility.

Two independent reviewers abstracted relevant data from included studies into a Microsoft Excel spreadsheet (v 2016; Microsoft) designed a priori. Abstracted data included study characteristics (eg, author, year of publication, study design, country of origin, time frame of the study), patient demographics (eg, sex, age, percentage dominant extremity, sample size, injury location, injury extent, anabolic steroid use), intervention details (eg, duration of follow-up, complications), and outcome data pertaining to pectoralis major tendon repair and control groups (eg, return to sport, return to work, time to return to activity, pain, overall satisfaction, cosmetic score). Disagreements between reviewers were solved by a third senior reviewer.

Quality Assessment

All studies included in this systematic review were independently assessed for quality in duplicate by the 2 reviewers. The assessment of methodologic quality was performed using the Methodological Index for Non-Randomized Studies (MINORS) appraisal tool³⁸ for all nonrandomized studies, and the Cochrane Risk of Bias Tool for Randomized Controlled Trials¹³ was used for the quality assessment of randomized studies. Methodologic quality for MINORS was

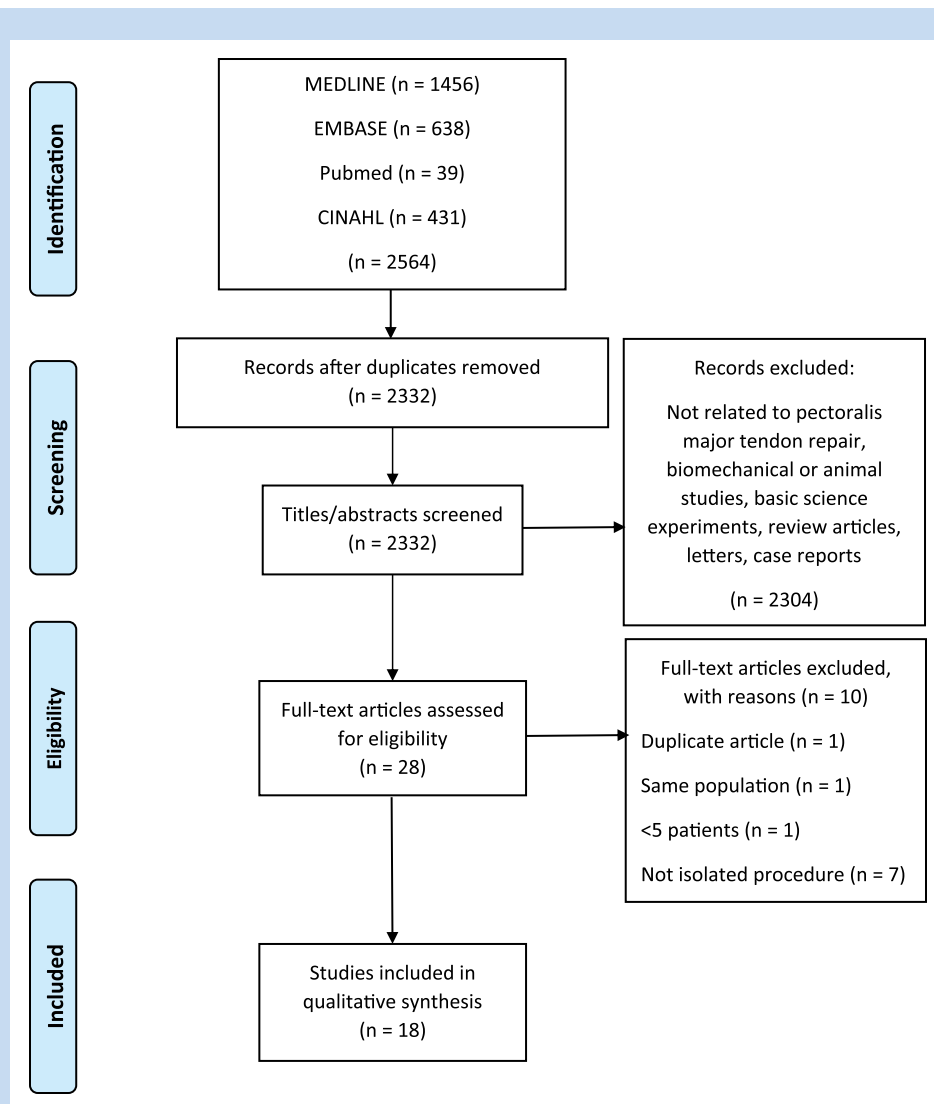


Figure 1. Transparent reporting of systematic reviews and meta-analysis flow diagram outlining the search strategy results from initial search to included studies.

categorized a priori as follows: 0 to 6, very low quality of evidence; 7 to 10, low quality of evidence; 10 to 14, fair quality of evidence; and >16, good quality of evidence for non-randomized studies. The level of evidence of each study was graded according to the criteria of Wright et al.⁴¹

Statistical Analysis

Descriptive statistics were calculated to reflect the frequency of outcome measures. A kappa (κ) statistic was used to evaluate interrater agreement for study eligibility at all screening stages. According to the guidelines created by Landis and Koch,¹⁹ agreement was categorized as follows: 0 to 0.20, slight agreement; 0.21 to 0.40, fair agreement; 0.41 to 0.60, moderate agreement; 0.61 to 0.80, substantial agreement; 0.81 or higher, almost perfect agreement. The intraclass correlation coefficient (ICC) was calculated for the quality assessment using the MINORS criteria based on a mean rating ($k = 2$), absolute

