Slip of the capital (upper) femoral epiphysis (SCF

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The physis connects the proximal femoral epiphysis (the femoral head) to the metaphysis (femoral neck). In certain physiological or pathological conditions a ‘stress fracture’ through the physis allows the epiphysis to displace as it would with an intracap - sular femoral neck fracture, so the leg lies short and externally /uni25CF /uni25CF /uni25CF /uni25CF rotated. There is painful limitation of hip movement. Hilton’s law , which states that a joint is supplied by the same nerves as the muscles that move the joint, explains why many children present with knee pain although the pathology is in the hip. Incidence and aetiology SCFE is rare, with an incidence of approximately 5 per 100 /uni00A0 000 population. Boys are a ff ected most commonly . The peak incidence is related to the start of puberty and hence is earlier in girls. As a result of hormonally stimulated growth, the strength of the physis, its resistance to shear and its orien tation are reduced. The hip is therefore ‘at risk’ and normal forces, exacerbated by obesity and repetitive minor trauma, precipitate a slip. Other conditions such as hypothyroidism, renal failur e and previous radiotherapy treatment (local or to the pituitary) also increase the risk. Diagnosis The diagnosis is suggested by the history and examination and confirmed on plain radiographs (Figure 44.22). Displacement is often more obvious on a lateral view and the diagnosis can be missed if only the anteroposterior radiograph is checked. Classification A SCFE can be classified according to three parameters: timing, severity and stability . The onset of symptoms divides slips into those that are acute, chronic or acute on chronic. Slip severity is assessed on the lateral radiograph in terms of percentage uncovering of the metaphysis (Table 44.8) or by measuring John Hilton , 1805–1878, surgeon, Guy’s Hospital, London, UK. Wayne O Southwick , 1923–2016, American surgeon and academic, first chairman of the Department of Orthopaedics and Rehabilitation, Yale University , New Hav en, CT , USA, from 1958 to 1979. Randall Loder , contemporary , Professor of Orthopaedic Surgery , Philadelphia, PA, USA. the slip angle of Southwick (Figure 44.23). An unstable slip is defined by Loder as one in which the patient cannot bear weight on the limb. -

Timing Type of procedure Comments Early Femoral osteotomy Varus and derotation Consider an opening wedge osteotomy to maintain length Innominate osteotomy Shelf acetabuloplasty Intermediate Arthrodiastasis Hinged distraction to allow movement, primarily /f_l exion/extension Late Femoral osteotomy Valgus With extension to undo a /f_i xed /f_l exion deformity or /f_l exion to remove the anterior bump from impinging on the acetabulum Arthrotomy To remove osteochondral fragments Head–neck osteoplasty After physeal closure Trochanteric epiphysiodesis or Epiphysiodesis not effective after age 7–8 To improve lever arm function distal transfer years Contralateral limb Distal femoral epiphysiodesis Aim To cover (‘contain’) the vulnerable femoral head To reduce deforming pressures on the femoral head To improve joint congruity and hence function; to improve joint mechanics To improve head shape by reducing femoroacetabular

impingement and increasing head/neck offset To reduce leg length discrepancy and effects on hip joint mechanics Figure 44.22 Anteroposterior pelvic radiograph demonstrating a mild slip of the upper (capital) femoral epiphysis on the left side. A line drawn along the upper margin of the femoral neck should transect the femoral head (right side); if it does not do so (left side) a slip is present. There are many other radiographic features that help to con /f_i rm the diagnosis but the changes are often subtle and may be seen /f_i rst on the frog lateral view.

Management Following an acute episode the patient is often unable to weight bear and the slip is considered to be unstable . Displacement is often moderate or severe. This situation is equivalent to a displaced intracapsular femoral neck fracture. This means that an acute unstable SCFE is an emergency . The A VN risk is considerable (Figure 44.24). With the reduction in muscle spasm that accompanies a general anaesthetic, a gentle repositioning of the femoral epiphysis occurs as the externally rotated limb is lifted into the neutral position using no force. A capsulotomy reduces the tamponade e ff ect on the epiphyseal vessels. T o be e ff ective such treatment should take place within 24 hours of injury . If delayed, the A VN rate may increase. With chronic slips the patient is able to weight bear, albeit with pain, and the slip is stable. Screw or pin fixation relieves pain and movement improves but there will be per manent reduction in abduction, flexion and internal rotation (Figure 44.25). The leg will be slightly short. In the chronic severe slip it may be impossible to place a screw in a satisfactory position centrally within the epiph ysis. Once healed, there may be significant, persistent defor mity leading to restriction of joint movement. In these cases a realignment osteotomy may be considered. As with all osteo tomies, the closer the correction is to the site of deformity , the better the outcome. However, in this situation the centr of rotation of angulation (CORA) for the deformity is at the of the physis; the risk of A VN or chondrolysis may be level unacceptably high with an osteotomy at this level, and so an intertrochanteric osteotomy could be considered. The slipped epiphysis is associated with a ‘cam’ type of femoroacetabular in situ - - - - e impingement and this may require treatment with a head–neck osteoplasty to restore the o ff set between the head and neck. Bilateral slips do occur and prophylactic pinning of the normal but ‘at-risk’ hip may be indicated.

Normal a b c 12° TABLE 44.8 Grading of the severity of slip of the capital femoral epiphysis. Slip severity Metaphysis uncovered (%) Mild <33 Moderate 33–66 Severe

> “ 66 SCFE b a 40° Figure 44.23 The Southwick slip angle c is measured on a lateral radiograph and denotes how far the epiphysis has slipped off the metaphysis. The value on the normal side must be subtracted from the value on the abnormal side to get the true value. SCFE, slip of the capital femoral epiphysis. (a) (b) Figure 44.24 Anteroposterior pelvic radiograph showing a left-sided acute severe unstable slip of the capital femoral epiphysis: (a) at presentation; (b) following partial repositioning and /f_i xation with a cannulated screw. When this heals, because of the incomplete reduc

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Summary box 44.10 Slip of the upper (capital) femoral epiphysis /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

Figure 44.25 Anteroposterior radiograph showing screw /f_i xation in situ of a case of bilateral chronic slip of the capital femoral epiphysis. Note the position of the screw: the more severe the slip, the more proximal and more anterior the screw entry point must be on the femoral neck. Occurs in prepubertal children, boys more commonly than girls Often presents with knee pain, and a short and externally rotated leg Classi /f_i cation systems relate to timing, severity and stability – all affect the prognosis Most slips are pinned in situ with a single screw into the centre of the epiphysis AVN is a feared complication of both the condition and its treatment

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Summary box 44.10 Slip of the upper (capital) femoral epiphysis /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

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