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Review

Return to sport after hallux valgus surgery in athletes: Current evidence

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Abstract

Objective: To present evidence regarding the different surgical techniques for hallux valgus and their impact on return to sports.

Methods: A search was conducted in PubMed, Embase, MEDLINE, and Google Scholar databases. The inclusion criteria were articles involving case series published in English from 1995 through January 2025. The exclusion criteria were articles addressing hallux rigidus, traumatic deformity, sesamoid pathology, and review articles. Studies that did not describe the athlete's level of play and the type of sport were also excluded.

Results: Eight studies on the surgical correction of hallux valgus in "athletes" published to date were identified. Current evidence supports Chevron osteotomy for mild to moderate deformities and Scarf osteotomy for moderate to severe deformities, both resulting in low recovery time. Metatarsophalangeal arthrodesis has demonstrated up to 96% patient satisfaction in sport-related activities.

Conclusion: Chevron and scarf osteotomies are effective surgeries for athletes with minor deformities. For severe hallux valgus, there is no clear consensus, but metatarsophalangeal arthrodesis appears to demonstrate a good result. Further studies are required to document activity levels and return to sport to help guide treatment.

Level of evidence I; Type of study; Evaluation of results.

Keywords: Athletes; Return to sport; Hallux valgus; Patient satisfaction.

Introduction

Hallux valgus (HV) is a common deformity that affects up to one-third of the population and is typically asymptomatic[1]. It occurs more frequently in women, especially following the introduction of high heels and pointed-toed shoes in the 1950s[1].

This condition is characterized by a multiaxial deformity in which the first metatarsal is in varus, the hallux is in valgus, and the first ray is in pronation. This deformity makes the medial region of the forefoot more prominent, which can lead to pain, particularly when wearing tight-fitting shoes. In addition, hallux valgus compromises first ray function, disrupts the gait pattern, and alters plantar pressure during different stages of walking[2].

Initial management typically involves the use of wide, firm-soled footwear. Although toe separators and various orthoses have been described, they have shown limited success. When conservative management fails, surgical intervention is considered. The literature reports over 100 surgical techniques, each with varying results[2].

Athletes are not exempt from this condition, with a higher prevalence in women. Hallux valgus in athletes can manifest as simple pain while wearing running shoes, a loss of strength during propulsion, transfer injuries, or even a decrease in overall athletic performance. Although repetitive trauma is considered a contributing factor, its exact impact remains unclear[3,4].

Currently, there are few targeted studies in the literature that address the return to sport following hallux valgus surgery. The objective of this review is to present evidence regarding the different surgical techniques for hallux valgus and their impact on return to sports.

Study performed at the Clínica Alemana, Santiago, Chile.

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Biomechanics of the first ray in sports and hallux valgus

The first ray bears approximately 30% of the load in the stance phase; therefore, a dysfunctional first ray, whether due to hallux valgus or another pathology, leads to a global foot malfunction, resulting in various conditions[5].

During running and jumping activities, the force on the first metatarsophalangeal (MTP) joint can reach up to 400% of body weight, in contrast to normal walking, where the force is around 80%[6-8]. For this reason, it is crucial to maintain a healthy and congruent MTP joint.

It is well-documented that in patients with hallux valgus, pressure in the forefoot is shifted from the first ray to the central rays[9,10]. After corrective surgery, the loads should theoretically normalize or eventually return to the first ray. However, studies are inconsistent due to small sample sizes and varying techniques.

Considering this, Wong et al.[11] conducted a systematic review in 2023, including studies with pre- and post-surgical podographic analyses. They analyzed 26 studies involving 857 operated hallux valgus cases. Overall, the results showed that a postoperative decrease in hallux plantar pressure, suggesting a tendency for increased transfer metatarsalgia. The study heterogeneity and the techniques used are reported as a significant limitation. These findings contradict expected outcomes; therefore, no adequate conclusions can be drawn.

