DOI: https://doi.org/10.30795/jfootankle.2025.v19.1928

Special Article

Insertional Achilles tendinopathy: Causes, diagnosis, and treatment

Roberto Zambelli de Almeida Pinto[1], Rodrigo Simões Castilho[1], João Murilo Brandão Magalhães[1], Matheus Levy Almeida Taveira de Souza[1], Paula Costa Machado[1], Hugo Bertani Dressler[1]

1. Rede de Saúde Mater Dei, Belo Horizonte, MG, Brazil.

Abstract

Insertional Achilles tendinopathy (IAT) is a multifactorial condition characterized by degeneration at the tendon-bone interface, leading to chronic heel pain, stiffness, and functional impairment. This review explores etiopathogenesis, clinical presentation, diagnostic strategies, and both conservative and surgical treatments for IAT. Risk factors include mechanical overload, aging, metabolic disorders, and biomechanical abnormalities. Diagnosis is primarily clinical, supported by imaging modalities such as ultrasound and magnetic resonance imaging, although imaging severity may not correlate with symptoms. Initial management emphasizes non-surgical options, including eccentric exercises, footwear modifications, and extracorporeal shockwave therapy, which have shown promising outcomes in symptom reduction and functional improvement. Injectable therapies—particularly hyaluronic acid and platelet-rich plasma—have emerged as potential adjuncts, though further evidence is needed to validate their efficacy and define ideal protocols. Surgical interventions are considered in refractory cases and include open debridement, calcaneoplasty, tendon reattachment with or without flexor hallucis longus transfer, and minimally invasive techniques. The choice of approach depends on the extent of tendon degeneration, anatomical considerations, and patient-specific factors such as activity level and comorbidities. Minimally invasive procedures, including percutaneous calcaneoplasty and Zadek osteotomy, offer reduced complication rates and faster recovery, especially in selected patients. Outcomes are generally favorable across techniques when all pathological components are addressed. However, complications such as wound healing issues and nerve injuries remain concerns. The review underscores the need for individualized treatment strategies and further high-quality studies to optimize IAT management and establish standardized therapeutic algorithms.

Level of evidence I.

Keywords: Achilles tendon; Insertional Achilles; Tendinopathy; Haglund deformity.

Introduction

Insertional Achilles tendinopathy (IAT) is characterized by degenerative changes at the tendon–bone interface and typically presents with localized pain, stiffness, and functional limitation, especially in older or less active individuals[1,2]. Pathophysiologically, it involves tendon degeneration, a failed healing response, and nociceptive activation at the insertion site, primarily driven by chronic mechanical overload and repetitive microtrauma[1,3]. Biomechanical alterations, such as abnormal foot posture or ankle instability, may exacerbate local stress and degeneration[1,4]. Understanding these mechanisms is crucial for precise diagnosis and effective treatment planning.

Risk factors

Insertional Achilles tendinopathy has a multifactorial etiology involving mechanical, cellular, and systemic factors, although its pathophysiology is not fully understood[5]. Identifying intrinsic and extrinsic risk factors is crucial for guiding prevention and treatment strategies, with an

Study performed at the Rede de Saúde Mater Dei, Belo Horizonte, MG, Brazil.

Correspondence: Roberto Zambelli de Almeida Pinto. Rua Ouro Preto, 1016, Sala 405, Santo Agostinho, 30170-041, Belo Horizonte, MG, Brazil. **Email:** zambelliortop@gmail.com. **Conflicts of interest:** Arthrex, Geislist. **Source of funding:** None. **Date received:** August 02, 2025. **Date accepted:** 2025-09-26.

How to cite this article: Pinto RZA, Castilho RS, Magalhães JMB, Souza MLAT, Machado PC, Dressler HB. Insertional Achilles tendinopathy: Causes, diagnosis, and treatment. J Foot Ankle. 2025;19(2):e1928.

emphasis on addressing modifiable contributors to reduce their clinical impact. Intrinsic risk factors for insertional Achilles tendinopathy include older age and female sex, likely due to degenerative tendon changes and hormonal influences. Biomechanical alterations, such as pes cavus and chronic lateral ankle instability, may lead to abnormal tendon loading and microtrauma[4]. Systemic conditions such as diabetes and hypercholesterolemia negatively affect tendon homeostasis and healing, contributing to the development and persistence of tendinopathy[5]. Extrinsic risk factors significantly contribute to the onset and progression of insertional Achilles tendinopathy. High-impact activities involving repetitive loading—such as running, jumping, and forceful push-offs—are major contributors, especially in athletes[6]. Footwear also influences symptom severity: with closed-back shoes increasing heel pressure, while open-backed options provide relief. Moreover, training errors—such as sudden increases in load without adequate recovery—can exceed the tendon's adaptive capacity, leading to microtrauma and tendinopathy[5]. Other contributing factors include pharmacological agents, notably fluoroquinolones, which are associated with impaired tendon metabolism and an increased risk of degeneration and rupture. Environmental exposures, such as training in cold temperatures, may also elevate injury risk by reducing local perfusion and increasing tendon stiffness, thereby compromising tissue resilience[7].

Common symptoms

Patients with IAT usually experience localized pain at the back of the heel, especially where the tendon attaches to the calcaneus. Morning stiffness or discomfort after resting is common, often along with swelling and tenderness when pressing on the insertion area. People often report limited movement during physical activity, and symptoms typically worsen when wearing closed-back shoes that put pressure on the affected area. In more severe cases, a visible bony bump at the back of the calcaneus may be seen, often caused by exostoses or calcific deposits, and may be linked to Haglund deformity.

