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Multiple Stress Fractures: A Case Report

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1. Abstract

Stress fractures are typically solitary overuse injuries involving weight-bearing bones such as the tibia, fibula, or metatarsals. Diagnosis is often challenging due to non-specific symptoms and early normal radiographs. We report the case of an 18-year-old female military trainee who developed synchronous multiple stress fractures in the lower limbs within one month of initiating intensive training. Imaging confirmed multiple fractures involving the femur, tibia, and metatarsals. Metabolic and endocrine evaluations, including bone mineral density, were normal. The patient was treated conservatively with activity modification and rehabilitation, achieving full recovery within three months. This case highlights the importance of early recognition of stress injuries in high-risk populations such as military recruits.

2. Keywords

Stress fractures, military training, overuse injury, lower limb

3. Introduction

Stress fractures are overuse injuries resulting from repetitive mechanical loading that exceeds the bone's reparative capacity. They arise due to cumulative microdamage from cyclic stress, particularly in weight-bearing bones of the lower extremities.

The tibia is the most frequently affected site, followed by the metatarsals and fibula. Femoral stress fractures are less common but clinically important due to potential complications. In most cases, stress fractures occur as isolated lesions; synchronous multiple stress fractures are rare and typically associated with sudden increases in physical activity, such as military training.

Early diagnosis is often difficult because clinical symptoms are non-specific and initial plain radiographs may be normal. Therefore, a high index of suspicion is required in at-risk individuals.

4. Case Report

An 18-year-old female military trainee presented with a one-month history of progressive bilateral lower limb pain that began shortly after initiation of basic military training. She also reported two episodes of minor inversion injuries during jogging.

4.1. Clinical Examination

The patient was otherwise healthy and not on regular medication. Examination revealed:

- Tenderness over bilateral mid-thighs
- Pain over the right tibial shaft
- Forefoot tenderness bilaterally
- Normal gait with full weight-bearing ability

No deformity or neurovascular deficit was present.

4.2. Investigations

Plain radiographs demonstrated multiple stress fractures with visible fracture lines and early callus formation involving:

- Bilateral femoral shafts
- Tibial shaft
- Second and third metatarsals

Bone scintigraphy confirmed multiple active stress injury sites and excluded additional skeletal involvement.

Dual-energy X-ray absorptiometry (DEXA) showed normal bone mineral density.

Comprehensive laboratory investigations, including full blood count, renal function, calcium, phosphate, thyroid profile, parathyroid hormone, vitamin D, and other endocrine parameters, were all within normal limits.

4.3. Management and Outcome

The patient was managed conservatively with:

- Immediate cessation of military training
- Activity modification and rest
- Analgesia as needed
- Gradual rehabilitation with low-impact exercises

Symptoms gradually improved, and she returned to full military duties after three months without recurrence.

5. Discussion

Stress fractures result from repetitive mechanical loading that causes microstructural bone damage when remodeling cannot keep pace with stress accumulation. Mechanical factors such as load magnitude, frequency, and distribution play a more important role than bone mineral density in their development.

The tibia is the most common site of injury, followed by metatarsals. Femoral stress fractures are less common but clinically significant due to risk of progression.

Multiple synchronous stress fractures, as seen in this case, are rare and usually occur in individuals exposed to sudden increases

in physical activity, such as military recruits undergoing intensive training programs.

Diagnosis is challenging because early symptoms are non-specific and radiographs may initially appear normal. Advanced imaging such as bone scintigraphy or MRI is often required for early detection.

Most cases are managed conservatively with rest and activity modification. Surgical intervention is reserved for high-risk fractures or complications. Prevention remains difficult but may be aided by gradual training progression, adequate recovery periods, and attention to biomechanics.

6. Conclusion

Multiple stress fractures are uncommon but important injuries in military trainees. Early recognition is essential to prevent progression and ensure full recovery. Clinicians should maintain a high index of suspicion in individuals presenting with persistent lower limb pain after increased physical activity. Conservative management is usually effective, with excellent functional outcomes when diagnosed early.

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