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ORIGINAL PAPER

Neonatal outcomes of elective caesarean section at 36 and 37 weeks compared with outcomes at 38 and 39 weeks

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ABSTRACT

Introduction: Not only late-preterm newborns but also those born as near-term are at increased risk of complications in the first hours of postnatal adaptation.

Aim of the study: The aim of the retrospective study was to compare the postnatal status and adaptation disorders in neonates born with elective caesarean section at 36, 37, 38, and 39 weeks of pregnancy in a level-three perinatal care department.

Material and methods: The research was carried out in a group of 200 newborns born in one year, 2015, and hospitalised from birth in the Department of Neonatology, Pomeranian Medical University in Szczecin. Postnatal status and occurrence of complications during the adaptation period were compared. The obtained results were compared between subgroups using appropriate statistical analysis methods.

Results: In the group of newborns born in weeks 36 and 37 of pregnancy, significantly lower ($p < 0.00001$, $p < 0.0002$) birthweight (2688 g, 3208 g vs. 3524 g), lower Apgar score in the first and fifth minute of life (Me 9, 10 vs. 10; $p < 0.00001$, $p < 0.05$), and lower frequency of breastfeeding from birth ($p < 0.0001$, $p < 0.002$) were found in comparison to those born in the 39th week of pregnancy (22%, 70% vs. 94%). In addition, the tendency for hypothermia was significantly more frequently ($p < 0.001$, $p < 0.02$) observed (36%, 26% vs. 8%), these newborns were more often required to stay in the observation room (80%, 28% vs. 8%; $p < 0.0001$, $p < 0.01$) and in the incubator (74%, 26% vs. 8%; $p < 0.0001$, $p < 0.02$), and significantly more often demonstrated symptoms of respiratory failure (48%, 18% vs. 4%; $p < 0.0001$, $p < 0.05$). The length of hospitalisation was also significantly longer (7.18, 5.42 vs. 4.46 days; $p < 0.0002$, $p < 0.05$).

Conclusions: Due to the high risk of complications during the adaptation period, especially from the respiratory system, an elective caesarean section performed before the 38th week of pregnancy is not an optimal solution for the newborn, unless there are important medical indications for such a termination of pregnancy. The most optimal term for elective caesarean section from the point of view of the newborn's interests is the 38th or 39th week of pregnancy.

KEY WORDS:

neonatal complications, elective caesarean section, newborn's status.

INTRODUCTION

Not only late-preterm newborns but also those born as near-term, meaning from 36^{+0} up to 36^{+6} weeks of pregnancy are at increased risk of complications in the first hours of postnatal adaptation [1]. Among the documented hazards are respiratory disorders [1–6], hypoglycaemia, hyperbilirubinemia, sepsis [3], problems with

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early and exclusive breastfeeding [5, 7, 8], and impaired neurological development [2, 7, 9].

The literature also emphasizes that newborns referred to as early-term, meaning those born between the 37th and 38th week of pregnancy, display symptoms of respiratory adaptation disorders, especially if they were born via elective caesarean section [1, 6, 10, 11]. Abnormalities in the adaptation of newborns are frequently found following preterm birth or delivery by caesarean section at term, and many of these infants will need delivery room resuscitation to assist in this transition [5]. In recent years, there has been an almost two-fold increase in the frequency of elective terminations of pregnancies [1, 6, 12], not only among near-term newborns but also among early-term pregnancies [13, 14]. It should be noted that additional risk factors affecting the infant's postnatal adaptation among these groups of newborns may be medical indications that induce obstetricians to terminate a pregnancy with an elective caesarean section before the 39th week of its duration [1, 15, 16]. The most common are complications during pregnancy or chronic maternal diseases [6, 14]. Such pregnant patients are referred to a level III centre for perinatal care due to the need to protect the newborn where there is an intensive neonatal supervision department.