Diagnostic methods

The diagnosis of IAT is clinical, supported by imaging studies. The severity of tendon disease on imaging does not always correlate with symptom severity, because abnormal findings may be seen in up to 35% of asymptomatic patients with Achilles tendon pain, and imaging findings may be present in up to 19% of symptomatic tendons[8].

Plain radiographs have limited sensitivity for soft-tissue assessment but are valuable for detecting bony abnormalities, including Haglund deformity, intratendinous calcifications, and enthesophytes[9,10] (Figure 1). Ultrasound is a dynamic and accessible imaging modality well-suited for assessing the Achilles tendon. Despite being operator-dependent, it can reliably detect tendon thickening, hypoechoic areas, and neovascularization, with a sensitivity above 80%[11].

Magnetic resonance imaging (MRI) provides excellent soft-tissue resolution and approximately 95% sensitivity for identifying tendon degeneration, inflammation, retrocalcaneal bursitis, and bony abnormalities[11,12]. It is particularly useful in cases that are inconclusive or atypical. Normally, the Achilles tendon appears hypointense on all MRI sequences due to its low water content[9] (Figure 2).

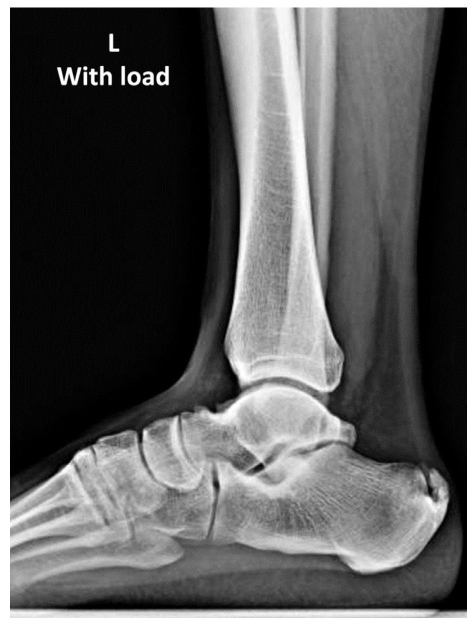

Figure 1. Lateral radiograph view showing insertional enthesophyte and tendinosis.

Figure 2. T2 sagittal magnetic resonance imaging showing enthesophyte, tendinosis, and peri-insertional bursitis.

These diagnostic tools collectively aid in confirming the diagnosis, evaluating the severity of tendon damage, and guiding treatment planning. Although it is a landmark, tendon imaging findings persist even when patients achieve good functional recovery. Thus, imaging appearance should not be used to determine whether the treatment succeeds[11].

Treatment

Conservative approaches

Insertional Achilles tendinopathy is a challenging condition to manage and a common cause of chronic posterior heel pain. Non-surgical interventions are considered the first-line approach, aiming to reduce symptoms and restore function while avoiding the risks associated with invasive procedures. These conservative treatments include physical therapy (particularly eccentric loading exercises), orthotic interventions, and extracorporeal shockwave therapy (ESWT), among others.

Eccentric loading exercises are the most evidence-based physical therapy intervention for IAT, effectively reducing pain and improving function[2,13]. They are often combined with adjunctive therapies, such as soft-tissue techniques, including massage and myofascial release, which aim to reduce pain and enhance mobility[1]. Although stretching and strengthening may improve flexibility and tendon resilience, their supporting evidence is weaker compared to eccentric training[13].

Heel lifts and footwear modifications are commonly used in the conservative treatment of IAT to reduce tendon loading by limiting ankle dorsiflexion and improving shock absorption[14]. Custom orthoses may benefit patients with biomechanical abnormalities, though evidence for their effectiveness in insertional tendinopathy is limited, warranting individualized use[14].

Extracorporeal shockwave therapy is a non-invasive treatment increasingly applied in IAT. It promotes neovascularization, modulates pain, and supports tissue healing. Studies report pain reduction of up to 60% and high patient satisfaction[15,16]. ESWT can be used alone or in combination with eccentric exercises to enhance outcomes[17]. Its effectiveness depends on factors such as energy flux density, treatment frequency, and number of sessions. However, due to variability in protocols, further high-quality randomized clinical trials are needed to define optimal parameters.

Injectable therapies

The efficacy of injectable therapies for IAT has been explored through various clinical trials and studies, focusing on different substances such as corticosteroids, hyaluronic acid, and platelet-rich plasma (PRP). These studies provide insights into the potential benefits and limitations of these treatments, highlighting improvements in pain and function, as well as patient satisfaction. Below is a synthesis of the key findings from the relevant studies.

It is a consensus in the literature that corticosteroid injections for the treatment of insertional Achilles tendinopathy should be avoided, as they contribute to the degenerative process and increase the risk of tendon rupture. For patients presenting with retrocalcaneal bursitis associated with tendinopathy, bursal injections may be considered.

Hyaluronic acid (HA) injections, due to their lubricating and anti-inflammatory effects, have been explored for use in fasciae and tendons. In a prospective case series of 28 feet, a single injection of 40 mg/2.0 mL led to improved function (The American Orthopaedic Foot & Ankle Society (AOFAS) score from 71 to 90) and a 3-point pain reduction over six months[18]. A pilot study with 15 patients using three weekly injections of 20 mg/2.5 mL also showed similar benefits[19]. Additionally, a preliminary study reported a 2.78-point reduction on the visual analog scale (VAS) after a single injection of 25 mg/2.5 mL[20]. While results are promising, larger methodologically robust trials are needed to confirm HA efficacy in insertional Achilles tendinopathy.

