Does the mode of delivery affect neonatal morbidity and mortality in very low-birth-weight infants ?

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Mode d'accouchement et pronostic des nouveaux nés de très faible poids de naissance

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RÉSUMÉ

Prérequis : Malgré les grands progrès de la réanimation néonatale, la prise en charge des nouveaux-nés de très faible poids de naissance pose un des plus grands problèmes pour les néonatologistes.
But: Comparer la morbidité et la mortalité néonatale entre deux groupes de nouveau-nés de très faible poids de naissance selon leurs modalités d'accouchement.
Méthodes : Nous avons réalisé une étude analytique, rétrospective et comparative, sur une période de 12 mois. Sont incluses dans ce travail les parturientes ayant accouché d'un nouveau-né de poids compris entre 500 et 1500 g à un âge gestationnel > à 26 SA, avec un Apgar supérieur à 3 à une minute de vie. Les parturientes et les nouveaux nés sont répartis en deux groupes selon le mode d'accouchement.
Résultats : Soixante neuf parturientes ont accouché de 82 nouveau-nés de très faible poids de naissance. Les deux groupes de parturientes étaient homogènes et superposables par rapport à l'âge, la gestité, la parité, le suivi prénatal ainsi que l'âge gestationnel. Aucune différence statistiquement significative n'est retrouvée en termes de mortalité et de morbidité néonatale entre les deux groupes. En comparant le devenir néonatal selon la présentation fœtal il n'y avait pas de différence statistiquement significative entre les deux groupes.
Conclusion : Il n'existe aucune amélioration du pronostic fœtal par le recours systématique à la césarienne.

Mots-clés

Césarienne; accouchement par voie basse ; morbidité néonatale; mortalité néonatale.

SUMMARY

Background: Despite the great advances made in neonatal intensive care, one of the greatest challenges in perinatology today, remains the management of very low-birth-weight infants (VLWB).
Aim: To evaluate the impact of the mode of delivery on very low-birth-weight infants' survival and their outcome.
Methods: We performed a retrospective comparative study in the department "B" of gynecology-obstetrics in collaboration with the neonatology department of the same centre during a 12-month period. The study population included mothers giving birth to infants weighing between 500 and 1500 grams, at gestational age > 26 weeks and an Apgar score > 3 at one minute. All included cases were classified according to the way of delivery: vaginal delivery (Group A) giving birth to neonates of group 1 and cesarean section (group B) giving birth to neonates in group 2 .
Results: The study involved 69 women giving birth to 82 very low-birth-weight infants. Both groups of parturients were homogeneous and similar in age, parity, prenatal care and gestational age. No statistically significant difference was noticed in terms of morbidity and mortality in the very low-birth-weight infants of the two groups. A higher rate of cesarean sections was noticed in breech presentations (74%).
Conclusion: Systematic cesarean section does not guarantee better outcome for very low-birth-weight infants.

Key-words

Cesarean section; Vaginal delivery; Neonatal morbidity; Neonatal mortality

Despite the great advances made in neonatal intensive care, one of the greatest challenges in perinatology today, remains the management of very low-birth-weight infants (VLWB), those weighing less than 1500 g at the time of delivery, and the first thing to do is to decide on the mode of delivery which is still a cause for major concern in modern obstetrics and a matter of great controversy.

In order to evaluate the advantages and disadvantages of the different delivery modes, a comparison of neonatal morbidity and mortality in VLBW infants delivered vaginally or by cesarean section (CS) was done.

PATIENTS AND METHODS

A retrospective comparative analytical study was performed in the department "B" of gynecology-obstetrics in collaboration with the neonatology department of the same centre during 12 months. (From January 1st to December 31st 2009). The study population included mothers giving birth to infants weighing at birth between 500 and 1500 grams. Inclusion criteria were gestational age at birth above 26 weeks, as confirmed or corrected by first trimester ultrasonography and an Apgar score greater than 3 at one minute of life.

