

Gladchuk I. Z., Herman Yu. V., Hrygurko D. O. Comparative analysis of neonatal complications after cesarean section to M. Stark and modified cesarean section in premature birth and congenital malformations of the fetus. *Journal of Education, Health and Sport*. 2021;11(2):107-116. eISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2021.11.2.012>
<https://apcz.umk.pl/czasopisma/index.php/JEHS/article/view/JEHS.2021.11.2.012>
<https://zenodo.org/record/4592395>

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019.
© The Authors 2021;

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland
Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike.
(<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.
The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 11.01.2021. Revised: 10.02.2021. Accepted: 26.02.2021.

Comparative analysis of neonatal complications after cesarean section to M. Stark and modified cesarean section in premature birth and congenital malformations of the fetus

I. Z. Gladchuk, Yu. V. Herman, D. O. Hrygurko

Odessa National Medical University

Department of Obstetrics and Gynecology, Odessa, Ukraine

CORRESPONDING AUTHOR Igor Gladchuk Head of Department of Obstetrics and Gynecology. Odessa National Medical University, Odessa, Ukraine tel: +380966689562
e-mail: igor.gladchuk@gmail.com

Abstract

The urgency of the problem lies in the large proportion of premature babies in the structure of perinatal morbidity and mortality. According to the WHO, the frequency of premature birth in the world varies widely - from 4.5% to 16% [1, 2, 5]. It is known that for premature infants, children with congenital malformations in the presence of obstetric indications is more careful surgical delivery [4, 5].

Therefore, the improvement of the technique of abdominal delivery in premature birth and congenital malformations of the fetus creates a certain additional reserve for improving perinatal outcomes

Keys words: premature birth; congenital malformations; neonatal consequences; cesarean section.

Background

Despite the increase in the frequency of operative delivery, the incidence and early neonatal mortality of newborns do not tend to decrease [1, 2, 4, 5, 10]. The perinatal mortality rate in Ukraine remains without positive changes and in 2018 amounted to 7.0 %%. Urgent caesarean section 2 - 3 times more often than planned surgery, hypoxic conditions, respiratory disorders and intraventricular hemorrhage in newborns [3, 4, 6]. The frequency and severity of hypoxic - ischemic, hemorrhagic CNS injuries in premature infants born by cesarean section, in the early neonatal period is 1.5 - 2 times lower than in natural childbirth [1, 3, 5, 9].

The urgency of the problem lies in the large proportion of premature babies in the structure of perinatal morbidity and mortality. According to the WHO, the frequency of premature birth in the world varies widely - from 4.5% to 16% [1, 2, 5]. Therefore, the improvement of the technique of abdominal delivery in premature birth and congenital malformations of the fetus creates a certain additional reserve for improving perinatal outcomes.

Objectives

To carry out a comparative analysis of the features of the early neonatal period and the frequency of neonatal complications in premature birth and congenital malformations of the fetus after the method to M. Stark and modified method of cesarean section to improve perinatal outcomes.

Materials and methods

To solve this goal, a comparative analysis of 35 histories of premature birth, the birth of which was carried out in the abdominal way.

Group I (main) included 18 patients in whom the caesarean section was performed according to the proposed modified method after obtaining the informed written consent of the patient.

Group II (comparative) included 17 patients who underwent surgery according to the classical method of M. Stark.

Criteria for inclusion in the study:

- premature birth (PP) within 22 - 36 weeks and 6 days of gestation;
- sciatic presentation of the fetus;
- multiple pregnancy;
- antenatally detected congenital malformations of the fetus;
- body mass index (BMI) 18-30 kg / m².

Exclusion criteria from the study:

- full-term pregnancy;
- body mass index (BMI) <18 or> 30 kg / m²;
- the presence of genital and extragenital pathology;
- mental disorders in pregnant women.

