

Distal Radius Salter-Harris III and Contralateral Scaphoid Fractures in an Adolescent Treated with Minimally Invasive Fixation

Christos I Vosinakis¹ and Ioannis C Vossinakis^{2*}

¹*Clinical Fellow, A&E Department, Harrogate District Hospital, Harrogate, UK*

²*Head of Orthopaedic Department, "ANASSA" Private Hospital, Volos, Greece*

***Corresponding Author:** Ioannis C Vossinakis, Head of Orthopaedic Department, "ANASSA" Private Hospital, Volos, Greece.

Received: March 11, 2022; **Published:** March 31, 2022

Abstract

Intraarticular distal radius fractures in adolescents are rare with only three Salter-Harris III fractures previously reported. Bilateral wrist fractures are also not very common and present a dilemma between conservative and surgical treatment. We present the case of a 16 year old boy with a left Salter-Harris III distal radial fracture and a contralateral scaphoid fracture that were treated with minimally invasive fixation. We discuss the literature and suggest that bilateral wrist fractures are an indication for surgical management, regardless of displacement, for allowing some independence in daily activities for the patient.

Keywords: *Intraarticular Fracture; Distal Radius; Adolescents; Bilateral Wrist Fractures; Surgery*

Introduction

Intraarticular (transitional) distal radius fractures in adolescents are quite rare and are almost always triplane fractures [1]. To our knowledge, only three Salter-Harris III fractures have been previously reported in the literature [2-4]. Contralateral wrist fractures are generally not very common and they predominantly occur with significant trauma. We present the case of a 16 year-old boy who suffered a left Salter-Harris III distal radius fracture and a right scaphoid fracture due to a motorbike accident.

Case Report

A 16 year old boy sustained bilateral wrist injuries due to a motorbike accident. The injuries were the result of a violent impact of both hands on the motorbike handles following a head-on collision. There was no fall on the hands. Radiographs taken at a district hospital revealed an intraarticular fracture of the left distal radial epiphysis. No fracture was obvious on the right wrist, but a 3rd metacarpal neck fracture was seen. On examination at our practice suspicion of a right scaphoid fracture was raised, despite the negative x-rays, and bilateral wrist CT scans were made. On the right, a minimally displaced scaphoid fracture was obvious (Figure 1), while on the left the fracture was classified as Salter-Harris III, involving the radial half of the epiphysis (Figure 2). Operative treatment was decided for all fractures in order to allow early use of at least one hand and to avoid delayed union or non-union of the scaphoid.

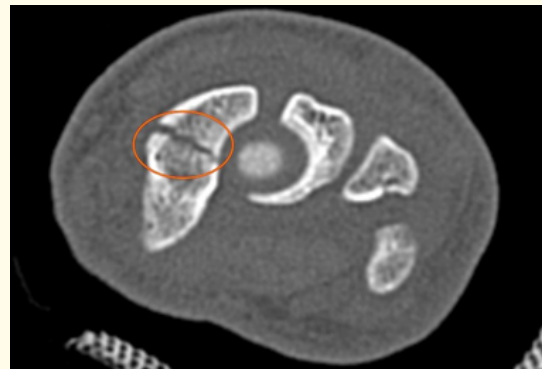


Figure 1: CT scan showing minimally displaced right scaphoid fracture.

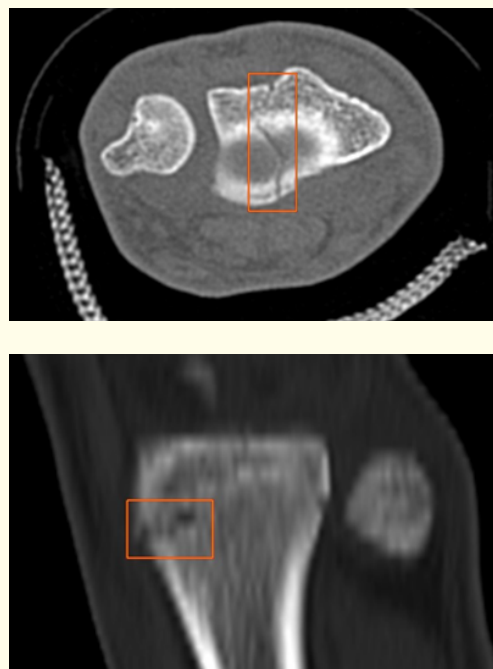


Figure 2A and 2B: CT scan left wrist. Fracture lines of a Salter-Harris III intraarticular distal radius fracture involving the radial part of the physis.

The distal radius and the scaphoid fractures were treated with closed reduction and internal fixation with headless, variable thread Acutrak screws (Acumed, Hillsboro, Oregon) under image intensification (Figure 3). The 3rd metacarpal fracture was treated with K-wire fixation. A removable right wrist-scaphoid splint was used for protection of the scaphoid and the metacarpal fixation, while the left wrist was not splinted, to allow use of at least one hand. At 3 weeks postoperatively the splint and the K-wires were removed and rehabilitation commenced. One month later the young boy returned to full activities, including work at his father's tyre repair garage.





