Report of Breakout Session

Slipped Capital Femoral Epiphysis Management 2011

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Where Are We Now?

Currently, the best management of the hip with slipped capital femoral epiphysis (SCFE) seems to depend on several variables, including whether the physis is open or closed, the mechanical stability of the slip, the degree of deformity and associated femoroacetabular impingement (FAI), and the experience of the treating orthopaedist with various surgical options, including anterior and surgical dislocation approaches for open reduction and osteoplasty.

The goal of treatment is durable normal hip function, considering potential risks (particularly of avascular necrosis of bone [AVN]) and benefits at each stage in treatment. Basic concerns have included circulation to the epiphysis, mechanical stability of the physis, and the degree and type of immediate and anticipated FAI.

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Most long-term (> 20–30 years' followup) series [1, 2, 6] have reported adequate hip function in most treated patients unless deformity was severe or complications of treatment occurred. Trends to slow loss of function have been reported for most patients [1, 2, 6].

Evaluation should include history, physical examination, and imaging. Bilaterality has been common (up to 50% in some series) and may impact treatment decisions. Physical examination should consider gait, hip motion, and pain caused by various maneuvers. Inability to walk has suggested mechanical instability of the physis, important because of the risk of AVN. Evaluation of passive hip ROM should note amount of internal rotation in 90° of flexion, with 10° or less of internal rotation suggesting anterior impingement. Imaging should include an AP pelvis radiograph showing both hips to below the greater trochanters. Some additional lateral projection of the proximal femur may also be needed. A 45° Dunn or true lateral view may be performed, rather than a frog lateral view, if mechanical instability is suspected. Parameters to measure include the tilt of the epiphysis (slip angle), the translation index of the epiphysis on the neck, and the alpha angle [8]. The degree of actual deformity is often more than is projected on routine views since the deformity is often underestimated on two views. In certain cases, CT scan or radial sequence MRI has offered the advantages of precise evaluation of deformity, though they should not delay treatment in an urgent situation. MRI has also allowed assessment of head circulation [10].

Every hip with SCFE deformity likely functions with some degree of FAI. Even the slightest metaphyseal prominence may be injurious to anterior acetabular cartilage and rim, perhaps aggravated by the commonly associated femoral and acetabular retroversion and deep socket. Some

articular cartilage damage is likely present in every hip after SCFE. Long-term studies [2, 3, 6, 9] demonstrate a relation between degree of deformity and risk of osteoarthritis (OA), most suggesting at least satisfactory function in most patients for decades.

Unstable SCFE requires urgent stabilization because femoral head circulation is at risk in these hips. While clinical instability preventing ambulation is not perfectly specific or sensitive for intraoperatively noted mechanical instability, it is a guide. Since all slips likely have posterior new bone on the neck, complete anatomic reduction by manipulation is risky for slips of any degree of stability. The best safe control of the blood supply during reduction has been by the surgical dislocation approach, which permits development of an extended retinacular flap and direct visualization and removal of callus on the posterior neck and other obstacles to anatomic reduction without tension on the blood supply [4, 5, 7, 11]. Intraarticular hematoma may also be removed. The anterior approach also allows decompression of hematoma and direct anterior visualization of the physis, as well as straightforward reduction to the point of chronic slip, but no direct visualization of the posterior callus.

Any slip in which acute symptoms occur may have a hematoma, and decompression by needle or arthrotomy should be considered if a closed reduction method is chosen.

Achieving mechanical stability safely has been the primary goal of SCFE treatment. After physeal stability is assured, the amount of residual deformity is a major determinant of long-term function. While major deformity has been tolerated well in some patients, minimizing postslip deformity should be a consideration in treatment while factoring in the risk of various interventions.

If no experience with open reduction methods is acutely available, acute stabilization of the unstable slip may be performed in conjunction with the safest possible reduction method. Evaluation of the hip after stabilization should be performed within a few weeks by a center with experience in realignment of SCFE deformity and transfer for further care arranged if appropriate.

Mild stable deformity with a slip angle up to perhaps 30° may not justify realignment treatment by osteotomy or acute reduction, although osteoplasty of the anterior metaphyseal prominence by open anterior arthrotomy or arthroscopy after physeal stabilization is an option.

More severe deformity may benefit from realignment of the femoral head to improve motion, reduce FAI, and delay onset of OA, provided no complications occur from the realignment. Options for realignment include modified Dunn osteotomy [7, 11] through the physis and flexion intertrochanteric osteotomy (ITO), with or without simultaneous resection of the metaphyseal prominence. Even if

SCFE is treated by pinning, with severe deformity not well treated by ITO, the open physis can be mobilized and modified Dunn-type osteotomy achieved by experienced surgeons but with more risk of AVN than intertrochanteric realignment. If the physis is closed, then osteotomy through the physis is risky to the retinacular vessels. In this situation, either distal neck osteotomy or ITO may be performed if enough deformity remains to suggest realignment.

Open approaches have allowed assessment and treatment of associated deformity, including not only the ubiquitous anterior metaphyseal prominence, which damages the rim and labrum, but in certain cases overcoverage. Treatment of damage to the labrum and anterior acetabular cartilage has been performed, but no long-term reports allow comment on the therapeutic effect of these measures.

Prophylactic stabilization of the contralateral hip has been controversial, but it probably has a limited indication. Certain patients with unilateral SCFE who are at high risk for subsequent contralateral slip (young patients with wide-open triradiate cartilage at time of first SCFE, endocrine abnormalities) should be considered for such prophylactic treatment.

Minimizing the risk of development of physeal instability and severe deformity by early diagnosis of SCFE is important and potentially achievable since both unstable SCFE and severe stable deformity almost always have been associated with weeks to months of symptoms, limp, or both.

Any patient with suggestive signs and symptoms should have prompt bilateral hip imaging. Treatment at the stage of minimal to no deformity is highly desirable and likely to give a high proportion of satisfactory outcomes with low-risk interventions.

Where Do We Need to Go?

Long-term prospective studies, employing both contemporary treatment methods and contemporary outcome measures, are needed to allow improved treatment selection and results for future patients with SCFE. These studies need not be randomized to be useful.

How Do We Get There?

To achieve the best possible outcomes for patients with SCFE, all healthcare providers must be aware of the earliest signs and symptoms in affected patients so that appropriate imaging may allow the diagnosis to be made and treatment instituted before physeal instability or the development of severe deformity. Improved training in methods of effective intraarticular surgery is essential to

allow specialized hip surgeons to deal with the cases of severe deformity. Progress in combating the epidemic of obesity may provide an equally important opportunity to reduce the risk of SCFE in the adolescent population at risk.

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