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Complications after traumatic distal triceps tears: an analysis of 107 cases

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Background: The major complication and reoperation rates after distal triceps repair are poorly defined. The purpose of this large retrospective cohort study of distal triceps repairs performed by multiple surgeons within a large orthopedic group was to more clearly define the rates and risk factors of clinically impactful major complications and reoperations.

Methods: All distal triceps tendon repairs for traumatic injuries performed from January 2006 to April 2017 with a minimum 2-month follow-up were identified using the Current Procedural Terminology code 24342. A total of 107 patients were included in this study. The primary outcome measure was total major complication rate. Reoperations, minor complications, and risk factors were also tracked.

Results: Repairs were performed via bone tunnels (63.5%), suture anchors (13%), or a combination of the two (17.8%). A 14% complication rate and 13.1% reoperation rate were observed. Indication for reoperation included 9 reruptures, 3 infections, and 2 others. The time between injury and surgery was not found to be a risk factor for tendon rerupture. Smoking status, gender, utilization of a splint or controlled motion brace, and time to first active mobilization were not shown to influence rates or rerupture.

Conclusion: Distal triceps repair for traumatic injuries is associated with 14% complication and 13.1% reoperation rates. Patient, rehabilitation, and surgeon-specific factors did not influence the complication rate.

Traumatic distal triceps ruptures requiring surgical repair are relatively rare injuries.[7,12,13,19] The incidence in the military population has been estimated at 1.1 per 100,000 person-years.[2] It is therefore not surprising that data regarding complications and reoperation after acute distal triceps repairs are similarly sparse and limited to smaller case series and retrospective reviews.[2,5,6,9-12,14,16,18] The ability to extrapolate these data to patients is similarly limited by the inclusion of debridement and reconstruction of enthesopathic insertional tendinopathy and subacute injuries in many of these studies.

The current literature defines 2 main variables that may influence complications and outcomes after distal triceps tendon repair: fixation type and time from injury to surgery. Fixation types previously assessed for distal triceps tendon avulsions include bone tunnels, suture anchors, or a combination of the two and direct tendon repair for intratendinous injuries.[10,14,16,18] The overall rate of rerupture has ranged from 0% to 21%,[2,5,6,9-12,14,16,18] with the largest study to date by Mirzayan et al reporting a 6.7% rerupture rate after bone tunnel repair vs. 0% after suture anchor repair in 184 cases.[14] Unlike prior studies,[6,16,18] the Mirzayan study showed no difference in "release from medical care" whether the triceps rupture was repaired before or after the 3-week mark. From a biomechanical perspective, the utilization of a suture anchor or transosseous (TO) repair appears to be similarly efficacious in limiting displacement under cyclic loading conditions.[4]

The purpose of this retrospective comparative study of distal triceps repairs performed by multiple surgeons within a large orthopedic group was to more clearly define the rates and risk factors for complications and reoperations. We hope to add further evidence to the discussion on whether surgical technique and timing from injury to surgery influence complication and reoperation rate.

Materials and methods

A retrospective comparative treatment study was conducted after institutional review board approval (Chesapeake IRB Pro00020921). A query of patients surgically treated by multiple

Chesapeake Institutional Review Board approved this study (Pro00020921).

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surgeons at a large independent orthopedic group (with more than 100 surgeons) for distal triceps tendon repair from January 2005 to April 2017 was generated using the Current Procedural Terminology (code 24342 for repair of ruptured distal biceps or triceps tendon). Patients were excluded from the study if they had less than 2 months of follow-up unless a major complication or reoperation occurred, if their injury was open, or if they underwent a distal biceps tendon repair. Importantly, patients were also excluded if they underwent distal triceps repair as part of insertional triceps reconstruction for enthesopathic degeneration. Chronic tears that required reconstruction with graft augmentation and revision surgeries were excluded. Traumatic tears that underwent a primary repair in a subacute or even chronic time frame (median 28 days with a range of 2-799 days) were included. Repairs were performed via a single posterior incision.

The primary outcome variable was the development of a major complication, which was defined by the occurrence of at least one of the following: distal triceps tendon rerupture, deep infection requiring operative intervention, major peripheral nerve palsy, clinically significant heterotopic ossification (HO), functional range of motion (ROM) loss treated with surgical intervention (without HO), vascular injury, complex regional pain syndrome, or any other postoperative complication or sequelae that required reoperation. The diagnosis of distal triceps tendon rerupture was made clinically by the treating surgeon and was often with magnetic resonance imaging. Functional loss of ROM with reoperation was separately defined as clinically significant limitation in ulnohumeral motion in the absence of HO on radiographs. Deep infection was defined by the clinical need for operative debridement for infection control.

