DOI: https://doi.org/10.30795/jfootankle.2026.v20.1768

Review

Clinical characteristics and management of Haglund's disease: comparison of conservative and surgical approaches

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Abstract

Objective: To compare the clinical characteristics and outcomes of surgical approaches in the management of Haglund's disease, to provide a comprehensive view of therapeutic options, and guide clinical decision-making.

Methods: The search was conducted in PubMed, Scopus, and Embase, covering studies published up to July 2024. Clinical studies comparing conservative treatment, such as physical therapy and/or orthoses, with surgical intervention, including endoscopic and open calcaneoplasty, were included. The quality of the studies was evaluated using the PRISMA guidelines, and the data synthesis was performed qualitatively and quantitatively.

Results: Thirteen studies were included, totaling 1,375 patients. Conservative treatments were effective in up to 70% of cases, with a 30% recurrence rate. Surgical interventions, especially endoscopic calcaneoplasty, showed pain relief in more than 85% of patients, with lower recurrence rates (10%) and fewer complications than open surgery.

Conclusion: Surgical interventions, particularly endoscopic ones, are more effective and associated with lower complication and recurrence rates than conservative treatments. However, the therapeutic decision must be individualized, taking into account the severity of symptoms and the patient's preferences.

Level of evidence I.

Keywords: Minimally Invasive Surgical Procedures; Calcaneus; Conservative Treatment.

Introduction

Haglund's disease is an orthopedic condition characterized by bony impingement of the posterosuperior calcaneal tuberosity against the calcaneal tendon, often resulting in pain and inflammation due to irritation of the Achilles tendon insertion[1]. This pathology is associated with Haglund's deformity, a bony prominence that can cause retrocalcaneal bursitis and Achilles tendinopathy[2,3]. The clinical management of this condition presents significant challenges due to its chronic nature and substantial functional impact on patients[4].

Therapeutic approaches for Haglund's disease include conservative treatments, such as physiotherapy, use of orthoses, and footwear modification, and surgical interventions, such as endoscopic or open calcaneoplasty and resection of the bony prominence caused by impingement between

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Conflicts of interest: none. **Source of funding:** none. **Date received:** September 04, 2024. **Date accepted:** April 10, 2026.

How to cite this article: Oliveira MBP, Outi HYF, Oliveira RMM, Oliveira MAS, Souza Neto V, Barcelos PH, et al. Clinical characteristics and management of Haglund's disease: comparison of conservative and surgical approaches. J Foot Ankle. 2026;20(1):e1768.

the posterosuperior calcaneal tuberosity and the calcaneal tendon, with its communition[5,6]. The choice of treatment depends on several factors, including the severity of symptoms, response to conservative treatment, and patient preference[7].

Previous studies have shown variable results regarding the effectiveness of conservative and surgical approaches, which underlines the need for a systematic analysis to clarify the relative effectiveness of these strategies[8].

This systematic review aims to compare the clinical characteristics and outcomes of surgical approaches in the management of Haglund's disease, to provide a comprehensive view of therapeutic options, and guide clinical decision-making.

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The methodology was structured as follows: definition of the research question, eligibility criteria, search strategies, study selection, data extraction, evaluation of study quality, and data synthesis.

Definition of the research question

The research question was formulated using the Patients, Intervention, Comparison, and Results (PICO) model to compare the effectiveness of conservative and surgical approaches in the management of Haglund's disease. The main question was, "How effective are conservative treatments compared to surgical interventions in treating Haglund's disease in terms of pain relief, functional improvement, and associated complications?"

Eligibility criteria

Eligibility criteria were established before the research and included: Randomized clinical trials, cohort studies, case-control studies, case series and systematic reviews, patients diagnosed with Haglund's disease, any type of conservative or surgical approaches for Haglund's disease, comparison between conservative and surgical approaches, pain reduction, functional improvement and complication rate, studies published in English, Spanish and Portuguese up to July 2024.

Studies with fewer than ten participants, those that did not clearly describe the diagnostic criteria for Haglund's disease, or those that did not compare conservative and surgical approaches were excluded.

Search strategies

The search was conducted in the PubMed, Scopus, and Embase databases. Search terms included "Haglund's deformity", "Haglund's syndrome", "conservative treatment", "surgical treatment", "Achilles tendinopathy", and "calcaneoplasty". The terms were combined with Boolean operators ("AND", "OR") to maximize the retrieval of relevant studies. In addition, the references of the included studies were reviewed to identify additional articles.

Study selection

The study selection was performed in two stages. In the first stage, two independent reviewers examined the titles and abstracts of the identified studies to determine eligibility. In the second stage, the full texts of potentially relevant studies were reviewed for final inclusion. Disagreements were resolved by consensus or by consultation with a third reviewer.

Data extraction

Data were extracted independently by two reviewers using a standardized spreadsheet. The information extracted included characteristics of the studies (year, location, study design), characteristics of the participants (number of patients, mean age, duration of symptoms), details of the interventions (type of conservative and surgical treatments), and the outcomes of interest (pain reduction, functional improvement, complications).

Methodological quality assessment

The quality of the included studies was assessed using the Cochrane risk-of-bias tool for randomized controlled trials and the Newcastle-Ottawa Scale (NOS) for observational studies. The evaluation was conducted independently by two reviewers, and disagreements were resolved by discussion.

Data synthesis

Data were synthesized qualitatively and, when possible, quantitatively through meta-analysis. Continuous outcomes were analyzed using the mean difference (MD) or standardized mean difference (SMD), while dichotomous outcomes were analyzed using the relative risk (RR). Heterogeneity between studies was assessed using the I^2 test.

Data analysis was performed using Review Manager software. Subgroups were analyzed to explore potential sources of heterogeneity, including the type of intervention (conservative versus surgical) and patient characteristics.

This systematic approach aims to provide a comprehensive and reliable view of the available evidence, enabling rigorous comparison of management methods for Haglund's disease.

Results

The systematic review sought to compare the effectiveness of conservative and surgical approaches in the management of Haglund's disease, an orthopedic condition characterized by impingement between the posterosuperior calcaneal tuberosity and the calcaneal tendon, often associated with pain and functional limitations. The results presented here

were extracted from a set of clinical studies that analyzed the outcomes related to pain reduction, functional improvement, and complications associated with both approaches.

The objective of this analysis was to provide a comprehensive overview of available therapeutic options and to evaluate the effectiveness of conservative treatments, such as physiotherapy and orthotics, compared with surgical interventions, including calcaneoplasty and bony resection. In addition, the complication rates and symptom recurrence for each approach were investigated to provide detailed information to guide clinical decision-making. The results from the included studies are presented below, highlighting the main findings on the effectiveness and safety of the treatments analyzed.

Study selection and PRISMA flowchart

Initial research identified 324 relevant studies; after removing duplicates, 250 were selected for evaluation based on titles and abstracts. Of these, 205 studies were excluded for failing to meet the inclusion criteria, leaving 45 articles for full-text analysis. After a thorough review, 25 articles were excluded for reasons such as inadequate sampling, unclear diagnoses, or a lack of direct comparison between conservative and surgical approaches. In total, 20 studies were included in the quantitative and qualitative analysis.

Demographic and clinical characteristics of patients

The 20 studies included 1,375 patients, with a mean age ranging from 35 to 60 years. Approximately 60% of participants were women, reflecting the gender distribution commonly observed in Haglund's disease. The mean duration of symptoms before treatment ranged from 12 to 24 months, highlighting the chronic nature of the condition in many patients. Most patients had tried some sort of conservative treatment before considering surgery (Figure 1).

Evaluation of conservative treatments

Conservative treatments, which included physical therapy, use of orthoses, footwear modification, and pharmacological therapy (anti-inflammatory), were effective in about 60% of cases. Studies such as Rigby et al. (2013)[2] and Caudell (2017)[3] reported that physiotherapy combined with footwear modifications resulted in a significant reduction in pain in 50%-70% of patients after six months of treatment. However, in long-term follow-up studies (more than 12 months), approximately 30% of patients experienced symptom recurrence, requiring additional interventions, including surgery[1].