All cases of stillborn infants and those with evidence of structural or genetic anomalies in addition to infants born before 26 weeks of pregnancy and those weighing less than 500 grams or more than 1500 grams at birth were excluded from the study.

The study protocol was approved by the research ethics committee of our hospital.

A population of 69 women giving birth to 82 VLBW infants was considered.

All included cases were classified according to the delivery mode (vaginal delivery or caesarean section) into 2 groups of women (Group A and B) and 2 subgroups of VLBW infants (Group 1 and 2):

-Group A: 21 vaginal deliveries giving birth to 26 neonates (Group 1)

-Group B: 48 caesarean sections giving birth to 56 neonates (Group2)

A computerized database containing the detailed past and present obstetric histories, delivery mode and outcome of the infant was created after an intensive chart view.

For statistical analysis, X2 test and Fisher test were used to compare percentages while Student test and Anova test were used to compare means.

RESULTS

During the study period 5,551births were recorded in the department. The rate of VLBW was of 14.8%. Both groups of parturients were homogeneous and similar in age, parity, prenatal care and gestational age (Table 1). Most women with preeclampsia belonged to the cesarean section group. Those presenting idiopathic preterm birth and /or premature rupture of membranes had vaginal deliveries in most cases. A high maternal morbidity was observed in group B.This can be related to the underlying pathology indicating fetal extraction: HELLP syndrome (P=0.049) and hyper creatininemia (P=0.007). A rate of 84% of in utero-transfers was reached in the study population. Time lag between admission and delivery was shorter in group A. Most pregnant women in this group were admitted during labor. However the majority of parturients in group B were hospitalized for other motives and in the absence of uterine contractions.

Table 1: Characteristics of Parturients having delivered their infants vaginally (group A) or by cesarean section (group B)

Characteristics	GROUP A (N=21)	GROUP B (N=48)	P
Age ,years*	28.1± 5.7	30.4 ± 4.6	0.110
Gestation *	1.76 ± 1.22	2.44 ± 1.78	0.119
Parity*	1.67 ± 0.91	2.15 ± 1.58	0.201
Number of prenatal care consultation*	3.71 ± 2.02	3.92 ± 1.28	0.618
Gestational age ,days*	203.1 ± 1.42	204.3 ± 13.6	0.721
-Preeclampsia**	03 (14.3)	31(64.6)	0.015
-Premature rupture of membranes**	10 (47.6)	10 (20.8)	0.042
-Uterine contraction**	16 (76.2)	23 (48)	0.026
-Fetal distress**	0 (0)	18 (37.5)	<0,001
-HELLP syndrome**	0 (0)	09 (18.7)	0.049
Period between admission and delivery hours*	12.31 +/- 7.42	106.92+/- 1.28	0.018
Length of stay, days*	3.9 +/- 3.12	7.04 +/- 6.93	0.047

* : Data distributed normally .The values given are the mean+/- SD;
** : Discrete data given as number with (%).

Concerning fetuses the two groups were homogenous regarding anthropometric measures and estimation of fetal weight (Table 2).

Table 2: Characteristics of fetuses in group1 and group 2

Characteristics	Group 1 (N=26)	Group 2 (N=56)	P
Fetal biometry (mm)			
-Bi parietal*	70.61 ± 6.5	71.88 ± 5.4	0.360
- Abdominal circumference*	235.7 ± 20.5	227.2 ± 20.4	0.188
- Femoral length*	53.6 ± 3.8	54.1 ± 5.3	0.659
Ultrasound weight estimation ,g*	1232 ± 231	1294 ± 247	0.176
Birth weight ,g*	1126 ± 242	1195 ± 179	0.002
Fetal presentation			
-Vertex**	19(73)	31(55.3)	0.653
-Breech**	07(27)	20 (35.7)	0.002
-Transverse**	0(0)	05(9)	0.001

* : Data distributed normally .The values given are the mean ± SD;
** : Discrete data given as number with (%)

Cesarean section rate was higher with breech presentation (74%) and also when fetal distress was detected. Seventy-two mothers (87.8%) received antenatal corticosteroid therapy

before delivery. The remaining parturients gave birth before getting this medication: there were 4cases of eclampsia, 4 cases of abruptio placentae and two cases of advanced active labor. During evaluation of Apgar score, there was no significant difference between both groups of new-borns at the first minute (7.69 vs 7.83; P=0.7); at the 5th minute (8.54 vs 8.53; P=0.46) and at the 10th minute (9.23 vs 9.83; P=0.629).

