Analysis of Cesarean Section Delivery at Nova Bila Hospital according to the Robson Classification

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ABSTRACT

An increase in Cesarean section birth rate is evident worldwide, especially in developed and developing countries. Since this trend is rapidly gaining epidemic status with unpredictable consequences regarding the reproductive and overall women's health, there is a need for systematic collection and analysis of Cesarean section occurrence data. At this moment, there is no standardized, internationally accepted classification that would be easy to understand and simple to apply. In 2001, Robson Cesarean section classification in ten groups, which might satisfy good classification criteria, was published. In this paper, we have retrospectively collected and sorted the data on Cesarean section births from the »Dr. Fra Mato Nikolić« Croatian Hospital in Nova Bila, according to Robson classification, for the period from January 1ˢᵗ, 1998 to December 31ˢᵗ, 2007. During this period, 6603 women have given birth. Of these, 1010 opted for Cesarean section (15.30%). The largest group of women giving birth belongs to group 3 (multiparous, single pregnancy, head down, 37 weeks gestation age or more, spontaneous labor), where 49.74% of all the analyzed births belong. The largest group for those with Cesarean sections is group 5 (previous Cesarean section) with 26.93% of all the Cesarean sections. Our results are similar to the results of studies done elsewhere in the world. Robson classification identifies the risk groups with high Cesarean section percentage and is appropriate for long-term tracking and international comparison of the recognized increase of the Cesarean section trend.

Key words: Caesarean section, Robson Ten Group Classification System (TGCS)

Introduction

The opinion of the World Health Organization from 1985[1] is that there is no medical justification for Cesarean section percentage above 10–15% on a national level at any part of the world. Aside from that, in World Health Organization's recommendation from 1994[2], it is noted that 5% is the lower limit of Cesarean section quota in overall birth rate, below which maternal mortality rate and morbidity are increased. Unfortunately, to this date there is no clear and fully acclaimed attitude regarding the optimal percentage of Cesarean sections in overall births[3,4].

There are multiple reasons for the increase in Cesarean section rate: reduced perinatal morbidity and mortality, increased age of pregnant women and lesser pregnancies, pregnancies and births in women with serious health conditions, the striving for »perfect« offspring, births after previous Cesarean sections, labor induction, continuous cardiotocography (CTG) during pregnancies[5–7].

The most common obstetric indications for Cesarean section in the mid-20ᵗʰ century were abundant bleeding due to placenta abruption (placenta praevia), asynclitic birth and significant cephalopelvic disproportion[8]. The most common indications today are a previous Cesarean section, dystocia, feet-first position (breech) and fetal distress[8]. Dystocia and fetal distress are often misdiagnosed due to subjective and often wrong judgment of the gynecologists or midwives[9]. The causes of increased Cesarean section rate have long stopped being determined exclusively by medicine indications which aim to reduce fetal and maternal mortality and morbidity[10,11]. For the majority of the female population, vaginal birth is becoming less and less desirable, while Cesarean sections are generally considered painless, elegant, sparing the woman and being safer for the child. As a result of these ideas, the demand for Cesarean section is increasing[12]. The obstetricians sup-

port Cesarean section births for fear of prosecution, personal comfort or lack of delivery skills[13,14].

The World Health Organization collects and analyzes data – the indicators of the world health situation, which includes Cesarean section birth data[15,16]. Unfortunately, not all the countries in the world offer the collected Cesarean section data (or other health indicators) because some countries do not collect or publish this information. Based on the data available, it is evident that the increase in Cesarean sections in the last three decades has been rapidly growing in developed countries and there is a noticeable increase in developing countries, as well[17,18]. Among developing countries, the countries of Latin America are the countries where Cesarean section is most popular. The overall percentage of Cesarean section births in South America is currently up to 29%[18–20]. In the United States of America, the incidence of Cesarean sections has grown from 21% in 1996 to 32% in 2007 and it is the most common gynecological operational intervention[19]. In Europe, the average percentage of Cesarean sections is 19%[15,21], while it is at 30% in Australia[17,20]. According to the data available, the percentage of Cesarean sections in Africa is 3.4%, while it is at 16% in Asia[17]. There are significant differences between certain regions and countries on all the continents. The overall worldwide percentage of Cesarean sections is 13.9% for the period from 2000 to 2008, according to the latest data published by the World Health Organization[22].

