**Small gestational sac to crown-rump length difference in IVF patients associated with increased risk of spontaneous abortion**

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**Background**

- In 2013, 174,962 In Vitro Fertilization (IVF) cycles were performed in the US(5).
- Most pregnancy losses occur within the first 7 weeks of pregnancy(1, 7, 8).
- 15-20% of clinical pregnancies end in spontaneous abortion(1, 7, 8).
- Ultrasound is commonly used to test fetal viability(4).
- Instrumental ultrasonographic markers in early gestation include mean gestational sac diameter (mGSD) and crown-rump length (CRL)(4).
- Gestational sac is the first sign of an intrauterine pregnancy on ultrasound and can be seen using transvaginal ultrasound at 3-5 weeks gestation(5).
- CRL provides the most accurate biometric parameter for pregnancy dating when measured between 7 and 10 weeks(7).
- There is no direct correlation between difference in mGSD−CRL and gestational age at time of delivery.

**Objective**

- Define incidence of small mGSD−CRL in IVF patients.
- Examine rates of pregnancy loss based on mGSD−CRL difference.
- Examine rates of birth outcomes based on mGSD−CRL difference.
- Study will help give IVF patients and providers accurate information to guide expectations and management following early obstetrical ultrasounds.

**Methods**

Retrospective cohort study conducted with data from UIHC IVF patients from Nov. 2011-Dec. 2014.

- Fields examined: Age, BMI, Race, Parity, History of recurrent pregnancy loss, Cycle type, ICSI, Gestational age at time of delivery, Delivery/SAB date.
- Cycles matched based on transfer date.
- Fields examined: CRL, mGSD, Subchorionic hemorrhage.
- Performed tests using SPSS: Chi square.
- Descriptive statistics.

**Sample Characteristics**

- Patient inclusion/exclusion criteria:
  - 773 IVF cycles with autologous eggs and 1 gestational sac on early ultrasound.
  - 684 cases with delivery or abortion date present.
  - 69 cases without delivery or abortion date present.
  - 680 cases with singleton gestation.
  - 4 cases with monoamniotic twin gestation (excluded).
  - 422 cases with mGSD and CRL measurements available (retained for analysis).
  - 258 cases without CRL and/or mGSD measurements available (excluded).

**Total sample (n=422)**

- Age, mean ± SD: 32.89 ± 4.43
- BMI, mean ± SD: 27.1 ± 6.72
- White race, n (%) (n=404): 375 (93%)
- Parity (# of previous deliveries), mean ± SD: 33 (8%)
- 2 or more previous pregnancy losses: 0.63 ± 0.72
- Fresh cycle, n (%): 266 (63%)
- ICSI (Intra-cytoplasmic sperm injection), n (%): 169 (40%)
- # embryos transferred, mean ± SD: 1.42 ± 0.61
- mGSD−CRL (mm), mean ± SD: 10.17 ± 4.02
- Subchorionic hemorrhage, n (%): 90 (21%)
- Spontaneous abortion, n (%): 86 (20%)

**Conclusions**

- There is an increased risk of spontaneous abortion with a mGSD−CRL difference <5 mm.
- There is no direct correlation between difference in mGSD−CRL and gestational age at time of delivery.
- There are 2 distinct groups for gestational age at delivery:
  - 1st trimester pregnancy losses
  - 3rd trimester deliveries

**Study Implications**

- This study provides information to further understand the trend in mGSD−CRL difference and spontaneous abortion rate in IVF patients.
- Data collected in this study shows a lower spontaneous abortion rate in IVF patients with a small mGSD−CRL difference than in the general population.
- Current findings raise questions as to what cutoff value for mGSD−CRL difference is diagnosable as high risk for spontaneous abortion in IVF patients.
- Future research:
  - Establish a more precise mGSD−CRL cutoff associated with early spontaneous abortion in IVF patients.
  - Analyze associations between mGSD−CRL differences, infertility diagnoses, and pregnancy complications.

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**References**