GYNECOLOGY

Trends in gestational age at time of surgical abortion for fetal aneuploidy and structural abnormalities

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BACKGROUND: Screening for fetal aneuploidy has evolved over the past 2 decades. Whether these advances impact gestational age at abortion has received little study.

OBJECTIVE: We sought to describe trends in the gestational age at the time of abortion by fetal diagnosis over an 11-year study period. We hypothesized that gestational age at time of abortion would decrease for fetal aneuploidy but remain unchanged for structural abnormalities.

STUDY DESIGN: We conducted a retrospective case series of all women undergoing surgical abortion for fetal aneuploidy or structural abnormalities up to 24 weeks' gestation from 2004 through 2014 in a hospital operating room setting at a single, urban medical center. We excluded labor induction abortions (<1% of abortions at our medical center) and suction aspirations performed in the office practice. We performed suction aspiration up to 14 weeks and dilation and evacuation after that gestational age. We describe the median gestational age at abortion by fetal indication and year.

RESULTS: For women undergoing abortion for fetal aneuploidy (n = 392), the median gestational age at time of abortion decreased from 19.0 weeks (interquartile range 18.0-21.0) in 2004 to 14.0 weeks (interquartile range 13.0-17.0) in 2014 (Kruskal-Wallis $P < .0001$). For women undergoing abortion for fetal structural abnormalities (n = 586), the median gestational age was ≥20 weeks for each year during the study interval ($P = .1$). As gestational age decreased in the fetal aneuploidy group, fewer women underwent dilation and evacuation and more became eligible for suction aspiration (<14 weeks). In 2004, >90% of women underwent dilation and evacuation for either indication. By 2014, 31% of women with fetal aneuploidy were eligible for suction aspiration compared to 11% of those with structural anomalies.

CONCLUSION: Gestational age at the time of abortion for fetal aneuploidy decreased substantially from 2004 through 2014; earlier abortion is safer for women. In contrast, women seeking abortion for fetal structural abnormalities did not experience a change in timing. Legislation restricting gestational age at the time of abortion could disproportionately affect women with fetal structural abnormalities.

Key words: abortion, amniocentesis, aneuploidy, chorionic villus sampling, dilation and evacuation, fetal abnormality, fetal anomaly, gestational age, noninvasive prenatal testing, prenatal diagnosis

Introduction

Approximately 3% of pregnant women in the United States receive a prenatal diagnosis of fetal aneuploidy, most commonly trisomy, or fetal structural abnormalities of the neurologic, cardiac, musculoskeletal, genitourinary, or other systems.[1-3] Many of these women undergo abortion.[3-5]

Advances in screening technologies have enabled earlier diagnosis of fetal aneuploidy. During the 1990s, maternal serum testing using a combination of markers provided a second-trimester screening test.[6] By the early 2000s, first-trimester screening with ultrasound measurement of fetal nuchal translucency became more widely available. By 2011, maternal serum testing for free fetal DNA became commercially available[7] and chorionic villus sampling (CVS), performed at 10-14 weeks, was more widely adopted. After a positive screen, CVS provides earlier confirmatory diagnosis than amniocentesis at 15-20 weeks.[8-10] By contrast, no first-trimester screening test exists for most of the nonaneuploid fetal structural abnormalities. Because of fixed patterns of fetal development, diagnosis of structural abnormalities has relied on second-trimester ultrasound.

Whether changes in prenatal aneuploidy screening and diagnosis have impacted the timing of abortion for fetal indications has received limited study.[11,12] This analysis examines abortion timing for fetal indications during the era of development and dissemination of first-trimester aneuploidy detection.

Materials and Methods

The Columbia University Medical Center Institutional Review Board approved this retrospective case series study. We sought to identify a convenience sample of all surgical abortions for fetal aneuploidy or structural abnormalities from Jan. 1, 2004, through Dec. 31, 2014. Abortions at our hospital are permitted to 23 weeks 6 days by standard obstetric dating.[13] Abortions in our center occur at 2 clinical sites. All dilation and evacuation cases ≥14 weeks' gestation and some suction aspiration cases <14 weeks' gestation occur in a hospital operating room. In the office practice we only offer suction aspiration <14 weeks' gestation. We did not include labor induction cases at our hospital (<1% of annual abortions) in this study. For the operating room, we used a quality assurance database created in January 2004 and documenting every abortion case since. Clinical staff create a comprehensive list of all abortions provided in the hospital operating room based on the surgical schedule and then administrative staff enter these cases into the database weekly. We did not include records from the office practice because records were only available after 2010 when the electronic medical record (EMR) was implemented.