At the stage of hospitalization, the examination included analysis of somatic and obstetric-gynecological anamnesis, laboratory methods (determination of group affiliation and rhesus factor, indicators of general blood analysis (GAC), general urine analysis (GAS), biochemical blood test, coagulogram), instrumental (ultrasonography) and statistical methods for analysis of the obtained results. The work was performed in compliance with moral and ethical principles in accordance with the basic provisions Helsinki Declaration of the World Medical Association on Biomedical Research, where man is their object (World Medical Association Declaration of Helsinki 1994, 2000, 2008), the Council of Europe Convention on Human Rights and Biomedicine (2007) on the positive conclusion of the Commission on Bioethics of the Odessa National medical university. All pregnant women were examined in accordance with industry standards [7, 8], received written voluntary consent.

Surgical interventions in patients were performed within the current order of the Ministry of Health of Ukraine [7, 8], in the obstetrics department of the Kherson Regional Clinical Hospital (clinical base of the Department of Obstetrics and Gynecology ONMedU).

The method of operative delivery used in the study is a modification of the classical method of cesarean section by M. Stark, using several new technical approaches [2], which are aimed at improving certain perinatal parameters.

The main difference between abdominal delivery at the stage of fetal retrieval in the presented modified method is the birth of children weighing less than 1500 g in the whole amniotic sac. In cases of birth of children in the early stages of gestation up to 30 weeks, with pelvic presentation of the fetus, infants with congenital malformations, was performed corporal incision on the uterus for more careful removal. In addition, a multidisciplinary organizational approach was used for children with congenital malformations. The modified caesarean section was performed in the hospital of the children's hospital of the III level in order to provide the newborn with the highest possible highly qualified assistance of related specialists. In the study, the condition of newborns was assessed on the Apgar scale at 1 and 5 minutes of life and the Ballard scale. In two clinical groups, the choice of analgesia was made individually, taking into account the condition of the mother and fetus, the planned operation and indications for cesarean section.

The comparative analysis of clinical-anamnestic and possible preoperative predictors testified to the representativeness of both clinical groups (Table 1). Gestational age in patients of both study groups ranged widely from 28 to 35 weeks, but the average duration of pregnancy was 32.1 ± 3.06 weeks, with no statistically significant difference between the comparison groups ($p > 0.05\%$).

