

Chapter 24

Ankle Osteoarthritis in Former Elite Football Players: What Do We Know?

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You don't stop playing Football because you're getting old. You get old because you stop playing Football.

Sir Stanley Matthews

Abstract Due to cumulative exposure to heavy physical demands and to the occurrence of traumatic ankle injuries during their career, former professional football players are likely to suffer in their post-sport life from ankle osteoarthritis. Ankle osteoarthritis involves a progressive degeneration of articular cartilage in the ankle joint that might lead to joint pain, reduced function, instability, deformity and swelling. The recent scientific literature has showed that the prevalence of ankle osteoarthritis in former professional football players was high (9–17 %) compared to former athletes from other sport disciplines and to the general population. Most of the former professional football players suffering from ankle osteoarthritis reported to experience moderate to severe problems related to joint pain/discomfort, mobility and performing usual activities (work, study, house, etc.). In addition, 37 % of them reported moderate or severe problems with anxiety/depression because of the pain/discomfort and impairments caused by ankle osteoarthritis. Future directions related to the medical care and support of former professional football players facing 1 ankle osteoarthritis might involve self-awareness (information provision) system, self-management programme and/or end-career socio-medical consultation.

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24.1 Introduction

During both training and competition, professional football players are highly exposed to intense and prolonged physical demands such as running, sprinting, jumping and landing, dribbling and passing and sliding or other duel forms with opponents. In addition, players are also exposed to high energetic demands (aerobic and anaerobic). Exceeding regularly normal health capacities, these physical and energetic demands, in combination with insufficient time to recover, lead regularly to the occurrence of injuries of the musculoskeletal system, especially in the ankle joint.

As elite athletes from other sport disciplines, former professional football players are keen to have on the long term a lower risk of chronic diseases (heart disease, diabetes, asthma and bronchitis) compared to healthy individuals of similar age. On the other hand, former professional football players are also keen to suffer after their career from long-term health problems. Especially, due to the cumulative physical exposure during training and competition, and to the high risk for severe, i.e. recurrent ankle injuries and related surgery, former professional football players are likely to suffer from ankle osteoarthritis in their post-career life.

24.2 Ankle Osteoarthritis

Osteoarthritis (OA) is a 'degenerative joint disease' resulting from the interaction of several factors such as joint integrity, genetics, local inflammation, mechanical forces and cellular and biochemical processes [7, 10, 17]. Being a normal consequence of ageing, OA is caused by overuse of the joint's cartilage and results in irreversible pathologic changes in the affected joints [7, 17].

Ankle OA involves a progressive degeneration of articular cartilage characterized by the formation of impinging bone spurs, loose bodies and joint space narrowing. The progression of ankle OA might lead to the decrease of articular cartilage thickness and to the enhancement of cartilage deterioration. As the ankle joint is formed by three bones (tibia, fibula and talus), OA might occur in three sets of articular surfaces: the medial, lateral and central articular surfaces.

Distinction is made between primary and secondary ankle OA. Primary ankle OA is seen as an idiopathic phenomenon related to the ageing process including previously healthy joints and having no apparent cause or initiating factor. Primary ankle OA occurs typically in older individuals. Secondary ankle OA is easier to understand and refers to a joint disease resulting from clear predisposing and initiating factors such as obesity, prior traumatic event that causes cartilage damage or excessive repetitive injury (especially in athletes). In contrast to primary OA, secondary ankle OA can occur in relatively young individuals.

Among reduced function, instability and deformity, the principal symptom associated with ankle OA is joint pain. Being exacerbated by activity and relieved by rest

in an early phase, joint pain occurs both at rest and at night in a more advanced disease stage. A common complaint among patients with ankle OA is also stiffness: after a patient awakens, morning stiffness typically resolves within 30 min but may recur following periods of inactivity. A distinction between noninflammatory and inflammatory OA is made. Aside from pain and disability-related complaints that may be seen in both types, patients with inflammatory OA might have joint swelling, morning stiffness lasting for more than 30 min, night pain and signs of inflammation. Most of these symptoms and signs can be detected by physical examination.

