

# Is Massive Pulmonary Embolism the Cause of Achilles' Death?

Selvi Askar<sup>1\*</sup>, Sevdegul Karadas Bilvanisi<sup>2</sup>, Hatice Kara<sup>2</sup>, Merhamet Tanrikulu<sup>1</sup> and Muntecep Askar<sup>3</sup>

<sup>1</sup>Yuzuncuyil University, Faculty of Medicine, Department of Chest Diseases, Van, Turkiye

<sup>2</sup>Yuzuncuyil University, Faculty of Medicine, Department of Emergency Medicine, Van, Turkiye

<sup>3</sup>Yuzuncuyil University, Faculty of Medicine, Department of Cardiology, Van, Turkiye

## \*Corresponding author

Selvi Askar, Yuzuncuyil University, Faculty of Medicine, Department of Chest Diseases, Van, Turkiye.

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## ABSTRACT

The Achilles tendon, named after Achilles, the son of Thetis, the goddess of water according to the Homeric epic, classically ruptures in the third decade and beyond during a sudden jumping movement. The Achilles tendon is the thickest and strongest tendon in the human body. It has been said that Achilles, the god of war, was killed by an arrow in his Achilles tendon, but this could not have caused his death. Achilles' mother She held him by the back of one of his heels and bathed him in the water of immortality. Although mythology argues that the part of the Achilles that does not come into contact with the water of immortality causes death, current literature states that Achilles tendon injuries cannot be a cause of death. In this study, we present a case of a patient who died with massive pulmonary embolism after Achilles tendon rupture in our clinic.

## Introduction

Achilles tendon rupture usually occurs with a sudden movement, during sports activities or traumatic events such as falls. The incidence of Achilles tendon ruptures is 0.2% and it is the most common tendon injury in the lower extremity [1]. It has been said that Achilles, the god of war, died because of an arrow in his Achilles tendon, but this could not have caused death, it could have been a poisoned arrow (Figure 1 a). In this case, a question may arise as to whether Achilles tendon injury kills. Current literature states that Achilles tendon injuries cannot be a cause of death. The cause of Achilles' death may not have been a poisoned arrow but massive pulmonary embolism due to tendon rupture. Treatment after rupture is usually done with surgical intervention or conservative treatment (cast, boot). In both cases, the patient may remain immobilized for some time. Immobilization increases the risk of developing deep vein thrombosis (DVT) and subsequent pulmonary embolism. Patients with Achilles tendon rupture are more prone to this risk, especially after surgery or prolonged immobilization. The association of Achilles tendon rupture and pulmonary embolism is a condition that needs to be carefully managed because it can lead to serious complications. Since the duration of anesthesia is short and mobilization is started in the early period in these operations, blood thinner treatment is not recommended by many physicians for patients without any risk factors. In some patients, the operation is not performed, mobilization is provided

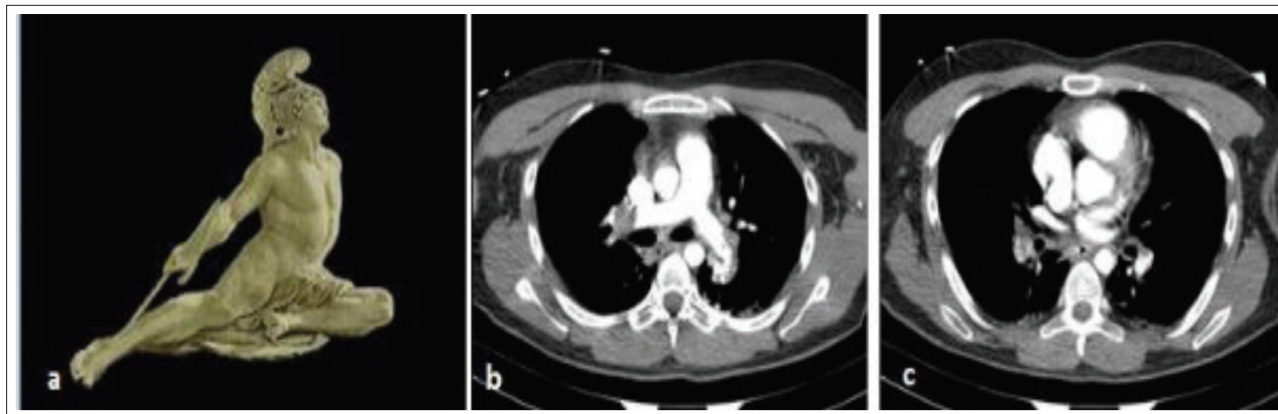
early, but pulmonary embolism still develops [2]. The Achilles tendon rupture itself may have triggered the venous thrombus in pulmonary embolism in these patients. In this case report, we present a case of massive pulmonary embolism in a young patient with a recent Achilles tendon rupture and postoperative immobilization.

