

# “Severs Disease” - Manifestations and Management

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## Abstract

Calcaneal apophysitis (Sever's Disease) is a common cause of heel pain in growing children. Its true incidence and etiology in unknown but, recent evidence supports overuse injury as an underlying etiology. It can present as either unilateral or bilateral heel pain in active growing children or adolescents who had a history of new-onset sports activity. Diagnosis mainly relies on a thorough clinical examination with a positive squeeze test being confirmatory. Radiologic imaging may be unnecessary but can help rule out or avoid missing other problematic conditions. Treatment options are mainly conservative and include rest, medications, therapy, or orthosis. Educating parents and coaches is pivotal for the prevention of these self-limiting conditions in young athletes. Evidence suggests a return to sports in most in a few weeks to months after appropriate care.

**Keywords:** Sever disease, heel pain, calcaneal apophysitis, overuse injury.

## Introduction

Posterior heel pain is a common presentation, especially in active children or adolescents ages 8–15 [1, 2]. Sever's disease is a common idiopathic condition, first described by an American orthopaedic specialist James Warren Sever in 1912 [3]. Although an incidence of 3.7/1000 patients [4] has been reported, this condition is underreported and its true prevalence is unknown [1, 5]. This condition is attributed to inflammation of the heel growth plate in physically active growing children [1, 5, 6] and is currently described as being an overuse injury with repetitive microtrauma experienced during physical activities. Evidence suggests no correlation to a traumatic event and usually presents with insidious onset heel pain after sports or physical activity [1, 5, 6]. Adolescents are particularly in more

danger due to physiological changes reducing muscle-tendon unit flexibility causing increased stress at incompletely ossified apophysis [1, 5, 6]. Despite its prevalence, not many studies exist in medical literature and with this article, we would like to put forth a brief overview of current concepts in understanding and managing this condition.

## Etiopathology

The calcaneum is the largest bone in the foot. The insertion of the Achilles tendon occurs in the posterior aspect near the apophysis [1, 6]. The apophysis is generally considered the weakest area which is subject to axial load stress. The apophysis fuses by approximately 13 years in girls and 15 years in boys. The muscle tendon unit loses its peak flexibility due to excessive bone growth

during the growth spurt leading to increased loading and stresses across the un-ossified apophysis which is believed to be initiated by excessive activity [1, 6]. The exact mechanism is still unknown but the currently recognized theory is that it is an overuse injury secondary to increased shear stress, and repetitive impact pressures due to micro trauma across the apophysis. Few studies have shown higher peak plantar pressures in children during gait with Sever's disease, suggesting activity as the cause of pain due to stress loading [1, 6, 7]. Rodríguez-Sanz D et al. [7] showed excessive pressures can result in tissue damage, with inflammatory responses leading to further structural changes and altered mechanics. These changes in forces lead to repetitive microtrauma. Rodríguez-Sanz et al. in a study showed these children had higher BMI, with boys having an 8 times higher risk of having an associated equinus deformity [7]. Muscular imbalances may be associated with this condition, predisposing children to overuse injuries. It is important to assess running as an

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increased normalized cadence is seen in these individuals to help control peak pressures and pain [6]. Risk factors such as improper footwear, equipment, increased height or waist circumference have also been described in literature [1].

### Clinical Presentation

Sever's disease presents in children between the ages of 8 and 15 years. It presents usually in the form of heel pain after physical activity but may also be present at rest in long-standing cases. It may be unilateral or bilateral. Often patients may present with a limp or toe walking, with an inability to walk or run due to pain. Usually, the patients do not give any significant history of injury. Most children are active in running, and jumping sports. Up to 87% incidence of heel pain has been reported in young athletes [1,7].

Symptoms:

- The non-radiating pain is localized to the posterior aspect of the heel adjacent to the Achilles tendon with painful passive ankle movements [1]
- Swelling near Achilles insertion
- Adjusted gait due to pain

Diagnosis relies on a good clinical examination. Typically the external look of the heel is nearly always normal without local signs. Pain on toe stance (sever sign) and the squeeze test involving compression of the heel's medial and lateral aspects is considered the main clinching diagnostic tests [1,6].