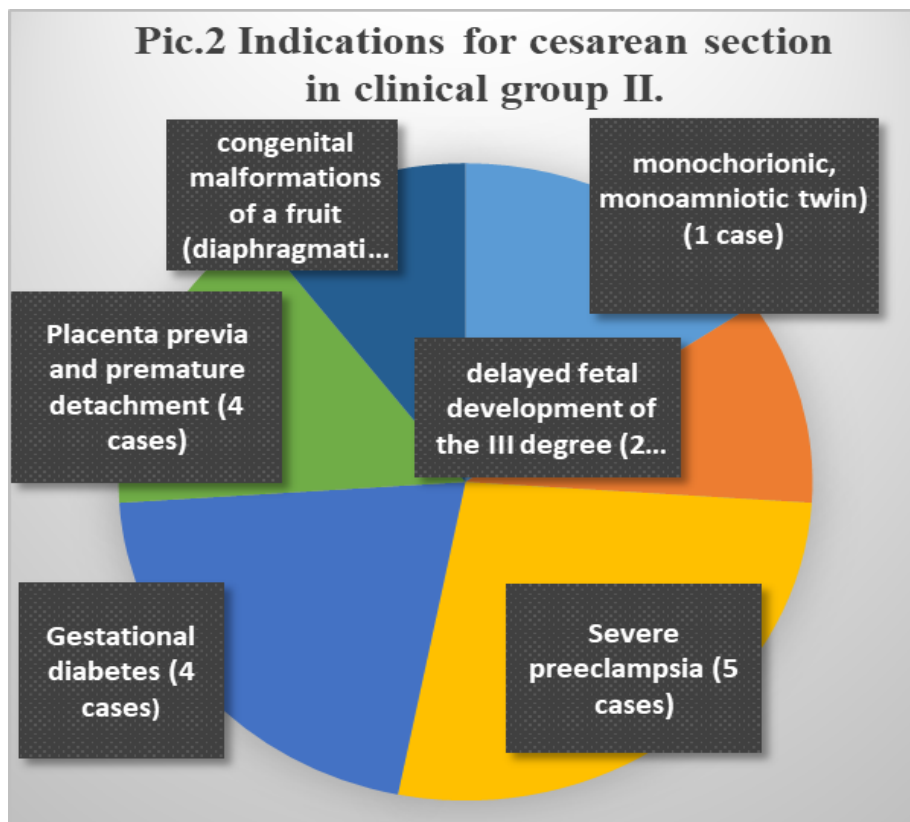
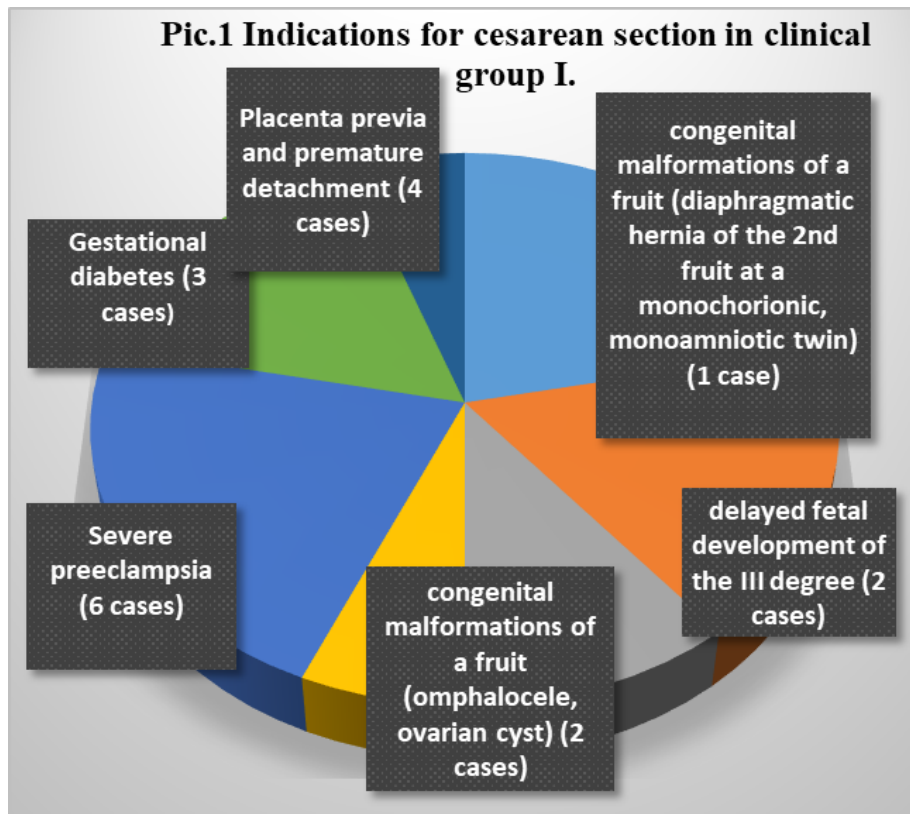
Table 1

Comparative characteristics of clinical and anamnestic data in pregnant women of two clinical groups (n = 35)

Indicator	Main group (n=18)	Comparative group (n=17)	Σ (n=205)	p
	Avarage value	Avarage value		
Age (years) (M \pm m)	29,97 \pm 5,59	28,71 \pm 5,65	29,38 \pm 5,64	0,114
Body weight (kg) (M \pm m)	80,72 \pm 18,88	77,58 \pm 13,74	79,22 \pm 16,68	0,181
Gestational term (weeks) (M \pm m)	31,3 \pm 3,84	32,3 \pm 2,51	32,1 \pm 3,06	1
Scar on the uterus after caesarean section Abs.number (%)	4 (22,2%)	3 (17,6%)	7 (20,0 %)	0,379
The order of operations (urgent) Abs.number (%)	6 (33,3 %)	5 (29,4%)	11 (31,4 %)	0,382
ETA Abs.number (%)	5 (27,7 %)	5 (29,4 %)	10 (28,57%)	0,485
SMA Abs.number (%)	13 (72,2 %)	12 (70,5 %)	25 (71,42 %)	0,482

During the study, the structure of indications for surgical delivery in the two clinical groups did not differ ($p > 0.05\%$). It should be noted that more than 70% of indications for cesarean section were from the pregnant woman and belonged to the I - III category of urgency (Pic.1, 2).

