Acta Orthop. Scand. *58*, 483–484, 1987

Complications at extraction of the ASIF epiphysiodesis screws

Sune Larsson and Sven Friberg

A retrospective study was performed of 30 consecutive patients operated on with ASIF epiphysiodesis for slipped capital femoral epiphysis. During extraction, complications were encountered in 13/23 patients. A total of 38 screws were removed. Thirteen screws broke and another three screws were embedded in bone, making extensive chiseling of cortical bone necessary before extraction was possible. Due to the frequent complications at extraction, the ASIF epiphysiodesis screw is not suitable for treatment of the slipped capital femoral epiphysis.

Internal fixation, with or without preoperative reduction of displacement, is the predominant treatment of slipped capital femoral epiphysis. However, complications have been reported following internal fixation with triflange nails (Wiberg 1959, Wilson et al. 1965, Cameron et al. 1978), as well as following fixation with threaded pins (Newman 1960, Tronzo 1975, Cameron et al. 1978) and screws (Friberg et al. 1985).

We report on complications associated with the use of the ASIF epiphysiodesis screw for fixation of the slipped capital femoral epiphysis.

Patients and methods

A retrospective study was performed of 30 consecutive patients (18 males, 12 females) treated for slipped capital femoral epiphysis during the years 1970–1982. All the patients were operated on with internal fixation of the slipped epiphysis using the ASIF epiphysiodesis screw (Figure 1). The average age of the patients at the time of diagnosis and treatment was 12.6±2.4 years. Biplane intraoperative fluoroscopic control was used to ensure correct position of the screws. Prophylactic fixation of the asymptomatic side was not used. In 2 patients, bilateral slipping occurred, and both hips were therefore surgically treated. At the time of the present study, extraction of the screws have been done in 23 patients, all with unilateral fixation. The time between insertion and extraction averaged 20±13 months. The total number of screws extracted was 38.

Department of Orthopedics, Umeå University Hospital, S-901 85 Umeå, Sweden

Results

Complications associated with insertion and fixation. Insertion of the screws was not associated with any complications. There were no infections or femoral head necrosis. In one hip, refixation was done owing to further slipping 10 months after primary fixation. In the remaining hips, there were no problems related to the quality of fixation.

Complications associated with extraction. Substantial complications were associated with extraction of 16 of the 38 screws (13/23 patients). Three screws were stuck in the bone so that cortical bone had to be extensively chiseled before extraction was possible. In another seven screws, the head twisted off. By the use of a hole-drill, all but one of these screws could be extracted. In the patient where the hole-drill failed to facilitate removal, the screw was left in situ. Three days after discharge from the hospital, the patient sustained a subtrochanteric fracture through the weakened bone. The fracture occurred without trauma and despite no weight bearing (Figure 2). Another six screws broke at the junction of the threaded and

Figure 1

Figure 2

Figure 3

Figure 1. ASIF epiphysiodesis screw. The threaded part has a larger diameter than the shank.

Figure 2. Subtrochanteric fracture following attempt to extract the screw.

Figure 3. Threaded part of one screw twisted off during extraction. Radiography during surgery.

Table 1. Complications at extraction of ASIF epiphysiodesis screws used for slipped capital femoral epihysis

	Years from insertion		
Complications	<1	1–2	>2
No	10	7	5
Yes	2	4	10

the smooth part (Figure 3). They were all removed by the use of a hole-drill.

If the screws were extracted more than 24 months after insertion, there were more complications (P <0.02, Fisher's exact test) than if extraction was done within the first 2 years after insertion. However, complications did occur even when extraction was done within the first year after insertion (Table 1).

Discussion

The complications associated with extraction of the ASIF epiphysiodesis screws are due to the design of the threaded part having a relatively larger diameter than the shank. The rapid remodeling and bone growth in the adolescent child results in formation of dense bone encircling the screw, thus making removal difficult. Moreover, there are no back-cutting flutes, which at least theoretically would facilitate extraction. The Gouffon pin is designed with a reverse cutting thread, but still problems associated with extraction are reported (MacEwen 1980). According to Cameron (1978), a back-cutting flute added at the junction of the smooth and threaded part might even act as a stress riser, with an increased risk of the screw breaking at this junction.

The ASIF epiphysiodesis screws broke either at the junction of the smooth and threaded part or between the smooth part and the head.

If screws are used, it is important that the whole screw is made out of one piece without weakening sweg bonds. Further, in order to facilitate extraction, the diameter of the threaded part must be less, or at the most, equal to the diameter of the shaft. In its present form, the ASIF screw is not suitable for treatment of the slipped capital femoral epiphysis.

References

Cameron H U, Wang M, Koreska J. Internal fixation of slipped femoral capital epiphyses. Clin Orthop 1978 Nov–Dec;(137):148–53.

Friberg S, Larsson S, Dahlström H. Complications associated with extraction of the AO epiphysiodesis screw. Acta Orthop Scand 1984;55(6):684.

MacEwen G D. Advantages and disadvantages of pin fixation in slipped capital femoral epiphysis. AAOS Instr Course Lect 1980;29:86.

Newman P H. The surgical treatment of slipping of the upper femoral epiphysis. J Bone Joint Surg (Br) 1960;42:280–8.

Tronzo R G. Letter: Acute slipped capital femoral epiphysis. J Bone Joint Surg (Am) 1975 Apr;57(3):433.

Wiberg G. Considerations on the surgical treatment of slipped epiphysis with special reference to nail fixation. J Bone Joint Surg (Am) 1959;41:253–61.

Wilson P D, Jacobs B, Schechter L. Slipped capital femoral epiphysis. J Bone Joint Surg (Am) 1965;47:1128–45.