HJOG An Obstetrics and Gynecology International Journal

Research

IN PRESS

The impact of current obstetric practice on temporal patterns of childbirth

Sakellariou Vasiliki, Dritsakou Kalliopi, Tzortzi Alexandra, Nousia Konstantina, Farmakides George

6th Department of Obstetrics and Gynecology, Elena Venizelou hospital, Athens, Greece

Correspondence

Farmakides George

Elena Venizelou hospital, 2 Elena Venizelou Square, GR-11521 Athens, Greece

E - mail: g.farmakides@hospital-elena.gr

Abstract

Introduction: The actual time of spontaneous delivery has been a matter of investigation for many years by anthropologists and physicians. The aim of this study was to test the possible associations between gestational age, mode, day, duration and time of delivery.

Material and Methods: This was an observational study of 412 women given birth in our maternity hospital that were recruited over a two month period, November 1st 2014 to January 1st 2015.

Results: Maternal age and parity were found to be higher in women given birth with cesarian section. The higher percentages of vaginal births and cesarian sections were conducted on Monday and Tuesday and between 08.00 to 12.00 a.m., in both groups. The differences in mode, day and time of labor were statistically significant. Mean duration of vaginal birth was higher on Mondays and Thursdays and between 14.00 to 20.00 p.m. Mean gestational age was higher in vaginal births compared with cesarian sections although differences were not statistically significant in mode, day and time of delivery.

Conclusion: Our findings highlight the need for maternity hospitals to re - examine practices regarding the non - medically indicated variations in obstetric procedure use, related to time and day of birth.

Keywords: temporal patterns of childbirth; labor; gestational age

The actual time of spontaneous delivery has been a matter of investigation for many years by anthropologists and physicians[1-5]. The possible correlations of different practices in obstetrics with the temporal patterns of childbirth have also been examined for decades[6-7]. The reason that in recent years in most developing and developed countries, an increasing interest regarding the impact of several obstetric practices on the temporal patterns of labor is noticed, is that, it is suggested that labor induction, augmentation and operative delivery are possibly associated with specific days, times and duration of labor[9-15]. Furthermore, these obstetric interventions raise concern of well - being of mothers and infants[16-17]. The aim of this study was to test the possible associations between gestational age, mode, day, duration and time of delivery.

Material and Methods

This was an observational study of 412 women given birth in our maternity hospital that were recruited over a two month period, November 1st, 2014 to

January 1st, 2015. Maternal and neonatal medical birth records were examined after maternity hospital scientific board's approval and informed consent was achieved. We excluded preterm births and stillborn infants from the study. The gestational age was confirmed by an ultrasound conducted at the 20th week of gestation.

Variables were first tested for normality using the Kolmogorov - Smirnov criterion. Normally distributed variables are expressed as mean (± standard deviation, SD), while variables with skewed distribution are expressed as median (interquartile range, IQR). Qualitative variables are expressed as absolute and relative frequencies. The independent Student's t test, Kruskall Wallis test, Chi - square and Fisher's exact tests were used. All reported p-values are two - tailed.

Results

A total of 412 women were recruited of which 63.1% (260/412) delivered their infants with cesarian section. Vaginal births after cesarian section (VBACs) consisted 6.6% (10/152) of all vaginal births. Maternal age and parity were found to be higher in women given birth with cesarian section (Table 1, Figure 1). Differences regarding the neonatal gender were not statistically significant between the two study groups. Gestational age and neonatal birth weight were higher in women delivering their infants vaginally. Contractions were the most common sign of childbirth initiation in vaginal births. The proportion of programmed cesarian sections was 36.9% (96/260). General anesthesia was used in 60% of cesarian sections, whereas 32.3% of cesarian sections were conducted under spinal anesthesia (Table 1) The proportion of colored amniotic fluid was almost the same between the two study groups. The higher percentages of vaginal births and cesarian sections were conducted on Monday and Tuesday and between 08.00 to 12.00 a.m., in both groups. The differences in mode, day and time of labor were statistically significant (Table 2, Figure 2). Mean duration of vaginal birth was higher on Mondays and Thursdays and between 14.00 to 20.00 p.m. (Table 3, Figure 3). Mean gestational age was higher in vaginal births compared with cesarian sections although differences were not statistically significant when the correlations of mode, day and time of delivery were tested (Table 4). VBACs were not found to be statistically related to any specific day, time or duration of delivery.

