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Delivery in diabetic pregnancy

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Summary. - Two hundred and twenty deliveries of diabetic pregnant women, occurring from 1990-1994 were studied: 186 gestational (GDM) and 34 pregestational diabetes (PGDM). Women who delivered during the year of 1994 were considered as control population (3615 births). Mode of delivery, planned delivery, delivery's gestational age, shoulder dystocia, macrosomia and large for gestational age (LGA) were investigated. Cesarean section and planned delivery were respectively 39% *vs* 20.5% and 51.6% *vs* 16% respectively in diabetic *vs* control women. Deliveries after 40 weeks were 29% in GDM, 3% in PGDM and 50% in control women. Macrosomia occurred in 17.7% of diabetic against the 8% of controls. Finally shoulder dystocia occurred in the 3.6% of diabetic women against the 0.3% of the control group. These data indicate that in our diabetic population there is a high rate of cesarean sections and planned deliveries, as well as macrosomia, LGA and shoulder dystocia. Obstetric decision to allow the delivery to term or near term was not enough to bring the rate of macrosomia and LGA close to the normal, which can be consequence of the diabetic control in pregnancy, in spite of intensive care intervention.

Key words: diabetes in pregnancy, glycemic control, macrosomia.

Riassunto *(Il parto nelle donne diabetiche)*. - Sono state studiate, negli anni 1990-94, 220 gravidanze diabetiche: 186 GDM e 34 PGDM. Per controllo sono stati valutati tutti parti di donne normali del 1994 (3615). Sono stati studiati la modalità di parto, i parti programmati, l'epoca di parto, le distocie e la macrosomia. Il parto cesareo e il parto programmato erano rispettivamente nelle gravidanze complicate da diabete rispetto ai controlli, pari al 39% *vs* 20,5% e 51,6% *vs* 16%. Parti oltre la 40ª settimana si avevano nel 29% delle GDM, nel 3% delle PGDM contro il 50% dei controlli. La macrosomia aveva una incidenza del 17,7% nelle diabetiche contro l'8% dei controlli. Infine parti distocici si verificavano nel 3,6% delle diabetiche contro lo 0,3% delle normali. Questi dati indicano che nella nostra popolazione diabetica vi è un'alta percentuale di parti cesarei e di parti programmati, così come della macrosomia e di parti distocici. La decisione ostetrica di consentire un parto al termine o vicino al termine non era sufficiente a portare nella norma l'incidenza di macrosomia, che può essere la conseguenza del controllo metabolico del diabete, nonostante una terapia intensiva.

Parole chiave: diabete in gravidanza, controllo glicemico, macrosomia.

Introduction

The diabetogenic effects of pregnancy are noteworthy in women who have no evidence of diabetes when they are not pregnant but develop distinct abnormalities of glucose tolerance during pregnancy and, at time, overt diabetes [1].

Most often, these changes are reversible. After delivery, the evidence of induction or worsened diabetes usually disappears rapidly, and the ability of the mother to metabolise carbohydrates returns to the prepregnant status.

During pregnancy, control of diabetes usually is made more difficult by a variety of complications. Nausea and vomiting may lead on one hand to hypoglycemic shock and, on the other, to insulin resistance if starvation is severe enough to cause ketosis.

Pregnant women are more prone to develop metabolic acidosis than nonpregnant. In diabetes, the likelihood of severe metabolic acidosis is increased appreciably. Infection during pregnancy commonly results in insulin resistance and ketoacidosis unless it is recognised promptly and both the infection and diabetes are treated.

Maternal glucose level should be as close to normal as possible.

Effective maternal counselling is an extremely important function of prenatal care. The woman should be seen often and instructed carefully to recognise and deal with problems that may arise in the interim. She must be encouraged to report immediately any of a variety of events. For example, respiratory or urinary infections, rather common occurrences during pregnancy, can pre-

cipitate diabetic ketoacidosis, that is tolerated poorly by the foetus. Otherwise normal nausea and vomiting of pregnancy may lead to the characteristic hypoglyc emic reactions, and when more severe and prolonged, starvation may lead to both serious acidosis and insulin resistance much sooner that in the nonpregnant woman [1].

Pregnancy should continue until the foetus is functionally mature, unless the intrauterine environment is deteriorating [1, 2].

One of the most critical and controversial aspects of perinatal medicine is the precise timing of the delivery. Furthermore, once a decision has been made to accomplish delivery, the clinician is confronted with a choice between abdominal or vaginal routes.

In the woman with diabetes, the management of glucose metabolism during cesarean section or labour appears to be an important determinant of at least some types of neonatal morbidity [1, 2].

Materials and methods

All the women who delivered in our maternity, from 1990 to 1994, with diabetes in pregnancy took part in this study. From the 220 women studied, 186 were gestational diabetic mellitus (GDM) women and 34 pregestational diabetic mellitus (PGDM) women. All of them were followed in the maternity's outpatient clinic for diabetes in pregnancy. 3615 women who delivered in the maternity during 1994 were considered as control population.

In our maternity, all pregnant women were screened for carbohydrate intolerance with a one h glucose challenge (50 g of glucose/200 cc of water) at the 24 and after at 32 weeks of gestation.

If plasma glucose was >140 mg/dl, a three h, 100 g oral glucose tolerance test (OGTT) was performed. Gestational diabetes, defined as "glucose intolerance with onset or first recognition during pregnancy" was diagnosed when two or more values were elevated, this was considered abnormal.

Treatment modalities included diet alone or a combination of insulin and diet.

