DO ANEUPLOID EMBRYOS MAKE BABIES? ONE NETWORK'S REAL-WORLD EXPERIENCE

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OBJECTIVE:

The aims of this retrospective study are to report on one clinic network's experience performing aneuploid embryo transfer, and to assess the real-world potential for known aneuploid embryos to result in successful pregnancies.

BACKGROUND:

Preimplantation Genetic Testing for Aneuploidy (PGT-A) is a screening test primarily intended to identify euploid embryos available for transfer. However, some clinicians critique PGT-A for the possibility of embryo wastage, and some patients desire the option to transfer aneuploid embryos on the basis that PGT-A is not diagnostic. A previous non-selection study of 102 blinded aneuploid embryo transfers showed no live births [1]. However, there is little data on the outcomes of known aneuploid transfers in a typical clinical setting.

MATERIALS AND METHODS:

We collected embryo transfer outcomes from a single clinic network that permits aneuploid embryo transfer. Only transfers of PGT-A-tested embryos were included. Genetic testing for all embryos was performed by a single genetic testing laboratory primarily utilizing next-generation sequencing with additional SNP calling for chromosome copy number analysis [2]. Embryos were considered euploid if all chromosome copy number calls deviated 20% or less from the expected value of 2; low-level mosaic (LLM) if one or more chromosomal copy number call deviated from 2 by >20-40%; high-level mosaic (HLM) if copy number deviated >40-80%; and aneuploid if copy number deviated >80% from expected. Transfers were performed between January 2020 and December 2021.

REFERENCES:

1. Tiegs, A. *et al.* A multicenter, prospective, blinded, nonselection study evaluating the predictive value of an aneuploid diagnosis using a targeted next-generation sequencing-based preimplantation genetic testing for aneuploidy assay and impact of biopsy. *Fertil Steril*, 2021. 115(3):627-637.
2. Buldo-Licciardi, J. *et al.* Utilization of standardized preimplantation genetic testing for aneuploidy (PGT-A) via artificial intelligence (AI) technology is correlated with improved pregnancy outcomes in single thawed euploid embryo transfer (STEET) cycles. *Fertil Steril*, 2023. 40(2):289-299
3. Viotti, M. *et al.* Using outcome data from one thousand mosaic embryo transfers to formulate an embryo ranking system for clinical use. *Fertil Steril*, 2021. 115(5):1212-1224.

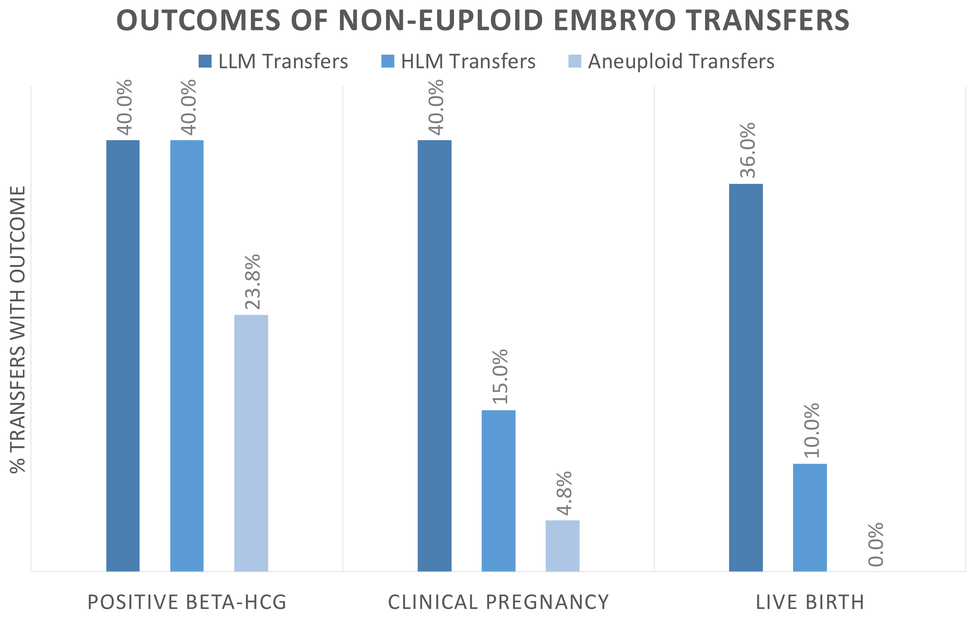
RESULTS:

Approximately 1,600 transfers of embryos tested by the single PGT-A laboratory occurred during the study period. This included 45 transfers of 50 embryos with mosaic results, and 15 transfers of 21 aneuploid embryos. Transferred embryos underwent PGT-A testing between September 2018 and November 2021.

The aneuploid transfers included 6 single embryo transfers (SETs), 5 double embryo transfers (DETs) involving two aneuploid embryos, 2 DETs of an aneuploid and a mosaic embryo, and 2 triple embryo transfers (TETs): one transfer of 2 euploids and 1 aneuploid embryo, and one transfer of 1 euploid and 2 aneuploid embryos. Of the aneuploid transfers, 5 (23.8%) resulted in a positive ß-HCG, 1 (6.7%) resulted in a clinical pregnancy and subsequent spontaneous abortion, and 0 resulted in an ongoing pregnancy or live birth (Table 1; Figure 1).

The 45 mosaic transfers included 33 SETs, 5 DETs of two mosaic embryos, 2 DETs of a mosaic embryo and an aneuploid embryo, and 1 TET with two euploid embryos and one mosaic embryo transferred together. These mosaic transfers yielded 18 (40%) positive ß-HCG results, 13 (28.9%) clinical pregnancies, 2 (4.4%) spontaneous abortions, and 11 (24.4%) live births. One DET and one TET resulted in a twin delivery; all other live births were singletons. See Table 1 and Figure 1 for a breakdown of results by level of mosaicism detected.

Summary of Non-Euploid Embryo Transfers		
Aneuploid Embryo Transfers	21	%
Positive Beta-HCG	5	23.8%
Clinical Pregnancy	1	4.8%
Live Birth	0	0.0%
Low-level Mosaic Transfers	25	%
Positive Beta-HCG	10	40.0%
Clinical Pregnancy	10	40.0%
Live Birth	9	36.0%
High-Level Mosaic Transfers	20	%
Positive Beta-HCG	8	40.0%
Clinical Pregnancy	3	15.0%
Live Birth	2	10.0%



CONCLUSIONS:

While the chance of successful pregnancy with aneuploid embryo transfer is nonzero, these data can reassure clinicians and patients that aneuploid embryos are unlikely to result in positive reproductive outcomes in real clinical settings. In contrast, as has been reported elsewhere, embryos with mosaic results have notable reproductive potential, with low-level mosaics demonstrating better outcomes than high-level mosaics [3].