

Slipped Capital Femoral Epiphysis

Masato SATO, M. D.

Department of Orthop. Surg., Saitama Children's Medical Center, Iwatsuki, JAPAN

Atsushi KITA, M. D.

Department of Orthop. Surg., Japanese Red Cross Sendai Hospital, Sendai, JAPAN

1. The first report of SCFE in Japan

Four boys were reported by Abe. Their age ranged from 15 to 16 years. The growth plate of their long bones were open, suggestive of delay of skeletal maturity. Traction was applied in one case and manual reduction in another one.

Abe K. Coxa vara Adolescentium. J Jpn Orthop Association 1930;5:299-321.

2. Cause of SCFE

Hormonal background of SCFE

The experiment on rats demonstrated that the force required to slip the epiphysis of the tibia was larger in female than in male. This force decreased in gonadectomized rats. And in gonadectomized rats the force increased by giving estrogen and decreased by testosterone. These results explain high incidence of SCFE in boys.

Oka M. The influence of sex hormones on the mechanical strength of the epiphyseal plate. The Cent Jpn J Orthop Traumat 1976;19:714-733.

Factors of occurrence in slipped capital femoral epiphysis (SCFE)

Most cases of SCFE are overweight boys and girls in Japan. Overweight children had decreased femoral anteversion (retroversion) proved by CT. The association of overweight with retroversion are seen. These two factors (obesity and retroversion) heavily contribute to occurrence of SCFE.

Sato M. Clin Exp Med, 1990;Vol.153:303.

3. Assessment of tilting angle of SCFE

Accurate method of measurement of slipped angle in slipped capital femoral epiphysis (SCFE) by using three dimensional surface reconstructions. The measurement of slipped angle in SCFE by plain radiography is not always accurate because the patient cannot take a standard position at the radiological examination because of pain and contracture. Three dimensional surface reconstructions make it possible to observe the femoral neck from all the direction. This method is reliable and useful for deciding the operative procedure.

Sato M. J Jpn Orthop Assoc 1989;63S 122.

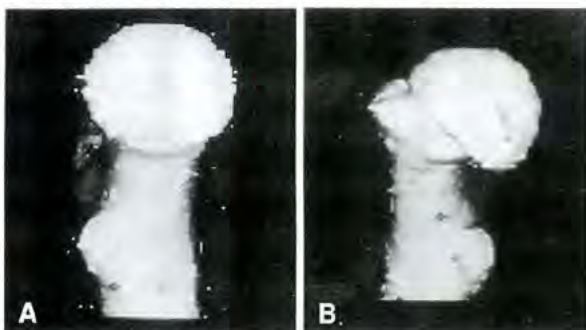


Fig.1 A, B : 3D-CT of SCFE (lateral view of femoral head)
A : Unaffected side , B : Affected side



Fig. 2 : 3D-CT of SCFE from AP to lateral view of femoral head. Every picture rotates 10 degree,

Tonoo reported the method of calculation of posterior and medial tilt angle of SCFE using coronal and axial slices parallel to the axis of femoral neck on MRI.

Tonoo M. Calculation of severity of SCFE utilizing MRI. J Jpn Paed Orthop Assoc 1991;1:45-50.

The first report showing angiographic patterns of blood supply to the SCFE. In some unstable slips the vascular injury occurs at the time of injury, before reduction. And the reduction does not necessarily contribute to the risk of avascular necrosis after SCFE. Maeda S. Vascular supplies to slipped capital femoral epiphysise. J Pediatr Orthop 2001;21: 664-667.



Fig. 2. An unstable slip of the left hip. A : Angiogram before manipulation shows nofilling of the superior retinacular artery (SRA) and the posterior column branch (PCB). B and C : Angiogram after manipulation and internal fixation shows the stain of lateral epiphyseal artery (white arrow) and SRA (black arrow).

4. Osteotomy for SCFE

For the case of the moderate type, simple flexion osteotomy, Imhäuser's and Southwick's 3-dimensional osteotomy were selected.

In the case of PTA over 45°, Transtrochanteric anterior rotational osteotomy brings good results. And in the case of PTA over 70°, addition of modified Kramer's osteotomy brings good results.

Sugioka Y. Transtrochanteric Rotational Osteotomy in the Treatment of Idiopathic and Steroid-induced Femoral Head Necrosis, Perthes Disease, Slipped Capital Femoral Epiphysis, and Osteoarthritis of the Hip. Clin Orthop and Rel Res 1984;184:12-23.

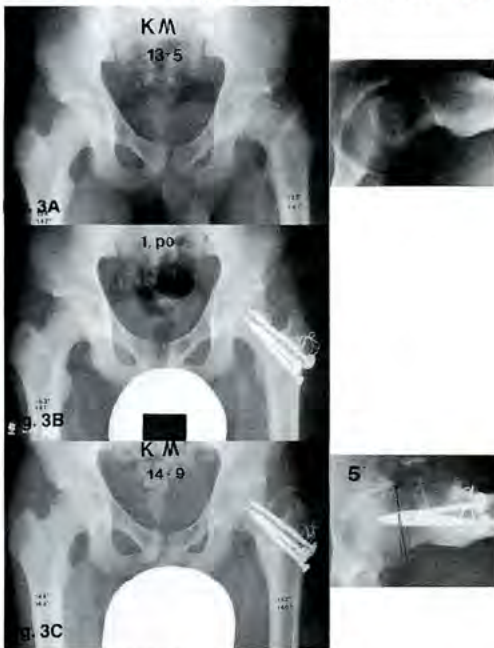


Fig. 3A-C : 12 years old male (from Kyusyu University)
 A : Preoperative radiogram (PTA : 50°)
 B : Postope. (Transtrochanteric anterior rotational osteotomy)
 C : 4 years after initial operation (PTA : 5°)



Fig. 4A-C: 13years old male, bilateral case(from Kyusyu University)
 A : Preoperative radiogram (PTA : 72°)
 B : Postope. (Transtrochanteric anterior rotational osteotomy + Modified Kramer's procedure)
 C : 3 years after initial operation (PTA : 7°)

For the case of the sever type, subcapital osteotomy is also selected, and brings good results. Nisiyama K. Follow up study of slipped capital femoral epiphysis. J Pediatr Orthop 1989;9:653-659.

5. Present problem of SCFE in Japan

The theme discussed now are the timing of removal of the pin and screw used for fixation (in situ) and indication of prophylactic fixation (in situ) for contralateral hip.