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Morphological anomalies in human oocytes with time-lapse monitoring: The consequence of smooth endoplasmic reticulum clusters

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INTRODUCTION:
Oocyte morphology is a leading factor in determining the success of ICSI/IVF cycles during assisted reproduction treatment. Oocytes exhibiting smooth endoplasmic reticulum (SER) clusters are associated with reduced embryo quality and poor implantation rates. Literature debates the precise implications of SER in developing embryos and whether the appearance of this dysmorphism is due to stimulation characteristics or rather indicative of an inherent suboptimal oocyte cohort.

AIM:
The aim of this study was to evaluate the implications of SER in the morphological development of embryos and subsequent pregnancy outcomes.

MATERIALS AND METHODS:
Approximately a third (35%) of all patients attending the unit between 2014 and 2015 exhibited the anomaly of SER. A retrospective evaluation of 60 patients from January 2014 to July 2015 was incorporated in the current study. Only patients with an HIV negative, fresh cycle, >5 oocytes obtained, without hyperstimulation characteristics and known pregnancy outcome were included in the study. The control group was randomly selected based upon the above criteria. A database of 33 SER negative (SER-/control) and 27 SER positive (SER+) patients was generated and statistical analyses (Fischer exact, t-test and two-way ANOVA) was performed to compare groups.

RESULTS:
No significant difference (p=0.2189) in maternal age was observed between the SER+ and SER- group (33.1 versus 34.4 years of age). Similarly, the day of embryo transfer (D3 versus D5) did not differ between the groups but with regards to the choice of ART procedure (ICSI versus IVF), ICSI was utilized more frequently in the SER+ group (64% versus 33% IVF) Additionally, D3 embryo transfers (ET) were more common in the SER+ group when compared to the SER- group which had predominantly D5 ETs. The number of oocytes retrieved per patient were similar between the SER+ and SER- group (8.04 ± 3.63 versus 8.91 ± 3.84, p=0.3733). However, the rate of normal fertilization of the oocytes was higher in the SER- compared to the SER+ group (64.6% versus 59.91%, not statistically significant p=0.2914) and subsequent cleavage of fertilized oocytes showed a 99.00% rate for the SER- group versus 97.00% for the SER+ group (not statistically significant p=0.1841). Finally, clinical significance (p=0.186) was detected in biochemical pregnancy rates between the SER+ (40%) and the control group (60%).

CONCLUSION/DISCUSSION:
The presence of SER clusters is associated with decreased fertilization rates, cleavage rates of the cohort oocytes/embryos and pregnancy outcomes. Not only is the cohort of SER+ patients compromised, an oocyte displaying an SER will fail to fertilize in 40.09% of cases. The incidence of SER clusters is, however, not associated with maternal age, short or long protocol stimulation procedure and number of oocytes retrieved. Counselling and follow-up of patients are advised of all patients with a SER+ cycle. Confirmation of data using a larger database, incorporating oocytes characteristics such as the diameter of SERs, movement characteristics within the ooplasma and algorithms of SER+ embryos that fertilized will be further investigated.