

Abstract Details

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★ Abstract title:

Blastocysts collapse as an embryo marker of low implantation potential a time-lapse study

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Study question:

To validate the relationship between blastocyst collapse and implantation potential in *in vitro* human embryo culture using Time-Lapse technology.

Summary answer:

Blastocysts showing a severe collapse during development are less likely to implant and generate a viable pregnancy compared with embryos which do not show collapse.

What is known already:

The process of hatching in mammalian embryo, involving the escape of the blastocyst from the zona pellucida (ZP) was first observed by Lewis and Gregory in 1929. Whether blastocyst collapse could be a novel marker of embryo quality, and correlated with outcome of ICSI/IVF cycles, should be demonstrated in an independent dataset of embryos. This study investigated the correlation between blastocyst collapse and pregnancy and implantation rates following elective single transfer at blastocyst stage (eSET).

Study design, size, duration:

This is a retrospective multicenter analysis, carried out between January 2016 and February 2017. Four IVF units participate to the study: EFREC, RIE, Edinburgh, UK, IVI Valencia, IVI Barcelona and IVI Zaragoza in Spain. Blastocyst were analysed by measuring the maximum volume reduction during development and defined as having collapsed if there was $\geq 50\%$ of the surface of the TE was separated from the ZP.

Participants/materials, setting, methods:

The study included 1297 ICSI/IVF cycles having an eSET on day 5. Embryos were cultured individually in an EmbryoSlide™, using an EmbryoScope™ imaging system in 6% CO₂, 5% O₂, 89% N₂. Morphological assessment was made by examining a video of development using the associated EmbryoViewer software. Following embryo transfer, blastocyst was retrospectively allocated to one of two groups (collapsed or not collapsed). Pregnancy and implantation rates were analysed.

Main results and the role of chance:

A total of 1297 cycles were analyzed. 259 blastocysts collapsed once or more during development (19.9%) and the remaining 1038 either contracted minimally or neither contracted nor collapsed during development (80.1%). A significantly higher ongoing pregnancy rate of 51.9% (CI95% 48.9%-59.9%) was observed when blastocysts which had not collapsed during development were replaced compared to cycles in which collapsed blastocysts were transferred 37.5% (CI95% 31.6%-43.4%). A multivariable logistic regression analysis revealed an ongoing pregnancy 1.78 (1.33-2.40) OR, and the stratified study demonstrated that blastocyst collapse is mainly affecting implantation potential on good quality embryos.

Limitations, reasons for caution:

Live birth rates should also be investigated to see if there is a difference in final outcome between the groups.

Wider implications of the findings:

The pattern of blastocyst collapse could improve IVF/ICSI outcome following eSET at blastocyst stage. Therefore, it could be used as a negative marker for embryo selection.

Trial registration number:

not applicable

Keywords:

Blastocyst collapse
time-lapse
implantation