# **Imperial Health** Center for Orthopaedics Primary Repair of the Achilles Tendon, is DVT Chemoprophylaxis Necessary?

Matt McCabe MS, DPM<sup>1</sup> • Tyson Green DPM, FACFAS<sup>2</sup> • Kalieb Pourciau DPM, FACFAS<sup>3</sup> <sup>1</sup> Chief Resident, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and Ankle Surgical Residency, Lake Charles, LA | <sup>3</sup> Attending, Christus St. Patrick Foot and St. Pat

**Format:** Scientific

Length of Follow Up: 7.5 Years

### **PURPOSE**:

Deep vein thrombosis (DVT) prophylaxis remains a controversial topic of debate among foot and ankle surgeons. Incidence of DVT for lower extremity surgery is quite low 0.12-3.5% (1-6). However, the literature does not present such a narrow incidence of DVT in regards to Achilles tendon ruptures, 0.11% to as high as 50% (3, 7-9). Guidelines for anticoagulation therapy are unclear with mixed results in the literature. The American College of Chest Physicians state that there is no need for anticoagulation for isolated lower limb trauma (10). Absolute risk factors that increase the likelihood of a DVT for lower extremity surgery have been identified and include age, tobacco use, elevated BMI above 40 kg/m<sup>2</sup>, active cancer and previous DVT (9,11-12). The purpose of this paper is to demonstrate that a standard for DVT prophylaxis is not clear and that DVT prophylaxis may be unnecessary for patients with no absolute risk factors undergoing primary repair of an Achilles tendon.

### **METHODOLOGY AND HYPOTHESIS:**

94 patients who underwent a primary repair of an Achilles tendon rupture at one facility involving seven surgeons over the course of seven and a half years are included in this study. All of the 94 patients in the study had no absolute risk factors for DVT. Operative and post-operative treatment was consistent throughout the different surgeons involving an open repair of the Achilles tendon. We propose that an Achilles tendon rupture and primary repair is not an indication on its own to warrant DVT prophylaxis, that evidence based guidelines for DVT prophylaxis are unclear and a patient's absolute risk factors must be considered if the surgeon is to begin DVT prophylaxis.

### **PROCEDURES:**

Achilles tendon ruptures were identified clinically with patients exhibiting: weakness or inability to ambulate, pain, weakness upon plantarflexion, the presence of a palpable dell and a positive Thompson's sign. All patients underwent MRI for surgical planning and all had an identifiable gap in the Achilles tendon. All 94 patients were taken to the operating room and had an open repair with an end to end re-approximation of the ruptured tendon using nonabsorbale suture to repair the tendon. In addition to end to end re-approximation, 36 patients received an anchor/hardware in the calcaneus to augment the repair. 12 patients underwent a flexor halluces longus (FHL) tendon transfer. Four patients underwent tendon lengthening or a gastrocnemius recession. All cases involved a tourniquet time below 40 minutes. Post-operative care was also consistent among surgeons, patients were non-weight bearing (NWB) for 2 weeks in a splint, then patients were NWB in a cast or a CAM boot for two more weeks. After four weeks patients began aggressive range of motion exercises and protected weight bearing in a CAM boot as well as physical therapy (PT). After three weeks of physical therapy patients were transferred into a brace. Throughout the entire treatment course no patients received chemical DV prophylaxis. Bancroft sign, Homan's sign and Pratt's sign were the exams used to test for DVT in the clinic during the post-operative course in addition to patients symptoms. All patients received no chemical DV prophylaxis in the preoperative, intraoperative or postoperative setting.

