EMBRYO MORPHOLOGY, EARLY SERUM HUMAN CHORIONIC GONADOTROPIN LEVEL, AND FIRST TRIMESTER ULTRASOUND MEASUREMENTS PREDICT PERINATAL OUTCOMES FOLLOWING SINGLE THAWED BLASTOCYST TRANSFER

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Background
Recent reports show relationships between early hCG level, early ultrasound measurements, and birthweight, suggesting an observable relationship between putative early placentation markers and perinatal outcome.[1] However, we know of no report that has correlated blastocyst morphology with birthweight.
Objective
We sought to determine if blastocyst morphology, early human chorionic gonadotropin (hCG) levels, and early fetal development can predict perinatal outcomes following transfer of single thawed blastocysts.
Materials and Methods
To avoid any potential effect of vanished twins, this study included only single thawed blastocyst transfers that resulted in a single sac, single fetal heart, and singleton live birth for which routine early hCG and ultrasound measurements were performed in one center. Blastocysts were morphologically assessed and measured after thaw and transferred in artificially prepared cycles. Linear regression was used to investigate relationships between these numeric variables. A P-value <0.05 was considered significant.
Results
This IRB-approved retrospective study included 791 singleton live births meeting inclusion criteria in a 14-year study period. Serum hCG level 5 days post-transfer was predicted by blastocyst diameter (P=0.0008) and the count of trophectoderm cells (P<0.0001). Day 10 hCG was predicted by trophectoderm (TE) cell count (P=0.0086). Crown-rump length at 10 weeks was predicted by day 5 hCG level (P=0.0032) and day 10 hCG level (P=0.0102). Sac diameter at 10 weeks was predicted by day 5 hCG (0.0017) and day 10 hCG (P<0.0001). Gestational age at birth was predicted by TE cell count (P=0.0320), day 10 hCG level (P=0.0195), crown rump length at 10 weeks (P=0.0022), and sac diameter at 10 weeks (P=0.0003). Birthweight was predicted by blastocyst diameter (P=0.0011), TE cell count (P=0.0344), crown-rump length at 10 weeks (P<0.0001), sac diameter at 10 weeks (P<0.0001), and gestational age at birth (P<0.0001). All of these correlations were positive (e.g. increasing blastocyst diameter corresponded with increasing gestational age at birth and increasing birthweight).
Conclusion
Larger blastocysts, greater early serum levels of hCG, and greater early ultrasound measurements each predict greater gestational age at birth and greater birthweight. If this is a causal relationship, then the current study provides new context regarding a sequence of effects of pre-transfer embryo growth, early placentation, early fetal growth, and perinatal outcome. This might give insight into the timing and cause of certain effects on perinatal outcome.

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References:

1. Morse, CB., et al., Association of the very early rise of human chorionic gonadotropin with adverse outcomes in singleton pregnancies after in vitro fertilization, Fertility and Sterility, 2016; 105(5), p.1208-1214.