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ORIGINAL ARTICLE

Epidemiological Characteristics and Trends of Caesarean Delivery in a University Hospital in Northern Greece

Les caractéristiques épidémiologiques et les tendances de l'accouchement par césarienne dans un hôpital universitaire en Grèce du Nord

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ABSTRACT

BACKGROUND: **Current obstetric practice is characterised by a continuous increase in caesarean section (CS) delivery rates.**

OBJECTIVE: **Main purpose of our study was to estimate the overall and annual rates of CS in a University Hospital in Greece.**

METHODS: **This was a retrospective chart review of all singleton pregnancies delivered by CS between 2004 and 2008 at a gestational age ≥ 24 weeks. The overall and annual CS rates were calculated. The rate of elective (Group 1) and emergency CS (Group 2), as well as the specific indications in the two groups of the study were also analyzed.**

RESULTS: **Overall 5362 singleton pregnancies were delivered in the period of the study. The overall CS rate was 29.2% (n = 1564). The mean ±SD maternal age in years of the women delivered by CS was 29.65 ± 6.72 years, while it was 27.10 ± 5.63 years for those who delivered vaginally (P<.0001). The overall rates of elective and emergency CS were 18.2% and 11.0% respectively in the 5-year period of the study. The most common indication for an elective CS was a previous CS (63.1%), which remained almost stable during the period of the study. The main indication for emergency CS was foetal distress in the first three years of the study, while labour progress failure was the leading indication in the last two years.**

CONCLUSION: **In this series, the overall CS rate was high. A previous caesarean delivery accounts for about one third of all cases and constitutes the leading indication for elective CS while foetal distress is the most common indication for an emergency caesarean section. WAJM 2011; 30(4): 250–254.**

Keywords: **Caesarean section rate, indication, foetal distress, previous caesarean.**

RÉSUMÉ

CONTEXTE: Les pratiques actuelles d'obstétrique se caractérise par une augmentation continue de la césarienne (CS) des tarifs de livraison.

OBJECTIF: Le but principal de notre étude était d'estimer les taux globaux et annuels de la CS dans un hôpital universitaire en Grèce.

Méthodes: Il s'agissait d'une étude rétrospective de tous les grossesses uniques livrés par CS entre 2004 et 2008 à un âge gestationnel > 24 semaines. Le taux global annuel et CS ont été calculés. Le taux de élective (groupe 1) et d'urgence CS (groupe 2), ainsi que les indications spécifiques dans les deux groupes de l'étude ont également été analysés.

RÉSULTATS: Globalement 5362 grossesses uniques ont été livrés dans la période de l'étude. Le taux global était de 29,2% CS (n = 1564). L'âge moyen ± écart-type de la mère au cours des années des femmes livrées par CS était 29,65 ± 6,72 années, alors qu'il était 27,10 ± 5,63 années pour ceux qui ont accouché par voie vaginale (p <0,0001). Le taux global d'urgence et élective CS ont été de 18,2% et 11,0% respectivement durant la période de 5 ans de l'étude. L'indication la plus commune pour une CS élective était un précédent CS (63,1%), qui est resté quasiment stable durant la période de l'étude. La principale indication en cas d'urgence CS a été une souffrance fœtale dans les trois premières années de l'étude, tandis que l'échec a été la progression du travail de la principale indication dans les deux dernières années.

Conclusion: Dans cette série, le taux global CS a été élevé. Une comptes précédents accouchements par césarienne pour environ un tiers de tous les cas, et constitue la principale cause de CS électives tout en détresse foetale est l'indication la plus commune pour une césarienne d'urgence. **WAJM 2011; 30(4): 250–254.**

Mots-clés: taux de césarienne, l'indication, la détresse fœtale, césarienne précédente.

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Abbreviations: CS, Caesarean section; **CTG,** Cardiotocography; **IUGR,** Intra-Uterine Growth Retardation; **IVF,** *In Vitro* Fertilization; **SD,** Standard deviation.

