Maternal and fetal outcomes of large fetus delivery: A comparative study

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Pronostic materno-fœtal de l'accouchement des macrosomes : Etude comparative

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RÉSUMÉ

But : Etudier le pronostic obstétrical et néonatal de l'accouchement des macrosomes (dont le poids de naissance dépasse 4000 g).

Méthodes : Etude rétrospective incluant 209 accouchements de macrosomes à terme pendant la période allant de Mars 2006 à Février 2007 au service de gynéco-obstétrique de l'Hôpital Mahmoud El Matri. L'étude s'est intéressée aux facteurs de risque, le mode d'accouchement ainsi que les complications maternelles et fœtales périnatales. Nous avons comparé ces résultats aux résultats d'un groupe contrôle de poids de naissance eutrophique durant la même période.

Résultats : La macrosomie a concerné 9,2% des accouchements. Les principaux facteurs de risque retrouvés étaient l'âge maternel supérieur à 30 ans (p=0,017), le diabète gestationnel (p=0,012) et le terme avancé (p=0,02). Ces facteurs de risque sont statistiquement plus importants dans ce groupe que dans le groupe témoin. L'accouchement à été effectuée par césarienne dans 24,4% dans le groupe des macrosomes contre 13,7% dans le groupe témoin (p=0,003) la plupart pendant le travail. En cas d'accouchement par les voies naturelles, la dystocie des épaules a été notée dans 1,9%, la détresse respiratoire et le transfert en néonatologie dans 4,8% et l'hypoglycémie dans 15,8% des cas. Les complications maternelles étaient dominées par l'hémorragie du post-partum (1,2%) et les traumatismes périnéaux (8,2%)

Conclusion : L'accouchement par voie basse est le principal mode d'accouchement en cas de macrosomie. Il n'y a pas d'indication à la césarienne systématique en cas de poids foetal dépassant 4 kg. Cependant la dystocie des épaules constitue la principale complication néonatale de l'accouchement par les voies naturelles nécessitant une prise en charge de l'accouchement par des obstétriciens expérimentés.

Mots-clés

Macrosomie, diabète, césarienne, dystocie des épaules

SUMMARY

Aim : To review the deliveries of macrosomic babies, weighing over than 4000g and their obstetrical and neonatal outcomes.

Methods: Retrospective study involving a total of 209 deliveries at term of macrosomic babies between Marsh 2006 and February 2007 in the Maternity Hospital of Mahmoud EL MATRI, Tunis. The study concerned risk factors, mode of delivery and the incidence of maternal and perinatal complications.We compared data in the study group to a control group of normal weight infants delivered at the same period.

Results: Macrosomia occurred in 9.2% of all deliveries. The main risk factors of macrosomia were maternal age over 30 years (p=0,017), multiparty (p<0.001), diabetes mellitus (p=0.012) and prolonged term of delivery (p=0.02). These risk factors were statistically significant compared to control group. Caesarian delivery was achieved in 24.4% in macrosomy group and in 13.7% in control group (p=0,003) the major part occurred during labor. Among vaginal deliveries in macrosomia group, shoulder dystocia was noted in 1,9%, fetal respiratory failure and admission in intensive care unit was noted in 4,8% of the cases and hypoglycemia complicated 15,8% of deliveries. Maternal complications were dominated by post partum hemorrhage documented in 1.2% of the cases and perineal tears noted in 8,2% of vaginal deliveries.

Conclusion: Vaginal delivery is the most frequent mode of delivery for a fetus weighing in excess of 4 kg and vaginal delivery should be attempted in the absence of contraindications and there is no need for elective systematic caesarian. However, shoulder dystocia remains the main complication of vaginal delivery for macrosomic fetuses and requires experienced obstetricians to manage these deliveries

Key-words

Macrosomy, Diabetes, Cesarean section, Shoulder dystocia

Macrosomia is a term used to describe a large fetus or neonate. There is no universally agreed definition of macrosomia. But in the literature, neonates weighing over than 4000g, are considered as macrosomic. The incidence of birth weight > 4000 g varies from 3 to 15 per 100 depending on the population being studied. Macrosomia is associated with a high risk of birth Complications to both mother and infant (1). Birth traumas are dominated in neonates by shoulder dystocia, fractures of humerus or clavicle.

Neonatal asphyxia is the most threatening complication because of its important neurological sequellae. Among mothers, hemorrhage is the main complication; it is due to excessive distention of uterus and frequently abnormal labor. Perineal tears are the head maternal complications in vaginal delivery. Several factors have been associated with macrosomia but the more common factors are maternal obesity, diabetes and postmaturity, identification of risk factors doesn't all the time guarantee the eviction of delivery complications.

One of the actual challenges of obstetricians is to estimate most precisely the fetal weight in order to avoid these complications. The purpose of the present study was to investigate retrospectively maternal and fetal factors that influence the delivery of large baby size at term

STUDY DESIGN

Study Material

This is a retrospective study based on a series of infants with a birth weight of more than 4000 g in the Mahmoud EL MATRI Maternity Hospital from march 2006 to february 2007. The list of patients was identified from the registry of the Obstetrics and Gynaecology Department. Charts were reviewed for demographic and medical characteristics, labour and delivery events, Apgar scores and maternal and perinatal complications. The demographic data being studied were maternal age, parity, history and frequency of past caesarean delivery and history of previous macrosomia and in utero fetal death. The infant's sex, birth weight were also studied. Medical characteristics evaluated were current status of gestational diabetes and, or impaired glucose tolerance.

