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ORIGINAL ARTICLE

Risk factors for cesarean section of primiparous women aged over 35 years

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Background. To determine the perinatal outcome of pregnancy in primiparous women over 35 years of age and to evaluate determinants predicting cesarean delivery in these women.
Methods. Two hundred and seven mothers aged at least 35 years (1.8% of the total deliveries) delivered in the Department of Obstetrics and Gynecology between 1995 and 2000. These women were matched with women aged 20–29 years according to gravidity. Multiple logistic regression analysis was used to evaluate the risk of cesarean delivery, with controls for possible confounding factors.
Results. Cesarean section was 2.09-fold more prevalent among the older than among the younger women; the difference being significant (odds ratio, OR=3.36, 95%CI 2.22–5.09; $p<0.001$). The advanced maternal age was associated with a significantly higher rate of assisted reproductive techniques involvement (OR 6.54; 95%CI 3.54–12.38; $p<0.001$). The difference between the rates of preeclampsia in the two groups did not reach the level of significance (OR 1.85; 95%CI 1.02–3.34; $p=0.056$). There were no significant differences in perinatal outcome between the two groups. The logistic regression model demonstrated an increased risk of cesarean section among the primiparous women aged over 35 years.
Conclusions. The risk of cesarean section at this advanced age is 6.54-fold. The determinants are included in the pregnancy, delivery and neonatal outcome.

Keywords: cesarean section; primiparous women

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For social, educational and economic reasons, childbearing in the developed world has shifted towards an older age (1, 2). Assisted reproduction also influences childbearing (3). Evidence has been presented that a maternal age of 35 years or more should be considered a high-risk factor in pregnancy (4).

However, some studies have reported that the neonatal risk involved in pregnancy is associated with an older maternal age (5–8). Others have reported more controversial data about neonatal and perinatal complications (9, 10). Some studies have suggested that pregnancy at an advanced maternal age is connected with a higher frequency of cesarean section among primiparous women (5–9).

The aims of this study were to analyze the perinatal outcome of pregnancy in primiparous women aged at least 35 years, and to determine the risk of complications of pregnancy. It is of clinical importance to know which factors determine the necessity for cesarean section in older primiparous women.

Study design

Between 1 January 1995 and 31 December 2000, 10 882 deliveries were recorded in our Department. During this period 207 (1.9% of the total) of the mothers were primiparous women aged 35 years or over. We compared the pregnancy outcome for these women with that of a primiparous control group aged 20–29 years; matched according to

parity and gravidity. There were 11 sets of twins and one set of triplets (12.9%) in both groups.

Intrauterine growth retardation was defined as a birth weight below the tenth percentile for gestational age according to sex, and preterm birth was defined as delivery before 37 completed gestational weeks. Previous abortion was taken as any type and any number of previous abortions. Statistical analysis was performed with the SPSS Regression Models, version 9.0 (SPSS Inc. Chicago, Illinois, USA) Differences in characteristics between the case and control groups were assessed by the chi-square test and the Student's *t*-test, and $p<0.05$ was regarded as statistically significant. Multiple logistic regression was carried out by a stepwise procedure, using the best-fit criteria for entering variables, including medical complications, with controls for possible confounding variables. The dependent factors were the primary and secondary indications for cesarean delivery.

Results

The maternal characteristics in the case and control groups are shown in Table I. The number of pregnancies after assisted reproductive techniques was significantly (almost five-fold) higher in the older group. Similarly in the older group, more women had participated in higher education but less in secondary education; the difference in the latter case being significant.

Table II reveals modestly increased rates of specific pregnancy complications in the older group as compared with the younger women. The maternal age had little impact on the incidence of gestational diabetes (9.3% vs. 5.2%). The primiparas aged 35 years or older were more likely to have preeclampsia than the younger primiparous women (17.5% vs. 10.3%), but the difference did not reach the level of significance. There were no perinatal deaths in either group.

Table III gives an overview of the maternal complications. There was no significant difference between the groups in the distribution of premature rupture of the membranes. The infants of the older primiparous women exhibited a higher incidence of malpresentation (11.6% vs. 8.2%) and premature birth (20.8% vs. 15.5%), and a lower rate of intrauterine growth retardation (7.7% vs. 11.1%) than those of the younger primiparous women, though these differences were not statistically significant. The frequency of cesarean section was significantly higher (two-fold) among the older primiparous women (53.6% vs. 25.6%; $p<0.001$). More newborns needed neonatal intensive treatment in the older group. The incidence of 5-min Apgar scores <7 was the same (3.9%) for the infants in both groups. A cord blood gas pH <7.2

Table I. General characteristics of deliveries in the two groups

	Age ≥ 35 (n=194)		Age = 20–29 (n=194)		p-value	OR
	n	%	n	%		
Married	141	72.7	147	75.8	NS	0.85 (0.54–1.34)
Education						
Primary school	16	8.2	32	16.5		
Secondary school	110	56.7	141	72.7	<0.001	
Higher education	68	35.1	21	10.8		
Assisted conception	62	32.0	13	6.7	<0.001	6.54 (3.45–12.38)
Previous abortion	83	40.1	86	41.5	NS	0.94 (0.64–1.39)
Uncared pregnancies	1	0.5	5	2.6	NS	0.20 (0.02–1.69)

OR, odds ratio; NS, not significant.