Platelet-rich plasma, derived from centrifuged peripheral blood, contains growth factors, cytokines, and other proteins involved in tissue repair, modulating inflammation, promoting angiogenesis, and influencing molecular pathways[21,22]. In a case series with eight patients, a single PRP injection improved AOFAS scores from 34 to 92 over 24 months. Another prospective study with 23 patients used two 2-mL injections in consecutive weeks, reporting improvements in the Victorian Institute of Sport Assessment-Achilles (52.8 to 82), VAS (5.9 to 2.6), and 78% patient satisfaction at six months[23].

While these studies demonstrate promising results for injectable therapies in managing IAT, it is important to consider the variability in outcomes and the need for further research. The studies highlight the potential of these treatments to improve pain and function, but also underscore the necessity for more robust, long-term trials to establish definitive efficacy and safety profiles.

Surgical interventions

The decision to use open or minimally invasive surgical techniques for IAT in athletes versus non-athletes is influenced by several key factors, including the severity of the condition, patient-specific anatomical considerations, and the potential for complications. Both surgical approaches have their advantages and limitations, which must be weighed against the patient's individual needs and activity levels. The implications for individualized treatment are significant, as they require a tailored approach that considers each patient's unique circumstances.

The choice of surgical technique for IAT depends on multiple factors. The severity and type of tendinopathy, including the degree of tendon degeneration and the presence of calcaneal deformities, often dictate the need for a more extensive open procedure or allow minimally invasive surgery (MIS) in less severe cases with limited calcification[24]. The patient's activity level is also relevant; MIS may be preferred in athletes due to its reduced soft-tissue trauma and faster recovery, although the risk of sural nerve injury must be carefully weighed in high-demand individuals[25]. Anatomical factors such as tendon involvement and calcaneal morphology influence the approach—cases with significant deformity may require procedures such as a calcaneal closing-wedge osteotomy, which typically favors an open approach[26]. Lastly, complication profiles differ: open surgery is more commonly associated with wound issues, whereas MIS carries a higher risk of nerve injury, making patient risk tolerance a key consideration[27,28].

Implications for individualized treatment include the need for a tailored surgical strategy based on a comprehensive assessment of the patient's clinical condition, activity level, and risk profile, aiming to optimize outcomes and reduce complications[29]. The type of surgical approach also impacts the rehabilitation protocol: MIS often allows earlier mobilization, which is particularly advantageous for athletes seeking a rapid return to activity, whereas open procedures may require a more cautious rehabilitation due to a higher risk of wound complications[27,28]. Furthermore, understanding patient expectations and preferences plays a crucial role in decision-making—some individuals may favor a quicker recovery, while others may prioritize minimizing the risk of adverse events[28,30].

Open surgery

There are several surgical techniques available to address the insertional portion of the Achilles tendon[31]. These approaches must include open debridement and repair, to remove degenerated tissue of thickened tendon, bursa, and bone spurs at the insertion, allowing direct visualization of the affected area. If necessary, calcaneoplasty decompresses the distal Achilles tendon; reinsertion of the tendon with bone anchors and tendon transfers can also be performed[31-33].

The most used patient position is prone, which allows the surgeon to access the heel through either a posterior, posteromedial, or posterolateral incision. It also allows performing tendon transfers and/or lengthenings[32,34,35,36]. In specific cases, e.g., the posterolateral approach without tendon transfers, the lateral position can be used at the surgeon's discretion.

Surgical approach

The heel can be accessed by a posterolateral, posterior, or posteromedial approach. (Figure 3A) For example, if the insertional spurs are located laterally at the insertion (Figure 3B), the posterolateral access allows less detachment of the insertion. There are also vertical J-shape, double incision, and others[32,37,38]. Many surgeons prefer the posterior transtendinous approach, which provides direct exposure of the posterior aspect of the calcaneus (Figure 3C)[32,33,35-37,39].

Anatomically, the Achilles tendon insertion is formed by gastrocnemius fibers posterolaterally on the calcaneus, and the fibers of the soleus are anteromedially, and is 5 to 6mm thick (anteroposterior). The insertion has medial and lateral projections, forming a crescent shape to dissipate stress[37]. The medial insertion is more expansive[33,37,40].

