A Survey on Management of Chronic Achilles Tendon Ruptures

Arturo D. Villarreal, BS, Clark R. Andersen, BS, and Vinod K. Panchbhavi, MD

Abstract

No controlled trials regarding management of chronic Achilles tendon ruptures have been published. We conducted an online survey of orthopedic surgeons affiliated with US medical schools.

One hundred twenty-seven surgeons responded, but not all responded to each survey question. Thirty-six percent had foot and ankle fellowship training. Nearly all respondents diagnosed tendon rupture by using palpation of the tendon gap (97%) and the Thompson calf-squeeze test (96%). The Matles test was used by 37% of respondents, with foot and ankle specialists nearly 5 times more likely to use it than nonspecialists ($P<.001$). For surgical repair of a ruptured tendon, most surgeons used the end-to-end Bunnell technique for gaps of a few centimeters, transitioning to the flexor hallucis longus procedure or V-Y tendinoplasty for larger gaps. Ninety-three percent of respondents used nonabsorbable sutures; absorbable suture use tended to increase with years of practice. Most surgeons (72%) preferred postoperative immobilization for up to 6 weeks and non–weight-bearing for up to 6 weeks (96%).

In most instances, the responses of foot and ankle specialists did not differ significantly from those of other orthopedic surgeons, allowing generalization of the survey results to practice trends among all orthopedic surgeons. Practice trends tended to follow published expert opinions.

Mr. Villarreal is Medical Student, Mr. Andersen is Clinical Scientist, and Dr. Panchbhavi is Professor of Orthopedic Surgery, Department of Orthopedic Surgery and Rehabilitation, University of Texas Medical Branch, Galveston, Texas.

Address correspondence to: Vinod K. Panchbhavi, MD, Department of Orthopedic Surgery and Rehabilitation, University of Texas Medical Branch, 301 University Blvd, Galveston, TX 77555-0165 (tel, 281-334-0620; fax, 281-334-0657; e-mail, vkpanchb@utmb.edu).

Am J Orthop. 2012;41(3):126-131.

The Achilles tendon is among the most commonly ruptured tendons in the human body.[1,2] The incidence of Achilles tendon ruptures was estimated to be as high as 18 in 100,000 in Oulu, Finland, with most occurring in men 30 to 39 years old.[3,4] The diagnosis of chronic Achilles rupture may be complicated by a lack of pain and swelling, and the filling of the tendon gap by fibrous tissue.[5,6] Weak plantar flexion may also remain, with the intact functions of the tibialis posterior, flexor hallucis longus, flexor digitorum longus, and peroneal muscles further complicating diagnosis.[7] Retraction of the proximal Achilles tendon occurs with chronic ruptures and leads to a decrease in the biomechanical efficiency and contractile force the muscle can develop; management options differ from those for acute ruptures.[7,8]

Many authors have proposed physical examination techniques for the diagnosis of Achilles tendon ruptures.[9-13] However, no studies have been conducted to compare examination techniques. Imaging techniques that can aid in the diagnosis of ruptures include lateral radiographs, high-resolution ultrasonography, and magnetic resonance imaging (MRI).[7,14] Numerous surgical options have been described, including tendon and fasciocutaneous flaps, tendon transfers, free autogenous muscle and fascia lata flaps and grafts, tendon and fascia lata allografts, use of allogenic tissues, and use of synthetic materials in tendon reconstruction.[15] However, no controlled studies have been conducted to compare surgical options. Multiple management algorithms based on tendon gap size have been proposed.[7,16-18] These algorithms are not standardized with respect to gap measurement and represent expert opinion.[19] In addition, studies focused on postoperative management of these ruptures have not been conducted.[7]

We conducted an online survey to gauge current orthopedic surgeon practices and preferences in managing chronic Achilles tendon ruptures. Our aim is to guide efforts to study management techniques.