The secondary outcome measures included specific rates of major complication, clinically relevant minor complications, and rates of reoperation. Minor complications were also recorded and included sensory nerve dysfunction, postoperative cubital tunnel syndrome, symptomatic (painful or ROM limiting) HO without repeat operative intervention, and superficial infection not requiring reoperation. The reasons for reoperation were recorded as an additional secondary outcome measure. Sensory neuritis or numbness was considered to be clinically meaningful (and included) if symptoms persisted beyond 2 postoperative months.

The following variables were tracked as potential confounding variables: patient age, tobacco use history, gender, time from injury to surgery, associated injuries (if any), use of postoperative HO prophylaxis, and postoperative rehabilitation details. The use of and duration of a postoperative rigid immobilization in a nonremoval splint or cast was specifically noted. Subsequent use and duration of hinged elbow brace or removable rigid elbow orthosis were also noted. Particular attention was paid to the restriction of terminal flexion while in a hinged elbow brace and the time of initiation of active elbow extension.

Additional operative findings were tracked as potential predictive variables. Tendon ruptures were classified as either full-thickness tears of the tendon from the proximal ulna vs. partial tears if attenuated or degenerative strands of the triceps tendon remained in continuity with the ulna, as mobilization and scarring of a retracted full-thickness tear may hypothetically predispose patients to a more adverse complication profile. The type of fixation was also recorded, including suture anchor(s) in isolation, suture anchor with the addition of TO bone tunnels, primary suture repair of tendon ends, or repair with TO sutures tied over bone tunnels alone. Revision repairs were documented, and the use of autograft or allograft tendon for reconstruction of a retracted distal triceps tendon was also recorded.

Postoperative rehabilitation was not standardized and followed the preference of the treating surgeon. The distal triceps repair protocol that most surgeons prescribed for postoperative rehabilitation centered on abstaining from active elbow extension for the first 6 postoperative weeks. Under this protocol, passive, tension-free ROM was advanced under physical therapist supervision, often with a brace in place to limit terminal flexion. After 6 weeks of progressive passive ROM exercises, the hinged elbow brace was discontinued, and active-assisted, progressing to active, extension was initiated; resisted active elbow extension was typically initiated 3 months after surgery.

Data were collected and stored in an electronic research database (REDCap). Standard descriptive statistics were calculated and reported, including measures of central tendency (mean/median), variance (standard deviation/interquartile range [IQR]), as well as frequencies and proportions. For bivariate analyses, chi-square or Fisher's exact tests were used for categorical data (eg, complications between groups) to determine statistical differences. For continuous variables (eg, age), a Wilcoxon rank-sum test was used to compare differences between groups. All data were analyzed using SAS Enterprise Guide 9.3 (Cary, NC, USA). Funding for the study was internal and without commercial or industry support. No data safety monitoring was necessary, given the retrospective nature of the study.

Results

In total, 1515 cases were identified during the sample period using the single Current Procedural Terminology code. After excluding distal biceps repairs, 269 distal triceps tears were available for review. Applying the exclusion criteria mentioned previously, a consecutive cohort of 107 primary repairs of acute distal triceps tears was analyzed.

The median age was 50 years at the time of surgery. Ninety-eight percent of patients were male. The median patient follow-up was 4.2 months after surgery (IQR 6.1 months). Patients who were defined as having a major complication were followed for longer, with a median 8.5-month follow-up ($P = .01$). The overall complication rate was 14%, with 17 major complications occurring in 15 patients. There was a 13.1% reoperation rate, with 14 complications occurring among the 107 patients. The indications for reoperation included 9 reruptures (8.4% rate of rerupture), deep infection in 3 patients, and 2 patients defined as other (Table I). There were no documented minor complications observed in our cohort. The method of fixation, whether bone tunnel, suture

Table I
Other variables of interest.