The aim of the current study is to compare the postnatal status and frequency of adaptation disorders in neonates born with elective caesarean section at 36, 37, 38, and 39 weeks of pregnancy in a level-three perinatal care department in Poland.

MATERIAL AND METHODS

The retrospective study was conducted in a group of 200 neonates born by elective caesarean section over the course of one year, 2015, in the Department of Perinatology, Obstetrics, and Gynaecology, which is a level-three perinatal care department in the Pomeranian Medical University; and who were, from birth, hospitalised in the Neonatal Department of the Pomeranian Medical University in Szczecin, Poland. The material examined was divided into subgroups of 50 newborns each, depending on the time of the pregnancy termination. Group 1 comprised 50 consecutively born newborns at 36 weeks of pregnancy; group 2, those at 37 weeks; group 3, those at 38 weeks; and group 4, those at 39 weeks of pregnancy. Newborns with severe congenital malformations at birth that could affect postnatal adaptation were excluded from the analysis.

Across the subgroups, we compared any complications during pregnancy, the indications for elective caesarean section, the neonatal birth status based on neonatal birthweight, Apgar scores, and the results of blood gas analysis of the umbilical artery.

Adaptation disorders were defined as abnormal skin colour (cyanosis or pale), low activity, thermoregulation disorders, and respiratory problems. If there were any problems with breathing, management included stimulation, bag and mask ventilation, intubation, and ventilation as necessary [17]. The necessity of using resuscitation procedures (bag and mask ventilation with oxygen, heart massage, positive airway pressure) in the delivery room was compared between the groups.

We also analysed how often newborns from four subgroups in the neonatal ward required observations with monitoring (pulse oximetry, body temperature, respiratory rate, heart rate, blood pressure) and whether they required the incubator for body temperature stabilisation or for various forms of oxygen therapy or respiratory support (Infant-Flow, none of the newborns need intubation) to aid their adaptation. Lung adaptation requires the coordinated clearance of foetal lung fluid, surfactant secretion, and the onset of consistent breathing. The respiratory disorders were recognised based on clinical symptoms and chest X-ray findings and classified as TTN syndrome (tachycardia, tachypnoea, desaturation, oxygen demanding), respiratory distress syndrome (typically found during auscultation, abnormal blood gas analysis, and typical chest X-ray), or pneumonia. Pneumonia was recognised based on clinical symptoms during auscultation and typical chest X-ray.

Our study assessed how often newborns could not be exclusively breastfed in their first 12 hours. None of the neonates we observed in incubators were sufficiently stable to be breastfed and lay apart from their mothers. Because of their instability these neonates were also not feeding orally at all for at least 12 hours, and some of them even longer. As soon as possible, maternal milk was given to the babies via a gastric tube. After each baby's status improved they were given to the maternal breast in the observation room.

We also compared the incidence of neonatal complications such as: hypothermia (core temperature < 36 to 36.5°C, cold extremities), hypoglycaemia (< 2.2 mmol/l), and hyperbilirubinaemia requiring phototherapy (above 12.9 mg/dl – 220 μmol/l). Prior to discharge, all neonates received an ultrasound examination of the brain and echocardiography to search for signs of intracranial haemorrhage, patent/persistent foramen ovale (PFO), or persistent ductus arteriosus (DAP). Finally, we also compared the duration of the hospitalisation of newborns from each subgroup.

The data collected for each of the parameters were compared between subgroups using appropriate methods of statistical analysis. We used the Kolmogorov-Smirnov test to check the normality of the distribution of the continuous variables. Median, minimum, and maximum values were used to describe the variables (in cases when the normal distribution assumptions were not met), while in other cases the mean and standard deviation were calculated. In our results, discrete variables are described by the frequency of their occurrence (number, percentage).

The χ^2 Pearson, χ^2 Yates, and χ^2 NW tests were used to study statistical differences and to check the homogeneity of groups. The statistical differences between continuous variables for each group were checked by applying the Mann-Whitney U test. In the results of all the tests we conducted, those in which the confidence level was $p < 0.05$ were considered statistically significant.