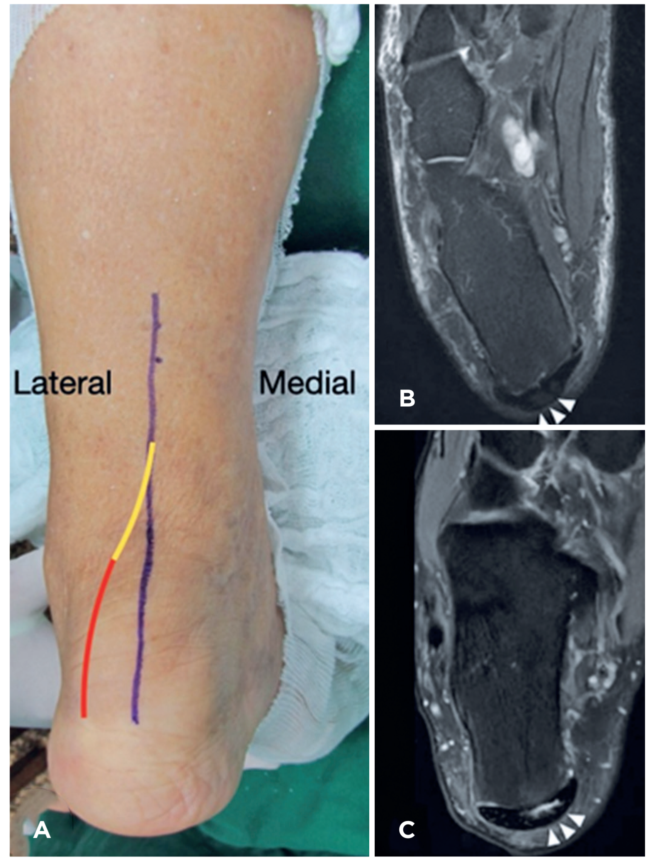

Figure 3. A) Demonstration of the central posterior approach (blue line). The posterior lateral approach (red line) and the proximal extension of this approach if necessary (yellow line); B) Axil magnetic resonance imaging showing the lateral localization of the calcifications (white arrowheads); C) Axil magnetic resonance imaging showing the medial localization of the calcifications (white arrowheads).

To decide what approach to use, the surgeon should consider some characteristics of the disease: the location of the calcifications (lateral, central, extensive), the anatomy of the tendon insertion, the amount of tendon detachment, and the surgeon's experience and preference.

Posterior lateral approach

For example, if the insertional calcifications are more laterally in tendons insertion, the lateral approach can be used (Figure 3B) Through the lateral incision, the lateral portion of the tendon can be detached from the calcaneus, the spurs can be excised, along with the bursa and the Haglund's prominence, and if necessary, the tendon can be reattached with bone anchors. It is possible to perform the flexor hallucis longus (FHL) tendon transfer through this same access if the surgeon extends the incision proximally and posteriorly (Figure 3A).

The advantages of this approach are the smaller incision size, preservation of the medial, strongest portion[33,40], and part of the central insertion of the tendon. Some authors consider that postoperative avulsion is less likely when this approach is used (Figure 4)[37]. The main disadvantages are the risk of iatrogenic sural nerve injury[37] and limited visualization of the medial portion of the insertion.

Central posterior approach

If the surgeon's preference or the characteristics of the insertional disease demand, the posterior central approach can be performed. This incision is preferred by many surgeons because it conserves the medial and lateral insertions, enabling broad debridement of the pathological tissue without the risk of vascular or nerve damage[32,37,41]. With this approach, it is also easy to harvest the FHL tendon for transfer (Figure 5)[32,37]. The disadvantages of this approach include the risk of scar irritation on the posterior aspect of the calcaneus[35,37].

Tendon's reinsertion

Many authors agree that after tendon detachment, reattachment with suture anchors is indicated[32,33,35,42]. The preservation of the lateral and/or medial portions of the insertion is important and should be respected if possible[32,38,43]. In some patients, tendon transfers can be used as an augmentation to the repair: patients with more severe tendinosis, patients older than 50 years, and patients with a high body mass index (BMI)[32,37,44]. The most commonly used tendon for this transfer is the FHL, a muscle with significant volume and strength[44].

To date, there is no strong evidence of a better outcome with the FHL transfer in these patients[37,44]. Hunt et al.[44] found greater ankle plantar flexion strength in FHL-augmentation patients than in debridement and ostectomy patients, but no difference in clinical outcomes. They also found similar hallux plantar flexion strength in both groups after 1 year. The authors of this paper also prefer to harvest the FHL tendon to augment the repair, using an interference screw to fix the tendon into the calcaneus.

