REPORT OF A VIABLE PREGNANCY ARISING FROM A ZYGOTE WITH A SINGLE PRONUCLEUS AT 16 HOURS POST INSEMINATION

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Introduction:
Following intracytoplasmic sperm injection (ICSI), the oocyte cell cycle is resumed and a second polar body is extruded (McLay and Clarke, 2003). At 16-18 hours post insemination (hpi) the fertilised oocyte should display two pronuclei (PN); one pronucleus originates from the sperm and the other belongs to the oocyte (Nagy et al., 1994). An absence of fertilisation can be inferred when there are no visible PN’s. Routinely, 1PN oocytes are discarded as they are thought to be abnormally fertilised (Lim et al., 2000).

Objective:
This report describes a case where a single embryo, showing one pronucleus at 16 hpi, was transferred following pre-implantation genetic diagnosis (PGD) and gave rise to a viable pregnancy.

Methods:
A female aged 37 years underwent assisted reproduction. The couple are beta-thalassaemia carriers and the primary aim of treatment was to have a healthy child. The secondary aim was to have a child who is a human leukocyte antigen (HLA) match for their affected child. The couple commenced treatment with ICSI followed by PGD at the blastocyst stage.

Results:
Post injection (16hpi), the patient had the following fertilisation results: 7x2PN, 4x1PN and 1xOPN. Following ICSI- PGD, the 1x1PN embryo was found to be normal (not a carrier/affected by beta thalassaemia) and was HLA identical. This embryo was graded 1BB using the Cornell blastocyst grading scheme (Veeck and Zaninovic, 2003) and resulted in a live birth when transferred to the patient.

Table 1: PGD results for beta thalassaemia and HLA matched embryos

<table>
<thead>
<tr>
<th>Embryo number</th>
<th>Diagnosis</th>
<th>Transferable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No diagnosis</td>
<td>Further analysis required</td>
</tr>
<tr>
<td>2</td>
<td>Carrier- HLA non identical</td>
<td>Not advised for this case</td>
</tr>
<tr>
<td>3</td>
<td>Carrier- HLA non identical</td>
<td>Not advised for this case</td>
</tr>
<tr>
<td>4</td>
<td>Affected- HLA identical</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Normal- HLA non identical</td>
<td>Not advised for this case</td>
</tr>
<tr>
<td>6</td>
<td>Carrier- Monosomy 6</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Carrier- HLA non identical</td>
<td>Not advised for this case</td>
</tr>
</tbody>
</table>

Unfertilised 1 (1PN with 2PB)
Normal HLA identical
Yes

Unfertilised 2 (1PN with 2PB)
Carrier- Monosomy 6
No

Unfertilised 3 (1PN with 2PB)
No diagnosis
Further analysis required

Following PGD analysis: two embryos were undiagnosed, one embryo was normal- HLA non identical, one embryo was normal HLA identical (transferred), three embryos were carriers- HLA non identical, two embryos were carrier’s- monosomy 6 and one embryo was affected- HLA identical.

Discussion:
1PN embryos can arise due to:
- Parthenogenetic activation, however this is uncommon and karyotype analysis on such embryos suggests that around 80.5% of 1PN embryos are diploid (Staessen et al., 1993).
- Asynchronous pronuclear appearance at the time of fertilisation check or due to late pronuclear formation at the assessment stage. This is due to the possibility of early male or female pronuclear membrane disappearance or late formation of either the male or female PN (Nagy et al., 1998).

Conclusion:
As shown in this case report, 1PN embryos can potentially be genetically normal. Therefore if carrying out PGD it is advisable to analyse cells from unfertilised embryos which have clearly progressed and reached the blastocyst stage as these embryos may have fertilised correctly but outside of the fertilisation check period.

References: