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**CAESAREAN SECTIONS  
IN THE GENERAL HOSPITAL  
IN SREMSKA MITROVICA (2007-2009)\***

**CARSKI REZ U OPŠTOJ BOLNICI  
U SREMSKOJ MITROVICI (2007.-2009.\***

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**Key words**

delivery, caesarean section, frequency,  
indications, perinatal outcome

**Ključne reči**

porodaj, carski rez, učestalost,  
indikacije, perinatalni ishod

**Abstract**

**INTRODUCTION:** The incidence of delivery by caesarean section in highly developed and developed countries is growing rapidly, from 5% in 1965, to currently over 25% in many countries.

**GOAL:** The goal of this paper is to present the frequency of caesarean section, parity and age of mothers, indications for surgical completion of delivery, gestation age and body weight of newborn babies, Apgar score in the first minute and perinatal morbidity and mortality.

**MATERIALS AND METHODS:** By insight into delivery protocols, case histories, surgical protocols and neonatology protocols, deliveries by caesarean section in the Department for Gynecology, Obstetrics and Neonatology of the General Hospital in Sremska Mitrovica in 1/1/2007-12/31/2009 period were analyzed in retrospect. Data was statistically processed and presented in table and graph form.

**RESULTS:** In the 2007-2009 period, the General Hospital in Sremska Mitrovica had a total of 4358 deliveries and 1264 caesarean sections. In the reviewed three-year period 29.08% of deliveries were by caesarean section. There were 33 twin pregnancies. Caesarean section was used to deliver 1299 babies. In 59.18% of cases, mothers were between 20 and 30 years of age. It was noted that a higher number of pregnancies ended in caesarean section in mothers over 30 years of age (34.41%), which can be explained by a higher frequency of diseases among pregnant woman (hypertension, diabetes melitus, infertility...), and the personal decision of women to give birth in later years. In the first delivery caesarean section was performed in 60.92% of cases, in the second in 32.04% of cases, in the third delivery in 5.07%, and in later deliveries in 1.34% of cases. The most frequent indications for surgical completion of delivery were: repeat caesarean section (25.40%), complications of delivery (24.45%), pathological presentation (13.29%), risky pregnancy (12.10%), disproportion (10.60%), disease of the mother (10.12%), twin pregnancy (2.61%), previous gynecological operation (0.79%), and congenital anomaly of the genitalia (0.63%). 23.50% of mothers had one previous caesarean section, 2.37% two, and 0.23% three. Most babies were born between gestation weeks 38 and 40 (89.68%), and with body weight 3000-3999g (68.98%). There were 61 (4.69%) premature babies. Apgar score 8-10 was the evaluation of to 90.92% of newborn babies. Total perinatal morbidity was 13.85%. The highest frequency was registered for asphyxia (88; 6.77%), followed by anemia (15; 1.15%), RDS<sup>1</sup> (14; 1.08%), and congenital malformations (14; 1.08%). Perinatal mortality in caesarean section was 0.92‰ of the total number of deliveries, while total perinatal mortality for all newborn babies was 4.1‰. According to our data, perinatal mortality in caesarean section shows a constant downward trend. In the reviewed 2007-2009 period, no maternal deaths were registered in caesarean section.

**CONCLUSION:** Caesarean section is one of the most important and most frequent operations in obstetrics, with a trend of growth from year to year, both in the world and in our country. Obstetricians bear a huge responsibility to make adequate and timely decisions to complete delivery by surgery, all with the goal to reduce perinatal and maternal morbidity and mortality.

<sup>1</sup>RDS- Respiratory Distress Syndrome

## INTRODUCTION

Caesarean section is one of the most important obstetric operations, where by a section through the wall of the stomach in the lower uterine segment the baby is extracted at a late stage of pregnancy, completing delivery via the abdominal route. Regardless of the fact that the caesarean section as a possible way to end pregnancy is first mentioned in the Middle Ages, legends of many nations describe this, at the time considered miraculous way of giving birth. Persons born in this manner were attributed supernatural powers. According to legends two very important persons were born this way: Julius Caesar and Scipio Africanus. The origin of the term "caesarean section" is obscure, it is erroneously linked to Caesar, while by its etymology it is probably of Latin origin (sectio - to cut, caesareus - cut out).

