

# PARS Achilles Tendon Repair

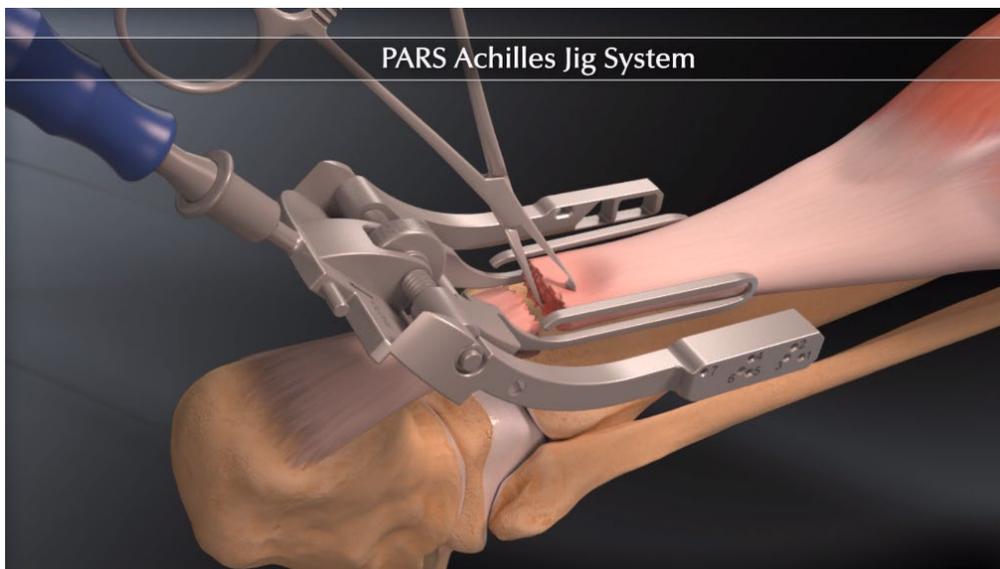
The Achilles tendon is the strongest and thickest tendon in the body. It attaches the calf muscles (soleus and gastrocnemius) to the heel bone (calcaneus). The tendon transmits force from the contracting calf muscles to the calcaneus to cause the foot action of plantar flexion (foot pointed down) that is important in walking, running, jumping and change of direction activities.

Although the Achilles tendon is the strongest tendon in the body, it is also the tendon most commonly torn or ruptured. The most common causes of rupture are:

- Sudden plantar flexion (foot moving downward) such as taking off to jump.
- Unplanned or forced dorsiflexion (foot moving upward) such as landing a jump or stepping into a hole.
- Direct trauma to the tendon.

Most Achilles tendon ruptures occur in sports that require running, jumping and change of direction. The typical age for rupture occurs between 30–40 years of age and is significantly more common in males than females. Older adults can also rupture the Achilles tendon and are more inclined to have degenerative partial tearing of the tendon. Other risk factors for Achilles tendon rupture include use of Fluoroquinolone antibiotics and direct steroid injections into the tendon. The diagnosis of an Achilles tendon rupture is made from clinical history, physical exam and diagnostic testing. Most patients who sustain an Achilles tendon rupture report a pop and a feeling of being kicked or shot in the back of the leg. On exam, there is a palpable divot or gap in the area of the rupture along with significant swelling. If the Achilles is torn, when the calf is squeezed the foot will not point down (plantarflex). Diagnostic testing such as an Ultrasound or MRI (magnetic resonance imaging) may be used to determine if there is a complete or partial tear.

Historically, open techniques have been utilized for repair of the rupture but can be complicated by wound-healing issues and infection. This percutaneous and minimally invasive technique minimizes this concern. The PARS (see figure 1) technique provides the opportunity for consistently reliable capture both parts of the torn Achilles tendon and utilizes color-coded FiberWire suture. The healed tendon achieves a more natural contour, unlike the typical large scarred tendon resulting from open repair. This minimally invasive technique is ideal for the middle-aged individual, where there may be a heightened concern for wound-healing issues.



*Figure 1: Arthrex PARS Achilles Jig system ([www.arthrex.com](http://www.arthrex.com))*

Rehabilitation following Achilles tendon repair is vital in regaining motion, strength and function. Initially a walking boot is used for the first 6-8 weeks. Gradually more weight bearing and mobility is allowed to prevent stiffness post-operatively. The rehabilitation progresses slowly into strengthening, gait and balancing activities. Rehabilitation guidelines are presented in a criterion-based progression. General time frames refer to the usual pace of rehabilitation. Individual patients will progress at different rates depending on their age, associated injuries, pre-injury health status, rehab compliance, tissue quality and injury severity. For Achilles repairs it is essential that the tendon does not heal “long”..... ie stretching or lengthening the tendon early in the rehab process an result in a longer less elastic tendon. This should be monitored during the rehab process through repeated assessments of resting equinus position in a prone knee flexed position.