### Imaging

It is debatable if imaging is needed for the diagnosis of sever's disease as it is a clinical diagnosis, but it is advisable to rule out other causes of heel pain [8]. Radiographs have been commonly described when patients present with heel pain, as they are regularly taken and have low radiation exposure [1, 6, 8]. Classically increased density and fragmentation of the calcaneal apophysis can be noted. Ultrasound may show

localized hyperemia and fragmentation of the apophysis [1]. Although higher imaging may not be required, magnetic resonance imaging can visualize edema around the apophysis and Achilles tendon with contrast enhancement at the level of the process, epiphyseal plate, underlying bone, and structures of the surrounding soft tissue [1, 6]. Higher imaging is usually required to rule out other conditions if the clinical diagnosis is questionable.

### Treatment

Treatment of sever's disease is generally conservative and aims at tissue healing and strengthening, allowing a return to sports and physical activity [1, 6]. There is no role for injections or surgical interventions. Various types of treatments have been mentioned in literature including, physical therapy and rest, kinesiotherapy and taping, and orthotic devices [1,5,6]. Unconventional methods such as non-weight-bearing ambulation and plasters have also been mentioned [6]. However, there is no consensus on modalities or any validated outcome measures as most recommendations are based on the experiences of authors [1,6].

### Physical Therapy, Rest, and Pain Control

Icing, activity modification, and therapy have been the mainstay treatments suggested [1,6]. The aim is to reduce the inflammatory process to decrease pain and improve comfort, improving outcomes [1, 6, 9]. Oral and topical nonsteroidal anti-inflammatory drugs (NSAIDs) have been used for controlling pain, topical NSAID ketoprofen is contraindicated below age 12 years [1, 6, 10]. White et al. reported positive outcomes while using Ketoprofen gel in children with close monitoring [10]. Physical therapy mainly consists of stretching and strengthening protocols focusing on the calf muscles and

strengthening of muscles to decrease the load on the Achilles tendon [1,6,11].

### Immobilization

Walking Boots or plasters along with non-weight bearing for 2–4 weeks may help in severe cases in non-compliant children to help reduce pain along with adjuvant rehabilitation [1,6,11].

### Kinesiotherapy and Taping

Kinesiotherapy and taping aim to regulate blood flow, to eliminate inflammatory cytokines thereby reducing pain [1, 6, 12]. Hunt et al. [13] assessed the effect of taping on heel pain levels and showed a significant reduction in pain with taping. Contrarily, Kuyucu et al. [14] showed treatment with taping had no significant reduction in pain levels, though the patients showed improved functional outcomes.

### Orthoses

Multiple publications have reported the use of orthotic devices used in conjunction with adjuvant therapies, but their individual role has not been clearly identified. Most orthotics mentioned were custom-made, with molding around the heel and arch support [1, 6, 11]. Cushioned Heels have been used to reduce the impact during activity [1, 6]. Heel lifts help by positioning the foot in plantar flexion thereby relaxing the Achilles tendon, lowering pressures on the heel and reducing pain [1, 6]. They are beneficial for symptoms that are not significant enough to stop activity [1, 6, 15].

Perhamre et al. [15] showed a reduction in pain scores in patients treated with heel cups for a period of 4 weeks. A study comparing the utility of orthoses to physical therapy and rest and showed a significant reduction in pain levels with all modalities with no significant differences between them [16]. A randomized trial conducted among 208 children compared the effectiveness of

heel lifts against custom orthotics and showed similar pain improvement but better overall outcomes with custom orthotics [17].

### Prevention

There is not much literature examining risk factors of such overuse injuries in the pediatric active cohort, hence it is difficult to provide specific guidelines. Over 50% of overuse injuries in youth are reported to be preventable [1]. Preventive measures aim at educating the individual patients, parents and coaches to help with early diagnosis thereby avoiding long recovery periods and layoffs [1]. Belikan et al. in their retrospective analysis among young

German football players showed athletes with recurrent symptoms showed a delay in recovery and return-to-play in comparison to athletes with a primary diagnosis [18].

The risk of exhaustion should be considered and integrated rest periods should be added to allow recovery. Priority in improving motor skill development and general fitness should be considered in younger athletes to amass their benefits with a reduction in risk of overuse injuries [1]. Children should be encouraged to maintain hydration, diet, and sleep and ensure proper use of equipment in sports [1, 6]. It is recommended against single sport specialization at an early age to prevent

such injuries.

