ALGORITHMS FOR THE PREDICTION OF BLASTOCYST FORMATION AND IMPLANTATION: THE PREDICTIVE VALUE OF OOCYTE AND CLEAVAGE-STAGE EMBRYO MORPHOLOGICAL CRITERIA
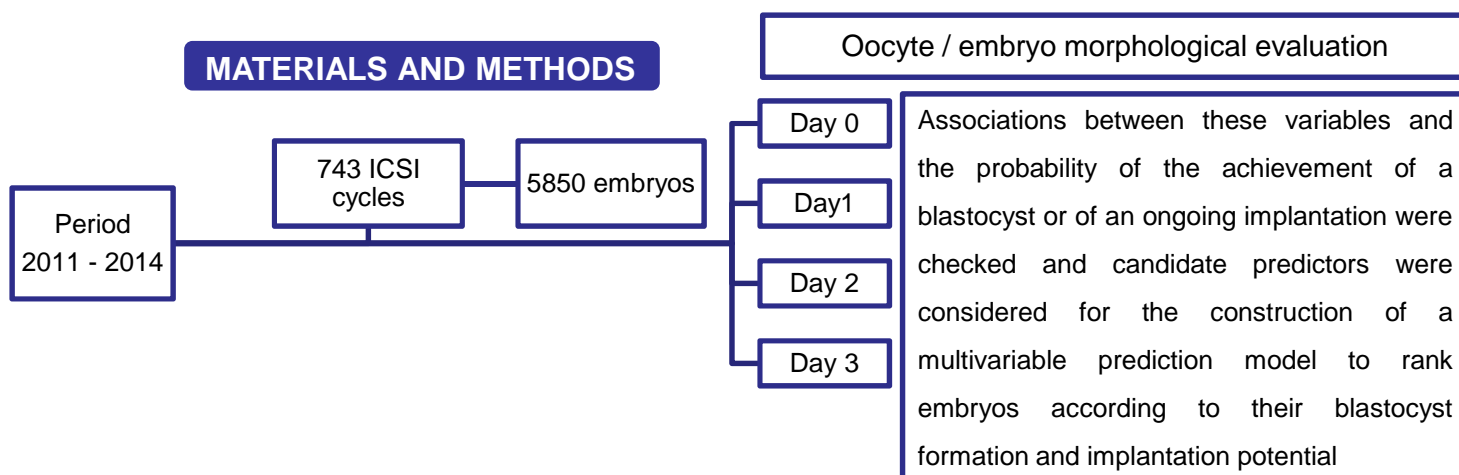
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INTRODUCTION

A prospective and individual determination of whether an extended embryo culture strategy would improve the chance of pregnancy is challenging. This challenge becomes more complicated when we consider our inability to predict whether (or which) cleavage stage embryos will form viable blastocysts. In order to define cycles that would benefit from extended embryo culture and result in higher chances of implantation, it is important to determine (i) which cleavage-stage morphological criteria would be able to predict blastocyst formation, and (ii) which of these criteria would be able to assist in blastocyst selection for transfer.

MATERIALS AND METHODS

Period 2011 - 2014 → 743 ICSI cycles → 5850 embryos → Day 0 / Day1 / Day 2 / Day 3

Oocyte / embryo morphological evaluation

Associations between these variables and the probability of the achievement of a blastocyst or of an ongoing implantation were checked and candidate predictors were considered for the construction of a multivariable prediction model to rank embryos according to their blastocyst formation and implantation potential

RESULTS

The final prediction model included 14 independent predictive factors for blastocyst formation:
- Female age
- Oocyte yield
- Large perivitelline space in the oocyte
- Day 2 - Cleavage rate
- Day 2 - Asymmetry
- Day 2 - Multinucleation
- Day 2 - Multinucleation in > 25% of blastomeres
- Day 2 - Absence of nucleus ≥ 1 blastomere
- Day 3 - Number of blastomeres
- Day 3 - Cleavage rate
- Day 3 - Asymmetry
- Day 3 - Fragmentation
- Day 3 - Blastomere multinucleation
- Day 3 - Number of blastomeres with no apparent nucleus

The final prediction model included four independent predictive factors for the blastocyst implantation:
- Female age
- D2 - Asymmetry
- D2 - Multinucleation
- D2 - Absence of nucleus in at least ≥1 blastomere

Accuracy rates:
- Blastocyst formation model: 71.7%
- Blastocyst implantation model: 80.1%

CONCLUSION

This study characterized variables with independent predictive value and provided algorithms for the prediction of blastocyst formation and implantation potential in ICSI cycles. These models provide a tool for clinics and embryologists that predicts the best time for embryo transfer without the use of time-lapse technology.