Bilateral synovitis in symptomatic unilateral transient synovitis of the hip

An ultrasonographic study in 56 children

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56 children with a clinical diagnosis of unilateral transient synovitis of the hip underwent bilateral sonographic assessment. On the anterior scan, the distance between the femoral neck and the fibrous joint capsule was measured. This distance, which we call the synovial capsular complex distance, was compared with age-dependent normal values. An increased distance was found in all 56 symptomatic hips (mean 10 mm, SD 1.8). This distance was also increased in 14 hips on the contralateral side (mean 8 mm, SD 1.6). An effusion was demonstrated in 53 symptomatic hips and in 8 hips on the contralateral side. These findings indicate that in one quarter of children with symptoms of unilateral transient synovitis the contralateral hip may have an increased synovial capsular complex distance due to synovial swelling or joint effusion, suggesting an asymptomatic synovitis. We therefore recommend a comparison of the synovial capsular complex distance on the symptomatic side with age-related normal values, in addition to a comparison with the asymptomatic hip.

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Ultrasonography is the best method for the imaging of a hip joint effusion (Seltzer et al. 1980, Jäppinen et al. 1984, Wilson et al. 1984, Wingstrand and Egund 1984, Kallio et al. 1985). The assessment is usually based on direct visualization of the joint effusion or on a comparison with the contralateral asymptomatic hip, which has been regarded as normal (Kallio et al. 1985, Terjesen and Östhus 1991).

We assessed the incidence of bilateral synovitis in unilateral transient synovitis of the hip. We also examined the utility of comparing the ultrasonographic findings in the symptomatic hip with the asymptomatic hip for detecting abnormality.

Patients and methods

Consecutive children treated at the Women's and Children's Hospital, Adelaide, South Australia, from 1991 to 1994 with a diagnosis of unilateral transient synovitis of the hip, and who also underwent hip ultrasonography, were included in this retrospective study.

The study group comprised 56 children (20 girls, 36 boys) having an average age of 7.5 (2.8–14) years without any history of previous hip disease. 29 children were treated on an outpatient basis with bed rest and 27 children were admitted to hospital.

In all 56 children the diagnosis of transient synovitis was made clinically. Patients were followed until symptoms had resolved. The laboratory tests (erythrocytes, hemoglobin, thrombocytes, leucocytes, erythrocyte sedimentation rate and C-reactive protein) were normal in all patients. Radiographs of the pelvis and hips were obtained in all cases and showed no bony abnormality.

Ultrasound examination was performed, using a 5.0 MHz linear array or sector transducer (Advanced Technology Laboratories, Seattle, WA, USA, Ultramark 9 machine). The hip sonogram technique was standardized, with all patients examined in the supine position, with the hips placed in neutral rotation and as far extended as possible. Ultrasound scans of both hips were performed in a vertical plane, using an anterior approach along the axis of the femoral neck (Figure 1).

Qualitative assessment of the synovial capsular complex distance involved classification of the fibrous capsule configuration as concave, flattened or convex, relative to the concavity of the femoral neck. The presence of an effusion was recorded and the synovial capsular complex distance was measured. This

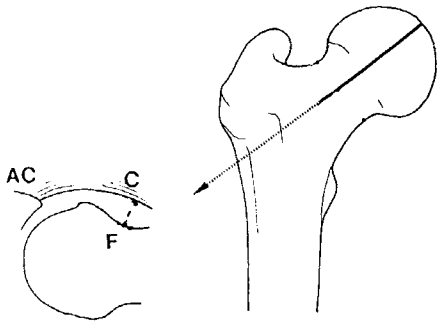

Figure 1. Standard ultrasonographic examination of the anterior region of the hip joint. The synovial capsular complex distance is measured between the leading point of the anterior joint capsule (C) and the anterior surface of the femoral neck (F) in the vertical plane of the longitudinal axis of the femoral neck. AC acetabular rim.

is defined as the distance between the posterior surface of the anterior fibrous joint capsule (iliofemoral ligament) and the anterior bony surface of the femoral neck. The synovial capsular complex comprises two layers of synovium separated by the potential space of the anterior recess of the hip joint and a layer of periosteum lying on the femoral neck (Figure 2). The distance was measured perpendicular to a tangent drawn at the point of maximal femoral neck concavity. Measurements were made using electronic calipers, measuring to within 0.1 mm.

