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The effect of advanced maternal age on maternal and neonatal outcomes of placenta previa: A register-based cohort study

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ABSTRACT

Objectives: Advanced maternal age (AMA) at the time of delivery generally worsens obstetric outcomes, but its effects on specific pregnancy problems, such as placenta previa, have not been adequately assessed. Therefore, the objective of the study was to explore the effect of AMA on adverse maternal and neonatal outcomes among pregnancies complicated by placenta previa.

Study Design: The study was a register-based cohort study using data of three Finnish health registries, including information of 283 324 women and their newborns. Separate multivariable logistic regression modeling was performed for women under age 35 and women aged 35 or older to assess the association between placenta previa and adverse maternal and neonatal outcomes. Furthermore, interactions between maternal age and placenta previa were tested.

Results: A total of 283 324 deliveries of which 714 (0.3%) were complicated by placenta previa. Adverse maternal and neonatal outcomes increased in women with placenta previa, with different patterns across age groups. The adjusted odds ratios and 95% confidence intervals for AMA and young women with previa were 7.3 (5.0–10.6) and 6.8 (5.2–8.9) in blood transfusion, 11.3 (5.4–23.3) and 10.9 (6.1–19.6) in placental abruption. In neonatal outcomes the adjusted odds ratios for AMA and young women with placenta previa were 8.8 (6.6–11.6) and 11.7 (9.7–14.1) in preterm birth <37 weeks, 4.0 (3.0–5.3) and 4.9 (4.1–5.9) in neonatal intensive care unit (NICU) admission, 4.0 (2.8–5.7) and 5.9 (4.7–7.4) low birth weight <2500 g, 2.7 (1.5–4.9) and 3.3 (2.2–5.0) in low Apgar score at 5 min. The joint effects of maternal age and placenta previa on the risk of adverse maternal and neonatal outcomes were non-significant.

Conclusions: The risk of adverse maternal and neonatal outcomes for women with placenta previa was not substantially affected by maternal age if their different risk profiles were taken into account.

Introduction

The number of women conceiving after 35 years old has increased in high-income countries [1]. In Finland, the mean age at first child has increased from 26.5 in 1987 to 28.8 in 2015 [2,3]. Reasons for delaying childbearing are diverse and range from individual, family and social factors to national and international factors [4]. Women delay childbearing because they want to peruse educational and career-related goals before having a family [5]. Additionally, the widespread use of contraceptives and advances in assisted reproductive technology are other contributing factors for delaying childbearing [6]. Advanced maternal age (AMA) is commonly known as maternal age of 35 years or older and related to a wide spectrum of adverse pregnancy outcomes [7,8].

Placenta previa complicates 0.3–0.5% of pregnancies [9]. Studies in different settings reported that the incidence of placenta previa has increased in parallel with changing trends in risk factors [10,11]. The increasing rates of Caesarean delivery, increasing trends to delay childbearing and introduction of in-vitro fertilisation (IVF) in fertility treatment have contributed to the rising incidence of placenta previa [10,12]. Pregnancies complicated by placenta previa are at higher risk for adverse maternal and neonatal outcomes [13,14].

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AMA and placenta previa are both associated with adverse pregnancy outcomes and have been reported to increase the length of maternal and neonatal hospital stays and consequently impose a large economic burden on families and healthcare systems [13,15]. Furthermore, current evidence suggested that AMA is associated with placenta previa [8]. There is a biological plausibility that the uterine arterial blood flow decreases in older women; therefore, a larger surface area is needed to provide enough blood flow [16]. We hypothesised that suboptimal placental perfusion in placenta previa, coupled with AMA may produce extra risks for unfavourable maternal and neonatal outcomes. Hence, the aim of the present study was to evaluate the effects of AMA on adverse maternal and neonatal outcomes among pregnancies complicated by placenta previa.

Materials and methods

Data and study population

The study was a register-based cohort study, using the data of three Finnish health registries with the information of 283 324 women and their newborns, from 2004 to 2008. The data consist of three Finnish health registries, including medical birth register (MBR). The hospital discharge register (HDR) and The register of congenital malformations. The register of congenital malformations was used to exclude pregnancies with major congenital anomalies. Women with multiple pregnancies were also excluded.