INTRODUCTION

Current obstetric practice is characterised by a continual increase in caesarean section (operative) delivery rates, despite the advances in the monitoring of women during pregnancy and labour.[1,2] Although the suggested rate of the operative delivery by the World Health Organisation is 10%,[3] current rates exceed 20% in countries providing advanced level of obstetric care such as the UK and U.S.A.[4,5] Rates are much more elevated for developing countries, exceeding even 70% in certain cases.[6]

The increased rate of caesarean section (CS) is often medically unjustified,[7] a matter which acquires special importance as caesarean delivery may be harmful for both mother and infant. First of all, several studies have reported higher neonatal morbidity of neonates born by emergency CS compared to those born vaginally.[8] Furthermore, caesarean section may similarly cause elevated rates of maternal morbidity and mortality.[9] In addition, history of multiple previous CS is associated with increased risk for adverse obstetric outcomes in subsequent pregnancies.[10] For all these reasons, a careful recording of caesarean delivery rates in tertiary and community hospitals, as well as analysis of main indications for CS is of great significance, not only for epidemiological purposes, but mainly for the persistent improvement of obstetric practice.

The main purpose of our study was to determine the overall and annual rates of CS in a University Hospital in Greece for the period 2004–2008. In parallel, we analyzed the main indications for elective and emergency caesarean sections performed during this 5-year period.

SUBJECTS, MATERIALS, AND METHODS

We performed a retrospective analysis of all singleton pregnancies delivered by caesarean section in the 4th Department of Obstetrics and Gynaecology of Aristotle University of Thessaloniki (Greece) from 2004 to 2008. In this tertiary centre, we follow up pregnancies from the local population of Thessaloniki, as well as referred cases from all Northern Greece. In our department, more than 1000 deliveries are conducted per year. Patient demographics, delivery details and neonatal outcomes are carefully recorded by the medical and midwifery staff. Institutional Review Board approved the present study.

Exclusion Criteria

For the purpose of the study, twin pregnancies, stillbirths and neonates with a gestational age at the time of delivery less than 24 weeks were not included in the analysis.

Indications for Caesarean Section

Based on the indication, the total cases of CS were divided into two groups: elective CS (Group 1) and emergency CS (Group 2). The main indications for CS were separately examined in the two groups of the study.

A caesarean section was defined as emergency when indicated by either foetal distress [defined as non-reassuring cardiographic (CTG findings)], failure of progress of labour (inadequate progress of labour for three hours in nulliparous and for two hours in multiparous women with documented uterine activity), malpresentation (cases already in labour with a non-cephalic presentation, delivered operatively out of schedule), placenta abruption, chorioamnionitis or umbilical cord prolapse.

In the group of elective CS, we included cases with a previous CS, breech presentation, advanced maternal age, preeclampsia, intra-uterine growth restriction (IUGR), placenta praevia, congenital abnormalities, maternal warts, presence or previous operation for uterine myomas, gestational diabetes associated with foetal macrosomia and *placenta accreta.*

Statistical Analysis

Mean values ± standard deviation (SD), frequencies of the different variables of our analysis were calculated using the Statistical Package for Social Science version 17.0 (SPSS Inc, Chicago, IL).

RESULTS

Overall, 5362 singleton pregnancies were delivered in the period of the study in our department according to the inclusion criteria. Of these, 1564 (29.2%) were delivered by CS. The mean maternal age (±SD) of women who delivered operatively was 29.7 ± 5.7 years, while their mean parity was 1.8 ± 0.9 and the mean gestational age at the time of delivery was 37.3 ± 5.9 weeks. The epidemiological characteristics of patients whose pregnancies were delivered by CS are shown in Table 1.

Overall and Annual Caesarean Section Rates

The annual rates of CS ranged between 27.0% in 2004 and 34.2 % in 2006. The overall rate of elective and emergency caesarean delivery was 18.2% and 11.0% respectively for this 5-year period. The lowest annual rates of elective and emergency CS were observed in 2005 (15.3%) and 2004 (8.6%) respectively, while the highest annual rates for both groups of the study were observed in 2006 (20.0% and 14.2% respectively). Overall and annual rates of emergency and elective CS are presented in Table 2.

Indications of Caesarean Section

A previous CS was the main indication in the 1614(11.4%) of total deliveries, representing almost a third of the total of caesarean sections that were performed in our department, as well as the leading indication of elective caesarean deliveries (63.1%, 614/973) during the period of the study. This rate remained almost stable between 2004 and

Table 1: Epidemiological Characteristics of Pregnancies Delivered by Caesarean Section

Characteristic	Value
Total	1564
Maternal age	
(mean ± SD) years	29.7 ± 5.7
≥35, n (%)	331 (21.2)
< 35, n (%)	1233 (78.8)
Gestational age	
(mean ± SD)	37.3 ± 5.9
Parity (mean ± SD)	1.8 ± 0.9
Nulliparous, n (%)	686 (43.9)
Multiparous, n (%)	878 (56.1)
Ethnicity, n (%)	
Natives	898 (57.4)
Foreigners	666 (42.6)