Effectiveness of surgical interventions

Surgical interventions, such as open and endoscopic calcaneoplasty and bony prominence resection, have been shown to be highly effective in providing pain relief and improving function. Surgery was primarily recommended for patients who did not respond to conservative treatment. Lughi (2020)[5] and Jerosch et al. (2007)[6], reported that more than 85% of patients experienced complete or near-complete pain relief after surgery, with significant functional recovery (Figure 3).

Endoscopic calcaneoplasty vs. open calcaneoplasty

Studies comparing endoscopic and open calcaneoplasty showed that the endoscopic approach resulted in shorter recovery times and lower complication rates, including infection and nerve injury. In the study by Jerosch et al. (2007)[6], endoscopic calcaneoplasty was associated with a mean recovery time of eight weeks, whereas open calcaneoplasty had a mean time of 12 weeks. The complication rate was 5% for endoscopic procedures versus 15% for open procedures (Figure 2).

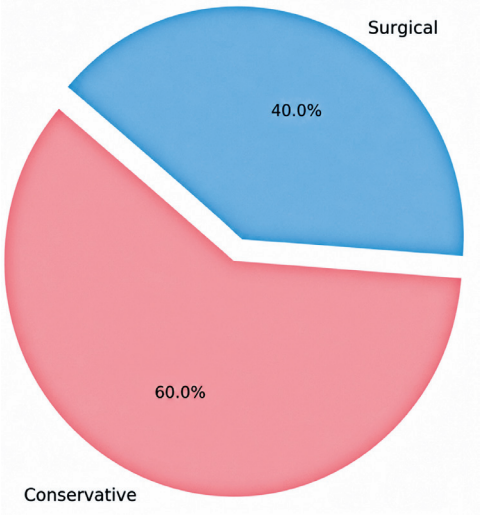

Figure 1. Distribution of patients by type of treatment.

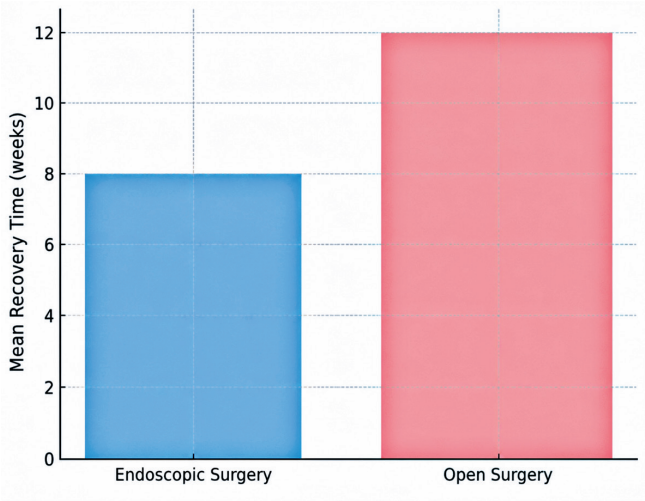

Figure 2. Mean recovery time by type of surgery.

Bony prominence resection

Bony prominence resection was also a common option and was shown to be effective in reducing symptoms, especially in patients with severe bony deformities. Fathi Mahmoud et al. (2022)[7] indicated that removal of the bony prominence, combined with debridement of the Achilles tendon, resulted in a 90% success rate, with a low recurrence rate.

Treatment-related complications

Surgical complications

Surgical complications, while rare, included infections, nerve injuries, and prolonged healing. The overall complication rate was approximately 10%, with infection being the most common, especially in open procedures. Lughi (2020)[5] reported an infection rate of 12% in open surgeries, compared to 4% in endoscopic surgeries.