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<b>Phase I (0 to 6 weeks after surgery)</b>	
<b>Rehabilitation appointments</b>	<ul style="list-style-type: none"> <li>• Physician appointment at 2 weeks post-op</li> <li>• One Rehabilitation appointment immediately following the physician 2-week post op appt.</li> </ul>
<b>Rehabilitation goals</b>	<ul style="list-style-type: none"> <li>• Reduce pain and swelling after surgery</li> <li>• Protect healing of repaired tissues and implanted devices</li> <li>• Safe use of crutches for non-weight bearing</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Non-weight bearing</li> <li>• Bledsoe boot:             <ul style="list-style-type: none"> <li>○ At 2 weeks post op =20° of plantar flexion.</li> <li>○ At 3 weeks postop = 10° of plantar flexion.</li> <li>○ At 4 weeks the boot will be transition to neutral, and place 2 6-layered heel lifts into the boot, and begin partial weight-bearing advancing to full weight-bearing by 6 weeks. Begin peeling 1 layer of the heel lifts off each week.</li> </ul> </li> </ul>
<b>Suggested therapeutic exercise</b>	<ul style="list-style-type: none"> <li>• Quad sets</li> <li>• 4-way straight leg raises</li> <li>• Core exercises</li> <li>• Active ankle dorsiflexion to neutral / 0 degrees (must not go past neutral until minimum 3 months post-op)</li> <li>• Passive plantarflexion</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Upper body</li> <li>• Bike with boot on, starting at 8 weeks, low resistance initially</li> </ul>
<b>Progression criteria</b>	<ul style="list-style-type: none"> <li>• 6 weeks</li> </ul>

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<b>Phase II (6 to 12 weeks after surgery)</b>	
<b>Rehabilitation appointments</b>	<ul style="list-style-type: none"> <li>• Physician appointment ~8 weeks post-op</li> <li>• Rehabilitation appointments begin 2 weeks post-op</li> </ul>
<b>Rehabilitation goals</b>	<ul style="list-style-type: none"> <li>• Reduce pain and swelling after surgery</li> <li>• Protect healing of repaired tissues and implanted devices</li> <li>• Ensure appropriate gait in the boot</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• No ankle dorsiflexion range of motion past neutral</li> <li>• Submaximal and gradual resisted ankle plantarflexion</li> <li>• Weight-bearing in boot until 9-10 weeks post-op (after being seen by MD), then transition out of boot over 1-2 weeks with at least one 3-layer heel lift in shoe</li> </ul>
<b>Suggested therapeutic exercise</b>	<ul style="list-style-type: none"> <li>• Gentle AAROM to neutral dorsiflexion</li> <li>• AROM for inversion / eversion</li> <li>• Continue quad, hip and core strengthening</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Upper body</li> <li>• Bike with boot on, starting at 8 weeks, low resistance initially</li> </ul>
<b>Progression criteria</b>	<ul style="list-style-type: none"> <li>• 12 weeks</li> </ul>

# PARS Achilles Tendon Repair

Phase III (begin 12 weeks after surgery)	
<b>Rehabilitation appointments</b>	<ul style="list-style-type: none"> <li>• Physician appointment 16-18 weeks after surgery</li> <li>• Rehabilitation appointments 1-2x week</li> </ul>
<b>Rehabilitation goals</b>	<ul style="list-style-type: none"> <li>• Normalize gait out of boot on level surfaces</li> <li>• Use of one or two 3-layer heel lifts PRN</li> <li>• Protection of the post-surgical repair</li> <li>• Gradual restoration of ankle range of motion</li> <li>• Single leg stand control for 10 seconds</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Gradually wean out of boot based on tolerance, fatigue and gait mechanics (usually over 2-3 weeks)</li> <li>• Avoid over-stressing the repair (avoid large movements in the sagittal plane; any forceful plantarflexion while in a dorsiflexed position; aggressive passive ROM; and impact activities)</li> </ul>
<b>Suggested therapeutic exercise</b>	<ul style="list-style-type: none"> <li>• Frontal and sagittal plane stepping drills (side step, cross-over step, grapevine step)</li> <li>• Active ankle ROM within ROM precautions</li> <li>• Static balance exercises (begin in 2 foot stand, then 2 foot stand on side to side balance board or narrow base of support and gradually progress to single leg stand)</li> <li>• Ankle strengthening with resistance</li> <li>• Low velocity and partial ROM for functional movements (squat, step back, lunge)</li> <li>• Hip and core strengthening</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Stationary bike</li> <li>• Elliptical</li> <li>• Flat treadmill – no incline, no running</li> <li>• Swimming with pull buoy, chest- level water walking</li> </ul>