In European medicine caesarean section is mentioned in the 16th century when the operation always had a lethal outcome for the woman. The 19th century is a turning point due to modern principles of asepsis, while today's modifications and principles being based on experiences from the 20th century.

There are significant differences in the incidence of caesarean section between specific regions in the world, and between hospital institutions. In the last 30-40 years, the number of caesarean sections keeps growing in developing countries. The incidence grew from an average of 4-5% to 5-20%, however, certain countries state even much higher incidences (In 2003, South Korea 40%, Italy 52%). The practice of performing a primary caesarean section exclusively according to the wishes of the patient has become broadly accepted in certain parts of the world among women of higher socioeconomic status. The manner of paying for delivery has a significant influence, with higher numbers of caesarean sections in private patients and in private hospitals. In Sao Paulo, Brazil, in the private sector, caesarean section was performed in 80%, and in state hospitals in 32.1% of cases. Factors contributing most to the frequency of this operation are: dystocia, previous caesarean section, pelvic presentation of the fetus, fetal distress, multiple pregnancy, late parity, reduced use of vacuum and forceps.

The increased number of caesarean sections leads to a constant reassessment of validity of indications, and thus to their change. Today, the fre-

quency of caesarean sections is 15-25%, with a tendency to grow. The recommendation of the World Health Organization is to keep caesarean sections up to 15%.

## GOAL

The goal of this paper is to present the frequency of caesarean section, parity and age of mothers, indications for surgical completion of delivery, gestation age and body weight of newborn babies, Apgar score in the first minute and perinatal morbidity and mortality.

## MATERIALS AND METHODS

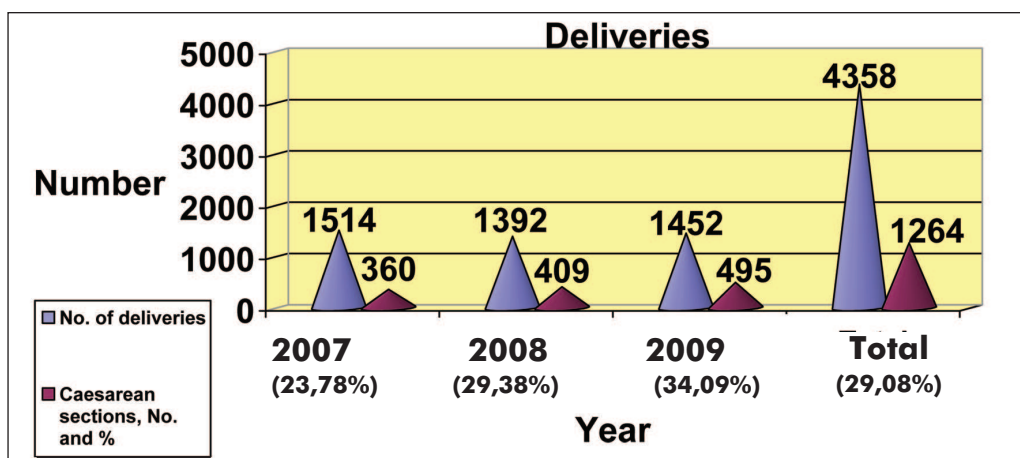
By insight into delivery protocols, case histories, surgical protocols and neonatology protocols, deliveries by caesarean section in the Department for Gynecology, Obstetrics and Neonatology of the General Hospital in Sremska Mitrovica in 1/1/2007-12/31/2009 period were analyzed in retrospect.

Data was statistically processed and presented in table and graph form.