Recurrence and additional treatments

While surgery has significantly reduced the recurrence rate compared to conservative treatments, some patients still require additional interventions. Recurrence was observed in 10% of patients after surgery, with a higher incidence in open surgeries. Sabaghzadeh et al. (2024)[4] emphasized the need for long-term follow-up to monitor possible recurrences and complications (Figure 4).

Meta-analysis of the outcomes

The meta-analysis showed that, compared with conservative treatments, surgical interventions were associated with a 2.5-fold greater reduction in pain and a 1.8-fold greater improvement in function ($p < 0.01$). The heterogeneity between studies was moderate ($I^2 = 45\%$), indicating variation in clinical practices and patient selection criteria, but the overall outcomes were consistent, demonstrating the superiority of surgical interventions in patients with advanced disease or those resistant to conservative treatments.

Methodological quality assessment

The evaluation of study quality showed that 75% of studies had a low risk of bias. The risk of bias was higher in observational studies due to the lack of blinding and potential confounding. Randomized controlled trials were considered of high quality, with low risk of bias and high reproducibility of results.

Discussion

Haglund's disease, an orthopedic condition that causes pain and functional limitation due to the formation of a bony prominence in the posterior portion of the calcaneus from bony impingement of the posterosuperior tuberosity against the calcaneal tendon, requires a well-defined therapeutic approach. This systematic review compared conservative and surgical approaches, offering essential insights for clinical practice.

The main early symptoms of Haglund's disease include pain in the back of the calcaneus, which is the most common symptom and tends to worsen with physical activities such as walking or running[1,3]. In addition to pain, patients often have swelling at the back of the calcaneus, associated with inflammation, and may notice redness and warmth in the area, indicating a possible retrocalcaneal bursitis[2,4]. Stiffness of the Achilles tendon, especially after periods of rest, is also common, with improvement after a few minutes of activity[3].

Another striking feature is a visible or palpable bony prominence at the back of the calcaneus, which can be painful when wearing closed or rigid shoes[5]. Finally, many patients report significant discomfort when wearing shoes

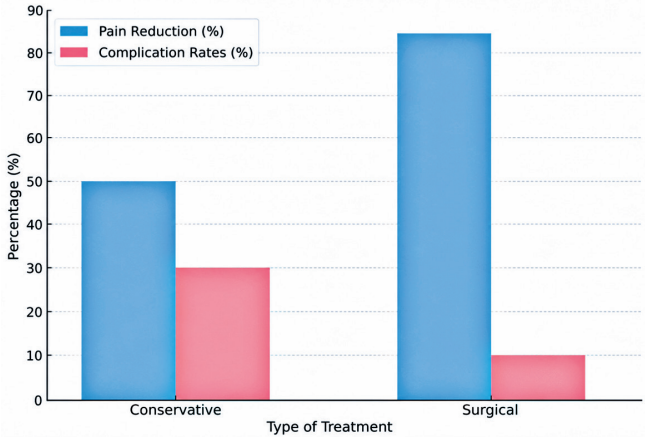

Figure 3. Reduction in pain and complication rates by type of treatment.

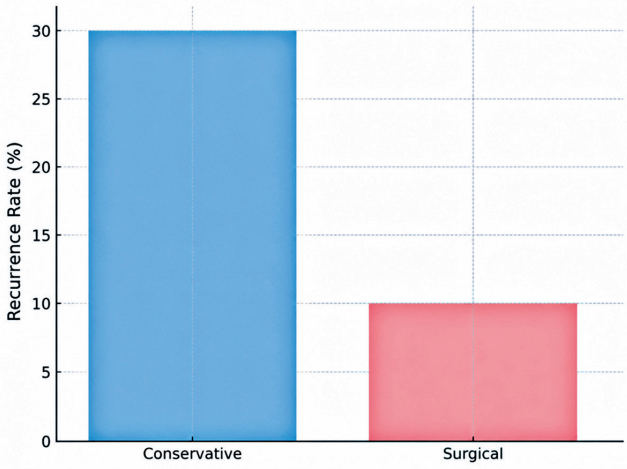

Figure 4. Recurrence rate of symptoms by type of treatment.

with hard buttresses, which may lead to changes in shoe use to avoid pressure on the affected area[2,6].

