BRIEF COMMUNICATION

Proportion of utilizable surplus embryos and blastulations after cleavage-stage fresh transfers is a reflection of the total quality management of the ART laboratory

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Abstract

Objective
The aim was to determine proportion of utilizable embryos obtained before and after cleavage-stage fresh transfers.
Methods
The embryos were cultured for 5/6 days in standard incubators. The culture is subjected to routine interruptions for daily embryo development checks or selection of embryos for embryo transfer on day 3. Surplus embryos were allowed to develop further until days5/6. Embryos and blastocysts were graded excellent to poor in a range of 4 to 1. Two embryos were transferred on days 2/3. Following embryo transfer remaining surplus embryos were categorized in two groups: (1) utilizable embryos if the grade is ≥3 or (2) non-utilizable if their quality of grade ≤2.0.
Results and Discussion
Overall fertilization was 83.6%. The proportion of oocytes with 2PNs (cIVF & ICSI) was 72.1%. About 95% of 2PN zygotes cleaved and 5.4% arrested at zygote stage. Proportion of day 3 utilizable embryos was 69.5% and 60.5% before and after ET. Utilizable blastocysts that developed from leftover embryos generated from 2PN embryos were 25.5% and the overall blastulation rate was 35.0%.
Conclusion
High fertilization rate, low zygote arrest rate, generation of good quality embryos and development of 25% utilizable blastocyst from surplus embryos is similar to previous reports. This outcome suggests total quality management (TQM) of the laboratory is of acceptable standards; further improvement is possible.

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Introduction

It was assumed that cycles involving cryopreservation likely transfer higher-quality embryos than cycles not involving cryopreservation. Surplus embryos that are cryopreserved are an indication of good quality control in the IVF lab (Stern et al., 2012). The objective of the present study was to determine the proportion of utilizable embryos obtained before and after cleavage-stage fresh transfers. We assumed the quality of the IVF laboratory is of good order if there were substantial numbers of cryopreserved blastocysts following embryo transfer on day 3.

Materials and methods

The embryo culture and handling media used was obtained from Sage® USA and Irvine®,USA. The embryos were cultured for 5/6 days in

standard incubators. The culture is subjected to routine interruptions for daily embryo development checks or selection of embryos for embryo transfer on day 3. Surplus embryos were allowed to develop further until days 5/6. Embryos and blastocysts were graded excellent to poor in a range of 4 to 1. Two embryos were transferred on days 2/3. Following embryo transfer, the remaining surplus embryos were categorized in two groups: (1) utilizable embryos if the grade is ≥3 or (2) non-utilizable if their quality is grade ≤2.0.

Results

Overall fertilization was 83.6%. Proportion of oocytes with 2PNs (cIVF & ICSI) was 72.1%. About 95% of the 2PN zygotes cleaved and 5.4% arrested at zygote stage. Proportion of day 3 utilizable embryos was 69.5% and 60.5% before and after ET. Utilizable blastocysts that developed from leftover embryos generated from 2PN embryos was 25.5% and the overall blastulation rate was 35.0% (Table 1).

Table 1: Characteristics of oocyte fertilizations by cIVF and ICSI and quality of embryos and blastocysts generated

Description	Number	%
Total oocytes for cIVF/ICSI inseminations	359	N.A.
% Total fertilized	300/359	83.6%
% 2 PN zygotes from cIVF/ICSI inseminations	259/359	72.1%
% 2 PN zygotes that cleaved	245/259	94.6%
% 2 PN zygotes that failed to cleave	14/259	5.4%
% 0 PN oocytes that cleaved apparently normally	29/359	8.1%
% Abnormal fertilization (1PN, polyspermy &frag PNs)	12/359	3.3%
% Utilizable embryos from 2PN zygotes before ET	180/259	69.5%
% Utilizable embryos from 2PN zygotes after ET	95/157	60.5%
% Non-utilizable embryos from 2PN zygotes after ET	62/157	39.5%
% Utilizable blastocysts grade ≥3	40/157	25.5%
% Non-utilizable blastocysts grade ≤2.9	15/157	9.5%
% Total blastulations from leftover embryos	55/157	35.0%

Discussion

The present study has noted that the total blastulation rate from the surplus or leftover embryos following day 3 transfers to be 35% with a blastocyst utilization rate of 25%. This is similar to the figures reported by Dayal and coworkers (Dayal et al., 2006) and (Kermack et al., 2022) under similar conditions. Dayal and coworkers observed 20% of leftover embryos from conventional IVF patients developed into blastocysts compared to 14% of embryos obtained from ICSI in 126 patients. Whereas Kermack and coworkers observed a 23% blastocyst development rate in standard incubators that is suitable for cryopreservation (Kermack et al., 2022) following embryo transfer.

Embryos cultured in standard incubators subjected to routine culture interruptions appear to generate a blastocyst development rate of around 46.3% (654/1412), AlHelou et al., 2017; and 38.5%, respectively; (Araki et al.2018). In

another study overall blastocyst formation was 50.2% for ICSI and 54.8% for IVF (Van Landuyt et al., 2005). In a large study embryo culture resulted in an overall blastocyst development rate per inseminated oocyte 37.8% (1073/3216; Cimadomo et al, 2018).

Based on the above previous findings, the current observation of high fertilization rate, low zygote arrest rate (Ali et al, 2014), generation of good quality embryos and development of 25% utilizable blastocyst from surplus embryos in the present study is an indication of good total quality management in the IVF Laboratory of acceptable standards.

Conclusion

High fertilization rate, low zygote arrest rate, generation of good quality embryos and development of 25% utilizable blastocyst from surplus embryos is similar to previous reports. This outcome suggests the total quality management of the laboratory is of acceptable standards.

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