FOOT & ANKLE INTERNATIONAL

Participation in Sports After Arthrodesis of the Foot or Ankle

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ABSTRACT

Currently no data or guidelines exist for the surgeon on how to advise patients about returning to sports participation after arthrodesis within the foot or ankle. Sequelae of inappropriate activity after arthrodesis includes periarticular arthrosis, arthrodesis failure and stress fracture. Some arthrodeses will preclude certain sports because it limits the patient's ability to perform movement vital to the game, for example, ankle arthrodesis preventing basketball players from jumping. Questionnaires were sent to members of the American Orthopædic Foot and Ankle Society (AOFAS) and to trainers of professional basketball and American football teams. This paper reports on the responses of orthopædic foot and ankle surgeons about return to sports participation, after arthrodeses within the foot and ankle, and suggests guidelines for sports participation after an arthrodesis of the lower extremity. A selective sports participation policy is advised. Patients with an ankle or triple fusion should avoid high-impact sports, while those with more distal arthrodeses should be monitored for arthrosis and stress fracture.

INTRODUCTION

The increased emphasis placed on the health benefits of exercise,[3] combined with improved function and relief of pain[2] lead many patients to consider sports participation after an arthrodesis about the foot or ankle. Currently no data or guidelines exist for the surgeon as to how to advise patients on their return to sports. Similar literature has been reported for hip and knee arthroplasty.[23]

The decision on sports participation after a lower extremity arthrodesis involves a number of elements. First, the arthrodesis may place an excessive burden on surrounding joints, leading to pain and subsequent arthrosis. Second, arthrodesis results in a longer rigid lever arm, which may result in stress fracture above or below the arthrodesis site. Third, the arthrodesis itself may be placed under excessive stress, leading to failure or pseudarthrosis. Finally, many sports are precluded simply because an arthrodesis renders the individual incapable of performing a fundamental motion of the sport. The decision about returning to sports is complicated by the vast number of different sports which can be played at many levels, from the recreational athlete to the professional athlete. Each level requires a certain level of biomechanical competency and skill.

This paper reports on the questionnaire responses of orthopædic surgeons who are members of the American Orthopaedic Foot and Ankle Society (AOFAS) about their opinions on return to sports participation after arthrodesis and details the type of arthrodesis and sports of professional athletes who successfully returned to their sports as reported by surgeons and trainers. The issues in giving athletes advice about sports participation after an arthrodesis of the lower extremity are discussed and guidelines are suggested.

METHODS

A detailed two-part questionnaire was e-mailed to members of the AOFAS. Part one asked the surgeon if he or she would allow a patient to return to a number of sports after different arthrodeses. The sports were football, basketball, soccer, tennis, golf, running, jogging and skiing. The lower extremity arthrodeses were interphalangeal joint (IPJ) of the great toe, metatarsophalangeal joint (MTPJ) of the great toe, Lisfranc, Chopart, subtalar, triple and ankle. Part two asked the surgeon if he or she had treated any professional athletes who had returned to their sport after a lower extremity arthrodesis. General comments from the surgeons were also collected in addition to the above information. A separate questionnaire was sent to the trainers of 60 NBA and NFL teams asking if any had past or present players with a lower extremity arthrodesis.

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Table 1: Recommended sports participation after lower extremity arthrodesis.

	Golf	Skiing	Tennis	Jogging	Running	Football	Soccer	Basketball
IP Arthrodesis Great Toe	100%	97%	100%	97%	97%	97%	97%	97%
MTP Arthrodesis Great Toe	97%	97%	92%	82%	73%	66%	64%	62%
Lisfranc Arthrodesis	97%	97%	84%	76%	54%	64%	69%	62%
Chopart's Arthrodesis	95%	91%	62%	54%	31%	27%	31%	29%
Subtalar Arthrodesis	96%	92%	77%	60%	43%	48%	45%	47%
Triple Arthrodesis	92%	89%	50%	38%	27%	23%	23%	21%
Ankle Arthrodesis	94%	77%	38%	23%	17%	11%	11%	11%

> 75% allowance
75-25% allowance
< 25% allowance

Table 2: Sport and arthrodesis of each professional athlete who successfully returned to their sport.

