

Patellofemoral incongruence in chondromalacia and instability of the patella

We measured the patellofemoral congruence in tangential radiographic projections according to Merchant in 64 patients with unilateral patellar pain. The congruence angle was usually within normal limits. However, compared with the asymptomatic side, the angle was increased in chondromalacia and instability of the patella. A comparison of congruence angles of the two knees seems more valuable than a comparison with normal values.

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Patellofemoral incongruence is a frequent finding in patellar instability (Hughston 1968, Aglietti et al. 1983), and has also been implicated as a cause of chondromalacia patellae (Heywood 1961, Marks & Bentley 1978), as well as a cause of pain in the "patellar pain syndrome" (Hughston 1968, Insall et al. 1983). Conversely, it is well known that patellofemoral incongruence may be asymptomatic (Merchant et al. 1974, Laurin et al. 1979). Conventional radiographic tangential views are frequently almost identical. However, it is tempting to speculate that even small deviations from congruence may be sufficient to cause symptoms.

We measured the patellofemoral congruence of both knees in patients with unilateral patellar pain. Among the many radiographic techniques (Hughston 1968, Merchant et al. 1974, Ficat & Hungerford 1977, Laurin et al. 1978), we found that the Merchant view was suitable for such a comparison, as this view allows a numeric value to the congruence.

Patients and methods

Sixty-four patients (24 men and 40 women) with unilateral symptoms of chondromalacia or instability of the patella and without arthrosis were studied. The mean age was 23 (18-35) years.

Tangential projections of both knees were obtained simultaneously according to Merchant et al. (1974) (Figure 1).

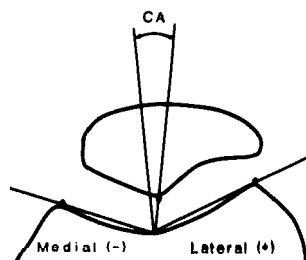


Figure 1. The congruence angle (CA) is the angle between the line bisecting the sulcus angle and the line connecting the apex of the sulcus to the lowest part of the patellar ridge (Merchant et al. 1974).

The diagnosis was chondromalacia patellae in 39 cases and recurrent subluxation in 25. The diagnosis chondromalacia was based on the "patellar pain syndrome" (Devas 1960, Bentley 1971, Insall et al. 1976, Ficat & Hungerford 1977), and the diagnosis of subluxation of the patella was based on the history and findings of patellar instability (McKeever 1954, Hughston 1968, Ficat & Hungerford 1977). Arthroscopy was performed in all knees and revealed different degrees of cartilage fibrillation at the patellar articulation, whereas the tibiofemoral compartments were normal in all patients.

The results were evaluated by a paired *t* test or Mann-Whitney *u* test.

Results

The congruence angle was increased on the affected side as compared with the nonsymptomatic side ($P < 0.001$, *t* test). This was true for both chondromalacia and instability of the patella with the same degree of significance (Table 1).

Table 1. The mean [S.D.] (range) congruence angles (degrees) in patients with subluxation of the patella and chondromalacia patellae

	Symptomatic	Nonsymptomatic
Subluxation (N=25)	+6 [12] (-16 - +32)	-2 [13] (-25 - +25)
Chondromalacia (N=39)	-4 [11] (-25 - +20)	-9 [14] (-37 - +19)
Total (N=64)	-1 [13] (-25 - +32)	-6 [13] (-37 - +25)

The mean congruence angle in patients with patellar instability was increased as compared with that of patients with chondromalacia, both on the symptomatic ($P < 0.001$, u test) and the nonsymptomatic side ($P = 0.05$, u test).

Five knees on the affected side in the group with instability had congruence angles greater than 16 degrees, whereas 15 knees had angles greater than 4 degrees. In the chondromalacia group, two patients had angles greater than 16 degrees and nine patients, greater than 4 degrees on the affected side.

The difference at the upper limit of the 95 per cent confidence interval between the symptomatic and the nonsymptomatic side of the total group was 5 degrees.

Discussion

Our study confirms that the clinical symptoms of patellar instability are associated with a radiographic patellofemoral incongruence (Hughston 1968, Aglietti et al. 1983). However, also the congruence angle of the asymptomatic side in this group was increased as compared with the group with chondromalacia (Laurin et al. 1979, Aglietti et al. 1983), but to a lesser degree than on the symptomatic side.

Lancourt & Cristini (1975), Insall et al. (1976, 1983) and Laurin et al. (1979) considered "idiopathic" chondromalacia and subluxation of the patella to be caused by the same functional imbalance. Our results indicate such a relationship, and also Aglietti et al. (1983) reported a mild patellofemoral incongruence in patients with chondromalacia patellae.

Merchant et al. (1974) stated, that a congruence angle greater than 16 degrees was abnormal. In a group of 150 normal knees Aglietti et al. (1983) found that the upper limit of the 95 per cent confidence interval was 4 degrees. For practical use, Insall et al. (1983) have proposed that a congruence angle greater than 0 degrees should be the upper limit of normality. Using the Merchant criteria for subluxation, only five knees with clinical symptoms of patellar instability could be classified as radiographic subluxation. A similar figure has been reported by Bentley & Dowd (1983). Merchant's values for patellofemoral congruence are probably too wide for clinical application. And our observations indicate that in patients with unilateral symptoms a comparison with the nonsymptomatic knee is more valuable than a comparison with normal values because even minor patellofemoral incongruence within the normal limits were found to be associated with definite clinical symptoms.

Our results also support the statement of Insall et al. (1983) that patellar tracking abnormalities are the major cause of patellar pain.

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