CASE REPORT

A curious case of stress fracture in a transsexual athlete

Tom Richardson, Michael Grant, Prakash Chandran

Department of Trauma and Orthopaedics, Warrington and Halton Hospitals NHS Foundation Trust, Warrington, Cheshire, UK

Correspondence to

Tom Richardson,
tomrichardson@doctors.org.uk

Accepted 11 March 2016

SUMMARY

Femoral neck stress fractures in young healthy individuals are rare and occur in those who take part in physical training with repetitive loading and those with osteoporosis. Bone density is related to sex hormone status, which is artificially manipulated during gender reassignment. Conflicting evidence currently exists on the effect of cross sex hormone treatment on bone density, with no literature suggesting a link between hormone treatment in gender reassignment and stress fractures. Our aim is to highlight the potential risk of stress fractures amongst transsexual patients receiving cross sex hormones as part of gender reassignment. The patient presented with groin pain after competing in a running event. Despite a number of risk factors, there was a delay in diagnosis, which could have led to complications compromising outcome. Femoral neck stress fractures should be considered in the differential diagnosis of transsexual patients receiving hormone treatment with non-specific groin/thigh pain following exercise.

BACKGROUND

The risk of stress fractures is known to be higher in specific subgroups, including females; endurance athletes who perform repetitive impact activities, such as long distance running; and adolescent females with nutritional issues or a hormone imbalance.¹⁻³ Anatomical sites at increased risk of stress fracture include the tibia, metatarsals and fibula, due to the biomechanical stresses placed on these areas.⁴⁻⁵ Stress fractures of the femoral neck in young healthy individuals are rare but have been reported,⁶ and account for 1% of stress fractures in runners.⁷ Such fractures occur in two cohorts, notably, participants in heavy physical training, and those with osteoporosis. Fractures occur as a result of the increased cyclic loading of the bone or impaired bone quality.⁸

At present, there are no reports in the scientific literature suggesting a possible increased risk of stress fractures among transsexual athletes. This case report and literature review serves to highlight the potential increased risk of stress fractures among transsexual athletes who are receiving cross sex hormones as part of their gender reassignment. It also discusses the importance of early diagnosis and the consequences that may occur as a result of delays.

CASE PRESENTATION

A 43-year-old preoperative transsexual (female to male) receiving testosterone therapy presented to hospital with a fractured neck of femur 6 weeks

after experiencing pain during a running event. The patient had been living as a male for 2 years since commencing medical transition by means of hormone treatment, including testosterone. The patient was fit and well, and led a healthy active lifestyle. He was a non-smoker, drank alcohol only occasionally and ran regularly.

Initial presentation to the local emergency department (ED) occurred after the patient felt significant pain in the right groin during the latter stages of a half marathon, resulting in him being unable to complete the race. Following this, he was discharged without investigations, with a diagnosis of soft tissue injury, and managed with analgesia, crutches and weekly physiotherapy sessions. A second presentation to the ED followed 6 weeks later. At this time, the patient had completed his fourth physiotherapy session, with no improvement in pain, and no progress with full weight-bearing mobilisation. Physiotherapists arranged imaging, which displayed a right-sided displaced intracapsular fracture of the neck of femur (figure 1) and the patient was subsequently transferred to the ED. Treatment included reduction and internal fixation with a fixed angle sliding plate and screw device (Targon plate). Post-operatively, he was kept partial weight bearing for 6 weeks. His recovery was satisfactory with no complications.

Clinically, the patient demonstrated an excellent clinical outcome at 3 months, with no pain, a full range of hip movements and 5/5 power in all muscle groups, on examination. Radiographs demonstrated union across the fracture site (figure 2). At present, the patient believes that his hip, however, is not back to normal since he experiences intermittent hip pain, and has noted reduced power and range of movement compared to before his fracture. This has meant he has been unable to return to all his normal activities, such as running and yoga. Despite this, the patient feels that his recovery is making good progress.

DISCUSSION

There is currently no link between femoral neck stress fractures in transsexuals treated with cross-sex hormones. Limited work has been done looking into its effect on bone mineral density, albeit with conflicting results. Some researchers have found that replacement testosterone was not enough to maintain bone mineral density in the female to male transsexual;⁶⁻⁷ while others have demonstrated that testosterone cross sex hormone therapy was adequate to maintain bone mineral density in these individuals.⁸⁻¹⁰

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To cite: Richardson T, Grant M, Chandran P. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-214110

Figure 1 Preoperative imaging.

It is widely known that, among other functions, sex hormones are involved in bone metabolism.¹¹ This is highlighted by the fact that deficiency of testosterone or oestrogens in males and females, respectively, is a major cause of osteoporosis.^{12 13} Oestrogens have been shown to initiate apoptosis in osteoclasts, hence limiting their lifespan and preventing bone resorption.¹⁴ It has also been proposed that oestrogens play a role in osteoblast formation and inhibition of osteoblast apoptosis.¹⁵ The major action of testosterone is to prevent bone resorption,¹⁶ although much of this action is indirect, via the aromatisation of testosterone to oestrogens.¹⁷ Testosterone influences osteoblasts and osteoclasts by inhibiting apoptosis,^{18 19} as well as having an effect on the proliferation of osteoblasts.²⁰ Deficiency of either oestrogens or testosterone will therefore clearly have an impact on bone health and bone metabolism.

The signs and symptoms of a femoral neck stress fracture are generally non-specific.²¹ Typical presentation may be with insidious onset of pain related to activity, and subsequent poorly localised groin, or anterior thigh, pain.^{22 23} As a result of this, early presentation can easily be misdiagnosed as a number of other injuries such as hip flexor or adductor strain, stress fractures in the pubic rami, gluteal cuff tendinopathies and labral tears. Those with such symptoms should therefore be treated with a high index of suspicion.¹³ It has also been reported that stress

fractures of the proximal femur may not be displayed on plain radiographs, hence a normal plain film X-ray in individuals presenting in this way does not exclude the diagnosis. Clinicians should have a low threshold to image further, using modalities such as MRI to confirm diagnosis.²⁴

Early diagnosis is of vital importance in those with a femoral neck stress fracture. A fracture that is initially undisplaced can easily become displaced if there is a delay in correct diagnosis. Complication rates have been shown to be as high as 63% in patients who have experienced such delays,²⁵ including a 30% chance of avascular necrosis.²⁶ It has been reported that the average delay in diagnosis is 14 weeks.¹⁸

The patient in this case presented with non-specific symptoms that occurred insidiously. He had a definite risk factor of taking part in strenuous exercise and the potential risk factor of having poor bone quality secondary to cross sex hormone therapy. Diagnosis was made 6 weeks after initial presentation, at which stage he was found to have a displaced fracture. Early reduction, stabilisation and protection increases the likelihood of achieving good bony union and return to function.

We conclude that transsexual athletes receiving cross sex hormones, presenting with pain and no obvious injury, should be treated with a high index of suspicion. Early imaging can be pivotal in diagnosis and preventing complications that may occur due to a delay. Further research is required to determine if cross sex hormone therapy alone is an absolute risk factor for such stress fractures.

Learning points

- ▶ Transsexual patients receiving cross sex hormones could be at risk of stress fractures.
- ▶ There should be a high index of suspicion in patients presenting with vague symptoms and risk factors for stress fracture.
- ▶ Early imaging is vital for early diagnosis and early management.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Figure 2 Postoperative imaging.

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