Sport	Arthrodesis
NBA Basketball	4th Toe DIP Arthrodesis
NFL Football	Great Toe IPJ Arthrodesis
First Division European Soccer Player	Great Toe MTPJ Arthrodesis
NBA Basketball	Great Toe MTPJ Arthrodesis
NFL Football	Great Toe MTPJ Arthrodesis
NFL Football	Lisfranc Arthrodesis
NFL Football	Lisfranc Arthrodesis
AAA Baseball	Lisfranc Arthrodesis
NBA Basketball	Lisfranc Arthrodesis
NBA Basketball	Lisfranc Arthrodesis
CFL Football	Chopart's Arthrodesis

RESULTS

One hundred and three surgeons responded to the questionnaire, a response rate of 20.6%. All respondents would allow patients to return to golf after IPJ arthrodesis of the great toe, while the lowest rate of allowance was 11% for football players, basketball players and soccer players returning to their sport after ankle arthrodesis. The remainder of responses is displayed in Table 1 ranked from right to left in decreasing frequency from top to bottom. Twelve percent of respondents allowed their patients to return to all sports irrespective of the arthrodesis, while 88% selectively allowed their patients to return based on arthrodesis and sport. Five of the respondents who allowed all patients to return to any sport commented that they would allow the patient to return if they could undertake the sport, but doubted that patients could play some sports with a hindfoot or ankle arthrodesis. Golf achieved the highest allowance rate, followed by skiing. Table 2 lists the sport and arthrodesis level of professional athletes who returned to their sport as reported by the surgeons or trainers. Unfortunately, we do not know how many professional athletes actually had some type of arthrodeses; we only have anecdotal experience from physicians and trainers. No professional athlete with an ankle or triple arthrodesis treated by a responding surgeon returned to his or her sport. These patients were all basketball or football players. Many surgeons recommended a foot orthosis or ankle-foot orthosis.

DISCUSSION

When advising patients after lower extremity arthrodesis on returning to sport, the surgeon currently has no literature or guidelines to follow. The issue is further complicated by the large number of different sports played at a variety of impact levels.

A selective return policy attempts to protect the patient from any possible acceleration of secondary arthrosis in surrounding joints, arthrodesis failure or stress fracture. Ankle[30] arthrodesis, double or triple arthrodesis[2] and subtalar arthrodesis[2] alter the kinematics of the entire lower extremity,[28] increasing the risk of periarticular arthrosis. Reported rates of subtalar arthrosis after ankle arthrodesis differ between reports,[23] however long-term follow-up studies[6] reported that osteoarthritis consistently developed in the ipsilateral subtalar, talonavicular, calcaneal-cuboid, navicular-cuneiform, tarsometatarsal, and 1st MTP joints, but not

in the ipsilateral knee or lesser MTP joints. Secondary arthrosis has been reported after triple and double arthrodesis[2,18] in the tarsal and ankle joints. Isolated subtalar fusion has been reported to lead to radiographic progression of osteoarthrosis in the ankle and transverse tarsal joints.[14,15]

Increased repetitive strains due to magnified abnormal ground reaction forces, localized osteoporosis and longer force lever arms predispose patients with lower extremity arthrodesis to stress fractures.[13] Stress fracture of the distal tibia and fibula have been described[13,1,17] following ankle and hindfoot arthrodesis. The majority of the tibial stress fractures reported presented with a painful lower extremity outside of the perioperative period and responded to nonoperative management. Metatarsal stress fractures have been reported after midtarsal and tarsometatarsal arthrodesis.[2] No case reports of stress fractures after great toe MTPJ arthrodesis appear in the literature. However the senior author has treated patients with first metatarsal stress fractures after such an arthrodesis.

