COA- Achilles Tendon Ruptures



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No Disclosures





"I don't get nothing from nobody, including my wife."

-Bill Hamilton





Achilles Rupture





Response to Injury

"...this tendon (Achilles), if
bruised or cut,
causes the most acute fevers, induces choking, deranges the
mind and at length
brings death."

-Hippocrates





Achilles Anatomy

- Spirals 90 degrees
- Collagen I and Elastin
- Surrounded by paratenon





Achilles Anatomy Blood Supply

- Musculotendinous junction
- Bone-Tendon junction
- Paratenon
- Anterior vascular bed





Achilles Anatomy Blood Supply

- Relative avascular zone between 2cm and 6cm proximal to the tendon insertion
- "Watershed Zone"





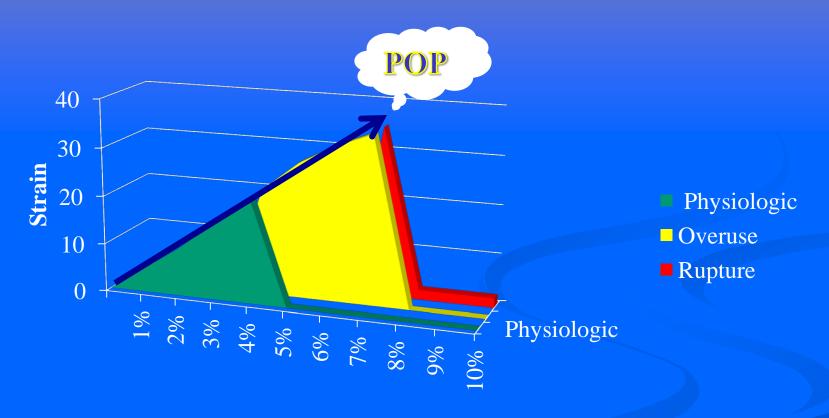
Achilles Peak Forces

12.5 X body weight





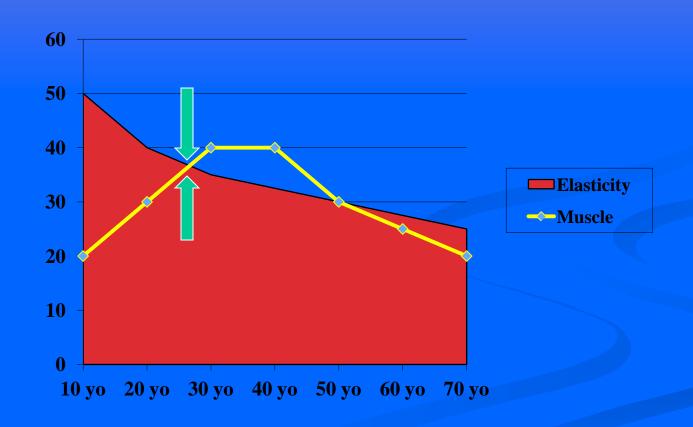
Length and What Happens







Muscle Force / Elasticity Mismatch







Achilles Exam

- Thompson Test
- Palpable Defect
- Contralateral Sag
- STAMP- STand And Maintain Plantarflexion





Achilles Rupture Treatment Goals

- Normal Resting Length
- Minimal Complications
- Get the Ends to Touch and Stay Touching
- Avoid Re-rupture
- Avoid Infection





Achilles Rupture Treatment Options

- Open Treatment
- Cast / Dynamic Brace
- Percutaneous
- Minimally invasive





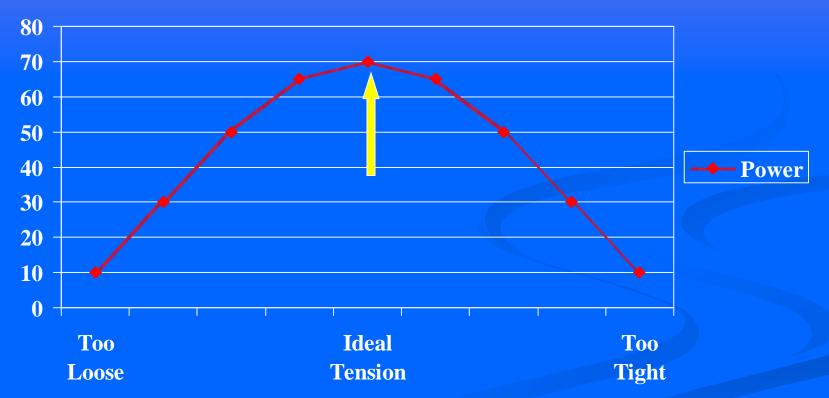
Achilles Tendon Infection is a LIFE changing event

