



Diagnosis: ?

Diagnosis: OSTEOARTHRITIS AFTER SUFE

Many studies seemed to confirm the original hypothesis that many cases of OA of the hip, which were previously considered “primary” or “idiopathic” were in fact caused by the minor developmental deformities that were previously unrecognized or ignored [cases of Mild SUFE].... J Bone Joint Surg Br. 1976;58:176–183.

IS IN SITU FIXATION PREVENTS DEVELOPMENT OF OSTEOARTHRITIS

Gold standard of management of SUFE is in situ fixation with a single screw as it gives low incidence of AVN. The long-term results of in situ pinning after a stable SCFE have been previously reported and are generally considered to be good or excellent, thus this is still considered the current standard of care for this condition.

However, it did suggest that even a mild degree of deformity commonly occurring after a minimal slipped capital femoral epiphysis (SCFE) was related to the later development of OA. In a recent study of in situ fixation for low grade SUFE: Almost **80% of our patients** presented clinical and radiographic signs of FAI [**J Pediatr Orthop 2013; 33:S76–S82**]. The direct relationship between having FAI and developing OA was clear in our results. All of the patients had some degree of OA on radiographic examination; the grade of OA did not always correlate with the clinical symptoms, with only 13% undergoing a total hip replacement and only another 9% undergoing a hip fusion,

There remains significant debate regarding optimal management of SCFE due to the increased risk of osteoarthritis and gait disturbance, and limited range of motion in hips treated with in situ pinning versus the increased risk of avascular necrosis with more complex reconstruction to correct the deformity.

The occurrence of FAI (or a pistol grip deformity) after even a low-grade slip is common. Clinical and radiographic signs of FAI in most of patients, and also found that the degree of deformity is directly related to the presence of OA in early adulthood.[J Pediatr Orthop 2013;33:S76–S82]

More recent studies [J Pediatr Orthop. 2012;32:125–130.] have further elucidated the risk for poor outcome after in situ SCFE fixation. They presented 176 hips treated with in situ fixation for SCFE with a mean 16-year follow-up. They showed that despite a mean Harris Hip Score of 90, **12%** of hips had undergone reconstructive surgery (total hip arthroplasty, osteotomy, or osteoplasty) and an additional **33%** were persistently painful. Although in situ fixation provides short-term symptomatic relief and relatively low rates of avascular necrosis in comparison with traditional osteotomy techniques, these hips remain at a high risk for early and persistent pain and degeneration.

PATHOGENESIS

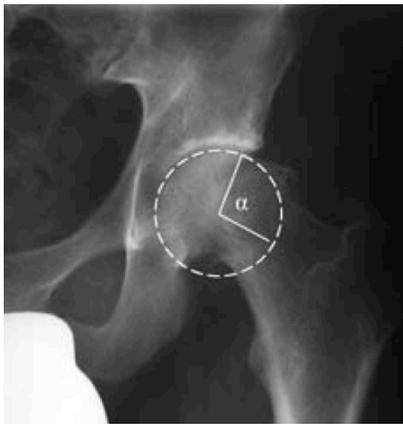
It has been proposed that minor morphologic abnormalities of the hip joint causing repetitive abutment of the femoral head-neck junction against the anterior rim of the acetabulum during flexion of the hip lead to labrochondral damage and ultimately to

early degeneration of the joint; in these cases early surgical intervention has been recommended.[J Am Acad Orthop Surg. 2007;15:561–570.]

Leunig [Acta Orthop Scand. 2000;71:370–375.] observed direct mechanical damage to the labrum and the peripheral acetabular cartilage from the prominent anterior femoral metaphysis upon direct intraoperative examination of 13 children with SCFE.

Ganz who questioned whether all patients with morphologic abnormalities indicative of FAI would necessarily develop OA, and argued against treatment in asymptomatic patients.[J Bone Joint Surg [Br]. 1953;35-B:598–626.]

ASSESSMENT OF DEFORMITY



Angle ACB =
alpha angle of

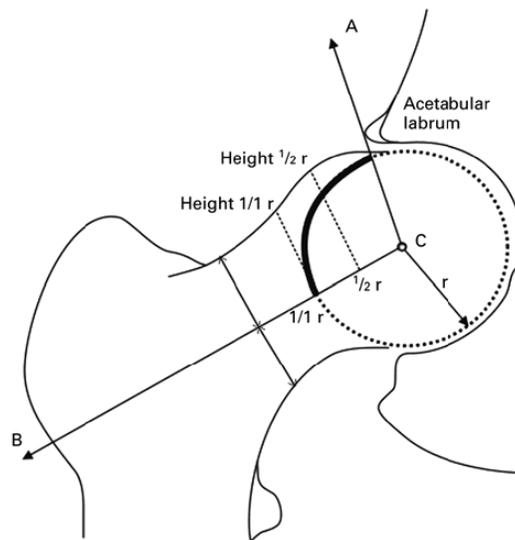


FIGURE 1. Diagram showing the α angle of Nötzli and colleagues (ΔACB) modified to the anteroposterior plane. The A-axis marks the lateral departure of the radius (r) of the femoral head. The B-C-axis is the longitudinal mid-axis of the femoral neck and is the radius of the normal femoral head.

