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Research Article

Vaginal Delivery in a Cohort of Pregnant Women Aged 40 or Older

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Abstract

Aim: Delivering after the age of 40 years can be challenging. Worldwide, compared to previous decade, the number of deliveries in this particular category of age is increasing constantly. The goal of the present study was to analyze the outcome of vaginal delivery in this category of patients.

Materials and methods: A retrospective study was performed in The First Clinic of Obstetrics and Gynecology, Cluj-Napoca, Romania between 1st of January 2012 and 31st of December 2012. All deliveries that took place in the above mentioned hospital in the mentioned period were included in the study.

Results: A significant increased number of Cesarean sections were observed in the group of older patients. The duration of the active phase was shorter in ≥40 years old primiparas than in <40 years old primiparas and similar to younger patient group for parity ≥2. The Apgar score and the fetal weight were not influenced by the maternal age. Regardless of parity, the frequency of the episiotomy practice was similar in women ≥40 years old and <40 years old.

Conclusion: Vaginal delivery is still a valid option for women 40 or older.

Keywords: Vaginal delivery; Cesarean section; Delivery route

Abbreviations

VD: Vaginal Delivery; CS: Cesarean Section; SD: Standard Deviation; h: Hours; min: Minutes; WA: Weeks of Amenorrhea; GA: Gestational Age; p1: Primiparas; p2: Secundiparas; p3: Multiparas; <40: Patient aged less that 40 years at delivery; ≥40: Patient aged 40 years or older at delivery

Introduction

Over the past years a trend of increasing age at the delivery of the first child has been observed [1]. In May 2014, a report published by the Centers for Disease Control and Prevention has shown in the United States [1] the birth rates in the maternal age category 40 to 44 years old increased more than 4-fold from 1985 to 2012 (from 0.5 to 2.3 per 1000 women). This trend was also observed in the United Kingdom and Romania [2-5].

Childbearing after 40 years has been associated with an increased number of complications throughout pregnancy and peripartum [6]. The social trend, with women demands to accomplish their studies and to get a specific job leading to a delayed pregnancy, and currently effective and available contraceptive methods that allow the occurrence of a pregnancy in the moment chosen by the couple [7], represent the main reasons for this delay. Additionally, the development and the accessibility to assisted reproduction techniques have given couples considered previously incapable of conceiving the chance for a pregnancy to happen [2,8].

The present study aims to describe the parameters of vaginal birth in women ≥40 years old and to compare these parameters with those observed in women <40 years old.

Materials and Methods

A retrospective analysis of all births that took place in the 1st Clinic of Obstetrics and Gynecology, Emergency County Hospital, Cluj-Napoca, Romania (a university teaching hospital) during 12 months (year 2012) was performed. 1,872 patients were included in the study. The multiple pregnancies (84 patients) were excluded from further analysis. All patients with breech presentation or transverse lie delivered by cesarean section (CS) were excluded from the vaginal birth analysis.

For statistical purposes, based on the age at delivery, the patients were divided in two groups: <40 years old (n=1744) and ≥40 years old (n=45). For each patient, the following parameters were collected: age, gravidity, parity, delivery route, neonatal parameters (weight, Apgar score, sex). In patients who delivered vaginally, the following supplementary parameters were analyzed: duration of dilatation period, duration of expulsion, duration and type of expulsion, use of episiotomy, vaginal or cervical laceration. The data were included in a Microsoft Excel 2007 file and later analyzed using STATA Intercooled 10 (Stata Corp, College Station, Texas). Student's t-test and chi-square test were used where appropriate for comparing the parameters in the different patient groups. A p-value of <0.05 was considered statistically significant.

Results and Discussion

The present analysis focused on all singleton deliveries (n=1,744).

Maternal age

The average age in the study group was 29.90 years (SD: 4.80); the youngest patient was 13 years old and the oldest was 45 years old

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Table 1: Repartition of cases based on maternal age.

