The importance of Doppler ultrasound in delivery planning

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Summary

With respect to the power of nature and the fact that it can still surprise us, even with all anticipated measures of safety, it is necessary to expand a range of true indications for surgical delivery. Thus complications of the delivery itself and conditions of increased morbidity can be reduced.

By following Doppler flow with a biophysical profile, cardiotocography and pH metry of the head (if available), indications for cesarean section can be expanded in time so the morbidity and mortality of the newborn population can be decreased. It is a fact that controlled vaginal delivery leads to additional maturation of the fetus. By provoking contractions, acts of hypoxia crisis under the influence of stress hormones cause larger and faster surfactant production. However, the danger of walking on a tightrope is decreased if it is anticipated that delivery can not be accomplished per vias naturalis and that it is more advisable and safer to perform cesarean section.

Key words: Doppler; Ultrasound; Delivery.

Introduction

Considering the advancement of medicine, general socio-economical conditions of developing countries and endeavor to decrease morbidity and mortality, necessarily lowering complications that exist in practice is compulsory. Standard classification into absolute and relative indications for cesarean section is necessary for medical advancement. With respect to the power of nature and the fact that it can still surprise us, even with all anticipated measures of safety, it is necessary to expand the range of true indications for cesarean delivery. Thus, complications of the delivery itself and the conditions of increased morbidity and smaller neonates after delivery could be avoided. By using technical advances and observing the condition of the fetus and placenta, with earlier generally accepted positions and conditions of mother and embryo, it is possible to have a more precise diagnosis and to approach delivery more carefully. On the other hand, chronicle hypoxia or acute hypoxia originating on an already vulnerable fetal nervous system, leads to increased morbidity not only of the neonate but society as a whole – starting from the family itself to all society. By delivering "posterity" with the consequences of birth, both family and society suffer.

Material and Method

Length and outcome of deliveries with no primary absolute indications for cesarean delivery were analyzed in order of generally accepted theoretical aspects. Group A included 30 patients who had had fetal growth retardation from 4 to 6 standard deviations (SD) and aggravation of Doppler flow with or without basic pathology of pregnancy. With an adequate Bishop's score and cardiotocography (CTG) result, patients were referred to delivery per vias naturalis. Group B had identical pathological entities but we decided on cesarean delivery. Parameters that were signs of pathological oxygenation, flow disorders, and total analysis of outcome and definite mode of delivery were analyzed in both groups of patients. Standard statistical tests were used. All patients were selected by the method of random sample based on an established pathological picture.

Objective of the study

The contributions and relevance of Doppler flow, especially in planning delivery, were studied. Considering the increasing morbidity and mortality and general drop in birthrate, it is necessary to approach every pregnancy as unique.

Results

The generally accepted approach is that even deterioration of flow demands urgent cesarean delivery, thus we analyzed all aspects of flow deterioration in relation to the potential dangers of vaginal delivery.

The first group of patients (group A) comprised pregnant women from the 36th to 40th week of gestation. They all had fetal growth retardation from three weeks (80%) to five weeks (20%). They also all had fetoplacental circulation disturbances and the umbilical artery resistance index was in the range of 0.72 to 0.86.

Contemporaneously, in 41% of cases (subgroup A1) we found flow redistribution, still centrally compensatory, but sufficient to imply a specific danger. Considering the fact that patients were in the 36th week of gestation with oxygen compensation they were referred to delivery induction by oxytocine with cardiotocographic monitoring. In relation to flow disturbance, inside the delivery room reverse flow was established in diastole in the second stage of delivery, thus patients were referred to the operating room where the delivery ended surgically in 50% of cases. It should be pointed out that patients were mainly primiparae.

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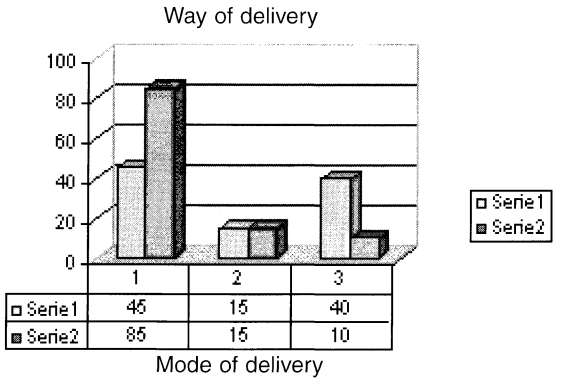

Figure 1. — Seria 1 - Seria A.
Seria 2 - Seria B
colum 1 - planned cesarean section
colum 2 - urgent cesarean section, even from the first planned vag
colum 3 - planned vaginal delivery

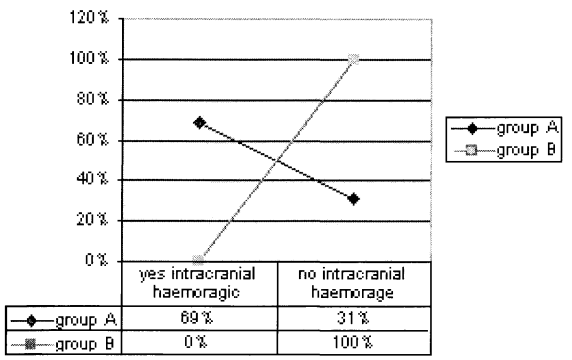

Figure 2.

