

Whatever the reason, this uncommon cause of compartment syndrome or local tissue necrosis in the finger seems to respond well to early treatment, including fasciotomy, if necessary. In cases presenting immediately after the injury, excision and drainage of the injected material seems to be a low price compared with the probable complications. In late presenting cases, close follow-up and treatment according to the severity of symptoms seem to be the best approach.

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- Aydın N. Adjuvantlar. In: *Immünooloji* (Ed. Arda M). Medisan yayın serisi. Ankara 1994: 13: 305-12.
- Diker K S. Asıllar ve asılama. In: *Immünooloji* (Ed. Diker KS). Medisan yayın serisi. Ankara 1998: 37: 271-85.
- Dresser D W. Immunization of experimental animals. In: *Handbook of immunology* (Ed. Weir D M). Blackwell Scientific Publications 1986: 8: 1-21.
- Goodman J W. Immunogenicity and antigenic specificity. In: *Basic and clinical immunology* (Ed. Stites D P). Lange Medical Book, California 1991: 101-21.
- Hsiang-Pih H. Problems and solutions relating to vaccination of poultry in the developing countries. In: *Avian immunology: Basis and practice* (Ed. Toivanen A). CRC Press Inc. Florida 1987: 159-67.

The role of prophylactic pinning in the treatment of slipped capital femoral epiphysis—a case report

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A 9-year-old girl had dragged her left leg for 3 weeks. 2 days before hospitalization she complained of pain in the left groin. She had a 30° restriction in internal rotation and 20° in abduction, in comparison with the right side. A shortening of the left leg by 1 cm was found. A metabolic or endocrinologic disease could not be diagnosed. The radiographs showed a 30° dorsocaudal displacement of the left physal plate. (Figure 1). An immediate simultaneous physodesis of both hip joints with threaded wires was performed (Figure 2). After uneventful clinical and radiographic follow-ups, the implants were removed 12 months later at the age of 10 years. Retrospectively, the reason for this early removal is unclear. The radiographs, which were taken before and after this operation, showed no sign of a new dislocation of the epiphyseal plate.

Only 3 months later, the girl started to drag her right leg, without pain. The clinical examination showed a positive "Drehmann" sign (external rotation of the hip during passive flexion) and no internal rotation. Radiographs showed a slipped capital femoral epiphysis on the right side (Figure 3). The hip joint was stabilized with 4 threaded

wires, because the parents would not agree to a physodesis of the left hip.

6 months later, the girl spontaneously complained about pain in the left hip once again. The reason was further slippage of the left epiphysis (Figure 4). Because of large displacement, stabilization was performed with 3 threaded wires and an intertrochanteric osteotomy according to Imhäuser (1987) and Southwick (1967) with internal rotation and 30° flexion of the distal fragment.

The implants were removed after closure of the physal plates at the age of 16 years (Figure 5). At this time, the girl had no pain. The hip joints showed a similar range of motion with flexion 130°/extension 5°, abduction 60°/adduction 30° and internal rotation 50°/external rotation 60°. The only residuum was a shortening of the left leg by 1 cm. 2 years after the last surgery, the girl has no hip problems.

Discussion

Slipped capital femoral epiphysis occurs bilaterally in 20% up to 80%. The incidence differs ac-



Figure 1. Axial radiographs of both hips at the age of 9 years showing slipped capital femoral physis of the left hip