Methods

The survey was developed using demographic questions modified from those used by Bhandari and colleagues[20] and questions focusing on aspects of management of chronic ruptures, including preferred surgical technique, type and duration of immobilization, and duration of non–weight-bearing (Figure 1). E-mail addresses of orthopedic surgeons were gathered from public databases at medical school websites. The specialties of orthopedic surgeons were noted, when possible, so that we could avoid sending the survey to surgeons who did not manage this injury. Orthopedic surgeons were sent an e-mail that included the link to the survey at the website

1. Tests used for definitive diagnosis of Achilles tendon rupture: (Check all that apply)

- ❍ Palpation of tendon gap
- ❍ Thompson calf-squeeze test
- ❍ Matles test—patient lying prone with knees flexed 90°
- ❍ O'Brien needle test—patient lying prone with needle inserted in substance of tendon and plantar/dorsiflexion performed by examiner
- ❍ Copeland sphygmomanometer test—with patient lying prone and foot plantar flexed, sphygmomanometer is placed around calf and inflated with examiner performing dorsiflexion to check for pressure change
- ❍ Lateral radiographs
- ❍ High-resolution ultrasonography
- ❍ Magnetic resonance imaging
- ❍ Other (please specify)

2. Operating techniques for ruptures of these sizes include:

Technique	Rupture Size, cm					
	<2	2-3	3-4	4-5	5-6	>6
End-to-end Bunnell	❍	❍	❍	❍	❍	❍
End-to-end plantaris (Lynn open fan)	❍	❍	❍	❍	❍	❍
Peroneus brevis	❍	❍	❍	❍	❍	❍
Flexor digitorum longus	❍	❍	❍	❍	❍	❍
Prosthetic graft	❍	❍	❍	❍	❍	❍
Flexor hallucis longus	❍	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍	❍

3. Duration of postoperative immobilization for repaired tendons:

- ❍ 0-3 weeks
- ❍ 4-6 weeks
- ❍ 7-10 weeks
- ❍ 11+ weeks

4. Type of immobilization, if any:

- ❍ None
- ❍ Above knee
- ❍ Back slab
- ❍ Below knee
- ❍ Front slab
- ❍ Walking boot orthosis
- ❍ Bivalve cast
- ❍ Other (please specify)

5. Suture material used for repair:

- ❍ Absorbable
- ❍ Nonabsorbable

6. Postoperative weight-bearing protocol:

- ❍ Immediate weight-bearing
- ❍ Non–weight-bearing for 0-3 weeks
- ❍ Non–weight-bearing for 4-6 weeks
- ❍ Non–weight-bearing for 7-10 weeks
- ❍ Non–weight-bearing for 11+ weeks

7. Years in practice:

- ❍ <5
- ❍ 5-9
- ❍ 0-14
- ❍ 15-25
- ❍ 26+

8. Work setting:

- ❍ Academic
- ❍ Nonacademic

9. Completed fellowship training in foot and ankle surgery:

- ❍ Yes
- ❍ No

10. Number of patients with chronic Achilles tendon ruptures you treat per year:

- ❍ <5
- ❍ 5-15
- ❍ 16-25
- ❍ >25

Figure 1. Survey questions.

http://www.surveymonkey.com. As many as 2 follow-up e-mails were sent to all nonrespondents at 2- to 3-month intervals. Data collected were categorical, and therefore, summarized as numbers and percentages of respondents with 95% Agresti-Coull confidence intervals (CIs). Logistic regression analysis was performed to determine if foot and ankle fellowship–trained surgeons had practice trends different from those of other orthopedic surgeons and to explore relationships between practice techniques and number of years in practice.

Results

Surveys were sent to 915 orthopedic surgeons' e-mail accounts; 194 accounts were immediately flagged as inactive. Another 142 accounts were later found to belong to surgeons (spine, hand, oncology, etc.) who did not manage Achilles tendon ruptures; these surgeons were excluded from our calculations. The response rate for the remaining surgeons was 22% (127/579). Not all respondents answered all questions. Participation in a foot and ankle fellowship was indicated by 36% (45/125) of respondents. Respondents' characteristics are summarized in Table I.

