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P-193  Comparison of ICSI outcomes and euploidy rates between AI and non-AI sperm selection

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Study question: Can artificial intelligence (AI) assisted sperm selection improve intracytoplasmic sperm injection (ICSI) outcomes and euploidy rates?

Summary answer: AI selected spermatozoa showed no statistical significance in various measures of ICSI outcomes but an increasing trend in euploidy rate can be observed.

What is known already: All ICSI practitioners would like to have an objective tool for the selection of sperm to be injected as it is one of the factors in producing successful ICSI. Sperm selection assistant (SiD; IVF 2.0 Limited, UK) is a real-time AI spermatozoa identifier that assesses all spermatozoa in a visual field based on their motility patterns individually. Mendizabal-Ruiz et. al. (2022) have reported promising data showing SiD may reduce subjectivity in sperm selection, which can potentially be an alternative method to our current practice.

Study design, size, duration: From June 2022 to December 2022, 89 ICSI cycles (mean age: 35.3; age range: 26.0–47.0) were done in Alpha IVF & Women’s Specialists. A sibling AI (Group A) and non-AI (Group B) assisted sperm selection study with ICSI was performed on the oocytes retrieved from these cycles. Of which, 76 cycles were planned for Preimplantation Genetic Testing for Aneuploidies (PGT-A) on utilizable blastocysts.
Participants/materials, setting, methods: All matured oocytes were injected using Piezo-ICSI method (Prime Tech Ltd, Japan). Half of the oocytes of each cycle were injected with SD selected sperm whereas the other half by manual selection. All injected oocytes were cultured up to day-7 and trophoderm biopsy for PGT-A screening (IonTorrent, USA) was done on utilizable blastocysts prior to vitrification (Cryotec, Japan). The fertilization, blastulation, utilization and euploidy rates were assessed in both groups.

Main results and the role of chance: In Group A, the fertilization rate (2PN), abnormal fertilization rate (>2PN), blastulation rate from 2PN, blastocyst utilization rate from 2PN and euploidy rate from utilizable blastocysts were 81.5% (419/514), 2.1% (11/514) 77.1% (323/419), 57.5% (241/419) and 45.2% (71/157) respectively. In Group B, the fertilization rate (2PN), abnormal fertilization (>2PN), blastulation rate from 2PN, blastocyst utilization rate from 2PN and euploidy rate from utilizable blastocysts were 79.7% (427/536), 2.8% (15/536), 75.9% (324/427), 59.0% (252/427) and 35.5% (60/169) respectively. No significant differences were observed in the fertilization rate (p = 0.4828), abnormal fertilization rate (p = 0.5545), blastulation rate from 2PN, blastocyst utilization rate from 2PN and euploidy rate (p = 0.0898). Although the ICSI outcomes are comparable between the two groups, AI assisted sperm selection showed an increasing trend in euploidy rates. SD may be considered as a tool to assist embryologist in selecting better spermatozoa during ICSI procedures.

Limitations, reasons for caution: The patient sample size was small but further studies with a larger sample size certainly seem to be justified, particularly in association with PGTA on utilizable blastocysts. The value of SD shall be greatly enhanced when spermatozoon morphology can also be measured.

Wider implications of the findings: This is more evidence suggesting that SD may improve ICSI outcomes and euploidy rate when compared to manual selection by an embryologist. In addition, it could be used to train and assist embryologists learning ICSI procedures.

Trial registration number: not applicable