EMBRYOLOGIC OUTCOMES IN INTRACYTOPLASMIC SPERM INJECTION (ICSI) CYCLES UTILIZING SPERM SELECTED VIA A MICROFLUIDICS DEVICE COMPARED TO STANDARD SELECTION

Prachi Godiwala MD, Jane Kwieraga BSc TS, Reeva Makhijani MD, Chantal Bartels MD, Alison Bartolucci PhD, Daniel Grow MD, John Nulsen MD, Claudio Benadiva MD, Lawrence Engmann MD
The Center for Advanced Reproductive Services, University of Connecticut School of Medicine, Farmington, Connecticut

Background

- Conventional sperm preparation methods such as density gradient centrifugation and the swim-up method utilize centrifugation during processing, which may damage the sperm.
- Microfluidics sperm processing may allow for improved selection of normal sperm compared with conventional sperm preparation as it yields sperm with a lower DNA fragmentation rate.

Objective

- To compare the high-quality blastulation rate in cycles in which sperm was processed via a microfluidics device versus gradient centrifugation.

Materials and Methods

- Study design: retrospective cohort study.
- Population and time frame: patients aged 18-45 years at a single academic IVF center between Jan 1, 2014 and Mar 31, 2020.
- The IVF/ICSI cycles of 45 patients utilizing sperm for ICSI processed via a microfluidics chamber (ZyMot™) were compared to the same patients' previous ICSI cycles in which standard sperm preparation was used. Use of microfluidics was based on physician discretion and/or the IVF lab recommendation based on previous low fertilization rate or blastulation rate.
- For standard preparation, sperm were processed via gradient centrifugation. For microfluidics processing, 850µl of raw semen and 750 µl of culture media was added to the Zymot device (ZMH085).
- Sperm were added to PVP and selected for ICSI according to standard lab procedure in both groups.
- Primary outcome: high-quality blastulation rate (≥3BB by Gardner scoring).
- Secondary outcomes: fertilization rate, number of high-quality blastocysts frozen, and euploidy rate among IVF cycles using preimplantation genetic testing for aneuploidy (PGT-A).
- Statistical analysis: McNemar's test was used for categorical paired data and paired T-test for continuous paired data. A two-sided p-value of <0.05 was considered statistically significant.

Results

- Mean patient age, partner age, BMI, and AMH level at the time of standard selection cycle were 37.3 years, 37.7 years, 25.5 kg/m2, and 2.5 ng/mL, respectively.
- The majority of patients' primary infertility diagnosis was male factor (42.2%), followed by unexplained (22.2%).
- 35.6% of patients used the same stimulation protocol for both cycles.
- The use of PGT-A, mean numbers of oocytes retrieved, and pre- and post-processing sperm parameters were similar.
- Although the high quality blastulation rate was higher in microfluidics cycles, the difference was not significant.
- The fertilization rate, euploidy rate and mean number of embryos frozen did not differ significantly.

Table 1: Embryologic outcomes in IVF/ICSI cycles comparing gradient centrifugation versus microfluidics selection

	Gradient Centrifugation Cycles (n = 45)	Microfluidics Cycles (n = 45)	p-value
No. of oocytes retrieved (n ± SEM)	10.1 ± 8.8	11.7 ± 8.6	0.08
Fertilization rate (% ± SEM)	54.1 ± 4.6	57.8 ± 3.5	0.49
High-quality blastulation rate (% ± SEM)	25.2 ± 7.3	38.1 ± 4.7	0.15
Number of high-quality blastocysts frozen (n ± SEM)	1.9 ± 0.3	2.8 ± 0.6	0.11
Euploidy rate (% ± SEM)*	16.7 ± 8.9	20.1 ± 6.4	0.78

*Euploidy rates were calculated from 14 gradient centrifugation cycles and 21 microfluidics cycles.

Conclusions

- Processing sperm with microfluidics device may improve blastulation rate although this was not statistically significant due to the sample size.
- Further large prospective randomized studies are needed.

References

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