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Pregnancy Rates in Frozen-Thawed Embryos Derived from Donor Oocytes According To the Mid-Luteal Phase Endometrial Echo Pattern

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ABSTRACT

Background: *Previous studies have found a lower live delivered pregnancy rate (LDPR) when women have a triple-line (TL) endometrial echo pattern in mid-luteal phase in natural cycles, but not specifically when a donor oocyte was used.*

Objective: *To determine if failure of progression of a triple line (TL) sonographic endometrial echo pattern despite supplemental progesterone (P) support in the luteal phase is associated with a LDPR following frozen embryo transfer (FET) where the embryos were derived from donor oocytes.*

Study Design/Materials and Methods: *A retrospective review was performed over a twenty-year period of all FET cycles performed in women ≤ age 42 and women ≥ age 43 when the oocyte source was a fresh donor oocyte. All women were on the same regimen of maximum P where 100 mg of P in oil plus vaginal P once there was adequate endometrial thickness. All FETs occurred on day three. The live delivered pregnancy rates were determined and compared according to whether a TL echo pattern, isoechogenic (IE), or homogenic hyperechogenic (HH) was found on the seventh day of taking P.*

Results: *No matter what age, the TL pattern was uncommon (<5%). Women aged > 43 showed a non-significant trend of about a 33% reduction in LDPRs if they continued with a TL pattern into mid-luteal phase.*

Conclusion: *Identifying a TL mid-luteal echo pattern may help to identify a potential correctable reason for failure to conceive following transfer of embryos derived from younger donors in a small minority of women aged > 43.*

Keywords

Donor oocyte, Frozen embryo transfer, Mid-luteal endometrial echo pattern.

Introduction

Previous studies have found a lower live delivered pregnancy rate (LDPR) when women have a triple-line (TL) endometrial echo pattern in mid-luteal phase in natural cycles without luteal phase progesterone (P) supplementation and, in women having either fresh or frozen ET despite P supplementation [1-3]. To date, there have not been any studies to evaluate whether a TL mid-luteal phase echo pattern is associated with a low LDPR when transferring embryos derived from donor oocytes.

The objective of this study was to determine if heartier embryos from young donor oocytes overcome the adverse endometrial factor associated with a TL endometrial echo pattern in mid-luteal phase. The aim of this study was also to determine if a TL mid-

luteal phase endometrial echo pattern has a greater negative impact with advanced reproductive age by comparing LDPRs in women ≤42 vs. women aged >43. Since cryopreservation followed by thawing puts an extra stress on the embryo, and may diminish, to some degree, the heartiness of the embryo, the study would evaluate whether the mid-luteal phase sonographic echo pattern and/or age may have a greater negative impact on successful implantation and subsequent live delivered pregnancies by using frozen-thawed embryos derived from donor oocytes.

Methods

Women having frozen ETs derived from frozen donor eggs were treated with P in oil 100 mg daily and luteal phase vaginal P 400mg 2x/day once an appropriate endometrial thickness was attained following a graduated oral and vaginal estradiol regimen. The mid-luteal endometrial echo pattern was recorded as triple-line (TL), isoechogenic (IE), or homogeneous hyperechogenic (HH). Data were evaluated according to two recipient age groups: age ≤ 42 vs ≥43. All embryos used were de-selected in that they all had a fresh ET that was either successful and they were now trying for another pregnancy, or the fresh ET failed, and they were now trying with frozen thawed only.

Statistical Analysis

Chi square analysis and Fisher's exact test were used to evaluate any significant difference between any groups.

Results

Frozen Embryo Transfers

There were 480 frozen ETs in women age ≤ 42. The HH pattern was found in 345 (75%), IE in 85 (18.5%), and TL in 30 (6.5%). For women age > 43 there were 511 frozen ETs. The HH pattern was found in 413 (80.8%), IE in 77 (15.1%), and TL in 21 (4.1%). (P=NS chi square).

The LDPRs were 48.1% with HH, 44.7% for IE, and 40.0% for TL in women age ≤ 42 vs 48.7%, 42.9%, and 33.3% for TL women for ≥ 43. (P=NS chi square and Fisher's exact test) The implantation rates for ages ≤ 42 were 33.0% (HH), 33.2% (IE), and 23.2% (TL) vs. 35.0%(HH), 32.4%(IE), and 21.1% (TL) for women ≥ 43. (P=NS, chi square analysis and Fisher's exact test).

Conclusions

The HH pattern was by far the most common echo pattern at mid-luteal phase in both age groups and TL was the least ($p<0.05$, chi-square for TL vs non-TL in both age groups). Thus, endometrial aging does not lead to a potential lesser quality endometrium as evidenced by not progressing past a TL pattern at mid-luteal phase, at least when an aggressive P replacement regimen is being used.

There were no significant differences in LDPRs with age or endometrial echo patterns. However, there were two trends observed. There was a trend for lower LDPRs in women aged 43 and older who did not attain an HH pattern in mid-luteal phase ($p=0.091$). Furthermore, another trend was found with a lower implantation rate according to age in women whose mid-luteal phase echo pattern was TL ($p=0.072$).