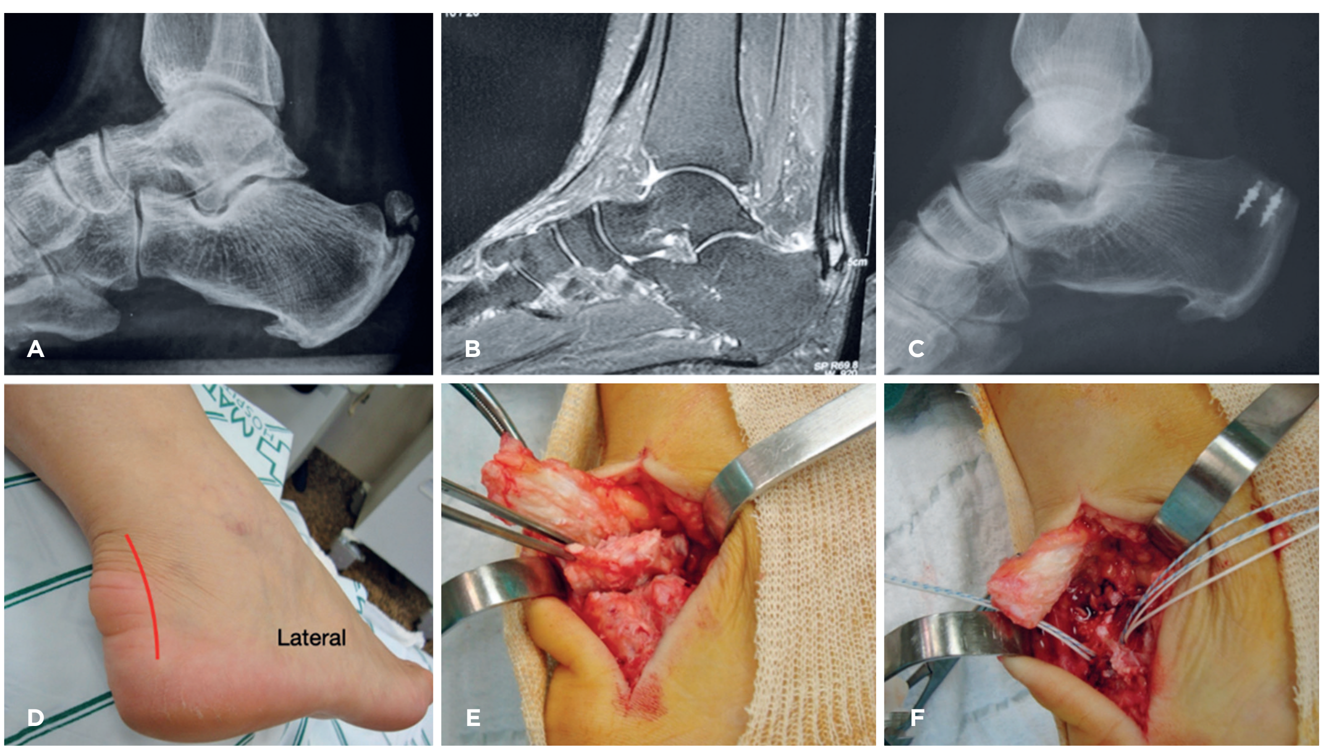

Figure 4. A) Lateral radiograph of insertional bone spur and intratendinous calcification; B) Sagittal magnetic resonance imaging showing the same calcifications and tendinopathy; C) Lateral magnetic resonance imaging of postoperative Haglund prominence resection and reattachment of the Achilles tendon with two bone anchors; D) The posterior lateral aspect of the foot in patient's lateral position, with schematic drawing of the posterior lateral approach (red line); E) Detachment of the Achilles tendon, resection of the posterior Haglund prominence, calcifications and bursa; F) Positioning of two double-row bone anchors to perform the reattachment of the Achilles Tendon.

Results and complications

Regardless of the surgical technique used, most authors recognize that the treatment will be effective if all components of the tendinopathy are addressed: debridement and removal of the affected tendon, bursectomy, removal of all calcifications, and calcaneoplasty when necessary[37,41,43]. Most authors report over 87% of clinical outcomes and patient satisfaction with the surgery[41,43,45]. In the posterior lateral approach, particular care should be paid to the sural nerve, which crosses the lateral margin of the Achilles tendon at about half of its length, and is vulnerable to iatrogenic injuries[43].

Thompson et al.[26] reported that wound complication rates were similar across all groups studied (posterior, lateral, medial, and complete approaches), although the highest rate was in the posterior group. The postoperative rupture rate was similar and also highest in the complete detachment group.

Complications resulting from the procedures have ranged from 6% to 30% in the literature and are most commonly due to wound-healing issues, painful scar, or sural nerve injury[37].

Minimally invasive surgery

Minimally invasive surgical approaches for Achilles insertional tendonitis have been developed to reduce complications and improve recovery times compared to traditional open surgeries. These techniques focus on addressing the underlying issues, such as calcaneal exostosis, tendon degeneration, and Haglund deformity. The outcomes of these procedures generally show promising reductions in pain, functional improvements, and patient satisfaction.

Isolated endoscopic or percutaneous calcaneoplasty

Isolated calcaneoplasty, performed either endoscopically or percutaneously under fluoroscopic guidance, is indicated in patients with symptomatic Haglund deformity without significant degeneration of the Achilles tendon. This surgical option is best suited for patients presenting with pain due to retrocalcaneal bursitis and a prominent posterosuperior calcaneal tuberosity, while maintaining an intact tendon structure[46]. The technique involves resection of the bony prominence through a small incision and is particularly recommended for patients at high risk for wound-healing