Congenital malformations of the respiratory and digestive systems of the fetus were antenatally diagnosed in both study groups. Among them: omphalocele, ovarian cyst of large size, diaphragmatic hernia of the II fetus with monochorionic, monoamniotic twin. Due to the lack of obstetric conditions for the birth of infants in a natural way, a planned abdominal delivery was performed.



The statistical package Microsoft Excel 2003 was used during the analysis of the results. Qualitative indicators were measured in absolute and relative (percentage) values. The

probability of differences in parametric characteristics in the appropriate groups was assessed using the Student's test (t - test). The level of statistical significance of 95% was used in the calculations and the differences were considered statistically significant if the probability of the null hypothesis (pH_0) was equal to or less than 0.05%.

Results and discussion

The recommendations of the European Association of Perinatal Medicine, adopted in 2018, indicate the lack of common opinion on the method of childbirth in case of premature birth [5, 10]. Abdominal delivery is more common in cases of pathology on the part of the pregnant woman / mother, which is an indication for cesarean section, while premature pregnancy only complements the complicated course of labor. The condition of newborns in such cases depends primarily on the gestational age, perinatal treatment, the presence of chorioamnionitis, multiple births [1, 3, 10]. Therefore, the issue of minimizing iatrogenic trauma to the fetus during surgical delivery is one of the crucial values to reduce the negative perinatal consequences [2, 4, 5, 6].

The literature widely discusses the birth of infants in the whole fetal bladder [1, 5, 9]. This method of cesarean section, in which it is proposed to dissect the uterus in layers to the amniotic sac, while maintaining its integrity, was primarily developed to reduce intraoperative blood loss and the risk of damage to the fetus with a scalpel, which occurs in 0.1 - 3.1% of the total cesarean section [4, 5, 9]. Subsequently, this technique was used to give birth to HIV-infected women to prevent contact of the child with the mother's blood [2, 9]. Krasnopolsky VI, 2018; Radzinsky VE, 2015; Fatkullin FI, 2015; Bashmakova NV, 2014 and others. believe that the whole amnion when removing children with critical and low body weight serves as a natural water reservoir, which helps to minimize mechanical and barometric trauma of the newborn, improve the overall condition.

Various scales (Ballard, Silverman) are used to assess the condition of infants at birth, but the easiest way to determine the category of children in need of resuscitation, more in-depth attention of neonatologists or the appointment of additional methods of examination is the Apgar scale [2, 4, 5]. The results of our study show that almost 90% of newborns in the main study group were removed in a condition that is oriented closer to satisfactory (table 2). The average score for the Apgar school was 6 points. In the comparison group, about 40% of infants were born in a state of moderate severity ($p = 0.022$), needed oxygen support, stay in the intensive care unit and further treatment in level III institutions.

Table 2

**Comparative analysis of neonatal consequences in premature birth in the studied groups
(n - 35)**

Indicator	Main group (n=18)		Comparative group (n=17)		Σ		P
	n	%	n	%	n	%	
Apgar score, 1 min (points)							
3 – 4	2	11,1%	6	35,2%	8	22,8%	0,022
5 – 6	16	88,9%	11	64,7%	27	77,2%	0,148
7 – 9	0	0,0%	0	0,0%	0	0,0%	1
Apgar score, 5 min (points)							
5 – 6	1	5,5%	8	47,1%	9	25,7%	0,048
7 – 9	17	94,5%	9	52,9%	26	74,2%	0,423
Hipoxis ischemic patoljgy (HIP)							
Total	8	44,4%	12	70,6%	20	57,1%	0,022
- I degree (easy form)	6	33,3%	8	47,1%	14	40,0%	0,178
- II degree (medium form of severity)	2	11,1%	4	23,5%	6	17,1%	0,103
Disease of hyaline membranes	0	0,0%	1	1,0%	1	28,5%	0,473
Treatment III level	2	11,1%	12	70,6%	14	40,0%	0,004
Early neonatal death	1	5,56%	2	11,7%	3	8,57%	0,223