Almost half of the respondents (49%, 62/127) had practiced for 15 years or more. Significant relationships were found between fellowship attendance and 10 to 14 years in practice ($P = .0315$), and 15 to 25 years in practice ($P = .0017$); no significant relationship was found for the other choices ($P > .06$). Fellowship attendees' odds of practicing for 10 to 14 years were 4.0 times nonattendees' odds (CI, 1.1-14.1). Likewise, attendees' odds of practicing for 15 to 25 years were 6.8 times nonattendees' odds (CI, 2.1-22.6).

No significant difference was found between fellowship attendance and work setting ($P = .68$). Most surgeons (92%, 117/127) worked in academic practice.

Most respondents (63%, 80/126) reported managing fewer than 5

Table I. Respondent Characteristics

	Respondents		
	n	% (CI–, CI+)	Fellowship[a]
Years in Practice			
<5	22	17 (12, 25)	5/21
5-9	20	16 (10, 23)	8/20
10-14	23	18 (12, 26)	10/23
15-25	30	24 (17, 32)	17/30
26+	32	25 (18, 34)	5/31
Total no. of respondents	127	—	—
Work Setting			
Academic	117	92 (86, 96)	42/115
Nonacademic	10	8 (4, 14)	3/10
Total no. of respondents	127	—	—
No. of Ruptures Managed per Year			
<5	80	64 (55, 71)	18/79
5-15	42	33 (26, 42)	24/42
16-25	1	1 (0, 5)	0/1
>25	3	2 (1, 7)	3/3
Total no. of respondents	126	—	—
Foot and Ankle Fellowship			
Yes	45	36 (86, 96)	45/45
Total no. of respondents	125	—	—

Abbreviation: CI, 95% confidence interval.
[a]No. of respondents who completed foot and ankle fellowship/responded to question.

chronic Achilles tendon ruptures per year, and most of the other respondents (33%, 42/126) reported managing 5 to 15 ruptures. Fellowship attendance was significantly related to the number of ruptures managed per year, with fellowship attendees' odds of managing 5 or more ruptures being 4.9 times nonattendees' odds (CI, 2.2-10.8).

The great majority of respondents established the definitive diagnosis of Achilles tendon rupture (Table II) by using palpation of the tendon gap (97%, 122/126) or the Thompson calf-squeeze test (96%, 121/126). The third most used test for diagnosis was MRI (71%, 89/126). Of the questionnaire-specified diagnostic tests, only the Matles test was associated with significant differences based on fellowship attendance ($P<.001$). The Matles test was used by 37% (46/126) of all respondents, and fellowship attendees' odds of reporting use of the Matles test were 4.6 times nonattendees' odds (CI, 2.0-10.9). There was no difference owing to fellowship attendance for any other test ($P>.08$).

Respondents' operating techniques for ruptures over a range of gap sizes are listed in Table III. For smaller gaps, the end-to-end Bunnell technique was most commonly used: 79% (98/124) of respondents used; this method for gaps smaller than 2 cm. For larger gaps, the flexor hallucis longus technique and the V-Y tendinoplasty were more commonly used, with 36% (45/124) and 23% (28/124) of respondents, respectively, using these techniques for gaps larger than 6 cm. The bubble plot in Figure 2 reinforces these trends. Use of the flexor hallucis longus technique for tendon gaps larger than 6 cm was significantly different