Interval of age (years)	No of cases	Absolute percentage	Cumulative percentage
<20	22	1.23	1.23
[20-25)	214	11.97	13.20
[25-30)	601	33.61	46.81
[30-35)	636	35.57	82.38
[35-40)	270	15.10	97.48
≥40	45	2.52	100

at delivery. Patients' distribution based on age is presented in Table 1. In the sample included in the analysis, the majority of the women were 30–34 years old (636 cases; 35.57%). The most frequent age to deliver in this particular maternity in 2012 was 30 years old (147 cases; 8.22%).

The majority of patients (1,743 cases; 97.48%) delivered at an age <40 years old. The frequency of delivering after ≥40 years old was 2.52% (45 cases), comparable to the frequency reported by other authors and which was situated between 2% [2] and 3.3% [5]. The frequency of the pregnancies >40 years of age observed in 2012 was similar to the frequencies observed in the same hospital the 2 previous years and the trend seems to be relatively constant over time, with values of 2.35% in 2010 and 2.65% in 2011 [9].

Significantly more primiparous delivered in the group <40 years old while significantly more multi parous (p3 – parity higher than 2) were in the ≥40 years old group (Pearson chi2 (1) =8.3744, p=0.004).

Delivery

The majority of patients (63.98%) delivered vaginally.

The age exposed the patients to a significantly increased risk of delivering by CS (<40 years old - 35.34% versus ≥40 years old - 62.22%, Pearson chi2 (1) =13.75, p=0.000). For the same parity no statistically significant differences regarding the mode of delivery was observed overall (Pearson chi2 (8) = 7.62, p= 0.471) or in the <40 years old group (Pearson chi2 (8) = 10.90, p= 0.207). In the ≥40 years old group, the majority of the primiparous delivered by CS, while the multiparous delivered vaginally (Pearson chi2 (5) = 12.85, p= 0.025). In a study published by Worley *et al* it has been shown that for multiparous, even >40 years old, a previous normal vaginal delivery is usually associated with a good outcome for a vaginal delivery at subsequent pregnancies [10].

Vaginal delivery

The analysis of vaginal delivery is schematically presented in Tables 2-4.

No statistically significant differences were observed in term of the duration of dilatation period between the ≥40 years old and <40 years old groups (t = 1.47, p=0.139). The dilatation period was significantly longer in primiparas than in multiparas from the ≥40 years old group (4.68 hours versus 3.87 hours, chi2 (24)=168.05, p=0.000) and in primiparas ≥40 years old than in primiparas <40 years old. The dilatation period had a similar duration in secundiparas and multiparas from the two age groups (p2 <40 versus ≥40 chi2 (15) = 16.20, p=0.360; and p3<40 versus ≥40 chi2 (9) = 2.27, p=0.986, respectively). Our analysis has a limited number of cases and we cannot expand our findings to the whole Romanian population; therefore, prospective multicenter studies are needed in order to elucidate this issue. However, a previous report published by Zhang *et al* in 2010 [11] that included in the analysis 62,415 patients from 19 hospitals in the US has shown that the labor has a similar progress in primiparas and multiparas up to 6 cm, but after this dilation it accelerates faster in multiparas that in primiparas. By analyzing the labor curves from this large number of patients and comparing them with those developed by Friedman [12], the authors showed that nowadays the labor progresses more slowly than 50 years ago and that the Friedman curve is not respected by the modern Obstetrics.

Table 2: Analysis of vaginal delivery – active labor phase.

Category	Parity	No of cases	Average (h)	SD (h)
<40 years	Overall	1097	4.24	2.9826
	p1	659	4.68	2.7667
	p2	367	3.71	3.495
	p3	71	2.92	1.8891
>40 years	Overall	17	3.17	1.8535
	p1	4	3.87	1.9311
	p2	10	3.05	2.1141
	p3	3	2.66	0.5773
p1	<40 versus ≥40 chi-square(24) = 168.05,		p=0.000	
p2	<40 versus ≥40 chi-square(15) = 16.20,		p=0.360	
p3	<40 versus ≥40 chi-square(9) = 2.275,		p=0.986	

Table 3: Analysis of vaginal delivery – fetal delivery.

