THE NEW FRONTIER IN PRENATAL DIAGNOSIS: EARLY PREGNANCY COELOCENTESIS FOR COMPREHENSIVE CHROMOSOME SCREENING AND GENOME-WIDE SINGLE GENE DISORDER TESTING

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Abstract Body

Introduction: Genetic testing for fetal anomalies is unavailable to pregnant couples prior to week 9 gestation. However, for fetuses at risk for genetic disease, this early pregnancy time period is cruicial to antenatal decision making of prospective parents.
Aim: To establish a comprehensive genetic test to screen early pregnancy fetuses for chromosomal as well as single gene disorders.
Materials and Methods: Coelomic fluid was collected via coelocentesis from a pregnant index carrying an early pregnancy fetus with arrested growth. Subsequently, DNA was prepared from peripheral blood of the parents and chorionic villi were separated from the miscarried fetus for follow-up genetic analysis. DNA from the coelomic fluid was whole genome amplified and tested for maternal contamination, chromosome copy number variations, and single gene disorders using custom/commercial STR-based or next generation sequencing-based kits. All results from coelomic fluid testing were validated by SNP microarray testing of chorionic villi from the fetus.
Results: Maternal contamination was ruled out in the coelomic fluid sample. However, STR-based testing for Fragile X, spinal muscular atrophy, and myotonic dystrophy suggested aneuploidy in all loci with one maternal and two paternal allele copies. Consistent with these findings, genome-wide chromosomal analysis detected an entirely triploid XXY karyotype in the coelomic fluid. This aneuploid karyotype (as well as all other coelomic fluid findings) was confirmed by SNP microarray analysis of the miscarried fetus.
Conclusions: We demonstrate that genome-wide single-gene and chromosome-copy number screening is feasible in early pregnancy via coelocentesis, a biopsy which does not inherently compromise ongoing pregnancy.