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Maternal complications associated with type of delivery in a university hospital

Roseli Mieko Yamamoto Nomura, Eliane Aparecida Alves and Marcelo Zugaib

Clínica Obstétrica do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo.
São Paulo, SP, Brasil

ABSTRACT

Objective

To analyze maternal complications associated to type of delivery, comparing cesarean (c-) section with vaginal delivery.

METHODS

Retrospective study of 1,748 deliveries carried out at a university hospital in the city of São Paulo, Southeastern Brazil, in which the newborn weighed more than 500 g. Maternal complications occurred during delivery as well as those diagnosed during puerperium that required further hospital admission were analyzed. Statistical analyses included Student's *t* test and Fisher's Exact test. Significance level was set at 0.05.

RESULTS

C-sections were performed on 988 patients (56.5%). Hemorrhagic complications occurred in 1.2% of c-sections and in 0.8% of normal deliveries, with no statistically significant difference between both groups. Endometritis was observed in 0.4% of c-sections and in 0.1% of vaginal deliveries, without statistically significant difference. Two cases of puerperal infection evolved to hysterectomies, in the c-section group. There were no maternal deaths related to c-section.

CONCLUSIONS

No associations were found between maternal complications and type of delivery in the period analyzed.

KEYWORDS

Cesarean section. Labor complications. Parturition. Puerperal infection. Puerperal complications.

INTRODUCTION

In the last few years, Brazil has had one of the highest rates of caesarian (c-) section delivery worldwide. This is related to a number of factors, which involve, mainly, recent improvements in surgical and anesthetic techniques, greater availability of propaedeutic resources that detect risk for the fetus, the increase in the incidence of pregnancies in patients with prior c-sections, and sociocultural factors related to the greater practicality of programmed delivery.¹¹ Obviously, any surgical procedure includes a level of risk inherent to the act itself. However, the possibility of avoiding a c-section in emergency situations, due to maternal or fetal risk, has stimulated discussions, since certain circumstances suggest elective c-sections as an option in the context of the dialog established between obstetrician and patient.¹⁰

In a study published in 1999, Belizán et al¹ (1999) report a growing increase in c-section rates in a number of Latin-American countries, especially Chile, with 40% and Brazil, with 27.1% (1994-96). However, according to governmental statistics provided by the *Sistema de Informações dos Nascidos Vivos* (Live-birth Information System - SINASC),⁹ the c-section rate in 2000 in the state of São Paulo was as high as 48.4%.

In high-risk pregnancies, complications may frequently require the premature interruption of gestation, producing an increase in c-section rates. The present survey was conducted in an obstetrical clinic of a university hospital. In a university environment, the procedures adopted tend to follow pre-established protocols,¹⁷ in which indications for surgical procedures are based mainly on the clinical and obstetrical aspects of each case, in an attempt to minimize c-section incidence.

The greater morbidity associated with c-sections in comparison with vaginal delivery is well documented in the literature.^{3,4,6,7} However, few studies describe in detail the types of complications associated to the procedures. The present study is aimed at analyzing the different delivery-associated complications, comparing c-section and vaginal delivery.

METHODS

The survey was carried out in the obstetrical clinic of a university hospital in the city of São Paulo, characterized by its status as a reference center for severe cases, thus receiving a significant body of high-risk patients with intercurrent clinical and obstetric conditions. The profile of this population increases the risk of abnormal occurrences during pregnancy and labor, as well as the risk of fetal suffering, thus increasing the proportion of c-sections.

Between 1 April and 31 December 2001, 2,410 patients were admitted to the facility. Early in 2001 a computerized program designed to store in- and outpatient personal and clinical data, including data related to the newborn, was implemented in the clinic. Admission files in the patient's medical records, as well as delivery files and discharge reports were printed using this software. In order to ensure the effective inclusion of all deliveries carried out in this clinic, electronic datasheets were checked on a monthly basis, comparing data from the software with the delivery registration journal, kept by the nursing service of the obstetrics clinic. During the period analyzed, a total 1,748 deliveries were carried out in which the newborn weighed more than 500 g. Data were analyzed retrospectively based on the institution's database.

Clinical diagnoses most frequently observed among the population analyzed are presented in Table 1.

Table 1 – Most frequently observed clinical diagnoses in gravida population.