Sterile Technique Similar To Total Joint Arthroplasty





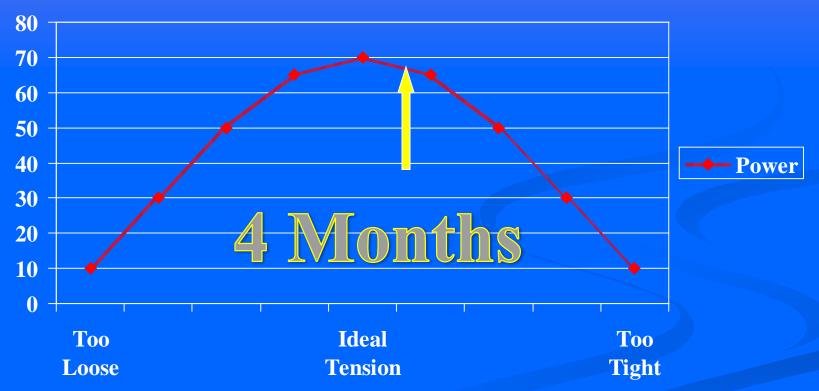
Blick's Resting Tension Curve







Blick's Resting Tension Curve Target Operative Tension





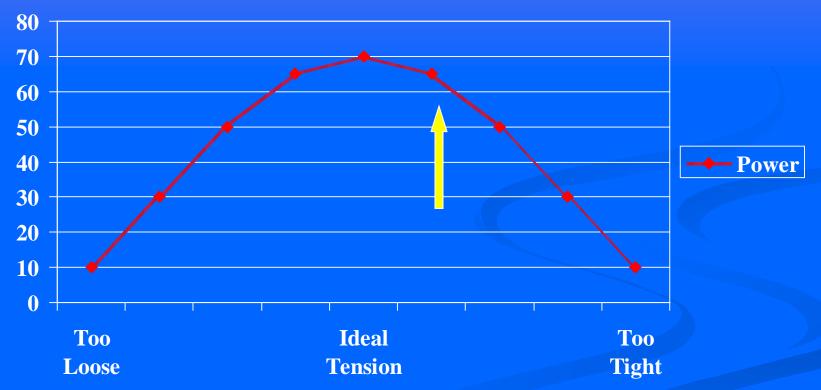








Blick's Resting Tension Curve Target Operative Tension













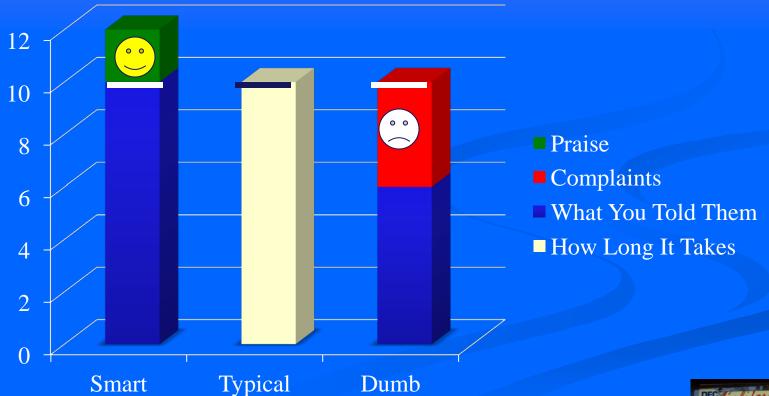
Achilles Rupture Treatment Options

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Expectation Management 1 Year









From: Treatment of Acute Achilles Tendon Ruptures: A Meta-Analysis of Randomized, Controlled Trials