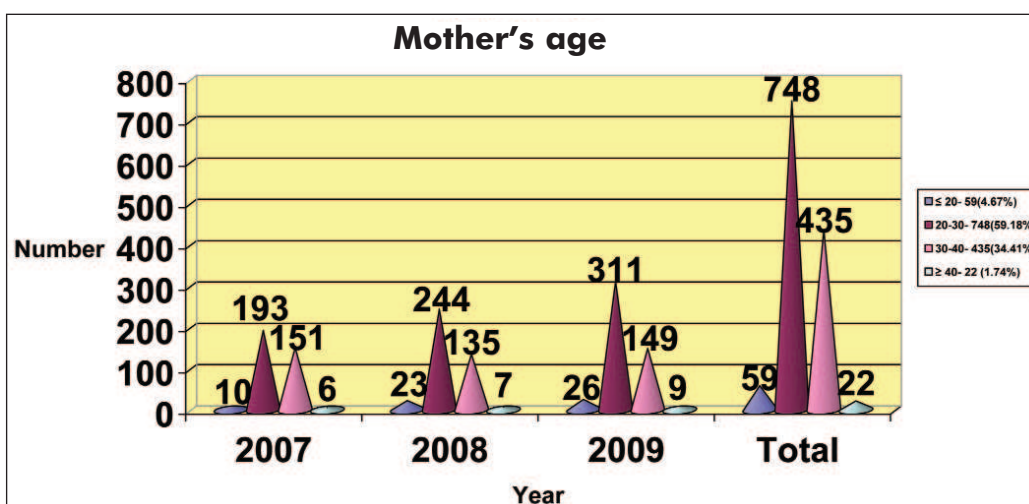
Deliveries	Year			Total	Σ
	2007	2008	2009		
No. of deliveries	1514	1392	1452	4358	1453
Number of CS <sup>2</sup>	360	409	495	1264	421
%	23.78	29.38	34.09	100.00	29.08