Surgical intervention for hallux valgus in athletes

As previously stated, multiple surgical options are available for the treatment of HV. Currently, there is no consensus on which procedure is optimal for athletes. Surgical approaches are often similar to those used in non-athletic patients, intending to achieve the same goals: correcting the MTP angle, restoring joint congruence, and positioning the metatarsal head above the sesamoid complex. In cases of mild hallux valgus, distal osteotomies are preferred, whereas proximal osteotomies are favored for moderate hallux valgus due to their greater corrective potential. In athletes, it is also crucial to consider functionality, as the required range of motion varies depending on the sport. One of the most debated issues among surgeons is MTP arthrodesis, as it induces joint stiffness, which may adversely affect athletic performance[12].

The definition of 'athlete' in the published literature is highly variable. This distinction is significant, as the expectations regarding surgery and outcomes can differ significantly between high-performance and amateur athletes.

Methods

A literature review was conducted by two researchers, primarily in the MEDLINE, PubMed, Embase, Google Scholar, and Scopus databases to search for the following terms: "hallux valgus," "bunion," "athlete," "surgery," "sport," and "physical activities." Several searches were performed using combinations of the terms, such as "hallux valgus", "athlete", "surgery and bunion," and "sports." Twenty-six articles were found; eight met the inclusion and exclusion criteria. The inclusion criteria were articles involving case series published in English from 1995 through January 2025. Exclusion criteria were articles addressing hallux rigidus, traumatic deformity, sesamoid pathology, and review articles. Studies that did not describe the athlete's level of play and the type of sport were also excluded. Figure 1 shows the flowchart of the search.

They were further divided into categories: distal osteotomies, proximal osteotomies, MTP, and tarsometatarsal arthrodesis. The outcomes of the procedures were carefully reviewed by the authors. The eight included studies are summarized in Table 1. The objective of gathering this information was to describe the findings in the selected prior publications in a narrative fashion with an emphasis on the different surgical techniques.

Results

Distal osteotomies

Within this category, all papers involving the use of any distal osteotomy were reviewed. The most common technique reported in the literature is Chevron osteotomy, followed by Scarf osteotomy. The Chevron osteotomy offers several advantages, including an inherently stable bone cut that facilitates an early return to daily activities.

Giotis et al.[13] describe a case series including 33 patients (42 feet) with mild to moderate hallux valgus surgically treated using Chevron and Akin osteotomies. Outcomes were evaluated using the American Orthopaedic Foot and Ankle Society (AOFAS) score, pain levels, cosmetic results, and mobility. The AOFAS score improved from a baseline mean of 47 points to 96 points. Range of motion did not vary significantly, 90% reported no pain, and 95% of cases rated the cosmetic outcome as excellent. All athletes returned to their sport within 12 weeks postoperatively and regained their preoperative performance level within six months.

Saxena et al.[14] define athletes as individuals participating in sports for at least six hours per week, including school-selected, university-level, or those running at least 25 miles per week. Patients returned to non-competitive sports within a mean of 8.9 weeks. However, the study did not specify findings regarding competitive sports. The authors conclude that the procedure is straightforward and reproducible; although it may lead to shortening of the first ray.

Regarding the Scarf technique, Ciechanowicz et al.[15] analyzed 79 patients with a mean age of 55 years over a three-year follow-up. Sixty-seven percent of the patients maintained their sports level, and 24% reported an improvement. The sports evaluated included running, functional training, skiing, and volleyball. The mean return to sports after surgery was approximately 15 weeks.

Proximal osteotomies

In general, proximal osteotomy is considered for moderate to severe hallux valgus. The reason is based on that "the

