

Observation of normal cytokinesis at first mitosis 26 hours after insemination is effective in predicting embryo development

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Study question:

Is the normal cytokinesis at 1st mitosis effective in predicting subsequent embryo development 26 hours after insemination?

Summary answer:

Embryos that underwent normal cytokinesis at 1st mitosis until 26 hours after insemination had high developmental potential compared with late-cleaved or abnormally-cleaved counterparts.

What is known already:

Data of time-lapse cinematography (TLC) has shown that normal cytokinesis at 1st mitosis is one of markers to predict the development to the blastocyst in human ART. In addition, the average time required for the start of 1st mitosis in embryos which developed to blastocysts was 26 hours after insemination. In this study, we examined whether we could predict the subsequent embryonic development by assessing the normal cytokinesis at 1st mitosis 26 hours after insemination using an inverted microscope, not TLC system.

Study design, size, duration:

This study included 3165 embryos that underwent normal fertilization after IVF or ICSI between October 2014 and March 2015. The couples received full explanations regarding the study and gave their consent to being involved.

Participants/materials, setting, methods:

We divided into two groups according to the cleavage pattern at 1st mitosis 26 hours after insemination (2 cell: Group A vs. 1 cell or abnormally-cleaved embryos: Group B). And then, embryos were cultured individually. Single embryo transfer was conducted on day 3. One morphologically-good embryo was selected for transfer. We investigated the rates of good quality embryo (GQE) on day 3, of blastulation, of good quality blastocyst (GQB) on day 5, and of implantation.

Main results and the role of chance:

The normal cytokinesis at 1st mitosis was observed in 779 embryos until 26 hours after insemination (24.6%). The rate of GQE in Group A was significantly higher than that in

Group B ($P < 0.0001$, 90.8 vs 62.0%). The rates of blastulation and GQB in Group A (70.7 and 40.4%) were also significantly higher ($P < 0.0001$) than those in Group B (37.8 % and 22.4 %). After single embryo transfer on day3, the implantation rate in Group A was significantly higher than in Group B ($P < 0.01$, 40.9 % vs 17.9 %).

Limitations, reasons for caution:

This study includes all cases obtained informed consents in the period without considering the patients' characteristics. So, we would like to assess effects of maternal age and stimulation protocol in the future.

Wider implications of the findings:

The observation of 1st mitosis 26 hours after insemination with a conventional microscope would be helpful to predict embryo development without using a high-priced TLC system.

Study funding/competing interest(s):

No other competing interests are declared.

Trial registration number:

None

Topic category: Clinical science

Topics: Embryology (incl. IVF/ICSI, gamete and embryo selection, culture, cryopreservation, vitrification, developmental biology)

Topics: Laboratory

Keywords: normal 1st cleavage / prediction of embryo development/