agreement, 2-way mixed-effects model. Agreement was established a priori, with an ICC of 0.61 or greater considered to indicate substantial agreement; ICC of 0.21 to 0.60, moderate agreement; and ICC of 0.20 or less, slight agreement.¹⁹ SPSS statistical analysis software (v 25; IBM Corp) was used to calculate the descriptive statistics.

RESULTS

Study Identification

The initial literature search yielded 2564 relevant studies. After the removal of duplicate studies, 2332 articles were screened for relevant title and abstracts; 28 studies then underwent full-text screening, and 18 full-text articles met the inclusion criteria (Figure 1). The characteristics of all included studies can be found in Table A2 in the Appendix (available online). There was substantial agreement between reviewers at the title and abstract

stage ($\kappa = 0.79$; 95% CI, 0.67-0.91), and almost perfect agreement at the full-text screening stage ($\kappa = 0.85$; 95% CI, 0.65-1.00).

Characteristics of Studies

All included studies were published between 1984 and 2017, 12 of which were published since 2000. Of 619 eligible patients, a total of 536 participants underwent isolated pectoralis major tendon repair without grafts for a pectoralis major rupture. The median sample size of the included studies was 13.5 patients (range, 5-257 patients). Of these, only 1 patient was female, the mean age was 28 ± 3 years, and the median follow-up was 21.5 months (range, 12-78 months). Injuries occurred to the dominant extremity in 48% (136/284) of patients, and 11% (48/425) of patients reported anabolic steroid use. Of the patients, 8% (44/536) were professional athletes, 65% (350/536) were amateur athletes, and 26% (142/536) were unreported.

Study Quality

All 18 studies were nonrandomized, of which 16 were case series and 2 were technique articles. The 2 technique articles used techniques that have also been used in other included studies. All articles were level 4 evidence. The mean MINORS score was 10.2 ± 1.9 , which is equivalent to a fair quality of evidence for nonrandomized studies (see Appendix Table A3). There was excellent interrater agreement for the MINORS score, with an ICC of 0.906 (95% CI, 0.746-0.965).