Table 2: Caesarean Delivery and Sub-Group Rates between 2004 and 2008

	Number (%)					
Mode of Delivery	**2004**	**2005**	**2006**	**2007**	**2008**	**2004–2008**
N	**1152**	**1040**	**1054**	**1023**	**1093**	**5362**
CS, n(%)	312 (27.0)	287 (27.6)	361 (34.2)	304 (29.8)	300 (27.5)	1564 (29.2)
Emergency CS, n(%)	99 (8.6)	128 (12.3)	150 (14.2)	105(10.3)	109 (10.0)	591(11.0)
Elective CS, n(%)	213(18.4)	159(15.3)	211 (20.0)	199(19.5)	191 (17.5)	973(18.2)
Forceps/vacuum	74(6.4)	48(4.6)	59(5.6)	71(6.9)	70(6.4)	322(6.0)

CS, Caesarean section

Table 3: Indications for Emergency Caesarean Deliveries between 2004 and 2008

	Number (%)					
Indication	**2004**	**2005**	**2006**	**2007**	**2008**	**2004–2008**
N	**99**	**128**	**150**	**105**	**109**	**591**
Foetal distress	49(49.5)	74 (57.8)	64 (42.7)	27 (25.7)	29 (26.6)	243 (41.0)
Failure of progress	13 (13.1)	20 (15.6)	44(29.3)	39 (37.2)	49 (44.9)	165 (27.9)
Malpresentation	14 (14.2)	15(11.7)	20 (13.3)	19 (18.1)	20 (18.4)	88 (14.9)
Placenta abruption	13 (13.1)	14 (11.0)	13 (8.7)	13 (12.4)	8 (7.4)	61 (10.4)
Chorioamnionitis	3 (3.0)	3(2.3)	1 (0.7)	2 (1.9)	1 (0.9)	10 (1.7)
Umbilicall prolapse	2 (2.0)	0 (0.0)	3 (2.0)	0 (0.0)	1 (0.9)	6 (1.0)
Other	5 (5.1)	2(1.6)	5 (3.3)	5 (4.7)	1 (0.9)	18 (3.1)

Table 4: Indications For Elective Caesarean Deliveries between 2004 and 2008

	Number (%)					
Indication	**2004**	**2005**	**2006**	**2007**	**2008**	**2004–2008**
N	**213**	**159**	**211**	**199**	**191**	**973**
Previous CS	133(62.4)	101(63.5)	122 (57.8)	135(67.8)	123(64.4)	614 (63.1)
Breech presentation	36 (16.9)	25 (15.7)	39 (18.4)	17 (8.6)	24 (12.6)	141 (14.5)
Advanced maternal age*	6 (2.8)	4 (2.5)	5 (2.4)	9 (4.5)	8 (4.2)	32 (3.3)
Preeclampsia	12 (5.6)	9 (5.7)	12 (5.7)	12 (6.0)	6 (3.2)	51 (5.2)
IUGR	7 (3.3)	7 (4.4)	6 (2.8)	11 (5.5)	8 (4.2)	39 (4.0)
Placenta praevia	4 (1.9)	2 (1.2)	6 (2.8)	2 (1.0)	1 (0.5)	15 (1.6)
Congenital abnormalities	3 (1.4)	2 (1.2)	5 (2.4)	2 (1.0)	3 (1.6)	15 (1.6)
Warts	1 (0.5)	3 (1.9)	1 (0.5)	2 (1.0)	5 (2.6)	12 (1.2)
IVF	0 (0.0)	4 (2.5)	0 (0)	2 (1.0)	3 (1.6)	9 (0.9)
Myomas	2 (1.0)	0 (0.0)	5 (2.4)	0 (0.0)	1 (0.5)	8 (0.8)
Gestational diabetes	2 (1.0)	0 (0.0)	2 (0.9)	1 (0.5)	1 (0.5)	6 (0.6)
Placenta accreta	2 (1.0)	0 (0.0)	1 (0.5)	0 (0.0)	0 (0.0)	3 (0.3)
Others	5 (2.3)	2 (1.3)	7 (3.3)	6 (5.0)	8 (4.1)	28 (2.9)

advanced maternal age: ≥ 35 years old;* ***CS,* *Caesarean section;* ***IUGR,*** *Intra-Uterine Growth Retardation;* ***IVF,*** *In Vitro Fertilization.*

2008. Foetal distress 243(41%) and failure of progress of labour 165(27.9%) were the main indications for emergency CS (41% and 27.9%, respectively). However, a progressive decline of the annual incidence of foetal distress was noted during the 5-year period of the study from 49.5% in 2004 to 26.6% in 2008 in favour of labour progress failure incidence that increased from 13.1% in 2004 to 44.9% in 2008. Overall and annual rates of indications for emergency and elective CS are presented in Tables 3 and 4.