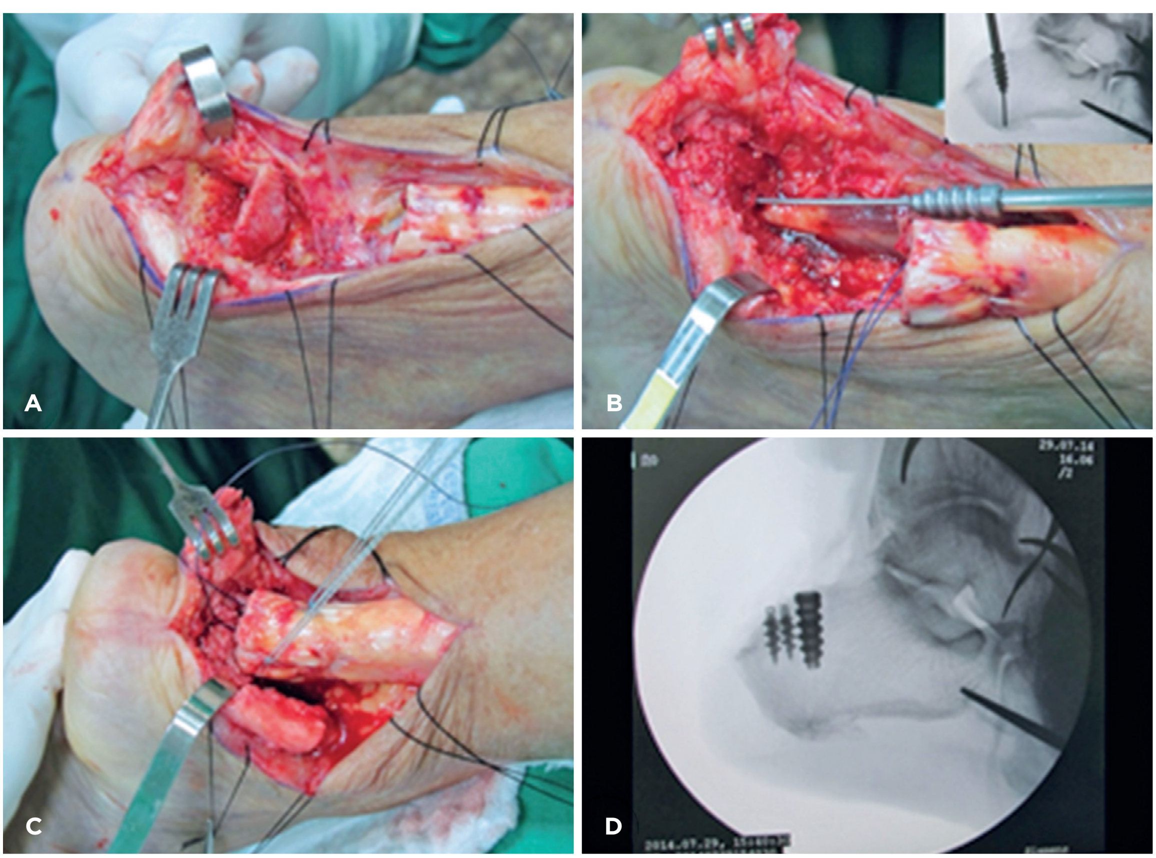

Figure 5. Central posterior approach to the Achilles Tendon. A) with resection of affected tendon, bone spurs, and Haglund's prominence; B) Preparation to flexor hallucis longus tendon transfer with interference screw; C) reattachment of the Achilles tendon with two double-row bone anchors; D) Lateral radiograph showing the position of the anchors and the interference screw in the calcaneus.

complications or those requiring a rapid return to functional activities. In contrast, it is contraindicated in cases with extensive calcific metaplasia, greater than 50% intratendinous degeneration, or attritional elongation of the tendon. Clinical outcomes of this approach are favorable. Studies have shown significant improvements in pain scores (VAS) and functional outcomes (JSSF), with a median return to sports of 4.5 months. Complications are rare and generally mild, such as scar hypersensitivity or isolated cases requiring reoperation[29,47].

Prominence resection with tendon reattachment (Endoscopic or percutaneous)

In cases of partial degeneration of the Achilles tendon at its insertion, isolated resection of the calcaneal prominence is often insufficient for symptom relief. These patients typically require partial or complete tendon detachment, excision of degenerated tissue, and subsequent reattachment of the tendon to the calcaneus. This approach is particularly indicated in young, active individuals presenting with symptoms related to footwear irritation or cosmetic concerns, especially when imaging reveals moderate insertional lesions and intratendinous calcifications ranging from 30% to 50%[46]. Reattachment may be performed via percutaneous or endoscopic techniques. Double-row fixation constructs, such as the one described by Miller et al.[48], are effective when combined with endoscopic resection of the Haglund deformity and percutaneous Achilles reattachment. The endoscopic "Snake" technique (or SpeedBridge) represents one of the most advanced minimally invasive options, allowing controlled detachment and secure reattachment of the tendon with favorable clinical outcomes in complex cases. In severe cases involving greater than 50% tendon loss, augmentation with FHL tendon transfer may be necessary. This technique is primarily indicated in patients with advanced degenerative changes and extensive intratendinous calcifications, particularly in those over 60 years of age or with lower functional demands[46]. This procedure should also be performed endoscopically

Percutaneous Zadek osteotomy

Zadek osteotomy (ZO), also known as the dorsal closing-wedge calcaneal osteotomy, is a minimally invasive alternative for the treatment of IAT, particularly in patients with functional shortening of the posterior chain and no significant tendon degeneration. In such cases, pain is primarily due to excessive traction at the tendon insertion, rather than bony impingement or local inflammation[49].

By altering the vector of the Achilles tendon, ZO reorients the posterosuperior portion of the calcaneus anteriorly and superiorly, reducing the posterior bony prominence and elevating the insertion point of the tendon. This biomechanical shift provides effective symptom relief without the need for tendon detachment or exostosis resection[50,51]. Radiographically, the goal is to reduce the Fowler-Philip angle and calcaneal pitch. A virtual simulation of the ZO demonstrated a mean reduction of 14° in the Fowler-Philip angle and a 6 mm shortening of the calcaneus[51].

Surgical technique

The patient is positioned in the lateral decubitus position, with the operative foot hanging off the end of the table and resting on a C-arm fluoroscopy unit to facilitate percutaneous access and intraoperative imaging[50,52]. A 5 mm lateral incision is used, suitable for both open and percutaneous approaches, with the latter preferred due to reduced wound complications (Figure 6)[50,51]. The osteotomy is created as a dorsal closing