Table 1. Number of deliveries, number and percent of caesarean sections

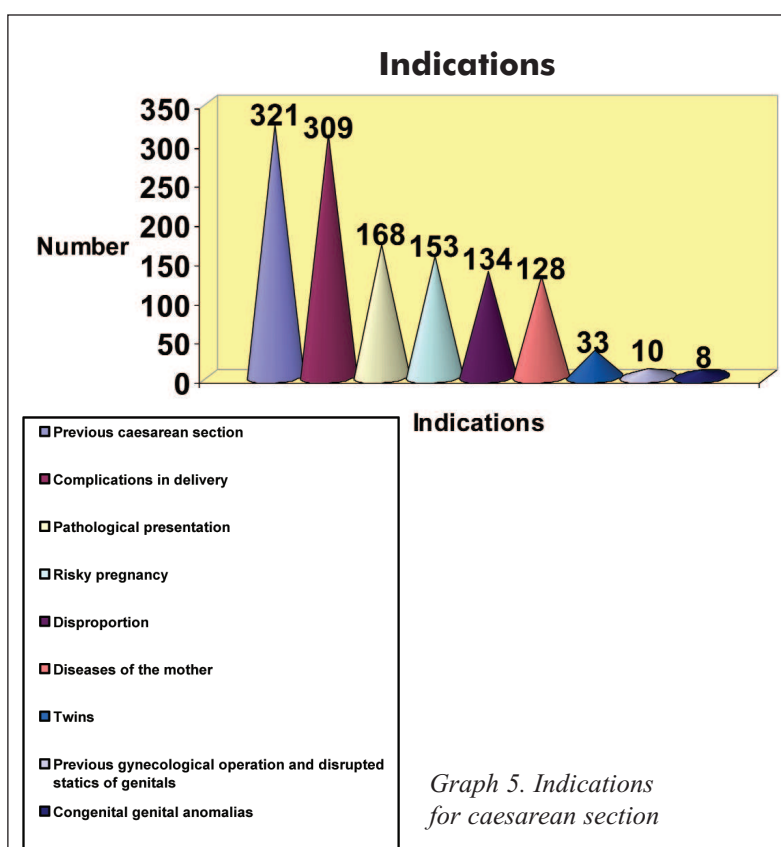
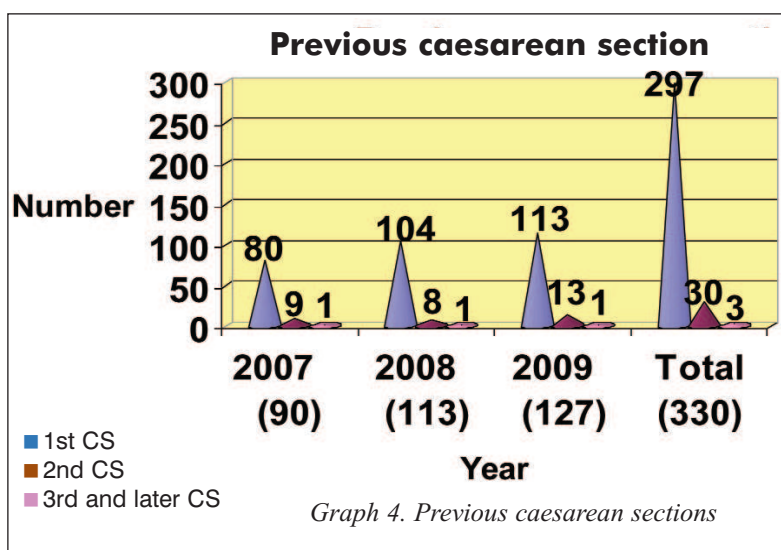
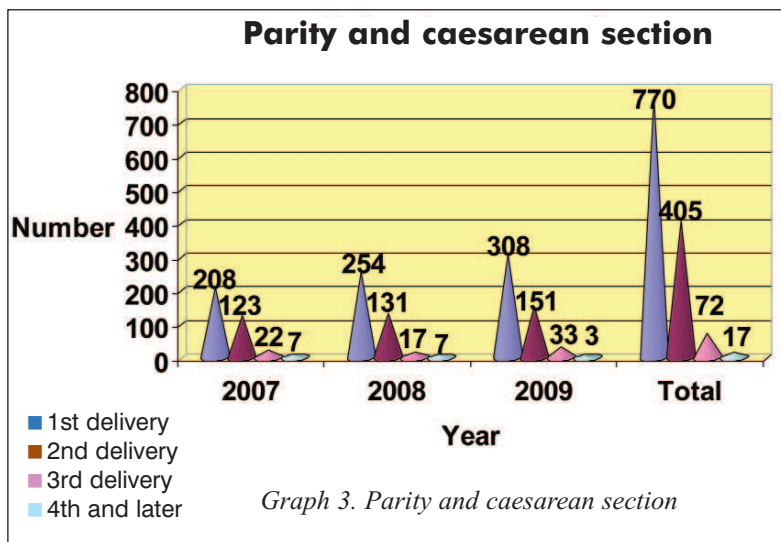
<sup>2</sup>CS - Caesarean Section



Graph 1. Number of deliveries, number and percent of caesarean sections



Graph 2. Mothers' age



## RESULTS

In the reviewed three year period there was a total of 4358 deliveries. The maximum number of deliveries was in 2007 (1514), and the minimum in 2008 (392), with an average for the period of 1453. In this period there were a total of 1264 caesarean sections (29.08%). In 33 twin pregnancies, delivery was completed by abdominal surgery. The total number of babies delivered by caesarean section was 1299. The maximum number of caesarean sections were done in 2009 (495; 34.09%), and the minimum in 2007 (23.78%). Data in Table 1 show a relative uniformity of the number of deliveries and a trend of growth for deliveries finished by caesarean section (23.78% - 34.09%). (Table 1, Graph 1.)

Most deliveries were in women aged 20-30 years (748, 59.18%), followed by 30-40 years (435; 34.41%), 20 years (59; 4.67%), and over 40 years (22; 1.74%). In the reviewed period, a growing number of mothers in the 30-40 year age group is evident, meaning that more women decided to give birth later in life.

Ages of patients delivered by caesarean section are presented in Graph 2.