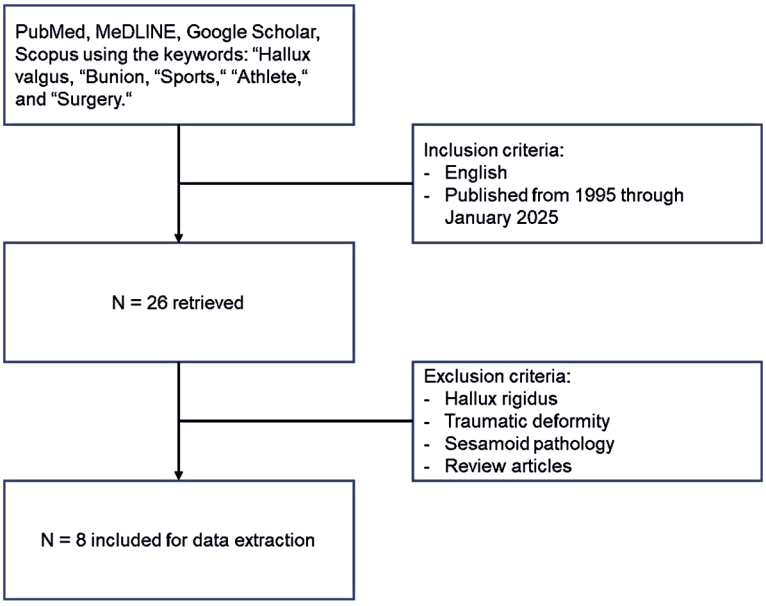

Figure 1. Flowchart of the review.

Table 1. Summary of evidence

Study	Procedure	Design	Patients	Follow-up	Results
Giotis et al. (2016)	Chevron	Prospective	33 (42 feet)	32 months	40/42 pain free
Saxena (2000)	Ludloff	Retrospective	12 (14 feet)	48 months	Return to sport 8.9 weeks*
Ciechanowicz et al. (2020)	Scarf	Retrospective	79	36 months	67% RTS and 24% increase of sport level
Saxena and St Louis (2013)	Ludloff	Prospective	112 (119 feet)	75 months	100% RTS
Macmahon et al. (2016)	Lapidus	Retrospective	48	2.8 years	80% RTS
McInnes and Bouché (2001)	Lapidus	Retrospective	25 (32 feet)	39 months	30% RTS
Da Cunha et al. (2019)	MTP arthrodesis	Prospective	50	5,1 years	96% RTS
Thong et al. (2024)	MTP arthrodesis	Retrospective	58	5,3 years	From 4.26 to 5.29 hours weekly

MTP: Metatarsophalangeal; RTS: return to sport. * It does not specify the sport level, only return to sport.

closer the osteotomy is to the base of the first metatarsal, the greater the lever arm and power of correction." Furthermore, proximal osteotomies facilitate sagittal plane correction; however, they are typically less stable than distal techniques. The Ludloff osteotomy is among the classical approaches in this category. To date, there are no studies demonstrating outcomes regarding sports reintegration related to these procedures; only an older study by Saxena et al (1997)[16], which assessed 12 patients (14 feet) treated with the Ludloff technique. Early weight-bearing was allowed at 3 weeks postoperatively, resulting in a mean return to sports at 3.6 months. All participants successfully resumed their sporting activities.

Tarsometatarsal arthrodesis

Among the procedures in this subgroup, the Lapidus technique is the most classically described, which entails arthrodesis of the first metatarsal with a medial wedge. This procedure allows for correction of deformities in the sagittal, coronal, and even rotational planes. Technically, it is more demanding since it requires simultaneous control of three planes and can result in shortening of the first ray.

McMahon et al.[17] demonstrated that the modified Lapidus technique—excluding arthrodesis between the base of the second to the first metatarsal—is a viable option for athletic patients. In their retrospective study with a mean follow-up of 2.8 years, 48 athletes with first ray hypermobility were evaluated. Overall, 81% of patients were satisfied with the surgery, and 80% managed to return to their previous sport. Two self-administered postoperative questionnaires were evaluated: the Foot and Ankle Outcome Score (FAOS) and a self-reported sports questionnaire. A total of 15% of complications were reported, ranging from hematomas to transfer metatarsalgia. Another study by McInnes and Bouché in 2001[18] assessed Lapidus surgery in 25 athletes

with a follow-up of 39 months. In contrast to the McMahon et al. study, only 30% returned to their previous sport, with a higher complication rate.

