

Minimally-invasive perinatal autopsy: post-mortem MRI with percutaneous organ biopsy

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Introduction

The decline in postmortem consent rates worldwide has led to MRI as a proposed alternative to perinatal autopsy, and researchers have examined their comparability (1). Despite increasing experience post-mortem MRI remains an unproven and investigational technique and there remains a question on its value in clinical practice (2). This study analyses the feasibility of MRI with percutaneous biopsy as an alternative to conventional autopsy.

Methods

Thirty fetuses (age 16-39 weeks, birthweight 61g-3270g) underwent whole-body post-mortem MRI and organ biopsies prior to conventional autopsy. Studies were performed on a GE Signa 1.5T MRI system (GE Healthcare, Milwaukee), using appropriate receiver coils for fetal size. T2W sequences consistent with previous reports were used. (1) Radiologists were provided clinical and ultrasound history only. Each anatomical structure was scored according to the probability of normality, where normal is assigned 100, and abnormal scored 0. Any structures where comment on normality was not possible were given a score of 50. Low degree of confidence about normality, and abnormality would score just over or just below 50 respectively. Percutaneous organ biopsies were performed using a 16-18 G Temno trucut needle. Target organs were lungs, heart, spleen, liver, kidneys, adrenals and thymus. Conventional autopsies were performed by one of two perinatal pathologists who were provided clinical and ultrasound findings only.

Results

Table 1 Table 1 summarises the individual organs' scores and Table 2 summarises the frequency of successful organ sampling.

Anatomical structure	n (normal)	Median score normal	n (abnormal)	Median score abnormal
Cardiac situs	30	92.5	0	
Cardiac atria	28	85	2	2.5
Cardiac ventricles	28	90	2	5
Atrial septum	30	80	0	
Ventricular septum	26	87.5	4	90
Left outflow tract	28	80	2	50
Right outflow tract	28	75	2	50
Lung volumes	26	90	4	37.5
Thymus	30	90	0	
Trachea	30	80	0	
Duodenum	30	60	0	
Liver	30	90	0	
Pancreas	30	62.5	0	
Spleen	30	90	0	
Left adrenal	30	90	0	
Right adrenal	30	90	0	
Left kidney	29	90	1	0
Right kidney	29	90	1	0
Cerebral hemispheres	27	95	3	0
Corpus callosum	26	90	4	30
Ventricular system	26	90	4	12.5
Cerebellum	30	90	0	
Spine	30	90	0	

Conclusions

Minimally-invasive perinatal autopsy is feasible as fetal anatomy can be evaluated with a high degree of confidence using MRI with the exception of cardiac or gastrointestinal abnormalities. Percutaneous biopsies for histological examination can be obtained from major organs such as liver and lungs.



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Table 2

Organ	Observed successful sampling rate proportion (95% CIs)	Observed sampling by histology proportion (95% CIs)
Lung	0.90 (0.73, 0.98)	0.76 (0.56, 0.90)
Liver	0.83 (0.64, 0.94)	0.86 (0.68, 0.96)
Myocardium	0.52 (0.33, 0.71)	0.52 (0.33, 0.71)
Kidney	0.52 (0.33, 0.71)	0.34 (0.18, 0.54)
Adrenal	0.41 (0.24, 0.61)	0.41 (0.21, 0.61)
Thymus	0.34 (0.18, 0.54)	0.17 (0.06, 0.36)
Spleen	0.17 (0.06, 0.36)	0.17 (0.06, 0.36)

References

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