

SONOGRAPHIC CHARACTERISTICS ASSOCIATED WITH EARLY PREGNANCY FAILURE IN PATIENTS WITH IN VITRO FERTILIZATION (IVF) PREGNANCIES

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Background

Existing guidelines to diagnose early pregnancy failure rely exclusively on sonographic findings without consideration for gestational age, as this information is often imprecise for spontaneously conceived pregnancies.¹ However, in pregnancies conceived via in vitro fertilization (IVF), the exact date of conception is known. Thus, incorporation of gestational age may allow earlier diagnosis of pregnancy failure.

Objective

We sought to define criteria for early pregnancy failure specifically for the IVF patient population in whom the exact date of conception is known.

Materials and Methods

All patients at a single academic IVF center who conceived following embryo transfer between 2014–2021 were eligible for inclusion. Patients with multiple gestations, unavailable transvaginal ultrasound reports, ectopic pregnancy, and unknown pregnancy outcomes were excluded. Demographic and clinical information, sonographic findings at time of first ultrasound, and pregnancy outcomes were collected. Sonographic parameters of interest included gestational age at time of exam, as well as presence and measurement of a gestational sac, yolk sac, fetal pole and cardiac activity. Pregnancy outcomes included live birth (delivery of a viable neonate), miscarriage (pregnancy loss at < 20 weeks gestation), stillbirth (delivery of a non-viable neonate at > 20 weeks gestation), and termination (induced termination at any gestational age). Data were examined to determine the gestational age at which the following findings carried a near 100% PPV for early pregnancy failure: absence of gestational sac, absence of fetal pole, and absence of fetal cardiac activity.

Results

A total of 913 patients met the defined inclusion and exclusion criteria. The mean age at transfer was 35.5 + 4.8 years, and mean BMI was 27.6 + 6.5 kg/m². Most patients underwent frozen embryo transfer (634/913, 69.4%) of a single embryo (671/913, 73.4%) at the blastocyst stage (683/913, 74.8%). Fifteen percent (138/913) of transfers were done following preimplantation genetic testing for aneuploidy (PGT-A). There were 727 (79.6%) live births, 176 (19.3%) miscarriages, 3 (0.3%) stillbirths, and 7 (0.8%) terminations.

Median gestational age at time of first ultrasound was 6 weeks 3 days (SD=5 days). Findings which carried a 100% PPV for early pregnancy failure were absence of a gestational sac at > 5 weeks 2 days (n=15) and absence of a fetal pole at > 6 weeks 3 days (n=20). At > 6 weeks 3 days, the PPV of absent fetal cardiac activity for early pregnancy failure was 94% (n=36). The PPV of absent fetal cardiac activity for early pregnancy failure reached 100% at > 7 weeks 4 days (n=2).

Conclusions

As the exact date of conception is known for patients who conceive via IVF, it may be possible to diagnose early pregnancy failure in this population sooner than traditional diagnostic criteria allow. Confirmation of our findings in larger data sets is needed before clinical application.

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1. DOUBILET PM, BENSON CB, BOURNE T, BLAIVAS M. Diagnostic criteria for nonviable pregnancy early in the first trimester. *New England Journal of Medicine* 2013;369:1443-51.