

Pregnancy Outcome Following Frozen Embryo Transfer According to Number of Blastomeres

D. Kiefer, B. Katsoff, J.H. Check and D. Summers-Chase

The University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School at Camden, Cooper Hospital/University Medical Center, Department of OB/GYN, Division of Reproductive Endocrinology & Infertility, Camden, NJ, U.S.A.

Summary

It is well known that pregnancy rates (PRs) and implantation rates correlate positively with blastomere number of the transferred embryos. The present study evaluated the correlation of blastomere number with frozen-thawed embryos. Ongoing and clinical PRs were determined according to the maximum blastomere number of any given embryo transferred. There were 332 transfers with a maximum of only 4 blastomeres. The clinical PR was 29.8%, the ongoing delivered PR was 20.1% and the implantation rate was 12.6%. The pregnancy outcome was twice as high for 7 and 8 cell embryos. Knowledge of these data can help a couple decide on how many embryos to transfer.

Introduction

There are data suggesting that following controlled ovarian hyperstimulation (COH) and in vitro fertilization (IVF) fresh embryo transfer (ET) of day 3 embryos, pregnancy rates (PRs) increase with increasing numbers of blastomeres of the embryos (1). Also, a similar correlation has been found in the transfer of fresh embryos in the absence of COH (2). A very effective simplified technique for embryo freezing especially at the 2 pronuclear (2PN) stage has been described (3).

The objective of this study was to retrospectively review frozen ETs of embryo cryopreserved by this technique to determine if pregnancy

outcome following frozen ET also shows a positive correlation with increasing number of blastomeres.

Materials and Methods

A retrospective review of frozen ETs over a 6 year period was performed. Embryos used for transfer were either frozen at the 2PN stage or multi-cell stage. The 2PN embryos may have been from IVF cycles where twice as many embryos as intended to transfer were allowed to reach multi-cell stage and the rest of the embryos were cryopreserved at the 2PN stage. Alternatively, in some individuals considered at risk for developing ovarian hyperstimulation syndrome, or those whose endometrium on the day of human chorionic gonadotropin (hCG) injection was considered inappropriate by ultrasound criteria, all embryos were cryopreserved at the 2PN stage. The source of multi-cell embryos used for frozen ET could be either the remaining multi-cell embryos not chosen for fresh ET, or could be the multi-cell embryos that developed from thawing 2PN embryos that were not selected for the first frozen ET.

The embryos were frozen using a simplified method in which a slow cooling program is started at the seeding temperature of -6°C in an alcohol-bath controlled-rate freezer. 1,2 propanediol was used as the cryoprotectant (3). The embryos were thawed using a one-step dilution of the cryoprotectant (3).

Clinical (ultrasound evidence of pregnancy) and ongoing/delivered (viable past 16 weeks) and implantation rates were then determined according to the maximum number of blastomeres in any one embryo transferred.

No distinction was made whether the embryos were fertilized conventionally or by intracytoplasmic sperm injection (ICSI) since there is no evidence that ICSI impairs future success of frozen ET (4).

The endometrium was prepared for the majority of women with a graduated dosage of oral and vaginal estradiol (E2) until day 14 and an adequate endometrial thickness was reached followed by the addition of vaginal progesterone (P) 200mg 2x daily. Embryo transfer was on day 3 and was preceded by assisted hatching (5).

Results

The clinical and ongoing pregnancy rates are seen in Table 1.

There was a significantly lower clinical and ongoing/delivered PR and implantation rate when the maximum number of blastomeres of any given embryo transferred was compared to 5-8 blastomeres ($p < .01$). there was a significantly higher clinical and ongoing/delivered PR and implantation rate when the maximum number of blastomeres was ≥ 8

Table 1 – Effect of blastomere number of day 3 frozen-thawed embryos on pregnancy outcome

	Maximum number of blastomeres of any given embryo transferred on day 3				
	4 cells	5 cells	6 cells	7 cells	8 cells
# ET cycles	332	407	444	334	305
# clinical preg.	99	165	153	143	156
% clinical preg./transfer	29.8	40.5	34.4	42.8	51.1
# ongoing/delivered preg.	67	144	131	119	137
% ongoing/delivered PR/transfer	20.1	35.3	29.5	35.6	44.9
Total # embryos transferred	1115	1404	1496	1058	908
# gestational sacs ultrasound	141	259	217	219	219
Implantation rate (%)	12.6	18.3	14.5	20.7	24.1

compared to the other 4 groups ($p < .01$). There was no significant difference between 7 and ≥ 8 blastomeres.

Discussion

Pregnancy rates and implantation rates when the maximum numbers of blastomeres is 4 is only half of the respective rates with an 8 cell embryo. Nevertheless, a 20% ongoing/delivered PR per transfer is good enough to include these embryos in a given transfer.

The knowledge of these statistics can help a patient make a better clinical decision. Frozen ET cycles generally are significantly less expensive than a COH cycle followed by oocyte retrieval, IVF and fresh ET. Also there is no risk of ovarian hyperstimulation or bleeding. A couple faced with "only 4 and 5 cell frozen embryos" knowing that the chance of conception is 80% of what it would be if an 8 cell embryo would probably want to try the frozen ET first before doing another COH, fresh ET cycle. Even if the maximum number of blastomeres was 4, a woman may still decide to proceed with a frozen ET for a 20% chance to have a live baby.

The knowledge of the chance of implantation can also help a given couple decide on how many embryos to transfer. Of course, these data apply only to this particular IVF center using the specific freezing protocol described. Each IVF center should calculate their own data in a similar manner to help couples make clinical decisions proceeding with frozen vs. fresh ET.

References

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