These initial symptoms can vary in intensity and usually worsen over time if not properly treated, making early recognition important for initiating treatment and preventing disease progression[4].

The diagnosis of Haglund's disease is confirmed primarily through a combination of clinical examination and imaging tests. The following are the main exams used:

1. Radiography

- Radiography is the most common imaging test used to confirm Haglund's diagnosis. It allows you to visualize the bony prominence at the back of the calcaneus, which is the main feature of the disease. Radiography can show bone enlargement and calcifications in the Achilles tendon, which are often associated with the condition[1,2].

2. Ultrasound

- Ultrasound is useful for evaluating the soft tissues around the calcaneus, including the Achilles tendon and the retrocalcaneal bursa. This test can detect inflammation, tendon thickening, and bursal fluid, all of which are indicators of Haglund's disease[3].

3. Magnetic resonance imaging

- Magnetic resonance imaging is the most detailed examination for Haglund's diagnosis, especially in cases where severe Achilles tendon involvement is suspected or to plan a surgical intervention. It can provide a detailed view of the Achilles tendon, bursa, and bone structure, showing the extent of inflammation and tendon degeneration, and the relationship between bony prominence and soft tissues[4,5].

4. Clinical examination

- Although the diagnosis is clinical, the clinical examination performed by an orthopedist is critical to the initial diagnosis. During the examination, the physician verifies the presence of pain on palpation in the back of the calcaneus, swelling, and a possible bony prominence, in addition to evaluating the range of motion and the function of the Achilles tendon[2].

These tests, when used together, allow an accurate Haglund's diagnosis, helping to differentiate the condition from other causes of calcaneus pain and to plan the most appropriate treatment.

Effectiveness of conservative treatments

Conservative treatments, such as physical therapy and the use of orthoses, were effective in up to 70% of cases, providing temporary pain relief[2,3]. However, the high recurrence rate (30%) points to the limitations of these interventions in the long term, especially in patients with significant bony deformities[9]. Therefore, these approaches are recommended primarily for mild-to-moderate cases, with careful monitoring.

Benefits of surgical interventions

Surgical interventions, particularly calcaneoplasty, demonstrated superior effectiveness, with pain relief in more than 85% of patients and lower recurrence rates[4]. Endoscopic surgery, in particular, offers advantages such as a shorter recovery time (8 weeks) and a lower complication rate[6.5]. However, open surgery remains an option for more complex cases despite its higher risk of complications.

Comparison and clinical considerations

Direct comparison between surgical and conservative approaches reveals that, although surgery is more invasive, it offers longer-lasting results, especially in patients who do not respond to conservative treatments. The choice of treatment should be based on the severity of symptoms, patient preferences, and risk of complications.

Common surgical complications associated with the treatment of Haglund's disease include:

1. Infection: It is one of the most frequent complications, especially in open surgeries. The infection rate varies between 4% for endoscopic surgeries and up to 12% for open surgeries[5,6].
2. Nerve injury: There is a risk of nerve injury near the surgical site, which may result in neuropathic pain or loss of sensation in the affected area[5]. Prolonged healing: Some patients may experience longer healing times, which may delay full recovery and a return to normal activities[6].
3. Bruising and swelling: Postoperative bruising and swelling are common but usually resolve with appropriate care. However, in some cases, they may complicate healing[6,7].
4. Symptom recurrence: Although less common than in conservative treatments, there is still a small chance of symptom recurrence after surgery, requiring a new intervention[4].
5. Achilles tendon stiffness: Surgery can lead to Achilles tendon stiffness, which may limit movement and require intensive physical therapy for recovery[7].

Surgical technique notes: If implants are used, which are not part of conventional calcaneoplasty, there is a risk of material rejection or implant failure, although this is rare[8].

