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Case study

A case report of a completely displaced stress fracture of the femoral shaft in a middle-aged male athlete – A precursor of things to come?

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ABSTRACT

Background: Displaced stress fractures of the femoral shaft are very uncommon. The proportion of middle-aged and older age groups participating in long-distance running, triathlon and other high intensity sports is increasing. As a consequence stress fracture of the femoral shaft may be on the rise in the future.

Case presentation: The patient was 43 years old male caucasian triathlete. The authors met the patient after he was admitted with a displaced femoral shaft fracture. The fracture occurred during running at the national championship in ½ Ironman. The patient reported that his symptoms had gradually developed over the last month before the fracture with pain localized anterior to the thigh. The patient interpreted the symptoms as local muscle damage. A clinical examination was conducted by a physiotherapist and the symptoms were interpreted as a simple muscle injury in the quadriceps.

Conclusion: When presented with a patient with non-traumatic, diffuse anterior thigh pain in an individual of this age, who is participating in high-level endurance running; clinicians should consider the possibility that the cause of the symptoms may be a femoral shaft stress fracture.

1. Introduction

Stress fractures of the lower limb are a common injury and may represent as much as 10% of all sports-related injuries (Koenig, Toth, & Bosco, 2008). The highest incidence is found among participants in certain sports such as long-distance running, which involves repetitive high loading. Repetitive high loading without adequate time for adaptation may lead to an accumulation of microfractures that exceeds the remodeling capacity of the bone (Anderson & Greenspan, 1996). Stress fractures of the tibial bone are the most common fracture in the lower limb and represent 26–49% of all stress fractures (Behrens, Deren, Matson, Fadale, & Monchik, 2013; Bennell, Malcolm, Thomas, Wark, & Brukner, 1996; Koenig et al., 2008; Matheson, Clement, McKenzie, Taunton, Lloyd-Smith, & MacIntyre, 1987). Stress fractures of the femur are rare and most often occur in the femoral neck, representing 1–7% of all stress fractures (Behrens et al., 2013; Bennell et al., 1996; Koenig et al., 2008; Matheson et al., 1987). Stress fractures of the femoral shaft, and especially displaced stress fractures of the femoral shaft, are very uncommon and rarely described in the literature (Hutchinson, Stieber, Flynn, & Ganley, 2008; Luchini, Sarokhan, & Micheli, 1983; Richter & Temple, 2003). The surgical treatment of displaced femoral shaft stress fractures involves intramedullary nailing (IM) (Behrens et al., 2013; Wood, 2006).

Stress fractures are most commonly reported between the ages of 11–23. They are most frequently reported during military training and among professional athletes competing in long-distance running and jumping (Behrens et al., 2013; Bennell et al., 1996; Hutchinson et al., 2008; Kang, Belcher, & Hulstyn, 2005; Koenig et al., 2008; Matheson et al., 1987; O'Kane & Matsen, 2001). Data from the Danish Triathlon Federation document a 67% increase in membership from 2001 to 2013, making it the fastest-growing sport in Denmark. In the 25–59 years age group the increase in athletes between 2001 and 2013 was 71% (*The Danish Triathlon Federation* – Webpage).

Activity related stress fractures have mainly been reported among younger age groups participating in endurance sports like long distance running. As a result of the recent increase in

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participation among people above 40 years of age, clinicians should prepare to encounter more activity related stress fractures in patients of middle age.

This case report involves a complete displaced stress fracture of the femoral shaft in a male adult triathlete and includes a detailed description of the amount and intensity of training prior to the time of fracture and the self-reported symptoms prior to the fracture.

Written informed consent was obtained from the patient for publication/presentation of this case report.

2. Case presentation

At the time of injury (July 2014) the patient was 43 years old. He is a caucasian male triathlete who competes at national masters level. The authors met the patient after he was admitted to the trauma center at Aalborg University Hospital, Denmark with a displaced femoral shaft fracture of the right side. The fracture occurred during the national Danish championship in ½ Ironman distance (1.9 km swim, 90 km cycling and 21.1 km running). At the time of the fracture only 1.1 km remained of the 21.1 km run.

The fracture occurred suddenly while running. The prior cycling and swimming sessions were completed without pain or any other warnings. At the start of the run he kept a pace of 3:45 min/km. After the first 6–7 km the patient experienced an unusually high heart rate (180 bpm) but still without any pain from the right thigh. During the last 6–7 km before the fracture the pace dropped to an unexpected 4:20–4:30 min/km and his heart rate increased to 185 bpm. At this point he felt no pain in his right thigh but was surprised that he could not maintain the expected 3:45 min/km. With 1.1 km remaining before the finish of the race the patient reported that he felt as if someone kicked him on the right thigh and then collapsed due to the missing support of his right leg.

The patient sustained an OTA (Orthopaedic Trauma Association) classification 32-A1 (Marsh et al., 2007) closed fracture of the femoral shaft (Fig. 1). The fracture was treated with a reamed intramedullary nail with distal and proximal locking screws (Fig. 2).

Fig. 1. Complete displaced stress fracture of the femoral shaft.

2.1. Patient history

The patient had no history of illness and was fit and well. He was a nonsmoker and had no family history of connective tissue disorders.

His body weight was 71 kg with a height of 1.83 m. Laboratory tests included complete blood tests, which were all within normal ranges. His heart rate at rest was 45 bpm, and the maximum heart rate recorded while running was 196 bpm. Dexa-scan was normal.

The patient reported that his symptoms had gradually developed over the last month before the fracture with pain localized anterior to the right thigh. The pain occurred primarily during running and disappeared while non-weight bearing. The patient interpreted the symptoms as local muscle damage. A clinical examination was conducted by the physiotherapist and the patient reported that the physiotherapist concluded that symptoms were interpreted as a simple muscle injury in the quadriceps. No additional examinations or radiological examinations were carried out. The symptoms were initially treated with thermal treatment and soft tissue massage and a decrease in running distance and intensity.

2.2. Physical exercise history

The patient started competing in triathlons in 2008. During his adolescence (from 9 to 16 years of age) the patient was a competitive swimmer. In the period between 17 and 36 years of age the patient did not participate in any competitive sports.

The patient reported a history of Achilles tendinopathy that lasted from December 2013 to February 2014. From February 2014 the patient resumed running with 4 running sessions a week. The running intensity and distance increased markedly around the spring of 2014 (see Fig. 3). In June the running distance increased from 45 to 60 km from one week to the next, which was accompanied by the onset of right thigh pain.

Fig. 3 shows the training load between January and June 2014 divided into cycling, running, total amount of exercise time and running pace. Data was generated from the patients own training log. From January to May 2014 the total amount of training time was between 4 and 6 h per week. From May to June the patient had a large increase in training load and reached 14 h per week. The majority of the running distance was performed between April and June 2014. From April to June 2014 the patient doubled the distance from 30 to 60 km/week while increasing his running pace.

3. Discussion

Even though stress fractures of the femoral shaft are uncommon, unspecific non-traumatic pain to the anterior thigh following a rapid increase in training activity in middle-aged participants in high level endurance sports should make the clinician think twice