Original Articles

Reproductive Biology Section

Evaluation of the importance of late follicular phase endometrial echo patterns and pregnancy outcome following embryo transfer by evaluating infertile donor/recipient pairs

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Summary

Purpose: To investigate if the late follicular phase echo pattern is associated with pregnancy outcome in donors vs recipients. *Methods:* Infertile donors sharing eggs with recipients were retrospectively evaluated. The endometrial echo pattern was evaluated on the day of human chorionic gonadotropin injection in donors and on the day before progesterone was given to recipients. *Results:* Almost twice as many donors conceived when the triple-line pattern was found compared to isoechogenic (IE) (51.5% or 52/101 vs 27.3% or 6/22) but there were inadequate numbers in the IE group to show a significant difference. There was not even a trend for a difference in recipients (55.2%, 37/67 vs 53.8%, 14/26). *Conclusions:* The trend in this study for higher pregnancy rates in COH cycles with triple-line isoechogenic pattern in the late follicular phase will prompt a study of a larger group of patients undergoing IVF-ET in the modern era. If confirmed one treatment option would be to freeze and defer transfer to an estrogen/progesterone cycle.

Key words: Frozen embryo transfer; Proliferative phase; Endometrial echo pattern.

Introduction

Oocyte donation has allowed older women as well as younger patients with premature ovarian failure to have successful pregnancies. The shared donor oocyte program allows infertile couples to get in vitro fertilization (IVF) at no charge in exchange for half of the oocytes retrieved which are given to recipients [1]. In this type of donor program, the same pool of oocytes is equally divided between two different women, which allows for a unique way to evaluate the effect of certain fertility parameters on pregnancy outcome [2, 3]. The study presented herein was designed to evaluate factors which may affect outcome in a shared donor oocyte program.

Materials and Methods

All shared donor oocyte IVF cycles were evaluated over a six-year time period where both donor and recipients had transfers of fresh embryos. Only cycles where all blood tests and ultrasounds were performed in our IVF facility were included. Recipients received a graduated estrogen followed by progesterone regimen which suppressed their own ovulation. Donors used either leuprolide acetate from the mid-luteal phase or the gonadotropin releasing hormone (GnRH) antagonists cetrorelix or ganirelix plus gonadotropin injections.

Donor-recipient pairs were divided into four groups: group 1 – both donor and recipient achieved a clinical pregnancy, group 2 – neither donor nor recipient achieved a pregnancy, group 3 – only the recipient achieved a pregnancy, group 4 – only the donor achieved a pregnancy. Once pairs were selected, only one of two had late proliferative echo patterns performed (i.e., some may have just measured thickness) – the one having the ultrasound was still included in the data.

The parameters evaluated in each group included: age of the donor, day 3 FSH (mIU/ml) of donor, endometrial thickness (mm) of donor on day of hCG, endometrial thickness (mm) of recipient on the day of donor's hCG, donor serum E2 (ng/ml) on day of hCG, donor serum P4 (pg/ml) on day of hCG, donor serum E2 (ng/ml) on the day after hCG, number of eggs donor received, number of eggs received by recipient and endometrial echo patterns, triple-line (TL) or isoechogenic (IE) in donors and recipients on day of hCG injection. The determination of when to give hCG injection was based on follicular size and serum estradiol levels and endometrial thickness in donors.

Results

There were 118 donor-recipient pairs included in the analyses; group 1 = 39, group 2 =30, group 3 = 29 and group 4 = 20. The pregnancy rate was 50% (59/118) in donors and 57.6% (68/118) in recipients (p = NS, chi-square analysis).

No differences were seen in the mean number of eggs, sera levels of FSH, E2 or progesterone (P) or the endometrial thickness among the four groups (Table 1) (ANOVA).

The mean age of the donor (Table 1) in Group 3 showed a trend to be slightly higher but the difference was not quite significant (p = .059). Distribution of TL endometrial echo patterns on the day of hCG was significantly lower in donors in group 3, p = .026 (Table 2) (ANOVA). There was no difference in the distribution of echo patterns in the recipient groups (Table 3) (ANOVA).

Pregnancy rates by echo pattern were 51.5% (52/101) in donors who had a TL echo pattern and 27.3% (3/11) in

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Table 1. — *Potential confounding factors by pregnancy group*.*

	Group 1	Group 2	Group 3	Group 4
Age of donor	30.9 ± 2.7	31.1 ± 2.9	32.7 ± 3.1	30.9 ± 3.6
Number of eggs to donor	9.7 ± 4.2	9.3 ± 2.5	8.5 ± 3.3	7.9 ± 3.4
Donor day 3 FSH (mIU/ml)	5.3 ± 2.2	5.3 ± 1.5	6.2 ± 4.5	5.7 ± 1.9
Donor endometrial thickness (mm) day of hCG	11.3 ± 2.3	12.4 ± 2.3	11.0 ± 2.6	11.5 ± 2.5
Donor E2 (ng/ml) day of hCG	2699.1 ± 1082.7	2498.6 ± 1014.2	2551.2 ± 905.8	2570.9 ± 966.0
Donor P4 (pg/ml) day of hCG	1.4 ± .7	1.6 ± .7	1.6 ± .7	1.3 ± .6
Donor E2 (ng/ml) day after hCG	3219.6 ± 1076.6	3392.1 ±1387.4	3272.2 ± 1380.6	3308.9 ± 1029.3
Number of eggs to recipient	10.3 ± 4.3	9.8 ±2.5	9 ± 3.2	9.2 ± 2.9
Recipient endometrial thickness (mm) on day of donor's hCG	9.4 ± 2.2	9.0 ± 2.2	9.4 ± 2.3	9.3 ± 1.9

* p = NS.