Diagnosisóstico	N	%
Hypertensive syndromes	307	17.6
Premature amniorrhexis	177	10.1
Diabetes	168	9.6
Cardiopathies	126	7.2
Infections	123	7
Fetal malformations	111	6.4

A large number of other diagnoses were observed with lesser frequency. 357 pregnant women did not present intercurrent clinical or obstetric conditions, or 20.4% of the analyzed population.

Maternal age varied between 12 and 44 years, with mean age 27.6 years, 6.9 years standard deviation and 27.1 years median value. In terms of obstetrical history, 694 were nulliparae, or 39.7% of cases. Antenatal care was provided at the same health facility for 1,173 patients (67%).

Due to its being a university hospital, most surgical procedures in the institution are performed by resident trainee students, under direct supervision of assistant doctors belonging to the department's clinical team. According to this classification, 1,706 deliveries were done by resident trainees, or 97.6% of analyzed cases.

Clinical and/or obstetrical indications for the termination of gestation by c-section are listed in Table 2.

Table 2 – Clinical and/or obstetric indications leading to c-sections.

Indications for c-section	N	%
Fetal suffering	207	21
Interactive c-section*	174	17.6

Labor dystocia	123	12.5
Severe maternal pathology	87	8.8
Meconium in amniotic fluid	75	7.6
Fetal-pelvic disproportion	61	6.2
Breech presentation	52	5.3
Oligohydramnion	45	4.6
Twin gestation	33	3.3
Fetal Malformation	31	3.1
Intra-uterine growth restriction	21	2.1
Maternal HIV infection	21	2.1
Premature membrane rupture	15	1.5
Premature placental detachment	10	1
Other diagnoses with frequencies below 1.0%	33	3.3

*Characterized as the c-section performed when the patient presented a history of two or previous more c-sections

The conditions listed in Table 2 correspond to those considered to be the main indication for the c-section in each case, even if more than one problem was diagnosed. The occurrence of maternal complications in cases in which c-sections were performed was compared to that of cases of vaginal delivery (normal or forceps). Complications studied included those occurred during the surgical procedure, as well as those occurred during puerperium that required rehospitalization. The infectious complication investigated was puerperal infection, defined as the infection originated in the genital apparatus after recent delivery. Endometritis was characterized as an infection of the placental implantation site with concomitant fever and pain, softening, and insufficient involution of the uterus, requiring treatment with specific antibiotic therapy. Abdominal wall infection at the site of surgical incision was only considered in this analysis in case there was the need for rehospitalization for restitching purposes. Hemorrhagic consequences analyzed included the occurrence of hypotonic myometrium or uterine atony in which excessive bleeding and inefficient contractility of the uterus required supplementary intravenous/ intramuscular oxytocin administration and uterine massage. Placenta accreta was characterized when placental villi was attached to the myometrium, with abnormally firm adherence to the uterine wall. In attempting at manual detachment, partial or total absence of a cleavage was observed.

Quantitative variables were analyzed descriptively through the observation of minimum and maximum values and mean, median, and standard deviation calculations. For qualitative variables, absolute and relative frequencies were calculated. Comparison of means was carried out using Student's *t* test for non-paired samples. Comparison of proportions was evaluated using Fisher's Exact Test. Significance level was set at 0.05 ($\alpha=5\%$). Hence, descriptive (*p*-) levels below this threshold were considered as significant ($p<0.05$).

RESULTS

Of the total 1,748 deliveries occurred in the obstetrical unit in the studied period, c-sections were performed on 988 patients (56,5%), whereas 760 patients (43.5%) underwent vaginal deliveries. Mean and median maternal age values according to the type of delivery are presented in Table 3. Mean age is significantly lower among the vaginal delivery group. Patient age ≥ 35 years was significantly associated to c-section, which was performed on 62,9% of patients in this age group. No significant differences in type of delivery were observed in terms of parity and gestational age. Of the 1,274 cases of patients without prior c-sections, 690 (54.2%) had vaginal deliveries. Vaginal deliveries occurred in only 23.4% (68 cases) of the 290 patients with a previous history of c-sections.

Table 3 – Characteristics of gestation according to type of delivery. April-December 2001.