	Total (n = 107)	
	n	%
Triceps tendon rerupture		
No	91	91.0
Yes	9	9.0
Reoperation		
No	93	86.9
Yes	14	13.1
Reoperation indication		
Infection	3	21.4
Other	2	14.3
Tendon rerupture	9	64.3
Reoperation indication other		
Chronic proximal forearm large ganglion cyst, triceps avulsion ossicle	1	50.0
Keloid scar	1	50.0
Major complication		
No	92	86.0
Yes	15	14.0
Minor complication		
No	107	100.0
Yes	–	–

anchors, a combination, or other, was not found to influence the complication ($P = .64$) or rerupture rate ($P = .70$; Table II). The most common method of fixation in our cohort was with bone tunnels (63.5%), and this subset had a 16.2% major complication rate and 14.7% reoperation rate (Table II). Suture anchors were used alone in 13% of our cohort, and a combination of suture anchors and bone tunnels was used in 17.8%. In addition, Table II provides a breakdown of the major complications observed by fixation strategy.

Gender and patient age were not found to correlate with complication or reoperation rate. There were no significant differences in the rate of major complications between the repair of full vs. partial tendon tears ($P = .94$). Current smokers made up 11% of the cohort, and 68% were never tobacco users. With the number of cases available for review, tobacco use was not shown to be a risk factor for developing a complication (Tables III and IV). A postoperative splint was used in 86% of the patients, and a hinged elbow brace after splint removal in 69%. With the number of cases available for review, the use of a splint or hinged elbow brace was not shown in influence major complication ($P = .41$ and $P = .41$, respectively) or rerupture ($P = .33$ and $P = .13$) rates. The splint was removed at a median of 11.0 days (IQR 10.0) and time to first active mobilization began at a median time of 4 weeks (IQR 4.0 weeks). Time to splint removal and first active mobilization were also not risk factors for rerupture or major (Tables III and IV).

When analyzed as a continuous variable, time from injury to surgery nearly reached the set P value cutoff for "significance" in correlating with a major complication (Table IV, $P = .08$) or rerupture (Table III, $P = .06$). Interestingly, this was an inverse trend where the earlier the surgery was performed, the more likely the patient was to have a rerupture or complication. Patients who had a major complication had surgery at a median of 14 days postinjury vs. 30 days for patients with no complication. Patients who had a rerupture underwent surgery at a median of 11 days postinjury vs 30 days for patients without rerupturing. As guided by previous literature, we analyzed time dichotomously as well using a 3-week from injury to surgery cutoff (Tables III and IV). With the number of cases available for analysis when using a 3-week cutoff to dichotomously assign the variable, time from injury to surgery did not correlate with major complications ($P = .19$) and reruptures ($P = .18$).

ROM data were obtained by medical record review on 103 of the 107 patients' operative extremities. Only one patient of the 103 reviewed was defined as having less than functional ROM. The documented median final ROM was 0-140. This was unchanged whether the patient underwent a revision operation, major complication, and/or rerupture.

Discussion

The guidance on the management of traumatic distal triceps ruptures is limited based on the available literature. Factors such as timing of repair and the best repair technique remain unclear, not surprising given the relatively rarity of these injuries.[1,2,7,12,13,19] With the information collected from this large cohort, we hoped to add data to the existing retrospective, observational studies in our literature in an attempt to address 2 important clinical questions: whether timing of surgical repair influences complications and whether there exists an ideal technique of fixation.

The median age of our cohort was 50 years, similar to that reported by Mirzayan et al, but slightly higher than previous reports.[2,7,9,11,12,16,17] Our population was predominantly male, which is consistent with the middle-aged male population most at

Table II
Surgical technique.