Surgical Technique, Chronicity, Injury Location, and Extent

Of the 15 studies that reported surgical technique, pooled data suggest that 36% (114/315) of pectoralis major tendon repairs involved bone tunnels, 32% (102/315) involved suture anchors, 20% (64/315) used cortical button fixation, and 11% (35/315) involved suture repairs (see Appendix Table A4). Older studies more frequently used bone tunnels,^{18,28,30} while recent studies more commonly reported the use of cortical button fixation.^{6,16,27}

The majority of pectoralis major ruptures reported in the literature were complete tears, with 59% (242/413) of ruptures in this review described as complete, while 41% (171/413) were partial tears. Pectoralis major ruptures more frequently occurred at the sternal head than the clavicular head, with 55% (187/341) of cases reporting a rupture of both sternal and clavicular heads, 44% (149/341) involving only the sternal head, and 1% (5/341) affecting only the clavicular head; 47% (175/372) of ruptures were at the humeral insertion, 41% (154/372) of ruptures were at the musculotendinous junction, 8% (28/372) of tears were intratendinous, 3% (12/372) were at the muscle belly, less than 1% (2/372) of ruptures included a bony avulsion of the tendon, and less than 1% (1/372) of ruptures occurred at the sternal origin. Ruptures at the muscle origin, muscle belly, and bony avulsions were rare in the included studies.⁹ Good outcomes were achieved for both tears at the humeral insertion and musculotendinous tears, and there were no differences in postoperative outcome for the different types

of ruptures. Six studies reported separate outcomes for chronic and acute patients, although studies defined chronicity differently, ranging from repair after 1 week to after 6 weeks.^{1,40} No study found a statistically significant difference in outcomes after acute repairs compared with chronic repairs, although 3 studies did find numerically superior but nonsignificant functional scores and satisfaction in patients with acute repairs compared with chronic repairs.^{1,2,26,35} Nute et al²⁷ performed a multivariate analysis of risk factors for surgical and clinical failure and found no difference between acute and chronic patients.

Pooled results from 10 studies reporting complications^{6,10,15,16,18,23,27,28,40,43} indicate that 18% (75/423) of patients had postoperative complications, and 7% (30/423) of patients required reoperation (see Table A4 in the Appendix). Common complications included reruptures in 4% (18/423) of patients, 61% (11/18) of whom underwent revision surgery, and wound infections in 4% (17/423) of patients, 76% (13/17) of whom required reoperation for irrigation and debridement.

Return to Activity, Injury Cause, and Rehabilitation

As reported in the literature, the most common causes of pectoralis major rupture were identified to be bench press in 49% (300/608) of cases, contact sports in 8% (47/608), and weight lifting in 7% (41/608). Pooled results from 10 studies^{2,6,10,11,15,16,18,20,28,30} suggest that 90% (134/149) of patients successfully returned to playing sports after isolated pectoralis major tendon repair at a mean time of 6.1 ± 1.7 months (range, 4-8.5 months) (Table 1). Of these patients, 8 studies^{6,10,11,15,16,18,28,30} reported that 74% (95/128) successfully returned to their preinjury level of sport. In 3 studies,^{2,26,27} 95% (269/284) of patients successfully returned to work after their surgery at a mean 6.9 ± 1 months (range, 4.1-7.1 months).

From 7 studies,^{1,2,6,10,15,27,30} pooled patient outcomes were described as excellent in 69% (268/388) of cases, good in 15% (58/388), fair in 11% (41/388), and poor in 5% (21/388); however, studies used various criteria to define these outcome categories. Four studies^{6,10,15,27} considered pain, range of motion, cosmetic complaints, isokinetic strength, and return to activity, while 3 studies^{1,2,30} used a composite criterion, including subjective patient opinion.

