

Osteoarthrosis and sport¹

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Introduction

It is often assumed that the athlete after suffering the stresses and strains of sport, particularly contact sport, will most likely develop osteoarthrosis in the joints primarily involved. Adams (1976) reviewed various papers on this apparent connection between sport and osteoarthrosis.

Morris (1943) briefly described 5 cases of 'athlete's ankle' which showed bone changes on the anterior and posterior surface of the tibia and talus. McMurray (1950) described 3 patients who had bony outgrowths on the anterior aspect of the ankle joint, which he considered to be common in footballers and not associated with osteoarthrosis. Pelissier *et al.* (1952), O'Donoghue (1962) and Cabot (1964) reported similar changes on the anterior and posterior aspect of the ankle joint, which were found in various sportsmen.

Brodelius (1961), in a radiological survey of the ankle joints of 34 footballers, reported osteoarthrosis to be present in 33, bilateral in 27 subjects. He also examined 16 ballet dancers, 14 of whom were said to have osteoarthrosis. Solonen (1966) examined 36 footballers and reported that 33 of the players showed the 'typical radiological changes of osteoarthrosis' in the ankle joint.

Adams (1973) examined the knee joints of all 51 players at one professional football club and 16 ex-professional players. The examination used the technique of Ahlback (1968), which primarily consists of the measurement of the joint space after five minutes weight bearing, which has been accepted by many authors as a reliable criterion of articular cartilage destruction. The diagnosis of osteoarthrosis being made upon the presence of articular cartilage changes, using Ahlback's (1968) criteria, and the formation of new bone at the articular surface, Adams (1973) reported an incidence of 3.0% in the series. Reviewing the same radiographs and using as the criteria for the diagnosis of osteoarthrosis the presence of any two abnormalities as described in the 'Epidemiology of Chronic Rheumatism' (Kellgren 1963), the incidence in the series was 10.6%.

As there are apparently contradictory statements concerning the incidence of osteoarthrosis in sportsmen, a series of ankle joints were examined.

Methods

Professional footballers represent a group of highly trained athletes who sustain considerable repetitive trauma to their ankle joints. All 56 players at one football club and the 6 members of the coaching staff, all being ex-professional footballers, were examined (Table 1). Non-weight-bearing anteroposterior and lateral radiographs of both ankle joints were carried out.

Table 1. Subjects

Group	No.	Age	
		Range	Mean
A	17	15-16	15.9
B	11	17-19	18.4
C	17	20-24	22.9
D	11	25-36	27.9
E	6	39-55	45.2

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Results

All 62 patients showed some changes around the ankle joints. There were bony outgrowths in 123 of the 124 ankle joints. A number showed sharp, osteophytic processes from the lateral and medial malleoli, on the navicular and less commonly on the tibia. The majority of changes consisted of rounded or irregular bony outgrowths, most commonly on the anterior surface of the tibia and talus and to a lesser extent on the posterior surfaces. These outgrowths were more common and of a larger size with increasing age of the patient (Table 2). There did not appear to be any significant difference between the findings on the dominant and nondominant legs.

There were seven ankle joints with an apparent os trigonum as a rounded, separate ossicle. There were 29 joints where an enlarged trigonal process, which was a distinct feature of many of the joints, appeared to have fractured and where a variable degree of separation had occurred. There were also 29 joints with at least one loose body apart from an os trigonum or a fractured trigonal process (Table 3).

There was only one ex-professional, age 47 years, in whom there appeared to be a loss of joint space as representing articular cartilage and the formation of new bone at the articular surface which I considered to be diagnostic of osteoarthritis. Since there were two osteoarthrotic joints in the one patient, the overall incidence of osteoarthritis of the ankle in this series was 1.6% (Table 4).

Table 2. Percentage incidence of bone outgrowths

Group	Tibia		Talus		Navicular	Cuneiform
	Anterior	Posterior	Anterior	Posterior		
A	79.4	2.9	82.3	2.9	52.9	—
B	100	4.5	81.8	—	59.1	9.1
C	80.2	33.3	80.2	8.8	73.5	—
D	95.4	36.4	68.1	4.5	72.7	13.6
E	100	66.7	75.0	—	91.7	33.3
Total	90.3	22.6	79.8	4.0	66.9	7.3

Table 3. Loose bodies

Anterior tibial	4
Posterior tibial	1
Anterior talar	10
Navicular	13
Cuneiform	2
Malleolar	9
Trigonal process	29
Os trigonum	7

Table 4. Summary

62 patients – mean age 23.2 years
1 joint – no changes
123 joints – some changes
1 ex-player – osteoarthritis
61 others – ‘périarthropathie sportive’

Discussion

The majority of reports on osteoarthritis and sport primarily describe changes in bone without apparent changes in articular cartilage. We must consider whether an unusual finding represents an adaptation to demand or is a degenerative process. We do not know the dividing line between the physiological response and the pathological state in the highly trained athlete.

There is agreement that bone remodelling constantly takes place, and it would appear that adaptation to withstand the stresses and strains of strenuous physical exercise also takes place, particularly if this commences in adolescence. Bone hypertrophy has been demonstrated as a positive effect of running in the rat (Saville & Whyte 1969), in the dominant arm of professional baseball pitchers (King *et al.* 1969) and in the hands of karate participants (Hirata 1971).

Osteophytes are often considered to be a sign of osteoarthritis, but Byers *et al.* (1970), Danielsson (1964) and others have shown that the presence of osteophytes alone does not

provide evidence of osteoarthritis or imply the later development of radiographically-demonstrable structural changes. Tibial spiking is also sometimes considered a sign of osteoarthritis, but Smillie (1962) considered it an indication of hard useage, and spiking to some degree was reported by Adams (1973) to be present in 85.6% of footballers in his series.

A review of the changes reported as osteoarthritis in athletes, the doubtful diagnosis of osteoarthritis on the basis of periarticular changes alone, the adaptation of bone to stress, the calcification of ligamentous insertions in response to repetitive stress, would support the concept of Cabot (1964) who proposed that an entity 'périarthropathie sportive', in which periarticular bone changes are found together with a normal joint space, should be separated from true osteoarthritis.

Wear and tear alone as a cause of osteoarthritis no longer appears acceptable. It would appear that altered joint mechanics from whatever cause – be this ligamentous laxity, intra-articular loose body, relative muscular insufficiency, congenital or developmental abnormalities – are the prime causes of osteoarthritis in athletes. A number of cases of osteoarthritis in athletes are preventable by modern surgery and particularly by adequate rehabilitation after injury.

I would suggest that osteoarthritis is not common in athletes and that the commonly used criteria for the diagnosis of osteoarthritis be applied with caution to subjects in whom there is a history of prolonged strenuous sporting activity.

Summary

Sport as a significant aetiological factor in the development of osteoarthritis is well known and therefore assumed to be true. Inspection of the evidence upon which this assumption is based causes doubt. A review of radiographs of the ankle joints of professional footballers is presented and this does not support the concept of the likely development of osteoarthritis, casting doubt upon the interpretation of minor radiological changes as necessarily being degenerative in origin.

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