	Total (n = 107)	Combination (n = 19)	Drill holes/bone tunnel (n = 68)	Suture anchors (n = 14)	Other (n = 6)	*P* value
Tendon rerupture, n (%)						
No	98 (91.6)	19 (100.0)	60 (88.2)	13 (92.9)	6 (100.0)	
Yes	9 (8.4)	0 (0.0)	8 (11.8)	1 (7.1)	0 (0.0)	.42
Deep infection requiring operative intervention, n (%)						
No	104 (97.2)	18 (94.7)	67 (98.5)	13 (92.9)	6 (100.0)	
Yes	3 (2.8)	1 (5.3)	1 (1.5)	1 (7.1)	0 (0.0)	.36
Pin palsy, n (%)						
No	107 (100.0)	19 (100.0)	68 (100.0)	14 (100.0)	6 (100.0)	
Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
Symptomatic heterotopic ossification, n (%)						
No	107 (100.0)	19 (100.0)	68 (100.0)	14 (100.0)	6 (100.0)	
Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
Loss of range of motion, n (%)						
No	106 (99.1)	19 (100.0)	68 (100.0)	13 (92.9)	6 (100.0)	
Yes	1 (0.9)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	.08
Proximal radioulnar synostosis, n (%)						
No	107 (100.0)	19 (100.0)	68 (100.0)	14 (100.0)	6 (100.0)	
Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
Complex regional pain syndrome, n (%)						
No	107 (100.0)	19 (100.0)	68 (100.0)	14 (100.0)	6 (100.0)	
Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	n/a
Adhesive capsulitis, n (%)						
No	106 (99.1)	19 (100.0)	68 (100.0)	13 (92.9)	6 (100.0)	
Yes	1 (0.9)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	.19
Ulnar nerve injury, n (%)						
No	105 (98.1)	19 (100.0)	67 (98.5)	14 (100.0)	5 (83.3)	
Yes	2 (1.9)	0 (0.0)	1 (1.5)	0 (0.0)	1 (16.7)	.20
Major other complications, n (%)*						
No	106 (99.1)	19 (100.0)	67 (98.5)	14 (100.0)	6 (100.0)	
Yes	1 (0.9)	0 (0.0)	1 (1.5)	0 (0.0)	0 (0.0)	>.99

n/a, not available.
Fifteen patients with 17 major complications (1 patient had 3 major complications [deep infection, loss of range of motion, and adhesive capsulitis]).
*Left median neuropathy at the wrist, carpal tunnel syndrome.

Table III
Distal triceps tendon rerupture.

	Total (n = 107)		Triceps tendon rerupture				*P* value
			No (n = 98)		Yes (n = 9)		
Age at injury, median (IQR)	50.0	(13.0)	50.0	(13.0)	53.0	(14.0)	.88
Age at surgery, median (IQR)	51.0	(13.0)	51.0	(13.0)	53.0	(14.0)	.83
Gender, n (%)							
Female	2	(2.0)	2	(2.2)	0	(0.0)	
Male	98	(98.0)	89	(97.8)	9	(100.0)	>.99
Smoking status, n (%)							
Current	11	(11.0)	11	(12.1)	0	(0.0)	
Former	17	(17.0)	15	(16.5)	2	(22.2)	
Never	68	(68.0)	61	(67.0)	7	(77.8)	
Not available	4	(4.0)	4	(4.4)	0	(0.0)	.81
Splint used, n (%)							
No	14	(13.1)	12	(12.2)	2	(22.2)	
Yes	93	(86.9)	86	(87.8)	7	(77.8)	.33
Splint time in days, median (IQR)	11.0	(10.0)	10.5	(7.0)	19.0	(13.0)	.25
Elbow brace used, n (%)							
No	33	(30.8)	28	(28.6)	5	(55.6)	
Yes	74	(69.2)	70	(71.4)	4	(44.4)	.13
Time to mobilization in weeks, median (IQR)	4.0	(4.0)	4.0	(4.0)	3.5	(1.0)	.43
Suture anchors used, n (%)							
No	74	(69.8)	66	(68.0)	8	(88.9)	
Yes	32	(30.2)	31	(32.0)	1	(11.1)	.27
Number of suture anchors used, n (%)							
Several	1	(3.5)	1	(3.6)	0	(0.0)	
1	14	(48.3)	13	(46.4)	1	(100.0)	
2	9	(31.0)	9	(32.1)	0	(0.0)	
3	3	(10.3)	3	(10.7)	0	(0.0)	
4	2	(6.9)	2	(7.1)	0	(0.0)	>.99
Time from injury to surgery, median (IQR)	28	(60.0)	30	(63.0)	11	(33.0)	.06
Time from injury to surgery, n (%)							
<3 weeks from injury to surgery	47	(44.3)	41	(42.3)	6	(66.7)	
≥3 weeks from injury to surgery	59	(55.7)	56	(57.5)	3	(33.3)	.18
Loss of range of motion, n (%)							
No	106	(99.1)	97	(99.0)	9	(100.0)	
Yes	1	(0.9)	1	(1.0)	0	(0.0)	>.99
Postoperative follow-up, median (IQR)	4.2	(6.1)	4.1	(5.3)	8.5	(12.4)	.07

