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Functional outcome after navicular tunneling and flexor digitorum longus tenodesis procedure in neglected tibialis posterior tendon rupture: A case report

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Abstract
The posterior tibialis tendon plays a vital role in maintaining the foot's arch and facilitating normal gait. Rupture of this tendon, if left untreated, can lead to progressive deformity and impaired function. This case report discusses a 22-year-old male with a neglected posterior tibialis tendon rupture who presented with pain, limited dorsiflexion and supination in the right ankle, and reduced function.
After clinical and radiological evaluations, surgical intervention was performed. The procedure involved creating a navicular tunnel for tendon reattachment and conducting a tenodesis to the flexor digitorum longus to improve foot stability. Postoperative management included immobilization, progressive weight-bearing, and structured physical therapy.
Following surgery, the patient showed significant improvements in pain reduction, restoration of arch height, and functional outcomes. Radiographs confirmed successful tendon reattachment and anatomical alignment. The American Orthopaedic Foot & Ankle Society (AOFAS) score improved markedly from 45 preoperatively to 88 at three months postoperatively.
This case highlights the efficacy of navicular tunneling combined with tenodesis in treating neglected posterior tibialis tendon ruptures. The approach offers stable reattachment and enhanced biomechanics, making it a promising solution for chronic cases. Further long-term follow-up is recommended to confirm the durability of these results.

Keywords: Posterior tibialis tendon, repair, rupture, surgical management

Introduction
The human foot is a complex structure comprised of numerous tendons and ligaments that work in harmony to facilitate movement and provide stability. Among these crucial structures is the Tibialis Posterior tendon, situated on the inner side of the ankle. This tendon plays a pivotal role in supporting the arch of the foot and controlling its inward rolling during walking and running. Tibialis posterior tendon is a critical structure responsible for maintaining the stability of the foot's arch and facilitating proper gait. However, under certain circumstances, this tendon can become susceptible to injury, resulting in a condition known as Tibialis Posterior Tendon Rupture.
Tibialis Posterior Tendon Rupture occurs when the tendon that runs along the inside of the ankle and foot tears or becomes damaged. This injury can be caused by a variety of factors, including overuse, traumatic injury, or degenerative changes associated with aging. As the tendon weakens or tears, individuals may experience pain, swelling, and a progressive flattening of the arch of the foot. Neglected posterior tibialis tendon rupture is a challenging condition associated with progressive foot deformity and functional impairment.
Understanding the causes, symptoms, and treatment options for Tibialis Posterior Tendon Rupture is crucial for both healthcare professionals and individuals alike. This condition can significantly impact mobility and quality of life, making early diagnosis and appropriate management essential for optimal outcomes. In this overview, we will performed the key aspects of Tibialis Posterior Tendon Repair, shedding light on its clinical manifestations, diagnostic approaches, and the range of therapeutic interventions available to address this challenging orthopaedic condition.

Case Description

We present the case of a 22-year-old man patient with a history of untreated posterior tibialis tendon rupture, who presented with pain, and functional limitations. Patient had an history of his right foot fell into a hole when exercises 6 months ago. Firstly his right foot become swelling and painful until the patient is unable for walking. Patient had already several time went to bone setter and the condition did not improve. The patient then transferred to RSUP Prof IGNG Ngoerah for further treatment. From Physical Examination range of motion decrease in dorsiflexion and supination at the right ankle joint.

Fig 1: A) Right foot slightly valgus on standing position, B) Patient have limitation in performing supination, C) and D) Patient have slight limitation in performing dorsiflexion

The patient then continue with imaging in Xray and Right Ankle MRI. No associated fracture was found from the X-Ray and the MRI shows fair alignment, no visible cortical discontinuity or bone bruising. Hyperintensity is seen accompanied by discontinuity of the tendon fibers of M. tibialis posterior with sprains in the right ATFL, CFL, PTFL and right spring ligament rupture of tibialis posterior tendon with normal soft tissue around the lesson.

Fig 2: Right Ankle X-Ray, A) AP View and B) Lateral View show normal alignment and no discontinuity of bone.

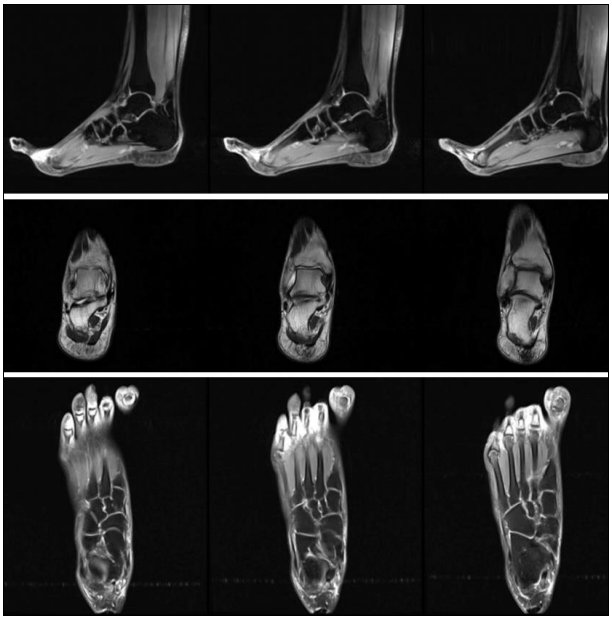

Fig 3: Right Ankle MRI, A) Sagita, B) Coronal and C) Axial View show rupture on tibialis posterior tendon.