The absence of newborns in satisfactory condition (Apgar score of 7 points or more per 1 minute of life) in both groups of the study is most likely due to the short gestational age. After all, such children are born with impaired respiratory functions and are less able to adapt to changing environments. We assume that due to the use of technically advanced stages of classical cesarean section (see section materials and methods) the condition of newborns in the main clinical group on the Apgar scale at 1 minute of life was assessed higher than in the comparison group, with a statistically significant difference ($p = 0.022$). The general condition of almost all newborns of the I clinical group at 5 minutes is characterized by a positive trend - 7 or higher points on the Apgar scale. In clinical group II, the condition of almost 50% of newborns remained within 6 points ($p = 0.048$). The use of modified access to the abdominal cavity, which involves the capture of the peritoneum with the index finger and stretching all the layers of the anterior wall in a blunt way simultaneously by two surgeons, allows you to reduce the time until the birth of the fetus by almost 4 minutes ($p < 0.001$), as

evidenced by the results of our previous study [2]. This is especially true in an emergency situation, when the baby needs a quick removal and further assistance from a neonatologist.

In the conditions of deeply premature pregnancy, pregnancies with congenital malformations of the fetus, we consider it rational to perform a corporal incision on the uterus during a cesarean section. Wide access, in addition to accelerating the removal of the affected fetus, helps to minimize trauma to the baby at birth, improves its overall condition in the early neonatal period, as evidenced by comparative data (table 2). All patients in the main study group with antenatally diagnosed fetal IBD underwent corporal caesarean section.

Interestingly, in the main clinical group, in which the birth of children occurred faster and atraumatic way, in a single fetoplacental complex there were statistically fewer cases of hypoxic-ischemic CNS damage (HIPCPS), which is one of the main causes of disability in children. due to neurological pathology ($p = 0.022$). In infants of the main clinical group, CNS lesions of the I degree were manifested in the form of tachypnea, increased physiological reflexes and excitability of the newborn. Episodes of seizures were present in children with moderate CNS HIPCPS in both study groups.

Due to the fact that the general condition in newborns of the main group of the study was as close as possible to satisfactory, with minor manifestations of CNS HIPCPS, it is possible to explain the reduction in treatment needs at level III by almost 6 times ($p = 0.004$). However, the decrease in the frequency of neurological disorders and morbidity in infants did not affect the decrease in early neonatal mortality ($p = 0.223$). It should be noted that the case of early neonatal mortality of a newborn with VVR in the main group of the study (diaphragmatic hernia of the II fetus in monochorionic, monoamniotic twins) was inevitable. Ultrasound revealed a lack of diaphragm by more than 50%, aplasia of the left lung.

In addition to the significant share of premature births in the structure of causes of perinatal mortality, one of the leading places is occupied by congenital malformations of the fetus, which account for about 20% of perinatal losses [4, 5]. To date, there are no measures to fully prevent developmental disabilities. Focusing on the experience of colleagues from the Institute of Pediatric Cardiology of the Medical Center. Schneider in Israel today is the most promising multidisciplinary organization of the "vicious circle" in providing highly qualified medical care for congenital malformations of the fetus within a single medical institution [11].

Some malformations of the fetus, according to the current clinical guidelines of the Ministry of Health of Ukraine for obstetric care "Cesarean section" from 27.12.2011 № 977, in which there is a threat of violation of the integrity of the newborn and provided the possibility of providing surgical care to the newborn.

The decision on the method of delivery in such cases is made by the prenatal council consisting of: obstetrician-gynecologist, neonatologist, ultrasound doctor, surgeon, other related specialists to determine the optimal time and method of delivery, further management of the newborn.

Today, most obstetric hospitals in the country lack technical equipment and specialized specialists, which makes it impossible to provide quality diagnosis and emergency surgical care to newborns with congenital malformations. Therefore, in three cases it was decided to perform a modified cesarean section in the hospital of the regional children's hospital. This allows you to coordinate around the newborn with congenital malformations specialists in obstetrics and pediatrics, thereby increasing the chances of favorable consequences for the baby.

