Medical and Research Publications
International Open Access

Case Report **Journal of MAR Orthopedics (Volume 5 Issue 2)**

A Young Patient with A Periprosthetic Distal Femur Fracture: An Approach to Treatment

Mohammed Nadir Sekkal *[1], Noura Baniyas [1], Wail Tilakh [1], Dr Basil Al Arabid [2]

1. Department of Orthopedic Surgery, Tawam Hospital, Al-Ain, United Arab Emirates

2. Orthopedic Consultant, Tawam hospital, Al Ain, UAE.

Corresponding Author: Mohammed Nadir Sekkal, Department of Orthopedic Surgery, Tawam Hospital, Al-Ain, United Arab Emirates.

Received Date: May 20, 2023

Published Date: June 01, 2023

Abstract

Background: *There has been an increase in the number of total knee arthroplasties (TKA) in the aging and young population. One complication of TKA is periprosthetic fractures, with majority occurring in the distal femur. Risk factors include poor bone quality, old age, osteoporosis, steroid use, and neurological disorders. Management depends on prosthesis stability and bone quality. Since periprosthetic fractures in younger populations are not commonly reported, this paper aims to discuss a case of periprosthetic fracture in a young patient, an approach to treatment and whether it aligns with the literature.*

Case: *A 39-year-old female with a TKA presented with a left thigh injury following a low impact fall. Range of motion was limited, and neurovascularity was intact. The patient sustained a displaced segmental comminuted left distal femur periprosthetic fracture extending into the femoral component, which appeared clinically unstable. Intraoperatively the prosthesis was stable, and the patient underwent open reduction and internal fixation using cerclage wires and a retrograde intramedullary nail fixed with 1 proximal and 4 distal screws. One day postop the patient began toe touch weight bearing. At 6 weeks follow up the x ray showed good alignment and signs of healing, the patient began partial weight bearing.*

Discussion: *Various treatment modalities are proposed according to fracture classification, most commonly the Lewis and Rorabeck classification. This patient had a Rorabeck type II fracture, with an open box prosthesis compatible with a retrograde intramedullary nail. Due to the simplicity of this classification, the Su classification is preferable for preoperative planning. The patient's fracture extended into the femoral component, classified as Su type III, thus requiring a revision. However, intraoperatively the implant was stable, and we opted for retrograde intramedullary nailing. The advantages included reserving periosteal blood supply, high union rates, early mobilization, and functional improvement.*

Conclusion: *Fracture classification is an important guide but not the sole determinant of treatment decision. The factors considered when managing this case were individualized to the patient and ultimately aligned with treatment algorithms proposed by the literature.*

Introduction

There has been a drastic rise in the number of total knee arthroplasties (TKA) being performed, especially in the aging population. TKA were previously avoided in the younger population, especially in patients less than 50 years old, due to the risk of complications including loosening and the need for multiple revisions **[**1**]**. Young patients who undergo TKA tend to have a primary diagnosis of rheumatoid arthritis, severe early osteoarthritis, or posttraumatic arthritis **[**1**]**. Complications of TKA include periprosthetic infections, aseptic loosening, and periprosthetic fractures **[**2**]**. Periprosthetic fractures of the knee are defined as fractures of the femur, patella, or tibia in a patient with a TKA. The majority, 0.3 – 2.5% of patients with primary TKA, sustain periprosthetic fractures in the distal femur **[**3**]**. Multiple risk factors exist including poor bone quality, older age, osteoporosis, use of steroids, and neurological disorders **[**4**]**. Periprosthetic fractures are less prevalent in the younger population and not commonly reported in the literature **[**1**]**. Management primarily depends on the stability of the knee prosthesis and the quality of the bone **[**4**]**. This paper will discuss a case of a periprosthetic distal femur fracture in a young patient, the challenges of the approach to treatment and whether this aligns with the current literature.

Case Presentation

History

A 39-year-old woman, with a history of a total knee arthroplasty done 6 years ago presented with left leg pain and an inability to bear weight on the left limb following a low impact fall. It was not associated with any weakness or numbness. Additionally, she has a history of multiple surgeries performed during childhood on the left knee to repair a neurological injury.

Physical examination

Upon assessment in the emergency department (ED) the patient had an obvious deformity of the left thigh. There was no open wound and neurovascularity was intact. Range of motion of the left knee was limited due to pain.

Investigations

Anteroposterior (AP) and lateral X-ray views of the left femur showed a comminuted segmental periprosthetic distal femoral fracture that extended into the femoral component of the prosthesis with

anterior displacement. Computed tomography (CT) scan of the left femur revealed that the femoral component of the prosthesis was stable. Using the Lewis and Rorabeck classification, the fracture was classified as type II.

Management

In the ED closed reduction was performed and backslab was applied, awaiting definitive management. The patient underwent open reduction and internal fixation. Using an anterior approach, soft tissue was dissected, the fascia was split, and the quadriceps muscle appeared to be weak. The patient had a Smith & Nephew Genesis II prosthesis. There was a multisegmental multileveled comminuted fracture of the left distal femur extending to the prosthesis; however, the femoral component of the prosthesis was stable. Open reduction and internal fixation was done using 3 cerclage wires and a retrograde intramedullary titanium nail of length 360mm and thickness 10mm from Synthes. The nail was fixed distally with 4 screws and proximally with 1 anterior screw.

