Available online at
ScienceDirect
www.sciencedirect.com
Elsevier Masson France
EM|consulte
www.em-consulte.com/en
Diabetes & Metabolism 41 (2015) 387–392

Original article

Outcome of twin pregnancies associated with glucose intolerance

C. Poulain [a], A. Duhamel [b], C. Garabedian [a,d], M. Cazaubiel [c], M.C. Rejou [c], A. Vambergue [c,d], P. Deruelle [a,d,*]

[a] *GEM-JDF Project, Pôle femme, mère, nouveau-né, Maternité Jeanne-de-Flandre, CHRU de Lille, Lille, France*
[b] *Department of biostatistics, EA2694, Faculté de médecine Henri-Warembourg, Université Lille 2, PRES Lille Nord de France, Lille, France*
[c] *Pôle médico-chirurgical, Hôpital Huriez, CHRU de Lille, Lille, France*
[d] *UPRES EA 4489, Environnement périnatal et croissance, Faculté de médecine Henri-Warembourg, Université Lille 2, PRES Lille Nord de France, Lille, France*

Received 6 October 2014; received in revised form 7 December 2014; accepted 8 December 2014
Available online 27 January 2015

Abstract

Objectives. – There is little information about the impact of hyperglycaemia in twin pregnancies. The objective of our study was to evaluate the maternal, foetal and neonatal complications in patients with twin pregnancy and glucose intolerance defined by gestational diabetes mellitus and gestational mild hyperglycaemia.

Study design. – We performed a single-centre retrospective study. Screening for gestational diabetes was achieved by a two-step method. Patients were managed according to the French guidelines. After matching for age and body mass index, outcomes were compared in 177 patients with glucose intolerance and 509 controls. Macrosomia was defined as birth weight above the 90th percentile of gestational age adjusted for parity, foetal sex and maternal biometrics.

Results. – Prevalence of glucose intolerance was 17.5% in our population. Complications of pregnancy and mode of delivery were similar between the two groups. Caesarean section was associated with age > 35 years, vascular complications of pregnancy and non-cephalic presentation of the first twin. Rate of macrosomia was not different between the two groups. The only risk factor for macrosomia was a history of macrosomia in a previous pregnancy (odds ratio = 5.9, 95% confidence interval = 1.8–19.2).

Conclusion. – Twin pregnancies complicated by glucose intolerance were not associated with an increased risk of macrosomia or Caesarean section. Further studies should assess the value of screening gestational diabetes mellitus in twin pregnancies.

Keywords: Obstetrics; Twin studies; Gestational diabetes mellitus; Pregnancy

1. Introduction

Gestational diabetes (GDM) is defined as a glucose tolerance disorder resulting in hyperglycaemia of variable severity, which begins or is diagnosed for the first time during pregnancy. Hyperglycaemia is associated with an increased risk of maternal and foetal complications [1]. The importance of the management of GDM during pregnancy is well-established [2]. Indeed, GDM treatment reduces the risk of maternal and foetal complications [2].

The frequency of twin pregnancies has increased since the beginning of the 1970's, mainly explained by the increase in maternal age and the diffusion of fertility treatments. The population of twins remains at high risk of preterm birth (PTB) and low birth weight (LBW). The complications of twin pregnancy may add an additional risk or, conversely, attenuate the risks of hyperglycaemia, especially macrosomia. While publications about GDM are numerous, in contrast, the impact of GDM or glucose intolerance on twin pregnancies has little been studied. Moreover, the results are conflicting [3–5]. These data suggest that more studies are needed to evaluate maternal and foetal complications in twin pregnancies complicated by glucose intolerance. The aim of our work was to examine maternal and

* Corresponding author at: Pôle femme, mère, nouveau-né, Maternité Jeanne-de-Flandre, CHRU de Lille, 1, rue Eugène-Avinée, 59037 Lille cedex, France. Tel.: +33 3 20446307; fax: +33 3 20446311.
E-mail address: philippe.deruelle@univ-lille2.fr (P. Deruelle).

http://dx.doi.org/10.1016/j.diabet.2014.12.005
1262-3636/

neonatal outcomes in women with twin pregnancy treated for glucose intolerance in comparison with normal glucose tolerant women.

2. Material and methods

This was a retrospective, comparative, single-centre study, performed in a level III university maternity. This study has approval by the national ethical review committee in obstetrics and gynaecology (CEROG OBS 2014-04-02). Women who delivered before 28 weeks of gestation, or who had a medical termination of pregnancy were excluded. Pre-pregnancy diabetes, stillbirth, twin-to-twin transfusion syndrome, monoamniotic pregnancies and the lack of screening for gestational diabetes or maternal anthropometric measurements were also exclusion criteria. The diagnosis of twin pregnancy and chorionicity was made early by the first trimester ultrasonography between 11 and 14 weeks.

