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Deya Alwadi
Department of Orthopedic,
Royal Medical Services, Amman,
Jordan

Ahmad Almgidat
Department of Orthopedic,
Royal Medical Services, Amman,
Jordan

Usage of elastic intramedullary nailing in highly unstable pediatric femur shaft fracture: A case report

Deya Alwadi and Ahmad Almgidat

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Abstract

Femoral shaft fractures are the leading cause of hospitalization for pediatric fractures, and their treatment is controversial and depends on many factors, including the child's age, weight, anatomical site, type of fracture, joint involvement, soft tissue conditions, and associated injuries. Treatment modalities of pediatric femoral fractures include non-operative options like palvic harness and spica casting, usually utilized in younger age groups, while surgical options like nailing and plating are used in older age groups. This paper reports an 8-year-old male with a long spiral femur shaft fracture treated with elastic nailing.

Keywords: Femur, fracture, intramedullary nail, pediatric

Introduction

Femoral shaft fractures represent less than 2% of all pediatric fractures. However, they are the leading cause of hospitalization in children ^[1, 2]. Many factors play a role when treating pediatric femoral shaft fractures, including the child's age, the patient's weight, the type of fracture, associated injuries, and the family's socioeconomic status. Nevertheless, many controversies exist in treating such fractures in the age group 5-16 years, with no consensus about the best option. Conservative options can be considered in the younger ages. However, surgical options, including external fixation, plating, and intramedullary nailing, are usually indicated in this age category ^[3].

Case presentation

An 8-year-old male presented to the emergency department late at night after falling from a one-meter height while playing inside the home and developed immediate pain and gross deformity of the right thigh. Clinical examination revealed an isolated right closed thigh injury with gross deformity associated with moderate swelling, mild ecchymosis, palpable distal pulses, and intact neurological function distal to the injury. The thigh radiograph demonstrated a long spiral right femur shaft fracture, figure 1. Accordingly, skin traction with 5 kilograms was applied.



Fig 1: Initial X-rays at the time of presentation.

Corresponding Author:
Deya AlWadi
Department of Orthopedic,
Royal Medical Services, Amman,
Jordan

The decision of fracture fixation by elastic intramedullary nailing versus plating was discussed with parents, and the advantage and disadvantages of each option were explained. Given the patient's age and weight (26 kilograms), the parents preferred the minimally invasive option of elastic intramedullary nailing.

Surgery was performed the next day morning under general anesthesia. Closed reduction was made, and two retrograde elastic nails size 4 mm were inserted percutaneously through two small skin incisions made at the medial and lateral distal

right femur, figure 2. Reduction stability was checked under a fluoroscope. The post-operative plan includes non-weight-bearing exercises for three weeks.

At three weeks, the wound healed, and the femur radiograph showed callus formation with a stable fixation construct, figure 2. Therefore, weight bearing as tolerated was initiated. Full weight-bearing started after six weeks, and the fracture healed at 12 weeks (figure 2), where the patient has pain free full weight-bearing gait.



Fig 2: (From left to right): The first two images showed post-operative X-rays. The next images showed three weeks and 12 weeks post-operative x-rays, respectively.

The patient was reevaluated at six months; he has no complaint, no limbing, and no lower limb length discrepancy, and the radiograph confirmed the fracture healing, figure 3.

Therefore, he was discharged from follow-up until the planned removal of the elastic nail one year after the surgery.



Fig 3: Post-operative x-rays six months after the operation.

Discussion

Pediatric femoral fracture treatments differ according to age, and to standardize femur fracture management, the American Academy of Orthopedic Surgeons (AAOS) introduced a clinical guideline^[4].

Fracture pattern and stability are essential factors to be considered in treating such fractures. Length unstable fractures are defined as Spiral, long oblique, or comminuted, and a fracture length more than or equal to twice the diameter of the femoral shaft at the level of the fracture^[5-11] and are often associated with > 2 cm of shortening^[5, 12]. Choosing the method of fixation for length unstable diaphyseal femoral fracture need to take in consideration many factors in children ages 5–11 due to the long recovery time, skeletal immaturity, the high risk of post-operative complications, and the lack of consensus on the mode of fixation^[5, 6, 13].

