

# Ankle Dislocation Without Fracture in a Child

John M. Mazur, MD, Eric A. Loveless, MD, and R. Jay Cummings, MD

**A**nkle injuries in children are most commonly associated with fractures of the growth plates. Pure ankle dislocations without fracture are extremely rare, especially in children with open growth plates. The ankle joint is intrinsically stable, making an isolated ankle dislocation a rare injury. The ankle ligaments are mechanically stronger than the growth plates.<sup>1</sup> A fracture through the growth plate is more likely to occur than a dislocation without an associated fracture. There have been only 2 other reports of an ankle dislocation without associated fracture in a child.<sup>2,3</sup>

Here we describe the case of a girl with a closed posterior dislocation of the ankle without fracture. We have obtained the informed consent of the patient whose case is described.

**“A fracture through the growth plate is more likely to occur than a dislocation without an associated fracture.”**

## CASE REPORT

A 14-year-old girl with open growth plates sustained a plantarflexion inversion injury to her left ankle when she slid into base while playing softball. Her ankle was painful, swollen, and deformed. Neurovascular status and skin were intact. Anteroposterior and lateral x-rays (Figure 1) showed the ankle dislocation without fracture.

Under intravenous sedation for pain control, the patient underwent immediate closed reduction, and then a non-weight-bearing short-leg cast was applied. After 4 weeks in the cast, she was allowed to weight-bear in a brace another 4 weeks. After intense physical therapy for 3 months, she recovered fully and returned to preinjury activities (tennis, volleyball). At 6-year follow-up, she was actively playing tennis, volleyball, and softball and was totally

asymptomatic. Stress x-rays showed no instability (Figure 2). A telephone interview was conducted 9 years after the injury. Now 23 years old, the patient had remained active in sports, completed college, become a yoga instructor, and remained totally asymptomatic.

## DISCUSSION

Joint dislocations seldom occur in children because the ligaments about children's joints are resistant to complete rupture. In children, joint trauma most likely leads to fracture of the bone or of the physal cartilage near the joint. Ankle dislocation in a child is extremely rare—there were only 2 previous case reports. Lovell<sup>2</sup> reported the case of a 13-year-old boy who sustained a posterior ankle dislocation while tobogganing. He was treated with closed reduction and a short-leg cast. X-rays obtained 4 years after injury showed a stable ankle. Nusem and colleagues<sup>3</sup> described a 12-year-old girl who sustained a similar injury while running downstairs. She too was treated with closed reduction. At 4-year follow-up, ankle stability was tested with a Telos stress device (Austin & Associates, Fallston, Md). The stress test showed no instability. Our case and the 2 previous cases are similar in several ways. All 3 cases occurred later in childhood (ages 12, 13, 14), resulted from significant plantarflexion and inversion forces, were treated successfully with closed reduction, and had excellent outcomes without disability at follow-up. In addition, in none of these cases was there any neurologic or vascular injury, but attention should be paid to the neurovascular status in patients with such injuries.

Posterior dislocation without fracture can occur if the ankle is stressed in full plantarflexion followed by inversion.<sup>4</sup> In the case of our patient, the plantarflexion inversion injury occurred when she slid into base while playing softball. The plantarflexed posture would have put the ankle in an unstable position eventually leading to the dislocation. In the plantarflexed position, the force from the slide into base caused failure of the anterior capsule, the anterior talofibular ligament, and the calcaneofibular ligament. Disruption of the ligamentous structures led to dislocation (Figure 1). The anatomy of the talus makes the joint unstable in full plantarflexion.<sup>4</sup> In this position, stresses are applied to the anterior capsule as well as the anterior talofibular and calcaneofibular ligaments, causing them to tear when the ankle dislocates. Disruption of the tibial-fibular syndesmosis seems to be rare in cases of posterior ankle dislocation.

In adults, ankle dislocations often present as open injuries.<sup>5</sup> Recommended treatment for an open dislo-

Dr. Mazur is Pediatric Orthopaedic Surgeon, Dr. Loveless is Pediatric Orthopaedic Surgeon, and Dr. Cummings is Pediatric Orthopaedic Surgeon, Nemours Children's Clinic, Jacksonville, Florida.

Requests for reprints: John M. Mazur, MD, Nemours Children's Clinic, 807 Children's Way, Jacksonville, FL (tel, 904-390-3600; fax, 904-390-3477; e-mail, jmazur@nemours.org).

*Am J Orthop.* 2007;36(5):E138-E140. Copyright 2007, Quadrant HealthCom Inc.



**Figure 1.** Anteroposterior (A) and lateral (B) plain films show the ankle dislocation. Figure 1A reprinted from *Rockwood & Wilkins' Fractures in Children*, 6th ed., Beaty JH and Kasser JR, eds., chap 26: Distal tibial and fibular fractures, page 1111, copyright 2001, with permission from Lippincott Williams & Wilkins.

cation is surgical ligament and capsular repair. The outcome in these open dislocations is much worse. Severe swelling can lead to compartment syndrome. Skin necrosis may require surgical skin-flap coverage and/or skin grafts. There is one report of ankle dislocation leading to below-knee amputation.<sup>6</sup> Compared with closed ankle dislocations, open dislocations are much more serious and require more emergent and aggressive treatment.

In both children and adults, closed dislocations historically have been treated with closed reduction and immobilization in a short-leg cast for 4 to 6 weeks.<sup>6</sup> At long-term follow-up, most patients have done well without instability or radiographic changes of degenerative arthritis.<sup>7</sup> We used this conservative treatment for our patient, and it was justified, according to the follow-up.



**Figure 2.** Anteroposterior plain films show both inversion (A) and eversion (B) stress tests. No instability was seen.

In short, recommended treatment for closed ankle dislocations in children is closed reduction and immobilization in a non-weight-bearing cast. Appropriate treatment seems to be 4 weeks in a non-weight-bearing cast followed by another 4 weeks in a weight-bearing brace. After rehabilitation with physical therapy, one should expect full recovery and return to sports. Our patient demonstrated no instability, and there was no evidence of arthritis. She remained asymptomatic 9 years after injury.

### CONCLUSIONS

Ankle dislocation without fracture is rare in the pediatric population. In this article, we have documented successful nonoperative management of this uncommon injury.

### AUTHORS' DISCLOSURE STATEMENT AND ACKNOWLEDGEMENT

The authors report no actual or potential conflict of interest in relation to this article.

## REFERENCES

1. D'Anca AF. Lateral rotary dislocation of the ankle without fracture. *J Bone Joint Surg Am.* 1970;52:1643-1646.
2. Lovell ES. An unusual rotary injury of the ankle. *J Bone Joint Surg Am.* 1968;50:163-165.
3. Nusem I, Ezra E, Wientroub S. Closed posterior dislocation of the ankle without an associated fracture in a child. *J Trauma.* 1999;46:350-351.
4. Rasmussen O. Stability of the ankle joint. Analysis of the function and traumatology of the ankle ligaments. *Acta Orthop Scand Suppl.* 1985;211:1-75.
5. Wilson MJ, Michele AA, Jacobson EW. Ankle dislocations without fracture. *J Bone Joint Surg.* 1939;21:198-204.
6. Moehring HD, Rana TT, Marder RA, Lian G. Ankle dislocation. *J Orthop Trauma.* 1994;8:167-172.
7. Fernandes TJ. The mechanism of talo-tibial dislocation without fracture. *J Bone Joint Surg Br.* 1976;58:364-365.