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Abstract

Soccer is a physically demanding and highly competitive sport with a high rate of injuries. The foot and the ankle joint are especially at danger. Risk factors of foot and ankle injuries in soccer players are: lack of structured warm up training, neuromuscular deficits, inadequate training, chronic fatigue, previous injuries, foul play, artificial turf, and others. While the most common injury is the ankle sprain, complex injuries like fractures, ligament tears, and cartilage damage can occur. Such injuries have a high impact on the player's career. Professional soccer players are pressured to meet the expectations of the clubs, and the public. While most injuries to the foot and ankle joint can be treated conservatively, complex injuries require anatomic reconstruction to allow for quick rehabilitation and return to play earliest possible.

Keywords
Soccer – injuries – foot – ankle

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Fuß- und Sprunggelenk-Verletzungen im professionellen Fußball

Zusammenfassung

Fußball stellt eine hohe Anforderung an den Bewegungsapparat, ist sehr kompetitiv und weist eine hohe Verletzungsrate auf. Der Fuß und das Sprunggelenk sind besonders verletzungsanfällig. Risikofaktoren für Fuss- und Sprunggelenk-Verletzungen im Fußball sind: Fehlen eines strukturierten Aufwärmtrainings, neuromuskuläre Defizite, inadäquates Training, chronische Ermüdung, vorangehende Verletzungen, Fouls, Kunstrasen u.a. Die häufigste Verletzung ist mit Abstand das Distorsionstrauma des oberen Sprunggelenkes. Komplexe Verletzungen mit Frakturen, ligamentären Verletzungen und Knorpelschäden können auftreten. Solche Verletzungen haben einen großen Einfluss auf die Karriere des Fußballers, da er sowohl den

REVIEW

Foot and Ankle Injuries in Professional Soccer Players

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Introduction

Soccer is a high demand team sport involving constantly changing complex movement patterns. Walking, running, and sprinting, sudden changes in direction, jumping, and body contact require a high grade of coordination and body control. With roughly 200.000 professional soccer players and around 240 million amateur soccer players, soccer is a game with worldwide appeal. However, with rising popularity, the incidence of injuries is increasing. The game presents a wide variety of musculoskeletal problems to the sports physician and orthopaedic surgeon. Especially the lower extremity with the ankle and foot, knee, and thigh is prone to injuries [1]. The high injury rate among soccer players in general and female players in particular constitutes a considerable problem for the player, the team, the club, and given the popularity of for society at large. Health consequences are seen not just in the short term but also in the dramatic increase in the risk of career break and early problems, as osteoarthritis. Foot and ankle account for most of the injuries in soccer players [2].

Epidemiology

Who is at risk?

Soccer is a widely popular sport, with participants being women and men of all age groups and skill levels. Overall, soccer injuries are more frequent with higher age of the participants, while incidence of injury in preadolescent players is low [3]. The incidence of injuries during practice is lower than during competition (1:2) [4]. Amateur soccer players have less injuries then professional soccer players [1].

What is at risk?

The most common site of injury in soccer player is the lower extremity. Breaking it down further, the most injured joint is the ankle joint (0.17–6.52 per 1000 person hours), followed by the knee and the thigh [1]. Of all foot and ankle injuries, ankle **sprains** are the most common (80%), then **bruises** (9-49%), and **tendon lesions** (2-23%) (Table 1). With 1% of all ankle injuries in soccer, fractures are very rare [5].

Risk factors for soccer injuries

Generally, one can differentiate in intrinsic (self-inflicted) factors, and extrinsic (external forces). Intrinsic factors are influenced by individual, biologic or psychological attributes of the soccer player. Extrinsic factors is the role that the environment plays. Intrinsic factors are hard to quantify, and can be underestimated. Most important individual factors for high risk of injury are a previous injury, and inadequate rehabilitation after injury [6].

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Erwartungen der Medien als auch der Vereine gerecht werden muss. Ein Großteil der Verletzungen kann konservativ behandelt werden. Bei komplexen Verletzungen ist ein operativer Eingriff oft unumgänglich. Das Ziel ist eine zügige Rehabilitation mit der baldigen Rückkehr in den Wettkampfsport.

Table 1. Overview over the distribution of lower leg injuries in soccer. Values are percentages calculated from total (whole body) injury data.

Year	Study	Sprain	Contusion	Tendon disorders	Fracture
1980	Sullivan [3]	35	38	-	6
1983	Ekstrand [7]	29	20	23	4
1989	Nielsen [36]	54	9	11	4
2001	Soderman [43]	24	9	3	1
2004	Junge [2]	14	49	3	3
2008	Tegnander [44]	20	<1	7	<1
2011	Junge [45]	8	19	<1	<1
	Range	8-54	1-49	1-23	1-6

Simple injuries can be followed by severe injuries [7]. Persistent symptoms after injuries can be a precursor of further injuries in the future. General ligament laxity, previous strain, ligament instability and isokinetic ankle force seem not to be associated with the risk of injury [8]. However, a muscular disbalance, e.g. between eversion and inversion force of the foot has been shown to be a risk factor [8]. Slow reaction time was shown to be an additional risk factor for injury [9]. The most important extrinsic risk factor seems to be foul play, which is committing an unfair act by a player against another, usually involving illegal body contact. This makes up to 23-33% of all injuries [10]. Certain forms of engaging the opponent, like tackling, where a player attempts to take the ball away from an opposing player by deliberately leaving his feet and sliding along the ground with one leg extended to push the ball away from the opposing player, can cause severe injuries. Injuries can be also caused due to collision when jumping for a header, or landing. However, many of the injuries are caused without direct body contact. Soccer shoes are equipped with cleats for better grip on the turf. Getting stuck on turf leads to unusually high load and torque in the knee and ankle joint. The composition of the soccer playground might influence the injury rate. It has been suggested that soccer players are at greater risk of sustaining ankle sprains on artificial turf, wherein less muscle strains are expected [11].

Common Injuries

Ankle Sprains

Ankle sprains account for 40% of all sport injuries and 80% of all soccer injuries [12]. Around 85% of all ankle sprains are due to an inversion trauma with the foot in various degrees of plantar flexion. The ligaments most commonly involved are the anterior talofibular (ATFL) and calcaneal fibular ligament (CFL). Ankle joint stability has a mechanical and postural component. Ligament integrity is responsible for mechanical stability of the ankle joint. Functional stability is maintained by ankle proprioception provided by muscles, tendon, ligament, and capsular innervation [13]. Interestingly chronic instability can be caused by impairment of ankle proprioception while the ligamentous structures are intact. Symptoms of instability are recurrent sprains, pain, giving way, and insecurity on uneven grounds. The soccer player's history is far more important in diagnosis than the