The common attitude which states that Cesarean section is a safe procedure is disputed by numerous studies which prove that maternal mortality and morbidity is two to five times larger for Cesarean sections than vaginal births, while there is no certain reduction of perinatal mortality rate after all[23,24]. Since the unjustified Cesarean section popularity increase significantly increases the costs of healthcare and causes long-term negative effects to the reproductive health of the overall population, the demands for reverting the Cesarean section rate within the medically justified limits have gained much prominence lately[10,14]. In order to achieve this, it is necessary to thoroughly analyze the existing situation and identify the problems related to the situation.

There is no standardized, internationally accepted method for Cesarean section classification. In 2001, Robson 10-group classification of Cesarean section was published[19,25]. This classification does not analyze the indications for Cesarean section. Instead, this classification analyzes the frequency of Cesarean section occurrence for different groups of mothers, based on four obstetric concepts. The groups can be further analyzed after the Cesarean section indications, age group, education level, health status of mothers, socio-economic conditions, healthcare level offered by a specific country or healthcare institution. This kind of systematically categorized data can be revised over time; it can also be tracked and compared among different healthcare systems. So far, there have been numerous studies published after Robson analysis criteria in various parts of the world[19,26–32].

Patients and Methods

The survey participants were mothers who gave birth between January 1st, 1998 and December 31st, 2007 in »Dr. Fra Mato Nikolić« Croatian Hospital in Nova Bila. It is a general level hospital, where pregnant women from their 34th pregnancy week on give birth; without more difficult pregnancy complications and offspring anomalies. The data from the birth and neonatal history has been retrospectively added to the electronic database. Upon acquisition, the data has been sorted according to Robson 10 group classification. The classification is based on 4 obstetric concepts (Table 1), and the mothers are classified in 10 different groups (Table 2). The groups are mutually exclusive, including the clinically relevant ones[25].

TABLE 1
OBSTETRIC CONCEPTS AND PARAMETERS OF ROBSON TEN GROUP CLASSIFICATION SYSTEM[24]

Obstetric concept	Variable
Category of pregnancy	Single cephalic pregnancy
	Single breech pregnancy
	Single oblique or transverse lie
	Multiple pregnancy
Previous obstetric history	Nulliparous
	Multiparous without uterine scar
	Multiparous with uterine scar
Course of pregnancy	Spontaneous labor
	Induced labor
	Caesarean section before beginning of labor
Gestation	Gestational age in completed weeks at time of labor

The aim of this research was to analyze and present the Cesarean section birth data for Nova Bila hospital, to determine the risk groups and to compare our results with the available data from the medical literature.

We analyzed retrospective data collected over a period of 10 years. This large sample ensured high statistical power and allowed for precise estimation of statistical parameters. In order to describe categories of deliveries, we calculated indicators of descriptive statistics: absolute and relative percentages and frequencies. The relative Cesarean section percentage values have been added in the brackets in the text.

Results

During the ten-year period, there have been a total of 6603 births, with 6666 children born. There have been 2454 nulliparous (37.16%) and 4149 have more than one child (62.84%). There has been a total of 1010 Cesarean sections (15.30% of overall births). The number of Cesarean sections done to nulliparous is 495 (49.01% of overall

TABLE 2
TEN-GROUP CLASSIFICATION, OBSTETRIC CHARACTERISTICS OF WOMEN INCLUDED IN EACH OF TEN-GROUP[24]

Group	Classification
1	Nulliparous, single cephalic, ≥37 weeks, in spontaneous labor
2	Nulliparous, single cephalic, ≥37 weeks, induced (including prelabor SC)
2a	Nulliparous, single cephalic, ≥37 weeks, induced labor
2b	Nulliparous, single cephalic, ≥37 weeks, prelabor SC
3	Multiparous (excluding previous SC), single cephalic, ≥37 weeks, in spontaneous labor
4	Multiparous (excluding previous SC), single cephalic, ≥37 weeks, induced (including prelabor SC)
4a	Multiparous (excluding previous SC), single cephalic, ≥37 weeks, induced
4b	Multiparous (excluding previous SC), single cephalic, ≥37 weeks, prelabor SC
5	Previous SC, single cephalic, ≥37 weeks
6	All nulliparous breeches
7	All multiparous breeches (including previous SC)
8	All multiple pregnancies (including previous SC)
9	All transverse/oblique lies (including previous SC)
10	All preterm single cephalic, ≤37 weeks, including previous SC