Figure 3A-3D: Plain radiographs. A, B: Right wrist, scaphoid and 3rd metacarpal fixation. C, D: Left wrist, distal radius fixation.

Discussion

Intraarticular physeal fractures account for 20% of all physeal fractures in adolescents [1]. They usually occur at the distal tibia and the progression of physeal closure has been well described [5-7]. Although distal radial physeal fractures are the most common paediatric fractures, intraarticular fractures are very rare [8]. An MRI study showed that the distal radial physeal closure is completed in less than a year [9], in contrast to the distal tibia, where physeal closure takes 18 months to complete [1]. This study showed that fusion begins at the centre of the radial part of the physis and progresses ulnarly in a counter clockwise manner. This can explain the significantly lower frequency of intraarticular distal radius fractures. The few reported in the literature are triplane fractures [10-12]. Two of the three Salter-Harris III fractures previously reported involved the ulnar part of the physis, which seems to be in agreement with the closure progression [2,4]. In our case however, although the patient was close to skeletal maturity, the fracture involved the radial part of the distal radial physis (Figure 2B). This could be due to delayed physeal closure or might mean that more studies are required to determine the progression of the distal radial physis closure. The remaining Salter-Harris III fracture previously reported involved a younger (10 year-old) boy and a complex injury with fractures of three carpal bones [3].

Treatment of intraarticular physeal fractures in adolescents is conservative, unless there is significant displacement (> 2 mm). The same is true for undisplaced scaphoid fractures. Had our patient's bilateral wrist fractures been treated conservatively, in plaster-casts, would have made the use of both hands impossible for at least three to four weeks. This was not acceptable by the patient, who opted for surgical treatment. Since both fractures were minimally displaced, no open reduction was necessary. Under image intensification, both fractures were fixed with variable thread, headless screws (Acumed, Hillsboro, Oregon). For the scaphoid the mini Acutrak screw was used and for the distal radius the standard screw provided ideal fixation. Fixation of both fractures was stable enough to allow immediate use of the left hand and quite early use of the right hand, taking in account the ipsilateral 3rd metacarpal fracture that was fixed with K-wires.

Conclusion

This case report is only the fourth of the extremely rare Salter-Harris III distal radial fracture in an adolescent. In addition, the combination of this rare fracture with a contralateral scaphoid fracture presented the dilemma of operative versus conservative treatment. Both the patient and the treating surgeon agreed that surgery was warranted for allowing the patient some independence in daily activities. We believe bilateral wrist fractures are an indication for surgical management, regardless of displacement, for allowing some independence in daily activities for the patient, although arguments for the contrary might ignite an interesting discussion.

Conflict of Interest

No financial interest or conflict of interest exists.

Bibliography

1. Kärholm J. "The triplane fracture: four years of follow-up of 21 cases and review of the literature". *Journal of Pediatric Orthopaedics. Part B* 6.2 (1997): 91-102.
2. Kurland A., et al. "Distal Radius Salter Harris III Transitional Fracture in an Adolescent Male". *Case Reports in Orthopedics* (2021): 5535109.
3. DeCoster T A., et al. "Case report. Pediatric carpal fracture dislocation". *Journal of Orthopaedic Trauma* 8.1 (1994): 76-78.
4. Sharma H., et al. "Volar lunate dislocation associated with a Salter-Harris Type III fracture of the distal radial epiphysis in an 8 year-old child". *The Journal of Hand Surgery, European Volume* 32.1 (2007): 77-79.
5. von Laer L. "Classification, diagnosis, and treatment of transitional fractures of the distal part of the tibia". *The Journal of Bone and Joint Surgery, American Volume* 67.5 (1985): 687-698.
6. Cass JR and Peterson H. A. "Salter-Harris type-IV injuries of the distal tibial epiphyseal growth plate, with emphasis on those involving the medial malleolus". *The Journal of Bone and Joint Surgery, American Volume* 65.8 (1983): 1059-1070.
7. Hoeffel JC., et al. "Tillaux's fracture". *Journal de Radiologie* 70.3 (1989): 213-217.
8. Cheng JC and Shen WY. "Limb fracture pattern in different pediatric age groups: a study of 3,350 children". *Journal of Orthopaedic Trauma* 7.1 (1993): 15-22.
9. Kraus R., et al. "Physiological closure of the physeal plate of the distal radius: an MRI analysis". *Clinical Anatomy* 24.8 (2011): 1010-1015.
10. Rauer Thomas., et al. "Transitional fracture of the distal radius: a rare injury in adolescent athletes. Case series and literature review". *European Journal of Medical Research* 25.1 (2020): 21.
11. García-Mata Serafín and Angel Hidalgo-Ovejero. "Triplane fracture of the distal radius". *Journal of Pediatric Orthopaedics. Part B* 15.4 (2006): 298-301.
12. Parkar AAH., et al. "Distal radius triplane fracture". *Annals of the Royal College of Surgeons of England* 96.8 (2014): e6-e7.

Volume 13 Issue 4 April 2022

©All rights reserved by Christos I Vosinakis and Ioannis C Vossinakis.