Follow up

One day post operatively, the patient began toe touch weight bearing on the affected limb.

Follow up 6 weeks post operatively, x ray showed good alignment and signs of fracture healing. The patient had a range of motion of 0-0-60 degrees. Partial weight bearing was initiated.

Discussion

This young patient who had undergone multiple knee surgeries at a young age had likely developed early onset osteoarthritis, requiring a TKA. Although periprosthetic fractures are common in elderly patients with TKA, it has not been commonly reported in the younger population. A study that followed 54 patients from the ages of 34 to 60 for 11 years, reported that only 1 patient sustained a periprosthetic fracture **[**1**]**. Various treatment modalities have been established according to the classification of the fracture. Periprosthetic fractures are commonly classified based on the Lewis and Rorabeck classification. Type I fractures are non-displaced with a stable prosthesis, type II are displaced with a stable prosthesis, and type III fractures have an unstable prosthesis **[**5**]**. This patient had a Rorabeck type II fracture. Rorabeck type II fractures can either be treated by a locking plate or a retrograde intramedullary nail; however, treatment is ultimately individualized to the patient **[**5**]**. Lombardo et al proposed a treatment algorithm that is based on the stability of the prosthesis, the fracture pattern, and

the quality of bone. Rorabeck type II fractures with an open box femoral component are best managed using a retrograde intramedullary nail, whereas those with a closed box or a component incompatible with an intramedullary nail are treated with an open reduction and internal fixation with a locking plate **[**4**]**. Nevertheless, due to the simplicity of this classification, the Su classification has been developed to aid in preoperative planning. Although, CT scan showed an intact prosthesis, this patient's fracture extended distally into the femoral component of the prosthesis; this classified her fracture as Su type III, potentially requiring a revision **[**6**]**. Although CT showed a stable prosthesis, as a result of the fracture pattern and extent of the fracture line distal to the prosthesis, we had initially planned for a revision surgery. However, intraoperatively the femoral component of the prosthesis showed no signs of loosening, it was a Smith & Nephew Genesis II implant, an open box implant, compatible with an intramedullary nail. Therefore, we had opted for an open reduction and internal fixation, using cerclage wires and a retrograde intramedullary nail. This was advantageous in terms of less soft tissue dissection compared to a locking plate, thereby not compromising periosteal blood supply, and allowing secondary healing. Additionally, it has shown to have high union rates compared to locking plates **[**7**]**. Moreover, intramedullary nailing, compared with locking plates, allows for early mobilization and overall functional improvement **[**7**]**.

Conclusion

This paper described the case of a young patient who sustained a periprosthetic distal femur fracture. Classification of the fracture is important to guide management; however, it should not be the only factor on the final treatment decision. The factors considered when managing this patient were both patient oriented and aligned with the treatment algorithms proposed by the literature.

References

1. Meftah, M., White, P. B., Ranawat, A. S., & Ranawat, C. S. (2016). Long-term results of total knee arthroplasty in young and active patients with posterior stabilized design. The Knee, 23(2), 318–321. https://doi.org/10.1016/j.knee.2015.10.008

2. Postler, A., Lützner, C., Beyer, F., Tille, E., & Lützner, J. (2018). Analysis of total knee arthroplasty revision causes. BMC Musculoskeletal Disorders, 19(1). https://doi.org/10.1186/s12891-018-1977-y

3. Han, H.-S., Oh, K.-W., & Kang, S.-B. (2009). Retrograde intramedullary nailing for periprosthetic supracondylar fractures of the femur after total knee arthroplasty. Clinics in Orthopedic Surgery, 1(4), 201. https://doi.org/10.4055/cios.2009.1.4.201

4. Lombardo, D. J., Siljander, M. P., Sobh, A., Moore, D. D., & Karadsheh, M. S. (2019). Periprosthetic fractures about total knee arthroplasty. MUSCULOSKELETAL SURGERY, 104(2), 135–143. https://doi.org/10.1007/s12306-019-00628-9

5. Ruchholtz, S., Tomás, J., Gebhard, F., & Larsen, M. S. (2012). Periprosthetic fractures around the knee—the best way of treatment. European Orthopaedics and Traumatology, 4(2), 93–102. https://doi.org/10.1007/s12570-012-0130-x

6. Wallace, S. S., Bechtold, D., & Sassoon, A. (2017). Periprosthetic fractures of the distal femur after total knee arthroplasty : Plate versus Nail Fixation. Orthopaedics & Traumatology: Surgery & Research, 103(2), 257–262. https://doi.org/10.1016/j.otsr.2016.11.018

7. Yoo, J. D., & Kim, N. K. (2015). Periprosthetic fractures following total knee arthroplasty. Knee Surgery & Related Research, 27(1), 1–9. https://doi.org/10.5792/ksrr.2015.27.1.1.