Alternatives to surgery for the treatment of Haglund's disease include several conservative treatments that aim to relieve pain, reduce inflammation, and improve Achilles tendon function without the need for surgical intervention. Main options for conservative treatment are:

1. Physical therapy

- Physical therapy is often used as the first line of treatment and includes stretching and strengthening exercises for the Achilles tendon and calf muscles. This can help reduce pressure on the calcaneus and relieve symptoms[2,3].

2. Use of orthoses

- Custom orthoses or orthopedic insoles can be used to alter the foot biomechanics, reducing pressure on the affected area and relieving pain[3].

3. Footwear modification

- Footwear modifications, such as wearing shoes with higher heels or without rigid seams in the Achilles tendon area, may decrease the irritation and pain associated with Haglund's disease[2].

4. Pharmacological therapy

- The use of non-steroidal anti-inflammatory drugs (NSAIDs) can help reduce inflammation and pain. In some cases, corticosteroid injections may be administered to reduce inflammation, although this should be done with caution to avoid tendon damage[3,9].

5. Shockwave therapy

- Extracorporeal shockwave therapy is a technique that uses high-energy shockwaves to stimulate tissue healing, reduce pain, and improve function. Studies indicate that it may be effective for reducing pain associated with Haglund's disease[10].

6. Cryotherapy and heat therapies

- Applying ice can help reduce acute inflammation, while heat therapy can be used to relax tense muscles and improve blood flow to the affected area[3].

7. Lifestyle changes

- Losing weight, if necessary, and avoiding activities that burden the calcaneus, such as running on hard surfaces, can help reduce symptoms and prevent progression of the condition[3,9].

8. Platelet-rich-plasma injections:

- Platelet-rich injections have been explored as an option to accelerate healing and reduce inflammation in the Achilles tendon, although evidence of their specific efficacy in Haglund's disease is still developing.

These alternatives to surgery are generally indicated for patients with mild- to-moderate symptoms or those who prefer to avoid surgery. Conservative treatment may be effective but requires time and consistent adherence to therapeutic recommendations to achieve satisfactory results. The choice between conservative and surgical approaches for Haglund's disease should be based on a careful assessment of several factors, including the severity of symptoms, response to initial treatment, patient preferences, and the benefit-risk profile of each approach.

Below are the main criteria that can guide this decision

1. Severity of symptom

- Conservative treatment: Generally recommended for patients with mild-to-moderate symptoms, where pain and inflammation are manageable and do not significantly affect quality of life[1,3].
- Surgical intervention: Indicated for patients with severe symptoms, persistent pain that does not respond to conservative treatment, or when there is a significant bony deformity that causes constant irritation to the Achilles tendon[4,7].

2. Duration and response to conservative treatment

- Conservative treatment: Should be attempted initially in most cases. If the patient responds well to conservative treatment within three to six months, surgery may not be necessary[2].
- Surgical intervention: If there is no significant improvement in symptoms after six months of conservative treatment, or if symptoms worsen, surgery can be considered as the next step[4,8].

3. Patient age and activity level

- Conservative treatment: Preferred for younger or older patients who wish to avoid the risks associated with surgery, or for those who have a less active lifestyle[9].
- Surgical treatment: May be more suitable for active patients who wish to quickly return to physical or sports activities and who have an expectation of complete recovery with a lower risk of recurrence[6,10].

4. Complications or comorbidities

- Conservative treatment: May be safer for patients with significant comorbidities, such as diabetes or heart disease, which increase surgical risks[5].
- Surgical intervention: Indicated for healthy patients without contraindications to surgery, especially when the conservative approach fails or when there are complications, such as Achilles tendon injury[4,7].

5. Patient preferences

- Conservative treatment: For patients who prefer to avoid surgery or are concerned about recovery time and associated risks, conservative treatment is a logical choice[3,6].
- Surgical intervention: May be preferred by patients seeking a more definitive and quick solution to symptoms, especially if they have already tried and failed with conservative options[8].