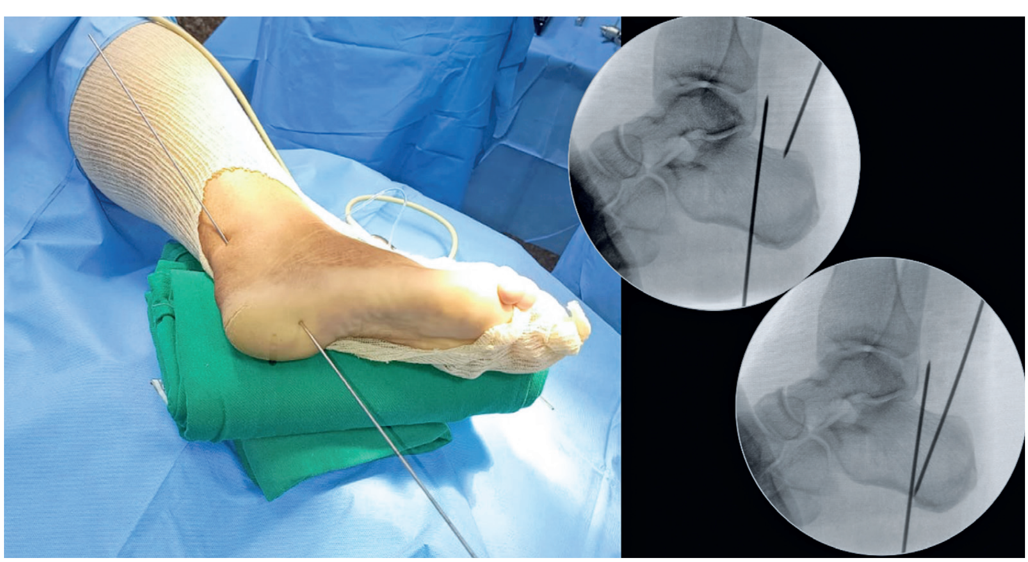

Figure 6. Percutaneous incision site and lateral approach to the calcaneus.

wedge, with the entry point approximately 1 cm anterior to the plantar aspect of the calcaneal tuberosity, directed obliquely toward the dorsal cortex[53]. For percutaneous procedures, a Shannon burr (e.g., 3.0 × 20 mm or 3.1 mm) is used to create the osteotomy, optionally guided by Kirschner wires for improved accuracy[52]. Cadaveric studies suggest that achieving a 10 mm wedge typically requires 5 sequential burr passes (Figure 7)[54]. Preserving a plantar hinge of 5–8 mm is critical to minimize the risk of fracture or nonunion[52]. Once the wedge is created, ankle dorsiflexion facilitates closure of the osteotomy gap. Fixation is commonly achieved with one or two 7.0 mm headless cannulated compression screws. Although a single screw may suffice, two are often recommended to better protect the plantar hinge[50,52]. Alternative fixation techniques, including plates and staples, have also been described (Figure 8)[55].

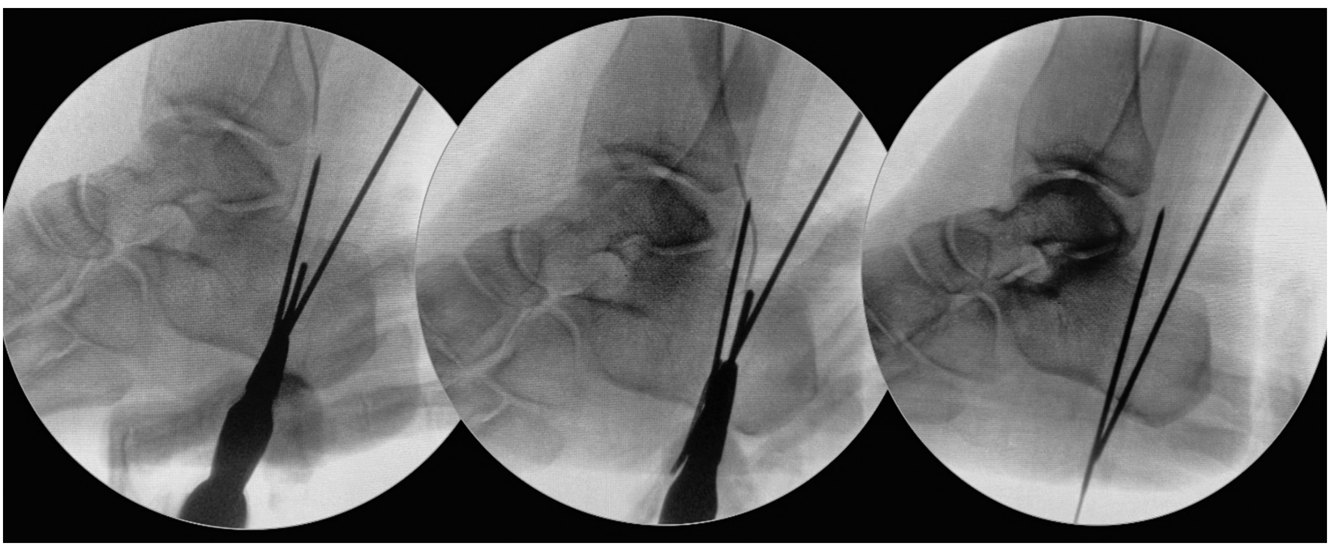

Figure 7. Osteotomy trajectory and burr orientation.