Normal synovial capsular complex distance measurements have been established by Keenan et al. (1994). They scanned 130 hips of 65 patients, aged 1–16 years who underwent ultrasound studies for unrelated clinical problems, and had no sonographic abnormality. No patient in this control group had a history or clinical signs of hip disease and all were examined sonographically with the same method which was used in this study. A normal curve of synovial capsular complex distance was calculated, showing an age-related logarithmic curve (unbroken line in Figure 3). Results were related to this curve and the synovial capsular complex distance was considered abnormal if the value was more than two standard deviations above the age-dependent normal values.

Significance levels were calculated by the t-test.

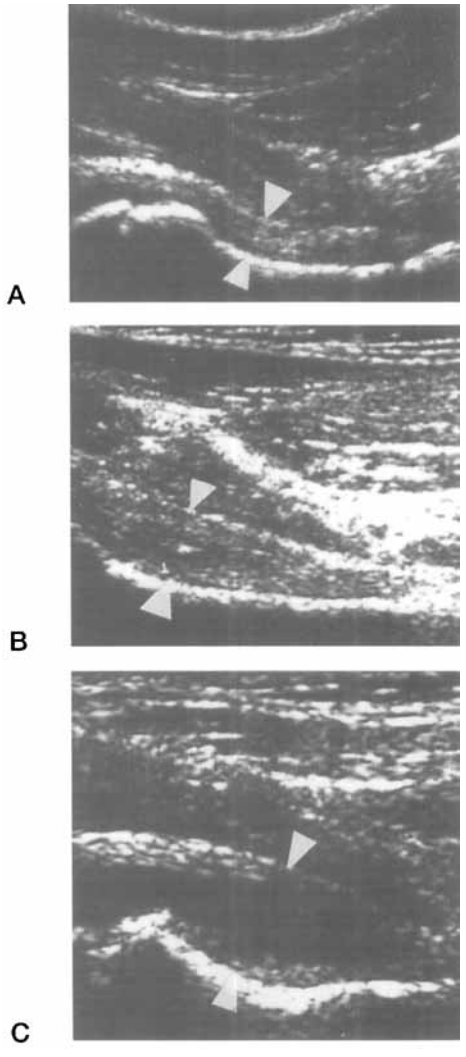

Figure 2. Ultrasonographic hip scans with arrowheads indicating the points used for measurements: A. normal (boy, 9 years, synovial capsular complex distance 6.0 mm), B. synovial swelling (girl, 8 years, distance 7.9 mm), and C. synovial swelling with effusion (boy, 4 years, distance 10.8 mm).

Results

In 56 children with unilateral symptomatic transient synovitis of the hip, symptoms involved the left hip in 37 patients and the right hip in 19. In the symptomatic hips the synovial capsular complex distance was abnormally increased in all 56 patients (mean 10 mm, *SD 1.8*) when compared with the age-related normal values, which in this age group had a mean of 5.3 *0.3* mm. A joint effusion was present in 53 hips. 3 children had synovial swelling, defined as a synovial capsular complex distance more than 2 SD above normal, without evidence of effusion.

In the 56 asymptomatic hips the mean synovial capsular complex distance was 6.0 *1.5* mm. The mean side difference was 4.0 *1.6* (0–6.8) mm. 47 patients had side differences equal to or greater than 2.0 mm. Of the 56 asymptomatic hips, 42 hips showed normal synovial capsular complex distances (5.4 *0.3* mm), but 14 children showed abnormal values (mean 8.1

