CASE REPORT

AN EPIPHYSEAL STRESS FRACTURE OF THE FOOT AND SHIN SPLINTS IN AN ANOMALOUS CALF MUSCLE IN A RUNNER

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ABSTRACT

The following case is presented as one of unusual foot and leg lesions encountered in an adolescent long-distance runner. The associated problems of a first metatarsal Salter Harris type II epiphyseal stress fracture, and an accessory calf muscle with "shin splints" in the contralateral leg are discussed. Treatment of these conditions is outlined with eventual return to full function by the athlete.

Key words:

Epiphyseal, stress fracture, hyperostosis, metatarsal, shin splints, accessory muscle, runner.

INTRODUCTION

Stress fractures were first described in relation to the foot principally in army recruits unaccustomed to the rigours of the increased demands placed on the locomotor system by the military discipline (Walter and Wolf 1977). One of the most common sites of this lesion is in the metatarsal bones. (Walter and Wolf 1977, O'Donoghue 1976, Devas 1975, Gilbert and Johnson 1966, McBryde 1975). Stress fractures in this area are most common in the second or third metatarsals, less common in the fourth and fifth metatarsals, and their incidence in the first metatarsal is rare. Indeed, in a series of approximately 2,000 stress fractures largely involving the foot in military recruits, Gilbert and Johnson (1966) reported only six stress fractures of the first metatarsal bone. We have been unable to find any references in literature to stress fractures involving a metatarsal epiphysis. (Cahill et al 1974, Clancy and Foltz 1976, Levi and Coleman 1976).

Trafton (1979) has recently reported a fracture in this region but following an acute traumatic episode and not as the result of repeated stress as will be discussed in this presentation.

The following case presentation illustrates a case of what is felt to have been an epiphyseal stress fracture in the first metatarsal of the foot. There was no history of trauma preceding the onset of symptoms and the patient was an elite runner.

In addition, the patient presented with a unilateral mass on the posteromedial and distal aspect of the contralateral leg which becomes painful on running long distances. Clinically this was felt to be an accessory muscle and this was confirmed at operation.

Treatment of these two conditions as discussed in detail with eventual return to full activities on the part of the athlete and with no residual complaints after a seven month follow up.

CASE PRESENTATION

This 16 year old boy has been running 8 to 10 miles daily for 1½ years. During the past 8 months prior to his first visit a persistent discomfort with swelling had developed over the dorsum of the right foot at the first metatarsocuneiform joint area. The area had recently become quite painful and patient's own

treatment of "icing" after running did not control the symptoms as it had in the past. Recently he had noted a swelling on the medial aspect of the left ankle with discomfort extending proximally after running approximately 3 miles.

The patient presented with cavus type feet bilaterally which were also mildly inverted and adducted. The walking gait appeared normal and the ranges of passive motion in the recumbent right ankle and foot were normal. With foot dorsiflexed the fascia at the plantar aspect of the second metatarsal area was sensitive to palpation. The dorsum of the first metatarsocuneiform joint area was sensitive to direct digital pressure, and there was some soft-tissue swelling in this region. On standing, the plantar fascia was painful at the base of the second metatarsal and the patient noted some discomfort on the dorsum of the first metatarsal.

Examination of the left foot and ankle revealed that dorsiflexion of the ankle was slightly limited. There was a large soft mass in the deep soft tissues extending distally from the calf muscle into the tendo achilles on the medial side. This mass became tense when the patient walked on his toes and he stated that it had been present for several years and that on long runs he noted pain in this area, which was relieved by rest.