J Bone Joint Surg Am. 2005;87(10):2202-2210. doi:10.2106/JBJS.D.03049

Open vs.Closed Overall Complications

Study or subcategory	Open operative n/N	Nonoperative n/N			RR (fixed			Weight %	RR (fixed) 95% CI
Nistor 1981 Cetti 1993 Schroeder 1997 Moller 2001 Total n/N (95% CI) Total events: 59 (Open operative		0/60 3/55 0/15 2/53 5/183				-	; ;	7.13 50.19 7.74 34.94	83.54 [5.25, 1329.75] 5.24 [1.62, 16.97] 5.71 [0.30, 109.22] 4.49 [1.03, 19.58] 10.60 [4.82, 23.28]
Test for heterogeneity: Chi ² = 4.9									
Test for overall effect: Z = 5.88 (F	P < 0.00001)		_						
			0.01	0.1	1	10	100)	
			Favors open s	urgery		Favors no s	surgery		

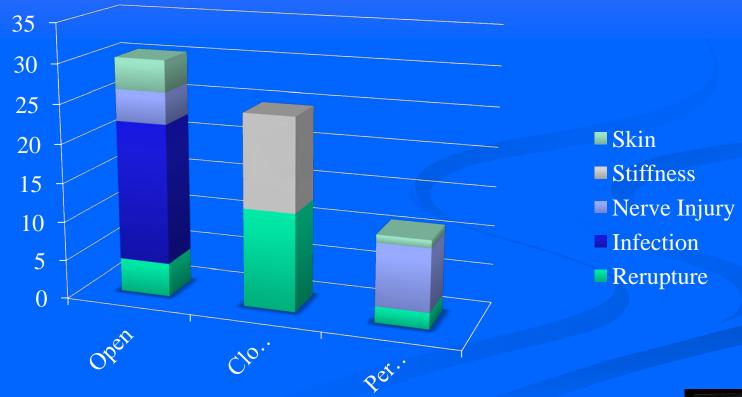


Favors Non Operative





Meta Analysis Achilles Rx Khan et al, JBJS 2005









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Open Vs. Closed Rerupture

Study or subcategory	Open operative n/N	Nonoperative n/N		RR (fixed) 95% CI		
Nistor 1981 Cetti 1993 Schroeder 1997 Moller 2001	2/45 3/56 0/13 1/59	5/60 7/55 0/15 11/53	_	-	18. 30.	79 0.42 [0.11, 1.54] Not estimable
Total n/N (95% CI) Total events: 6 (Open operative), Test for heterogeneity: Chi ² = 2.50 Test for overall effect Z = 2.99 (P	0, df = 2 (P = 0.29), I^2 = 20.0%	23/183		•	100.0	0.27 [0.11, 0.64]
			0.01 Favors open sur	0.1 1 rgery	10 100 Favors no surgery	

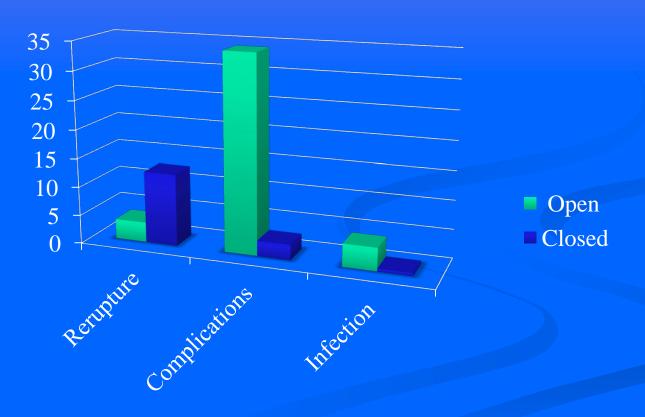
Favors Surgery





Open vs. Closed Achilles Rx

Meta-Analysis Khan et al, JBJS 2005









From: Treatment of Acute Achilles Tendon Ruptures: A Meta-Analysis of Randomized, Controlled Trials

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Open vs. Perc Reruptures

Study or subcategory	Open n/N	Percutaneous n/N			RR (fixed			Weight %	RR (fixed) 95% CI
Schroeder 1997 Lim 2001	0/13 2/33	0/15 1/33				-	_	100.00	Not estimable 2.00 [0.19, 21.00]
Total n/N (95% CI) Total events: 2 (Open), 1 (Percutaneous) Test for heterogeneity: not applicable Test for overall effect: Z = 0.58 (P = 0.56)	2/46	1/48					_	100.00	2.00 [0.19, 21.00]
			0.01	0.1	1	10	100)	
		F	avors ope	en surgery		Favors per	cutaneous		