DISCUSSION

This study showed that the overall caesarean section rate in our unit was 29.2% between 2004 and 2008. History of a previous caesarean section account for about a third of all caesarean deliveries and about two-thirds of the elective ones, remaining almost stable during the period of the study. On the other hand, foetal distress and failure of progress of labour

were the leading indications for emergency caesarean delivery.

Annual Caesarean Section Rates

Previous studies reported a variation in the annual CS rates among departments from different countries. Taljaard *et al.,* in an analysis from countries in Latin America, report CS rates ranging from 11% to 78%[6]. However, focusing on studies conducted in developed countries, most reported CS rates are comparable to our findings ranging between 30% and 35%.[4,7,11] Lipkind *et al.* reported rates between 20.3% and 34.2% in the different departments of Obstetrics and Gynaecology of New York (USA).[5] These rates refer to primary CS only and they are similar to the rate observed in our analysis, as 11.4% out of 29.2% of the overall rate of CS were performed because of a previous CS. In contrast, the National Sentinel Caesarean Section Audit, showed an overall CS rate of 21.5% in England and Wales, which was one of the lowest rates observed in Europe.[4]

Indications of Caesarian Section

Concerning indications for caesarean delivery, our analysis demonstrates similar results with those described in the literature. Previous studies reported that foetal distress and failure of progress are the prevalent indications for emergency CS[12,13], which is in accordance with our findings. Furthermore, previous caesarean delivery and breech presentation were the most common indications for elective CS, which is also reported by several studies.[14–16] In our series, previous CS was overall the most common indication (almost a third) for caesarean delivery. This is in contrast with other studies that demonstrated that foetal distress and failure of progress of labour were the most common indications.[17–18]

Variations Throughout Years

Change of CS rates throughout years is an issue of great interest. Although several studies have reported that alterations in obstetric practice have contributed to the increase of CS rates worldwide,[19–23] CS rate in our unit was only slightly modified during this 5-year period. Choudhury *et al.,* in a similar study, reported a stable increase of 6% of the annual level of CS from 2001 to 2007.[4] Similarly, there are reports of a 50% rise of pregnancies delivered by CS during the last decade.[24] However, in our department, the overall rate in this 5-year period was only 2.2% higher than the one of the beginning year of the study (2004), remaining practically stable, with the exception of year 2006 when it was 34.2%. This increase involved mainly cases of emergency CS which were 14.2% in 2006 compared to 8.6% in 2004.

However, a significant change in the annual rate of foetal distress and failure of delivery progress as main indications for emergency CS was observed. Incidence of failure of progress increased from 13.1% (2004) to 44.9% (2008). In contrast, foetal distress which was the most common indication in 2004 (49.5%), surprisingly decreased to 26.6% in 2008. This change implies our department's policy to decide an emergency CS as soon as failure of progress of labour is observed. Despite our increased vigilance (continuous CTG monitoring in labour ward) in order to prevent foetal distress, we managed to maintain caesarean section rate practically stable for the whole period of the study. This observation is in contrast with the theory that low caesarean section rate probably reflects lower vigilant attention[5]. Such a theory, induced by the high rate of primary CS in private clinics where a higher level of vigilance is the rule, is refuted by the fact that rates of NICU admission are similar between public and private hospitals. Thus, low CS rate of a teaching hospital does not reflect less vigilance, but probably higher compliance with guidelines of CS performance.[25]

Limitations of Study

The findings of this study are limited by the retrospective nature and the relatively small number of cases. However, they reflect current obstetric practice in the largest University Hospital in Northern Greece. The rate of CS as expected is influenced by the fact that this is a tertiary centre where complicated pregnancies are referred from other hospitals for further management. This most likely results in an increased number of CS compared to other hospitals.

Conclusion

In conclusion, the total caesarean section rate was about 30% between 2004 and 2008 and remained almost stable during this period. Previous caesarean section was the main indication for elective caesarean section, accounting for about two thirds of these cases. The main indication for emergency CS in the first years of the study was foetal distress followed by failure of delivery progress, an observation that was reversed during the last years of our study.

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The authors clearly state that there is no one to acknowledge concerning this article.

Duality of Interest

The authors clearly state that there is no duality of interest

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