TABLE 3
TEN-GROUP CLASSIFICATION, 1998 – 2007 SURVEY IN HOSPITAL IN NOVA BILA

Obstetric population	Relative size of the group %	Cesarean section rate in each group %	Absolute contribution made by each group to overall Cesarean section rate of 15.30%	Relative contribution made by each group to overall Cesarean section rate of 100%
1. Nulliparous, single cephalic, ≥37 weeks, in spontaneous labor	1994/6603 30.20%	247/1994 12.39%	247/6603 3.74%	247/1010 24.46
2. Nulliparous, single cephalic, ≥37 weeks, prelabor SC	249/6603 3.77%	139/249 55.82%	139/6603 2.11%	139/1010 13.76
2a. Nulliparous, single cephalic, ≥37 weeks, induced labor	117/6603 1.77%	7/117 5.98%	7/6603 0.11%	7/1010 0.69
2b. Nulliparous, single cephalic, ≥37 weeks, induced (including prelabor SC)	132/6603 2%	132/132 100%	132/6603 2%	132/1010 13.07
3. Multiparous (excluding previous SC), single cephalic, ≥37 weeks, in spontaneous labor	3284/6603 49.74%	94/3284 2.86%	94/6603 1.42%	94/1010 9.31
4. Multiparous (excluding previous SC), single cephalic, ≥37 weeks, induced (including prelabor SC)	195/6603 2.95%	41/195 21.03%	41/6603 0.62%	41/1010 4.06
4a. Multiparous (excluding previous SC), single cephalic, ≥37 weeks, induced	154/6603 2.33%	0/154 0%	0/6603 0%	0/1010 0.00
4b. Multiparous (excluding previous SC), single cephalic, ≥37 weeks, prelabor SC	41/6603 0.62%	41/41 100%	41/6603 0.62%	41/1010 4.06
5. Previous SC, single cephalic, ≥37 weeks	409/6603 6.19%	272/409 66.50	272/6603 4.12%	272/1010 26.93
6. All nulliparous breeches	101/6603 1.53%	77/101 76.24%	77/6603 1.17%	77/1010 7.61
7. All multiparous breeches (including previous SC)	73/6603 1.11%	44/73 60.27%	44/6603 0.67%	44/1010 4.36
8. All multiple pregnancies (including previous SC)	63/6603 0.95%	28/63 45.84%	28/6603 0.42%	28/1010 2.77
9. All transverse/oblique lies (including previous SC)	25/6603 0.38%	25/25 100%	25/6603 0.38%	25/1010 2.48
10. All preterm single cephalic, ≤37 weeks, including previous SC	210/6603 3.18%	43/210 20.48%	43/6603 0.65%	43/1010 4.26

births), while 515 multiparous had a Cesarean section. This raw data is sorted according to Robson classification (Table 3). For each group, we have calculated a relative group size, the Cesarean section percentage for each group, the absolute and relative Cesarean section percentage for each group in the total Cesarean section amount.

The groups are sorted from the largest Cesarean section amount to the smallest: 3, 1, 5, 2, 10, 4, 6, 7, 8 and 9. The largest percentage of Cesarean sections is in group 5, followed by groups 1, 2, 3, 6, 7, 10, 4, 8 and 9 (Table 3).

The largest group of women who gave birth in the examined period is group 3, with 49.74% of the overall birth rate, while group 5 has the largest percentage of Cesarean sections done overall, 4.12% (26.93% relative percentage – RP). Of these groups, the smallest group of the women who gave birth is group 9 with 0.38% and with the same, smallest percentage of Cesarean sections 0.38% (2.48% RP). Group 3 has the smallest Cesarean section percentage compared to the overall group size, 2.86% (Figures 1 and 2). The largest groups are groups 3 and 4 with a total of 52.69% of all the births, while groups 1 and 2 have the largest total percentage of Cesarean sections 5.85 (38.22% RP) (Figure 3). Groups 6 and 7, which refer to feet-first (breech) births, have a total of 2.64% of total births, of which 26.22% gave vaginal births. There was a total of
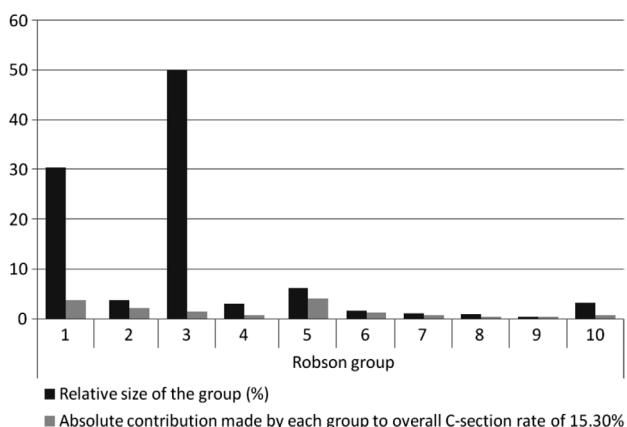

