

## Post-mortem verification of first trimester cardiac ultrasound findings by micro-computed tomography of the fetal heart

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### Objective

To compare fetal cardiac findings on obstetric ultrasound and post-mortem micro-computed tomography (micro-CT) in patients undergoing surgical termination of pregnancy (TOP) before 17 weeks' gestation.

### Methods

Fetal heart specimens were retrieved from suction material in 14 patients after TOP for chromosomal or structural abnormalities diagnosed before 17 weeks' gestation. In all cases, a detailed assessment of the fetal heart was carried out by ultrasound before TOP. Heart specimens were soaked in iodine contrast solution and scanned using a commercially available micro-CT with an isotropic resolution of 18 $\mu$ m. Ultrasound videoclips and micro-CT images were compared and analysed.

### Results

The median gestational age at ultrasound was 13. 1 (range 12-16) and the median gestational age at TOP was 14. 2 (range 13-17) weeks. In all cases there was concordance between ultrasound and micro-CT in the diagnosis of a normal or abnormal fetal heart. Abnormal cardiac findings were reported on both technologies in 7 (50%) of 14 cases. Micro-CT confirmed the ultrasound diagnoses of corrected transposition of the great arteries (n=1), truncus arteriosus (n=1), hypoplastic left heart (n=1) and overriding aorta (n=1). In 2 cases, complex abnormalities of the great arteries were reported on both examinations but micro-CT was not able to provide additional information due to sub-optimal image quality. In 1 case, ventricular and great arteries disproportion was reported on ultrasound and micro-CT demonstrated a partial atrio-ventricular septal defect.

### Conclusion

Micro-CT provides highly accurate imaging of ex-vivo isolated fetal hearts retrieved after surgical TOP before 17 weeks' gestation. Micro-CT technology can be used in a clinical setting for non-destructive post-mortem confirmation of early fetal cardiac ultrasound findings, which are only rarely verified by anatomic dissection at these gestational weeks.