### **LITERATURE REVIEW:**

Although the literature is fairly consistent in terms of anticoagulation for lower extremity trauma, studies are mixed in terms of the routine use of chemoprophylaxis specifically after an Achilles rupture/repair and the prevention of a DVT (11, 13). Articles describing the incidence of DVT after an Achilles repair vary somewhat in their post-operative protocols however they all begin full weight bearing between four and six weeks (7,9,14-18). When isolating literature focused on DVT's and Achilles ruptures, one main difference between studies with higher reported DVT's and studies with lower reported DVT's was that the studies with the higher incidence of DVT reported not only symptomatic but asymptomatic DVT's. Lapidus and Nilsson-Helander conducted prospective studies with the intent to identify the presence of a DVT regardless of patient symptoms (7,19). They used ultrasound to identify a DVT at a determined time period postoperatively. Although some patients

### Level of Evidence: Level III

**Classification:** Epidemiology/Population Study

did not have any signs of a DVT they underwent ultrasound of their lower extremity veins. They reported symptomatic and asymptomatic DVT's. Furthermore Lapidus didn't identify other risk factors as contributory to their results and did not objectively differentiate symptomatic versus asymptomatic DVT's (19).

### **RESULTS:**

There were no DVT's or symptoms of DVT among all 94 patients. The average age was 45.15 years old. M:F ratio was 60:34. Patients with absolute risk factors for DVT such as elevated BMI over 40kg/m<sup>2</sup>, active smoker, age over 80 years, active cancer and a previous DVT were excluded in the study. There were no symptoms of postthrombotic syndrome (PTS) in the patient population. None of the patients were admitted to the hospital. One patient reruptured his Achilles tendon eight weeks after surgery and was repaired again surgically. There were two cases of suture dehiscence that were managed in the wound care clinic without any further complications. All patients healed without any complications and all returned to their pre-procedure activity level.

Author	Patients	Anticoagulation	Number of DVT's
Ahmad <sup>16</sup>	32	No	1 (3.1%)
Healy <sup>15</sup>	45	No	0
Lapidus <sup>19</sup>	91	Yes and No <sup>*</sup>	32 (35.2%)
Nilsson-Helander <sup>7</sup>	49	Yes	14 (28.6%)
Patel <sup>9</sup>	472	No	2 (0.04%)
Persson <sup>18</sup>	4	No	1 (25%)
Rensing <sup>17</sup>	1626	Unknown	3 (2%)
Saragas <sup>14</sup>	88	No	5 (5.7%)

\*All patients underwent surgical repair although some patients received subcutaneous anticoagulation and some received an anticoagulation placebo.

## **ANALYSIS AND DISCUSSION:**

The evidence to support routine DVT chemoprophylaxis is not well defined with varying results in the literature. Heyes et al. evaluated the rate of DVT's after cast immobilization for an Achilles rupture. They evaluated 945 patients over a 12 year period. Patients were immobilized in a plaster cast for four weeks and then transitioned into functional orthoses with weight bearing allowed. With the exception of a handful of patients, none of the 945 patients received chemoprophylaxis during their treatment course. Their rate of DVT after their retrospective examination was 10 (0.011%) out of the 945 patients (3).

In a smaller study of 95 patients, a higher rate of DVT was reported. Patients were divided randomly into surgical and nonsurgical candidates. 49 out of the 95 patients underwent a primary repair of the Achilles tendon and 46 were treated conservatively. Surgical patients received IV anticoagulation on the day of surgery and nonsurgical patients received anticoagulation via subcutaneous injections throughout treatment. Patients began range of motion exercises between 10-14 days post operatively. The article does not specify when patients were fully weight bearing. At eight weeks patients were screened using color duplex sonography (CDS) to identify the presence of a DVT. 14/49 surgical patients had a CDS verified DVT and 18/46 nonsurgical patients had a CDS verified DVT. There was no statistical significance between the surgical and nonsurgical patients (7) Lapidus et al. also showed that there is no significant difference in prophylaxing Achilles tendon ruptures. In a randomized, placebo controlled study, 91 patients underwent primary repair of an Achilles tendon rupture. 47 patients received subcutaneous anticoagulation therapy and 44 received the placebo subcutaneously. DVT was determined via CDS in all of the patients. They concluded that there were no statistically significant differences in the two groups (19).