Variable	C-section (N=988)		Vaginal delivery (N=760)		p
Maternal age (years)					
Mean (standard deviation)	28.4	(6.9)	26.5	(6.9)	<0.0001
Median	28.2		25.6		
≥35 years (%)	187	(18.9%)	110	(14.5%)	<0.05
Parity					
Mean (standard deviation)	1.2	(1.4)	1.3	(1.6)	NS
Median	1		1		
Previous c-sections (%)					
None	584	(59.1%)	690	(90.8%)	<0.0001
One	222	(22.5%)	68	(8.9%)	
Two or more	182	(18.4%)	2	(0.3%)	
Gestational age at delivery (w)					
Mean (standard deviation)	37.7	(2.9)	37.8	(3.1)	NS
Median	38.4		38.6		
Under 37 weeks (%)	280	(28.3%)	185	(24.6%)	0.06

Table 4 presents data referent to the maternal complications observed, according to the type of delivery. There were no statistically significant differences in terms of hemorrhagic or infectious complications, both of which occurred only in a small proportion of cases. Uterine atony and hypotonic myometrium were the most frequent among hemorrhagic complications. However, they were not related to type of delivery. Among the cases that evolved to hemorrhagic complications, seven required hysterectomy due to excessive bleeding, six of which were from the c-section group. Other complications proper of each type of procedure were also observed. The prolongation of hysterotomy is an event observed only in c-section deliveries, whereas perineal lacerations are proper of vaginal delivery.

Table 4 – Maternal complications according to type of delivery. April to December 2001.

Variable	c-section (n=988)		Vaginal delivery (n=760)		p
Hemorrhagic complications					
Uterine atony and hypotonia	7	(0.71%)	5	(0.66%)	0.87
Placenta accreta	4	(0.41%)	1	(0.13%)	0.40
Hypocoagulation (HELLP syndrome)	1	(0.10%)	0	(0%)	1.00
Total	12	(1.22%)	6	(0.79%)	0.53
Cases of hemorrhagic complications that evolved to hysterectomy	6*	(0.61%)	1**	(0.13%)	0.15
Infectious complications					
Endometritis	4	(0.41%)	1	(0.13%)	0.40
Infection-related hysterectomy	2	(0.20%)	0	(0%)	0.51
Incision deiscence with new abdominal wall closure	5	(0.51%)	2	(0.26%)	0.71
Total	11	(1.11%)	3	(0.40%)	0.16
Other complications					
Prolongation of hysterotomy	7	(0.71%)	***	***	-
Vesical lesion	1	(0.10%)	0	(0%)	-
Perineal laceration					
2 nd degree rupture	***	***	16	(2.11%)	-
3 rd degree rupture	***	***	4	(0.51%)	-

*Indication: Atony (2 cases), HELLP syndrome (1 case), and placenta accreta (3 cases).

**Indication: Atony (1 case).

***Complication not pertinent to the respective type of delivery

No maternal deaths directly related to the analyzed obstetrical procedure were observed during the present study.

DISCUSSION

The high incidence of c-sections (56.5%) in the facility investigated reflects the large proportion (80%) of patients with intercurrent clinical and/or obstetric conditions among its population. This limits the value of c-section rate comparisons with low-risk populations. Yazlle et al,¹⁵ in an analysis of deliveries taken place between 1986 and 1995 in Ribeirão Preto report a 48.4% c-section rate. Governmental statistics show a 48.4% c-section rate for the state of São Paulo in 2000.⁹ These levels are acknowledgedly higher than those encountered in the US and Europe. Dobson⁵ reports rates as high as 21.5% in England and Wales in 2000. Rates in the US varied between 21 and 22% in the 1989-98 period.⁴ However, a high incidence of c-sections in high-risk pregnancies is expected, and contributes towards an increase in these rates in university hospitals,¹⁴ to which more severe cases are referred. Similarly, Turnbull et al¹³ reported a 43.9% c-section rate among high-risk pregnancies in Adelaide, Australia, despite the country's 19.5% national rate.

In high risk pregnancies, clinical or obstetric complications often require gestation termination. In such cases, some particularities usually prevent vaginal delivery. Preterm birth, which occurred in 26.6% of cases in the present study, hinders the induction of labor, especially in cases in which cervical maturation has not yet been achieved, thus promoting an increase in the number of c-sections. Likewise, the induction of labor is not recommended in the presence of uterine scars. Thus, iterative c-sections – when the patient has a history of two or more previous c-sections – are frequent in Brazil. In the present survey, of the patients that underwent c-section delivery, as many as 40% had a history of prior c-sections.

Mean maternal age was lower among pregnancies that progressed to vaginal deliveries. Patients aged ≥ 35 years also presented a higher c-section rate. The occurrence of clinical abnormalities is known to be directly proportional to age, often influencing the rate of c-sections. Bobrowski & Bottoms² (1995) found a relationship between maternal age and intercurrent clinical conditions such as chronic arterial hypertension and diabetes. These authors also described an important increase in c-section rates in >35 years nulliparae (48.5%).