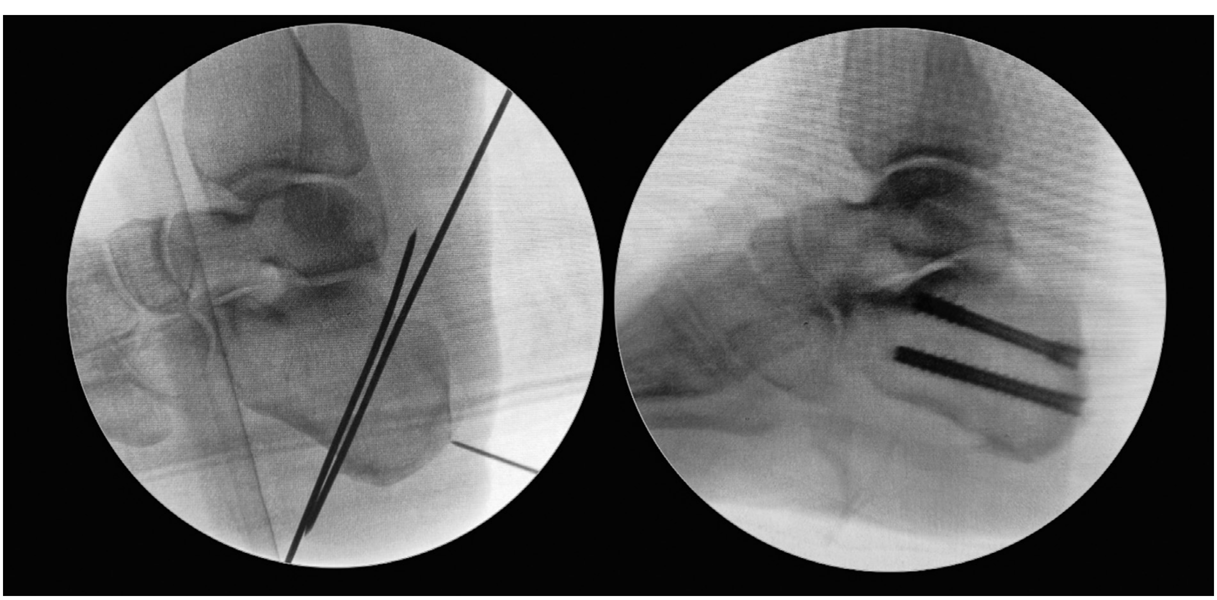

Figure 8. Fixation technique: compression screws and protection of the plantar hinge.

Postoperative management

Postoperatively, the patient is immobilized in a CAM boot and remains non-weight-bearing for 2 weeks. Progressive weight-bearing is then initiated, with the transition to supportive footwear typically around 6 weeks[50,52]. Return to low-impact activities is generally allowed at 6 weeks, and to high-impact activities at approximately 3 months[50].

Clinical outcomes

Clinical studies report high rates of bony union and patient satisfaction, with 95% of individuals experiencing symptom relief and functional recovery. Complications are minimal and include superficial infection and transient neuritis, both of which are managed conservatively[49].

Several studies have suggested that excision of the calcaneal exostosis may not be necessary during ZO to achieve symptom relief. Hall et al.[50] demonstrated that performing a modified ZO without debriding tendon calcifications resulted in favorable functional outcomes, attributing symptom improvement to biomechanical changes that reduce friction between the tendon and the calcaneus (Figure 9). Their findings showed that the procedure significantly decreases the Fowler-Philip angle and calcaneal length, which alone may be sufficient to alleviate pain. Supporting this, Black et al.[55] reported superior clinical and radiographic outcomes at 24 months in patients treated with osteotomy alone compared with those who also underwent Haglund resection.

Figure 9. Lateral weigh'tbearing radiographs demonstrating the effect of Zadek osteotomy on the posterior calcaneal morphology. (A) Preoperative image showing a prominent posterior-superior calcaneal tuberosity. (B) Postoperative radiograph after Zadek osteotomy, illustrating anterior and superior rotation of the calcaneal tuberosity. Note how the exostosis has been displaced away from the Achilles tendon calcification, reducing mechanical friction and impingement, despite not being resected.

Functional outcomes and considerations

All surgical approaches generally result in improved outcomes and the ability to return to activity, with a mean time to return to activity of approximately 7 months[56]. The choice of surgical technique should be based on the extent of tendon injury, patient-specific factors, and surgeon preference, as there is no consensus on a superior method[57,58]. Minimally invasive techniques are emerging as alternatives, offering reduced wound complications and faster recovery, though more research is needed to establish their efficacy[59,60].

Complications and considerations

While MIS offers advantages in terms of recovery speed and reduced complications, it is not without its challenges. There is a risk of sural nerve injury associated with MIS, which requires careful surgical technique to avoid. Additionally, the choice between MIS and open surgery may depend on the specific characteristics of the tendinopathy and the surgeon's expertise. Despite the benefits of MIS, high-quality, standardized trials are still needed to establish it as the definitive standard for managing Achilles tendon ruptures[28].

Conclusion

Insertional Achilles tendinopathy is a multifactorial condition characterized by mechanical overload, tendon degeneration, and systemic factors, such as metabolic disorders. It affects both athletes and sedentary individuals, often leading to chronic heel pain, functional limitations, and reduced mobility. Early diagnosis, based on clinical evaluation and supported by imaging, is essential to prevent disease progression. Conservative treatment remains the first-line approach, including eccentric exercises, orthotics, and shockwave therapy, with outcomes varying depending on the combination and duration of interventions.

In refractory cases, surgical intervention may be required, with the choice between open and minimally invasive techniques guided by patient-specific clinical and anatomical factors. Minimally invasive approaches offer potential advantages such as faster recovery and fewer complications, though further validation is still needed. Ultimately, personalized treatment strategies that consider biomechanical, systemic, and lifestyle factors are key to optimizing outcomes and achieving long-term symptom relief. Ongoing research is essential to refine diagnostic protocols and expand effective therapeutic options for this challenging condition.

Authors' contributions: Each author contributed individually and significantly to the development of this article: RZAP *(https://orcid.org/0000-0001-9692-5283) Conceived and planned the activities that led to the study, interpreted the results of the study, participated in the review process, data collection, statistical analysis, bibliographic review, and survey of the medical records; RSC *(https://orcid.org/0000-0002-8930-7046), JMBM *(https://orcid.org/0000-0002-4224-8149), MLATS *(https://orcid.org/0000-0003-0921-3451), PCM *(https://orcid.org/0009-0008-0505-1145), and HBD *(https://orcid.org/0000-0001-5314-4364) Conceived and planned the activities that led to the study, interpreted the results of the study, participated in the review process, data collection, bibliographic review, and survey of the medical records. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID) iD.

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