

Defining diagnostic thresholds for femoral head coverage in developmental dysplasia of the hip

Introduction: Although ultrasound is commonly used to diagnose developmental dysplasia of the hip (DDH), the femoral head coverage (FHC) parameters for 'normal', 'dysplastic' or 'subluxed/dislocated' hips remain poorly defined. This creates diagnostic confusion and impedes clear communication.

Method: Two routine hip screening datasets were used, containing 2032 paired alpha angle and FHC measurements from 1419 patients (age range 0.43-25.0 weeks, mean 7.83 weeks, 66.2% female). It included the following DDH severities (Graf1 971, G2 672, G3/4 389) and age groups (0-6 weeks 833, >6-12 875, >12-25 324). 1031/2032 (50.7%) retrospective scans were obtained in one hospital from 842 patients (age range 0.86-25.0 weeks, mean 9.24 weeks, 57.5% female) and underwent prospective re-measurement by expert clinicians. The remaining 1001 measurements from 577 patients (age range 0.43-22.42 weeks, mean 6.38 weeks, 80% female) were prospectively collected from four regional paediatric centres (including the UK Global Hip Dysplasia Registry). The temporal correlation between ultrasound methods and the 90th percentile for FHC in each Graf class was calculated.

Results: The overall correlation (ρ) between the methods in the datasets (combined/retrospective/prospective) was 0.73/0.79/0.75. By age groups in weeks (0-6/>6-12/>12-25), these values were 0.77/0.79/0.78, 0.68/0.78/0.71, 0.72/0.80/0.64, respectively. The 90th percentile value for FHC was 60% in Graf 2 and 35% in Graf 3/4.

Conclusions: There was a strong positive correlation between Graf alpha angle and FHC, which persisted across different age groups. In 9 out of 10 patients, FHC <35% would likely identify a subluxed/dislocated hip and >60% would be normal.