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TABLE 1
Demographic and pregnancy characteristics of women undergoing abortion by fetal indication

Characteristic	Total m = 978	Aneuploidy n = 392	Structural n = 586	*P*
Median maternal age, y (IQR)	34 (30–38)	37 (33–40)	32 (28–35)	< .001
Race/ethnicity, n (%)				.8
Hispanic	222 (23)	91 (23)	131 (22)	
White	540 (55)	217 (55)	323 (55)	
Black	99 (10)	38 (10)	61 (10)	
Other	81 (8)	31 (8)	50 (9)	
Missing	36 (4)	15 (4)	21 (4)	
Parous, n (%)	553 (57)	244 (62)	309 (53)	.03
Insurance, n (%)				< .001
Medicaid	242 (25)	72 (18)	170 (29)	
Commercial + self pay	736 (75)	320 (82)	416 (71)	

IQR, interquartile range.

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We included all abortions with a confirmed diagnosis of fetal aneuploidy or structural abnormalities specified in prenatal records. We categorized a case as fetal aneuploidy when a karyotype was abnormal on diagnostic amniocentesis or CVS, whether or not a concomitant structural abnormality was present. We categorized a case as structural if imaging (ultrasound, fetal magnetic resonance imaging, or echocardiography) identified a fetal organ system abnormality, with normal or unknown testing for aneuploidy. For all cases of aneuploidy we required a confirmatory diagnostic test; we planned to exclude aneuploidy cases without confirmatory diagnostic testing. We included all structural abnormalities, whether or not a positive cell-free fetal DNA screen was followed by confirmatory testing. We excluded abortions done for maternal indications and for other fetal indications (demise, abnormal microarray without a structural abnormality, sickle cell anemia, cystic fibrosis, spinal muscular atrophy, fragile X, Rh isoimmunization, infection).

TABLE 2
Specific fetal aneuploidy diagnoses (n = 392)

Aneuploidy, n (%)	Total
Trisomy 21	204 (52)
Trisomy 18	55 (14)
Trisomy 13	29 (7)
Turner syndrome	24 (6)
Klinefelter syndrome	16 (4)
Mosaic	35 (9)
Other	29 (7)

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For each case in the database, we reviewed all available clinical records in the EMR and abstracted the procedure date, maternal demographic characteristics (age, race, insurance), reproductive history, and gestational age in weeks. Abortion is a covered benefit for women with Medicaid in New York state.[14] We categorized abortion procedures performed <14 weeks' gestational age as suction aspiration and those ≥14 weeks as dilation and evacuation. We then deidentified cases and created a password-protected database for analysis.

We characterized our sample using descriptive statistics and compared maternal characteristics between groups using *t* tests, χ^2 tests, and nonparametric tests as appropriate. For each study year (2004 through 2014), as gestational age was not normally distributed, we calculated the median gestational age at abortion by indication. We used the Kruskal-Wallis test to compare median gestational ages by indication. We calculated the proportion eligible for suction aspiration vs dilation and evacuation. We carried out analyses using SPSS version 22.0 (Cary, NC). Q3

Results

We reviewed medical records of 3853 abortions performed during the study interval. We excluded 2875 cases: 2801 for maternal indications, 73 for ineligible fetal indications, and 1 with incomplete information. The final sample for analysis included 978 cases, 392 (40%) with aneuploidy, and 586 (60%) with structural abnormalities. No women underwent abortion for fetal aneuploidy based on a positive cell-free fetal DNA test without a confirmatory diagnostic test. A concomitant structural abnormality was present in 160 (41%) of fetal aneuploidy cases. Of the women we categorized as having a fetal structural abnormality, 10 had positive cell-free fetal DNA screen without a confirmatory diagnostic test for aneuploidy.

Table 1 summarizes the maternal demographic and pregnancy characteristics of our sample. In bivariate comparisons, women undergoing abortion for fetal aneuploidy were older, had higher parity, and more often had commercial insurance than women undergoing abortion for structural abnormalities. Tables 2 and 3 list the specific fetal aneuploidy diagnosis or structural abnormality by organ system. Overall, women with fetal aneuploidy underwent abortions at earlier median gestational ages than women with structurally abnormal fetuses (18.0 vs 21.0 weeks, $P < .0001$).

Over the 11-year study interval, the total number of fetal aneuploidy and structural abnormality cases per year varied from 51 (2004) to 141 (2013) and within each year at least 31% of cases were for aneuploidy. Figure 1 demonstrates trends in gestational age at

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