## UW Health sports rehabilitation guidelines

<b>Progression criteria</b>	<ul style="list-style-type: none"><li>• Normal gait mechanics without the boot</li><li>• Squat to 30° knee flexion without weight shift using heel lifts to keep ankle dorsiflexion to neutral</li><li>• Single leg stand with good control for 10 seconds</li><li>• Active ROM between 0° of dorsiflexion and 40° of plantarflexion</li></ul>
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## PARS Achilles Tendon Repair

Phase IV (begin after meeting phase III criteria, usually 18 weeks after surgery)	
<b>Rehabilitation appointments</b>	<ul style="list-style-type: none"> <li>• Physician appointment 24-28 weeks after surgery</li> <li>• Rehab every 1-2 weeks</li> </ul>
<b>Rehabilitation goals</b>	<ul style="list-style-type: none"> <li>• Normalize gait on all surfaces without boot or heel lift</li> <li>• Single leg stand with good control for 10 seconds</li> <li>• Active ROM between 15° of dorsiflexion and 50° of plantarflexion</li> <li>• Good control and no pain with functional movements, including step up/down, squat and lunges</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Avoid forceful impact activities</li> <li>• Do not perform exercises that create movement compensations</li> </ul>
<b>Suggested therapeutic exercises</b>	<ul style="list-style-type: none"> <li>• Frontal and transverse plane agility drills (progress from low velocity to high, then gradually adding in sagittal plane drills)</li> <li>• Active ankle ROM</li> <li>• Gastroc/soleus stretching</li> <li>• Multi-plane proprioceptive exercises – single leg stand</li> <li>• 1 foot standing nose touches</li> <li>• Ankle strengthening – concentric and eccentric gastroc strengthening</li> <li>• Functional movements (squat, step back, lunge)</li> <li>• Hip and core strengthening</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Walking and stationary bike</li> <li>• Swimming</li> <li>• Avoid running and jumping because of landing impact</li> </ul>
<b>Progression criteria</b>	<ul style="list-style-type: none"> <li>• Normal gait mechanics without the boot on all surfaces</li> <li>• Squat and lunge to 70° knee flexion without weight shift</li> <li>• Single leg stand with good control for 10 seconds</li> <li>• Active ROM between 15° of dorsiflexion and 50° of plantarflexion</li> </ul>

## PARS Achilles Tendon Repair

Phase V (after surgery if meeting phase IV goals)	
<b>Rehabilitation appointments</b>	<ul style="list-style-type: none"> <li>• Physician appointment 9 months after surgery (if needed)</li> <li>• Rehab every 2-3 weeks</li> </ul>
<b>Rehabilitation goals</b>	<ul style="list-style-type: none"> <li>• Good control and no pain with sport/work specific movements, including impact</li> </ul>
<b>Precautions</b>	<ul style="list-style-type: none"> <li>• Post-activity soreness should resolve within 24 hours</li> <li>• Avoid post-activity swelling</li> <li>• Avoid running with a limp</li> </ul>
<b>Suggested therapeutic exercises</b>	<ul style="list-style-type: none"> <li>• Impact control exercises beginning 2 feet to 2 feet, progressing from 1 foot to</li> <li>• other and then 1 foot to same foot</li> <li>• Movement control exercise beginning with low velocity, single plane activities and</li> <li>• progressing to higher velocity, multi-plane activities</li> <li>• Sport/work specific balance and proprioceptive drills</li> <li>• Hip and core strengthening</li> <li>• Stretching for patient specific muscle imbalances</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Replicate sport/work specific energy demands</li> </ul>
<b>Progression criteria</b>	<ul style="list-style-type: none"> <li>• Patient may return to sport after receiving clearance from the orthopedic surgeon and the physical therapist/athletic trainer. Progressive testing will be completed. The patient should have less than 15% difference in Biodex strength test, force plate jump and vertical hop tests, and functional horizontal hop tests.</li> </ul>

These rehabilitation guidelines were developed by the UW Health Sports Medicine group.

References:

Hsu AR, Jones CP, Cohen BE, Davis WH, Ellington JK, Anderson RB. Clinical Outcomes and Complications of Percutaneous Achilles Repair System Versus Open Technique for Acute Achilles Tendon Ruptures. *Foot Ankle Int.* 2015 Nov;36(11):1279-86.

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