

Review of third trimester abdominal circumference (AC) measurements

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Aim: To pilot a method of peer-review for obstetric ultrasound.

Background:

Sonographers are aware of the need for peer-review as advocated by both the Royal College of Radiologists (RCR) and BMUS. Vigorous review processes are in place for nuchal translucency scans. Similar peer-review processes are not routine within other areas of obstetric ultrasound. To pilot obstetric peer-review we have chosen third trimester growth scans, and specifically AC measurements, due to the implementation of the "Saving Babies Lives" care bundle. This relies on serial third trimester growth scans to monitor pregnancies at risk of fetal growth restriction. AC measurements are the best predictor of fetal wellbeing. There is evidence to suggest that the two-diameter method of measurement is more reproducible than an ellipse.

Method:

22 growth scans were randomly selected. Nine sonographers blindly re-measured five AC images using the ellipse and two-diameter methods. Twelve sonographers were given a PowerPoint presentation of 22 measured AC images to assess independently against eight image criteria based on those from the Fetal Anomaly Screening Programme. The results were analysed before they were presented and discussed with the sonographers.



Fig 1a: two-diameter AC measurement



Fig 1b: original measured AC image

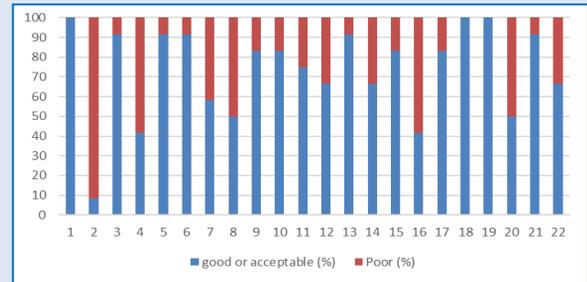


Fig 2: Overall AC image rating by 12 sonographers (%)

Results and Discussion:

There was poor inter-operator variability for both methods. Measurement differences for the five images were 16.9-33.7mm for the ellipse and 12.7mm-35.7mm for the two-diameter method (Fig 1a). **The student t test performed for each of the five images showed no significant difference between the ellipse and two-diameter measurements ($p>0.05$).** The two-diameter method did not demonstrate the improved inter-operator variability anticipated.

Of the re-measured images 83% (10/12) of the sonographers agreed that the original caliper placement was correct in 3 of the images (Fig 1b). However, of these images, the average retrospective ellipse measurements for each case varied from the original measurement by -9.4mm, -2.8mm and +1.0mm respectively, **suggesting a tendency to over-measure the AC in real time.**

The sonographer image ratings revealed that 23% (5/22) of images were considered poor by >50% (6/12) of sonographers (Fig 2). The results of the review against image criteria, across the 264 image ratings, are summarised in Table 1. **The most common problems were multiple rib echoes, an oblique spine or inclusion of part of a kidney.**

Image Criteria	Image ratings meeting the criterion (n=264)
Visible stomach bubble	88.3% (233)
1/3 umbilical vein	78.8% (208)
Spine seen as 3 dots	62.5% (165)
Single long rib	60.6% (160)
No kidney seen	25.1% (69)
Round section	86.7% (229)
Magnified to fill 50% of image	92.4% (244)
Correctly placed calipers	70.1% (185)

Table 1: Image criteria rating of 22 images by 12 sonographers

Conclusions:

After discussing the review sonographers felt they were more aware of their own practice and the potential for bias. **To help sonographers avoid over measurement we have now removed the gestational age from all ultrasound machine displays.** The next stage will be to evaluate the interpretation of AC measurements by reviewing reports. We will re-audit in 3 months' time and plan to use the same model to review other aspects of obstetric ultrasound.

References:

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