IMPACT OF LEAD FOLLICLE SIZE AT TRIGGER ON OOCYTE AND EMBRYO QUALITY IN IVF CYCLES

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Background:

A primary factor in determining the optimal time to trigger ovulation for egg retrieval during IVF is the size of the lead follicle(s) during ovarian stimulation. Historically, the timing of the trigger has been based largely on retrospective data focused on maximizing the number of mature oocytes retrieved. However, while this metric is essential, it may not fully capture the quality of the oocytes, which ultimately influences embryo development and pregnancy outcomes. Larger follicles may yield mature oocytes, but the quality of these oocytes—and their potential to fertilize, develop into high-quality blastocysts, and result in clinical pregnancy—has not been thoroughly evaluated. This study investigates whether triggering with smaller versus larger lead follicles affects not only oocyte number and maturation but also the quality of the oocyte cohort, as measured by fertilization rates, high-quality blastocyst development, and clinical pregnancy rates.

Objective:

To compare the impact of lead follicle size at trigger (<20mm vs. ≥20mm) on fertilization rates, high-quality blastocyst (HQB) development, and fresh embryo transfer pregnancy rates.

Materials and Methods:

Design: Retrospective cohort study.
Setting: Academic fertility center.
Subjects: 907 IVF cycles, including 466 cycles with lead follicle ≥20mm at trigger.

Intervention: Triggering cycles when the lead follicle size is either <20mm or ≥20mm in diameter. The institutional trigger criterion required at least three dominant follicles >16mm.

Outcomes:

1. Fertilization rate: Ratio of 2-pronuclei (2PN) to metaphase II (MII) oocytes.
2. High-quality blastocyst (HQB) rate**:** Proportion of 2PN that developed into high-quality blastocysts.
3. Clinical pregnancy rate: Proportion of fresh embryo transfers resulting in pregnancy.

Statistical Analysis: Parametric and non-parametric tests were used, along with linear and logistic regression models adjusted for oocyte age, anti-Müllerian hormone (AMH) levels, body mass index (BMI), peak estradiol (E2), oocyte yield, and infertility diagnosis.

Results:

A total of 907 IVF cycles were analyzed, with 466 cycles triggered when the lead follicle measured ≥20mm. Of these, 159 cycles underwent conventional insemination, and 748 used ICSI. There were no clinically significant differences in baseline characteristics between the <20mm and ≥20mm groups. Average oocyte age was 37.2 years versus 36.5 years (p=0.01), AMH levels were 2.4 ng/mL versus 2.6 ng/mL (p=0.23), BMI was 25.9 versus 27.1 (p=0.001), peak estradiol was 2193.5 pg/mL versus 2211.5 pg/mL (p=0.82), and oocyte yield was 12.1 versus 11.7 (p=0.54) for the <20mm and ≥20mm groups, respectively.

The fertilization rates were similar, with 74.5% in the <20mm group compared to 73.7% in the ≥20mm group (p=0.291). This remained consistent regardless of fertilization method, with conventional insemination achieving 68.1% versus 67.1% (p=0.799) and ICSI achieving 75.9% versus 75.0% (p=0.623) for the <20mm and ≥20mm groups, respectively. After adjusting for confounding variables (oocyte age, AMH, BMI, peak estradiol, oocyte yield, and infertility diagnosis) no significant differences were observed in fertilization rates. The adjusted differences were -1.8% [-5.1%, 1.5%] (p=0.323) for the total population, -3.6% [-11.6%, 4.3%] (p=0.368) for conventional insemination, and -1.7% [-5.3%, 1.9%] (p=0.361) for ICSI.

The rate of HQB formation was also comparable between groups, with 44.5% in the <20mm group versus 47.9% in the ≥20mm group (p=0.105). Clinical pregnancy rates among 190 patients who underwent fresh embryo transfers were similar, with 53.9% in the <20mm group compared to 52.3% in the ≥20mm group (p=0.695). These findings remained non-significant after statistical adjustments.

Conclusions:

This study demonstrates that triggering oocyte retrieval with a lead follicle ≥20mm does not negatively impact fertilization rates, blastocyst development, or clinical pregnancy outcomes. These findings support the approach of continuing ovarian stimulation to recruit additional oocytes, even if the lead follicle exceeds 20mm. Future studies should explore additional thresholds of lead follicle size to further refine optimal trigger timing for balancing oocyte quality and quantity.

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