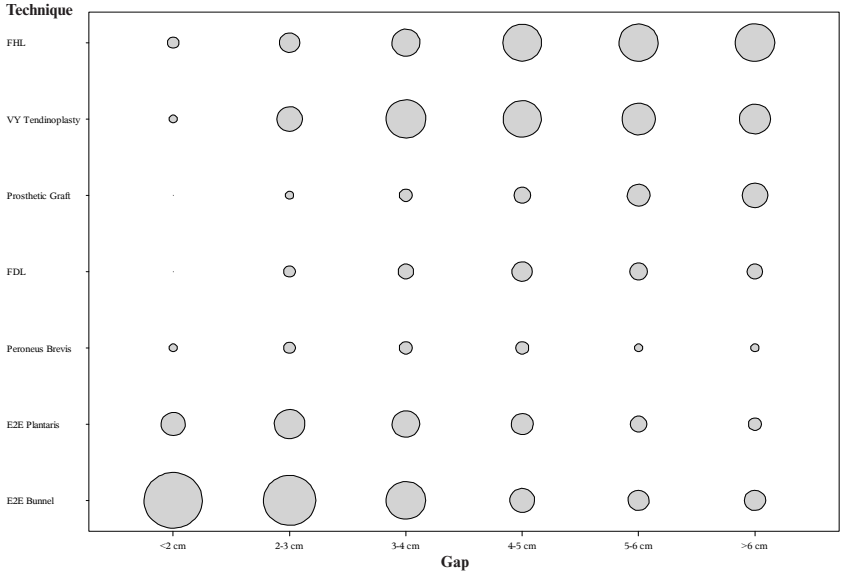

Figure 2. Bubble plot of surgical techniques used for particular gap sizes. Areas of circles are proportional to percentage of respondents for each combination of gap size and surgical technique. Use of end-to-end Bunnell technique is most common with smaller gaps and decreases with larger gaps, whereas opposite trend occurs for flexor hallucis longus technique and V-Y tendinoplasty.

between fellowship attendees and nonattendees (P = .003), though no differences were found for other gap sizes or other methods (P>.09). Fellowship attendees' odds of using the flexor hallucis longus technique for gaps larger than 6 cm were 8.8 times nonattendees' odds (CI, 2.1-36.9).

Most surgeons used nonabsorbable sutures (93%, 115/123; CI, 87%-97%). No significant difference in suture type was found between fellowship attendees and nonattendees (P = .29). A significant relationship was found between use of absorbable sutures and years in practice (P = .027), where, for each category increase in years of practice, the odds of using absorbable sutures increased by a factor of 2.0 (CI, 1.1-3.7).

Responses for postoperative duration and type of immobilization and

Table II. Tests Used for Definitive Diagnosis of Achilles Tendon Rupture

Definitive Diagnostic Test	Respondents		Fellowship[a]
	n	% (CI–, CI+)	
Palpation of tendon gap	122	97 (92, 99)	43/120
Thompson calf-squeeze test	121	96 (91, 99)	42/119
Matles test (prone, knees 90°)	46	37 (29, 45)	25/46
O'Brien needle test	2	2 (0, 6)	0/2
Copeland sphygmomanometer test	1	1 (0, 5)	0/1
Lateral radiographs	26	21 (15, 29)	5/25
High-resolution ultrasonography	29	23 (17, 31)	8/28
Magnetic resonance imaging	89	71 (62, 78)	28/87
Other	6	5 (2, 10)	4/6
Total no. of respondents	126	—	—

Abbreviation: CI, 95% confidence interval.
[a]No. of respondents who completed foot and ankle fellowship/responded to question.

Table III. Operating Techniques for Ruptures of Specified Sizes[a]

Technique[b]	Rupture Size, cm						Total No. of Respondents
	<2	2-3	3-4	4-5	5-6	>6	
E2E Bunnell							
n	98	79	45	18	3	13	103
% (CI–, CI+)	79 (71, 85)	64 (55, 72)	36 (28, 45)	15 (9, 22)	11 (6, 17)	11 (6, 17)	
Fellowship	32/96	23/78	16/45	7/18	5/8	5/8	
E2E Plantaris							
n	17	27	22	14	8	5	46
% (CI–, CI+)	14 (9, 21)	22 (15, 30)	18 (12, 26)	11 (7, 18)	7 (3, 13)	4 (2, 9)	
Fellowship	7/17	6/26	3/21	3/14	2/8	1/5	
Peroneus Brevis							
n	2	4	5	5	2	2	10
% (CI–, CI+)	2 (0, 6)	3 (1, 8)	4 (2, 9)	4 (2, 9)	2 (0, 6)	2 (0, 6)	
Fellowship	1/2	1/4	1/5	0/5	0/2	0/2	
Flexor Digitorum Longus							
n	0	4	7	12	9	7	19
% (CI–, CI+)	0 (0, 4)	3 (1, 8)	6 (3, 12)	10 (6, 16)	7 (4, 13)	6 (3, 12)	
Fellowship	0/0	1/4	2/7	4/12	3/9	3/7	
V-Y Tendinoplasty							
n	2	19	46	42	32	28	77
% (CI–, CI+)	2 (0, 6)	15 (10, 23)	37 (29, 46)	34 (26, 43)	26 (19, 34)	23 (16, 31)	
Fellowship	1/2	7/19	20/45	18/41	13/32	12/28	
Prosthetic Graft							
n	0	2	5	8	15	19	25
% (CI–, CI+)	0 (0, 4)	2 (0, 6)	4 (2, 9)	7 (3, 13)	12 (7, 19)	15 (10, 23)	
Fellowship	0/0	1/2	2/5	4/8	7/15	7/12	
Flexor Hallucis Longus							
n	4	12	23	43	44	45	63
% (CI–, CI+)	3 (1, 8)	10 (6, 16)	19 (13, 26)	35 (27, 43)	36 (28, 44)	36 (28, 45)	
Fellowship	4/4	8/11	13/23	27/43	28/44	31/45	
Other	—	—	—	—	—	—	42