Table 2. — *Distribution of late follicular phase echo patterns in donors.*

	Group 1	Group 2	Group 3*	Group 4	All groups
TL	100% (37/37)	93.1% (27/29)	78.6% (22/28)	83.3% (15/18)	90.2% (101/112)
IE	0	6.9% (2/27)	21.4% (6/28)	16.7% (3/18)	9.8% (11/112)

TL: triple-line; IE: isoechogenic; *p = .026.

Table 3. — *Distribution of late follicular phase echo patterns in recipients.*

	Group 1	Group 2	Group 3*	Group 4	All groups
TL	72.4% (21/29)	69.6% (16/23)	72.7% (16/22)	73.7% (14/19)	72% (67/93)
IE	27.6% (8/21)	30.4% (7/23)	27.3% (6/22)	26.3% (5/19)	28% (26/93)

TL: triple-line; IE: isoechogenic.

Table 4. — *Pregnancy rates by echo pattern in donors vs recipients.*

	Donors	Recipients	Overall
TL	51.5% (52/101)	55.2% (37/67)	53% (89/168)
IE	27.3% (3/11)	53.8% (14/26)	45.9% (17/37)
overall	49.1% (55/112)	54.8% (51/93)	51.7% (106/205)

TL: triple-line; IE: isoechogenic.

donors who had an IE echo pattern; however, statistically no difference was observed using chi-square analysis, which was most likely due to the small number of IE echo patterns (Table 4). The pregnancy rate did not differ by echo pattern in the recipients; 55.2% TL vs 53.8% IE (Table 4).

Discussion and conclusions

Only TL and IE echo patterns were seen in this study because, based on previous data, all embryos are frozen and embryo transfer is deferred if the woman undergoing controlled ovarian hyperstimulation (COH) has a homogeneous hyperechogenic (HH) pattern on the day of hCG [4].

Although not statistically significant, these data show that nine more recipients than donors conceived, which is consistent with previous data suggesting negative effects of controlled ovarian hyperstimulation (COH) [5].

There was no difference or even a trend for lower pregnancy rates in recipients whether the echo pattern the day before P supplementation was TL or IE. In contrast the new data from the present study suggest that for a woman undergoing COH and oocyte retrieval, having an isoechogenic endometrium on day of hCG may somewhat decrease the chance of pregnancy; however, to determine if clinical importance is such that embryo transfer should be deferred and all embryos frozen, as is the policy for the HH pattern, a large prospective study would be required. It may be that the adverse effect of COH in some women may be reflected by the failure to attain a TL pattern on the day of hCG injection.

Evaluation of data, as in the present study, may also help to determine cause for negative outcome in donor-recipient pairs; endometrial echo patterns were good in the group in which neither donor or recipient conceived suggesting the possible need to investigate egg quality whereas the lowest proportion of TL echo pattern in donors was seen in the group where only the recipients conceived suggesting poor endometrial receptivity in the donors in this group.

References

[1] Check J.H., Fox F., Choe J.K., Krotec J.W., Nazari A.: "Sharing of oocytes from infertile versus paid donors results in similar pregnancy and implantation rates". *Fertil. Steril.*, 2004, *81*, 703.

[2] Check J.H.: "The shared donor oocyte program: the advantages and insights it provides in determining etiologic factors of infertility". *Clin. Exp. Obstet. Gynecol.*, 2002, *29*, 229.

[3] Check J.H., Cochrane H., Yuan W., Wilson C.: "Evidence using a shared oocyte pool that the sperm rather than the oocyte in some cases may be responsible for the production of embryos with a high percentage of fragmented blastomeres - Case report". *Clin. Exp. Obstet. Gynecol.*, 2004, *31*, 139.

[4] Check J.H., Lurie D., Dietterich C., Callan C., Baker A.: "Adverse effect of a homogeneous hyperechogenic endometrial sonographic pattern, despite adequate endometrial thickness on pregnancy rates following in-vitro fertilization". *Hum. Reprod.*, 1993, *8*, 1293.

[5] Check J.H., Choe J.K., Katsoff D., Summers-Chase D., Wilson C.: "Controlled ovarian hyperstimulation adversely affects implantation following in vitro fertilization-embryo transfer". *J. Assist. Reprod. Genet.*, 1999, *16*, 416.

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