Category	Parity	No of cases	Average (min)	SD (min)
<40 years	Overall	1096*	13.02	6.8436
	p1	654	14.23	7.7791
	p2	370	11.32	4.6851
	p3	72	10.79	4.2656
>40 years	Overall	16*	10.31	5.6180
	p1	3	16.66	11.5470
	p2	10	8.50	2.4152
	p3	3	10.00	0.0000
p1	<40 versus ≥40 chi-square(13)=5.68		p=0.957	
p2	<40 versus ≥40 chi-square(6)=7.50		p=0.276	
p3	<40 versus ≥40 chi-square(5)=1.38		p=0.926	

Table 4: Analysis of vaginal delivery – placental delivery.

Category	*Parity*	*No of cases*	*Average (min)*	*SD (min)*
<40 years	Overall	1103	10.92	4.5300
	p1	660	11.04	4.8770
	p2	370	10.72	4.1165
	p3	73	10.75	3.0812
>40 years	Overall	16	12.18	7.5208
	p1	3	16.60	11.5470
	p2	10	11.50	7.4721
	p3	3	10.00	0.0000
p1	<40 versus ≥40 chi-square(11)=15.64		p=0.155	
p2	<40 versus ≥40 chi-square(6)=17.52		p=0.008	
p3	<40 versus ≥40 chi-square(4)=0.52		p=0.971	
Artificial placental extraction				
p1	<40 versus ≥40 chi-square(1)=7.62		p=0.006	
p2	<40 versus ≥40 chi-square(1)=1.84		p=0.174	
p3	<40 versus ≥40 chi-square(1)=0.04		p=0.838	

It was hypothesized that this may be due to differences in population characteristics (older age and higher weight of women at delivery) [11]. The total duration of the labor observed in our study was lower than the one reported by Zhang *et al* [11] in both primiparas and multiparas. This difference may be explained by differences in the physical characteristics of patients included in both analyses.

No statistical significant differences of the fetal expulsion duration had been detected between the group of patients older or younger than 40 years regardless of parity (Table 3). All placental deliveries were managed actively using intravenous infusion of Oxytocin 10 IU in 1000 ml of saline solution. A significant statistical difference regarding manual placenta removal was observed between the two maternal age groups (chi2 (1) =4.49, p=0.034), the artificial placental extraction being more frequent in the <40 years old group. A more detailed analysis showed that in primiparas <40 years old the number of manual extractions was significantly higher than in primiparas ≥40 years old (chi2 (1) =7.62, p=0.006). Additionally, we observed that manual placental removal was more frequent in primiparas than in multiparas in the <40 years old group and in multiparas than in primiparas in the ≥40 years old group. The present data are similar to those previously published, which showed that the multiparity does not expose to an increased risk of manual placental removal [13,14].

Neonatal parameters

Gestational age (GA)

The labor occurred more frequently in the 39th week of gestation (data are presented in Table 5). No statistically significant differences were found between the 2 maternal age groups regarding the average GA at delivery. The results are similar to those published by Vaughan *et al* [15], who reported in 39,916 women the absence of a high risk of preterm birth in women >40 years old.

Fetal sex

The sex of the baby is very important not only for the family, but also for the medical personal knowing that some particular diseases are inherited only in males or females [16]. Currently it is possible to know the fetal sex from free fetal DNA as early as 10 weeks of gestation [17]. Although previous studies have found an increased number of boys in post term pregnancies [18], in our analysis, without taking into account maternal age, there was no difference between the frequency of boys and girls before, at or after term (<37 GA - p=0.457; [37–41) GA - p=0.270; ≥41 GA - p=0.311) (Table 6). In primiparas, no statistically significant differences between the frequency of boys and girls were observed regardless of GA, or maternal age (Table 6). However, a statistically significant higher percentage of girls was recorded in secundiparas ≥40 years old at term than in secundiparas <40 years old at term (p=0.037).