Multiple papers have investigated the association between sports participation and later osteoarthrosis.[4,9,12,22] Studies investigating osteoarthrosis in long-distance runners suggest similar rates of osteoarthrosis to non-runners.[10,11,20] However, other studies suggest that sports which subject athletes to intense impact and torsional loading may have increased rates of lower extremity osteoarthrosis.[4] Such sports include tennis,[25] American football[5,19,21,29] and soccer.[8,22]

Part 2 of the questionnaire was designed to elucidate if it were possible for a professional athlete to return to his or her sport after an arthrodesis. The question inquired about professional athletes as they would have to perform at an elite level, rather than recreational athletes who could modify their activity based on their disability. This question is a good indicator of an athlete's ability to perform after a particular arthrodesis. It does not give any indication of possible sequelae of playing with these arthrodeses, only that the athletes were able to play at a predetermined elite level. Interestingly, of the 103 surgeons who responded and the 60 trainers questioned, only 11 professional athletes were reported to have returned to their sport. The athlete with the most proximal arthrodesis that was able to return to the game was a Canadian football player with a Chopart's arthrodesis. This was an interesting finding, as the arthrodesis would significantly affect his lower-extremity kinematics. Five athletes returned after Lisfranc arthrodeses, and three after great toe MTPJ arthrodesis. Theoretically, MTPJ arthrodesis would interfere with sprinting ability.[26] However, a carbon-fiber orthotic may reduce the effect.[27] Energy-absorbing orthotics and well-designed shoes[16] can reduce the incidence of stress fractures. Although we were able to identify several professional athletes who, having undergone an arthrodesis in the foot, were able to return to their sport, we were not able to identify professional athletes who had an arthrodesis, but could not return to their sport. This is a definite weakness of our study in that we do not know how many professional athletes actually underwent arthrodesis. We believe, however, that it is important to point out to the reader that under highly selective exceptional conditions certain athletes for whatever reason are able to return at the most elite level having undergone arthrodesis. This is clearly an area that requires more in-depth study and perhaps should be more closely investigated by another questionnaire attempting to find out how many professional athletes were unable to return after undergoing an arthrodesis.

A potential flaw of this study is the surgeon's low response rate of 20.6%. This may have been due to technical difficulties associated with the use of the e-mail software or printing out the survey attached to the email. A higher response rate would have been preferable. However, the low response rate does not invalidate the data. The questionnaire was designed to obtain the opinion of a large group of orthopædic surgeons who have an interest in foot and ankle surgery as the basis for a discussion, and it achieved this. It is not an epidemiological survey, for which a higher response rate would be necessary.

Creating guidelines for return to sport after lower extremity arthrodesis is imprecise given the scant literature available on the topic, the variable intensity at which different sports can be played and the large variety of different sports. In a similar study reporting on surgeons attitudes to return to sports after hip or knee arthroplasty, McGory et al.[23] recommended no-impact or low-impact activity after arthroplasty. The authors used an arbitrary figure of 75% of surgeons agreeing or disagreeing to either recommend or not recommend a variety of sports.

The majority of surgeons who responded to this survey supported a selective return policy. This policy has the greatest merit, as allowing a patient to return to any sport may result in a stress fracture, periarticular arthrosis or arthrodesis failure. However, pain typically will alert both the patient and physician to the condition. We suggest the following guidelines for sports participation after lower extremity arthrodesis, based on McGrory et al's[23] figure of 75% surgeon's agreement combined with the above literature.

1. Preoperatively, the patient should be aware of the potential functional limitations after an arthrodesis.
2. The arthrodesis must be clinically and radiologically united and pain-free.

3. The patient must be aware of the possibility of accelerated periarticular arthrosis and stress fracture. Arthrodeses that stiffen the hindfoot or ankle are at a greater risk of these sequelae than distal arthrodeses.
4. High-impact sports, such as football, soccer, singles tennis and basketball, should be avoided after ankle and hindfoot arthrodesis.
5. Patients with isolated subtalar or Chopart's fusion can return to high-impact sports with an orthosis, but should be counseled and monitored for periarticular arthrosis or stress fracture.
6. Patients with forefoot arthrodesis can return to low- and high-impact sports with counseling and an orthosis.
7. Patients with a lower extremity arthrodesis who suffer pain during sports participation should be counseled to seek medical attention.

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