The use of hyaluronic acid for sperm immobilisation and selection before intracytoplasmic sperm injection: a systematic review and meta-analysis

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Introduction

• Several methods (ultramorphology, surface electric charge, apoptotic vs nonapoptotic, chromatin structure assay) have been recently proposed for optimising the sperm selection in order to reduce the risk of chromosomal anomalies associated with poor ICSI outcome.

• Hyaluronic acid (HA) is found naturally in the women’s reproductive tract and it forms a component of the cumulus–oocyte complex. It has been proposed as a physiological alternative to polyvinylpyrrolidone (PVP) for use as a selection medium to reduce sperm motility as a solution for the reported toxicity and unknown long term effects of PVP.

• Furthermore, it has been shown that sperm’s capacity to bind HA is a biochemical marker of maturity and function, suggesting the selection of sperm by HA binding to be an alternative to microscopic assessment of motility and morphology.

Objective

• The objective of this study is to appraise critically the published randomised controlled trials (RCTs) reporting on the use of HA for sperm immobilisation and selection before ICSI.

Methods


• We set our inclusion criteria as RCTs evaluating sperm immobilisation and selection using HA before ICSI with no filter for date, country or hospital of origin, publication language, sample size or blinding. For studies presented in more than one publication, we only included the most extensive and recent version in order to avoid overlapping data.

• The primary endpoints of the present meta-analysis were defined as: fertilisation rate, embryo quality and live birth rate. Secondary endpoints were: clinical pregnancy and implantation rates, adverse events and costs.

• The software package RevMan 5.2.11, provided by the Cochrane Collaboration, was used for statistical analysis. We calculated the Risk Ratio (RR) with a 95% confidence interval (CI) using the Mantel-Haenszel method for binary data variables.

• We measured the heterogeneity using the χ2 test and quantified it using I2.

Results

• Eleven RCTs evaluating 13719 oocyte intracytoplasmatic injections with sperm immobilised and selected using HA or PVP were included in this systematic review and meta-analysis. There were 6926 injections in the HA group and 6793 injections in the PVP group.

• Based upon the guidelines suggested by the Cochrane Collaboration, the quality of most of the included studies was moderate to poor because of unclear randomisation technique, inadequate allocation concealment and blinding.

• There was no significant difference between HA and PVP groups in terms of fertilisation rate (A), embryo quality (B) or live birth rate (C).

Conclusion

• This systematic review and meta-analysis based on eleven moderate to low quality RCTs provides evidence of similar efficiency between using HA or PVP for sperm immobilisation and selection before ICSI in terms of fertilisation, embryo quality and live birth rates.

• Future trials should be conducted according to the CONSORT guidelines.