Discussion

There are quite enough data available in the literature that suggest the role of fetal hypothalamic - pituitary - adrenal system in the initiation and duration of spontaneous delivery. Many studies have highlighted the fact that natural labors peak around midnight partly due to the advantageous availability of social support at night. Recently, it has been reported that most labors take place during the day[2-5]. The frequency of use of widely known obstetric procedures to assist in vaginal labor has been shown to diversify due to characteristics of pregnant women and healthcare providers, irrespectively of the clinical indications for intervention[3-9]. These variations in obstetric practices' use based on "non - medical" factors is worthy of attention, as it raises the possibility of unnecessary intervention that might increase the costs of maternity care, and possibly increase the maternal or neonatal morbidities as well. A lot of evidence of the additional maternal and neonatal morbidity associated with frequent use of medical interventions underlines the necessity to test the correlation between day, time, gestational age and mode of delivery.

Overuse or misuse of obstetrical procedures, for the reasons of convenience - that is, as a way to control pregnant women's anxiety or manage time more efficiently - is examined in our study. Little evidence exists for this "convenience" hypothesis[10-17]. We explored the extent to which "convenience" factors may probably influence the use of obstetric procedures including cesarean section, for a population of women that gave birth in our maternity hospital over a two month period. Specifically, the objective of the study was to test time of weekday variation associated with labor augmentation and interven-

Table 1. Maternal and neonatal demographic characteristics

	Vaginal birth	Cesarean section	P - value
	N (%)	N (%)	
Total	152 (100%)	260 (100%)	
Maternal age, mean (SD)	28.9 (5.6)	31.6 (4.4)	<0.001
Gender			
Male	84 (55.3%)	120 (46.2%)	0.083
Female	68 (44.7%)	140 (53.8%)	
Parity, median (IQR)	1.0 (1.0)	2.0 (1.0)	0.015
Gestational age (weeks), median (IQR)	39.4 (1.8)	38.3 (1.4)	<0.001
Birth weight (grams), mean (SD)	3300 (401.8)	3105.2 (481.4)	<0.001
Childbirth initiation mechanism			
Spontaneous rupture of membranes (SRM)	40 (26.3%)	32 (12.3%)	<0.001
Contractions	76 (50%)	92 (35.4%)	
Contractions and SRM	24 (15.8%)	16 (6.2%)	
Labor induction	12 (7.9%)	23 (8.8%)	
Cesarian sections programmed	0 (0%)	96 (36.9%)	
Anesthesia type			
General anesthesia	0 (0%)	156 (60%)	<0.001
Epidural anesthesia	12 (7.9%)	12 (4.6%)	
Spinal anesthesia	0 (0%)	84 (32.3%)	
Perineal anesthesia	140 (92.1%)	8 (3.1%)	
Type of amniotic fluid			
Clear amniotic fluid	140 (92.1%)	240 (92.3%)	0.129
Colored amniotic fluid	12 (7.9%)	20 (7.7%)	

Table 2. Correlations between mode, day and time of delivery

	Vaginal birth	Cesarean section	P - value
	N (%)	N (%)	
	152 (100%)	260 (100%)	
Day of labor			
Monday	48 (31.6%)	68 (26.2%)	<0.001
Tuesday	60 (39.5%)	68 (26.2%)	
Wednesday	8 (5.3%)	48 (18.5%)	
Thursday	16 (10.5%)	48 (18.5%)	
Friday	20 (13.2%)	8 (3.1%)	
Saturday	0 (0%)	4 (1.5%)	
Sunday	0 (0%)	16 (6.2%)	
Time of labor			
00.00 - 02.00	4 (2.6%)	20 (7.7%)	<0.001
02.00 - 04.00	12 (7.9%)	4 (1.5%)	
04.00 - 06.00	0 (0%)	0 (0%)	
06.00 - 08.00	16 (10.5%)	4 (1.5%)	
08.00 - 10.00	56 (36.8%)	60 (23.1%)	
10.00 - 12.00	28 (18.4%)	96 (36.9%)	
12.00 - 14.00	8 (5.3%)	16 (6.2%)	
14.00 - 16.00	8 (5.3%)	28 (10.8%)	
16.00 - 18.00	4 (2.6%)	0 (0%)	
18.00 - 20.00	0 (0%)	4 (1.5%)	
20.00 - 22.00	12 (7.9%)	0 (0%)	
22.00 - 00.00	4 (2.6%)	28 (10.8%)	

Table 3. Correlations between mean duration of vaginal births (hours), day and time of delivery