Fetal weight

Classically, fetal weight increases with parity and maternal age [19], but it has been also shown that advanced maternal age is a risk factor for severe growth-restricted fetuses [20]. In our study the newborn weight ranged from to 500 to 6,200 grams. Maternal age had no effect upon fetal weight regardless of the timing of delivery (two tailed t-test <37 - p=0.451, [37–40) - p=0.7888, ≥40 - p=0.899). The analysis based on fetal weight at delivery is depicted in Table 7. As expected, in primiparas a significantly higher proportion of women age ≥40 delivered by CS newborns with a weight between 2,500 and 3,999 grams (p=0.001). The rates of CS did not differ significantly in multiparas with a newborn weight superior to 4,000 grams between the maternal age groups (p=0.4960). Interestingly, the CS rate was statistically superior in multiparas ≥40 years old than in younger women in the newborn weight category 2,500–4,000 grams (p=0.001).

Apgar score

The data regarding the Apgar score are presented in Table 8. The ante/intrapartum fetal deaths were excluded from this analysis. As expected, there were no differences for the Apgar score values at 5 minutes between the maternal age groups at any category of GA (Table 8). Previously, it has been reported that mortality and morbidity of the fetuses increases with maternal age [21], but this was not confirmed in our study.

Episiotomy

Episiotomy is significantly more frequently performed in primiparas than in multiparas [22,23] and its frequency increases with advanced age [23]. We did not observe any statistically significant differences between the two maternal age categories at any parity and at any GA category (Table 9).

Maternal comorbidities

Maternal comorbidities are significantly more frequently encountered in older women (Table 10). Preeclampsia, the most frequent pregnancy-induced condition, has been diagnosed in 8.72% of all women delivering during the study period. The average maternal age in pre-eclamptic patients was 34 years, with a minimum of 22 years and a maximum of 44 years. These results are interesting because it is known that extreme maternal age (<18 years or >40 years) is a risk factor for preeclampsia [24]. Possible explanations for

Table 5: Analysis of birth based on gestational age at delivery.

Maternal age (years)	No of cases	Mean gestational age at delivery (weeks)		Gestational age – WA (no of deliveries)					
				<37		[37-41)		≥41	
		Average	SD	Average	SD	Average	SD	Average	SD
Overall	1785	38.76	2.1304	33.14	2.8578	38.42	0.767	40.34	0.5586
<40	1740	38.77	2.1300	33.13	2.8463	38.43	0.7263	40.34	0.5597
≥40	45	38.31	2.1194	33.50	3.6968	38.20	0.7143	40.36	0.5045
Two tailed t-test <37 <40 versus ≥40 p=0.801 [37-41) <40 versus ≥40 p=0.088 ≥41 <40 versus ≥40 p=0.912									

Table 6: Fetal sexual repartition after gestational age.

Maternal age (years)	No of cases	Fetal sex				Gestational age – WA											
						<37				[37-41)				≥41			
		Male		Female		Male		Female		Male		Female		Male		Female	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Overall	1785	943	52.83	842	47.17	79	56.83	60	43.17	503	53.23	442	46.77	361	51.50	340	48.50
<40	1740	923	53.05	817	46.95	76	56.30	59	43.70	490	53.55	425	46.45	357	51.74	333	48.26
≥40	45	20	44.44	25	55.56	3	75.00	1	25.00	13	43.33	17	56.67	4	36.36	7	63.64