24.3 Prevalence of Ankle Osteoarthritis in Former Professional Football Players

As degenerative changes in the joint is not consistently associated with clinical OA, determining the prevalence of ankle OA remains difficult. Nearly 20 years ago, 6 % of former professional football players were found to have been admitted to the hospital for OA of the weight-bearing joints of the lower limbs among which hips, knees and ankles [12]. While epidemiological researches related to hip and knee OA have been largely performed among various study populations, studies related to ankle OA are scarce, especially among former professional football players as acknowledged in a systematic literature review.

Only two empirical studies were retrieved from the scientific literature in which the prevalence of ankle OA was presented [11]. Among 185 retired English professional football players who had played professional football on average for nearly 14 years, the prevalence of ankle OA (diagnosed by clinician) was found to be 5.7 % in the right ankle and 6 % in the left ankle. In this study, the mean age at diagnosis was 30 years for the right ankle and 32 years for the left ankle. A second study explored 284 former professional football players from the United Kingdom who had played professional football on average for nearly 14 years. Forty-nine percent of these former professional football players indicated that they had been diagnosed (by clinician) at an average age of 40 years with OA on at least one anatomical site, 29 % in two or more joints and 15 % in three or more joints. Especially, the ankle joints accounted for 17 % of all 314 OA diagnoses among these 284 former professional football players, whereof 11 % in the right ankle and 6 % in the left ankle [11]. A latest published study by Armenis et al. [2] explored the prevalence of ankle/foot OA in a group of 105 former Greek professional football players (older than 40 years) who had played professional football for 8–10 years. Clinical signs of OA were found in 4 % of these former professional football players, while radiographic OA was found in nearly 9 %.

Whether the occurrence of ankle OA in former professional football players is alarming can be put into perspective when compared to the general population or to athletes from other sport disciplines. An older study from Kujala et al. [12] acknowledged that the prevalence of ankle OA ranged from 0 to 2 % in former elite athletes (44 years old or older) that were involved during their career in different sport

Table 24.1 Prevalence (%) of ankle osteoarthritis: overview among former professional football players (≥ 30 years of age), former elite athletes from various sport disciplines (≥ 44 years of age) and the general population (≥ 30 years of age)

Football	9–17
Athletics ^a	0.2
Basketball	0
Boxing	0.4
Cross-country skiing	0
Ice hockey	1.8
Long-distance running	0
Weight lifting	0.9
General population	1–4

^aJumping, sprinting, hurdling, decathlon, middle distance running

disciplines (long-distance running, cross-country skiing, ice hockey, boxing or weight lifting; see Table 24.1). Worldwide, approximately 1–4 % of the adult general population has OA of the ankle. Then, despite the limited information available from the scientific literature, it is clear that the prevalence of ankle OA in former professional football players is higher than in the general population or former athletes from other sport disciplines.

24.4 Consequences of Ankle Osteoarthritis in Former Professional Football Players

Being primarily associated with previous traumatic injuries, ankle OA is a frequent health concern among former professional football players, a condition that might even appear in the early years after the end of a football career. The adverse impacts of ankle OA on the quality of life and functioning (work and daily living) of former professional football players cannot be neglected, even if empirical evidence about the long-term consequences of this health condition is limited.

In a recent systematic review [5], only two original studies exploring the consequences of ankle OA in former professional football players were identified. A cross-sectional survey was conducted in the United Kingdom (UK) among 284 former professional football players who had played professional football on average for nearly 14 years. One hundred and thirty-eight of these former professional football players suffered from OA in a lower limb joint (hip, knee, ankle and/or foot), from which 33 from OA in the right ankle and 20 from OA in the left ankle. From the former professional football players suffering from OA (not solely of the ankle), nearly 90 % reported to have moderate or severe joint pain and discomfort, while around 65 % indicated to experience moderate or severe problems with mobility and performing usual activities (work, study, house). In addition, 37 % of them reported moderate or severe problems with anxiety/depression because of the pain/discomfort and impairments caused by ankle osteoarthritis. Based on this study, the authors conducted 2 years later a qualitative study by interviewing 12 former

professional football players who were suffering from hip, knee and/or ankle OA. With regard to pain, some former professional football players reported that their conditions were chronically very painful, and that the pain was significantly affecting their lives. With regard to restricted mobility and movement, some former professional football players reported that the lack of mobility was a major issue in their lives, moving being hardly possible, especially bending, kneeling and long standing. With regard to employment, some former professional football players reported that no employer wanted to employ them with their conditions and that they abandoned their jobs for this reason.