	Vaginal birth (N= 152)	P - value
Day of labor, median (IQR)		
Monday	5.9 (6.6)	<0.001
Tuesday	3.9 (3.5)	
Wednesday	3.3 (4.5)	
Thursday	6.1 (3.4)	
Friday	2.4 (1.0)	
Saturday	2.0 (1.0)	
Sunday	3.0 (1.5)	
Time of labor, median (IQR)		
00.00 - 02.00	2.0 (1.0)	<0.001
02.00 - 04.00	2.0 (1.5)	
04.00 - 06.00	4.0 (5.0)	
06.00 - 08.00	3.0 (3.8)	
08.00 - 10.00	4.0 (5.5)	
10.00 - 12.00	4.5 (7.5)	
12.00 - 14.00	4.0 (4.0)	
14.00 - 16.00	5.7 (10.5)	
16.00 - 18.00	6.0 (11.0)	
18.00 - 20.00	5.2 (9.0)	
20.00 - 22.00	2.5 (7.5)	
22.00 - 00.00	2.0 (8.0)	

Table 4. Correlations between gestational age (completed weeks), mode, day and time of delivery

	Vaginal birth (N= 152)	Cesarean section (N= 260)	P - value
Day of labor, median (IQR)			
Monday	39.9 (2.2)	38.1 (1.0)	0.569
Tuesday	39.2 (1.7)	38.5 (1.9)	
Wednesday	39.1 (0.2)	37.5 (1.6)	
Thursday	39.3 (3.8)	38.6 (1.6)	
Friday	39.4 (1.0)	37.3 (1.9)	
Saturday	38.2 (1.5)	37.4 (1.8)	
Sunday	39.1 (2.0)	38.4(1.9)	
Time of labor, median (IQR)			
00.00 - 02.00	39.2 (2.0)	39.1 (1.4)	0.321
02.00 - 04.00	38.4 (2.4)	37.3 (1.9)	
04.00 - 06.00	38.6 (1.0)	37.4 (1.8)	
06.00 - 08.00	39.2 (2.2)	37.5 (1.6)	
08.00 - 10.00	39.5 (1.4)	38.1 (1.8)	
10.00 - 12.00	39.4 (1.6)	38.4 (1.1)	
12.00 - 14.00	38.2 (1.6)	38.5 (2.7)	
14.00 - 16.00	39.5 (1.0)	38.0 (1.1)	
16.00 - 18.00	39.1 (1.0)	37.5 (1.6)	
18.00 - 20.00	38.4 (1.2)	37.4 (1.8)	
20.00 - 22.00	38.4 (3.5)	37.5 (1.6)	
22.00 - 00.00	38.4 (1.2)	37.6 (1.0)	

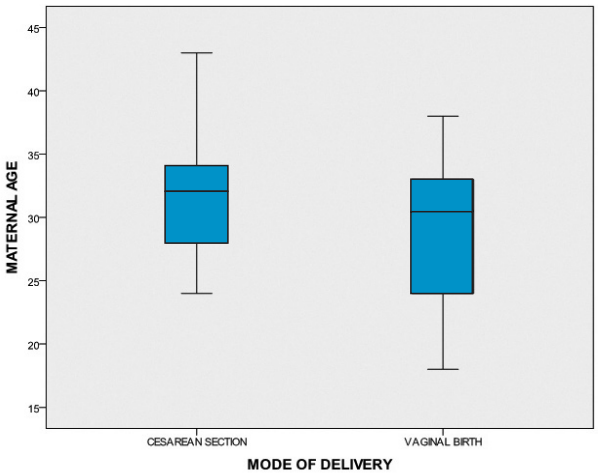

Figure 1: Correlation of maternal age with mode of delivery

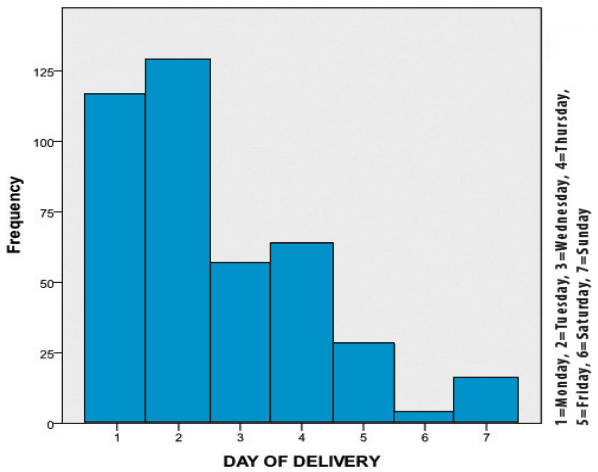

Figure 2: Distribution of daily number of births

tional obstetric procedures when healthcare professionals may be under extra pressure to speed up the labor and delivery process[6-8].