A larger angle corresponds to diminished concavity at the junction implying a CAM type lesion. In the original paper by Notzli and colleagues, they found that the α angle measured a mean of 42 degrees in the control group compared with 74 degrees in the cohort with impingement.

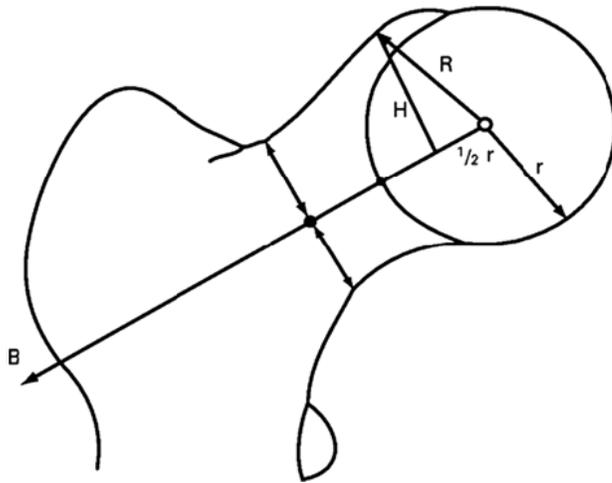


FIGURE 2. Diagram showing the triangular index for assessment of the asphericity of the femoral head and hump malformation. The radius (r) of the femoral head is measured. Then $1/2r$ and the corresponding perpendicular height (H) to the cortex are measured. The pathologically increased radius (R) is found by applying the Pythagorean law for triangular figures ($a^2+b^2=c^2$). If $R \geq r+2$ mm on a radiograph, with 1.2 magnification, asphericity is demonstrated for all practical purposes.

Normal: Alpha angle is 42 angles

SUFE: The mean angle on the AP radiographs was 86° in the affected and 62° in the unaffected side. The mean angle on the AP radiographs was 86° in the affected and 62° in the unaffected side. [VOL. 89-B, No. 12, DECEMBER 2007].

Besides a growth abnormality of the capital femoral epiphysis, subclinical and clinical SCFE are discussed as one possible cause for a reduced or absent head-neck ratio.

CAN WE ALTER THE NATURAL HISTORY OF OSTEOARTHRITIS AFTER SCFE WITH EARLY REALIGNMENT? *J Pediatr Orthop.* 2013 Jul-Aug;33 Suppl 1:S83-7

In situ fixation has been the gold standard for the treatment of slipped capital femoral epiphysis for some time. This technique has been popular despite obligate residual proximal femoral deformity due to the increased risk for catastrophic avascular necrosis of the femoral head with closed manipulation and historical open reduction techniques. As the body of evidence regarding long-term outcome has grown, it has become evident that **early osteoarthritis is common after in situ or conservative treatment** because of femoroacetabular impingement of the deformed femoral neck on the acetabular rim.

New techniques have been developed that show promise in preventing the early onset of osteoarthritis while minimizing the risk of avascular necrosis with early realignment of the proximal femoral anatomy and elimination of femoroacetabular impingement.

Southwick osteotomy: Traditional intertrochanteric osteotomy for SCFE, even in the absence of avascular necrosis, leaves the patient with significant proximal femoral deformity that can preclude the use of a standard primary hip arthroplasty stem. Coppola et al³¹ demonstrated 36% incidence of osteoarthritis in patients undergoing the Southwick osteotomy. [Acta Orthop Traumatol Turc. 2008;42:358–364.]

NEW TECHNIQUES:

1. Mild to Moderate slip: The surgical dislocation approach developed and popularized by Ganz is becoming the workhorse for both acute and delayed correction due to a decreased risk of avascular necrosis. Surgical dislocation and osteoplasty can also be combined with intertrochanteric valgus/flexion osteotomy
2. Mild: Single screw fix + arthroscopic osteoplasty
3. For moderate and severe SCFE, the surgical dislocation approach has been used with a modified Dunn osteotomy to allow for anatomic restoration of proximal femoral anatomy [Needs training and has not been recommended for slips with closed physes.]
4. Deformity with closed physis [Surgical dislocation and osteoplasty can also be combined with intertrochanteric valgus/flexion osteotomy]



Although biomechanically the anatomic restoration of proximal femoral alignment

should result in lower rates of early osteoarthritis and debilitating hip pain, it will take some time to fully elucidate the value of early proximal femoral realignment in this patient population.

REFERENCES

1. J Pediatr Orthop. 2013 Jul-Aug;33 Suppl 1:S76-82.
2. J Pediatr Orthop. 2012;32:125–130
3. JBJS. 89-B, No. 12, DECEMBER 2007
4. Clin Orthop Relat Res (2013) 471:2124–2131. Effects of unpinned hip [155 of chances of displacement]