

**Surgical Treatment of Chronic Achilles Tendon Rupture Results in Improved Gait Biomechanics,**  
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**Level of Evidence: 3**

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The purpose of this study was to investigate whether the gait biomechanics in patients with chronic Achilles tendon rupture can be improved after surgical treatment compared to patient's gait at one year postoperatively with those of healthy controls. The authors of this study hypothesize that there will be improvements in gait biomechanics after one year compared to preoperative status.

The study was approved by regional ethical review board in Gothenburg. All patients received written/oral consent and information about the study. There was 70 healthy control group and 23 patients with CATR that was consented and included in the study. The CATR patients who agreed to participate were included in the study and participated in both pre and postoperative gait analysis. The healthy control group was included in gait analysis and confirmed that they had no effect on walking ability.

Patients received surgical treatment between one to thirty-six months after Achilles tendon rupture. 22 of the 23 patients with a CATR were treated with augmentation using a free flap from the gastrocnemius aponeurosis. One of the patients also received a suture anchor in the calcaneus due to the distal location of the rupture. In one of the patients, they received a free semitendinosus autograft due to the large size of the gap. Postoperatively, a below-knee plaster cast was applied for three to five weeks followed by an adjustable lower leg brace which was removed after 8 weeks. Partial weightbearing was allowed after 3 weeks and gradually increase to full weightbearing with brace for 6 weeks. Patients were then scheduled for physical therapy at 8 weeks postoperative status.

Gait analysis was conducted preoperatively and postoperatively using optical tracking system. Markers were placed to the proximal border of the sacrum, anterior and superior iliac spine, lateral knee joint line, proximal boarder of the patella, tibial tubercle tuber calcaneus, lateral malleolus and between the second and third metatarsal. In the analysis, spatiotemporal variables such as speed, step width, stride length and stance phase were collected. Kinematic variable such as dorsiflexion and plantarflexion of the knee joint was also considered. Lastly, the kinetic variables collected were power and moment in the ankle and knee joint during stance phase.

There were significant differences between the CATR patients and the healthy controls in terms of age, weight and BMI. Patients with a CATR exhibited slower gait speed, a wider step width, a shorter stride length, and a longer relative stance phase, compared with the healthy control group.

The most important findings of this study were that there was improved gait biomechanics after one year following surgical intervention for patients that had CATR. Overall, there was improvement in gait speed, stride length, step width and peak power in ankle and knee joints. Preoperatively, patients with a CATR exhibited a lower generated peak power in the ankle joint during gait due to the ruptured Achilles tendon. Even though there are postoperative improvements, patients may need more than one year to fully recover and reach their full potential in range of motion. The primary limitation of this study is the small sample size of the injured group. It was also noted that patients with CATR had higher body weight compared to healthy control. Future implication of long-term outcome of gait biomechanics is still needed in order to fully access patients with CATR.