IQR, interquartile range.

risk for insertional tendon ruptures about the elbow as documented in our previous report.[8]

The median time from injury to surgery in our study was 28 days. The study by Mirzayan et al reported a mean time to surgery of 19 days. Information was not extracted from the database to account for the surgery time difference. This difference could represent more missed or delayed diagnoses, delays in presentation, surgeon-elected delays, or differences in our health systems. Delay between injury and surgery has previously been described as a risk factor for complications after surgery.[6,16,18] Waterman et al noted in their series of 69 patients that patients who had complications underwent surgery at a median of 60 days postinjury vs. 35 days among patients who did not have postsurgical complications.[18] van Riet et al defined chronic injury at 3 weeks from injury to surgery and recommended surgical repair before this.[16] Interestingly, we observed an inverse trend toward statistical significance ($P = .08$), with patients with complications undergoing repair closer to the time of injury, at a median 14 days, than patients without complications, at a median 30 days postinjury. Yet, when the variable was dichotomously assigned around the 3-week time point for analysis based on the reports by van Riet et al, no correlation was demonstrated ($P = .19$).[16] Similar to the report by Mirzayan et al, all tendons within our study were able to be primarily repaired no matter the time frame without allograft augmentation.[14]

Consistent with previous reports, our population undergoing triceps repair for traumatic injuries obtained subjectively excellent postoperative ROM and strength at minimum 2-month follow-up.[2,5,9,11,16,17] This remained true even in the subset of patients that required reoperation, as they also achieved excellent ROM at the final follow-up. The median reported ROM at the final follow-up was 0-140, with only one patient not achieving a full functional arc of motion. It should be noted that our ROM data collected from medical records represent an estimate of the treating physician or physician assistant. A goniometer was not routinely used.

Cadaveric biomechanical testing has demonstrated similar resistance to failure between TO bone tunnel and suture anchors constructs under cyclic loading conditions.[4,20] Petre et al demonstrated that neither of these constructs reaches the mechanical strength of the native tendon.[15] Several smaller studies have reported favorable outcomes using the TO bone tunnel technique,[6,11,16] whereas others report superior outcomes with suture anchor repair.[3,10,16] Despite the TO technique being the traditional gold standard, the use of the suture anchors has become increasingly more common.[14] In our cohort that includes patients from 2007 to 2017, suture anchors were used alone in 13.0% of our patients or in combination with the TO technique in 17.8%. In the report by Mirzayan et al, 40% of their population was repaired with suture anchors, and in their series, they found a higher rerupture rate in the TO tunnel group (6.7%) than in the suture anchor group (0%; $P = .0244$).[14] Correspondingly, the suture anchor group in their study had a lower reoperation rate: 1.4% vs. 9.5% in the TO group.

Our study had a higher overall complication rate (14.0%) and rerupture rate (8.4%) than reported by Mirzayan et al. Yet, these numbers lie within range of what has been previously described at 0%-21%.[2,5,6,9-12,14,16,18] We found that the type of fixation used to

Table IV
Distal triceps major complications.