24.5 Origin of Ankle Osteoarthritis in Former Professional Football Players

The origin of ankle OA on the long term among former professional football players is expected to be related to physical exposure and occurrence of ankle injury during a career. Within professional football, it remains unknown whether the cumulative exposure to intense and prolonged physical demands involving the ankle joint (running, sprinting, jumping and landing, dribbling and passing, duel forms with opponents) during both training and competition contributes solely to the high prevalence of ankle OA among former players. Despite the lack of empirical studies involving large sample sizes and suitable controls matched for football exposure, ankle OA in former professional football players seems principally attributed to the occurrence of ankle injury during a football career [7, 10, 17].

24.5.1 Picture Sliding in Football if Available?

In (professional) football, ankle ligament (medial and lateral bands) and cartilage injuries are common during training and competition, accounting approximately for 20–30 % of all injuries. Especially, having more drastic consequences during a football career in terms of related surgery, rehabilitation and long-term disability, recurrent or severe ankle injuries, in combination with their surgical treatment, are seen as determinants for ankle OA in former professional football players. Recent empirical studies in which causality between previous injury and ankle OA was investigated among former professional football players (both in study and control groups) are lacking. However, older studies or studies performed among athletes from other sports disciplines indicate that the occurrence of ankle injuries is a relevant determinant for ankle OA.

Larsen et al. [13] examined the incidence ankle OA in injured and uninjured elite football players, with a mean time from injury of 25 years. OA was present in 33 % of the injured ankles, whereas the incidence of OA in uninjured players was 18 % in

the ankle. On a series of more than 300 ankle fractures treated with open reduction and internal fixation, Lindsjö [14] found that the prevalence of posttraumatic OA was 14 %, which was directly correlated with the fracture pattern. Reviewing retrospectively data from 30 patients (mean age: 59 years, 33 ankles) with ankle OA, Valderrabano et al. [27] found that 55 % had a history of sports injuries (33 % from soccer) and 85 % had a lateral ankle ligament injury. Even more, the same author [28] found in a study of 406 ankles with end-stage OA that the underlying aetiology in this group was posttraumatic ankle OA in 78 % of cases. Within these posttraumatic OA cases, 62 % were attributable to fracture events (malleolar fractures and tibial plafond fractures) and 16 % to ligamentous injuries. Some studies indicate that severity of the initial injury and the initial cartilage damage may play a role in the development of ankle OA.

24.6 Diagnosis

In order to diagnose ankle OA and assess thoroughly the extent of the disease, anamnesis, physical examination and radiographic evaluation should be combined [7, 10, 17]. While the presence of OA might be suggested by anamnesis and physical examination, ankle OA diagnosis is usually confirmed by routine radiographic evaluation. In addition, radiological diagnostic assesses OA severity and serves as an initial evaluation to monitor the worsening of the disease.

24.6.1 Anamnesis and Physical Examination

During the anamnesis, the physician strives to retrieve important information related to ankle symptoms, exploring several aspects such as joint pain, joint stiffness in the morning, duration of the symptoms, past (recurrent) trauma, sprain and related surgery, family history and any general symptoms (fatigue, weight loss, fever, etc.) affecting the whole body. Also, the contribution of sport activities, occupational activities and daily living activities to the symptoms is explored. In order to assess the overall functional level, the American Orthopaedic Foot and Ankle Society (AOFAS) hindfoot score can be used. This valid questionnaire (available in different languages) consists of 42 items (5-point Likert scale) divided into subscales assessing symptoms, stiffness, pain, quality of life and function, resulting in a score from 0 to 100 with higher scores indicating fewer problems.

