

CASE SERIES

The “Heel Hook”—A Climbing-Specific Technique to Injure the Leg



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Acute injuries in rock climbing either come from a fall onto the lower leg or from performing a hard move and injuring the upper extremity. Further evaluations of lower leg injuries in rock climbing athletes have been performed recently finding sport characteristics such as peroneal tendon dislocations or chronic deformations of the feet. One injury mechanism described in case reports is the so-called heel hook position, which is used more frequently today compared with the beginnings of rock climbing. In addition, the number of these injuries is expected to rise with the increase in popularity of climbing and bouldering. Therefore, it is important to further analyze this pathology. We investigated 17 patients with injuries of the lower extremities after performing a heel hook.

Key words: tendon tear, hook, heel hook, rock climbing, climbing, bouldering

Introduction

Most acute injuries in climbing either come from a fall onto the lower leg or from performing a hard move and injuring the upper extremity.^{1,2} Because these injuries on the upper extremity are very sport specific, such as flexor tendon pulley injuries or epiphyseal fractures in the finger joints, most climbing-related scientific studies focus on them. Only recently further evaluations of lower leg injuries have been performed.^{3,4} Most injuries to the lower leg are acute trauma, such as those that result from falls (eg, fractures and sprains). These happen more often in alpine or traditional climbing than in sport climbing.^{1,2} Some of these lower extremity injuries exhibit sport characteristics such as peroneal tendon dislocations.⁵ One injury mechanism described only in case reports thus far is the so-called heel hook position (Figure 1).⁶⁻⁸ These injuries occur mostly in bouldering. Because the number of these injuries is expected to rise with the increase in popularity of climbing and bouldering, it is important to further analyze this pathology.

The Heel Hook

With the increasing popularity of bouldering, ropeless climbing in minor height, the complexity of the climbing moves performed has increased. Whereas climbing in the 1970s and 1980s used to be mostly vertical face climbing, the rock features climbed nowadays are more 3 dimensional. This especially applies to the very complex forms of artificial bouldering walls that are also used regularly in competitions. These steep walls require the use of the legs and feet in a more complex form than just standing on them. The legs are used in a similar way as the arms, to hook with the toe or heel, pull and jam (Figure 1).

To perform a heel hook, the back of the foot, the heel, is used to apply pressure onto the hold, while pulling on the foot by flexing the hamstrings (Figure 2). In addition, during this motion the knee is often rotated outwardly, applying a high force onto the back and lateral structures of the knee and leg (lateral collateral ligament, lateral meniscus, posterior cruciate ligament, popliteus tendon, dorsal joint capsule, tractus ileotibialis, hamstring tendons). Climbers often report a snapping or popping sound at the time of injury. Even though lower leg and knee injuries only account for 5.9% to 12.7% of climbing injuries we see, these heel hook injuries can present many different clinical features and thus

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Figure 1. A heel hook performed in outdoor bouldering.

should be further analyzed.⁹ During the last 5 years (2010–2014) we saw 17 climbers with injuries due to this specific technique. The outcome was evaluated at a minimum of 6 months after the injury and classified in an analogous sport-specific score to a score that was used for finger pulley injuries in rock climbers.^{10,11}

Patients and Diagnostics

All patients were seen in our sports medical outpatient clinic, which is part of our orthopedic, traumatology, and sports medical department. The sports medical outpatient clinic serves as primary care for sports orthopedics as well as a referral center specialized in outdoor sports

medicine. Within the time frame of 5 years (2010–2014) we saw 17 patients complaining about an injury while performing a heel hook (see [Table 1](#)). In 6 patients we served as the primary medical consult; 11 patients came to seek a second opinion. Because some climbing injuries are very sport specific (eg, pulley ruptures, heel hook injuries), we are regularly seeing patients seeking a second opinion because initial diagnosis may be missed, because not all medical centers are familiar with these types and mechanism of injuries.

All 17 patients reported sudden dorsal-sided pain in the knee, thigh, or pelvis. Seven also reported hearing a snapping sound, similar to those reported in achilles tendon tears. Walking was difficult in all cases and all were limping. The time frame in between the injury and the consultation was 1 to 14 days. The clinical evaluation showed point tenderness (tuber ischiadicum, tractus iliotibialis, lateral collateral ligament, or biceps femoris muscle belly), and in few cases minor haematoma. Pain increased in stretching the respective muscle. A visible or palpable muscle gap was present in only 1. After clinical examination and exclusion of the minor injuries (sprains) we performed ultrasound (11 patients) and/or magnetic resonance imaging (MRI) (11 patients) in accordance with the suspected injury based on the physical examination. Within our sample of 17 patients, we found 9 patients with injuries at the knee and 8 with injuries at the thigh or the pelvis ([Figure 2](#)).



Figure 2. Injury distribution.

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