RESULTS

During the one-year period (2015) of our study the incidence of caesarean sections in our department was 52.2% (736/1411 labour), and among these 457/736 (62.1%) were elective. In total 109 newborns were delivered as near-term, and among them 45.9% were by elective caesarean section. There were no statistically significant differences in the incidence of complications during pregnancy between the four subgroups analysed in our study. However, our analysis of selected pregnancy complications indicated a more frequent occurrence of hypertension in the first group compared with the third (Table 1).

Other complications observed during the women's pregnancies were as follows: pregnancy cholestasis, HELLP syndrome, oligohydramnios, polyhydramnios, epilepsy, placenta previa, asthma, thrombocytopenia, anaemia, orthopaedic disorders, ophthalmological problems, and cerebral palsy.

When we analysed the most common indications of elective caesarean section, we found that a multiple pregnancy was a significantly more frequent indication (38%) in the first group compared with the other three groups (20%, 0%, 0%, respectively). The incidence of multiple pregnancies was 2.05% for the year of our study (2015). Premature rupture of the foetal membrane was a significantly more frequent indication for caesarean sections in the first group (16%) compared with the other three groups (0%, 2%, 0%, respectively). The woman's condition after the previous caesarean section was a significantly less frequent indication for caesarean section in the first group (24%) compared with the third (53%) and fourth groups (54%), and no statistically significant difference was found in comparison with the second group (Table 2). The remaining caesarean sections were made for various reasons, most often for reasons resulting from the pregnant woman's condition.

The body weight of newborns born at 36 weeks of pregnancy was significantly lower (2688 g) than that of newborns from the other three groups (3208 g, 3270 g, 3524 g, respectively). Newborns born at the 37th and 38th weeks of pregnancy had significantly lower body weights than those born at the 39th week of pregnancy (Table 3). Newborns born at 36 weeks of gestation scored significantly fewer Apgar points at 1 minute and 5 minutes after birth (Me – 1 minute Apgar 8, and 5 minutes Apgar 9) than neonates from the other three groups (Me – 10 and 10, respectively). Newborns born at 37 weeks of gestation received significantly lower scores on the Apgar scale at 1 minute ($p < 0.007$) and 5 minutes ($p < 0.05$) than those born at week 39 (Table 3).

The pH value of umbilical artery blood was significantly lower ($p < 0.05$) in newborns born at week 36 compared with other groups, and the value of base deficiency (BE) was significantly higher ($p < 0.002$, $p < 0.01$) in newborns born at week 36 compared with those in groups 3 and 4 (Table 3).

TABLE 1. Comparison of the prevalence of complications during pregnancy in the analysed groups

Complications during pregnancy	Group 1 (%)	Group 2 (%)	Group 3 (%)	Group 4 (%)	*p*
Total	29 (58)	34 (68)	25 (50)	26 (52)	NS
Gestational diabetes	10 (20)	12 (24)	10 (20)	9 (18)	NS
Arterial hypertension	5 (10)	1 (2)	0 (0)	1 (2)	1/3 $p < 0.05$
Thyroid disease	9 (18)	13 (26)	6 (12)	6 (12)	NS
GBS+	4 (8)	2 (4)	2 (4)	5 (10)	NS
Collagenosis	2 (4)	1 (2)	2 (4)	0 (0)	NS
Other	15 (30)	13 (26)	6 (12)	10 (20)	NS

GBS+ – maternal birth canal colonisation of group B streptococcus, NS – not significant

TABLE 2. The most common indications for elective caesarean section in the analysed groups