Favors Percutaneous

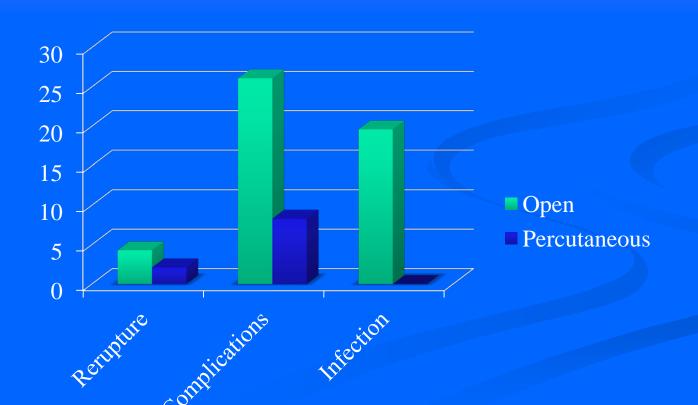






Open vs. Percutaneous Achilles Rx

Meta-Analysis Khan et al, JBJS 2005







From: Treatment of Acute Achilles Tendon Ruptures: A Meta-Analysis of Randomized, Controlled Trials

J Bone Joint Surg Am. 2005:87(10):2202-2210, doi:10.2106/JBJS.D.03049

Cast vs. Functional Bracing

Study or subcategory	Cast n/N	Cast and Brace n/N			RR (fixed 95% CI	*		Weight %	RR (fixed) 95% CI	
Kangas 2003 Cetti 1994 Mortensen 1999 Kerkhoffs 2002 Maffulli 2003	2/25 2/30 2/35 1/23 0/27	1/25 1/30 1/36 0/16 0/26		_			_	28.00 28.00 27.61 16.39	2.00 [0.19, 20.67] 2.00 [0.19, 20.90] 2.06 [0.20, 21.68] 2.13 [0.09, 49.08] Not estimable	
Total n/N (95% CI) Total events: 7 (Cast), 3 (Functional brace) Test for heterogeneity: $Ch\vec{P} = 0.00$, $df = 3$ (P = Test for overall effect: Z = 1.12 (P = 0.26)	7/140 1.00), l² = 0%	3/133			1			100.00	2.04 [0.59, 7.06]	
			0.01 F	0.1 avors cast	1	10 Favors brace	100			

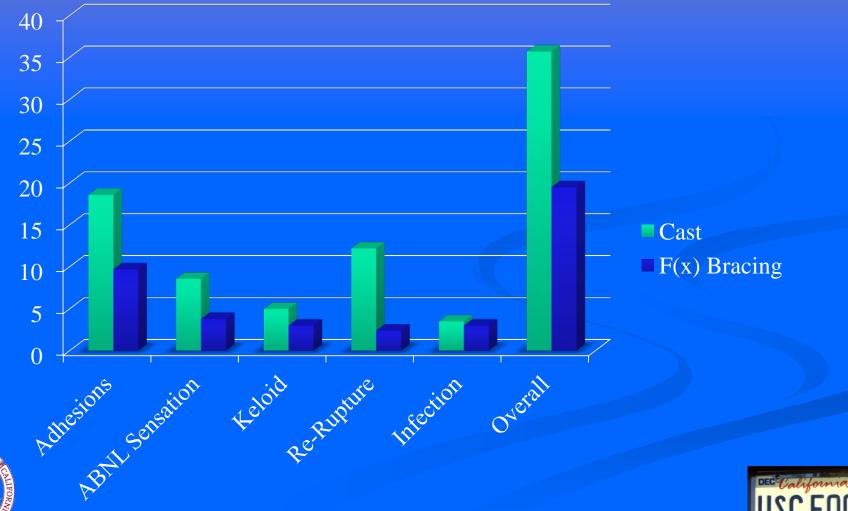
Favors Bracing







Post-Operative Casting vs. Bracing Achilles Rx Meta-Analysis Khan et al, JBJS 2005







From: Operative versus Nonoperative Treatment of Acute Achilles Tendon Ruptures: A Multicenter Randomized Trial Using Accelerated Functional Rehabilitation

