

Familial slipped capital femoral epiphysis

In 50 consecutive cases of slipped capital femoral epiphysis (SCFE) from 49 families, the heredity was analyzed by radiographic examination of the first-degree relatives and by interview regarding the second-degree relatives. In four of the 49 families, SCFE was obvious in one or more first-degree relatives; and in another 13 families (14 relatives), radiographic signs of SCFE were found besides the primary case.

The familial accumulation was much higher than expected from incidence studies, indicating a hereditary factor in the etiology.

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Several case reports (Fittig 1909, Schreiber & Schmied 1968, Ochsner et al. 1977) and some investigations (Jerre 1950, Wilson et al. 1965, Rennie 1982) have pointed out that there is probably a hereditary factor involved in the etiology of slipped capital femoral epiphysis (SCFE). Because many slippings are asymptomatic (Hägglund et al. 1986), at least until middle life, the true frequency of SCFE must be based on radiographic examination. In a material of SCFE, we analyzed the heredity by radiographic examination of the first-degree relatives and by interview with the second-degree relatives.

Patients and methods

In 50 consecutive cases (32 males, 18 females) of SCFE treated at the Department of Orthopedics in Lund from 1972 through 1982, the families were interviewed regarding hip disorders or symptoms. Further, parents and siblings were asked if they would be willing to undergo a radiographic examination. The series contained 2 sisters with SCFE; thus, 49 families were investigated.

Forty-five mothers and 44 fathers were examined radiographically; 3 mothers and 3 fathers were interviewed; 1 mother and 1 father had died; and 1 father could not be traced.

Besides the 2 sisters with SCFE in the series, there were 37 brothers and 29 sisters above adolescent age. Of these, 34 brothers and 28 sisters were examined radiographically, whereas the remaining ones

were interviewed. Finally, 4 half brothers and 3 half sisters without hip symptoms were not included in the material.

At the radiographic examination, anteroposterior and Lauenstein projections were used. Evidence of slipping was searched for using the relation between the femoral head and the calcar femorale (Ordeberg 1986); a position of the center of the femoral head >3 SD below its normal position was regarded as diagnostic.

Results

In three families a first-degree relative had been treated for SCFE (the 2 sisters in the series, 1 father, and 1 brother), whereas in four families there was a treated second-degree relative. In one family both a first- and a second-degree relative were treated for SCFE (Hägglund & Hansson 1986).

At the radiographic examination, a bilateral moderate slipping was found in the father of the 2 sisters treated for SCFE (Table 1). In another 5 fathers, 7 mothers, and 2 sisters, both the radiographic appearance and the femoral head/calcar relation was suspect of SCFE. In all of these hips, the femoral head/calcar relations was >3 SD below normal; i.e. the femoral head was displaced dorsomedially >3 SD from its predicted position.

Of the remaining 133 examined relatives, the radiographic appearance and the femoral

Table 1. Radiographic findings in first-degree relatives of patients with slipped capital femoral epiphysis (SCFE)

Conventional evaluation Relation femoral head-calcular femorale	Not examined	Normal	Suspected SCFE	SCFE	Total
	Not examined	<3 SD ^a	>3 SD SCFE		
Fathers	5	37	5	2(+1) ^b	49
Mothers	4	38	7		49
Brothers	3	33		1	37
Sisters	1	25	2	1	29
Total	13	133	14	4(+1) ^b	164

a. Including 38 hips without a distinctly visualized calcular femorale.

b. One family with SCFE in 2 sisters and their father.

head/calcular relationship were normal. However, three hips showed arthrosis, but without signs of slipping. In 38 hips the calcular femorale was not distinctly visualized. None of these were classified as SCFE.

Totally, there was an obvious additional case of SCFE in at least one first-degree relative in four of the 49 families with a primary case of SCFE. When second-degree relatives were included, there were 2 cases or more of SCFE in seven families. Upon inclusion of the suspect hips, 17 families had 2 or more members with evidence of SCFE. Finally, 9 of the index cases were boys and 8 were girls.

In 10 families there was a second-degree relative with radiographically verified coxarthrosis, besides the 4 cases treated for SCFE. Because Lauenstein projections were not available in these cases, they could not be analyzed regarding underlying SCFE.

Discussion

In 1909, Fittig described 2 twins with bilateral slipping. Since then, several case reports describing families with an accumulation of SCFE have been published (Schreiber & Schmied 1968, Ochsner et al. 1977). Both Jerre (1950), in his report on 166 cases of SCFE in southern Sweden, and Wilson (1965), among 240 cases in New York, found SCFE in 5 per cent of close relatives. Rennie (1982), in his material from Scotland, found 15 per cent SCFE in relatives. Among 306 reexamined SCFE cases in southern Sweden between 1910 and 1964 (Häggglund et al. 1984), 6 per cent

were known to have a relative with SCFE; the material included 2 monozygotic twins with respectively right- and left-sided slipping.

The above-mentioned investigations were all based on questionnaires and clinical reports. Because many slippings are asymptomatic (Häggglund et al. 1987), these figures do not include the total number of slippings among relatives.

In this investigation of the 49 families, six families had 2 members or more that were known to have SCFE before the radiographic examination, corresponding to the earlier presented results. The radiographic examination, however, revealed signs of slipping in an additional 11 families, indicating an accumulation of SCFE in about one third of the families.

The incidence of SCFE in southern Sweden is about 3-6/10,000 living born (Häggglund et al. 1984). This value denotes the number of SCFE diagnosed during adolescence. The true incidence requires radiographic examination of the population. However, the number of SCFE diagnosed during adolescence among first-degree relatives in the present material (3/164) was higher ($P < 0.001$) than expected from the incidence study.

The incidence of SCFE is higher in males than in females (Wilson et al. 1965, Kelsey et al. 1970, Häggglund et al. 1984). There is also a racial/geographic difference, with a higher incidence in blacks as compared with whites (Kelsey et al. 1970), and a lower incidence in Japan than in Sweden or in the United States (Ninomiya et al. 1976).

In southern Sweden there has been a periodic incidence pattern with peaks about

every 20th year (Hägglund et al. 1984). There is also, at least in girls, a seasonal variation with a higher incidence during spring and summer (Andrén & Borgström 1958, Hägglund et al. 1984).

Our observations suggest the need for increased awareness of hip symptoms among adolescent relatives of patients with SCFE because an early diagnosis is essential for a favorable prognosis.

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