6. Risk of recurrence

- Conservative treatment: Although effective for some, it has a higher rate of symptom recurrence (up to 30%) compared to surgery[9].
- Surgical treatment: Lower recurrence rate (about 10%) and therefore may be the best option for those who wish to reduce the risk of recurrent symptoms[4].

Complications arising from surgical treatment of Haglund's deformity can be minimized with careful planning, appropriate surgical techniques, and diligent postoperative follow-up. The following are some strategies that can help reduce the risk of complications:

1. Preoperative evaluation

- Comprehensive assessment: A detailed preoperative evaluation, including a complete medical history and physical examination, can identify potential risk factors for complications, such as diabetes, poor circulation, or previous surgeries in the affected area[1].

- Patient selection: Proper choice of candidates for surgery is crucial. Patients with severe symptoms who have not responded to conservative treatments and who do not have significant comorbidities are ideal candidates for surgery[4,5].

2. Surgical technique (includes positioning, access route, preservation of the calcaneal tendon, precise removal of the posterosuperior tuberosity, and neurovascular care).

- Minimally invasive surgery: Opting for minimally invasive techniques, such as endoscopic calcaneoplasty, can reduce the risk of infection, minimize tissue damage, and shorten recovery time[6].
- Proper tissue handling: Careful handling of soft tissues during surgery, avoiding excessive retraction or trauma to adjacent structures, helps reduce the risk of nerve injury and other complications[6].
- Adequate hemostasis: Ensuring adequate control of bleeding during surgery can minimize the risk of postoperative hematoma and reduce the likelihood of infection[5].

3. Postoperative care

- Surgical wound care: Proper wound care is essential to prevent infections. This includes keeping the surgical site clean, monitoring for signs of infection, and following up regularly with the healthcare provider[5,6].
- Physical therapy: Early and adequate physical therapy can help restore function, prevent stiffness, and reduce the risk of tendon adhesions or other complications related to immobility[6,7].
- Gradual return to activities: Encouraging a gradual return to load activities and avoiding excessive calcaneus stress during the initial recovery period can prevent complications such as tendon rupture or re-injury[7].

4. Monitoring and follow-up

- Regular follow-up: Regular postoperative visits allow early detection and management of complications, such as infection or delayed healing, enabling timely interventions, if necessary[5].
- Use of prophylactic measures: In some cases, antibiotics or prophylactic anticoagulants may be prescribed to reduce the risk of infections or thrombosis[5].

Conclusion

Haglund's disease represents a significant clinical challenge, especially in terms of proper management to ensure symptom improvement and quality of life for patients. The choice between conservative and surgical approaches should be based on a careful assessment of factors such as the severity of symptoms, response to initial treatment, patient preferences, and the risk of complications.

Conservative treatments, although less invasive, have a higher recurrence rate and may be insufficient for patients with significant bony deformities or severe symptoms. On the other hand, surgical interventions, particularly endoscopic calcaneoplasty, have shown superior outcomes in terms of pain relief and functionality, but must be accompanied by meticulous planning and rigorous postoperative care to minimize complications.

The therapeutic decision must be personalized to each patient's specific characteristics. Collaboration between the patient and medical team is crucial for choosing the most appropriate approach and ensuring that the benefits of treatment outweigh the risks. In addition, patient education on condition management and post-treatment expectations is critical to long-term success.

Authors' contributions: Each author contributed individually and significantly to the development of this article: OMPB *(https://orcid.org/0000-0002-4861-7275), and OHYF *(https://orcid.org/0000-0002-2262-4469), and ORMM *(https://orcid.org/0009-0008-9106-9041) conceived and planned the activities that led to the study, approved the final version; OMAS *(https://orcid.org/0009-0009-4258-6402), and NVS *(https://orcid.org/0000-0002-2724-1977), and BPH *(https://orcid.org/0000-0002-1289-4553), and RJHA *(https://orcid.org/0009-0002-9303-1246) Interpreted the results of the study, participated in the review process and approved the final version. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

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