

PROSPECTIVE EVALUATION OF ENDOMETRIAL COMPACTION IN FRESH IN VITRO FERTILIZATION CYCLES AND CORRELATION WITH PREGNANCY OUTCOMES IN A SUBSEQUENT FROZEN EMBRYO TRANSFER CYCLE

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Background

Endometrial factors influencing outcomes of in vitro fertilization (IVF) remain poorly understood. Studies have suggested endometrial compaction, a decrease in endometrial thickness (EMT) in response to the progesterone-induced shift from the proliferative to secretory phase, is associated with improved pregnancy rates in frozen embryo transfer (FET) cycles; however, other studies have contradicted these findings [1]. With the potential benefit of earlier endometrial assessment prior to an embryo transfer, the predictive utility of endometrial compaction assessment in a fresh IVF cycle for determining future FET outcomes is unknown.

Objective

To prospectively assess whether endometrial compaction in a fresh IVF cycle corresponds with compaction and pregnancy outcomes in a subsequent FET cycle.

Materials and Methods

We performed an observational prospective study of patients undergoing IVF with subsequent euploid FET within one year. In fresh IVF cycles, maximum EMT by transvaginal ultrasound and serum estradiol and progesterone levels were assessed on the day of trigger and 5-7 days post-oocyte retrieval. In the subsequent FET cycle, maximum EMT by transvaginal and/or transabdominal ultrasound was measured on day of trigger (or progesterone start) and on the day of FET. Groups were divided based on the change in EMT: 1) compaction (>5% decrease), no change (within 5%), expansion (>5% increase). Pregnancy outcomes included total pregnancy (PR), clinical pregnancy (CPR), miscarriage (MR), and live birth rates (LBR). The Kruskal-Wallis and Wilcoxon signed rank and rank sum tests were applied for continuous variables and Chi-square test for categorical variables to evaluate for statistical differences ($p < 0.05$).

Results

76 patients were recruited to participate in the study and 50 patients underwent a subsequent FET cycle. No significant demographic differences were associated with changes in EMT including age, ethnicity/race, BMI, and infertility diagnosis. In a fresh IVF cycle, compaction was noted in 46% (35/76), expansion in 39% (30/76), and no change in 14% (11/76) of participants. Post-trigger serum estradiol levels were higher in patients with compaction compared to expansion ($p=0.016$), but otherwise serum estradiol and progesterone did not correlate with changes in EMT. Paired analysis of changes in EMT between IVF and FET cycles were overall similar ($p=0.65$). No significant associations were found between change in EMT in IVF cycle and pregnancy outcomes in FET cycle (**Table 1**). A sub-analysis evaluating the degree of compaction between 5-10% and >10% revealed similar findings regarding pregnancy outcomes and consistency with FET EMT changes.

Conclusions

Endometrial compaction and expansion were overall comparable between IVF and future FET cycles, suggesting a predictive potential of fresh IVF cycles. However, these changes were not associated with significant pregnancy outcomes in future FET cycles, questioning the utility of endometrial compaction for predicting pregnancy outcomes. Future larger studies may offer valuable insight on whether compaction patterns and serum hormone levels across cycles have any implications for live birth outcomes.

Support

NIH R44 SBIR, CiceroDx

References:

1. Turkgeldi E et al. 2023. Can endometrial compaction predict live birth rates in assisted reproductive technology cycles? A systematic review and meta-analysis. *J Assist Reprod Genet* (Epub).

Table 1. The association between compaction in IVF cycle and clinical outcomes in the FET cycle.

	Expansion (>5% increase)	No difference (within 5%)	Compaction (>5% decrease)	p-value
	N=19	N=11	N=20	
Overall Pregnancy	74% (14/19)	82% (9/11)	70% (14/20)	>0.9
Clinical Pregnancy	58% (11/19)	73% (8/11)	60% (12/20)	0.8
Live Birth	56% (10/18)	73% (8/11)	56% (10/18)	0.7
Miscarriage/ Biochemical Pregnancy Loss	16% (3/19)	0% (0/11)	10% (2/20)	0.3
Ectopic Pregnancy	0% (0/19)	9.1% (1/11)	0% (0/20)	0.2
Multiple Gestation	5.3% (1/19)	0% (0/11)	0% (0/20)	0.6