Exertional Leg Pain

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KEYWORDS

• Medial tibial stress syndrome • Stress fractures • Compartment syndromes
• Popliteal artery • Iliac artery • Nerve compression syndromes • Leg injuries
• Athletic injuries

KEY POINTS

- A detailed history, physical examination, and evidence-based approach to diagnostic testing are essential in the evaluation and management of exertional leg pain.
- The clinician should be aware of the possibility of more than 1 diagnosis to explain complex presentations of exertional leg pain.
- The physical examination is often normal at rest, and provocative maneuvers or exertional activities are often required to precipitate examination findings.

INTRODUCTION

Exertional leg pain (ELP) is defined as pain distal to the knee and proximal to the talocrural joint that is associated with exertion.[1]

The incidence of ELP in runners varies in the literature, with one retrospective study of 2002 running injuries reporting a rate of 12.8%, and another reporting that 82.4% of cross-country athletes had a history of ELP.[2] A further study noted that running more than 40 miles per week was associated with patients presenting with ELP.[3]

ELP is commonly categorized as having a musculoskeletal, vascular, or neurologic origin. This article focuses on medial tibial stress syndrome (MTSS), tibial bone stress injury (TBSI), chronic exertional compartment syndrome (CECS), arterial endofibrosis, popliteal artery entrapment syndrome (PAES), and entrapment neuropathies.[1,4]

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MEDIAL TIBIAL STRESS SYNDROME

The incidence of MTSS in runners is between 13.6% and 20.0%.[5] Other names for this condition include shin soreness, tibial stress syndrome, medial tibial syndrome, shin splints syndrome, and shin splints.[6] The most commonly accepted definition of MTSS is pain along the posteromedial border of the tibia that occurs during exercise, excluding pain from ischemic origin or signs of stress fracture.[7]

MTSS affects the posteromedial tibia, most commonly in the middle or distal third. The exact mechanism of injury is unclear, but studies show that patients with MTSS may be less adapted than control subjects to tibial load.[8] In addition, low tibial bone density has been noted in MTSS patients compared with healthy controls.[9] The decreased tibial bone density normalizes once the athlete recovers from MTSS.[10] Thus, tibial bones with decreased bone density may not tolerate the repeated loads experienced by athletes, resulting in MTSS, or repeated loads may themselves cause decreased bone density and lead to MTSS.

History and Physical Examination

MTSS should lead the differential diagnosis for running athletes with posteromedial tibial border pain.[6] The pain is usually located in the middle or distal third of the tibia. Patients will often report that symptoms initially were absent at rest, began with exertion, and subsided with continued exercise.[6] As the condition worsens, symptoms may not resolve during exercise.[6] Pain after exertion can also manifest, but in these cases it is essential to rule out TBSI.[11]

On examination, diffuse tenderness to palpation along the posteromedial distal two-thirds of the tibia is reportedly more sensitive than the pain on hopping or with percussion.[6] **Table 1** details intrinsic risk factors found to be associated with MTSS.[12] Foot pronation can be assessed using the navicular drop test (**Fig. 1**).

Table 1
Intrinsic risk factors found to be associated with the development of medial tibial stress syndrome in a systematic review and meta-analysis of the literature

	No. of MTSS	No. of Controls	MD [95% CI]	I^2 (%)	Overall Effect
Significant Difference					
BMI	187	264	0.79 [0.4, 1.2]	0.00	*P*<.001
Navicular drop	198	366	1.2 [0.5, 1.8]	40.19	*P*<.001
Ankle PF ROM	71	166	5.9 [3.6, 9.2]	0.00	*P*<.001
HIP ER	117	162	3.9 [1.8, 6.1]	0.00	*P*<.001
No Significant Difference					
Ankle DF ROM	173	308	−0.01 [−0.96, 0.93]	17.89	*P*=.98
Ankle eversion ROM	108	173	1.17 [−0.02, 2.36]	31.58	*P*=.06
Ankle inversion ROM	89	160	0.98 [−3.11, 5.07]	71.58	*P*=.64
Q-angle	132	214	−0.22 [−0.95, 0.50]	5.23	*P*=.54
Hip IR	117	162	0.18 [−5.37, 5.73]	83.74	*P*=.95

Abbreviations: BMI, body mass index; CI, confidence interval; DF, dorsiflexion; ER, external rotation; I^2, heterogeneity; IR, internal rotation; MD, mean difference; MTSS, medial tibial stress syndrome; PF, plantar flexion; ROM, range of motion.

Data from Magnusson HI, Westlin NE, Nyqvist F, et al. Abnormally decreased regional bone density in athletes with medial tibial stress syndrome. Am J Sports Med 2001;29(6):712–15.