Many IVF centers do not evaluate the mid-luteal phase echo pattern following transfer of fresh or frozen embryos derived from donor oocytes. Since the large majority of patients receiving the estradiol/P regiment to prepare the endometrium do progress from a TL pattern, failure to perform this sonographic test of endometrial echo patterns in mid-luteal phase would not lead to an observable decrease in the LDPRs of given IVF centers when transferring frozen-thawed embryos derived from donor eggs.

Obtaining a pregnancy by using donor oocytes is very expensive. In the authors' opinions, the low frequency of TL endometrial echo patterns at either age does not warrant a mock cycle prior to the transfer especially with the unpleasantness of intramuscular P injections. However, with the trend for lower LDPRs with this TL pattern in women aged ≥ 43, those who fail to conceive in the first transfer of donor eggs derived embryos could consider a mock cycle without embryo transfer to see if adjustments could correct the problem.

One could question what one would do if the mid-luteal phase echo pattern was TL at mid luteal phase. There have been some studies suggesting that increasing the dosage of P at mid-luteal phase may improve pregnancy rates in fresh and frozen ETs [4,5]. Thus, in the next ET cycle one could increase the dosage of P from the early luteal phase. One could also consider performing an endometrial biopsy to evaluate inflammation markers e.g., BCL6 [6,7]. If there is evidence of inflammation, and there is persistence of a TL endometrial pattern in mid-luteal phase, one could consider a laparoscopy with the hope of removing endometriosis, consider a dopaminergic drug to reduce cellular permeability (thus avoiding excessive infiltration of irritants into the endometrial tissue causing inflammation), or consider antibiotic treatment [8-11].

It should be noted that there has been another manuscript evaluating both follicular and luteal phase endometrial sonographic echo patterns in oocyte donation cycles [12]. However, the methodology used by Barker et al was to see if there was any difference in frequency of TL pattern in those conceiving vs not and found no difference (this statement was made but no statistics provided). However, based on the low frequency of the TL pattern, their methodology would not be adequate to determine if those not progressing out of a TL pattern would have lower pregnancy rates in donor oocyte cycles [12].

Authors Contributions

BN was responsible for writing 60% of the manuscript and JHC 40%. 60% of data collection was completed by CW and 40% by BN. CW entered all of the data on the patients and provided the data set and statistical analysis that we used for the study and all authors approved the final draft.

Ethical Statement

There were no financial grants or awards for this study. All patients

on their initial visit are asked to sign a statement that their results may be included in research studies, but their anonymity will be maintained. Generally, 99% sign the statement. Those who do not, their chart is flagged and not used in research studies. Cooper Medical School of Rowan University does not require IRB approval for retrospective studies. Performing a mid-luteal vaginal ultrasound is part of our standard procedure.

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References

1. Check JH, Gandica R, Dietterich C, et al. Evaluation of a nonhomogeneous echo pattern in the mid luteal phase as a potential factor associated with unexplained infertility. Fertil Steril. 2003; 79: 590-593.
2. Check JH, Dietterich C, Lurie D. Non-homogeneous hyperechogenic pattern 3 days after embryo transfer associated with lower pregnancy rates. Hum Reprod. 2000; 15: 1069-1074.
3. Check JH, Dietterich C, Nazari A, et al. Non-homogeneous hyperechogenic echo pattern three days after frozen embryo transfer is associated with lower pregnancy rates. Clin Exp Obstet Gynecol. 2005; 32: 15-18.
4. Check JH, Dietterich C, Lowney M, et al. Adjusting progesterone (P) dosage to compensate for a non-homogeneous hyperechogenic (HH) echo pattern three days after transfer. Clin Exp Obstet Gynecol. 2019; 46: 356-358.
5. Check JH, Dietterich C, Cohen R, et al. Increasing the dosage of progesterone (P) supplementation from the mid-luteal phase in women not attaining a mid-luteal homogeneous hyperechogenic (HH) pattern with sonography improves pregnancy rates (PRs) following frozen embryo transfer (ET). Clin Exp Obstet Gynecol. 2010; 37: 13-14.
6. Almquist LD, Likes CE, Stone B, et al. Endometrial BCL6 testing for the prediction of in vitro fertilization outcomes: a cohort study. Fertil Steril. 2017; 108: 1063-1069.
7. Lessey BA, Kim JJ. Endometrial receptivity in the ectopic endometrium of women with endometriosis: it is affected, and let me show you why. Fertil Steril. 2017; 108: 19-27.
8. Nowroozi K, Chase JS, Check JH, et al. The importance of laparoscopic coagulation of mild endometriosis in infertile women. Int J Fertil. 1987; 32: 442-444.
9. Gu J, Sun Q, Qi Y, et al. The effect of chronic endometritis and treatment on patients with unexplained infertility. BMC Women's Health. 2023; 23: 345.
10. Check DL, Check JH. Novel methods of improving fecundity and various pathological disorders based on a hypothetical model of embryo implantation. Gynecol Reprod Health. 2020; 4: 1-15.
11. Check JH, Chern R, Katsoff B. Prevention of first-trimester miscarriage with dextroamphetamine sulfate treatment in women with recurrent miscarriage following embryo transfer –case report. Clin Exp Obstet Gynecol. 2013; 40: 471-472.
12. Barker MA, Boehnlein LM, Kovacs P, et al. Follicular and luteal phase endometrial thickness and echogenic pattern and pregnancy outcome in oocyte donation cycles. J Assist Reprod Genet. 2009; 26: 243-249.

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