J Bone Joint Surg Am. 2010;92(17):2767-2775. doi:10.2106/JBJS.I.01401

Open Vs. Closed

	Nonopera	ative	Operat	ive	Odds Ratio			Odds Ratio			
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	Year	M-H, Random, 95% CI			
Thermann	0	28	0	22		Not estimable	1995				
Metz	5	41	3	42	59.5%	1.81 [0.40, 8.10]	2008	- •			
Present Study	3	72	2	72	40.5%	1.52 [0.25, 9.39]	2010				
Total (95% CI)		141		136	100.0%	1.68 [0.53, 5.36]		-			
Total events	8		5								
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.02$, $df = 1$ ($P = 0.89$); $I^2 = 0\%$ Test for overall effect: $Z = 0.88$ ($P = 0.38$)								0.01 0.1 1 10 100 Favors nonoperative Favors operative			

Favors Operative







The Journal of Bone & Joint Surgery

this article.

Operative versus Nonoperative Treatment of Acute Achilles Tendon Ruptures

A Multicenter Randomized Trial Using Accelerated Functional Rehabilitation

By Kevin Willits, MA, MD, FRCSC, Annunziato Amendola, MD, FRCSC, Dianne Bryant, MSc, PhD, Nicholas G. Mohtadi, MD, MSc, FRCSC, J. Robert Giffin, MD, FRCSC, Peter Fowler, MD, FRCSC, Crystal O. Kean, MSc, PhD, and Alexandra Kirkley, MD, MSc, FRCSC

Investigation performed at the Fowler Kennedy Sport Medicine Clinic, London, Ontario, and the University of Calgary Sport Medicine Centre, Calgary, Alberta, Canada



1y30°/s 1y60°/s 1y240°/s 2y30°/s 2y60°/s 2y240°/s

Time and Speed





AOFAS Specialty Day 2013 Baumhauer et al

- 26,000 surgery in ABOS Oral Exam
- Foot and Ankle Surgery had higher risk of complications vs other body parts
- 8.41% infection rate Achilles tendon





"And the Survey Says?"



Charlton's Way

- Achillon
- Bilateral drape / prone position
- Cheat 5 to 10 degrees too tight
- Judge at 45 knee flexion





Achilles Rupture Sign the BACK of the Leg

Put the tourniquet on before you flip













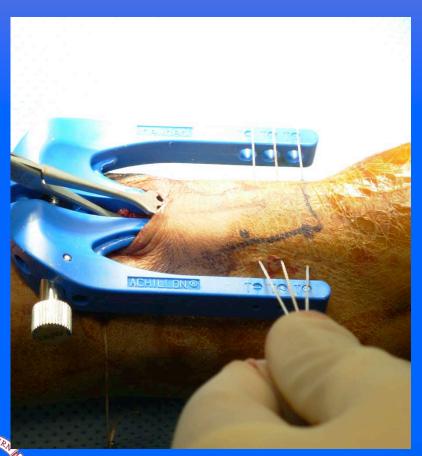


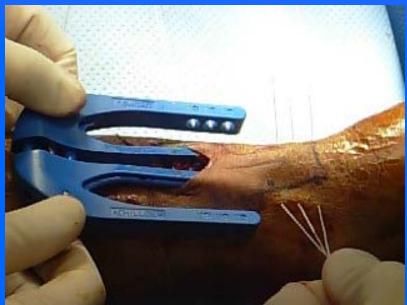




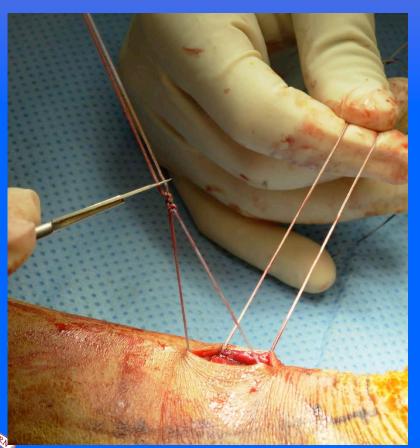






















Achilles Rehab Thordarson Open Charlton Achillon

- Plantar Flexion Cast
- NWB 2 weeks
- Passive to Neutral on Week #3
- WBAT w/ heel lift in cam walker up to week #6
- Felt heel lift in a shoe on week #6

