



QUESTION | I HAVE A CLIENT WHO HAS RECENTLY BEEN DIAGNOSED WITH A FEMORAL NECK STRESS FRACTURE. SHE HAS A COMPLEX HISTORY OF TRAUMA BUT NOTHING WITHIN THE PAST 14 MONTHS. SHE IS WORRIED THAT IT WAS CAUSED BY A GLUTE MACHINE IN THE GYM. SHE HAD NOT RECENTLY INCREASED HER LOADING ON THIS PIECE OF EQUIPMENT. I WAS WONDERING, IN ISOLATION, COULD THIS EXERCISE BE THE PRIMARY CAUSE OF A FEMORAL STRESS FRACTURE.

In this month's Question for Physiotherapists Dr John Best will deliver Part 2 of his article on Femoral Neck Stress Fractures (FNSF). This month's article will outline the 'Return to Sport' plan for our patients after Femoral Neck Stress Fractures (FNSF). This follows on from last month's article on the diagnosis and causation of Femoral Neck Stress Fractures (FNSF).

A. Diagnosis, Grading and Broad Management Considerations

The diagnosis of a FNSF is a clinical one which is confirmed with imaging. This assists in categorising the injury in terms of site and severity. A classification system and treatment plan may be based on 3 categories of these fractures:

- infero-medially, or the compression side, which are the most common,
- supero-laterally or the tension side, and
- displaced femoral neck fracture.¹

As the blood supply to the femoral head runs through the neck of femur, a FNSF with displacement may cause avascular necrosis of the femoral head – a surgical emergency.²

Once the diagnosis has been made on clinical and radiological grounds, the severity of the FNSF should be graded. This grading is also on clinical and radiological grounds and is similar to the grading systems applied to tendon disorders.

Grade	Clinical and Radiological Features
1 Mild	Post exercise pain only. No medications used. Minor radiological changes.
2 Moderate	Pain during exercise. Possible antalgic gait with exercise. Unicortical features on MRI/Bone Scan.
3 Severe	Pain walking. Unable to perform weight bearing sport. Possible transcortical imaging findings with x-ray changes also.
4 Advanced	Rest pain; possible night pain. Using regular medications. Using walking aids. ?Surgical opinion

In the management of FSNFs one must always consider the risk factors and seek to eliminate or reduce these. These include previous injuries leading to weakness, limb shortening and reduced hip range of motion.³ It is also worthwhile explaining the concept of 'load' and 'impact' to your patient. On impact, the load of body weight is transmitted down the lower extremities. This may exceed 3-5 times body weight in the region of the femoral neck during running. Muscular absorption of forces helps distribute the load (especially the gluteus medius), thus these forces when there is also weakness are relevant in the prognosis and management of the stress fracture.

Finally, bone health should be discussed. Bone health should be approached in terms of any family history of osteopenia or osteoporosis, dietary abnormalities (including a history of eating disorders) and menstrual abnormalities (amenorrhoea or oligomenorrhoea). Twenty years ago there was no clear causal relationship between bone health and bone stress but the data is now compelling.⁴ Vitamin D deficiency and the use of certain medications such as oral corticosteroid also carry an increased risk.⁵ Obtaining relevant pathology and bone density studies is appropriate as indicated.

Each patient has their own rate of recovery, personal goals and psychological expectations which should be considered.⁶ The recovery plan should be personalized but must avoid unreasonable expectations. The following guidelines are appropriate for non-surgical cases.

B. Phases of Recovery

NB : It will take 8-12 weeks until your patient is running safely with most FNSFs!!

- Acute Phase – Weeks 1 and 2

Regardless of the grading all patients with a FNSF should cease all impact activities (running and jumping sports) for a minimum of 6 weeks. If there is any pain with walking, standing or the development of night pain, crutches will be required for a minimum of 3 weeks. Initially this is non-weight bearing and a graduated progression to touch weight bearing and partial weight bearing is prescribed depending on the clinical response.

Analgesics should be prescribed as needed, but anti-inflammatory medications are unlikely to be of assistance. Physiotherapy modalities are not helpful for the healing of the FNSF.

In the acute phase one may plan and commence the subsequent fitness program. This should be on alternate days initially. If the patient is on crutches it is often a drama for them to be transported to and from gyms, pools, etc. Non-impact exercise such as cycling, freestyle swimming, pool running (using a floatation belt) and weights may be commenced early in most patients with a few provisos – remain seated on the bike; all weights should be performed lying down or seated; avoid kicking in the pool; and pool running should be performed carefully, that is a trial of 10 minutes initially as hip flexor (iliopsoas) irritability may occur which may aggravate infero-medial stress fractures. In the acute phase aim to keep these training sessions to less than 40 minutes.

Recovering Phase – Weeks 3 onwards

The timing of this will vary but the key is comfort when walking unaided; and increasing walking load. Once the patient is able to stand and walk to achieve their ADLs (activities of daily living) for one week test them with a single leg hop test in the office. If this is comfortable then I would be introducing (and increasing) walking for exercise the following week.

There are various formulae for this which are in the medical literature and public domain.^{7,8} When walking is permitted it should be performed for 20 minutes on a softer surface (treadmill or grass). At a rate of 6km per hour this would be a 2km walk. If the patient is comfortable during the walk and has no pain the following day then the walking can be done on alternate days. They should not increase more than 10% per week (aiming to reach 40 minutes which is generally accepted as being cautious and safe). If walking starts at 3 weeks then using this formula it would require a further 8 weeks to reach this milestone.

- Return to Sport Phase – Weeks 8-12 onwards

If pain occurs at any stage with impact then a medical review is recommended. Once 40 minutes of pain-free walking is reached then a walk/jog routine is introduced. This is performed 30 minutes per session, three times a week for two weeks and then increased to 40 minutes. This is because the load of running is 2-5 times that of walking (depending on body weight and biomechanics).

An approach would be:

- Week 1 - Walk 5 minutes, jog 5 minutes - for 30 minutes
- Week 2 – Walk 3 minutes, jog 7 minutes - for 30 minutes
- Week 3 – Walk 3 minutes, jog 7 minutes - for 40 minutes
- Week 4 – walk 5 minutes, jog for 20 minutes, walk 5 minutes (total 30 minutes)

You will notice that the running time between weeks 3 and 4 is effectively identical. The difference is that the volume of uninterrupted running is greater (that is week 4 is 20 minutes continuous, whilst week 3 is 7 minute efforts). Following week 4, the running time may be increased by 10% weekly. Following this sports specific drills may be introduced.

As a final comment: If my patients do not display reversible risk factors for their stress fracture (eg weakness) I urge them to set their running limit at 25% less than their running volume at the time of injury (for example if they ran 40km per week, this should be reduced to 30km/week) possibly as a long term measure.

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