Graph 3 presents parity. Caesarean section was most often performed in the first delivery (770; 60.92%), followed by the second (405; 32.04%) and third (72; 5.70%) deliveries, and in later deliveries (17; 1.34%).

Data about previous caesarean sections were analyzed. One previous caesarean section was present in 297 (23.50%) of patients, two in 30 (2.37%) and three in 1 (0.23%) patient. By calendar years, there is a visible trend of growth of repeat caesarean sections. A total of 330 (26.10%) repeat caesarean sections were performed. (Graph 4)

Most frequently the decision to do a caesarean section was made because of a previous caesarean section (321; 25.40%), complications in delivery (fetal hypoxia, uterine dystocia, bleeding during pregnancy and delivery, threatening rupture of the uterus,... - in 309 cases or 24.45%), pathological presentation (168; 13.29%), risky pregnancy (PIH<sup>3</sup>, prolonged and transferred pregnancy, infertility, placenta previa, older primiparae, IUGR<sup>4</sup>, - in 153 cases or 12.10%), disproportion (large fetus, narrow pelvis - in 134; 10.60%), diseases of the mother (uterine myomas, glaucoma, epilepsy, malignancy,... - in 128 or 10.12%), twin pregnancy (33; 2.61%), previous gynecological surgery and disrupted statics of the genitalia (10; 0.79%), and congenital genital anomalies (8; 0.63%). This paper presents individual most important indications, with two or more indications present in certain cases. (Graph 5)

<sup>3</sup> PIH-Pregnancy-induced Hypertension

<sup>4</sup> IUGR- Intrauterine Growth Retardation



A total of 1299 babies were born by caesarean section. Gestation ages and body weights of newborn babies delivered by caesarean section are presented in Table 2. Most were born at 38-42 weeks of gestation (1165; 89.68%) and with a body weight of 3000-3999gr (896; 68.98%). In 2007, the total number of babies delivered by caesarean section was 369, with maximum BW<sup>5</sup> 6200gr and minimum BW 1350gr. In 2008 the total number of babies delivered by caesarean section was 421, with maximum BW 5050gr, and minimum BW 900gr. In 2009 the total number of babies delivered by caesarean section was 509, with maximum BW 4970gr, and minimum BW 1200gr. There were 61 (4.69%) premature babies.

Apgar score of 8-10 was awarded to 1181 (90.92%), 4-7 to 106 (8.16%), 1-3 to 8 (0.61%) newborn babies. Four babies (0.31%) were stillborn, and the caesarean section was performed for the benefit of the mother. In two cases of stillborn babies, caesarean section was done because of premature placental ablation, in one case because of a twin pregnancy and intrauterine death of one twin, and in one case because of eclampsia and previous caesarean section. (Table 3)

Body weight	Gestation age					Total	%
	< 28 BW	28-32 BW	33-37 BW	38-42 BW	> 42 BW		
≤ 999		1				1	0.08
1000-1999		3	5	1		9	0.69
2000-2999			46	199	11	256	19.70
3000-3999			6	844	46	896	68.98
≥ 4000				121	16	137	10.55
Total		4	57	1165	73	1299	100.00
%		0.31	4.39	89.68	5.62		100.00

Table 2. Gestation age and body weight

Apgar score	Year			Total	%
	2007	2008	2009		
0	2	1	1	4	0.31
1-3	3	4	1	8	0.61
4-7	38	26	42	106	8.16
8-10	326	390	465	1181	90.92
Total	369	421	509	1299	100.00

Table 3. First minute Apgar score

Morbidity	Year			Total	%*
	2007	2008	2009		
Asphyxio perinatalis	39	23	26	88	6.77
Sy. aspirationem	5	3	3	11	0.85
RDS	1	6	7	14	1.08
Hyperbilirubinemia	4	2	2	8	0.62
Hypoglicemia		5	3	8	0.62
Anaemia	6	4	5	15	1.15
Thrombocytopenia		1	1	2	0.15
Fractura claviculae	2	1		3	0.23
Cephalhaematoma	2	2	2	6	0.46
Conjunctivitis	3	2	3	8	0.62
Sepsis	1			1	0.07
Pyoderma	1		1	2	0.15
Malformatio cong. major	5	3	6	14	1.08
Total	69	52	59	180	13.85