Rehabilitation protocols varied across studies. Of the 12 studies that reported rehabilitation time, ^{7,2,6,10,16,18,35,40} recommended shoulder range of motion within 4 to 6 weeks after surgery, followed by isometric exercises, and progressively increased resistance training. In 7 studies,^{1,6,10,16,18,26,35} full activity was allowed within 6 months, while 2 studies^{2,10} recommended waiting up to 12 months before full activity. Äärmaa et al¹ recommended an intensive training protocol including free movement within 2 to 3 weeks and full activity within 3 months, which the authors claimed to be responsible for shorter recovery times for 33 patients. Meanwhile, Kakwani et al¹⁵ allowed an accelerated rehabilitation protocol involving elbow exercises the first day after surgery, with isometric rotator cuff

Table 1. Summary of clinical outcomes after pectoralis major tendon repair

First Author, Year	Pain Outcomes	Return to Sport	Return to Same Level of Sport	Return to Work	Time to Return	Cosmesis Satisfaction	Satisfaction
Orava, 1984 ²⁸	NR	4/5	3/5	NR	4 mo	NR	NR
Kretzler, 1989 ¹⁸	16 no pain	13/16	13/16	NR	NR	0/16 had complaints	NR
Wolfe, 1992 ⁴⁰	NR	NR	NR	NR	NR	NR	6/7
Pavlik, 1998 ³⁰	NR	6/7	6/7	NR	NR	NR	NR
Schepsis, 2000 ³⁵	Acute pain relief 95% (85%-100%), chronic pain relief 89% (75%-100%)	NR	NR	NR	NR	NR	NR
Hanna, 2001 ¹¹	NR	9/9	6/9	NR	NR	NR	NR
Äärilmaa, 2004 ¹	NR	NR	NR	NR	NR	NR	NR
Zvijac, 2006 ⁴³	18 no pain, 1 pain	NR	NR	NR	NR	NR	18/19
Kakwani, 2007 ¹⁵	6 no pain, 6 mild pain, 1 constant pain	13/13	11/13	NR	8.5 mo (range, 6-12 mo)	1/13 had complaints	NR
Antosh, 2009 ²	Routine activity: 7 no pain, 6 mild pain, 1 moderate pain Strenuous activity: 3 no pain, 7 mild pain, 3 moderate pain, 1 severe pain	12/14	NR	14/14	4.1 ± 3.3 mo (return to work)	NR	13/14
Shah, 2010 ³⁶	Preoperative: 2 no pain, 1 mild pain, 5 moderate pain, 2 severe pain Postoperative: 9 no pain, 1 mild pain	NR	NR	NR	NR	2/10 had complaints Preoperative: 4.1/10 Postoperative: 6.8/10	NR
Lau, 2013 ²⁰	NR	6/7	NR	NR	NR	NR	NR
Guity, 2014 ¹⁰	23 no pain, 1 pain	21/24	6/24	NR	NR	8/24 had complaints	NR
Kang, 2014 ¹⁶	NR	10/14	10/14	NR	NR	NR	NR
Mooers, 2015 ²⁶	4/6 no pain, 2/6 pain on exertion	NR	NR	13/13	NR	0/6 had complaints	NR
Cordasco, 2017 ⁶	NR	40/40	40/40	NR	5.5 mo (range, 4.5-6.5 mo)	10/40 had complaints	9.6 ± 1 (range, 6-10) out of 10
Merlin, 2017 ²³	Preoperative average pain at rest: 3.92/10 Postoperative average pain at rest: 1.03/10	NR	NR	NR	NR	Preinjury: 8.26/10 Preoperative: 3.15/10 Postoperative 6.08/10	7.65/10
Nute, 2017 ²⁷	Preoperative: 219 reporting, 3.6 ± 2.5 out of 10 Postoperative: 245 reporting, 0.5 ± 1.1 out of 10	NR	NR	242/257	7.1 ± 4.4 mo	NR	NR

NR, not reported.

strengthening 2 weeks later, which was claimed to be crucial for complete functional recovery. However, on average, patients waited 4 weeks after surgery to begin rehabilitation (see Table A4 in the Appendix).