Indications for CS	Group 1 (%)	Group 2 (%)	Group 3 (%)	Group 4 (%)	Statistical significance
Status post CS ($n = 83$)	12 (24)	18 (36)	26 (53)	27 (54)	1/2 – NS; 1/3, 4 $p < 0.002$
Multiple pregnancy ($n = 29$)	19 (38)	10 (20)	0 (0)	0 (0)	1/3, 4 $p < 0.00001$; 1/2 $p < 0.05$; 2/3 $p < 0.001$; 2/4 $p < 0.001$
PROM ($n = 9$)	8 (16)	0 (0)	1 (2)	0 (0)	1/2 $p < 0.01$; 1/3 $p < 0.05$; 1/4 $p < 0.01$

CS – caesarean section, PROM – premature rupture of the foetal membrane, NS – not significant

TABLE 3. Birth status of newborns in the compared groups

Analysed features	Group 1	Group 2	Group 3	Group 4	Statistical significance
Male sex (%)	17 (34)	22 (44)	27 (56)	25 (50)	1/3 $p < 0.05$
Birthweight (g) Mean ±SD	2688 ±482	3208 ±506	3270 ±396	3524 ±414	1/2, 3, 4 $p < 0.00001$; 2/4 $p < 0.0002$; 3/4 $p < 0.01$
Apgar 1' (Me, range)	8 (2–10)	10 (5–10)	10 (6–10)	10 (6–10)	2/4 $p < 0.007$; 1/2, 3, 4 $p < 0.00001$
Apgar 5' (Me, range)	9 (7–10)	10 (8–10)	10 (8–10)	10 (8–10)	1/3, 4 $p < 0.00001$; 2/4 $p < 0.05$; 1/2 $p < 0.003$
pH* Mean ±SD	7,29 ±0,06	7,31 ±0,048	7,31 ±0,06	7,31 ±0,04	1/2, 3, 4 $p < 0.05$
pCO_2* (mm Hg) Mean ±SD	56,6 ±10,6	52,9 ±6,63	54,12 ±8,8	53,7 ±6,18	NS
pO_2* (mm Hg) Mean ±SD	16,0 ±8,03	15,58 ±5,67	15,5 ±5,53	17,4 ±12,8	NS
BE* (mmol/l) Mean ±SD	–1,52 ±2,08	–1,00 ±1,99	–0,57 ±2,05	–0,77 ±1,46	1/3 $p < 0.002$; 1/4 $p < 0.01$
Features of the immaturity (%)	18 (36)	0 (0)	0 (0)	0 (0)	1/2, 3, 4 $p < 0.0001$
Early breastfeeding** (%)	11 (22)	35 (70)	41 (86)	47 (94)	1/2, 3, 4 $p < 0.0001$; 2/4 $p < 0.002$

** the umbilical artery blood gas values, ** during the first 12 hours after delivery*

The possibility of effective breastfeeding from the first hours of life was significantly less frequent in those born at 36 weeks of pregnancy (22%) compared with newborns from the other groups (70%, 86%, 94%, respectively) (Table 3). Newborns born at 37 weeks of gestation were less likely to be breastfed from the first hours of life than those born at 39 weeks of gestation.

Signs of prematurity were observed significantly more frequently in those born at 36 weeks of gestational age (36%) compared with the neonates from other groups (0%) (Table 3), and as such they required significantly more frequent oxygen in the delivery room (10% vs. 0%), more incubation under observation (74% vs. 26%, 12%, 8%), and more frequent and various forms of oxygen therapy (free in incubator oxygen – 32% vs. 10%, 8%, 2%; oxygen hood – 12% vs. 8%, 4%, 2%) in the first hours of postnatal adaptation (Table 4). Respiratory failure symptoms were more often diagnosed in the group of newborns born at 36 weeks (48% vs. 18%, 10%, 4%), and their hospitalisation time was significantly longer than that of the other groups (7.18 vs. 5.42, 4.54, 4.46 days).

Newborns born at 37 weeks needed to stay in an incubator in the observation room significantly more often than those born at 39 weeks of pregnancy (26% vs. 8%). Significantly, the group born at 37 weeks were diagnosed with more respiratory failure symptoms (18% vs. 4%) and required longer hospitalisation times (5.42 vs. 4.46 days) than those born at week 39 (Table 4).