The newborn is referred to neonatologists and related specialists with a clear diagnosis, necessary examinations and a preliminary treatment plan, which is adjusted in the dynamics. In the study, all infants with congenital malformations were born in a satisfactory condition with an Apgar score of 6 and 7 points at 1 and 5 minutes of age. After a comprehensive examination and additional examination successfully operated on the first - second day after birth. In our opinion, in order to improve the perinatal consequences, in some selected cases it is advisable to perform a modified caesarean section in the walls of a children's hospital, with a corporal incision in the uterus and removal of premature infants in the entire fetal bladder. However, these studies require further, more extensive and in-depth analysis.

Conclusions

The proposed modified method of cesarean section, namely an improved method of entering the abdominal cavity, performing a corporal incision in the uterus, the birth of premature babies in the entire fetal bladder improves the overall condition of newborns according to the Apgar score at 1 and 5 minutes ($p = 0.05$), accompanied by a decrease in the incidence of CNS CIP ($p = 0.022$), reduces the need for treatment of newborns at III level ($p = 0.004$), which may be an additional reserve in improving perinatal outcomes in preterm birth and congenital malformations.

Conflict of interest. The authors argue that there is no conflict of interest.

References

1. Bashmakova N.V. (2014). Sverhrannie prezhdevremennye rody: novye rezultaty. Optimizaciya klinicheskikh ishodov prezhdevremennyh rodov: opyt Uralskogo federalnogo okruga. Status Praesens. 6 (23) 12.13-19.

2. Gladchuk I.Z., Volyanskaya A.G., German Yu.V., Grigurko D.A. (2019). Sravnitelnyj analiz neonatalnyh posledstvij posle klasicheskogo (po M.Stark) ta modifitsirovannogo kesarevogo secheniya. Vestnik Vinnickogo nacionalnogo medicinskogo universiteta. T.23 №3. 445-453.
3. Znamenskaya T.K., Kirilova L.G., Shvejkina V.B. (2013). Diagnostika gipoksichesko-ishemicheskogo porazheniya golovno mozga u nedonoshennyh novonarodzhennyh v ostrom periode. Perinatologiya i pediatriya. № 2(54): 26-30.
4. Korchinskaya O.O., Gulpe K Yu. (2014). Materinskie ta perinatalnye posledstviya, kotorye svyazany s kesarevym secheniem : sravnitelnyj analiz s opytom kolleg so Slovenii. Nauchno-prakticheskij zhurnal dlya pediatrov i doktorov obshej praktiki – semejnoy medicini. 9 (10):35-39.
5. Krasnopolskij V.I. i dr. (2018) Kesarevo sechenie. Problemy abdominalnogo akusherstva: ruk. dlya vrachej /; pod. Obsh. Red. V.I.Krasnopolskogo . – 3-e izd., pererab. i dop. – M.: SIMK. 224.
6. Lakatosh V.P., Naritnik T.T., Belaya V.V., Aksenova A.V., Tkalich V.O. (2014). Prezhdevremennye rody: protivorechiya i sovremennye realii. ZDOROVE ZhENShINY. 7 (93): 10-18.
7. Prikaz MOZ Ukraini ob utverzhdenii klinicheskikh protokolov po akushersko-ginekologicheskoy pomoshi № 976 ot 27.12.2011.
8. Prikaz MOZ Ukraini ob utverzhdenii klinicheskikh protokolov po akushersko-ginekologicheskoy pomoshi № 977 ot 27.12.2011.
9. Fatkullin F.I. (2009) Optimizatsiya abdominalnogo rodorazresheniya beremennyh zhenshin s malovesnyimi plodami. Kand. Diss. Kazan. 182.
10. G.C. Di Renzo, L. Cabero Roura, F. Facchinetti, H. Helmer, C. Hubinont, B. Jacobsson, J.S. Jorgensen, R.F. Lamont, A. Mikhailov, N. Papantoniou, V. Radzinsky, A. Shennan, Y. Ville, M. Wielgos, G.H.A. Visser. The Journal of Maternal Fetal & Neonatal Medicine. 2017. — Vol. 30, Is. 17; <https://doi.org/10.1080/14767058.2017.1323860>.