- Plantar Flexion Cast for 4 weeks
- Cam Walker in Plantar Flexion for 4 Weeks PWB
- WBAT in Cam
 Walker at Week #8
- Cowboy Boot for 4
 weeks until week #12



Achilles "Birthday"







Oops, Somebody Missed It

1/6th of Achilles Ruptures Are Missed By the 1st Physician Who Exams The Patient





Chronic Rupture

- Small gap- primary repair
- Medium gap- VY lengthening
- Large gap- FHL transfer

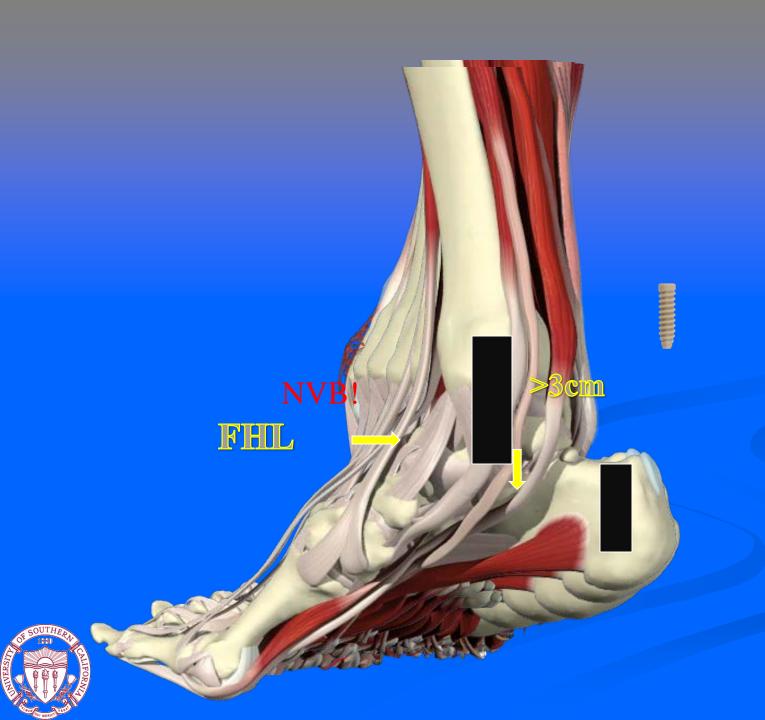














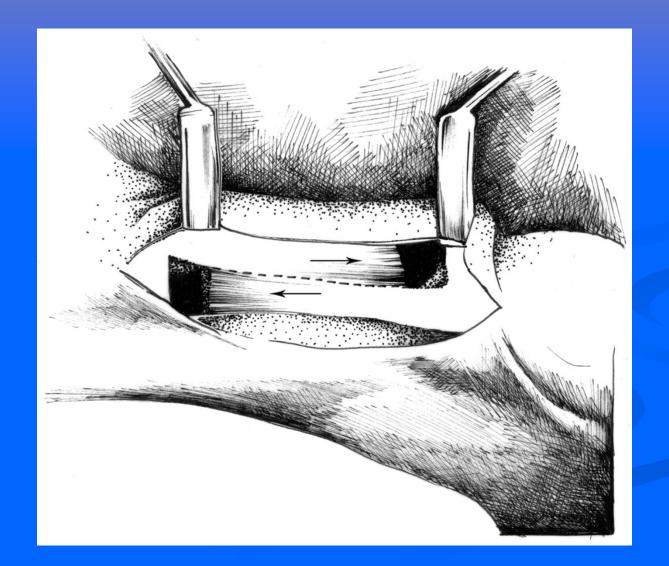






























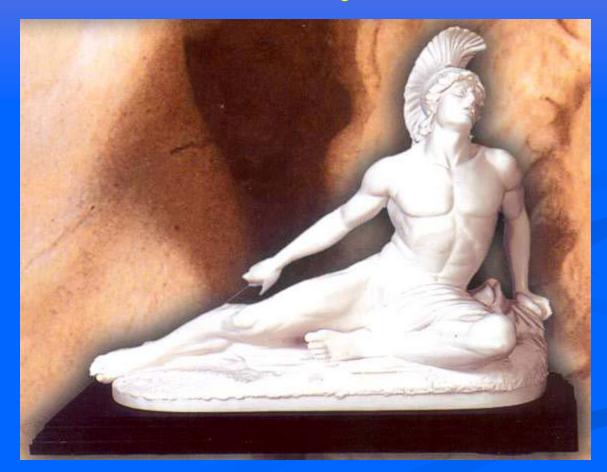
Conclusion

- Surgery vs Non-operative remains controversial
- Balance the tension
- Avoid the big complications—rerupture and infection
- Get the correct diagnosis