Metatarsophalangeal arthrodesis

Metatarsophalangeal arthrodesis has been employed for many years to treat severe hallux valgus, especially when associated with degenerative changes. The fusion of the first metatarsal with the proximal phalanx allows for significant corrections; however, the major drawback is the loss of joint motion, resulting in rigidity. Consequently, its use in athletes remains controversial.

Brodsky et al.[19] observed the effects of MTP joint arthrodesis on gait. Gait analysis was performed in 23 patients with a mean age of 58.0 ± 9.5 years preoperatively and at least one year postoperatively. The results showed increased maximum ankle propulsion power and single-limb stance time in the operated limb, along with a decrease in stride length, concluding that MTP joint arthrodesis leads to objective improvements in propulsion power, foot weight-bearing capacity, and gait stability.

Da Cunha et al.[20] conducted a prospective study with 50 patients, with a mean follow-up of 5.1 years. The patients participated in 22 different sports (one in three engaged in more than 10 hours per week) and underwent surgery at a mean age of 49 years. Sports included swimming, running, cycling, and trekking. Forty-four percent managed to return to their sport six months postoperatively, achieving peak performance between nine to 12 months. Additionally, 96% of patients reported satisfaction with the surgery outcome regarding their return to sports.

Thong et al.[21] assessed 58 patients with a mean age of 54 years (ranging from 18 to 59 years) with a follow-up of 5.3 years. Weekly sports activity increased from 4.26 to 5.29 hours postoperatively, with 52% participating in high-intensity sports such as tennis, running, triathlon, basketball, and soccer, without any change in sports intensity.

Discussion

The most appropriate surgery for hallux valgus for athletes remains unknown. The current evidence is limited, and studies that cover different registration systems and sports are not comparable. Furthermore, all surgical techniques appear to affect foot biomechanics. Therefore, it is not possible to provide a definitive recommendation on which surgery to perform for each athlete.

It is noteworthy that most studies on hallux valgus report "return to activities" using various scoring systems; however, they are quite ambiguous regarding the specific sport, lacking detailed records, which immediately disqualifies most studies for this review.

One of the most extensively analyzed studies was conducted by Da Cunha et al[20]. They conducted a long-term follow-up and applied standardized and validated scales such as the FAOS, analyzing different sports disciplines. A noted limitation of the study is that although it separates sports into high and low intensity, it does not account for high-performance or professional athletes.

Regardless of the surgical technique chosen, it is recommended to implement some physical activities, such as low-impact sports, during early rehabilitation to avoid complications such as muscle atrophy and stiffness, among others. Impact activities may be reintroduced once radiographic evidence of consolidation is confirmed.

One of the limitations of our study is the narrative review design, as no meta-analysis was conducted, which would have been ideal to strengthen the conclusions; however, current limited evidence precludes such an analysis. Additionally, there is a lack of consistent definitions regarding athlete classification, particularly the distinction between amateur and high-performance athletes.

Despite these limitations, we believe that return to sport outcome should be considered in future prospective studies. It is important to specify results by type of sport, given that the physical demands differ significantly. It appears reasonable to hypothesize that if osteotomies can be performed without sacrificing joints, they should be the first option in sports requiring preserved ankle and foot mobility.

On the other hand, with the growing trend of minimally invasive surgery, which theoretically should have accelerated recovery times and less pain, such procedures should be considered as a treatment alternative for athletes. Currently, a directed review of studies published up to 2024 reports multiple scores such as MOXFQ and EQ-5D; however, they do not report on sports reintegration or return to play[22-25].

Conclusion

Athletes are equally susceptible to hallux valgus as the sedentary population; however, the treatment approach must be different. A tailored assessment that considers the patient's functional demands and expectations is essential to guide optimal surgical decision-making. Chevron and scarf osteotomies are effective surgeries for athletes with minor deformities, leading to relatively early return to sports and low complication rates. For severe hallux valgus, there is no clear consensus, but metatarsophalangeal arthrodesis appears to demonstrate a good sports reintegration rate without function alteration, despite evident biomechanical alterations. Further studies regarding hallux valgus and athletes are required, especially in minimally invasive surgery and a proper definition of "athlete".

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