### Conclusion

Sever's disease (Calcaneal apophysitis) is a self-limiting overuse condition affecting young active individuals. Heel pain which can be unilateral or bilateral is associated with increased BMI. It is now considered to be caused by repetitive micro-trauma on the calcaneal growth plate. Clinical examinations are often diagnostic but imaging can be utilized to exclude other conditions. Various treatment options are available but are mostly conservative with variable results. Prevention and early diagnosis are key to reducing morbidity.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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## References

- Fares MY, Salhab HA, Khachfe HH, Fares J, Haidar R, Musharrafieh U. Sever's disease of the pediatric population: Clinical, pathologic, and therapeutic considerations. *Clin Med Res* 2021;19:132-7.
- Howard R. Diagnosing and treating sever's disease in children. *Emerg Nurse* 2014;22:28-30.
- Sever JW. Apophysis of os calcis. *NY State J Med* 1912;95:1025.
- Wiegerinck JI, Yntema C, Brouwer HJ, Struijs PA. Incidence of calcaneal apophysitis in the general population. *Eur J Pediatr* 2014;173:677-9.
- Ramponi DR, Baker C. Sever's disease (Calcaneal apophysitis). *Adv Emerg Nurs J* 2019;41:10-4.
- Hosny GA, Al-Ashhab MI, Moeselhy MA, Abdrabboh MM. Current concept review of Sever's disease in paediatric age group. *Benha J Appl Sci* 2021;6:297-303.
- Rodríguez-Sanz D, Becerro-de-Bengoa-Vallejo R, López-López D, Calvo-Lobo C, Martínez-Jiménez EM, Perez-Boal E, et al. Slowvelocity of the center of pressure and high heel pressures may increase the risk of Sever's disease: A case-control study. *BMC Pediatr* 2018;18:357.
- Kose O, Celiktaş M, Yigit S, Kisin B. Can we make a diagnosis with radiographic examination alone in calcaneal apophysitis (Sever's disease)? *J Pediatr Orthop B* 2010;19:396-8.
- James AM, Williams CM, Haines TP. Effectiveness of interventions in reducing pain and maintaining physical activity in children and adolescents with calcaneal apophysitis (Sever's disease): A systematic review. *J Foot Ankle Res* 2013;6:16.
- White RL. Ketoprofen gel as an adjunct to physical therapist management of a child with Sever disease. *Phys Ther* 2006;86:424-33.
- McHugh MP, Cosgrave CH. To stretch or not to stretch: The role of stretching in injury prevention and performance. *Scand J Med Sci Sports* 2010;20:169-81.
- Kase K, Wallis J, Kase T. *Clinical Therapeutic Applications of the Kinesio Taping Method*. Albuquerque, NM: Kinesio; 2003.
- Hunt GC, Stowell T, Alnwick GM, Evans S. Arch taping as a symptomatic treatment in patients with Sever's disease: A multiple case series. *Foot* 2007;17:178-83.
- Kuyucu E, Gülenç B, Biçer H, Erdil M. Assessment of the kinesiotherapy's efficacy in male athletes with calcaneal apophysitis. *J Orthop Surg Res* 2017;12:146.
- Perhamre S, Janson S, Norlin R, Klässbo M. Sever's injury: Treatment with insoles provides effective pain relief. *Scand J Med Sci Sports* 2011;21:819-23.
- Wiegerinck JI, Zwiers R, Sierveit IN, van Weert HC, van Dijk CN, Struijs PA. Treatment of calcaneal apophysitis: Wait and see versus orthotic device versus physical therapy: A pragmatic therapeutic randomized clinical trial. *J Pediatr Orthop* 2016;36:152-7.
- Alfaro-Santafé J, Gómez-Bernal A, Lanuza-Cerzócimo C, Alfaro-Santafé JV, Pérez-Morcillo A, Almenar-Arasanz AJ. Effectiveness of custom-made foot orthoses vs. heel-lifts in children with calcaneal apophysitis (Sever's disease): A CONSORT-compliant randomized trial. *Children (Basel)*

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2021;8:963.

of 10 years. J Orthop Surg Res 2022;17:83.

18. Belikan P, Färber LC, Abel F, Nowak TE, Drees P, Mattyasovszky SG. Incidence of calcaneal apophysitis (Sever's disease) and return-to-play in adolescent athletes of a German youth soccer academy: A retrospective study

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