Fig. 1. *Relative size of the group and absolute contribution made by each group to overall Cesarean section rate.*
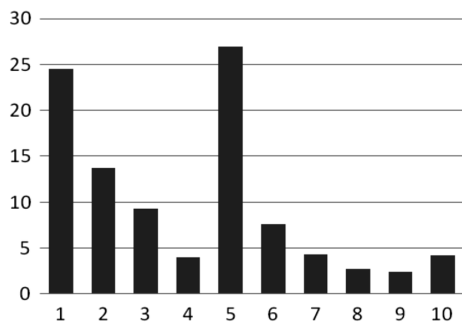

Fig. 2. *Relative contribution made by each group to overall Cesarean section rate of 100%.*
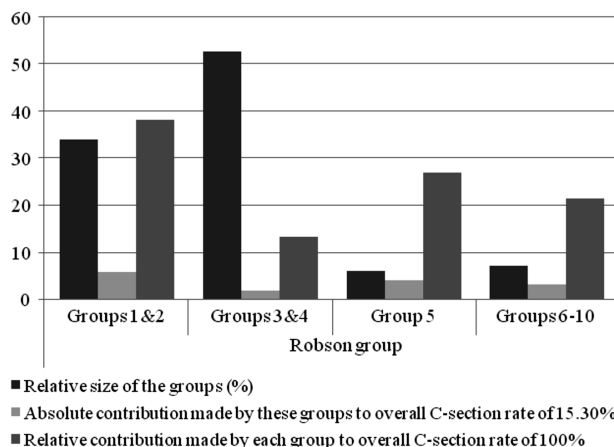

Fig. 3. *Cumulative percentage of selected groups and corresponding CS rates.*

0.95% of multiple births with 0.42% of overall Cesarean sections (Table 1). This is fairly close to the results of the other studies carried out the same way[19,26–32].

In comparison to other studies, our study shows lower results for groups 2 and 4 regarding the number of overall births and Cesarean section percentages. The size of 2a and 4a subgroups is the cause for this. The reason is the retrospective nature of the study and undefined role of amniotomy as a birth induction method, which isn't clearly marked in our birth archives. Considering the most common practice of our maternity ward where amniotomy is not carried out until it is certain that the delivery had started, the number of such deliveries transferred to groups 1 and 3 is not significant. The size of group 10 (premature births) is also below the average in comparison to other studies because these studies mainly refer to data from the clinical hospitals.

Discussion

In paper presented here we conducted the classification of Caesarean section according to Robson[19,25,27]. This is, to our knowledge, the first such attempt in this part of Europe. The existence of unified classification is the prerequisite for objective follow up of obstetric practice related to Cesarean section trend and better and unambiguous communication among participants as well scientists. Before discussing the results of classification we will first refer to some basic information on Cesarean section practice in our sample.

Since the data analyzed here was collected from a general level hospital, the overall Cesarean section percentage of 15.30% suggests that there is some area of improvement of practice during childbirth and possible decrease in percentage of CS. This is a fair conclusion even if it is taken into consideration that there is a satisfactory rate of perinatal mortality for the period of analysis, amounting to 7.65‰ (fetal mortality percentage is 4.95‰ and early neonatal percentage is 2.70‰) calculated from 28th

gestation week to the first week of the newborn's life[33]. The threshold of 28 gestational weeks is taken according to recommendation of World Health Organisation[33] that is used for international comparison of perinatal mortality[33,34].

Groups 1, 2, 3 and 4 account for 86.66% of the total births, as well as 7.89% of total Cesarean sections (51.59% RP).

Groups 1 and 2 account for 33.97% of overall births and they account for the largest amount of Cesarean sections, i.e 5.85% (38.22% RP). These two groups generate the majority of the further increase in Cesarean section popularity. In general, the rate of induced delivery (groups 2 and 4) is smaller than stated in other reports[27]. This difference reflects in larger rate of CS in these groups than expected. Namely, in the investigated hospital the established practice is to support natural birth wherever possible, and induced labor is applied only if highly indicated. For this reason, the relative percentage of CS in these groups is higher in comparison to other hospitals [17,26,27]. However, if we look into relative contribution of these groups to overall CS we can see that it is even lower than reported by other authors.

