Hypertrophic Bone Spurs and Myositis Ossificans in Athletes: A Comparative Review of Clinical Features, Imaging, and Rehabilitation Approaches

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ABSTRACT

Background:
Myositis ossificans (MO) and hypertrophic bone spurs (HS) are two distinct conditions involving abnormal bone formation, occasionally observed in athletes. While MO is well-documented in sports medicine literature, HS remains poorly characterized in athletic populations.

Objective:
To compare the clinical features, imaging findings, and rehabilitation outcomes of MO and HS in athletes, and to highlight the literature gap surrounding HS.

Methods:
This narrative review synthesizes current literature on MO and HS, focusing on etiology, presentation, imaging modalities, and treatment. Key studies addressing rehabilitation strategies for MO were analyzed, and available data on HS in the general population were reviewed for comparative purposes.

Results:
MO is consistently linked to acute muscle trauma and demonstrates favorable rehabilitation outcomes with conservative treatments such as shockwave therapy and guided physiotherapy. Conversely, no athlete-specific studies on HS were identified. Most available evidence on HS stems from general orthopedic cases, where physiotherapy modalities like ultrasound, TENS, and spa-based exercise have shown functional improvements.

Conclusion:
There is a substantial discrepancy in the evidence base for MO and HS in athletes. While MO management is well-established, HS remains underreported in sports medicine. Clinicians may cautiously extrapolate general HS rehabilitation strategies to athletic cases, although further research is needed to validate their effectiveness in this population.

***Keywords*: Bone Hypertrophic Spurs , Myositis Ossificans , Musculoskeletal Injury , Sports Injury**

1. *INTRODUCTION*

Musculoskeletal injuries are common in athletes, with some cases resulting in abnormal bone formation within soft tissues. Two such conditions—myositis ossificans (MO) and hypertrophic bone spurs (HS)—pose diagnostic and therapeutic challenges, particularly when they occur in high-performance individuals. While myositis ossificans typically arises after trauma, characterized by heterotopic ossification within muscle tissue, hypertrophic spurs are often associated with repetitive stress and osteotendinous or enthesis-related changes.

In the athletic population, MO has been extensively described in terms of clinical presentation, imaging features, and rehabilitation outcomes [1–7]. Conversely, the literature offers scarce data regarding hypertrophic bone spurs in athletes, with no identified studies describing their clinical or radiological profile, treatment, or rehabilitation [1,8].

This imbalance presents a significant gap in the sports medicine literature, limiting comparative understanding and evidence-based rehabilitation planning. Therefore, this narrative review aims to:

- Compare clinical, imaging, and management aspects of myositis ossificans and hypertrophic spurs,
- Highlight rehabilitation strategies that have shown effectiveness in MO,

Identify the research void concerning HS in athletes.

2.Mechanisms of Injury in Athletic Context

Although the available clinical literature on hypertrophic bone spurs (HS) in athletes is lacking, known biomechanical and pathophysiological principles allow us to hypothesize plausible mechanisms for the development of both myositis ossificans (MO) and HS in sport-specific settings.

Myositis Ossificans (MO):
MO typically follows acute muscle trauma such as direct contusions, strains, or repetitive microtrauma. These injuries initiate inflammation, hemorrhage, and fibroblastic proliferation. Inappropriately timed return to sport or inadequate management of muscle injury can promote osteogenic transformation of mesenchymal cells, especially in deep or bulky muscles.
High-risk sports: football, rugby, gymnastics, martial arts
Common scenarios: thigh contusion in football players; overtraining in gymnasts without sufficient recovery

Hypertrophic Bone Spurs (HS):
HS (osteophytes) are more likely to result from chronic mechanical stress at tendon insertions or joint margins. Repetitive traction forces, joint overload, and poor biomechanics can stimulate endochondral ossification and bone outgrowth, particularly where tendons attach to bone.
High-risk sports: long-distance running, tennis, weightlifting
Common scenarios: plantar fascia traction in runners (calcaneal spur); elbow overload in tennis (lateral epicondyle spur)

Table 1. *Comparative Clinical and Imaging Features of Myositis Ossificans and Hypertrophic Bone Spurs in Athletes*

Feature Category	Myositis Ossificans (MO)	Hypertrophic Bone Spurs (HS)	References
Etiology	Post-traumatic; often after muscle contusion or strain	Chronic mechanical stress; osteotendinous interface	[1,2,4]
Onset	Delayed (typically 2–8 weeks post-injury)	Insidious, progressive over time	[1,3]