Thank you







Achilles Tendon Ruptures

Exam Questions





A 62-year-old tennis player ruptured his achilles tendon 12 months ago. He initially chose non-operative treatment, but continued to have weakness and difficulty ambulating. During surgery extensive debridement there is a 4cm gap between viable tissue ends. Which of the following surgical techniques most likely will provide the best clinical outcome?

- 1. Primary repair with the foot in maximal plantarflexion followed by a gradual stretching program
- 2.Reconstruction with hamstring autograft
- 3. Achilles repair augmented with transfer of the posterior tibial tendon
- 4. Achilles repair augmented with transfer of the extensor digitorum longus
- 5. Achilles repair augmented with transfer of the flexor hallucis longus





A 62-year-old tennis player ruptured his achilles tendon 12 months ago. He initially chose non-operative treatment, but continued to have weakness and difficulty ambulating. During surgery extensive debridement there is a 4cm gap between viable tissue ends. Which of the following surgical techniques most likely will provide the best clinical outcome?

- 1. Primary repair with the foot in maximal plantarflexion followed by a gradual stretching program 1%
- 2.Reconstruction with hamstring autograft 6%
- 3. Achilles repair augmented with transfer of the posterior tibial tendon 4%
- 4. Achilles repair augmented with transfer of the extensor digitorum longus 3%
- 5. Achilles repair augmented with transfer of the flexor hallucis longus 86%
- Will RE, Galey SM Outcome of single incision flexor hallucis longus transfer for chronic achilles tendinopathy. Foot Ankle Int. 2009 Apr;30(4):315-7



What is the biggest advantage of surgical repair of an acute Achilles tendon rupture with early range of motion compared to non-operative treatment with immobilization in a short-leg cast for 6 weeks?

- 1. Lower rate of infection
- 2. Lower rate of nerve injury
- 3. Better skin cosmesis
- 4. Lower rate of DVT/ VTE
- 5. Lower rate of re-rupture





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- 1. Bhandari M, Guyatt GH, Siddiqui F, et al: Treatment of acute Achilles tendon ruptures: A systematic overview and metaanalysis. Clin Orthop Relat Res 2002;400:190-200
- 2. Khan RJ, Fick D, Keogh A, et al. Treatment of acute Achilles tendon ruptures: A meta-analysis of randomized, controlled trials. J Bone Joint Surg Am 2005;87:2202-2210
- 3. Willits K, Amendola A, Bryant D, Mohtadi NG, Giffin JR, Fowler P, Kean CO, Kirkley A. Operative versus nonoperative treatment of acute Achilles tendon ruptures: a multicenter randomized trial using accelerated functional rehabilitation. J Bone Joint Surg Am. 2010 Dec 1;92(17):2767-75.
- 4. Patel A, Ogawa B, Charlton T, Thordarson D Incidence of deep vein thrombosis and pulmonary embolism after Achilles tendon rupture. Clin Orthop Relat Res. 2012 Jan;470(1):270-4.





Which factor increases the chance of wound complications after Achilles tendon repair?

- 1. increased body mass index
- 2. immediate surgery
- 3. male gender
- 4. age over 40 years old
- 5. tobacco use





Which factor increases the chance of wound complications after Achilles tendon repair?

- 1. increased body mass index 5%
- 2. immediate surgery 3%
- 3. male gender 1%
- 4. age over 40 years old 1%
- 5. tobacco use 91%

Orthobullets

1. Bruggeman NB, Turner NS, Dahm DL, Voll AE, Hoskin TL, Jacofsky DJ, Haidukewych GJ. Wound complications after open Achilles tendon repair: an analysis of risk factors. Clin Orthop Relat Res. 2004 Oct;(427):63-6.



Which factor increases the chance of DVT/VTE after Achilles tendon repair?

- 1. Obesity
- 2. Non operative treatment
- 3. Previous history of DVT/VTE
- 4. Age over 40 years old
- 5. None of the Above





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