

Maternal and Fetal Outcome in Elective versus Emergency Caesarean Section in a Developing Country

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ABSTRACT

As the other major European countries, Croatia has also seen a marked increase in the rate of caesarean sections. The aim of this study was to determine the most common reasons for caesarean section, to compare emergency and elective caesarean section in regard to intraoperative and postoperative complications in both mother and child, and to assess the decision-to-delivery interval (DDI) in our clinic in comparison to current recommendations. Analyzing the results of our research we can say that the new-borns in the group with the elective caesarean section had considerably better Apgar index score in the first minute ($p=0.00056$) and in the fifth minute ($p=0.054$) than the children born in the group with emergency caesarean section. Children from the group with elective caesarean section had also less frequent asphyxia ($p=0.02315$) and considerably less frequent resuscitation ($p=0.0143$) than the children from the group with emergency caesarean sections. Only 39.73% of the emergency caesarean sections were performed within the »golden standard« period of 30 minutes. Regarding the data from the literature our results are similar with the ones from developed countries and 30 minute current standard seem to be not achievable.

Key words: caesarean section, decision-to-delivery interval (DDI), maternal and fetal outcome

Introduction

Caesarean section has been shown to be a safe operation¹ and in many countries around the world there has been a dramatic increase in its frequency²⁻⁵. In the 19th century, mortality was almost 100%, with the major causes being haemorrhage and infections. Aseptic and antiseptic methods with antibiotic therapy, use of blood transfusion and improved anaesthesia have all contributed to the dramatic decrease in mortality seen during the last century².

Despite these improved results, considerable care is still required to maintain and improve the rates of maternal and perinatal morbidity and mortality.

As with other major European countries, Croatia has seen a marked increase in the rate of caesarean section⁶. In our clinic during the last decade, we have noted a doubling in the frequency of caesarean section with 615 performed among 6130 deliveries (1%) in 1993 increasing to

774 among 4,326 deliveries (17.8%) in 2003. Reasons for this increase include developing facilities for fetal monitoring and invasive diagnostic procedures, also the clinic becoming a tertiary health care centre for perinatal medicine for the Ministry of Health, with referral of pathological pregnancies from all over the country.

It has been shown that the risks of surgical complications are greater with emergency compared with elective caesarean sections⁵. It has been recommended that the interval between a decision for caesarean section and the delivery in emergency cases should not exceed 30 minutes⁷. To explore this recommendation in our clinic, we have audited our performance to determine how often we achieve the »gold standard« target of 30 minutes. We have also determined the rate of complications accompanying emergency caesarean and elective caesarean sections and the duration of patient's hospitalization. The

condition of the newborn at delivery, the need for resuscitation and duration of stay in the neonatal intensive care unit, as well as any other neonatal injuries or complications have also been studied.

Materials and Methods

An analysis of numbers of deliveries and caesarean sections performed during the 11 year period, from 1993 to 2003, was performed. A detailed analysis of 183 caesarean sections performed during the six month period from January 1st to July 1st 2004 was conducted; preterm deliveries and multiple pregnancies were excluded from the analysis.

Emergency caesarean section was defined as one performed for fetal bradycardia, prolapsed umbilical cord, heavy vaginal bleeding and eclampsia. Elective caesarean section was defined as one performed during labor for failure to progress. Maternal data collected included the following: age, parity, mode of previous delivery, antenatal blood pressure, indication for caesarean section, status of surgeon, operative complications, post-operative complications and duration of hospitalization. Neonatal data collected included: sex, birth weight, one and five minute Apgar scores, umbilical artery pH values, need for resuscitation, referral to neonatal intensive care unit, neonatal complications and duration of hospitalisation. Asphyxia is defined as a severe disturbance of oxygen supply to the fetus, which develops during the first or second stage of labor. The diagnosis is confirmed by a severe metabolic acidosis in the umbilical artery blood (pH<7.0), a persistent low Apgar index score (<7) as well as functional disturbances as a result of hypoxic damage in various organs including the central nervous system.

Indications for surgically completed deliveries

The indications for emergency caesarean section are: fetal distress, secondary inertia of the uterus, preeclampsia, prolapsus of the umbilical cord, threatening uterus

rupture, abruption of placenta. The indications for the caesarean section were: breech presentation, the condition after the previous caesarean section, fetomaternal disproportion, placenta praevia.