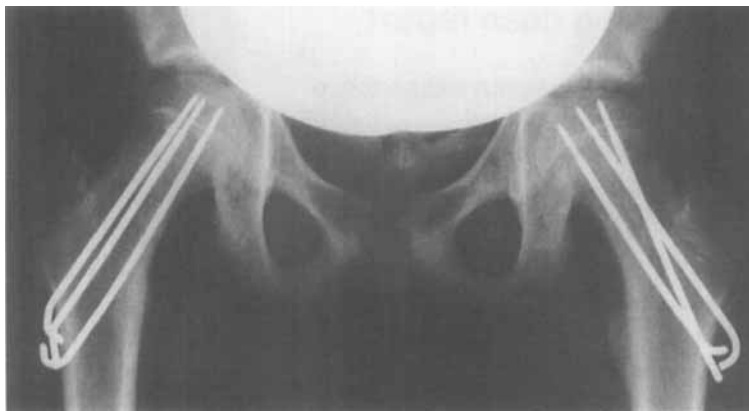


Figure 2. Fixation in situ on both sides with threaded wires

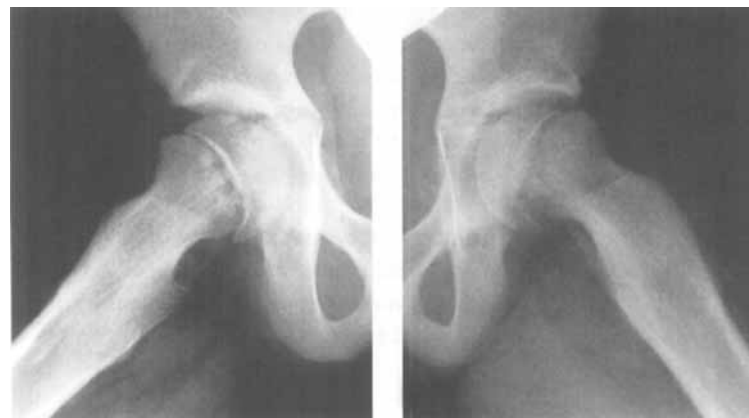


Figure 3. Axial radiograph of slipped capital femoral epiphysis of the right hip 3 months after removal of the wires at the age of 10 years

Figure 4. Further slipping of the left hip 10 months after the removal of the implants

according to the radiographic assessment (Hägglund et al. 1988, Canale 1989, Engelhardt 1994, Hägglund 1996, Jerre et al. 1996). However, there is no agreement about prophylactic stabilization of the contralateral hip joint (Imhäuser 1987, Crawford 1988, Canale 1989, Engelhardt 1994, Kumm et al. 1996).

Arguments against prophylactic stabilization are the possible complications: avascular necrosis of the femoral head or the epiphysis, chondrolysis, further slippage after insufficient stabilization, pathologic fractures around the unused drill holes, pin penetration, intraarticular position of the implants, and movement or breakage of the implants (Canale 1989).

Crawford (1988) said, that "the complications that may be encountered considerably outweigh the benefits in a child who is otherwise normal". He recommends prophylactic pinning only in patients with metabolic disorder or endocrinopathy.

Canale (1989) believed that there is no indication for prophylactic pinning, because later slipping occurred only in 16% of the cases in his series. Jerre et al. (1996) found bilateral slipping in 59% by using the Billing standardized lateral view after a follow-up time of 32 years. In 42 of 59 patients (71%), slip-

Figure 5. Result before removal of the implants at the age of 16 years after the closure of the epiphyseal plates.



Anteroposterior view of both hips



Axial view of the right hip



Axial view of the left hip

ping of the contralateral hip was asymptomatic. In 1994, Jerre et al. could not show any statistical significant evidence, whether the incidence of arthrosis in the contralateral hip was related to the occurrence of slipping or to the management by pinning in situ.

Hurley et al. (1996) evaluated the prevalence of slipped capital femoral epiphysis in the contralateral hip of 169 children who had been managed with pinning in situ and 30 who had been managed with immobilization in a spica cast. 31 of the 169 patients (36%) and 2 of the 30 patients subsequently developed a slip in the contralateral hip. The reason for the difference may be an overloading of the contralateral, not pinned hip by walking with crutches.

In a retrospective evaluation of 260 patients,

in opinion, repeated radiographic examinations are not a guarantee against development of severe slipping.

Hägglund (1996) also stated that, if prophylactic pinning is not performed, the children and parents must be informed that there is an increased risk of slipping in the contralateral hip, and that they must be aware of early symptoms in the hip. This may cause anxiety, and such children are not generally allowed to participate in sports. With prophylactic pinning, the child can participate in sport activities. Hägglund (1996) recommended that, at centers with a low complication rate of pinning, prophylactic pinning should be performed in all children. Kumm et al. (1996) found no perioperative complications after prophylactic dynamic screw fixation of the asymptomatic hip

Hägglund (1996) detected 61% with bilateral slippings at follow-up examinations at an average age of 47 years. Only 32 of the contralateral slips were diagnosed during adolescence and 17 of them showed arthrosis at follow-up. Of the 104 contralateral slips that were asymptomatic during adolescence and diagnosed at follow-up, 28 showed arthrosis. Several slips were severe, and the frequency of arthrosis was higher than in a similar follow-up of slipped hips with mild slipping treated with pinning in situ. He pointed out that it is possible to reduce the risk of arthrosis in the contralateral hip by prophylactic pinning, if the pinning is performed by a technique with a complication rate lower than the complication rate of the slip itself. In his

in 34 patients at an average follow-up of 5 years. No avascular necrosis or chondrolysis occurred.