During the physical examination, the physician strives to identify important signs related to ankle OA such as:

- Presence of abnormal skin and soft tissues
- Presence of tender areas, synovitis, effusion, bony knobs and loose bodies
- Ankles pattern (if only one is affected)

- Ankle instability (anterior draw and talar tilt test)
- Ankle impingement (Molloy impingement test)
- Remaining movement in the subtalar and midtarsal joints
- Range of motion
- Muscle weakness or atrophy
- Unequal leg lengths
- Alignment of the tibia to the hindfoot, the midfoot and the forefoot
- Other joints and limb alignment
- Gait

24.6.2 Radiography

A routine radiographic evaluation of the ankle consisting of a weight-bearing AP view, a mortise view and a lateral view (Fig. 24.1) is made in order to identify radiological signs of OA, including asymmetrical narrowing of the joint space (indicating loss of cartilage), development of osteophytes and subchondral sclerosis [10, 17, 25]. On a true AP view, the talus overlaps a portion of the lateral malleolus, obscuring the lateral aspect of the ankle joint. The mortise view is obtained with the foot in 15–20° endorotation, making visualization of both the lateral and medial joint spaces possible. An additional hindfoot alignment radiograph can be considered in situations where the ankle has coronal plane tilting and the heel is in varus or valgus position.

The Kellgren and Lawrence (K&L) criteria have been widely used to grade OA and were chosen as reference by the World Health Organization to characterize OA in the hip and knee joints [8]. By now, the K&L criteria have been also validated for the ankle joints [6], consisting in the assessment of three radiological ankle features (osteophyte formation, joint space narrowing and bone end sclerosis). According to the K&L criteria, ankle OA can be classified as follows:

- Grade 0: normal joint
- Grade 1: unlikely or doubtful narrowing of joint space and possible osteophytes
- Grade 2: definite osteophytes and possible narrowing of joint space
- Grade 3: multiple moderately sized osteophytes, definite narrowing of joint space, some sclerotic areas and possible deformation of bone contour
- Grade 4: large osteophytes, marked narrowing of joint space, severe sclerosis and definite deformation of bone contour

24.7 Treatment

While the treatment of hip and knee OA has been sufficiently based on scientific knowledge, evidence to support the effective treatment of ankle OA is lacking. Nevertheless, analogously to OA in other joints, conservative and surgical treatment



Fig. 24.1 Radiographs of a healthy ankle joint and an ankle joint affected by osteoarthritis (a) Lateral view OA (b) Lateral view healthy (c) Mortise view OA (d) Mortise view healthy

have been suggested to treat ankle OA in order to prevent and slow down OA worsening, relieve symptoms and improve joint function [9, 10, 17, 21, 22, 24]. With regard to safety, invasiveness and costs, conservative treatment might be preferred to surgical treatment. Surgical treatment should be reserved to the patients who do not improve with conservative treatment and who have seriously affected quality of life.

24.7.1 Conservative Treatment

Aiming to relieve and control the pain associated with ankle OA and improve the function of the joint, conservative treatment relies on various pharmacological or non-pharmacological options involving [9, 15, 16, 18, 21, 25]:

- Short-term use (because of side effects) of nonsteroidal anti-inflammatory drugs (NSAIDs) to relieve and control ankle pain
- Glucosamine and chondroitin supplement as a safe and potential effective option for the relief of ankle OA symptoms
- Injection of viscosupplementation into the ankle joint to alleviate joint symptoms
- Judiciously timed injection of corticosteroids into the ankle joint to decrease pain for the enjoyment of a particularly important life event
- Modified footwear (rocker-bottom sole, solid ankle cushion heel, polypropylene ankle/foot orthosis, lace-up ankle support, ankle brace)
- Physical therapy to preserve joint mobility and range of motion
- Specific exercises to increase muscle and neuromuscular, i.e. proprioceptive functions in order to enhance ankle functions and stability
- Healthy lifestyle, especially related to weight control through general physical, i.e. fitness programmes