## Case

A 32-year-old man was brought to the emergency room with fainting following chest pain. The patient's oxygen saturation was 45% and pulse rate was 40 per minute. The patient was connected to mechanical ventilator. It was learned that he had been operated one month ago due to rupture of the Achilles tendon after exercise. The patient had no swelling in his legs and was not immobilized. Body mass index was 26 and blood D-dimer value was 4.5. Other blood hemogram and biochemical values were normal. The patient was diagnosed with

Echocardiography performed in the emergency department revealed a hypokinetic right heart. Pulmonary computed tomography revealed thrombus occluding both main pulmonary arteries, especially the right one (Figure 1b,c). Thrombolytic therapy was initiated. The patient's oxygen saturation increased and the need for vasopressors continued. The patient died in the twelfth hour of treatment. Doppler ultrasonography of both legs performed during this period showed a suspicious echogenic

appearance in the lumen of the left popliteal vein. The results of the blood thrombophilia panel obtained from the patient were normal.



**Figure 1:** A: Achilles image, B,C: Lung computed tomography images of the patient.

### Discussion

We report a young patient without any known risk factors (obesity, chronic disease, corticosteroid use, rheumatologic disease, ischemic disease) who died with a diagnosis of massive pulmonary embolism after Achilles tendon rupture. The patient had a short duration of anesthesia and no immobilization. A blow to the Achilles tendon was considered a risk factor for venous thrombus. Although Achilles tendon ruptures are usually due to trauma, they are more common in patients with ischemic disease, long term corticosteroid users and rheumatologic diseases [3]. While these conditions are risk factors for Achilles tendon rupture, they can also be considered as risk factors for pulmonary embolism. Çolak et al. analyzed the patients who had Achilles tendon rupture and underwent surgery between 2006 and 2014 and found deep vein thrombus DVT in 7.6% of the patients [4]. The majority of these patients were over 40 years of age and had a body mass index (BMI) above 30. Embolism developed in 1.7% of these patients. None of the patients with embolism had previous symptoms of deep vein thrombus. Although there is limited data on the use of thromboprophylaxis in foot and ankle surgery, the authors argued that routine thromboembolism prophylaxis should be considered in patients with Achilles tendon rupture. DVT rates reported in the literature after Achilles tendon rupture vary between 6.3% and 34% [5,6]. Patel et al. retrospectively followed 1172 patients. In this study, patients were divided into operated and nonoperated patients. They found embolism in only 0.34% of the patients and found no relation between embolism and age, body mass index, comorbidities and previous embolism. These authors, unlike us, argued that prophylaxis has no place. In a cohort study involving 28,540 patients in Denmark, venous thromboembolism was found in 1.36% of patients (2). DVT was detected in the majority of the patients within the first month. The majority of the patients with DVT were over 40 years of age and consisted of non-operative male patients. DVT was more common in women, especially in oral contraceptive users. According to this study, it was argued that the risk of DVT should be considered especially in the first month. It was argued that embolism can occur even without an operation and that not only the operation but also Achilles tendon rupture is a risk factor, as we argued in our case. While routine thromboprophylaxis is recommended in major orthopedic

operations, thromboprophylaxis remains a controversial issue in minor operations such as Achilles tendon rupture. Lapidus et al. applied thromboprophylaxis with deltaparin to 46 of 91 patients with Achilles tendon rupture and compared 2 groups [6]. While pulmonary embolism was not observed in both groups, they found DVT in 34% in the group receiving prophylaxis and 36% in the group not receiving prophylaxis. The mechanical effects of trauma, previous operations and immobilization have a clear effect on DVT formation. Therefore, it may be necessary to protect patients from pulmonary embolism.

In conclusion, patients with Achilles tendon rupture, with or without surgery, are at great risk for DVT, especially with prolonged immobilization. Situations in which DVT may lodge in the pulmonary artery and cause PE are life-threatening emergencies. Thromboprophylaxis should be considered in these patients

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