Table 4. Perinatal morbidity in newborn babies delivered by caesarean section

\*Percent calculated relative to the total number of babies born (1299)

<sup>5</sup> BW - Body Weight

Morbidity in newborn babies is presented in Table 4. Total perinatal morbidity was 13.85%. Asphyxia (88; 6.77%) was most frequent, followed by anemia (15; 1.15%), RDS (14; 1.08%), and congenital malformations (14; 1.08%).

Perinatal mortality in caesarean section in promilles: 1.36‰ in 2007, 0.71‰ in 2008, 0.68‰ in 2009, average 0.92‰ relative to the total number of deliveries. Average perinatal mortality for the total number of babies born in the same period was 4.1‰ (Table 4).

In the reviewed period no maternal mortality was registered in caesarean section.

## DISCUSSION

The incidence of delivery by caesarean section in highly developed and developed countries is growing rapidly, from 5% in 1965, to currently over 25% in many countries. In the reviewed three-year period in the General Hospital in Sremska Mitrovica, the registered percent of delivery by caesarean section was 29.08%. In 59.18% of cases, patients were 20-30 years old. In the reviewed period, a higher incidence of pregnancies completed by caesarean section was

noted in the group 30-40 years old (34.41%), compared to the previously reviewed 1991-2000 period (26.54%), which can be explained by a higher frequency of diseases (hypertension, diabetes, infertility) among pregnant women, and the decision to give birth later in life. In first deliveries caesarean section was performed in 60.92% cases, in second deliveries in 32.04%, in third deliveries on 5.07%, and in later pregnancies in 1.34% of cases.

The most frequent indications for surgical delivery were: repeat caesarean section (25.40%), complications in delivery (24.45%), pathological presentation (13.29%), risky pregnancy (12.10%), disproportion (10.60%), disease of the mother (10.12%), twin pregnancy (2.61%), previous gynecological surgery (0.79%), and congenital anomaly of the genitalia (0.63%). As for previous caesarean sections, 23.50% of patients had one previous caesarean section, 2.37% had two, and 0.23% had three. Our results from the 1991-2000 period show that the decision to perform caesarean section had been made because of complications in delivery (956; 49.46%), disproportion (273; 41.12%), risky pregnancy (229; 11.85%), pathological presentation (224; 11.59%), repeat caesarean section (173; 8.95%), disease of the mother (33; 1.71%), twin pregnancy (16; 0.83%), previous gynecological surgery and disrupted genital statics (15; 0.77%), and congenital anomaly of the genitalia (14; 0.72%). One previous caesarean section had been performed in 17.85% of patients, 1.71% had had two, and 0.05% had had three. A difference of indications for caesarean section and a higher number of previous caesarean sections can be noted. The percent of caesarean sections performed due to a previous caesarean section has almost tripled, while indications due to complications in delivery have decreased by 50%.

Perinatal mortality	Year					
	2007		2008		2009	
	Total	SC	Total	SC	Total	SC
FMU <sup>6</sup>	6	2	6	1	5	1
ENM <sup>7</sup>			1			
Perinatal mortality, total	3.94‰		4.97‰		3.39‰	
Perinatal mortality, CS		1.36‰		0.71‰		0.68‰

Table 5. Perinatal mortality

Two decades ago, the performing of a primary caesarean section was inconceivable. In the USA, the four most common indications for caesarean section are: previous caesarean sections, dystocia, fetal distress and pelvic presentation. Previous caesarean section as an indication is present in approximately 50% of pregnancies, when the previous pregnancy was also completed by caesarean section. The number of caesarean sections due to intrapartum hypoxia has doubled, and due to dystocia tripled. For pelvic presentation, the number of caesarean sections has increased from 30% to 88%, and for twin pregnancy from 13% to 47%. However, the practice of performing a primary caesarean section exclusively because this is desired by the patient has become broadly accepted in certain parts of the world, among women of higher socioeconomic status (23% in the USA). Controversies linked to primary elective caesarean section will not be resolved until adequate control studies are performed.