For the same reason, relative contribution in overall CS of group 2b is larger than relative contribution of group 2a. Group 2a consists of pregnant women for whom induced labor was indicated, while Group 2b consists of women for whom induced labor was not indicated but CS was done. Similarly to this, among multiparae, same trend is visible in differences between groups 3 and 4. Our data suggest that induced labours were well estimated and rarely finished with CS. So, pregnant women had either induced labour or were indicated for CS. Less often than in other reports[27,29–31] delivery included both induction and subsequent CS.

Groups 3 and 4, which can be characterized as »low risk groups«, account for 52.69% of total births and 2.04% of Cesarean sections (13.37% RP). Groups 2b and 4b, elective Cesarean sections, participate with 2.62% in overall

Cesarean sections (17.13% RP). These two subgroups often conceal the mothers with serious health conditions, undesirable obstetrical diagnostics and numerous non-medicinal reasons. With timely delivery induction and more intense monitoring of such pregnancies, it would be possible to reduce these groups by increasing the groups 1 and 3, as well as subgroups 2a and 4a, potentially resulting in increased number of vaginal births.

If we compare our results to the results of other studies, group 5 shows satisfying results, with 33.50% of vaginal births after a previous Cesarean section. Following a detailed analysis of CS indications and better application on evidence-based medicine, we expect to increase the number of successfully completed vaginal births after a previous Cesarean section[35]. The target groups we recommend for improving the birth practice are primarily the low-risk groups 1, 2, 3 and 4. For each of these groups, further analysis of the reasons for choosing the Cesarean section as the ideal birth option will be necessary.

The least area for improvement of Cesarean section statistics we find in the »high risk groups« from 6 to 10, where our results are still good, in comparison to other studies.

Conclusion

Robson 10-group classification provides a good insight into certain birth groups. A more detailed analysis of certain groups should help obstetricians to detect the causes of increased Cesarean section rate for each group more clearly. Based on these conclusions, the birth monitoring algorithms should be adapted and implemented into a quality clinical practice and evidence-based medicine. Similar suggestions are made by other authors that applied this classification[17,26–28,30,33]. In our case, this would relate mainly to the groups 1, 2, 3 and 4, since there is by far the most area for work quality improvement in these groups.

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ANALIZA PORODA CARSKIM REZOM U BOLNICI U NOVOJ BILI PREMA ROBSONOVOJ KLASIFIKACIJI

SAŽETAK

Porast broja carskih rezova evidentan je širom svijeta, posebno u razvijenim zemljama i zemljama u razvoju. Kako ovaj trend poprima razmjere epidemije sa nepredvidivim posljedicama na reproduktivno i opće zdravlje žena, postoji potreba za sustavnim prikupljanjem i analizom podataka o pojavnosti carskog reza. Trenutno ne raspolažemo sa standardiziranom, međunarodno prihvaćenom klasifikacijom koja bi bila jednostavna za razumjeti i laka za primijeniti. 2001. godine publicirana je Robsonova klasifikacija carskog reza u 10 grupa koja bi mogla zadovoljiti kriterije dobre klasifikacije. U našem radu retrospektivno su prikupljeni i razvrstani prema Robsonovoj klasifikaciji podatci o porodima carskim rezom u Hrvatskoj bolnici« Dr Fra Mato Nikolić« u Novoj Bili, u razdoblju od 1.1.1998. godine do 31.12.2007. U tom razdoblju porođene su 6603 žene od čega 1010 carskim rezom (15,30%). Najbrojnija grupa rodilja je grupa 3 (višerotkinje bez prethodnog carskog reza, jednoplodna trudnoća, plod u uzdužnom položaju, stav glavom) u koju spada 49,74% svih analiziranih poroda a grupa sa najvećim postotkom carskih rezova je grupa 5 (porodi nakon prethodnog carskog reza) sa 26,93% svih carskih rezova. Naši rezultati su približni do sada urađenim studijama drugdje u svijetu. Robsonova klasifikacija identificira rizične grupe rodilja s visokim postotkom carskih rezova te je primjerena za dugoročno praćenje i međunarodnu usporedbu prepoznatog trenda povećanja broja carskih rezova.