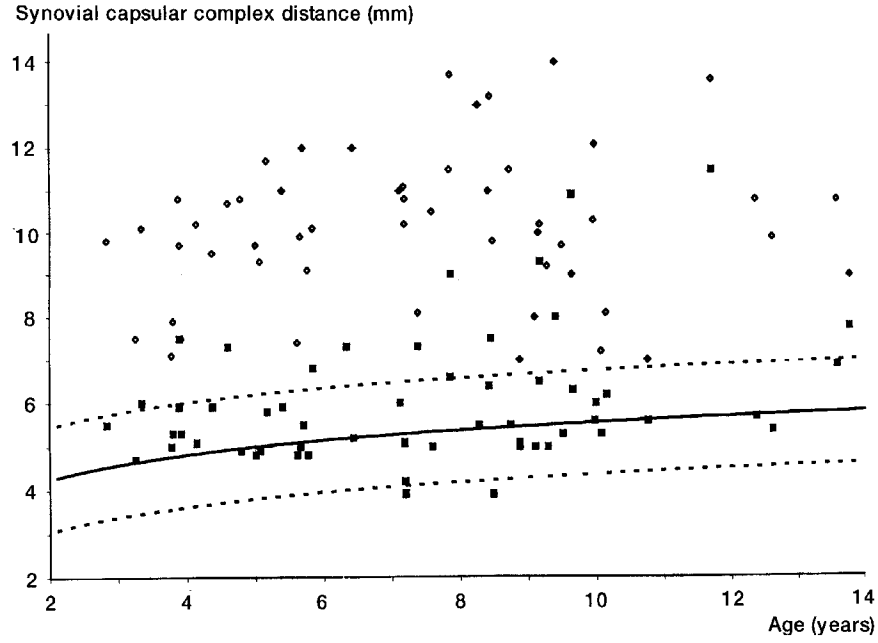

Figure 3. Synovial capsular complex distances in 56 patients. Diamonds represent the symptomatic hips, black squares represent the asymptomatic hips. The unbroken line represents mean values in normal hips (Keenan et al. 1994); the dotted lines indicate two SD above and below the mean.

1.6 mm). The distance was greater on the symptomatic side in 12 of these 14 patients (in 7 cases the side difference was equal to or greater than 2.0 mm) and in the remaining 2 the distances were equal. A joint effusion was found in 8 hips and 6 hips showed synovial swelling.

Discussion

To describe sonographic findings in transient synovitis of the hip we used, in common with Keenan et al. (1994), the term synovial capsular complex distance instead of anterior capsular distance. This has a similar meaning but is a more accurate description of what is actually measured. Historically, the assessment of transient synovitis has been based on the presence of a hip joint effusion, or a comparison with the contralateral asymptomatic hip (Kallio et al. 1985, Terjesen and Östhus 1991). It has been suggested that a difference in the synovial capsular complex distance between the 2 hips greater than 2 mm is abnormal (Kallio et al. 1985, Terjesen and Östhus 1991). Some investigators (Kallio et al. 1985, Futami et al. 1991) considered a synovial capsular complex distance above 6.0 mm to be abnormal, with no reference to age. The authors of all these studies regarded the asymptomatic contralateral hips as being normal. Despite this, Kallio et al. (1985) and Futami et al. (1991) mentioned that in their studies 7% and more than 8%, respectively, of the asymptomatic hips showed more than 6 mm synovial capsular complex distances. On the basis of the clinical assessment, simultaneous bilateral involvement has been reported by Haueisen et al. (1986) in 1% and by Adams (1963) in 4%. Kallio et al. (1985) found bilateral sonographic changes and evidence of effusion in 6% of the cases.

The basic pathology would suggest that, as in other inflammatory conditions, the milder forms of synovitis will be manifested as edema and swelling of the synovium. This was seen as a change in the contour of the hip joint capsule overlying the anterior recess of the hip joint and is demonstrated as an increase in the synovial capsular complex distance. An effusion becomes apparent in the more severe forms of synovitis and, in general, the severity of the hip restriction and pain relates to the degree of distension of the joint capsule (Kallio et al. 1985).

Keenan et al. (1994) recently confirmed the findings of Terjesen et al. (1991) who gave age-related sonographic normal values for the synovial capsular complex distance. In both studies, the mean age-related normal values plus 2 SD were found to be similar, showing a logarithmic curve.

In this study, sonography showed that the incidence of asymptomatic effusion in the contralateral hip was

8 out of 56 patients. Such a high rate has not been reported before, but the improved resolution of current ultrasound equipment and the aim of detecting effusions, especially in the asymptomatic hip, might explain the findings. The availability of age-related normal values for the synovial capsular complex distance (Terjesen et al. 1991, Keenan et al. 1994) has facilitated a very sensitive indicator for the presence of synovitis. We found altogether 14/56 contralateral asymptomatic hips with abnormally increased synovial capsular complex distances. Again, this high incidence has not been pointed out before, but was said to occur, although with a smaller incidence, by Kallio et al. (1985) and Futami et al. (1991). An interesting observation in Kallio's study was that at the 2-week follow-up sonography, the mean synovial capsular complex distance was decreased; not only on the symptomatic side which was highly significant, but also on the asymptomatic side. This would suggest the possibility of significant involvement of the asymptomatic hip in transient synovitis. A remarkable finding in our study was that 4 children had synovial capsular complex distances as great as 9–12 mm on the contralateral hip and still had no symptoms.

We conclude that sensitivity in the diagnosis of synovitis with ultrasound can be improved by comparing the synovial capsular complex distance on the symptomatic side with age-related normal values in addition to comparison with the asymptomatic hip.

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