Table II. Pregnancy complications

	Age ≥ 35 (n=194)		Age = 20–29 (n=194)		p-value	OR
	n	%	n	%		
Gestational diabetes	18	9.3	10	5.2	NS	1.88 (0.84–4.19)
Preeclampsia	34	17.5	20	10.3	0.056	1.85 (1.02–3.34)
Myoma	7	3.6	1	0.5	NS	7.22 (0.88–52.29)
Placenta previa*	1	0.5		1	0.5	
Abruption placentae*	0	0.0		1	0.5	

OR, odds ratio; NS, not significant.
*Statistical analysis was not meaningful.

Table III. Perinatal outcome in the two groups

	Age ≥ 35 (n=207)		Age = 20–29 (n=207)		p-value	OR
	n	%	n	%		
Premature rupture of membranes	75	36.2	89	43.0	NS	0.75 (0.51–1.12)
Malpresentation	24	11.6	17	8.2	NS	1.47 (0.76–2.82)
Prolonged labor	19	9.8	17	8.8	NS	1.13 (0.57–2.25)
Prolonged second stage	12	6.2	18	9.3	NS	0.65 (0.30–1.38)
Cesarean section	111	53.6	53	25.6	< 0.001	3.36 (2.22–5.09)
Premature delivery	43	20.8	32	15.5	NS	1.43 (0.87–2.38)
Intrauterine growth retardation	16	7.7	23	11.1	NS	0.67 (0.34–1.31)
NICU transfer	22	10.6	20	9.7	NS	1.11 (0.59–2.11)
5-min. Apgar <7	8	3.9	8	3.9	NS	1.00 (0.37–2.72)
Umbilical cord blood (pH <7.2)	22/187*	10.7	45/194*	21.8	0.003	0.43 (0.25–0.74)
Congenital malformation	6	2.9	5	2.4	NS	0.83 (0.25–2.76)
Gestational age (mean ± SD; week)	37.66 ± 2.93		38.03 ± 2.96		NS	
Birth weight (mean ± SD; g)	3079 ± 745		3088 ± 808		NS	
Weight at delivery (mean ± SD; kg)	87.63 ± 15.9		74.24 ± 12.9		< 0.001	

*Measurement was not performed in all cases. NS, not significant; OR, odds ratio; NICU, neonatal intensive care unit.

was less frequent among the older primiparas (10.7% vs. 21.8%) and the difference was statistically significant. The number of congenital anomalies was low in both groups.

Table IV displays the results of the multiple logistic regression analysis. The older women had an overall 6.54-fold higher risk of cesarean section. Within the older group there was a 17.31-fold higher risk of cesarean section when the fetus exhibited any malpresentation, and a 15.08-fold higher risk of cesarean section when a cephalo-pelvic disproportion was present. The risk of cesarean section rose to 8.57-fold when a feto-pelvic disproportion was present, to 5.55-fold when there was fetal distress, and to 4.29-fold when there was a preterm delivery. Previous abortion influenced the occurrence of cesarean section, with an OR of 1.96, while premature rupture of the membranes diminished the risk, with an OR of 0.43.

Discussion

In the older group more pregnancies concluded preterm, but there was a lower incidence of intrauterine growth retardation (IUGR). Neither of the variables was significantly different. Some authors have claimed that this high-risk pregnancy is associated with a significantly higher incidence of preterm birth and IUGR (5–8).

Many reports have described a higher incidence of cesarean delivery (5–9). This study shows that first-time mothers who give birth at the age of 35 years or older are at high risk of cesarean delivery. The frequency of cesarean delivery was about two-fold higher in the case group than in the younger group. However, this data is more than 2.5-fold higher than the Hungarian average (2). The higher rate of cesarean delivery among controls is because of the fact that our Department is a tertiary center. The multiple regression analysis was performed to determine risk factors of cesarean section. The chance of cesarean section was 6.54-fold higher than in the control group, 17.31-fold higher when the fetus displayed malpresentation, and 15.08-fold higher when a cephalo-pelvic disproportion was present.

Our data suggest that primiparous women aged 35 years or over generally have slightly more pregnancy and perinatal complications, but do not have a worse outcome as compared with younger mothers. The differences seem to cumulate the overall higher risk factors of cesarean delivery.

Table IV. Risk factors of cesarean section according to the logistic regression model

Risk factors of cesarean section	p-value	AOR	95%CI
Women aged 35 or over	< 0.001	6.54	3.62–11.79
Malpresentation	< 0.001	17.31	7.62–39.32
Prolonged second stage	< 0.001	15.08	5.05–45.06
Feto-pelvic disproportion	< 0.001	8.57	2.86–25.72
Fetal distress	< 0.001	5.55	2.81–10.94
Preterm delivery	< 0.001	4.29	2.17–8.49
Previous abortion	0.015	1.96	1.14–3.39
Premature rupture of the membranes	0.004	0.43	0.24–0.76

AOR, adjusted odds ratio; CI, confidence interval.

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