We believe, like Hurley et al. (1996), that slipped capital femoral epiphysis is not a unilateral disease but a disease of both hips. Our case demonstrates 2 complications that resulted from non-optimal operative therapy. First, the implants were removed too early, at the age of 10 years. A short time after this operation, a unilateral new slipping occurred. Prophylactic pinning of the contralateral side was not performed, because the parents refused this operation, although we recommended it. Within 6 months, a further slippage of the non-stabilized hip was detected, which would have been obviated by simultaneous pinning.

We use threaded wires, because we have seen few complications with this technique. An outgrowing of these wires from the physeal plate occurs very seldom, so the risk of restabilization is low. This is important, because too-early removal of the implants and outgrowing seem to be the same functionally.

Canale S T. Problems and complications of slipped capital femoral epiphysis. In: American Academy of Orthopaedic Surgeons, Instructional Course Lectures, XXXVIII (Ed. Barr J S) CV Mosby, St. Louis 1989: 281-90.

Crawford A H. Slipped capital femoral epiphysis. *J Bone Joint Surg (Am)* 1988; 70: 1422-7.

Engelhardt P. Spontanverlauf der Epiphyseolysis capitis femoris. *Orthopäde* 1994; 23: 195-9.

Hägglund G. The contralateral hip in slipped capital femoral epiphysis. *J Pediatr Orthop (Part B)* 1996; 5: 158-61.

Hägglund G, Hansson L I, Ordeberg G, Sandström S. Bilaterality in slipped upper femoral epiphysis. *J Bone Joint Surg (Br)* 1988; 70: 179-81.

Hurley J M, Betz R R, Loder R T, Davidson R S, Alburger P D, Steel H H. Slipped capital femoral epiphysis—The prevalence of late contralateral slip. *J Bone Joint Surg (Am)* 1996; 78: 226-9.

Imhäuser G. Spontane Epiphysenlösung am koxalen Femurende. In: *Orthopädie in Praxis und Klinik*, Band VII, Spezielle Orthopädie (Eds. Witt A N, Rettig H, Schlegel KF). Georg Thieme Verlag, Stuttgart-New York 1987: 2115-48.

Jerre R, Billing L, Hansson G, Wallin J. The contralateral hip in patients primarily treated for unilateral slipped femoral epiphysis—long-term follow-up of 61 hips. *J Bone Joint Surg (Br)* 1994; 76: 563-7.

Jerre R, Billing L, Hansson G, Karlsson J, Wallin J. Bilaterality in slipped capital femoral epiphysis: importance of a reliable radiographic method. *J Pediatr Orthop (Part B)* 1996; 5: 80-4.

Kumm D A, Schmidt J, Eisenburger S-H, Rütt J, Hackenbroch M H. Prophylactic dynamic screw fixation of the asymptomatic hip in slipped capital femoral epiphysis. *J Pediatr Orthop* 1996; 16: 249-53.

Southwick W O. Osteotomy through the lesser trochanter for slipped capital femoral epiphysis. *J Bone Joint Surg (Am)* 1967; 49: 807-35.

Irreducible fracture-separation of the distal ulnar epiphysis in the Galeazzi equivalent fracture—a case report

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An 11-year-old girl was admitted to the emergency room after sustaining an extension injury to her outstretched left hand, presenting pain, tenderness and swelling of the wrist. The neuromuscular examination was normal. Radiographs showed a distal radial shaft fracture and a type II Salter-Harris fracture of the distal ulna with dorsal displacement of the proximal fragment (Figure 1).

Closed reduction under general anesthesia was tried but the ulnar fracture could not be reduced. Open reduction was performed through a dorso-ulnar approach over the distal radioulnar joint. Intraoperative examination revealed that the ulnar metaphyseal fragment was dislocated into a capsular buttonhole (Figure 2), leaving the epiphysis of the distal end of the ulna with its metaphyseal flake in its normal location at the distal radioulnar