Most babies are born between gestation weeks 38 and 40 (89.68%), and with a body weight of 3000-3999 g (68.98%). There were 61 (4.69%) premature babies. 90.92% newborn babies had an Apgar score of 8-10. Morbidity is dominated by perinatal asphyxia (6.67%), anemia (1.15%), RDS (1.08%), and congenital malformations (1.08%). In the reviewed period, relevant to the total number of deliveries, average perinatal mortality in caesarean section was 0.92‰. In the same period, average total perinatal mortality was 4.1‰. According to our data, perinatal morbidity and mortality in caesarean section show a continuous downward trend. In the reviewed period no maternal mortality was registered linked to caesarean section.

## CONCLUSION

Caesarean section is one of the most important and most frequent operations in obstetrics, with a trend of growth from year to year, both in the world and in our country. Reduced complications due to the progress of surgical techniques, the introduction of modern anesthesia and powerful antibiotics, possibilities for early detection of intrauterine threats to the fetus, progress of intensive care for newborn babies, fear and pressure from the mother and relatives, are all possible reasons resulting in more frequent completion of delivery by caesarean section. The most frequent indications are previous caesarean sections, complications in delivery and pelvic presentation.

Obstetricians bear a huge responsibility to make adequate and timely decisions to complete delivery by surgery, all with the goal to reduce perinatal and maternal morbidity and mortality.

## ABBREVIATIONS:

1. RDS- Respiratory Distress Syndrome
2. CS-Caesarean Section
3. PIH-Pregnancy-induced Hypertension
4. IUGR- Intrauterine Growth Retardation
5. BW- Body Weight
6. FMU-Fetus Mortus in Utero
7. ENM- Early Neonatal Mortality

<sup>6</sup> FMU-Fetus Mortus in Utero

<sup>7</sup> ENM- Early Neonatal Mortality

## Apstrakt

**UVOD:** Incidenca porodaža carskim rezom u visoko razvijenim i razvijenim zemljama, rapidno raste, i sa 5% koliko je iznosila 1965.god. ona danas u mnogim zemljama prelazi 25%.

**CILJ:** Cilj rada je da prikaže učestalost carskog reza, paritet i godine života porođilja, indikacije za operativno završavanje porodaža, gestacijsku starost i telesnu težinu novorođenčadi, Apgar skor u prvoj minuti i perinatalni morbiditet i mortalitet.

**MATERIJAL I METODE:** Uvidom u protokole porodaža, istorije bolesti, protokole operacija i neonatološke protokole retrogradno su analizirani porodaži carskim rezom u Službi za ginekologiju, akušerstvo i neonatologiju Opšte bolnice u Sremskoj Mitrovici u periodu 1.1.2007.-31.12.2009. Podaci su statistički obrađeni i prikazani tabelarno i grafički.

**REZULTATI:** U periodu 2007.-2009.godine u Opštoj bolnici u Sremskoj Mitrovici bilo je ukupno 4358 porodaža i 1264 carskih rezova. U posmatranom trogodišnjem periodu stopa porodaža žena carskim rezom iznosi 29,08%. Bilo je 33 gemelarnih trudnoća. Carskim rezom je rođeno 1299 novorođenčadi. U 59,18% slučajeva pacijentkinje su bile starosne dobi od 20-30 godina. Uočeno je povećanje broja trudnoća završenih carskim rezom nakon 30. godine-34,41%, što se može objasniti povećanom učestalošću obolavanja trudnica (hipertenzija, dijabetes melitus, infertilitet...) i ličnom odlukom pacijentkinje o rađanju u kasnijem životnom dobu. Kod prvorođetke je urađen carski rez u 60,92% slučajeva, kod drugorođetke u 32,04%, trećorođetke 5,07% i kod višorođetke u 1,34% slučajeva.