Although flexible intramedullary nailing for pediatric femur shaft fracture is an effective procedure for length-stable fractures, there is a big concern to use for length-unstable fractures. It has the advantage of minimal soft tissue disruption with a relatively low complication rate. Additionally, it provides immediate-to-early stability, allowing early mobilization and returning to normal activities. However, it is associated with increased malunion, hardware irritation, and a longer time to full weight-bearing. Femur plating required more extensive soft tissue disruption; however, it demonstrated the fastest healing rate and returned to full weight-bearing^[14].

Conclusion

Both flexible intramedullary nailing and plating are safe and effective options for length-unstable femoral shaft fractures in children 5 to 11 years of age. Flexible intramedullary nailing can provide similar clinical results with less blood loss, operative time, and shorter hospital stays. However, with flexible intramedullary nailing in length-unstable fractures, special caution and additional immobilization may be required.

Disclosure

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References

1. Flynn JM, Skaggs D. Femoral shaft fractures. In: Flynn J.M., Skaggs D., Waters P., editors. *Rockwood & Wilkins' Fractures in Children*. Philadelphia: Wolters Kluwer; c2014. p. 987-1026.
2. Loder RT, ODonnell PW, Feinberg JR. Epidemiology and mechanisms of femur fractures in children. *J. Pediatr. Orthop.* 2006;26(5):561-566. DOI: 10.1097/01.bpo.0000230335.19029.ab.
3. Kocher MS, Sink EL, Blasler RD, Luhmann SJ, Mehlman CT, Scher DM, *et al.* American Academy of Orthopaedic Surgeons American Academy of Orthopaedic Surgeons clinical practice guideline on treatment of pediatric diaphyseal femur fracture. *J. Bone Joint Surg. Am.* 2010;92(8):1790-1792.

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4. Jevsevar DS, Shea KG, Murray JN. AAOS clinical practice guideline on the treatment of pediatric diaphyseal femur fractures. *J Am Acad Orthop Surg* 2015;23(12):e101.
5. Sutphen SA, Beebe AC, Klingele KE. Bridge Plating Length-Unstable Pediatric Femoral Shaft Fractures. *J Pediatr Orthop.* 2016;36(Suppl 1):S29-S34.
6. Soni JF, Schelle G, Valenza W, Pavelec AC, Souza CD. Unstable femoral fractures treated with titanium elastic intramedullary nails, in children. *Revista Brasileira de Ortopedia (English Edition).* 2012 Sep 1;47(5):575-80.
7. Sink EL, Hedequist D, Morgan SJ, Hresko T. Results and technique of unstable pediatric femoral fractures treated with submuscular bridge plating. *Journal of Pediatric Orthopaedics.* 2006 Mar 1;26(2):177-81.
8. Sink EL, Gralla J, Repine M. Complications of pediatric femur fractures treated with titanium elastic nails: a comparison of fracture types. *Journal of Pediatric Orthopaedics.* 2005 Sep 1;25(5):577-80.
9. Sink EL, Faro F, Polousky J, Flynn K, Gralla J. Decreased complications of pediatric femur fractures with a change in management. *Journal of Pediatric Orthopaedics.* 2010 Oct 1;30(7):633-7.
10. Li Y, Hedequist DJ. Submuscular plating of pediatric femur fracture. *JAAOS-Journal of the American Academy of Orthopaedic Surgeons.* 2012 Sep 1;20(9):596-603.
11. Kuremsky MA, Frick SL. Advances in the surgical management of pediatric femoral shaft fractures. *Current opinion in pediatrics.* 2007 Feb 1;19(1):51-7.
12. Samora WP, Guerriero M, Willis L, Klingele KE. Submuscular bridge plating for length-unstable, pediatric femur fractures. *Journal of Pediatric Orthopaedics.* 2013 Dec 1;33(8):797-802.
13. Ellis HB, Ho CA, Podeszwa DA, Wilson PL. A comparison of locked versus nonlocked Enders rods for length unstable pediatric femoral shaft fractures. *Journal of pediatric orthopaedics.* 2011 Dec 1;31(8):825-33.
14. Furlan D, Pogorelić Z, Biočić M, Jurić I, Budimir D, Todorčić J, Šušnjar T, Todorčić D, Meštrović J, Milunović KP. Elastic stable intramedullary nailing for pediatric long bone fractures: experience with 175 fractures. *Scandinavian journal of surgery.* 2011 Sep;100(3):208-15.

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