ASCERTAINMENT CATEGORY IS A PREDICTOR OF IN VITRO FERTILIZATION (IVF) OUTCOMES AMONG CARRIERS OF STRUCTURAL CHROMOSOME REARRANGEMENTS

Authors: Jenna Reich, MD[1], Jillian Pecoriello, MD[1], Amelia G Kelly, M.D.[2], Jennifer K Blakemore, MD, MSC[2] and Andria G Besser, M.S.[2], (1) NYU School of Medicine, New York, NY, (2)NYU Langone Fertility Center, New York, NY

Background:
The impact of ascertainment category on pregnancy and delivery outcomes for translocation carriers has been previously documented (1,2). However, similar studies have not been conducted that focus on IVF outcomes for those with structural rearrangements (SR).
Objective:
The purpose of this study is to understand the effect of SR ascertainment on in vitro fertilization (IVF) outcomes.
Materials and Methods:
All IVF cycles including preimplantation genetic testing for structural rearrangements (PGT-SR) were retrospectively reviewed. Ascertainment categories for SR carriers (including translocations, inversions, and other SRs) were defined as: infertility, known family history, recurrent pregnancy loss (RPL), fortuitous discovery, or unbalanced offspring. IVF outcomes collected included number of oocytes retrieved (RET), mature oocyte rate (MII), fertilization rate (FERT), and blastocyst formation rate (BLAST). Following PGT-SR, embryos were categorized as usable if they were balanced for the SR without other aneuploidies, or as unusable if they were unbalanced or had other aneuploidies. Descriptive statistics, Kruskal Wallis and Mann Whitney were used for analysis with significance at $p<0.05$.
Results:
71 patients with SRs who underwent 160 IVF cycles were identified. SR ascertainment category was infertility for 32.4% (23/71), family history for 23.9% (17/71), RPL for 11.3% (8/71), fortuitous for 9.9% (7/71), and unbalanced offspring for 5.6% (4/71) of patients. The ascertainment category was unknown for the remaining 16.9%(12/71). Median oocytes retrieved was lower among patients with infertility (11) or RPL (11) compared to unbalanced offspring (20), family history (18), or fortuitous discovery (19) [$p<0.01$]. MII (range: 76.9% - 85.2%) and FERT (range: 70.0% - 80.0%) were not associated with ascertainment category ($p=0.32$, $p=0.80$). BLAST was lower for patients with RPL (33.3%) compared to the other categories (range: 50.0% - 68.6%; $p<0.02$). The median usable embryo rate was lower among patients with infertility, unbalanced offspring, and RPL (median of zero across categories, mean 12.8%, 8.7%, 10.9% respectively), while the median for other ascertainment categories ranged from 14.3% to 17.4% (mean range: 16.8%-24.0%) [$p<0.01$].
For maternal SRs alone, RET remained lower among infertility (10) and RPL (10.5) categories, compared to unbalanced offspring (21), family history (18), and fortuitous (22.5) categories ($p<0.01$). For paternal SRs alone, FERT was significantly lower in patients with RPL (45.0%) compared to infertility (71.4%), unbalanced offspring (75.9%), family history (70.0%), and fortuitous (70.0) categories ($p<0.02$). BLAST was not associated with ascertainment category when assessing paternal translocations alone ($p=0.051$), though this may be due to sample size given that RPL rate (median 0.0%, mean 25.0%) was seemingly lower than in other groups (median: infertility 60.0%, unbalanced output 72.2, family history 66.7).
Conclusion:
SRs were most frequently ascertained following diagnosis of infertility, and these patients had fewer oocytes retrieved and lower rates of usable embryos compared to SR carriers ascertained through their family history or fortuitously. Patients ascertained following RPL had lower BLAST and fewer usable embryos. Among paternal SR carriers whose female partners had RPL, FERT

was reduced. SR ascertainment category appears to impact IVF outcomes. This information can be used to inform patient counseling and manage expectations for IVF and PGT-SR.

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References:

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