Abbreviations: CI, 95% confidence interval, E2E, end-to-end.
[a]Total no. of respondents for this question: 124.
[b]Fellowship rows: no. of respondents who completed foot and ankle followship/responded to question.

Table IV. Duration and Type of Postoperative Immobilization, and Postoperative Weight-Bearing Protocol (Questions Allowed for More Than 1 Response)

	Respondents		
	n	% (CI–, CI+)	Fellowship[a]
Immobilization Duration, wk			
0-3	37	30 (23, 38)	13/37
4-6	52	42 (34, 51)	17/50
7-10	29	23 (17, 32)	9/29
11+	6	5 (2, 10)	5/6
Total no. of respondents	124	—	—
Immobilization Type			
None	0	0 (0, 4)	0/0
Above knee	2	2 (0, 6)	0/2
Back slab	8	6 (3, 12)	2/7
Below knee	57	46 (37, 54)	25/57
Front slab	5	4 (2, 9)	1/5
Walking boot orthosis	44	35 (27, 44)	12/43
Bivalve cast	3	2 (1, 7)	0/3
Other	15	12 (7, 19)	12/15
Total no. of respondents	125	—	—
Postoperative Weight-Bearing Protocol			
Immediate weight-bearing	13	11 (6, 17)	2/13
Non–weight-bearing, wk			
0-3	53	43 (35, 52)	21/52
4-6	52	42 (34, 51)	21/51
7-10	8	7 (3, 13)	4/8
11+	3	2 (1, 7)	2/3
Total no. of respondents	123	—	—

Abbreviation: CI, 95% confidence interval.
[a]No. of respondents who completed foot and ankle fellowship/responded to question.

weight-bearing protocol are listed in Table IV. The largest percentage of surgeons (42%, 52/124) used immobilization for 4 to 6 weeks, closely followed by 0 to 3 weeks (30%, 37/124) and 7 to 10 weeks (23%, 29/124). Immobilization of 11 or more weeks was uncommon (5%, 6/124). No difference in duration of postoperative immobilization was found between fellowship attendees and nonattendees ($P = .20$).

Below-knee immobilization (46%, 57/125) and walking boot orthosis (35%, 44/125) were the most common types of immobilization. Only the "other" response showed a significant difference between fellowship attendees and nonattendees ($P = .008$), where attendees' odds of choosing an unlisted technique were 10.5 times nonattendees' odds (CI, 1.9-59.0). Many of the "other" responses included mention of some form of casting followed by a boot. There was no significant relationship between fellowship attendance and any other technique used ($P>.4$).

Most respondents selected a postoperative non–weight-bearing protocol of either 0 to 3 weeks (43%, 53/123) or 4 to 6 weeks (42%, 52/123). There was no significant relationship between fellowship attendance and postoperative weight-bearing protocol ($P = .14$).

Discussion

The large majority of surgeons used palpation of the tendon gap and the Thompson calf-squeeze test to diagnose ruptures. Very few surgeons used the Copeland sphygmomanometer test or the O'Brien needle test. The Matles test was the only diagnostic test that was used significantly more by fellowship attendees. Nonuse of the Copeland and O'Brien tests may be attributed to the extra equipment required for these tests, along with their lower sensitivity.[5] The Thompson calf-squeeze and Matles tests are both significantly more sensitive than the other physical examination maneuvers listed in Table II.[5] In some patients, the Achilles tendon tear may heal in the absence of intervention, causing no observable or palpable tendon gap along with dubious findings on calf-squeeze testing.[7] In these patients, push-off ability remains markedly decreased, and the Matles test remains positive.[7] However, when any 2 physical examination maneuvers are positive, complete rupture of the tendon is assured.[5]

A large proportion of respondents (71%, 89/126) also used MRI for diagnosis, while much fewer residents used high-resolution ultrasonography (23%, 29/126) or lateral radiographs (21%, 26/126). MRI can show in detail the ends of the ruptured tendons and allow estimation of gap size between ruptured ends.[7,19] Although high-resolution ultrasonography can be more rapid and inexpensive, it is also very user-dependent.[7]

The preference of all surgeons for end-to-end techniques for

smaller rupture gaps is consistent with other authors' recommendations.[7,16-18] The Bunnell stitch is still the "gold standard," which explains its preferential use by surgeons.[21] The technique carries the disadvantages of a larger approach (vs other strategies), a complex and complicated suture technique, and compromise the microcirculation because of transverse compression of the tendon.[21] The significant difference between fellowship attendees and nonattendees in choosing the flexor hallucis longus technique for gaps larger than 6 cm may indicate that rupture gaps of these sizes are more often referred to foot and ankle specialists. The flexor hallucis longus technique has the advantages of being longer and more durable than other tendon transfer candidates, and the axis of the flexor hallucis longus contraction resembles that of the Achilles tendon and fires in phase with the gastrocnemius–soleus complex.[7] The operative technique is also easier because there is no need to open other compartments or disturb the neurovascular bundle and the muscle belly aids in providing vascular supply to the distal Achilles tendon stump.[7] However, the weakness in the hallux may cause athletic patients difficulty in sprinting, owing to loss of push-off strength.[22]

To our knowledge, no investigators have examined duration or type of immobilization after repair. However, a meta-analysis of postoperative rehabilitation protocols indicated that shorter immobilization was associated with more patient satisfaction without increasing rerupture or infection rates.[23] This is consistent with our finding that the large majority of surgeons (72%, 89/124) preferred immobilization of less than 6 weeks. The popularity of below-knee immobilization is consistent with published recommendations. However, included in these recommendations is the use of a lower leg anterior splint after 2 weeks.[7]

The consensus (96%, 118/123) for weight-bearing of less than 6 weeks is consistent with recommendations for postoperative protocols.[7,23]

A limitation of this study is its relatively low response rate (22%), even though its absolute number is larger than that of another published survey on acute Achilles tendon ruptures (53 respondents, similar response rate).[24] Possible causes of this low response rate include outdated e-mail listings, lack of surgeon familiarity with the Internet, and categorization of the survey as junk e-mail or spam.[25] While most respondents (64%) managed fewer than 5 chronic ruptures per year, this finding likely reflects the majority of practices, as chronic ruptures are not very common. Another study limitation is that very few nonacademic surgeons were surveyed.

Our survey represents a good sampling of surgeons who manage Achilles tendon ruptures. As very few responses differed significantly by foot and ankle fellowship status, the results may be generalized in an academic setting to reflect current standards of management for these injuries.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