The MBR covers more than 99.9% of all births in Finland and includes detailed information on maternal and neonatal birth characteristics as well as perinatal outcomes of all women and their newborns up to 7 days of age [17]. The HDR compiles nationwide data on all aspects of inpatient care in public and private hospitals as well as outpatient visits to public hospitals [18]. The register of Congenital Malformations contains information on congenital, chromosomal and structural anomalies in stillborn and liveborn infants from all Finnish healthcare settings [19]. The national institute for health and welfare (THL) receives data electronically from each setting and three national health registries are linked together by using unique personal identification numbers.

Variables and definitions

In this study, maternal age was categorised as a categorical and continuous variable. Placenta previa was a dichotomous variable without any further explanation about the types of placenta previa and the position of the placenta in the uterus. Placenta previa was diagnosed by ultrasounds in the second and third trimester when the placenta covers internal os of cervix. In the international disease classification (ICD-10), placenta previa is represented by the O44 diagnosis code.

The main outcome variables were blood transfusion, placental abruption, preterm birth, neonatal intensive care unit (NICU) admission, low birth weight and low Apgar score at 5 min. The variable blood transfusion was coded as (yes) for women who received any transfusion of blood products. Placenta abruption was diagnosed by clinical examinations and in some women by ultrasonography. Preterm birth was recorded for births less than 37 weeks of gestation and NICU admission was considered when infants were intubated. Infants less than 2500 g were classified as low birth weight. Apgar scores between 0–6 were recorded as a low Apgar score at 5 min.

Table 1
Delivery characteristics of women with singleton births, stratified by placenta previa.

Characteristics	No placenta previa 282609(99.7)	Placenta previa 714(0.3)	P-value[a]
Maternal age (N/ %)[b]			<0.001
<35y	229506(81.2%)	496(69.5%)	
≥35y	53103(18.8%)	218(30.5%)	
Mean maternal age (years, SD)[c]	29.51(5.4)	31.93(4.9)	<0.001
Parity			0.765
Primipara	119311 (42.3%)	298(41.7%)	
Multipara	162807(57.7%)	416(58.3%)	
Prior Caesarean section	3042(1.1%)	126(17.6%)	<0.001
Smoking status			0.010
Non-smoking	233370(82.6%)	611(85.6%)	
Quitted smoking before first trimester	10530(3.7%)	15(2.1%)	
Smoking during pregnancy	31057(11.0%)	79 (11.1%)	
Embryo transfer	5631(2.0%)	79(11.1%)	<0.001
In-vitro fertilisation (IVF)	178(0.1%)	4(0.6%)	<0.001
Amniocentesis before 25 weeks of gestation	7517(2.7%)	41(5.7%)	<0.001
Anaemia (haemoglobin < = 100 g/L)	4885(1.7%)	38(5.3%)	<0.001
Hospitalization due to bleeding	3042(1.1%)	126(17.6%)	<0.001
Hospitalization due to the threat of preterm delivery	8182(2.9%)	40(5.6%)	<0.001
Mode of delivery			<0.001
Vaginal delivery	213216(75.4%)	106(14.8%)	
Assisted vaginal delivery	21370(7.6%)	7(1.0%)	
Planned Caesarean section	19980(7.1%)	309(43.3%)	
Unplanned Caesarean section	27632(9.8%)	292(40.9%)	
Breech presentation	8639(3.1%)	30(4.2%)	0.076
Mother transferred to another hospital	939(0.3%)	21(2.9%)	<0.001
Birth weight (mean, SD)	3501.1(579)	2937.1 (732)	<0.001
Gestational age (weeks, SD)	39.28(1.9)	36.36(3.1)	<0.001
Outcome of newborn up to age of 7 days			<0.001
Discharge from hospital	262361(92.8 %)	491(68.8 %)	
Hospital stay ≥7 days	10659(3.8 %)	141(19.7 %)	
Transfer to another hospital	1422(0.5 %)	10(1.4 %)	

[a]Statistical analyses were modeled with Chi-Square test and Student's *t* test.
[b, c]Values are number and percentage for categorical variables and mean and standard deviation (SD) for continuous variables.