Feature Category	Myositis Ossificans (MO)	Hypertrophic Bone Spurs (HS)	References
Clinical Presentation	Localized pain, swelling, limited range of motion, palpable mass	Often asymptomatic or mild pain with range-of-motion limits	[1,5]
Common Locations	Quadriceps, adductors, biceps, gluteus	Entheses of tendons (e.g., heel, elbow); not reported in athletes	[1,6]
Imaging Modalities	X-ray, MRI, ultrasound, CT, histology	Sparse/no data in athletes	[1,3,6]
Imaging Appearance	Intramuscular ossification with zonal pattern (mature periphery, immature center)	No specific patterns reported in sports context	[1,2]
Diagnostic Timeline	Usually diagnosed 3–12 weeks post-injury	No data available	[1,6]
Size of Lesions	Ranges reported: 2.3×2.5×6 cm; 70×45×35 mm	No athletic case size data	[1]
Response to Rehab	Frequently positive; return to sport in 3–12 months even with residual calcification	Unknown	[1,2,7]

Table 2. *Comparative Treatment and Rehabilitation Outcomes for MO and HS in Athletes*

Study / Source	Myositis Ossificans (MO): Intervention & Outcome	Hypertrophic Bone Spurs (HS): Data Availability or Intervention	Reference
Buselli et al., 2010	Shockwave therapy + rehab; 87.5% returned to sport at 3 mo; normal ROM at 2 mo	No data reported on HS in athletes	[1]
Simon et al., 2016	Observation + ultrasound; 100% return by 12 mo	No data reported on HS in athletes	[2]
Diallo et al., 2016	Same as above	No data reported on HS in athletes	[3]
Devilbiss et al., 2018	Gradual rehab; light at 2–3 mo; full activity at 6 mo; preinjury level by 1 yr	No data reported on HS in athletes	[4]
Bagnulo & Gringmuth, 2014	Acetic acid phonophoresis; symptom and size reduction at 4 weeks	No data reported on HS in athletes	[5]
Wieder, 1992	Iontophoresis + ultrasound; return at 3 weeks	No data reported on HS in athletes	[6]
Martins et al., 2016	Shockwave + rehab; return to sport in 15–45 days; full ROM despite persistent mass	No data reported on HS in athletes	[7]
Onu et al., 2020	N/A	TENS, ultrasound, stretching; VAS improvement in calcaneal spurs after 10 days	[11]
Dagfinrud et al., 2008	N/A	Spa exercise + group physio; pain ↓ 18%, function ↑ 24%, mobility ↑ up to 18%	[12]

3.Treatment and Rehabilitation Approaches

Rehabilitation strategies for myositis ossificans (MO) in athletes are well-documented, with consistent success reported through conservative management. In contrast, hypertrophic bone spurs (HS) lack clinical, therapeutic, or outcome data in athletic populations. However, general population studies provide insight into possible physiotherapy strategies.

Table 2 compares documented interventions and outcomes for MO and HS, highlighting the research gap regarding spurs. The most promising non-athlete HS protocols involved supervised, multimodal physiotherapy including spa-based exercise, group rehabilitation sessions, and physical modalities such as ultrasound and TENS.

4.Discussion

The present review highlights a stark contrast in the available literature on two forms of abnormal bone formation affecting athletes: myositis ossificans (MO) and hypertrophic bone spurs (HS). MO, typically arising post-trauma, has been well-characterized in terms of clinical progression, imaging features, and response to conservative rehabilitation [1–7]. In contrast, hypertrophic spurs—despite being a known entity in orthopedics—remain largely undocumented in athletic populations.

A recurring pattern across MO case series is the efficacy of conservative treatment. As shown in Table 2, athletes treated with modalities such as shockwave therapy, ultrasound-guided monitoring, or phonophoresis consistently achieved return to sport within 3 to 12 months. Several studies noted full functional recovery even in the presence of persistent ossification [1,2,4,6].

In contrast, hypertrophic bone spurs—frequently associated with tendinopathies and enthesopathies—were not the subject of any of the included studies in athletes. This omission represents a substantial gap in sports medicine research. While spa-based physiotherapy and group rehab protocols from general populations show promise [11,12], their efficacy in athletic contexts remains to be tested.

5.Conclusion

This narrative review identified substantial differences in the available evidence regarding myositis ossificans (MO) and hypertrophic bone spurs (HS) in athletes. MO, a well-documented post-traumatic condition, demonstrates consistent clinical and radiological characteristics, with multiple studies supporting conservative rehabilitation protocols leading to return to sport within 3–12 months. Conversely, no clinical studies were found examining HS in athletes, leaving their management, prevalence, and functional implications entirely undocumented in this population.

Despite this lack of sport-specific data, general orthopedic literature suggests that supervised, multimodal rehabilitation—particularly incorporating spa exercise, group physiotherapy, and stretching—can improve pain and function in patients with bone spurs. While not yet validated in athletes, these protocols may provide a foundation for individualized care and future clinical trials in sports medicine.

6.Clinical Recommendation:

Clinicians encountering suspected HS in athletes may consider adapting physiotherapy strategies from general population studies. These could include short-course ultrasound and TENS therapy for localized spurs, or structured group rehabilitation and spa-based interventions for more diffuse axial spurs. Until further research is available, such extrapolations must be applied cautiously and monitored closely.

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