Initial Radiographic findings:

The skeletal framework of the right foot demonstrated a high arch-type foot. (Fig. 1) The subtalar and midtarsal joints were properly aligned and congruous, but the forefoot was mildly adducted. The shape of the first metatarsal of the right foot was grossly abnormal as compared to the normal left foot. In the AP view the epiphysis was 5 mm wider in the affected right foot than in the left foot. The entire proximal shaft of the first metatarsal was remodelled like an hourglass. The modelled cortex on the lateral side of the shaft was hypertrophied. At the epiphyseal line there was an area of increased bone density extending into the metaphysis. The epiphyseal line was widened and a small triangular fragment of lateral metaphysis detached from the diaphysis was attached to the epiphysis. A diagnosis of a Salter Harris Type II epiphyseal stress fracture was made as the authors described in 1963. The X-rays of the left ankle revealed a soft-tissue swelling not consistent with fatty tissue density and a diagnosis of a possible accessory muscle in this area was made. (Fig. 2)

The patient was taken off his regular running routine to minimize the stress and strain on the base of the first metatarsal of the right foot. At the same time, he was advised to use a bicycle and swimming to maintain his general physical condition and training level. It was believed that the lesion in the left ankle region represented an accessory muscle with ischaemic-type pain or shin splits. An exploration and biopsy of this lesion was recommended.

Fig. 1: Initial X-rays AP and Lateral right foot showing thickened epiphyseal line with metaphyseal fragment first metatarsal.

Fig. 2: Lateral radiographs left ankle (left) and right ankle showing thickened soft tissues posterior aspect of ankle joints lower leg.

Operation:

The patient was taken to the operating room where under general anaesthesia the medial aspect of the left ankle and heel region was explored. The soft-tissue mass was found to be an anomalous muscle lying in a tense sheath, which arose higher in the leg from the tibia and was inserted into the medial aspect of the calcaneum. Following complete decompression of the sheath surrounding this anomalous muscle, a biopsy specimen

was taken and sent to pathology for histological examination. This section revealed skeletal muscle showing marked variation in fibre size, numerous central nuclei, fibre splitting, mild interstitial fibrosis, and atrophic and regenerating fibres with no evidence of an inflammatory process. These findings suggested transient attacks of ischaemia with resulting atrophy and replacement fibrosis in an anomalous muscle.

Progress:

The patient did well postoperatively and 2 months following the surgery to the left ankle returned to a modified running programme. The left ankle was symptom free at that time, but the right foot continued to give him some discomfort on running 6 to 8 miles. Ice applied locally after running relieved the swelling discomfort in the right foot and it was only with difficulty that he could be convinced to cut back his daily running from 8 to 3 miles. X-rays at that time, some 3 months following the original X-rays revealed that the gross appearance at the base of the first metatarsal was basically unaltered. (Fig. 3) He continued to have discomfort in his foot after running 3 miles, so a Schuster runner's mold orthotic was fitted and a Spenco neoprene inner sole was recommended to overlay the orthotic.

Fig. 3: X-rays right foot 3 months following initial visit and diagnostic X-ray showing healing epiphyseal line fracture first metatarsal base.

X-rays taken a month later revealed that the reaction around the epiphysis at the base of the first metatarsal in the right foot was diminishing and the fracture appeared to be healing. (Fig. 4)

Fig. 4: X-rays 1 month later with foot showing progressive healing of fracture to first metatarsal base.

One month later he complained of further discomfort in the mid dorsum of the right foot. Another X-ray was taken which revealed that he had developed considerable thickening of the shaft of the second metatarsal on the right foot. (Fig. 5) This was interpreted as being a

Fig. 5: X-rays 1 month later showing fracture of base of first metatarsal healed and thickening of second metatarsal shaft.

stress phenomenon from redistribution of the weight-bearing load from the first to the second metatarsal because of the stress fracture in the first metatarsal.

X-rays repeated a month later showed that the original epiphyseal stress fracture had healed completely and the second metatarsal bone on the right foot was remodelling but still quite enlarged. His symptoms of pain on the dorsum of the foot overlying the second metatarsal had subsided.

A final clinical and radiological examination was carried out 7 months following institution of treatment. (Fig. 6) The X-rays revealed that there was complete repair of the epiphyseal fracture and that further remodelling was occurring in the second metatarsal on the right foot. The patient had been completely symptom free in the right foot for some 2 months. In addition, the patient stated that he had no further symptoms in the left ankle region since he started running again some 2 months following the muscle-sheath decompression on that side.

Fig. 6: X-rays right foot 2 months later (final radiological assessment) showing healed fracture base of first metatarsal with thickened shaft of metatarsal, and remodelling of second metatarsal shaft.

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