Patel et al conducted a retrospective examination of 1172 patients who had Achilles tendon ruptures. The patients were divided into surgical and non-surgical groups. Patients were considered to have a symptomatic DVT if diagnosed with in 3 months of initial injury or surgery. DVT was diagnosed clinically and was followed up with an ultrasound. They identified 0.43% of DVT in their population across both groups. Upon conclusion of the study, a patient's age over 40 years was found to be a risk factor that was consistent in increasing a patient's risk of DVT. None of the surgeons in their study routinely use anticoagulation for Achilles tendon rupture repair (9).

Level III and level IV studies exist that have identified absolute risk factors for DVT after foot and ankle surgery. Miller et al conducted a literature review with multiple statistical analyses examining risk stratification for patients undergoing Achilles rupture repair, the risk of DVT had the lowest risk ratio of 0.37% compared to infection and loss of sensation (20). Mangwani et al.also established risk factors for DVT in elective foot and ankle surgery. The reported risk factors include previous history of VTE, immobilization, high BMI, age, comorbidities, contraceptive pill, and air-travel and that there is a cumulative effect when two or more risk factors are present when a patient had a repair of an Achilles tendon (21).

Immobilization may not be an absolute indication for DVT's after foot and ankle surgery. Watson et al. conducted a retrospective examination of 42 patients with similar lower extremity injuries and a DVT. They compared two groups, patients treated with cast immobilization with symptomatic DVT's and patients with the same injury treated with cast immobilization with no symptomatic DVT. Routine prophylaxis was not used. They retrospectively evaluated patient charts for the purpose of identifying individual DVT risk factors. They concluded that they were unable to identify individual risk factors between the two groups and stated that immobilization alone was not an absolute risk factor for DVT prophylaxis (22). Rasi et al. evaluated the incidence of DVT's after lower extremity trauma and immobilization; they identified individual risk factors for a DVT. Although Achilles tendon ruptures were not included in the study, patients did not receive chemoprophylaxis and they found that patients with three or more risk factors were at an increased risk of a DVT when immobilized (23). Risk factors identified were age, smoking, elevated BMI, immobilization, gender and cardiovascular disease. There are some limitations in this study in terms of the necessity of DVT prophylaxis. This is a retrospective study. While a retrospective study is helpful it is limited in its ability to truly identify risk factors for a DVT. Prospective studies stratifying the patient population into sub categories such as BMI, active cancer, etc. would be helpful in further identifying the risk of a DVT in a patient with an Achilles tendon rupture. Asymptomatic DVT's were not examined nor were they sought out as this was not an aim of the retrospective examination however, the authors recognize that asymptomatic DVT's could have been present in the patient population. It is not uncommon to schedule an Achilles tendon rupture for surgery after the patient has been seen and evaluated in a clinical setting; therefore it is difficult to know if the patient formed the DVT prior to surgery. The low incidence of DVT in this study cannot be fully explained, although the effected limb was immobilized, the vast majority of the patient population used crutches or a roll-about for ambulation and this could be a variable contributing to the results. There is also disparity between range of motion and weight bearing protocols among surgeons across the board throughout the literature and this could be an over looked factor in pre and post-operative care. Larger patient studies and a deeper examination of the causes of DVT in Achilles ruptures are needed.

The evidence in favor of DVT prophylaxis is unclear in patients with no absolute risk factors. However, the retrospective examination of patients with Achilles ruptures with in our cohort provide early evidence that chemoprophylaxis may not be necessary given no absolute risk factors for a DVT such as age, tobacco use, elevated BMI, active cancer and/or history of a DVT and that risk factors should be considered on a patient to patient basis. The American College of Foot and Ankle Surgeons state, "The decision to prescribe chemical prophylaxis during non-operative or operative management of foot and ankle disorders should be based



on each patient's unique risk-benefit analysis. This involves weighing the risks and consequences of bleeding against those of developing VTED. Exactly what constitutes sufficient risk to warrant chemical prophylaxis is not clear" (11). With the exception of the presence of absolute risk factors, the authors do not routinely give any anticoagulation for DVT prophylaxis of Achilles tendon rupture repair.

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