	Total (n = 107)		Major complications				*P* value
			No (n = 92)		Yes (n = 15)		
Age at injury in years, median (IQR)	50.0	(13.0)	50.0	(12.0)	54.0	(16.0)	.18
Age at surgery in years, median (IQR)	51.0	(13.0)	50.0	(12.0)	54.0	(16.0)	.21
Gender, n (%)							
Female	2	(2.0)	2	(2.2)	–	–	
Male	98	(98.0)	90	(97.8)	15	(100.0)	>.99
Smoking status, n (%)							
Current	11	(11.0)	12	(13.0)	–	–	
Former	17	(17.0)	13	(14.1)	5	(33.3)	
Never	68	(68.0)	63	(68.5)	10	(66.7)	
Not available	4	(4.0)	4	(4.4)	–	–	.18
Splint used, n (%)							
No	14	(13.1)	11	(12.0)	3	(20.0)	
Yes	93	(86.9)	81	(88.0)	12	(80.0)	.41
Splint time in days, median (IQR)	11.0	(10.0)	11.0	(8.0)	11.0	(13.0)	.63
Elbow brace used, n (%)							
No	33	(30.8)	27	(29.4)	6	(40.0)	
Yes	74	(69.2)	65	(70.7)	9	(60.0)	.41
Time to mobilization in weeks, median (IQR)	4.0	(4.0)	4.0	(4.0)	3.0	(2.5)	.06
Suture anchors used, n (%)							
No	74	(69.8)	62	(68.1)	12	(80.0)	
Yes	32	(30.2)	29	(31.9)	3	(20.0)	.55
Number of suture anchors used, n (%)							
Several	1	(3.5)	1	(3.9)	–	–	
1	14	(48.3)	12	(46.2)	2	(66.7)	
2	9	(31.0)	9	(34.6)	–	–	
3	3	(10.3)	2	(7.7)	1	(33.3)	
4	2	(6.9)	2	(7.7)	–	–	.44
Time from injury to surgery in days, median (IQR)	28	(60.0)	30	(66.0)	14	(33.0)	.08
Time from injury to surgery, n (%)							
<3 weeks from injury to surgery	47	(44.3)	38	(41.8)	9	(60.0)	
≥3 weeks from injury to surgery	59	(55.7)	53	(58.2)	6	(40.0)	.19
Loss of range of motion, n (%)							
No	106	(99.1)	92	(100.0)	14	(93.3)	
Yes	1	(0.9)	–	–	1	(6.7)	.14
Postoperative follow-up in months, median (IQR)	4.2	(6.1)	4.0	(3.8)	8.5	(16.7)	.01
Full vs. partial tendon tear, n (%)							
Full	58	(54.2)	50	(54.4)	8	(53.3)	.94
Partial	49	(45.8)	42	(45.7)	7	(46.7)	

IQR, interquartile range.

repair the triceps tendon did not influence major complications, reoperation, or rerupture rate. A difference in our study that has not been previously explored in a comparative study was the 19 patients (17.8%) that had a combination of suture anchors and TO sutures used. The only other series to our knowledge to evaluate a combination technique was Kokkalis et al, who reported on 11 patients and had 0% rerupture at a mean of 21-month follow-up.

There have been a number of series that have analyzed patient outcomes and complications recently. Waterman et al reviewed 69 patients who underwent distal triceps repair with a minimum of 1-year follow-up, 18 of which had preexisting enthesopathy.[18] Similar to our study, they found that surgical technique did not influence complication rate; in addition, they found that patient-reported outcomes were similarly high regardless of repair technique.[18] Dunn et al and Balasz et al reported on the active-duty military population, which likely has a higher functional demand than our general population but found a similar rerupture rate (11%)[2] and a high rate of return to active duty.[5] Giannicola et al reported on results from a more general population including 28 patients with an average age of 45 years who achieved good strength, ROM, and patient-reported outcomes. Only one of their 28 patients had a rerupture.[9] Horneff et al compared TO bone tunnels with suture anchor constructs and suggested that suture anchor repair is associated with superior DASH scores relative to repair. Their study included 56 patients, all male, with 41.1% suture anchors used and had a 7% rerupture rate.[10]

Our study has limitations. The review was retrospective, included multiple different treating surgeons, spanned over a decade, and included nonstandardized surgical techniques and postoperative rehabilitation. Although these factors make our series more generalizable, they limit the ability to assess for confounding variance within the study population. Also, our review did not include assessment of patient-reported outcome measures and is limited to the evaluation of complications. This also limits the strength and functional data we could obtain from the electronic medical record. In addition, we did not assess for or report on mechanism of injury, ethnicity, or workers' compensation claim status. These factors may have an influence on patient-reported outcomes, but we feel that they would have little impact on major complication or reoperation rates.

Several strengths of the study substantiate our findings. First, we comprehensively collected demographic and operative data through a single medical record system for the entire cohort. In addition, this is a large, consecutive series—it is only the second series in the literature with more than 100 patients. Importantly, many surgeons performed the cases reported in this series across a large orthopedic group rather than within a subspecialty-only service line, making the results more generalizable. Finally, we comprehensively reported our complication rate, which is higher than most of the previously described literature.

Conclusions

This study adds a large cohort of patients to the available traumatic distal triceps injury literature. The rates of major complications (14%), reoperations (13.1%), and reruptures (8.4%) are slightly higher than previously described in the literature. The type of fixation, TO bone tunnels vs. suture anchors vs. a combination, was not found to influence the rates of major complications or rerupture. There was no difference in complication rates in patients who underwent surgery before or after the previously described 3-week postinjury time point.

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