Assignment to diet therapy was determined on the basis of the fasting plasma glucose level from the OGTT ($\leq$95 mg/dl), two h postprandial glucose level (< 120 mg/dl) and mean blood glucose levels, defined as mean blood glucose from diagnosis to decision point (< 105 mg/dl) [3].

Subjects were counselled by nutritionists about a diet regimen of several meals daily.

Diet adherence was reinforced at subsequent clinic visits.

Patient who did not achieve glycemic goals on diet therapy were assigned to insulin therapy.

The following items were evaluated: mode of delivery, planned delivery, gestational age at the delivery, shoulder dystocia, macrosomia (birth weight $\geq$ 4000 g), large for gestational age (LGA).

Results

The authors carried out their study by the *mode of delivery* in the diabetic population (220) and found 60.5% of vaginal deliveries and 39% of cesarean sections; the numbers found were very different from those calculated in the control group (3615): 77.5% of vaginal deliveries and 20.5% of cesarean sections. But if we are to subdivide the diabetic population in gestational diabetes mellitus and pregestational diabetes mellitus we will find even bigger asymmetries: 33.6% of cesarean sections in the GDM group and 67.6% of cesarean sections in the PGDM group (Table 1).

In other analysis of deliveries in diabetic women, the authors found a large number of *planned deliveries.* They considered planned deliveries the sum of induced deliveries and of elective cesareans. This definition has a margin of error which is translated by premature rupture of membranes (PRM), at term. In our protocol, delivery will be induced after 24 h in none resolved spontaneous labour of PRM ocurres. This situation is an example of induced labour but cannot be included in planned deliveries. However, due to the discrepancy of the authors numbers, such an error seems neglectable.

51.6% of planned deliveries was found in the diabetic general group in contrast with 16% in the control group (Table 1).

The authors then divided the diabetic population in subgroups and obtained the following data: GDM 47.6% and PGDM 70.5%; which are numbers even more asymmetric than those mentioned above.

As one can see, the big number of planned deliveries and of cesarean sections found in diabetic group, has the same significant value, which is the importance of a thorough and complete outpatient control and the need of careful obstetric care due to the gravity of these situations [4-8].

We also analyzed the diabetic deliveries according to the *gestational age.* We verified an incidence of deliveries of 40 or more weeks in the general population of 50%. In the GDM group this incidence was of 29% and in the PGDM group of 3%. This translates the obstetrics' preoccupation to plan the deliveries of diabetic women at term or near term and to garantee fetal maturity and avoid macrosomia.

Speaking about gestational age involves speaking about preterm deliveries (PPT). The numbers found in the control population was a mean of 5.3%, but for the PGDM it was much higher, 23.5%.

As the reason for the prematurity cases were analysed, it became clear that the cause was due to premature induction of labour because of fetal distress.

Table 1. - Delivery in diabetic pregnancy, 1990-1994

	GDM	PGDM	Total	Control
Mode of delivery				
Cesarean section	36.6 *(a)*	67.6 *(a)*	39	20.5
Vaginal delivery	66.1 *(a)*	32.3 *(a)*	60.5	77.5
Planned delivery	47.6 *(a)*	70.5 *(a)*	51.6	16
GA at the delivery				
At term (≥ 40 Weeks)	29 *(a)*	3 *(a)*	25.4	50
PPT	4.3 (pNs)	23.5 *(a)*	7.2	5.3
Shoulder dystocia	-	-	3.6 *(b)*	0.3
Macrosomia	-	-	17.7 *(b)*	8
LGA	-	-	40	-

(a) $p < 0.01$, GDM *vs* PDGM *vs* control; *(b)* $p < 0.01$, total *vs* control.

Without doubt, when we think about the delivery in diabetic women there is a major problem that the obstetrician has simultaneously to face, i.e., *macrosomia* (birth weight ≥ 4000 g) which can be avoided by making sure there is a tight control of the glicemic blood values and faced by deciding what attitude to take when confronted with macrosomia at the end of a gestation [9].

The data revealed 17.7% of cases of macrosomia in the diabetic population and 8% in the control group.

However, for the obstetrician the notion of *large for gestational age* (LGA) is the main point of the problem. All newborn with a percentile > 90 for weight, according to the Lubchenco curve, will fall into this category of LGA.

This idea of LGA is of extreme importance because as the obstetrician planes deliveries he reduces extreme gestational age and consequently avoids newborns with 4 or more kg. However, the fact of reducing the weight at birth does not resolve the problem since there will always be infants large for their gestational age.

Our data revealed 40% of LGA. In this diabetic subpopulation we have 48% of cesarean sections and 61% of planned deliveries.

The distribution of LGA is made in the following way: of 79% of GDM, 21% were submitted to insulinoterapy during pregnancy, and 20% in PGDM group.

As we refer to macrosomia, or LGA newborns, *shoulder dystocia* is implied and so is the impact that this situation arouses.

In our population of 220 diabetic women we found 8 cases of shoulder distocia which represents 3.6%. This percentil is substantially higher then the value found in the control group, which is of 0.3% (Table 1).

In the cases of shoulder dystocia, four occurred macrosomic newborns and four occurred in non macrosomic newborns. However all of them were LGA, reflecting the characteristic newborns of the diabetic women to have a higher distribution of fat tissue to the shoulders and trunk.

Conclusions

These data indicate that in our diabetic population there is a high rate of cesarean section and planned deliveries, as well as macrosomia, LGA and shoulder dystocia. Obstetric decision to allow the delivery to term or near term was not enough to bring the rate of macrosomia and LGA close to the normal, which should be consequence of the diabetic control in pregnancy, in spite of intensive care intervention.

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