Hypothermia was significantly more frequently observed in newborns born at 36 weeks of pregnancy (36% vs. 26%, 6%, 8%) compared with other groups. Hypothermia was also significantly more frequent in newborns born at 37 weeks of pregnancy compared with those born at 38 and 39 weeks of pregnancy. The duration of pregnancy had no significant effect on the incidence of hypoglycaemia and hyperbilirubinaemia that required treatment (Table 4).

Echocardiography was performed in 74 newborns, including in 37 in group 1, 20 in group 2, 10 in group 3, and 7 in group 4. Echocardiography study was conducted on newborns who required a stay in the observation room in an incubator with oxygen therapy, or in whom a heart murmur was found. In 25 newborns PFO was noticed, in 4, DAP was observed, and in 4 others, other heart defects were found (Table 4).

An ultrasound brain examination was performed on all the children in the study, and pathological changes were found in two of the children in group 1, and in one child in group 3.

Abdominal ultrasound examinations were performed on all the children in the study, and pathological changes were observed in nine children of group 1 (18%), in two children of group 2 (4%), in two children of group 3 (4%), and in one child of group 4 (2%).

DISCUSSION

Termination of women's pregnancies by elective caesarean section, especially before the 38th week of pregnancy, most often results from medical indications [1, 13, 14, 16], although it is emphasised that women increasingly demand such a method for terminating their pregnancy [14, 16].

In the subjects of our study the most usual indications for performing caesarean sections at 36 weeks of gestation were multiple pregnancies (38%), previous caesarean sections (24%), and the premature rupture of foetal membranes (16%). At 37 weeks of pregnancy in 20% of cases it was because of a multiple pregnancy, and in 36% of cases it was due to the woman's condition after a previous caesarean section. At weeks 38 and 39 of pregnancy

TABLE 4. Complications of the neonatal period in the analysed groups

Analysed features	Group 1 (%)	Group 2 (%)	Group 3 (%)	Group 4 (%)	Statistical significance
Resuscitation in the delivery room	3 (6)	1 (2)	1 (2)	1 (2)	NS
Oxygen in the delivery room	5 (10)	0	0	0	1/2, 3, 4 $p < 0.02$
Observation room	40 (80)	14 (28)	8 (16,7)	4 (8)	1/2, 3, 4 $p < 0.0001$; 2/4 $p < 0.01$
Incubator	37 (74)	13 (26)	6 (12)	4 (8)	1/2, 3, 4 $p < 0.0001$; 2/4 $p < 0.02$
Free oxygen into incubator	16 (32)	5 (10)	4 (8)	1 (2)	1/2, 3 $p < 0.02$; 1/4 $p < 0.0001$
Oxygen hood in incubator	6 (12)	4 (8)	2 (4)	1 (2)	1/4 $p < 0.05$
Symptoms of the respiratory failure*	24 (48)	9 (18)	5 (10)	2 (4)	1/3, 4 $p < 0.0001$; 1/2 $p < 0.002$; 2/4 $p < 0.05$
Infant-Flow	2 (4)	2 (4)	0 (0)	1 (2)	NS
Chest X-ray	5 (10)	3 (6)	1 (2)	1 (2)	NS
Pneumonia**	1 (2)	1 (2)	1 (2)	1 (2)	NS
PFO	12	6	2	5	NS
DAP	2	0	1	1	NS
Hypoglycaemia	5 (10)	1 (2)	3 (6)	1 (2)	NS
Hypothermia	18 (36)	13 (26)	3 (6)	4 (8)	1/3, 4 $p < 0.001$; 2/3 $p < 0.01$; 2/4 $p < 0.02$; 1/2 – NS
Hyperbilirubinaemia	6 (12)	5 (10)	4 (8)	4 (8)	NS
Time of hospitalisation (days)	7,18 ±3,2	5,42 ±2,81	4,54 ±1,9	4,46 ±1,55	1/2 $p < 0.0002$; 1/3, 4 $p < 0.00001$; 2/3 $p < 0.05$; 2/4 $p < 0.05$