Pain, Function, Cosmesis, and Satisfaction

Across studies reporting pain on follow-up, pooled results from 7 studies^{2,10,15,18,26,36,43} indicated that 81% (83/102) of patients experienced no pain on final follow-up (Table 1). Pooled outcomes from 6 studies^{6,10,15,18,26,36} reported that 19% (21/109) of patients had complaints with the postoperative cosmesis of their shoulder, while 2 studies^{23,36} found that patients rated their postoperative cosmesis as 6.8 and 6.1 out of 10 compared with their preoperative cosmesis of 4.1 and 3.2 out of 10, respectively. While this increase is still lower than their preinjury cosmesis rating of 8.3, it is nonetheless important for bodybuilders and weight lifters, who made up a large portion of included patients. Overall, pooled outcomes from 3 studies^{2,40,43} found 93% (37/40) of patients were satisfied with the surgery. Two other studies^{6,23} reported patient satisfactions of 9.6 and 7.7 out of 10.

Comparative Outcomes

Four studies^{11,20,35,43} compared pectoralis major tendon repair with nonoperative treatment, with 2 studies^{11,35} concluding that surgical treatment produced superior outcomes compared with nonsurgical care (see Appendix Table A5). Schepsis et al³⁵ found that pain relief, return to strength, satisfaction, peak torque, and work per repetition were all higher in 13 patients who underwent repair compared with 4 patients who chose nonoperative treatment. Hanna et al¹¹ reported similar results, with higher peak torque, work, and return to sport in surgically treated patients compared with nonoperatively treated patients. In contrast, Zvijac et al⁴³ and Lau et al²⁰ did not find differences in return to sport and satisfaction in their patients, although they did not conduct objective measurements of strength.

DISCUSSION

The ability for young and middle-aged athletes to return to sport after pectoralis major tendon repair is very good according to the available literature. This systematic review found that 90% of athletes were able to return to sport after a mean 6.1 months. Furthermore, 74% of patients returned to their preinjury level of sport. In parallel with the high return to sport, 95% of patients successfully returned to work after surgery at a mean 6.9 months. Nearly all of these patients were returning to physical work or the military, which may have higher work requirements, explaining the longer time to return to work than to return to sport.²⁷ Overall, this review suggests that patients can anticipate a high likelihood of returning to athletics or work after pectoralis major tendon repair and a moderate likelihood of returning to the same level of sport.

Despite the high return to activity after pectoralis major tendon repair, among papers that reported complications, 18% of patients sustained a complication, with the most common

being ruptures and wound infections. Furthermore, nearly 40% of these patients required reoperation. It should be noted that this number may be overestimated from reporting bias among studies with more serious complications.^{6,10,23} While the risk of complications was significant, patient outcomes after revision surgery were good, with 6 studies^{6,10,15,23,27,36} reporting good or excellent outcomes.

This review included primarily amateur athletes (65%), with a small number of competitive athletes (8%). While the return to sport was good for both levels of patients, the proportion of professional athletes who returned to their preinjury level of sport was lower. The largest included study of competitive athletes included 24 athletes who were primarily bodybuilders.¹⁰ A total of 21 athletes returned to sport, but only 6 athletes returned to the same level of sport and experienced strength loss less than 10% compared with their uninjured arm.¹⁰ This parallels reports of marginally lower cosmesis satisfaction, return to strength, peak torque, and work of the repaired arm compared with the uninjured arm, which is important in bodybuilding and competitive weight lifting.^{11,35}

It is widely known that surgical management of pectoralis major tendon ruptures can improve muscular strength, satisfaction, and cosmesis compared with nonoperative treatment.^{7,17,31} Two articles^{11,35} found improved peak torque and work as well as superior pain relief, return to strength, and satisfaction after surgical repair, but these findings were not consistent across papers. Two included studies^{20,43} identified no difference between surgical and nonoperative care but did not measure objective indicators for peak torque and work. Many chronic surgical repairs occur after failed conservative treatment.^{1,31,32,35} Therefore, the difference in outcomes between surgical and nonoperative treatment may be underestimated. Meanwhile, in elderly individuals⁴ or those with tears at the pectoralis major muscle origin or muscle belly,⁹ nonoperative treatment has been shown to allow a return to everyday activities.

