

**Introduction:**

This study aims to investigate the relationship between spindle normality and blastocyst formation, and implantation rates.

**Materials and methods:**

100 IVF/ICSI cycles producing 920 oocytes were included in the study. Inclusion criteria were formal consent, woman's age  $\leq 40$  yrs, and collection of  $\geq 5$  and  $\leq 15$  mature oocytes and having SET. Women with  $> 3$  consecutive failed IVF cycles were excluded. Egg collections were performed 36 hrs post hCG trigger and ICSI was performed 39-41 hrs post hCG using Oosight microscopy. Images were captured at injection time and analysed at the completion of the study. Spindle normality was independently assessed by two scientists. Blastocysts (BL) were chosen for transfer using standard light microscopic morphological criteria by scientists who were blinded to the spindle assessment. Image analysis was performed blinded to implantation or pregnancy outcome. Implantation rates were taken as number of sacs detected/embryos transferred.

**Results:**

Of the 920 oocytes collected, 808 MII oocytes were identified. 711 (88%) had a visible spindle- 205 (29%) were normal (NS) and 506 (71%) abnormal (AS). *Inter-observer* variation for spindle normality assessment was 2%. Fertilization rates were significantly higher in NS oocytes 185/205 (90%) vs. 366/506 (72%);  $P < 0.001$ . Both NS and AS oocytes formed morphologically good quality BL. Higher BL formation resulted from those with NS 140/205 (68%) vs. 115/506 (22%);  $P < 0.001$ . NS oocytes generated significantly more usable (embryo transfer or freeze) BL than AS oocytes 100/205 (49%) vs. 52/506 (10%);  $P < 0.001$ . There were two biochemical pregnancies generated from abnormally spindled derived BL but no clinical pregnancies. Thus implantation rates were 0/32 in AS derived BL vs. 41/68 (60%) in NS. Two patients, who had AS derived BL transferred, had NS derived BL frozen.

**Conclusions:**

Normality of the meiotic spindle in mature MII oocytes in IVF/ICSI cycles is associated with higher fertilization rates, BL formation, numbers of usable embryos and implantation rates. All pregnancies in this study resulted from NS oocytes. In view of these findings, spindle assessment with polarised light microscopy provides an early predictor of the pregnancy potential of that oocyte. Good quality BL can be formed from AS oocytes, but these appear to have no chance of ongoing pregnancies. Thus, spindle assessment should improve the selection of the best BL for SET.

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