** desaturation, tachypnoea, nasal grunting, abnormal blood gas analysis (decreasing pO_2, increasing pCO_2 and decreasing pH), abnormal chest X-ray, ** – clinical symptoms during auscultation, typical chest X-ray; PFO – persistent foramen ovale, DAP – persistent ductus arteriosus*

in more than 50% of cases the indication was the woman's post caesarean section status. In other cases the pregnancy was terminated by an elective caesarean section due to the coexistence of such complications as gestational diabetes, gestational hypertension, thyroid disease, and collagenosis. In the study by Prefumo *et al.*, in over 50% of cases the indication was a previous caesarean section; in 10% of cases the caesarean section was performed at the mother's request before the 38th week of gestation, and in the remaining cases pregnancy complications were indicated, such as preeclampsia, gestational diabetes, and intrauterine hypotrophy [16].

In our own research, a group of newborns born at 36 weeks of gestation when compared with those born at 37 weeks of pregnancy were characterised by significantly lower body weight, worse Apgar scores in the first and fifth minutes of life, and a lower possibility of the newborns being breastfed early. Indeed, more often, we found morphological and physiological immaturity in the newborns born at 36 weeks. For these reasons, they required the use of oxygen in the delivery room more often that other babies, they were more frequently under medical care in the neonatal ward's observation room than others, and oxygen therapy was used significantly more frequently during the follow-up period due to their respiratory failure symptoms. There was no significant difference in the incidence of hypoglycaemia, hypothermia, and hyperbilirubinaemia. The newborns born at 36 weeks required longer hospitalization than the other newborns in our study.

However, in the group of newborns born at 37 weeks of pregnancy, compared with those born at 39 weeks, we observed significantly lower birth weights, worse Apgar scores in the first and fifth minutes of life, and lower frequencies of breastfeeding from birth. In addition, we observed that they had a significantly more frequent tendency to develop hypothermia, they were required to stay in the incubator in the observation room more often, and they exhibited significantly more frequent symptoms of respiratory failure. The length of their hospitalisation was also significantly longer than newborns born at 38 and 37 weeks.

Similar observations have also been noted by other authors. In a study by Tita *et al.*, in a group of approximately 4000 newborns delivered via elective caesarean section from 37 to 39 weeks of pregnancy, 12.8% of the newborns born at week 37 and 8.1% of those born at 38 weeks required a visit to the observation room (NICU), compared with 5.9% for those born at week 39 [18]. In the study by Prefumo *et al.* intensive observation in the NICU was required for 25% of newborns from week 36, compared with 9.4% born at week 37 and significantly fewer of the newborns from week 38 (2.7%) [16].

In our study, it is noteworthy that we observed a very high percentage of newborns with symptoms of respiratory failure in the first hours of life. This observation contrasts with the observations reported by other researchers.

Marrocchella *et al.* reported symptoms of respiratory failure in 0.56% of newborns born at the time, compared with a rate of only 1.4% in the group of newborns born

at the 36th week of pregnancy [7]. In our studies, the rates were 4% and up to 48%, respectively. The high frequency of respiratory failure symptoms observed by us may have been because all the newborns in our study were born by elective caesarean section. The research of other authors shows that this method of delivery is associated with higher incidences of respiratory failure symptoms even in those born at 38 or 39 weeks of pregnancy [6, 10, 11, 19–21].

In addition, Marrocchella *et al.* evaluated only newborns from healthy mothers who had no complications during pregnancy, and their study did not specify the method of delivery [7]. In our own studies, we analysed a specific delivery method (elective caesarean section), and the presence of pregnancy complications in over 50% of women could also have had an influence on the frequency of the respiratory failure symptoms we observed.

