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Resident's corner

Periprosthetic femoral fractures

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ABSTRACT

This article describes the case of a patient with a periprosthetic femoral fracture. The risk factors and possible reasons for the increasing incidence of this type of fracture in current orthopaedic practice are discussed. A classification is presented and the correct approach to management, with direct application to the case described, is presented.

1. Case summary

An 84-year-old lady tripped and fell onto her left side whilst cleaning at home. She was generally well and had no significant co-morbidities. She had previously had her hips replaced, the right in 1980 with a revision in 2012 and the left in 2001. Before the fall, she was mobilising without walking aids in the house and was using a stick outdoors. She had been having occasional pain in the left thigh aggravated by walking for a year or so prior to the fall. She had no complaints regarding the right hip. She was brought to hospital as she was unable to stand after the fall and had severe pain and an obvious deformity of the left lower limb. This was a closed injury without any neurovascular compromise. Radiographs of the pelvis and left hip were performed (Figs. 1 and 2).

2. Questions (answers overleaf)

1. What is your diagnosis from the radiographs presented?
2. What are the risk factors for periprosthetic femoral fractures?
3. The incidence of periprosthetic hip fractures has been reported to be increasing. What could be the reason(s) for this?
4. What factors influence your decision making with regard to the treatment of periprosthetic femoral fractures?
5. Do you know any of the classification systems that can help in decision making with femoral periprosthetic fractures? How would you classify this fracture?
6. Do you know any clues to help in distinguishing between Vancouver type B1 and type B2/B3 fractures?
7. How would you manage this case?

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Fig. 1 – Pelvis X-ray (hips) of patient on admission.

Fig. 2 – Lateral X-ray of left hip (horizontal beam lateral) on admission.

8. What are the reported outcomes and complications related to Vancouver type B2 and B3 fractures?

1. **What is your diagnosis from the radiographs presented?**

This lady has sustained a displaced left femoral periprosthetic fracture. The fracture is around the tip of the stem, which is a cemented monoblock stem (of Charnley type). There is a cemented polyethylene socket in place.

2. **What are the risk factors for periprosthetic femoral fractures?**

Risk factors include osteolysis and loosening, trauma, older age, female gender, osteoporosis, previous revision surgery and the type of implant used (uncemented metaphyseal engaging components, particularly flat wedge tapers).[1,2] Osteolysis and loosening are the leading causes, with The Swedish Hip registry showing that 70% of periprosthetic fractures involve loose prostheses. Amongst these, 23% were loose before surgery, and 47% were first identified as being loose at the time of surgery.[3] Biomechanical studies have demonstrated that loose femoral stems have nearly 60% reduction in the torque to failure compared with well-fixed stems.[4]

3. **The incidence of periprosthetic hip fractures has been reported to be increasing. What could be the reason(s) for this?**

Several reasons for this increase have been proposed. These relate mainly to the ageing population and increased risk of osteoporosis, the increasing number of THAs being done and the increasing prevalence of people with THAs. In addition, the indications for THA are expanding, including younger and more active patients who are exposed to higher energy trauma and therefore are at increased risk of periprosthetic fracture. Increasing numbers of patients are also requiring revision THA, which increases the risk of periprosthetic fractures.[5]

4. **What factors influence your decision making with regard to the treatment of periprosthetic femoral fractures?**

The treatment of femoral periprosthetic fractures is usually surgical, unless the patient has overwhelming co-morbidities which make surgery life-threatening. Deciding which type of surgery (fixation of fracture with a plate or revision surgery) can be challenging. The factors to be taken into consideration are location of the fracture, implant stability (well-fixed/loose) and bone stock available. A common mistake is to plate a fracture around a loose stem, a situation often leading to failure of fixation in the longer-term and the requirement for re-operation. Diagnosis of stem loosening can be challenging in some cases, but there are clinical and imaging clues which can help (see below).

5. **Do you know any of the classification systems that can help in decision making with femoral periprosthetic fractures? How would you classify this fracture?**

The Vancouver Classification is the most common classification system used for periprosthetic fractures. This classification is based on the use of the 3 factors described above to influence decision making in treating these fractures: fracture location, implant stability (loose or well-fixed) and the integrity of the residual bone stock. There are 3 categories (types) – A, B and C.[6]

Type A fractures occur in peritrochanteric area and are subdivided into Type A(G) which involve the greater trochanter and Type A(L) which involve the lesser trochanter.

Type B fractures occur around the prosthesis stem or at its tip. Type B fractures are further subdivided according to stem stability and bone stock. Type B1 fractures occur around a well-fixed stem with good bone quality. Type B2 fractures occur around a loose femoral component but with supportive bone stock, and type B3 fractures are fractures occurring with a loose femoral component and associated poor bone stock (metaphyseal and diaphyseal bone stocks are deficient and unsupportive, respectively).

In this case, we are dealing with a type B2 periprosthetic fracture, as the implant seems to be loose, but the bone stocks appear supportive.

6. **Do you know any clues to help in distinguishing between Vancouver type B1 and type B2/B3 fractures?**

It is not uncommon for type B2 fractures to be mistaken for type B1 fractures. Determining whether the stem is well-fixed or loose is critical in appropriate treatment of