Najčešće indikacije za operativno završavanje porodaža bile su: ponovni carski rez-25,40%, komplikacije u porodažu-24,45%, patološka prezentacija-13,29%, rizična trudnoća-12,10%, disproporcije-10,60%, oboljenje majke-10,12%, blizanačka trudnoća-2,61%, prethodna ginekološka operacija-0,79% i urođena anomalija genitalnih organa-0,63%. Sa jednim prethodnim carskim rezom bilo je 23,50% porođilja, sa dva 2,37% i sa tri 0,23%.

Najveći broj novorođenčadi rođen je između 38. i 40. nedelje gestacije-89,68% i sa telesnom masom 3000-3999g-68,98% porodaža. Prevrneno je rođeno-61.(4,69%) novorođenče. Apgar score ocenu 8-10 dobilo je 90,92% novorođene dece. Ukupan perinatalni morbiditet iznosio je 13,85%. Najčešće je registrovana asfiksija-88(6,77%), potom anemija -15(1,15%), RDS-14(1,08%) i kongenitalne malformacije-14(1,08%). Perinatalni mortalitet kod carskog reza je 0,92% u odnosu na ukupan broj porodaža, a ukupni perinatalni mortalitet za svu novorođenu decu 4,1%. Perinatalni mortalitet kod carskog reza je prema našim podacima u kontinuiranom opadanju. Maternalni mortalitet kod porođilja sa carskim rezom nije zabeležen u ispitivanom periodu 2007.-2009.

**ZAKLJUČAK:** Carski rez je jedna od najvažnijih i najčešćih operacija u akušerstvu i iz godine u godinu se beleži porast stope carskog reza kako u svetu, tako i kod nas. Na akušerima je velika odgovornost u smislu pravilne i pravovremene odluke o operativnom završavanju porodaža, a sve u funkciji smanjenja perinatalnog i maternalnog morbiditeta i mortaliteta.

## REFERENCES

1. Kurjak A.: Textbook of Perinatal Medicine, Jaypee Brothers Medical Publishers (P) Ltd. New Delhi, 2005; 2422-2435.
2. 2nd Medical enciklopedija, Yugoslav Lexicographic Institute, Zagreb MCM-LXVII, I
3. Farine D.: What is the optimal C/S rate? The Second World Congress on Contraversies in Obstetrics, Gynecology & Infertility Ed. Monduzzi Editore, Paris, 2001; 343-351.
4. Fisk N: Cesarean section for all? P. 217 The First International Congress on Cotroversies in Obstetrics, Gynecology & Infertility Ed. Monduzzi Editore, Bologna, Italy 1999.

5. Jovanović R.: Place of cesarean delivery in modern management. Anniversary XL GOW. Collection. Belgrade, Sava Center 1996; 3-11.
6. Petaković S., Potrebić N., Dokić D., Arbanas S., Malobačić D., Petrović Z., Mitrović B.: Cesarean section in modern obstetrics, Proceedings of GOW Belgrade, 2004; 131-137.
7. Gould J. et al: Socioeconomic differences in cesarea rates of section. N Engl. J Med 1989; 321: 233-239. Jul 27 1989.
8. Paterson-Brown S: Should doctors perform an elective cesarean on request? Yes, as long as the woman is fully informed. BMJ. 1998 Aug 15; 317 (7156): 462-3

9. O'Driscoll K, Foley M.: Correlation of decrease in perinatal mortality and increase in cesarean section rate. Obstet. Gynecol, 1983; 61:1.
10. Guzman Ibarra Mde et al: Is the high frequency of Cesarean section in the highly specialized gynecologic hospital justifiable. Ginekol Obstet. Mex. 2003; 71: 291-296.
11. MacKenzie, Cooke I., Annan B.: Indications for cesarean section in the consultant obstetric unit over three decades. J Obstet Gynecol 2003; 23: 233-238.
12. Kozak Lj. Njeeks JD. U.S.: Trends in Obstetric Procedures 1990-2000. Birth 2002; 29: 157-161