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Title:

IS THE NUMBER OF BLASTOCYCT MORPHOLOGIC EVALUATIONS (BMA) ON DAY 6 CORRELATED WITH DAY 7 EMBRYONIC COMPETENCE?

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Objective:

Blastocyst morphologic assessments (BMAs) are used to determine the optimal time to perform trophoctoderm (TE) biopsy for preimplantation genetic testing for aneuploidy (PGT-A). Embryos that have not hatched by the morning of day 6 may be cultured to Day 7 to await TE herniation. There is concern that repeated exposure of embryos outside of incubation may induce environmental stressors that can impact embryonic metabolic activity. Thus, our study sought to assess the relationship between the number of BMAs on Day 6 and development of Day 7 embryos.

Design:

Retrospective cohort analysis

Materials and Methods:

The study included patients who had embryos cultured and biopsied to Day 7 for PGT-A from 2015 to 2019. Cases were separated into 2 groups: (Study Group: 2 BMAs - morning and afternoon of Day 6; Control Group: 1 BMA - morning of Day 6). The primary outcomes were the rate of blastocysts that adequately expanded for TE biopsy (BBR) and top quality blastocyst rate (TQBR) (≥ 4 BB Modified Gardner). Secondary outcomes included euploid rate (ER),



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clinical pregnancy rate (CPR), ongoing pregnancy/live birth rate (OP/LBR), and spontaneous abortion rate (SABR). Student’s t-test and chi-square tests were used for statistical analysis, with $p < 0.05$ considered significant. Multivariate logistic regression analysis was performed to control for confounding variables.

Results:

A total of 5,034 embryos were cultured to Day 7. Within the 2 BMAs group (n= 1,412), 478 were biopsied on Day 7. Within the 1 BMA group (n=3,622), 1,407 were biopsied on Day 7. TQBR, BBR, and ER were significantly higher in the 1 BMA group. When controlling for confounders, having 1 BMA was significantly associated with the number of TQBR ($\beta = 0.73$, $p < 0.0001$). However, our model demonstrated no correlation between the count of BMAs on Day 6 and the probability of a Day 7 blastocyst having adequately expanded for TE biopsy ($\beta = 0.02$, $p = 0.82$) or rate of euploid embryos ($\beta = 0.10$; $p = 0.42$). There were no significant differences in CPR, OP/LBR, or SABR.

	1 BMA		2 BMA		p-value
	N	%	N	%	
TQBR	519/3622	14.33%	111/1412	7.86%	<.0001
BBR	1407/3622	38.85%	478/1412	33.85%	0.001
ER	597/1407	42.40%	176/478	36.80%	0.03
CPR	31/118	26.27%	11/49	22.45%	0.60
OP/LBR	23/118	19.49%	7/49	14.29%	0.42
SABR	8/31	25.81%	4/11	36.36%	0.51

Conclusion:

Our results demonstrated that the number of BMAs on Day 6 of development for embryos cultured Day 7 did not correlate with clinical outcomes. Our data shows that a single check on Day 6 may optimally minimize environmental exposures and allow for the subsequent acquisition of critical embryonic genomic data via PGT-A without comprising outcomes of Day 7 embryos. These results may be used as a guide for other reproductive centers who are incorporating the culture of embryos to Day 7 as standard practice.