Letter

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Factors affecting mode of delivery in women of advanced maternal age

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SUMMARY With the implementation of the two-child policy in China, an increased number of women of advanced maternal age (AMA) have been giving birth. Formulating evidence-based guidance for the clinical management of this population is crucial. This retrospective study aimed to explore factors influencing the mode of delivery in women of AMA. Data on 350 women of AMA who delivered at Shanghai Putuo Maternity & Infant Health Hospital from January to June of 2016 were collected. Results indicated that most (114/134, 85%) of the multiparae chose delivery *via* cesarean section (CS) because of uterine scarring. There were significant differences in the body mass index (BMI) before pregnancy, BMI at delivery, gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), and placenta previa between the CS and vaginal delivery groups ($P < 0.05$ for all). The current results suggest that vaginal delivery is recommended for the first delivery whenever reasonable. Moreover, management of metabolic disorders during pregnancy is essential to effectively reduce the rate of CS among women of AMA.

Keywords advanced maternal age (AMA), cesarean section (CS), vaginal delivery, BMI, multipara

Advanced maternal age (AMA) is generally defined as pregnancy in women age 35 years or older. In recent years, the number of women of AMA in China has been increasing with the implementation of the two-child policy, changes in the concept of fertility, economic development, and the advancement of assisted reproductive technology. The rate of cesarean sections (CS) has increased with the increase in the number of women of AMA (*1*). AMA is closely associated with adverse maternal and neonatal outcomes (*2*). The risk of miscarriage, stillbirth, neonatal death, pregnancy complications, and the rate of CS are known to increase as the maternal age increases (*3*).

A retrospective study has been conducted to analyze factors associated with the delivery plan as well as maternal and neonatal outcomes in women of AMA in order to guide the clinical management of this population.

Subjects were 350 women of AMA (≥ 35 years of age) who delivered at Shanghai Putuo Maternity & Infant Health Hospital from January to June of 2016. Subjects were divided into a CS group and a vaginal delivery group. Information regarding pregnancy conditions, pregnancy complications, and neonatal outcomes was collected.

Numerical values and percentages were calculated for categorical variables. The chi-square test or Fisher's exact test was used to determine differences in categorical variables between the two groups. The mean and standard deviation (SD) or median and range were calculated for continuous variables. Continuous variables were tested for normality and equality of variances between groups. The Student's *t* test was used to compare continuous variables that were normally distributed, and nonparametric methods were used to compare non-normally distributed variables. All of the above analyses were two-sided and performed using SPSS version 22 for Windows. A P value of < 0.05 was considered statistically significant.

Among the 350 women of AMA who delivered a child, more than 70% were multiparae (249/350, 71.1%). Of the multiparae, 134 delivered *via* CS; 114 chose CS because of uterine scarring (114/134, 85%). Table 1 shows comparisons of body mass index (BMI) and pregnancy complications in women of AMA with different modes of delivery. Excluding those choosing

Table 1. Comparisons of BMI and pregnancy complications in women of AMA with different modes of delivery (excluding those choosing a caesarean section because of uterine scarring, *n* = 236)

Items	Transvaginal delivery group (*n* = 165)	Caesarean section group (*n* = 71)	*P* value
Pre-pregnancy BMI	20.96 ± 2.83	21.68 ± 3.11	0.029
BMI at the time of delivery	27.25 ± 3.65	28.23 ± 3.05	0.006
Pregnancy-induced hypertension (*n*, %)	5 (3.0%)	6 (8.5%)	0.007
Gestational diabetes mellitus (*n*, %)	28 (17.0%)	40 (56.3%)	< 0.001
Premature rupture of membranes (*n*, %)	19 (11.5%)	8 (11.3%)	1.000
Placenta previa (*n*, %)	1 (0.6%)	6 (8.5%)	0.003
Thyroid disease (*n*, %)	2 (1.2%)	3 (4.2%)	0.326

CS because of uterine scarring, a total of 236 women were included in the analysis. There were statistically significant differences in pre-pregnancy BMI (P = 0.029) and BMI at delivery (P = 0.006) between the two groups. In addition, there were significant differences in the incidence of gestational diabetes mellitus (GDM), pregnancy-induced hypertension (PIH), and placenta previa ($P < 0.05$ for all) between the two groups. However, there was no statistically significant differences in the incidence of premature rupture of membranes (PROM) or thyroid disease between the two groups.

In terms of labor complications and neonatal outcomes, there were no significant differences in postpartum hemorrhage, neonatal birth weight, neonatal asphyxia, macrosomia, or low birth weight between the two groups with different modes of delivery ($P > 0.05$ for all).

Both psychological factors and physical conditions might explain the increasing rate of CS among women of AMA. Maternal anxiety (*1*) and fear of labor pains (*4*) may affect the decision regarding the mode of delivery for both mothers and obstetricians, contributing to a CS being performed at a higher rate. A scarred uterus after a prior CS is a strong indicator of a repeat CS. A recent study reported that women with a scarred uterus preferred a CS, and that was especially true for women of AMA (*5*). However, pregnancy after a cesarean delivery was associated with an increased risk of placenta accreta, placental abruption, miscarriage, and stillbirth (*6*). Therefore, reducing the rate of CS during the first delivery is essential to reducing the rate of CS among multiparae. Pregnancy complications and chronic metabolic disorders are other possible indicators of CS in women of AMA. Recent studies have indicated that pregnant women with conditions such as hypertensive disorders, diabetes, mild renal impairment, and multiple sclerosis tended to choose a CS again, indicating that pregnancy complications affect which mode of delivery is chosen (*4*). In the current study, there were significant differences between the two groups in terms of GDM, PIH, and placenta previa. All of this evidence indicates the importance of metabolic disorder management during pregnancy to reduce the rate of CS. Women with a higher pre-pregnancy BMI or obesity were more likely to develop pregnancy complications and deliver *via* CS (*7*). Therefore, women of AMA should maintain a normal BMI through diet and exercise before and during pregnancy.

In conclusion, caution is required when choosing the mode of delivery now that the two-child policy has been implemented. Interventions must be implemented in women of AMA to reduce the rate of CS, reduce adverse pregnancy outcomes, and improve the quality of delivery. Pre-pregnancy preparation and management of metabolic disorders during pregnancy is pivotal to reducing complications and the rate of CS. Future prospective studies with an adequate sample size need to be conducted to provide more evidence.

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