In 15% of cases (subgroup A2) with fetal growth retardation, reverse flow was also discovered in diastole even with applied oxygen compensation, magnesium infusion and nitroglycerine patches (adhesive strips). Within three to five days all patients underwent cesarean section because end-diastole block was affirmed. Deliveries were ended between the 35th and 37th week of gestation.

In the last subgroup (subgroup A3), 40% of patients were delivered by oxytocine induction with an increasing resistance index (RI) and compensatory increment of central blood flow, considering the fact that local findings were adequate.

In group B, 30 patients with identical age of gestation and fetal growth retardation from three to five weeks were evaluated. All patients with RI deterioration (85%) with a compensatory CNS condition were delivered by cesarean section.

In the same group, when reverse diastole flow was noticed (15%), patients were referred to urgent cesarean delivery with application of corticosteroid therapy for artificial fetal lung maturation directly to the fetus.

In three cases (10%) findings indicated a fast vaginal delivery so they were induced with oxytocine.

Discussion

Patients in the group B were delivered by cesarean with or without fetal maturation.

In group A, following the standard principles and considering indications for cesarean section, patients were not referred to surgery. Also, considering the possibility of further flow deterioration and the necessity of delivery, we referred patients to the delivery room and applied oxytocine induction. In 50% of cases we had to perform urgent cesarean delivery because of fetal indications, i.e. total asphyxia and end-diastole block observed by Doppler and the existence of dip II parameters on CTG.

Of 45% of the cases in group A1, 50% were ended surgically with a statistical significance of $p < 0.01$.

Analyzing the complete picture, vaginal delivery ended successfully only in cases of multipara where duration of delivery was anticipated to be maximally three to four hours.

Neonatal outcomes were monitored carefully. Keeping in mind the growth retardation and the fact that neonates had low body weight along with Apgar scores, we observed fetal blood pH metry in case of further therapy or possible neurological complications.

In group B all pregnancies ended surgically. In the cases where we expected possible fetal distress, we applied the routine procedure of acute maturation, 4 mg dexamethasone in combination with 1 ml longaceph, directly to the fetus under ultrasound control. Patients were then delivered by cesarean section.

Even in the group with artificial maturation, total neonatal outcomes were significantly better in relation to the group where vaginal delivery was started.

For group B fetal blood oxygenation was better. There were no neurological complications (hyporeflexion, excitability, intracranial hemorrhage).

There was a smaller degree of starting RDS (respiratory distress syndrome) but only 12 to 24 hours after delivery which was solved by continuing corticosteroid therapy and oxygen application to the neonate even without the use of surfactants.

In group A, when vaginal delivery was decided on, there were no signs of RDS but there was a significant oxygen disturbance, the necessity to apply additional oxygen support, and intracranial hemorrhage (first degree) in 62% of neonates delivered vaginally and second degree intracranial hemorrhage in 7% of cases.

Considering the data that intracranial hemorrhage did not exist in neonates delivered by cesarean section, we get a great statistical significance ($p < 0.01$).

Analyzing the pH metry of neonates, in subgroup A1 the pH boundary was around 7.25 ± 0.05, but the pH metry of fetuses delivered in subgroup A3 was physiologically optimal. It points out the importance of comparisons within the group ($p < 0.05$) and the correctness of early diagnosis and the decision for cesarean delivery.

Conclusion

In conditions where there is fetoplacental unit deterioration it is necessary to consider fetoplacental dynamics along with routine indications and contraindications.

By following Doppler flow with a biophysical profile, cardiotocography and pH metry of the head (if available), indications for cesarean delivery can be ascertained in time thus reducing morbidity and mortality of newborns.

It is a fact that controlled vaginal delivery leads to additional maturation of the fetus. By provoking contractions, acts of hypoxia crisis under the influence of stress hormones cause larger and faster surfactant production. However, also the danger of walking on a tightrope is decreased if it is anticipated that delivery cannot be accomplished *per vias naturalis* and that it is more advisable and safer to perform cesarean section.

The application of artificial maturation provides fewer complications and avoids possible respiratory distress syndrome mortality. Moreover, it provides additional protection to blood vessels of the central nervous system.

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