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Z-Plasty Lengthening for Management of Achilles Tendon Contracture: A Case Report

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Abstract

Tendo-Achilles contracture is characterized by shortening and tightening of the Achilles tendon, leading to restricted ankle dorsiflexion and equinus deformity that significantly affects gait and functional mobility. The Achilles tendon connects the gastrocnemius–soleus complex to the calcaneum and plays a crucial role in walking, running, and jumping. Contracture can result from prolonged immobilization, trauma, neuromuscular disorders, repetitive strain, or biomechanical abnormalities. Surgical lengthening procedures are indicated when conservative management fails. This paper describes the successful management of Achilles tendon contracture in a 34-year-old male using Z-plasty tendon lengthening. The technique provided controlled elongation of the tendon while preserving its structural integrity and biomechanical strength. Postoperative follow-up demonstrated improved dorsiflexion, correction of equinus deformity, and restoration of a near-normal gait pattern. Z-plasty remains a reliable and effective surgical technique for treating moderate to severe Achilles tendon contractures.

Introduction

The Achilles tendon is the strongest and largest tendon in the human body and forms the terminal insertion of the gastrocnemius and soleus muscles into the posterior surface of the calcaneum. It plays a fundamental role in locomotion by enabling plantar flexion during the push-off phase of gait. Contracture of the Achilles tendon leads to equinus deformity of the ankle, restricting dorsiflexion and causing abnormal gait mechanics. Patients commonly present with heel pain, calf tightness, stiffness, and reduced ankle mobility. If left untreated, the condition may result in compensatory biomechanical stress across the foot, ankle, and knee joints.

Etiological factors include prolonged immobilization, trauma, neuromuscular disorders, repetitive strain injuries, inappropriate footwear, and congenital or developmental abnormalities. Conservative management includes physiotherapy, stretching exercises, orthotic support, and serial casting. However, persistent or severe contractures may require surgical intervention. Among various surgical techniques, Z-plasty lengthening provides controlled elongation of the tendon while maintaining its mechanical strength and continuity.

Materials and Methods

A 34-year-old male presented with a three-month history of persistent heel and lower calf pain associated with progressive stiffness and difficulty in ankle dorsiflexion. The pain was more pronounced in the morning and after periods of rest and increased toward the end of the workday. There was no visible swelling or skin discoloration on inspection.

Clinical examination revealed a plantar flexion deformity of approximately 70 degrees compared to the contralateral ankle. No local tenderness or rise in temperature was noted. Gait analysis demonstrated a compensatory pattern with knee flexion and predominant forefoot weight bearing. Neurovascular examination of the affected limb was normal. Based on the clinical findings, the patient was planned for Achilles tendon lengthening using the Z-plasty technique.

Case Description and Surgical Technique

The patient underwent detailed clinical evaluation including inspection, palpation, gait assessment, and special tests. The Thompson test was performed to confirm the structural integrity of the Achilles tendon prior to surgery.

Under appropriate anesthesia and aseptic precautions, a Z-plasty tendon lengthening procedure was performed. A 3 cm Z-shaped incision was made over the Achilles tendon. The tendon was carefully exposed and the flaps created by the Z-incision were dissected and mobilized. The tendon segments were then transposed and sutured in an elongated position to achieve the desired lengthening.

Intraoperatively, approximately 5 cm of tendon lengthening was achieved. Proper alignment and physiological tension of the tendon were confirmed before closure. The wound was closed in layers and a posterior POP slab was applied with the ankle maintained in maximum dorsiflexion. Gradual weight bearing was initiated after suture removal as part of the postoperative rehabilitation protocol.

Results and Discussion

The surgical procedure achieved approximately 5 cm of controlled tendon lengthening intraoperatively. Postoperative follow-up demonstrated significant improvement in ankle dorsiflexion and correction of the

equinus deformity. The patient showed restoration of a more physiological gait pattern and reported relief from pain and functional limitation.

Z-plasty allows controlled and predictable tendon lengthening while maintaining structural continuity and biomechanical strength. Compared with other tendon lengthening techniques, Z-plasty minimizes the risk of over-correction or under-correction. Additionally, it provides satisfactory cosmetic results due to the reorientation of the incision lines.

Existing literature also supports favorable long-term functional outcomes following Z-plasty tendon lengthening in patients with moderate to severe Achilles tendon contractures that fail conservative treatment.

Conclusion

Z-plasty is a reliable and effective surgical technique for the management of Achilles tendon contracture. It allows controlled tendon elongation while preserving mechanical integrity. The procedure provides functional correction of equinus deformity, improves ankle dorsiflexion, and restores a near-normal gait pattern. When conservative management fails, Z-plasty offers excellent clinical and cosmetic outcomes.

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