Complications

In the intraoperative complications we included bleeding, laesion of the urinary bladder, urethra, intestines or arteries of the uterus. In the postoperative complications we included bleeding (1500 ml and more), infection, relaparotomia, anaemia (haemoglobin <80 g/L), increasing values of the blood pressure (140/100 or more), thrombosis, haematoma, high body temperature (38 °C and higher), ileus and stay in the hospital for more than 6 days.

Surgeon

We analysed the importance of the surgeon's experience (resident in the Department of Obstetrics and Gynecology versus specialist of Obstetrics and Gynecology), the result of the surgery, and appearance of the complications, comparing emergency caesarean sections and the elective ones.

Decision-to-delivery interval (DDI)

The Decision-to-Delivery Interval was defined as the time between the decision to perform the caesarean section and the delivery of the infant. The decision to perform a caesarean section was always made by senior (consultant) obstetrician who is always present in the clinic. The decision to delivery interval was determined for each delivery from time recorded in the patient's record for the recommendation for caesarean section and the time recorded for the birth of the baby.

Statistical analyses were performed using Student's t-test, χ^2 -test and Mann Whitney U-test.

TABLE 1
NUMBER OF THE DELIVERIES AND FREQUENCIES OF THE CAESAREAN SECTIONS IN A 10 YEAR PERIOD

Year	Number of the deliveries	Number of caesarean sections	%	Emergency caesarean section % / Elective caesarean section %
1993	6,130	615	10.10	83/17
1994	5,325	567	10.64	81/19
1995	5,558	596	10.72	84/16
1996	5,428	587	10.81	76/24
1997	4,882	651	13.33	79/21
1998	4,870	614	12.60	72/28
1999	4,817	687	14.26	74/26
2000	5,048	772	15.29	63/37
2001	4,361	787	18.04	58/42
2002	4,479	765	17.07	54/46
2003	4,326	774	17.89	52/48

TABLE 2
AGE, PARITY AND DURATION OF GESTATION OF WOMEN IN MONITORED GROUPS

	Emergency caesarean section	Elective caesarean section	p
Mother's age (years, X±SD)	29.21±6.15	31.89±5.06	0.0016
Parity	1.50	1.809	0.013
Duration of the gestation (weeks, X±SD)	39.61±1.33	39.43±1.12	ns

TABLE 3
EXPERIENCE OF THE SURGEON, TYPE OF ANAESTHESIA, HYPERTENSION OF THE MOTHER AND DECISION TO DELIVERY INTERVAL (DDI) IN MONITORED GROUPS

	Emergency caesarean section	Elective caesarean section	p
Resident (%)	15	15	ns
Specialist (%)	85	85	ns
General anaesthesia (%)	79	82	ns
Local anaesthesia (%)	21	18	ns
Hypertension of the mother (%)	24.47	11.42	0.02
DDI (min, X±SD)	44.01±39.10	53.16±50.01	ns

DDI – decision-to-delivery interval

Results

We analysed 183 caesarean sections. 89 were elective and 94 emergency ones. All the results are shown in the tables.

We notice the increasing incidence of caesarean sections in the last 10 years. In the last 10 years the number of caesarean sections has increased for 8%.

There were differences in the ages of the pregnant women. Those who had emergency caesarean section were statistically much younger from the mothers who had elective caesarean section. Statistically, patients in the group of emergency caesarean section gave birth less than the ones in the elective caesarean section group. Duration of the gestation has no difference in monitored groups.

There were no differences in the experiences of surgeons compared to the operative techniques. The majority of both emergency and electives caesarean sections are done by a specialist. The type of anaesthesia did not differ between the emergency caesarean sections and the elective ones. Both emergency and elective caesarean sections are done under the general anaesthesia. Statistically, the hypertension of the mother (blood pressure >140/100) was significantly more frequent in the group of the emergency caesarean section than in the group of the elective caesarean section. In the time of the »golden standard« we performed 39.73% emergency caesarean sections.

The most frequent reason for the elective caesarean sections was the condition after the surgery of the uterus (previous caesarean section, myomectomy), breech presentation, fetomaternal disproportion and/or pregnancy after IVF/ET (In Vitro Fertilisation/Embryo Transfer).

The most frequent indication for the emergency caesarean section was preeclampsia, vaginal bleeding/abruption placentae, breech presentation with CTG pathology, febris sub partu and secondary inertia of the uterus.