In Prefumo's studies of a neonatal group born by elective caesarean section from pregnancies not complicated by the premature rupture of foetal membranes, symptoms of respiratory failure were observed in 7% of newborns born at week 36, 3.4% at week 37, and in 1% of those born at week 38 [16]. In turn, in a study published by Tita *et al.*, symptoms of respiratory failure were found in the statistically significant different rates of 8.2%, 5.5%, and 2.7% of newborns born at 37, 38, and 39 weeks of pregnancy, respectively [18].

Hypoglycaemia and hyperbilirubinaemia are often observed as neonatal complications in newborns born as near-term.

In our studies, hypoglycaemia occurred in 10%, 2%, 6%, and 2% of newborns from the 36th, 37th, 38th, and 39th weeks of pregnancy, respectively. Prefumo *et al.* reported hypoglycaemia in 6% of newborns at 36 weeks, and significantly less (1.3% and 2.2%) in those born at 37 weeks and 38 weeks of pregnancy, respectively [16]. In the Marrocchella *et al.* study, hypoglycaemia was noted in 1.49% in neonates born at time, and in 6% in those born at 37 weeks of gestation, compared with 7% in newborns born at 36 weeks [7]. These observations do not differ significantly from our observations.

In the full-term newborns, Marrocchella *et al.* observed jaundice requiring phototherapy with a frequency of 1.58%, and in those born at 36 weeks of gestation the frequency was 7% [7]. In our own research, we observed jaundice requiring phototherapy in a greater percentage of newborns, 8% in those born full-term, and 12% in those born at 36 weeks of pregnancy.

Intracranial haemorrhages (PIVH) are observed in newborns born naturally up to the 35th week of pregnancy [11]. Marrocchella *et al.* did not report PIVH in those born at 36 weeks of gestation [7]. We observed 4% of those born at 36 weeks with PIVH and 2% at 38 weeks.

It is not only newborns born as near-term who require longer hospitalisation, but also those born as early-term [22]. In our own studies, the average time of hospitalisation was 5.42 days for those born at 37 weeks of pregnancy, and in those born at 39 weeks of pregnancy, the significantly shorter period of 4.46 days. Hospitalisations of more than five days for newborns were also observed by other authors [12, 16, 18]. In the studies of Tita *et al.*, 9.1% of newborns from the 37th week of pregnancy and 3.6% of newborns from the 39th week of pregnancy required hospitalisation of more than five days [18]. In the studies of Vidic *et al.* hospitalisations longer than five days were required by as many as 42.3% of those born at week 37 and 42.5% of those born at week 39 [12]. Conversely, Prefumo *et al.* reported hospitalisations of more than five days for 16.2% of those born at week 37 and the significantly smaller figure of 6.9% of those born at 38 weeks of pregnancy [16].

It should be noted that in our study, although the analysed group of 200 neonates born with elective caesarean section is relatively small in relation to the study populations analysed by other authors, our observations, especially concerning disorders of adaptation in the respiratory system, are confirmed by other reports. The safe period from the neonatal perspective for ending pregnancy with an elective caesarean section is from the 38th week of pregnancy [6, 23–25].

CONCLUSIONS

Multiple pregnancies and the presence of the premature rupture of the foetal membrane prompt obstetricians to perform an elective caesarean section at 36 weeks of gestation, while the most common indication for the termination of pregnancies by elective caesarean section at 38 and 39 weeks of gestation is the woman's condition after previous caesarean sections.

The 37th week of pregnancy in neonates born by elective caesarean section is associated with an increased risk of disorders during the period of adaptation compared with newborns born at 38 and 39 weeks of pregnancy.

Due to the high risk of complications during the adaptation period, especially in the respiratory system, an elective caesarean section made before the 38th week of pregnancy is not an optimal solution for the newborn, unless there are important medical indications for such a termination of the pregnancy.

The optimal date for elective caesarean section from the perspective of the interests of the newborn is the 38th or 39th week of pregnancy.

DISCLOSURE

The authors declare no conflict of interest.

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