For each patient, we identified age, parity, self-reported pre-pregnancy weight and height to calculate body mass index (BMI = weight/height^2), history of gestational diabetes or macrosomia in a previous pregnancy, medically assisted procreation and smoking.

Screening for gestational diabetes was based on the two-step strategy: O'Sullivan's test between 24 and 28 weeks of gestation. GDM was diagnosed when the 1-hour glucose value was $\geq$ 11.1 mmol/L. For a value between 7.2 and 11.1 mmol/L, a 100 g oral glucose tolerance test was realized. GDM was defined for two or more pathological values (threshold values; fasting: 5.3 mmol/L, 1 h: 10.1 mmol/L, 2 h: 8.7 mmol/L and 3 h: 7.8 mmol/L) and gestational mild hyperglycemia (GMH) by one abnormal value [4]. We chose to limit the study period from 1997 to 2010 due to the introduction in 2010 of the new screening methods in France.

Patients with "GDM" and "GMH" were considered as a single group, i.e. glucose intolerance. A diabetologist and a dietitian supported them within 15 days after diagnosis. Women were instructed to perform self-monitoring glucose profile associated with lifestyle changes. When blood glucose targets were not achieved after 10 days of diet, insulin was started after education of the patient.

Obstetric and neonatal outcomes included preterm labour, gestational hypertension, preeclampsia or HELLP syndrome, nature of onset of labour, mode of delivery, use of obstetric manoeuvres and postpartum haemorrhage, rate of prematurity, birth weight, Apgar score at 5 min, pH < 7.20, transfer to intensive care. Neonatal complications considered acute respiratory distress, hyperthermia, hypoglycaemia, hypocalcaemia and neonatal hyperbilirubinemia. Macrosomia was defined as a weight of newborn above the 90th centile of gestational age and adjusted to the weight and size of the patient, parity and foetal sex [6].

Statistical methods: we considered two main criteria: the rate of caesarean section (either planned or in emergency with exclusion of caesarean sections for the second twin) and the rate of LGA neonate defined as, at least, one of the two twins with a birth weight > 90th centile. Statistical analyzes were performed using SAS software (SAS Institute, Cary, NC, USA, Version 9.2). To balance the two groups (gestational diabetes yes/no), patients were matched for age (< 35 years, $\geq$ 35 years) and BMI classes (< 18 kg/m^2, [18–25 kg/m^2[, [25–30 kg/m^2[; $\geq$ 30 kg/m^2). A patient with glucose intolerance (case) was paired with a normal glucose tolerant woman (control) by the global optimum algorithm using the method of the propensity score [7]. The following variables were included in the propensity score: caesarean section, parity, age and body mass index. The link between the occurrence of caesarean (dependent variable) and the presence of glucose intolerance was studied by the generalized linear model to take into account the pairing in the statistical analyzes. The matching block has been considered as a random effect and gestational diabetes as a fixed effect. The various factors that influence the occurrence of a caesarean section were then searched using the same model (bivariate analyzes). Parameters with a level of less than 0.1 in bivariate significance were considered as confounding factors. The effect of glucose intolerance on the incidence of caesarean section was adjusted for these confounding factors using a multivariate generalized linear model. The results of this final analysis were expressed as odds ratio and confidence interval of 95%. The same analysis was performed for macrosomia.

3. Results

A total of 1436 patients delivered a twin pregnancy during the study period. We had a total of 1009 women includes in this study, among whom 177 patients had GDM or intolerance to carbohydrates and 832 had normal glucose tolerance. The prevalence of glucose intolerance was 17.5%; 44.7% of patients had one abnormal value at OGTT and 55.3% two abnormal values. After matching for age and BMI, we had 177 cases and 509 controls.

The characteristics of the population are described in Table 1 and were similar between the two groups. In the glucose-intolerant group, 11.3% of women needed insulin in addition to lifestyle and dietary changes. Pregnancy and delivery outcomes were similar between the two groups, except for instrumental extraction for T1 that was more frequent in the glucose-intolerant group (Table 2, 19.8% versus 9.8%, $P < 0.001$). Mean birth weight and rate of LGA were similar between the two groups (Table 2). There was no newborn with a birth weight greater than 4 kg. The number of admissions to an intensive care unit was increased in the glucose-intolerant group compared to the control group (33.1% versus 26.6%, $P < 0.03$).

There was no significant difference in the rate of glucose intolerance between the two groups according to the mode of delivery (28.2% in the vaginal delivery group versus 23.3% in the caesarean section group, $P = 0.14$). History of gestational diabetes or macrosomia, age, overweight, parity, chorionicity and macrosomia did not influence the caesarean section rate. In contrast, the occurrence of vascular complications and non-cephalic presentation (breech or transverse) were risk factors for caesarean sections. Pelvimetry and induction of labour were less frequent in the caesarean section group (Table 3).