References

1. Maffulli N. Rupture of the Achilles tendon. *J Bone Joint Surg Am*. 1999;81(7):1019-1036.
2. Pérez-Teuffer A. Traumatic rupture of the Achilles tendon. Reconstruction by transplant and graft using the lateral peroneus brevis. *Orthop Clin North Am*. 1974;5(1):89-93.
3. Leppilahti J, Puranen J, Orava S. Incidence of Achilles tendon rupture. *Acta Orthop Scand*. 1996;67(3):277-279.
4. Ballas MT, Tytko J, Mannarino F. Commonly missed orthopedic problems. *Am Fam Physician*. 1998;57(2):267-274.
5. Maffulli N. The clinical diagnosis of subcutaneous tear of the Achilles tendon. A prospective study in 174 patients. *Am J Sports Med*. 1998;26(2):266-270.
6. Nestorson J, Movin T, Möller M, Karlsson J. Function after Achilles tendon rupture in the elderly: 25 patients older than 65 years followed for 3 years. *Acta Orthop Scand*. 2000;71(1):64-68.
7. Maffuli N, Ajis A. Management of chronic ruptures of the Achilles tendon. *J Bone Joint Surg Am*. 2008;90(6):1348-1360.
8. Maffulli N, Ajis A, Longo UG, Denaro V. Chronic rupture of tendo Achillis. *Foot Ankle Clin*. 2007;12(4):583-596.
9. Copeland SA. Rupture of the Achilles tendon: a new clinical test. *Ann R Coll Surg Engl*. 1990;72(4):270-271.
10. Matles AL. Rupture of the tendo Achilles. Another diagnostic sign. *Bull Hosp Joint Dis*. 1975;36(1):48-51.
11. O'Brien T. The needle test for complete rupture of the Achilles tendon. *J Bone Joint Surg Am*. 1984;66(7):1099-1101.
12. Simmonds FA. The diagnosis of the ruptured Achilles tendon. *Practitioner*. 1957;179(1069):56-58.
13. Thompson TC, Doherty JH. Spontaneous rupture of tendon of Achilles: a new clinical diagnostic test. *J Trauma*. 1962;2:126-129.
14. Kabbani YM, Mayer DP. Magnetic resonance imaging of tendon pathology about the foot and ankle. Part I. Achilles tendon. *J Am Podiatr Med Assoc*. 1993;83(7):418-420.
15. Ibrahim SA. Surgical treatment of chronic Achilles tendon rupture. *J Foot Ankle Surg*. 2009;48(3):340-346.
16. Den Hartog BD. Surgical strategies: delayed diagnosis or neglected Achilles' tendon ruptures. *Foot Ankle Int*. 2008;29(4):456-463.
17. Kuwada GT. Classification of tendo Achillis rupture with consideration of surgical repair techniques. *J Foot Surg*. 1990;29(4):361-365.
18. Myerson MS. Achilles tendon ruptures. *Instr Course Lect*. 1999;48:219-230.
19. Padanilam TG. Chronic Achilles tendon ruptures. *Foot Ankle Clin*. 2009;14(4):711-728.
20. Bhandari M, Devereaux PJ, Tornetta P III, et al. Operative management of displaced femoral neck fractures in elderly patients. An international survey. *J Bone Joint Surg Am*. 2005;87(9):2122-2130.
21. Herbort M, Haber A, Zantop T, et al. Biomechanical comparison of the primary stability of suturing Achilles tendon rupture: a cadaver study of Bunnell and Kessler techniques under cyclic loading conditions. *Arch Orthop Trauma Surg*. 2008;128(11):1273-1277.
22. McClelland D, Maffulli N. Neglected rupture of the Achilles tendon: reconstruction with peroneus brevis tendon transfer. *Surgeon*. 2004;2(4):209-213.
23. Suchak AA, Spooner C, Reid DC, Jomha NM. Postoperative rehabilitation protocols for Achilles tendon ruptures: a meta-analysis. *Clin Orthop*. 2006;(445):216-221.
24. Worth N, Ghosh S, Maffulli N. Management of acute Achilles tendon ruptures in the United Kingdom. *J Orthop Surg (Hong Kong)*. 2007;15(3):311-314.
25. Sprague S, Quigley L, Bhandari M. Survey design in orthopaedic surgery: getting surgeons to respond. *J Bone Joint Surg Am*. 2009;91(suppl 3):27-34.

Erratum

In the article, "Infrapatellar Branch of Saphenous Neurectomy for Painful Neuroma: A Case Report" by Joseph J. Fazalare, MD, Joshua D. Harris, MD, and David C. Flanigan, MD, published in *Am J Orthop.* 2012;41(1):37-40, Dr. Michael J. Griesser, MD, was not listed among the authors. The correct order of the authors is Joseph J. Fazalare, MD, Joshua D. Harris, MD, Michael J. Griesser, MD, and David C. Flanigan, MD.