A previous meta-analysis by Bak et al³ found positive results after pectoralis major tendon repair, reporting that 88% of patients experienced good or excellent results. This is in comparison with 27% of patients undergoing nonoperative treatment. These results are similar to the current systematic review, which evaluated a wider range of outcomes, including return to sport, satisfaction, and cosmesis rather than a custom classification of excellent, good, fair, or poor outcomes. The present review supports the finding by Bak et al³ that there were no differences in outcome after the surgical repair of intratendinous, humeral insertion, and musculotendinous junction ruptures.

The majority of ruptures were complete and occurred at both the sternal and clavicular heads. As previously reported, tearing of the pectoralis major typically occurs first at the sternal head, followed by clavicular heads with increasing loads.⁹ A variety of surgical techniques have been described for pectoralis major repair, including bone tunnels, suture repairs, suture anchors, and cortical buttons, all with favorable results. The use of more

robust fixation techniques may allow for faster rehabilitation times and more favorable outcomes.⁵ In our review, bone tunnels were the most popular technique, comprising 36% of all repairs, followed by suture anchors in 32% of patients. Earlier studies primarily used bone tunnels and suture anchor fixation, although cortical button fixation has become increasingly popular recently because of theoretically decreased stress on the humerus, potentially decreasing the risk of fracture.¹⁶ No study has yet compared all surgical techniques in patients, and 2 biomechanical studies have identified no differences between transosseous repairs, suture anchor repairs, and endosteal Pec Buttons.^{12,37} Other studies have found varying results when comparing bone trough repairs with suture anchor repairs, with 1 reporting that bone trough repairs were stronger and another reporting that bone trough techniques may increase postoperative fracture risk.^{34,39} Wilson et al³⁹ found that unicortical button fixation with larger caliber suture and suture tape may provide superior construct strength compared with transosseous suture repairs.³⁹

The interval between injury and surgery may have an impact on the outcome after pectoralis major tendon repair.⁵ While several included studies have noted marginally better functional outcomes after acute repairs compared with chronic repairs,^{1,2,26,35} none of the included studies indicated statistically significantly improved outcomes in acute repairs, although the majority of studies were not sufficiently powered to show differences between the 2 groups.^{2,35,40} Thus, while immediate repairs may be optimal in maximizing patient outcomes, a chronic injury can also be repaired with excellent results.^{1,2,31,32,35,36} Several studies have also associated the use of anabolic steroids with an increased likelihood of pectoralis major tendon rupture,³¹ as well as superior outcomes after surgical repair.¹ In this review, 11% (48/425) of patients reported prior use of anabolic steroids, and subgroup analysis was not possible because individual outcomes were not typically reported. The use of anabolic steroids may be underreported because of disciplinary repercussions for athletes and members of the military.²⁷ Nonetheless, the use of anabolic steroids does not appear to be a major factor in this review.

The key strengths of this systematic review include the rigorous methodology and selection of studies. The wide-ranging search strategy and predetermined inclusion criteria ensured that we included much of the relevant literature. Reviewer bias was minimized by screening and extracting data in parallel with 2 independent reviewers. The interrater agreement was almost perfect. The inclusion of only studies with isolated pectoralis major tendon repair and exclusion of studies including graft reconstructions reduced the heterogeneity of included studies. Furthermore, the exclusion of case reports and old studies, which were included in previous reviews, minimized the likelihood of publication bias.

The main limitations of this systematic review related to the study designs, sample sizes, and outcome assessment criteria of included studies. The majority of included studies were of level 4 methodologic quality, which is a limitation of the current

literature. Variability between studies was significant because of differences in surgical technique, rehabilitation protocols, and reporting of outcomes, including various scoring systems.

CONCLUSION

Current literature suggests pectoralis major tendon repair results in 90% return to sport and 95% return to work, with the majority of patients reporting pain relief and improved cosmetic appearance. Complications were reported in 18% of patients, with reoperation required in 7% of patients. The evidence supporting all outcomes was limited by the rarity of the injury and the variable surgical techniques, rehabilitation protocols, and outcome assessment criteria.

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