There was no difference in the delivery-weight of a new-born in the emergency and elective caesarean sec-

TABLE 4
USUAL INDICATIONS FOR THE ELECTIVE CAESAREAN SECTION

Indication	Number of patients	%
Previous surgery of uterus	43	48.32
Breech presentation	30	33.70
Fetomaternal disproportion	11	12.36
Pregnancy after IVF/ET	5	5.62

IVF/ET – *in vitro* fertilisation/embryo transfer

TABLE 5
USUAL INDICATIONS FOR THE EMERGENCY CAESAREAN SECTION

Indication	Number of patients	%
Preeclampsia	51	54.25
Vaginal bleeding/Abruptio placentae	17	18.09
Breech presentation/CTG pathology	12	12.76
Febris sub partu	7	7.45
Secondary inertia of the uterus /Fetomaternal disproportion	7	7.45

CTG – cardiotocography

TABLE 6
COMPARISON OF THE DELIVERY-WEIGHT, PRESENCE OF ASPHYXIA, RESUSCITATION AND APGAR INDEX SCORE OF NEWBORNS IN MONITORED GROUPS

	Emergency caesarean section	Elective caesarean section	p
Delivery-weight (g, X±SD)	3480.9±501.1	3497.6±508.7	ns
Asphyxia (%)	23.40	8.9	0.0085
Resuscitation (%)	21.28	6.74	0.0049
First minute Apgar index (X±SD)	8.44±2.05	9.36±2.42	0.0012
Fifth minute Apgar index (X±SD)	9.31±1.38	9.75±0.70	0.021

Apgar index – index of fetal assessment at 1 and 5 minutes after birth. Scores of zero to two are given for each of the following parameters: heart rate, respiratory effort, muscle tone, colour and response to catheter in nostril.

tion. Asphyxia was more frequent in the group of the emergency sections than in the group of the elective caesarean section. The resuscitation of a new born child was more frequent in the group of the emergency caesarean section than in the group of the elective caesarean section. There is a statistical significance in the analysis of Apgar index in monitored groups. The children born in the emergency caesarean section statistically had a significantly lower Apgar from the children born in the elective caesarean section in the first minute and in the fifth minute.

There was no statistical significance in analyzing all other previously mentioned parameters from the mother's side and from the child's side. The average hospitalization of patients was 6 days for both monitored groups.

Discussion

In the last decades in the world, we note an increasing frequency of the caesarean sections with continuing growth¹⁻⁵. The mentioned trend is noted in Croatia as well⁶. Analyzing the frequency of deliveries with caesarean section at our clinic in the last 10 years we mark the increase of 8%. Today at our clinic we complete 18% of deliveries surgically (Table 1).

Regarding to our research the most frequent reasons for the elective caesarean sections were the condition of the previous surgery of the uterus (48.32%), the breech presentation (33.70%, Table 4). For emergency caesarean sections those were preeclampsia/threatening asphyxia of a child (54.25%) and vaginal bleeding/abruptio placentae (18.09%, Table 5) which is similar as in literature^{4,5}. The condition after a previous caesarean section as an indication for the surgically completed delivery in our research was 48.32%. In Norway that portion is 3.6%, in Sweden 6.6%, and in the USA 10.5%⁵. It is considered that a liberal view of the first elective caesarean section in breech presentation and diagnosis of »feto-maternal disproportion« in our clinic is the reason why there is such a high percentage of the caesarean sections⁶.

There is a large number of the publications for postoperative complications after the caesarean section⁷⁻¹⁷, while for the intraoperative complications there are not

many publications and if there are they exist just in the sense of illustration of the case¹⁸⁻²¹. In our research we didn't find a statistically significant difference in the frequency of intraoperative and postoperative complications in monitored groups.

The new-borns in the group with the elective caesarean section had considerably better Apgar index score in the first minute (p=0.00056) and in the fifth minute (p=0.054) than the children born in the group with the emergency caesarean section. Children from the group with the elective caesarean section had also less frequent asphyxia (p=0.02315) and considerably less frequent resuscitation (p=0.0143) than the children from the group with the emergency caesarean sections (Table 6). The facts from the literature are similar^{7,8}.

Professional associations of obstetricians and gynecologists recommended that the decision-to-delivery interval for emergency caesarean section should not exceed 30 minutes²². However, this recommendation does not appear to be sustained by evidence based data, and is probably drawn from medical legal grounds²². In practice, the decision-to-delivery interval is mainly influenced by the facilities and staff availability.

