P-019 Sperm parameter and ICSI / IVF outcomes after sperm selection using microfluidic sperm separator and density gradient centrifugation with swim-up in split semen sample

R. Higashiyama[1], M. Kishimoto[1], S. Komure[1], S. Mizuta[1,2], K. Kitaya[1], T. Takeuchi[1], H. Matsubayashi[1,2], T. Ishikawa[1,2]

[1]Reproduction Clinic Osaka, Lab, Osaka-shi, Japan ;
[2]Reproduction Clinic Tokyo, Lab, Tokyo, Japan

Study question: To analyze whether microfluidic sperm selection (MSS) by ZyMōt™ improves sperm DNA fragmentation rate and embryonic development compared to density gradient centrifugation with swim-up (DGCS).
Summary answer: MSS by ZyMōt™ selects sperm for clinical use with less DNA damage significantly compared to DGCS.
What is known already: Conventional sperm preparation methods, such as density gradient centrifugation and the swim-up method utilize centrifugation during processing, may damage the sperm. MSS may allow for improved selection of normal sperm compared with conventional sperm preparation as it yields sperm with a lower DNA fragmentation rate. However, there are few clinical studies by sibling oocytes study compared to DGCS.
Study design, size, duration: This prospective study was performed between March 2020 and May 2020 at a reproductive center. All patients involved gave written consent, and institutional review board approval was granted. A total of 575 metaphase II oocytes were collected from 49 cycles. Wife's age was 34.7 ± 3.9 years old. Raw sperm concentration and motile sperm concentration was 63.1 ± 78.7M/mL, and 41.6 ± 67.7M/mL, respectively.
Participants/materials, setting, methods: Patients who performed ART for the first or second time were divided into two groups according to MSS and DGCS. Sperm DNA fragmentation rate (SDFR) and motile sperm concentration were compered between MSS and DGCS. SDFR was measured by sperm chromatin structure assay (SCSA) using a flow cytometer. Sibling oocytes were randomized into MSS-IVF, DGCS-IVF, MSS-ICSI, and DGCS-ICSI. Rate of two pronuclear (2PN) oocytes, blastocysts development, and good-quality blastocysts were compared between each group.
Main results and the role of chance: SDFR was 13.5 ± 11.8% for raw semen. SDFR was significantly lower after MSS (3.6 ± 4.1%) than that for raw semen and after DGCS (17.4 ± 14.8%) (P <0.01). Motile sperm concentration after MSS (19.0 ± 28.3M/mL) was significantly higher after than after DGCS (15.4 ± 15.3M/mL) (P<0.01). The number of IVF performed was 145 for MSS and 132 for DGCS. IVF results (MSS vs DGCS) were 2PN rate (73.1% vs 72.0%), blastocysts development rate (65.3% vs 55.4%), and good quality blastocysts rate (43.2% vs 34.9%). The number of ICSI performed was 149 for MSS and 149 for DGCS. ICSI results (MSS vs DGCS) were 2PN rate (77.9% vs 79.2%), blastocysts development rate (68.8% vs 65.8%), and good quality blastocysts rate (35.8% vs 30.6%). No significant difference was observed between MSS and DGCS for each parameter both IVF and ICSI.
Limitations, reasons for caution: The participants were limited to those who collected semen of 2mL or more and motile sperm concentration of above 1M/mL, because semen sample needed to be divided to MSS and DGCS.
Wider implications of the findings: This is the first study to conducted in sibling oosytes study with MSS and DGCS, in both IVF and ICSI. MSS is effective in collecting sperm with less DNA damage compared to DGCS. Motile sperm concentration after using MSS is sufficient to perform IVF as well as DGCS.
Trial registration number: not applicable