Bilateral Supracondylar Femoral Stress Fractures in an Adolescent: A Case Report

Bardia Barimani, Donald Davidson, Bilal Al-Obaidi, Reza Mobasher

ABSTRACT

Bilateral supracondylar stress fractures of the femur in adolescents is a rare presentation. Due to the uncommon and non-specific presentation there is a high risk of misdiagnosis and thus detrimental complications. We report a case of bilateral supracondylar femur stress fractures in an 18 year old male of Somali ethnic background who presented to our institution with a right oblique supracondylar fracture of the femur with evidence of sclerotic fracture edges. The patient was found to have symmetrical bilateral stress fractures of the femur which were missed in primary care and as a result of this weakening it ultimately lead to a fracture. Although stress fractures are most commonly seen in the osteoporotic population, other factors include: exercise type, anatomical and hormonal variables. Our case report highlights predisposition to stress fractures and the importance of heightened clinical suspicion when faced with adolescents presenting with chronic musculoskeletal pain.

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Key words: Stress Fractures; Bilateral; Supracondylar Femur

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OUTCOME AND FOLLOW-UP

The patient made a full recovery and the screws were removed without imaging guidance. He returned to sports and has a full range of knee and hip motion. The patient was commenced on Vitamin D replacement therapy.

DISCUSSION

A Stress fracture is an overuse injury that occurs as a result of repetitive loading below yield\(^{[1]}\). They occur if the loading frequency is high enough so that the rate of bone resorption exceeds the rate of bone formation during the remodelling process\(^{[2]}\). The epidemiology of stress fractures in athletes is that they tend to occur in the early phases of training or when a training regimen is significantly increased\(^{[3]}\). The commonest area for stress fractures has been found to be the tibia with 23.6% of all stress fractures followed by the tarsal navicular with 17.6% and metatarsals with 21%\(^{[4]}\). Stress fractures of the femur are uncommon (6.6%)\(^{[5]}\) and can be split into femoral neck (50%), condylar region (24%) or proximal shaft (18%)\(^{[6]}\). Stress fractures are more common in the elderly osteoporotic population where physiological muscular activities stress bone, deficient in mineral and elastic resistance, causing what are termed insufficiency fractures\(^{[7]}\). Stress fractures are diagnosed by clinical examination and history, imaging if chronic stress fracture and exclusion of pathological fracture.

Stress fractures present with localised pain that comes on at the end of physical activity, which can be juxtaposed to soft tissue injuries that tend to be painful first thing in the morning and improve with exercise\(^{[8]}\). If the stress fracture is not treated, the pain experienced will usually have an earlier onset during the exercise regime and stay for a longer period of time. A history is very important because usually you will find that the patient has changed their normal training regime 2 to 6 weeks prior to their presentation\(^{[9]}\). On examination you expect to find local tenderness over the affected area and thus a thorough examination must be conducted and any abnormal features taken note of.

Radiographic findings are found 2 to 8 weeks after symptom onset. At this time point the sensitivities of the radiographs can be as low as 10%, which increases up to 70% on follow up\(^{[10]}\). With the potential that stress fractures will take 8 weeks to become evident on radiological imaging this may not be of great diagnostic use\(^{[11,12]}\). Typical findings include a fine area of periosteal bone elevation, sclerosis and an area of low-density bone may also be seen\(^{[13]}\). MRI is currently the gold standard to assess stress fractures due to its ability to exhibit soft tissue and bone oedema, an early feature of stress fractures.

Vitamin D deficiency is very common with 30-50% of the global population being at risk of vitamin D deficiency\(^{[14]}\). In children, vitamin D deficiency will cause growth retardation and potentially signs and symptoms of rickets\(^{[15]}\). In adults vitamin D deficiency will lead to osteopaenia and osteoporosis thus increasing the risk of fractures\(^{[16]}\). Low vitamin D levels lead to un-mineralised bone which lack support for the periosteal covering\(^{[17]}\). This can cause generalised...
bony pain[11] and as with our patient, increase risk of stress fractures. Calcium for bone mineralisation and vitamin D for bone homeostasis and remodelling have been shown to be protective agents[12]. The commonest cause of vitamin D deficiency is insufficient exposure to sunlight and the management for this being vitamin D and calcium supplementation[10].

The treatment for stress fractures depends on the severity; initially conservative therapy can be trialled including rest or immobilisation for 6-8 weeks progressing to low impact rehabilitation exercises to maintain strength (e.g. pool walking and elliptical exercise machines)[13]. If conservative therapies are unsuccessful or not clinically indicated, then surgical interventions can be deployed as in our case[13].

Despite the prevalence of vitamin D deficiency and stress fractures, it is evident from reviewing the current literature that our patient’s presentation of bilateral supracondylar femoral stress fractures is uncommon. There are only two previous reported similar cases; the first being a female long-distance runner with bilateral femoral shaft stress fractures as a consequence of over-use from inappropriate training, mal-alignment, nutritional deficiencies, and an endocrine disorder[14] and the second being bilateral femoral supracondylar stress fractures in a cross country runner caused by a vegan diet resulting in low protein and calcium levels[13].

Bilateral supracondylar femoral stress fractures in adolescents is a rare presentation. This case highlights the importance of heightened clinical suspicion and early diagnosis of stress fractures in patients presenting with a typical history (i.e. musculoskeletal pain associated with activity that subsides with rest) in order to prevent subsequent morbidity. It also highlights the importance of assessing vitamin D levels in patients diagnosed with a stress fracture.

CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

REFERENCES

15 Ross K, Fahey M. Bilateral femoral supracondylar stress fractures in a cross country runner. Orthopedics 2008; Aug;31(8):803. Written informed consent was obtained from the patient for publication of this Case report and any accompanying images.

Peer reviewer: Sun, Wei MD, Associate Professor, Department of Orthopedic, China-Japan Friendship Hospital, 2 Yinghuadong Road, Chaoyang District, Beijing, China.