<37 <40 versus ≥40 chi-square(1)=0.55 p=0.457
[37-41) <40 versus ≥40 chi-square(1)=1.21 p=0.270
≥41 <40 versus ≥40 chi-square(1)=1.02 p=0.311
overall <40 versus ≥40 chi-square(1)=1.30 p=0.254

p1
<37 <40 versus ≥40 chi-square(1)=0.75 p=0.384
[37-41) <40 versus ≥40 chi-square(1)=0.65 p=0.418
≥41 <40 versus ≥40 chi-square(1)=0.24 p=0.624
overall <40 versus ≥40 chi-square(1)= 0.42 p=0.517
p2
<37 <40 versus ≥40 chi-square(1)= 0.13 p=0.714
[37-41) <40 versus ≥40 chi-square(1)=4.35 p=0.037
≥40 <40 versus ≥40 chi-square(1)=1.00 p=0.317
overall <40 versus ≥40 chi-square(1)=3.63 p=0.056
p3
<37 <40 versus ≥40 - no test was performed because no delivery had been noted in the category ≥40
[37-41) <40 versus ≥40 chi-square(1)=0.78 p=0.377
≥41 <40 versus ≥40 chi-square(1)=0.29 p=0. 588
overall <40 versus ≥40 chi-square(1)=1.20 p=0.273

Table 7: Analysis of fetal weight at birth.

Maternal age (years)	No of cases	Mean gestational neonatal weight at delivery (g)		Neonatal weight at different fetal age categories					
				<37		[37-41)		≥41	
		Average	SD	Average	SD	Average	SD	Average	SD
Overall	1788	3297.54	610.7954	2057.19	719.3423	3282.28	450.7797	3566.68	440.3183
<40	1743	3298.07	610.7483	2049.25	721.0361	3281.57	447.5605	3566.95	440.1527
≥40	45	3277.11	619.1843	2325.00	694.6222	3304.00	548.5001	3550.00	472.2288

Two tailed t-test
<37 <40 versus ≥40 p=0.451
[37-41) <40 versus ≥40 p=0.788
≥41 <40 versus ≥40 p=0.899

p1
<2500 VD versus CS and <40 versus >40 years chi-square(1)=2.23 p=0.135
[2500-4000) VD versus CS and <40 versus >40 years chi-square(1)=10.42 p=0.001
≥4000 VD versus CS and <40 versus >40 years - no test was performed because no delivery had been noted in the category ≥40
p2
<2500 VD versus CS and <40 versus >40 years chi-square(1)=3.32 p=0.068
[2500-4000) VD versus CS and <40 versus >40 years chi-square(1)=2.17 p=0.140
≥4000 VD versus CS and <40 versus >40 years chi-square(1)=0.24 p=0.623
p3
<2500 VD versus CS and <40 versus >40 years - no test was performed because no delivery had been noted in the category ≥40
[2500-4000) VD versus CS and <40 versus >40 years chi-square(1)=6.42 p=0.001
≥4000 VD versus CS and <40 versus >40 years chi-square(1)=0.46 p=0.496

our observations may be the small sample included in the analysis, but also the different genetic susceptibility of different populations. No statistical significant differences in terms of the frequency of comorbidities were observed between the 2 maternal age groups in any parity (overall chi2 (1) = 0.00, p=0.997; p1 chi2 (1) = 0.33, p=0.560; p2 chi2 (1) = 0.092, p=0.760; p3 chi2 (1) = 3.36, p=0.067).

Conclusion

Present data suggest that it is safe to deliver even after 40 years. However, one should take into account that the oldest woman from our study was only 45 years old.

Surprisingly, the duration of the active labor was shorter in older primiparas, whereas in secundiparas or multiparas no change was observed. Additionally, we have observed no differences for the duration of the expulsion of the fetus or placenta between the younger or older women regardless of parity. Unexpectedly, the manual removal of the placenta was less frequently performed in older patients. No difference in the practice of episiotomy was observed between the two age groups.

Even if the risks associated to the vaginal delivery are acceptable, the rate of cesarean delivery increased with age, especially in

Table 8: Analysis of Apgar score at 5 minutes.