An analysis of the incidence of c-section-related maternal complications shows a greater absolute number of complications involving this procedure. However, there was no significant association between complications and type of delivery; it should also be noted that the frequency of each complication was low, with values below 1%.

Difficulties in the characterization of infectious complications limit comparisons with other studies in the literature. The criteria applied in different healthcare facilities for hysterectomy recommendation in cases of puerperal infection are not uniform. Several factors may influence the option for such a procedure, including age, parity, and desire for further gestations. In a study of the occurrence of endometritis, Yokoe et al¹⁶ (2001) found 0.8% incidence of this infection after c-sections and 0.2% after vaginal deliveries. Loverro et al⁶ (2001), in an analysis of post-surgical febrile morbidity, found

that 5.14% of cases of c-section delivery presented infectious complications characterized by fever on two consecutive days. This proportion was significantly higher than that observed after vaginal delivery (0.29%). However, the authors did not include specific data on endometritis. Other studies, report greater endometritis rates of c-sections. Spinnato et al¹² (2000) report endometritis in 4.7% of non-elective c-sections. Mah et al⁸ (2001), in an analysis of risk factors for infections following surgical incision found this type of complication in 2.8% of c-sections, and reported independent risk factors such as surgery duration and nonuse of prophylactic antibiotic therapy. However, the authors again did not specifically discriminate endometritis.

Despite the lack of statistical significance, the present survey included two cases of hysterectomy due to puerperal post-c-section infection, which might have been avoided if a vaginal delivery had been carried out. Such situations are usually characterized by a high risk of maternal mortality, especially when accompanied by generalized infection or septicemia.

An important effect of hemorrhagic complications is the need for hysterectomy, since this procedure definitely impairs the patient's reproductive life. In the present study, hemorrhage-related hysterectomy was required for less than 1% of cases. Few studies include in-depth analyses of the hemorrhagic complications related to c-sections. Loverro et al⁶ (2001) evaluated blood loss during labor indirectly, through an analysis of the need for blood transfusion during intra- and post-delivery periods. The authors found no statistically significant differences in the percentage of cases requiring intra-delivery blood transfusion, which ranged from 0.1% in vaginal deliveries to 0.4% in c-sections. In the post-delivery period, a significantly higher proportion of transfused patients was observed among c-section subjects (1.9%) when compared to the vaginal delivery group (0.39%). Combs et al³ (1991) reported 6.4% incidence of hemorrhagic complications in 3,052 c-sections, characterized by ≥ 10 point hematocrit reductions or the need for blood transfusion. The authors also analyzed 9,598 vaginal deliveries, finding 3.9% incidence of transfusions.

Post-surgical morbidity in obstetrical procedures is influenced by the circumstances in which these procedures take place. There were no cases of c-section-related maternal death in the present sample. Lydon-Rochelle et al⁷ (2001) considered c-sections not as a risk factor for maternal mortality, but as a marker for preexistent morbidity. Emergency c-sections, as well as those indicated after the onset of labor involve conditions not always adequate for the performance of surgical procedures. Time since membrane rupture, number of pelvic examinations, chorioamnionitis, and intra-delivery fetal monitoring are some of the factors that may increase post-delivery infection incidence. Studies comparing elective and emergency c-sections and vaginal delivery may aid in the analysis of complications related to these procedures. The information provided to the couple must include, in a simple and objective way, the benefits and risks of each type of delivery, with emphasis on the safety of each procedure as well as its associated complications, so that the couple may make a conscious decision concerning the type of delivery to be carried out.^{9,10}

In conclusion, no significant associations between the occurrence of maternal complications and type of delivery were observed during the analyzed period. The continuity of research in this healthcare unit, along with further studies in low-risk populations in the private and public healthcare sectors pose new challenges that will aid in the evaluation of the risk of complications de facto related to this surgical procedure.

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ADDRESS TO CORRESPONDENCE

Roseli Mieko Yamamoto Nomura
Rua General Canavarro, 280 Bairro Campestre
09070-440 Santo André, SP, Brazil
E-mail: roseli.nomura@terra.com.br

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Avenida Dr. Arnaldo, 715
01246-904 São Paulo SP Brazil
Tel./Fax: +55 11 3068-0539

revsp@org.usp.br