24.7.2 Surgical Treatment

The decision for surgical treatment of ankle OA requires a grounded evaluation of the patient's functional needs and problems. As surgical techniques continuously change and evidence for effectiveness accumulates, the indications for surgery treatment of ankle OA have been evolving in time. For ankle OA, surgery is seen as a treatment option when conservative treatment has failed to control the patient's symptoms in such a way that the patient's quality of life and daily living or work activities are seriously affected. Surgical options for ankle OA include joint-preserving surgery, arthrodesis and (total) ankle replacement [10, 17, 20, 23, 25, 26].

Joint preserving surgery, including arthroscopic debridement and articular distraction, aims to delay more invasive and extensive surgery. Being commonly achieved through arthroscopy, ankle debridement is performed in case of impinging osteophytes, loose bodies and chondral defects. For severe end stage of OA, articular distraction based on an external articulated fixation frame and a distraction force applied across the ankle has been recently advocated for patients being candidate for arthrodesis in order to decrease joint pain and improve movements.

Ankle arthrodesis has been seen for several decades as the gold standard treatment of end-stage ankle OA. Ankle arthrodesis can be done with numerous techniques and approaches. Several methods of stabilization can be used such as external

fixation; internal fixation with screws, plates and on-lay or dowel bone grafts; and cast fixation alone. Despite several limitations such as a disturbed gait pattern and reduced functionality after ankle fusion, most patients are satisfied with ankle arthrodesis. However, it remains unclear to which extent ankle arthrodesis contributes to progressive degeneration of adjacent joints.

24.8 Future Directions: Medical Care and Support of Former Professional Football Players

Professional football players should be seen as any other employees from any occupational sectors. Consequently, as stated by the World Health Organization (WHO) and the International Labour Organization (ILO), professional football clubs and responsible (inter)national bodies are responsible for ‘the protection, promotion, surveillance and maintenance of the highest degree of physical, mental and social well-being of players during their career but also long after their retirement years’. Consequently, the expectation is that the medical care and support offered to professional football players would be related to long-term health problems such as ankle OA because it may impair their sustainable health and functioning in their post-sport life.

Nevertheless, recent findings suggested that the current medical care and support in professional football is exclusively directed towards the short-term health issues during a career, namely, the injuries of the musculoskeletal system [1]. Despite the occurrence after retirement of long-term health problems such as ankle OA, any form of socio-medical counselling aiming to empower sustainable health and functioning of players in their post-sport life has been up till now neglected [1, 4]. Both current and former professional football players, as well as physicians working in professional clubs, have recently acknowledged that information provision about long-term adverse effects was lacking, advocating the development and implementation of a proper socio-medical counselling for these long-term adverse effects [1]. These needs are consistent with past findings in which the necessity to develop a long-term strategy for (forced) retired football players was underlined [4].

Consequently, several future directions related to the medical care and support of former professional football players facing long-term adverse effects such as ankle OA might be proposed. A first step could be to raise the self-awareness (information provision) of professional football players at the time around their retirement with regard to ankle OA. Especially, relevant information could be disseminated about potential risk determinants, disease process, pain mechanisms, treatment options and strategies, consequences for well-being, sport and work functioning.

For chronic health conditions such as rheumatic diseases (including OA), self-management programmes have been identified as effective in order to engage and promote a healthful and active behaviour of patients in managing their disease [19]. Consequently, the development and implementation of a self-management programme related to the particular characteristics and specific needs of former

professional football players facing ankle OA at the time around their retirement might be helpful as cognitive and behavioural therapy in order to manage ankle OA, prevent its worsening and empower sustainable health and functioning. Also, an end-career socio-medical consultation could be an optimal innovation in order to empower former players and give them advice about active lifestyles and relevant physical activities that might be performed (non-weight-bearing rather than weight-bearing activities) to prevent an increase in body mass and a decrease in muscular and neuromuscular function and to increase functional abilities in (working) life [3].

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