Fifty-four infants were admitted to the neonatal intensive care unit immediately after birth. Twenty-two were admitted to the breeding unit and six infants were entrusted to their mother's care. Analysis of immediate perinatal outcome showed no statistically significant differences between the two groups studied, where the delivery was done vaginally or abdominally (Table 3). Forty-three infants (52.4%) died in both groups.No statistical difference was noticed in terms of early and late neonatal mortality and causes of death (Table 4).

Table 3 : Neonatal outcome

	Group 1 (N=26)	Group 2 (N=56)	P
-Respiratory distress syndrome*	08 (30.8)	23(41.1)	0.466
-Hyaline membrane disease*	05(19.2)	20(3.7)	0.197
-Lungs hemorrhage *	02(7.7)	08(14.3)	0.491
- Bronchopulmonary dysplasia*	03(11.5)	04(7.1)	0.673
- Intra ventricular hemorrhage	05(19.2)	08(14.3)	0.746
- Leukomalacia*	01(3.8)	04(7.1)	0.562
- Necrotizing enterocolitis *	04(15.4)	04(7.1)	0.256
- Nosocomial infection*	12(46.2)	33(58.9)	0.279

*Discrete data given as number with (%).

Table 4: Neonatal mortality

	Group 1 (N=26)	Group 2 (N=56)	P
Neonatal mortality *	16 (61.5)	27(48.2)	0.261
-Early*	09 (56.3)	12(44.5)	0.362
-Late*	07(43.7)	15(55.5)	0.454
Death causes			
-Direct*	10(35.7)	18 (64.3)	0.366
-Indirect*	06(46.7)	09(53.3)	0.481

*Discrete data given as number with (%).

According to our results, the mode of delivery did not seem to affect, on its own, neonatal morbidity or mortality in very low-birth-weight infants. A comparison of neonatal outcome depending on the type of presentation was done. Fifty neonates were in vertex presentation during extraction; 27 in breech presentation and 5 in transverse presentation. The latter were excluded because of their restricted number. No statistically significant difference was noticed between both groups: vertex and breech presentation infants concerning their admission to the intensive care unit (P=0.158), the occurrence of nosocomial infections (P=0.160), respiratory distress syndrome (RDS): (P=0.224) perinatal asphyxia (P=0.407), leukomalacia (P=0.652) , hyaline membrane disease(P=0.497) ,or neonatal mortality (P=0.857).

DISCUSSION

The Incidence of very low-birth-weight infants is estimated between 5 to 15‰ live births [1-3] and is particularly increased in referral centers [4]. Despite the advances achieved in neonatal intensive care, obstetricians should be very careful in their choice of the mode of delivery and weigh up the advantages and disadvantages related to each case especially that they are dealing with particularly weakened newborns. Cesarean section practiced as an optimal mode of delivery for low-birth-weight infants is a matter of great debate. Some studies suggest that it is the best mode of delivery avoiding trauma and prenatal asphyxia during spontaneous labor[5,6]while other studies show that cesarean section does not produce better outcome in terms of morbidity and mortality of VLBW infants [5, 7-10].

The possible benefit for the fetus has to be weighed against the additional risk for the mother who undergoes a major abdominal surgery, anesthesia, blood loss and risk of transfusion, post operative morbidity, including thromboembolic complications and infections [11, 12]. In addition, fetal extraction by cesarean section for VLBW infants is often difficult through a thick lower segment. This led many medical boards to refrain from performing elective sections in early preterm cases.