Maternal age (years)	No of cases	Apgar score		Apgar score at different gestational ages (WA)					
				<37		**[37-41)**		**≥41**	
		Average	SD	Average	SD	Average	SD	Average	SD
Overall	1758	9.59	0.7892	8.69	1.3459	9.67	0.6458	9.63	0.7402
<40	1714	9.59	0.7934	8.67	1.3571	9.67	0.4540	9.63	0.7445
≥40	44	9.68	0.6120	9.33	0.5773	9.63	0.6686	9.91	0.3015
Two tailed t-test **<37** **overall <40 versus ≥40 p=0.405** **VD <40 versus ≥40 p=0.573** **CS <40 versus ≥40 - no test was performed because no delivery had been noted in the category ≥40** **[37-41)** **overall <40 versus ≥40 p=0.714** **VD <40 versus ≥40 p=0.408** **CS <40 versus ≥40 p=0.910** **≥41** **overall <40versus ≥40 p=0.217** **VD <40 versus ≥40 p=0.322** **CS <40 versus ≥40 p=0.439**									

Table 9: Analysis of the frequency of performing episiotomy at birth.

Maternal age (years)	**No of cases**	**Episiotomy**				**Gestational age – weeks**											
						<37				**[37-41)**				**≥41**			
		Yes		No		Yes		No		Yes		No		Yes		No	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Overall	1127	970	86.07	157	13.93	52	62.65	31	37.35	488	86.22	78	13.78	430	89.96	48	10.04
<40	1111	960	86.41	151	13.59	51	62.96	30	37.04	482	86.69	74	13.31	427	90.08	47	9.92
≥40	16	10	58.82	6	35.29	1	50.00	1	50.00	6	60.00	4	40.00	3	75.00	1	25.00
<37 <40 versus ≥40 chi-square(1)= 0.14 p=0.708 [37-41) <40 versus ≥40 chi-square(1)= 5.88 p=0.015 ≥41 <40 versus ≥40 chi-square(1)= 0.99 p=0.318 overall <40 versus ≥40 chi-square(1)= 7.51 p=0.006																	
p1 <37 <40 versus ≥40 - no test was performed because no delivery had been noted in the category ≥40 [37-41) <40 versus ≥40 chi-square(1)= 0.13 p=0.717 ≥40 <40 versus ≥40 chi-square(1)= 0.04 p=0.840 overall <40 versus ≥40 chi-square(1)= 0.23 p=0.628 p2 <37 <40 versus ≥40 chi-square(1)= 0.01 p=0.953 [37-41) <40 versus ≥40 chi-square(1)= 0.77 p=0.380 ≥40 <40 versus ≥40 chi-square(1)= 0.27 p=0.597 overall <40 versus ≥40 chi-square(1)= 0.98 p=0.321 p3 <37 <40 versus ≥40 - no test was performed because no delivery had been noted in the category ≥40 [37-41) <40 versus ≥40 chi-square(1)=2.21 p=0.136 ≥40 <40 versus ≥40 chi-square(1)=0.79 p=0.374 overall <40 versus ≥40 chi-square(1)=2.39 p=0.122																	

Table 10: Analysis of the maternal comorbidities.

Maternal age (years)	**No of cases**	**Pathology**			
		Yes		No	
		N	%	N	%
Overall	1788	547	30.59	1241	69.41
<40	1743	517	29.66	1226	70.34
≥40	45	30	66.67	15	33.33
<40 versus ≥40 chi-square(1)=28.29 p=0.000					

primiparas. This increase in primiparas, observed more frequently in the ≥40 years old group compared with the <40 years old group, can be explained by previous fertility treatments and a higher percentage of associated disease that can contraindicate a vaginal delivery.

All these arguments encourage us to recommend vaginal delivery, in the absence of other condition, even after the age of 40.

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