ULTRASOUND MEASUREMENT OF FEMORAL ANTEVERSION

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In a recent article by Lausten, Jørgensen and Boesen (1989) anteversion (AV) of the femoral neck was measured directly, by ultrasound, and by computerised tomography (CT). The authors reported poor correlation between the angles measured by ultrasound and the two other methods, and concluded that ultrasound at present seemed unsuitable for the measurement of femoral anteversion. We believe that our findings and their own results (appropriately modified) show that ultrasound is in fact a suitable method.

Method and results. We have compared the results of ultrasound with those of biplanar radiography in 20 dry bones, using the Dunlap-Rippstein technique (Dunlap et al 1953; Rippstein 1955). The ultrasound technique was similar to that employed by Lausten, Jørgensen and Boesen (1989), as we also used real-time ultrasound, and measured the anterior tangent of the femoral head and the greater trochanter (head–trochanter tangent). We have already published these results (Anda et al 1988).

When determining femoral AV by ultrasound and radiography, different anatomical landmarks are used, and, thus, different angles are measured (Fig. 1). In order to find out whether the anterior head–trochanter tangent was a suitable reference line, we measured the angle between this line and the dorsal plane of the femoral condyles by radiography, and found good correlation between this angle and the same angle measured by ultrasound (r = 0.97). The mean discrepancy was 1.7° (range 0° to 5°), which indicated that the head–trochanter tangent measured by ultrasound was accurate within ± 5°. We also found that the correlation between the radiographic head–trochanter tangent and the AV angle was very high (r = 0.95), as was the correlation between the head–trochanter tangent by ultrasound and the AV angle by radiography (r = 0.95). However, the angle of the head-trochanter tangent was always greater than the AV angle, and the mean discrepancy was 8.7°. Consequently, femoral anteversion measured by ultrasound has to be adjusted by a correction factor in order to obtain an approximation to the real anteversion angle.

In a clinical study, comparing AV measurements by ultrasound and radiography in adolescents and adults, the mean discrepancy between the methods was 11.2° (Terjesen, Anda and Svenningsen 1990). This corresponds well with the results from dry bones; thus, 10° should be subtracted from the AV angle measured by ultrasound when using the head–trochanter tangent. In children, the correction factor is 5° (Terjesen and Anda 1987).

Discussion. The findings of Lausten et al (1989) compare well with ours as they, too, consistently found greater AV angles with the head–trochanter tangent than by direct measurements; their mean discrepancy was 9°. The correlation between their ultrasound and direct measurements (using the values in their Table II) was very high, in fact as high as that between CT and direct measurements (r = 0.88 and 0.91, respectively). However, they did not use any correction factor, and concluded that ultrasound was not suitable for AV measurements. But if 10° are subtracted from their ultrasound values the mean discrepancy between ultrasound and direct measurements is only 2.7° (range 0° to 8°), which corresponds well with our value of 2.3° (range 0° to 8°) (Anda et al 1988). Thus, both studies indicate that femoral anteversion is reliably measured by ultrasound.

With regard to the actual technique of ultrasound...
measurements, we recommend tilting the transducer instead of keeping it horizontal, especially when measuring large AV angles (Terjesen and Anda 1987). By tilting the transducer until the head–trochanter tangent is horizontal on the monitor screen, the greater trochanter is always clearly outlined, no matter how large the AV angle.

In conclusion, femoral anteversion measured by ultrasound seems to be a reliable technique. Since the patient is not subjected to any radiation, the method is recommended as the primary imaging technique in rotational disorders of the femur.

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REFERENCES


PLEURAL-SUBARACHNOID FISTULA DETECTED BY RADIONUCLIDE MYELOGRAPHY

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Only six patients with iatrogenic subarachnoid-pleural fistulas have, as far as we know, been reported; all occurred after resection of an upper lobe lung carcinoma (Schannon et al 1982). We report a case of iatrogenic cerebrospinal fluid (CSF) leak into the right hemithorax following anterior spinal cord decompression; conventional myelography failed to demonstrate the fistula, which was, however, revealed by radionuclide myeloscintigraphy.

Case report. A 75-year-old woman with a history of breast cancer was admitted with weakness, numbness, and increased reflexes in the legs; radiographs showed metastatic lesions of the spine. Since she had already received 40 Gy over an area which included the spine, surgical decompression and stabilisation was indicated.

Pre-operative myelography localised the compression to the anterior aspect of the upper thoracic spine (T3, T4, T5). The approach used for anterior decompression was similar to that described by Turner and Webb (1987); no dural leak was detected during the operation. The spine was stabilised with a plate and bone cement. An underwater seal drain was left in the pleural cavity.

Good neurological recovery followed but on the third day, after the drain was removed, there was a persistent pleural effusion; as she also complained of headache a pleural-subarachnoid fistula was suspected. The pleural effusion was aspirated but showed no CSF, only blood. The contrast myelogram showed no residual

Fig. 1