The 30 minute period from the decision for the emergency caesarean section-until the baby's delivery (decision-to-delivery interval) was accepted as a »golden standard«^{23,25}.

There are many dubious facts from the literature if it is realistic²⁵⁻²⁹. In the analysis of the facts that influence the caesarean section in mentioned time interval the experience of the surgeon did not show as important²³. It seems that the time from the decision for the surgical delivery, transfer of the patient to the operating room, preparation of the team for the surgery and introducing the patient into anesthesia lasts for more than 30 minutes²⁹. Similar results were found in our research, as well. 39.73% of emergency caesarean sections at our clinic were done within the »golden standard«.

We compared the umbilical artery pH of the children born with the emergency caesarean section within the »golden standard« with umbilical pH of the children born in remaining emergency caesarean group. In our research the umbilical artery pH in monitored groups was not statistically considerably different. The same results

were found in several other researches^{7,24}. Can we then consider the umbilical pH an adequate parameter for the valuation of the child condition after the delivery and is it an adequate indicator for a long time neurological child outcome? Only 10–15% of all cerebral palsy cases developing after delivery at term, are a consequence of a hypoxic encephalopathy developing during the process of labor and delivery⁷. For a long time, it was ignored, that a number of pregnancy pathologies may lead to brain damage, which could also produce the typical symptoms of cerebral palsy.

Our clinic is a tertiary prenatal health care centre with organized 24 hours a day team of obstetricians, midwives, neonatologists and anesthesiologists. In analyzing our results we determine that in the group of the emergency caesarean sections, only 37.42% were performed within the 30 minutes of the »golden standard«. Introducing standardization and designing protocols in the clinical practice in the world, there is an intention to shorten the time from the decision for the caesarean section to the delivery. However, after the accessible facts from the literature it seems that it is very difficult to reach it^{24–29}.

The question is, if the 30 minute period of time brings specific benefit for the new born child if we consider that there were no differences with umbilical pH in compared

groups. For everyday clinical work the most important thing is to make a decision timely, clearly determine the parameters which determine that. The monitored parameters from the mother's side in our research did not differ a lot. There was just more frequent hypertension in the group of the patients who had the emergency caesarean section ($p=0.017$, Table 3). With the introduction of antibiotic prophylaxis with the patients who give birth with the caesarean section at our clinic the infections of the lesions are lessened by 5% and this result is similar with the ones from the literature^{10,12}.

Analyzing the results of our research and comparing them, we can say that in our clinic children born in the group of the elective caesarean section had significantly higher Apgar index in the first minute and in the fifth minute, had significantly less asphyxia and significantly were less resuscitated, than the children in the group of the emergency caesarean section. There were no significant differences in the analysis of the umbilical artery pH in compared groups and we have not found any significant difference in the maternal intraoperative and postoperative complications in the compared groups. Only 39.73% of the emergency caesarean sections were completed within the »golden standard« period of 30 minutes. Regarding the data from the literature our results are similar to those of the developed countries and 30 minute current standard seems to be not achievable²⁹.

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MATERNALNI I FETALNI ISHOD U IZBORNIM I HITNIM CARSKIM REZOVIMA U ZEMLJI U RAZVOJU

S A Ž E T A K

Kao i većina evropskih zemalja i Hrvatska bilježi trend porasta učestalosti carskih rezova. Cilj ovog istraživanja bio je utvrditi najčešće razloge za izvođenje carskog reza, usporediti intraoperacijske i poslijeoperacijske komplikacije za majku i dijete u skupini izbornih i hitnih carskih rezova, utvrditi koliko iznosi »vrijeme proteklo od donošenja odluke o hitnom carskom rezu do vremena poroda djeteta« (Decision-to-Delivery Interval, DDI) te ga usporediti sa današnjim preporukama. Analizirajući naše rezultate možemo reći da su djeca rođena izbornim carskim rezom imala bolji Apgar indeks u prvoj ($p=0.00056$) i petoj minuti ($p=0.054$), imala su značajno rjeđe asfiksiju ($p=0.02315$) i značajno su rjeđe reanimirana ($p=0.0143$). Samo 39.73% hitnih carskih rezova izvedeno je u vremenu »zlatnog standarda« od 30 minuta. Prema podacima iz literature naši su rezultati identični onima iz razvijenih zemalja te se vrijeme današnjeg standarda od 30 minuta čini teško dostižnim.