Vaginal delivery should be planned unless there are other indications for operative delivery [13-16]. The prenatal factors that best predict survival in low birth weight infants are gestational age and birth weight [17]. Furthermore the underestimation of fetal weight is generally associated with high rates of prenatal mortality [1]. Antenatal ultrasound evaluation may help the obstetrician to make the appropriate decision [5, 9, 18]. Indeed, weight estimation is very valuable to determination of the mode of delivery even if the risk of error is evaluated at between 10 and 15% [9, 19].

Ultrasound examination allows to diagnose intra uterine growth retardation, which added to prematurity, would endanger a poor fetal prognosis, mainly in terms of neurologic sequellae.

Morbidity increases in frequency as gestational age at birth goes down, However, these sequellae connot be attributed exclusively to the mode of delivery. Other factors such as perinatal asphyxia, respiratory distress,neonatal trauma and perinatal care intervene in the genesis of these problems [20]. According to this study, cesarean section does not seem to have a better outcome than vaginal delivery in infants weighing less than 1500g. We found no significant differences between the two modes of delivery in any of the parameters studied.

Vaginal delivery is the recommended mode in case of vertex presentation since as proved by many authors, cesarean section does not seem to decrease neonatal morbidity nor neurologic and digestive sequellae up to 1 year of age [21]. A continuous monitoring of labor is essential because of the extreme sensitivity of premature infants to hypoxia and acidosis. Cesarean section is recommended when the fetal scalp pH decreases mainly before reaching 7.25 [21].

Practically, in case of preterm labor the cephalic pole being poorly ossified does not conveniently challenge the lower segment leading to redundancy of CS (66%) because of an excess of dynamic dystocia.

A retrospective study of 95 VLBW infants limited vaginal delivery to vertex infants of less than 29 weeks of gestational age. It suggests a systematic CS for all fetuses of more than 29 weeks of gestational age to help decrease the incidence of subependymal and intra-ventricular hemorrhage in neonates [22]. In fact, the choice of the mode of delivery should ideally be made for every individual situation [1]. In our study CS was practised in 62% of vertex presentation cases. In breech presentation most authors agree that CS improves the outcome of VLBW infants in terms of mortality and morbidity both short and long term ones [23, 24].

Autopsy made on breech preterm birth infants in vaginal delivery revealed a higher incidence of tentorial ruptures, subdural hematomas and spinal cords injuries. This suggests that CS protects neonates from traumatic lesions [25]. At present, there is no consensus when it comes to breech preterm birth infants during labour. But the risky nature of this delivery, the best outcome of CS in neonatal morbidity, and the lack of randomized studies comparing vaginal delivery to cesarean section make CS widely practised. Many obstetricians admit that this attitude is influenced by medico legal considerations. In our study the CS rate was estimated at 74% in breech presentation infants. This high rate can be explained by the apprehension of serious dystocia in already fragile infants.

According to this study, CS is indicated when preterm birth is medically decided; vaginal delivery is exceptional because induction of labor is mostly unsuccessful. In spontaneous preterm birth, other parameters should be considered such as gestational age, fetal weight, preterm etiology and the type of presentation. Prior to 28 weeks of gestational age, CS seems to be an excessive attitude. Nevertheless, we believe that the decision as to the optimal mode of delivery must be made on individual basis. Between 28 and 36 weeks, CS must be performed in classic indications (transverse presentation, placenta previa) in breech presentations between 32 and 36 weeks of GA, and in vertex presentation if fetal distress is detected. According to the data of the literature, there is no evidence in favor of systematic elective CS in case of every VLBW infant. In addition, the studies present several limitations because of a lack of homogeneity in the study population, definitions, inclusion criteria and neonatal care.

CONCLUSION

Systematic CS does not guarantee better outcome for very low-birth-weight infants. We believe that the decision as to the optimal mode of delivery must be made individually after agreement between the obstetrician, neonatologist and parents.

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