Surgical intervention was done necessary after thorough evaluation. The surgical procedure involved the procedure of a navicular tunnel to facilitate tendon reattachment, followed by tenodesis to enhance stability. A medial approach incision was carried out layer by layer, fibrous tissue and rupture were found in the tibialis posterior tendon, continued with tendon repair by creating a tunnel in the navicular and continued with tenodesis between the Tibialis Posterior and Flexor Digitorum Longus. Added immobilization with backslab in plantarflexion position. Post-operative care included immobilization, gradual weight-bearing, and physical therapy. Anatomical alignment was maintained and effective tendon reattachment was shown by radiological evaluations. With an improvement in ambulatory ability and quality of life, the patient was able to resume routine activities, and in a three-month follow-up, their AOFAS Score progressed from 45 to 88 points.

Fig 4: Operative durante show posterior tibialis tendon rupture

Fig 5: Navicular tunneling and posterior tibialis tendon repair

Discussion

Posterior tibialis tendon rupture is a progressive, acquired foot and ankle disease that most commonly affects middle-aged individuals. It is the most prevalent etiology of adult acquired flatfoot. In accordance with the disease's severity, conservative and surgical treatments are utilized. The diagnosis and treatment of posterior tibialis tendon rupture, along with the interprofessional team's responsibility in the care of individuals with this condition, are covered in this exercise. A bimodal age distribution was identified by the researchers, featuring highest values in the fourth and eighth decades. Significantly, during both periods of peak disease prevalence, this survey received a considerable number of non-respondents. However, the greatest incidence rates were observed among women aged 75 to 80 and 85 to 90 years (5.0 and 12.5%, respectively). In general, research findings indicate that posterior tibialis tendon rupture may be more prevalent among the elderly than was previously believed.

Nonsurgical and surgical interventions are employed in accordance with the precise disease staging to rectify abnormalities associated with that stage and impede progression to the subsequent stage. Multiple studies indicate that stage ii management commences with nonsurgical interventions, specifically therapeutic modalities and bracing. When nonsurgical treatment alternatives fail to demonstrate any discernible clinical improvement, surgical intervention becomes the focal point of treatment. In addition to open surgery being required for the insertion of the posterior tibialis tendon and a displace fracture of the auxiliary navicular bone, open treatment is not yet being administered to the patient in this particular circumstance [3]. Surgical treatment is intended to prevent and rectify deformities. Debridement, reconstruction, or restoration may be utilized to address a dysfunctional posterior tibialis tendon [2]. in order to manage this patient surgically, calcaneal osteotomy and posterior tibialis tendon repair were conducted, utilizing a customized k-wire staple that was secured to the navicular bone. Following a three-month evaluation period, we observed enhancements in the aforementioned physical examination result pertaining to the range of motion on the left ankle base, AOFAS midfoot function score, and pain.

Prompt identification and intervention will aid in mitigating the disease's advancement. Patients who underwent rehabilitation and customized orthotics improved significantly. 89% of patients with stages I and II posterior tibialis tendon rupture benefited from orthotics, according to a recent study by Alvarez *et al*. All of these patients regained full strength within four months [11]. Evaluations of the results of surgical treatments indicate that they are considerably less predictable, and it is not possible to guarantee a full recovery from the disease. Certain residual effects may remain in patients after undergoing reconstructive surgery. Frequent surgical complications include thromboembolic events, infection, wound dehiscence, brain injury, and uncomfortable hardware. Wound healing complications have been documented in as many as one-third of patients undergoing flatfoot reconstruction; therefore, it is critical to provide appropriate wound care [12]. In addition to undergoing surgery, our patient had completed rehabilitation to regain function in muscles, joints, and tendons. Local strengthening activities may be more effective than concentric exercises, foot orthoses, stretching alone, and self-reported total foot function in reducing pain, disability, and self-reported total foot function, according to another study by Megan *et al*. [6]

Conclusion

Posterior tibialis tendon rupture is a progressive foot and ankle disease affecting middle-aged individuals. Treatment varies based on severity, with nonsurgical interventions starting with therapeutic modalities and bracing. Surgical interventions, such as navicular tunneling with posterior tibialis tendon repair, can prevent progression and give good functional outcome. Rehabilitation and orthotics can improve patient's condition after the operation to regain back muscle strength and ankle range of motion.

Declaration by Authors

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- **Conflict of Interest:** The authors declare no conflict of interest.

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