

Chronic Achilles Tendon Rupture

- Perspectives on outcomes after surgical treatment and rehabilitation

Akademisk avhandling

som för avläggande av medicine doktorexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligens försvaras i hörsal 2118, Hälsovetarbacken, hus 2, onsdagen den 25 maj 2022, klockan 09:00.

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Fakultetsopponent:

Professor Suzanne Werner
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Avhandlingen baseras på följande delarbeten

- I. **Patients with chronic Achilles tendon rupture have persistent limitations in patient-reported function and calf muscle function one year after surgical treatment – a case series**
Nordenholm A, Nilsson N, Hamrin Senorski E, Nilsson Helander K, Westin O, Olsson N
Journal of Experimental Orthopaedics, 2022;9(1):15. doi: 10.1186/s40634-022-00451-5.
- II. **Surgical treatment of chronic Achilles tendon rupture results in improved gait biomechanics**
Nordenholm A, Hamrin Senorski E, Westin O, Nilsson Helander K, Möller M, Karlsson J, Zügner R
Journal of Orthopaedic Surgery and Research, 2022;17(1):67. doi: 10.1186/s13018-022-02948-2.
- III. **Greater heel-rise endurance is related to better gait biomechanics in patients surgically treated for chronic Achilles tendon rupture**
Nordenholm A, Hamrin Senorski E, Nilsson-Helander K, Möller M, Zügner R
Accepted to Knee Surgery, Sports Traumatology, Arthroscopy.
- IV. **Disappointment and frustration: patients experience undergoing treatment for a chronic Achilles tendon rupture**
Nordenholm A, Nilsson N, Krupic F, Hamrin Senorski E, Nilsson Helander K, Westin O, Karlsson J
Journal of Orthopaedic Surgery and Research, 2022;17(1):217. doi: 10.1186/s13018-022-03103-7.
- V. **The economic cost and patient-reported outcome of chronic Achilles tendon ruptures**
Nilsson N, Nilsson Helander K, Hamrin Senorski E, Holm A*, Karlsson J, Svensson M, Westin O
Journal of Experimental Orthopaedics, 2020;7(1):60. doi:10.1186/s40634-020-00277-z.

*Change of last name to Nordenholm during 2021.

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Abstract

Chronic Achilles tendon rupture (CATR) is a rupture of the Achilles tendon for which adequate diagnosis and treatment has been delayed after index injury. In this thesis defined as 4 weeks or more. The purpose of this thesis was to determine the outcomes of surgical treatment and postoperative rehabilitation in patients with a CATR from a broad perspective, including several validated outcome measurements.

Study I, a case series, evaluated the 1-year postoperative outcomes and found that the level of recovery varies greatly between individuals. Persistent limitations in subjective foot and ankle function were found and the majority of patients had returned to a light to moderate physical activity level. In terms of calf muscle endurance, some patients recovered well while others had deficits up to 30% to 50% compared with the healthy side. Moreover, an elongation of the injured tendon was found compared with the healthy tendon.

In **Study II**, gait biomechanics were evaluated preoperatively and 1-year postoperatively. Postoperative gait biomechanics was then compared with a healthy control group. Power development in the ankle and knee joint during gait was significantly improved at the 1-year follow-up compared with the preoperative gait. There were persistent impairments in gait biomechanics compared with healthy controls.

Study III investigated the relationship between calf muscle endurance, gait biomechanics and tendon elongation at 1 year postoperatively. Greater calf muscle endurance was found to be related to better gait biomechanics, especially to power development in the ankle joint during gait. Moreover, the results indicated that less tendon elongation may be related to greater calf muscle endurance.

Study IV, a qualitative interview study, investigated patient experiences related to sustaining, undergoing treatment for and recovering from a CATR, at 4-6 years after surgical treatment. The patients described a traumatic or non-traumatic injury mechanism that resulted in persistent weakness in the foot/ankle that did not improve over time. Receiving the correct diagnosis was a relief, but realizing that the treatment had been delayed due to themselves or a healthcare professional initially misinterpreting the injury was frustrating. The patients expressed an overall satisfaction with outcomes, however, some had adjusted their physical activities due to a fear of re-rupture.

In **Study V**, the healthcare costs and production loss costs of patients surgically treated for CATR were evaluated and compared with the costs of patients treated non-operatively or operatively for an ATR. Furthermore, the study evaluated the preoperative and 1-year postoperative patient-reported foot and ankle function. The study concluded that the healthcare costs were significantly higher for patients treated for a CATR compared with patients treated for an acute ATR, irrespective of treatment. In terms of total costs, surgical treatment of patients with a CATR was more expensive compared with non-surgical treatment of patients with an acute ATR. Patient-reported function was significantly increased postoperatively compared to the preoperative scores.

Keywords: chronic achilles tendon rupture, outcome, heel-rise, tendon length, gait biomechanics, patient experiences, cost analysis