ENDOMETRIAL GROWTH RATIO PREDICTS PERINATAL OUTCOMES IN SINGLETON BIRTHS FOLLOWING SINGLE THAWED BLASTOCYST TRANSFERS

Padhye M (1), Kaye L (2, 3), Bedient CE (2, 3), Garner F (2, 3), Shapiro B (2, 3).

Affiliations: (1) Dept. of Obstetrics & Gynecology, Sunrise Health GME Consortium, HCA Healthcare, Las Vegas, NV, USA; (2) Fertility Center of Las Vegas, Las Vegas, NV, USA; (3) Kirk Kerkorian School of Medicine, Las Vegas, NV, USA.

Background

Endometrial thickness, measured as the original baseline thickness plus growth during the proliferative phase, has been extensively studied and reported to have moderate effects on birth weight and other perinatal outcomes [1,2]. Given the effect of variables such as maternal body mass index, age, and genetics on original baseline thickness, endometrial growth may serve as a superior marker for predicting perinatal outcomes in frozen embryo transfer cycles. Literature on endometrial growth is limited.

Objective

This study investigates whether endometrial growth ratio (EGR) is associated with birth weight, gestational age at birth, low birth weight (LBW), and small for gestational age (SGA).

Materials and Methods

Single thawed blastocysts were transferred in artificially prepared cycles after endometrial preparation with exogenous estradiol. Endometrial thickness was measured by transvaginal ultrasound at baseline before estradiol start and again at progesterone start. EGR was then calculated as the ratio of endometrial thickness at progesterone start to the baseline thickness before estradiol start. Endometrial thickness of at least 7mm (≥8mm preferred) was considered adequate before initiating intramuscular progesterone. To avoid any potential effect of vanished twins, only single-embryo transfers, singleton pregnancies, and singleton live births were included in this analysis. Linear regression was used to assess correlations of EGR with birth weight and gestational age. Logistic regression was used to assess correlations between EGR and the rates of SGA and LBW (<2500g). P-value <0.05 was considered significant.

Results

570 singleton live births were included in the study period. Baseline endometrial thickness measured 3.9±1.1 mm (mean±SD), total thickness measured 10.2±2.0 mm, endometrial growth measured 6.2±2.1 mm, gestational age at birth measured 271.5±9.7 days, birth weights measured 3338±497 g, and 60 cases of SGA (10.5% of births) and 35 cases of low birth weight (6.1% of births) were observed. EGR measured 2.79±1.04 and ranged from 1.13 to 11.1, and was significantly correlated with birth weight (P=0.0136), LBW (P=0.0006), and SGA (P=0.0010), but was not significantly correlated with gestational age (P=0.1584).

Growth Ratio	Observations	Mean gestational age (d)	Mean Birth weight (g)	LBW (<2500g) cases (%)	SGA cases (%)
<2.00	77	271.5±9.4	3268±491	9 (11.7)	11 (14.3)
2.00 to 2.99	294	271.4±9.4	3323±495	20 (6.8)	35 (11.9)
3.00 to 3.99	127	270.8±10.2	3376±529	4 (3.1)	12 (9.5)
4.00 to 4.99	52	272.1±10.4	3359±453	2 (3.8)	2 (3.9)
≥5.00	20	276.1±9.8	3530±398	0 (0.0)	0 (0.0)

Conclusion

The risks of LBW and SGA have strong negative correlations with EGR, the ratio of endometrial thickness at progesterone start to thickness at baseline. If these are causal relationships, then endometrial thickness at progesterone start exceeding baseline thickness by a factor of at least 4.0 would minimize the risk of LBW and SGA. Further investigation is warranted.

Financial Support:

None.

References:

1. Mahutte N et. al, Optimal endometrial thickness in fresh and frozen-thaw in vitro fertilization cycles: an analysis of live birth rates from 96,000 autologous embryo transfers. Fertility and Sterility. 2022. 117(4): p. 792-800.
2. Martel RA et. al, The effect of endometrial thickness on live birth outcomes in women undergoing hormone-replaced frozen embryo transfer. Fertility and Sterility. 2021. 2(2): p.150-155.