Additional research is warranted to confirm the generalizability of these findings to other populations. As a conclusion, our findings highlight the need for maternity hospitals to re - examine their practices regarding the non-medically indicated variations in obstetric procedure use, related to time and day of birth, and to prevent any unnecessary maternal or infant morbidity induced by such use.

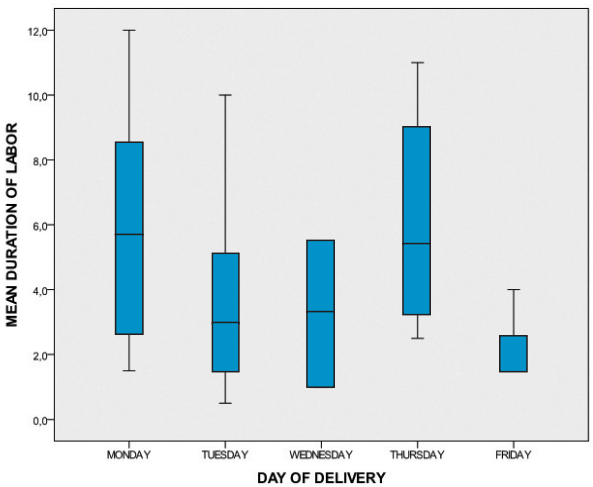

Figure 3: Mean duration of labor (in hours) per day of delivery

Conflict of interest

All authors declare no conflict of interest.

References

1. Roberts CL, Tracy S, Peat B. Rates for obstetric intervention among private and public patients in Australia: population based descriptive study. BMJ 2000;321:137 - 41.
2. Rosenblatt RA, Dobie SA, Hart LG, et al. Interspecialty differences in the obstetric care of low-risk women. Am J Public Health 1997;87:344 - 51.
3. Robinson JN, Norwitz ER, Cohen AP, Lieberman E. Predictors of episiotomy use at first spontaneous vaginal delivery. Obstet Gynecol 2000;96:214 - 8.
4. Hueston WJ. Factors associated with the use of episiotomy during vaginal delivery. Obstet Gynecol 1996;87:1001 - 5.
5. Reid AJ, Carroll JC, Ruderman J, Murray MA. Differences in intrapartum obstetric care provided to women at low risk by family physicians and obstetricians. CMAJ 1989;140:625 - 33.
6. Carroli G, Mignini L. Episiotomy for vaginal birth. Cochrane Database Syst Rev 2009;1:CD000081.
7. Brown S, Lumley J. Maternal health after childbirth: results of an Australian population based survey. Br J Obstet Gynaecol 1998;105:156 - 61.
8. Sultan AH, Kamm MA, Hudson CN, Thomas JM, Bartram CI. Anal - sphincter disruption during vaginal

delivery. N Engl J Med 1993;329:1905 - 11.
9. Yeomans ER, Hankins GD. Operative vaginal delivery in the 1990's. Clin Obstet Gynecol 1992;35:487-93.
10. Chalmers JA. Vacuum extraction or forceps? BMJ 1986;292:343.
11. Burns LR, Geller SE, Wholey DR. The effect of physician factors on the cesarean section decision. Med Care 1995;33:365 - 82.
12. Fraser W, Usher RH, McLean FH, et al. Temporal variation in rates of cesarean section for dystocia: does "convenience" play a role? Am J Obstet Gynecol 1987;156:300 - 4.
13. Evans MI, Richardson DA, Sholl JS, Johnson BA. Cesarean section. Assessment of the convenience factor. J Reprod Med 1984;29:670 - 6.
14. Webb D, Culhane JF, Snyder S, Greenspan J. Pennsylvania's early discharge legislation: effect on maternity and infant lengths of stay and hospital charges in Philadelphia. Health Serv Res 2001;36:1073-83.
15. Anim - Somuah M, Smyth R, Howell C. Epidural versus non - epidural or no analgesia in labour. Cochrane Database Syst Rev 2005;4:CD000331.
16. Zhang J, Klebanoff MA, DerSimonian R. Epidural analgesia in association with duration of labor and mode of delivery: a quantitative review. Am J Obstet Gynecol 1999;180:970 - 7.
17. Halpern SH, Leighton BL, Ohlsson A, Barrett JF, Rice A. Effect of epidural vs parenteral opioid analgesia on the progress of labor: a meta-analysis. JAMA 1998;280:2105 - 10.