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2ND METATARSAL STRESS FRACTURES

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Abstract. Metatarsal fractures are a common occurrence for the Orthopaedic surgeon. Some of these injuries are secondary to trauma or acute events. Other times, these fractures are a chronic issue for patients. It becomes a chronic issue when it is an overuse type of injury that leads to a stress fracture. In this chapter you will be able to identify the risks associated with 2/3rd metatarsal stress fractures and treat them appropriately. Diagnosing these injuries in the clinical setting can sometimes be difficult given their vague symptoms. Rarely do these injuries require operative fixation and this will be further explained within the chapter. Occasionally vitamin supplementation is adequate to push these injuries into healing. With the advent of more laboratory tests, diagnosing osteoporosis or osteopenia has become a standard work up to direct treatment. The bigger issue is usually determining why these injuries occurred in the first place, which is the more challenging aspect. The metabolic concerns will be described in depth and alternative methods to healing these fractures will also be discussed. New modalities have been developed over the years and they have led to improved healing potentials in these types of fractures. Clinical cases will show the patho-anatomy of these injuries and their typical course for recovery, both physically and radiographically.

Introduction

Stress fractures of the foot and ankle are common injuries sustained by athletes, military recruits, and those participating in repetitive activities.¹⁻³ These injuries result from the summation of stresses that leads to “spontaneous fracture” of normal bone.⁴ The cyclic loading of otherwise harmless forces causes structural fatigue and microdamage.^{5,6} An imbalance between repetitive strain and bone remodeling leads to pathological stress reactions.^{6,7} Changes in the microscopic property of bone including elasticity, osteoclastic activity, and bone porosity further contribute to the pathology of stress fractures.⁸ In comparison, insufficiency fractures result from the compromise of already weakened bone under normal levels of activity.⁹

Stress fractures occur predominantly in the weight bearing lower extremities and most commonly involve the tibia, tarsal, and metatarsal bones.^{10,11} Metatarsal stress fractures account for 3.7% of all sports-related injuries, comprise 20% of all stress fractures in runners, and represent the most common stress fractures of the foot.^{2,8,12} Eighty to ninety percent of metatarsal stress fractures have been reported to involve the second and third metatarsals.^{10,12,13} Both extrinsic and intrinsic risk factors including environmental influences, biomechanical considerations, and physiological factors play a role in the development of stress fractures.^{2,6,14}

Iwamoto and colleagues reported an association between sport type and stress fracture location. They also demonstrated an increased susceptibility in those with the diagnosis of the female athlete triad.^{15,16} Studies have generally shown that women are more susceptible than men.^{13,20-23} Professional ballet dancers with prolonged amenorrhea and extensive training schedules had a

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