The criteria used to diagnose gestational diabetes were fasting blood sugar over than 1,05 g/l at two biological samples and or impaired O'sullivan glucose test.

Labor and delivery events analyzed were gestational age at delivery, premature rupture of membranes, induction and augmentation of labor, duration of first, second and third stage of labor, mode of delivery that is caesarean section (emergency or elective)or vaginal spontaneous or forceps assisted delivery. Maternal complications evaluated were perineal and cervical lacerations requiring repair, postpartum and/or intrapartum hemorrhage. Haemorrhage was taken as estimated blood loss of more than 500 ml, or intolerance of acute anemia. Neonatal complications evaluated were shoulder dystocia, humerus or clavicle fractures, depression of Apgar scores at 1, 3 and 5 minutes and admission to the intensive neonatal care unit.

The study group was compared to a control group including twice as more patents than the study group. This control group concerns uneventful pregnancies with normal estimated fetal weight, that delivered at the same period, patients were randomly included.

Statistical Analysis

Statistical analyses were performed with SPSS 11.0 version (SPSS Inc). Univariate analyses were performed with the khi square, Fisher exact, Student t tests and Spearman test. Results were considered statistically signifiant at $P < 0.05$.

RESULTS

The overall macrosomia was 9.2%.The birth weights of most babies were between 4·00 and 4·250 kg. 24.4% of macrosomic birth weights were within 4·250–4·500 kilograms. (Table I). The heaviest baby was 4·900 kg and he was delivered vaginally. There was a preponderance of male infants with macrosomia with the male to female ratio of 3 to 1.

Table 1 : Repartition of population according to fetal weight

Range	Number	Percentage
4000-4250	138	66,1
4250-4500	52	24,4
4500-4750	16	7,6
4750-5000	4	1,9
Total	**209**	**100**

Thirty per cent of the macrosomic infants were delivered at a gestational age in excess of 41 weeks, in general population this pourcentage is of 22.3% ($p<0.02$).The gestational age was calculated from the date of the last menstrual period in most of the cases. In our study, 10.5% of mothers had gestational diabetes in this pregnancy, whereas in the control group this condition was noted in 5.1% ($P= 0.012$)

Macrosomia occurred most frequently at para 3 and more with 75 cases (38.8%), whereas in the general population the highest frequency of delivery was of para 1. The frequency of macrosomia increased with subsequent parity. The frequency of macrosomic deliveries peaked with mothers in the age group of 30.5 year-olds compared to the general population where the highest frequency of delivery occurred in the age group of 29.5-year-olds($p=0.017$) a history of macrosomia was noted in 23% of the study group wereheas, an antecedent of in utero death was found in 3 women and in only one case in the control group ($p<0.01$). Concerning prediction of macrosomia all our patients had a mesure of uterine hight (UH), median value was of 34.5 cm, according to our results this way of operating missed one third of macrosomic babies, in these cases UH was less than 32 centimeters.

Sonographic estimation was more appropriate, according to the sonographic features such as measuring the biparietal diameter (BIP), abdominal circumference (AC) and femur length (FL).

All of these three values were adjused to estimate fetal weight using the formula developed by Sheppard
Median value of BIP was of 95.05 cm whereas it is of 92.6 cm in control group (p<0.000001), concerning AC median value was 358.6 cm versus 338.96 in control group (p<0.000001), these parameters are hence appropriate and useful to predict macrosomia.

Mode of delivery
The majority of women (73.7%) had vaginal delivery of a macrosomic fetus. There were four cases of forceps-assisted vaginal delivery. The cesarean delivery was achieved in 24.4% of the cases of which 8cases were elective. During labour, 14% of women had a cesarean section against 7.3% in the control group (p 0.003) vaginal delivery was achieved in 65·6%.

Maternal complications
A total of 7.3% of maternal complications were noted. The proportion of postpartum hemorrhage was noted in 1.2 % in study group. In all cases, we need not any surgical treatment and there was no maternal death during the study period.
Perineal tears complicated 8.4% of the cases in the study group compared to those who delivered vaginally P<0.005, elective episiotomy was done in most cases of vaginal deliveries as well as oxytocin assisted third stage of labour. However, all perineal tears were at second degree.

Fetal complications
Shoulder dystocia occurred in 1·9% of all vaginal deliveries. Poor Apgar score after 5 minutes was noted in ten cases (4.8%), these babies were all born vaginally and they needed to be admitted in a neonatal intensive care unit.

DISCUSSION

Macrosomia has been associated with maternal and fetal complications, predicting accurately macrosomia is a daily challenge for obstetricians and most of decisions are often made intrapartum. The rate of macrosomia in our study is comparable to the rates quoted by studies in other populations (1). Many studies have enlighted the influence of several factors on fetus weight, these factors include diabetes mellitus during pregnancy (2-5), high maternal body weight (2, 6), postdate pregnancy (7-9), multiparity and prior delivery of large infant. Macrosomia is rather expected in diabetic pregnant women because the principle substrate for fetal growth is glucose. However, this condition is controversial, while some studies have failed to demonstrate any significant relationship especially if diabetes is well controlled (10) many others found a positive relationship between maternal glucose levels and fetal macrosomia (11). This study shows that only 10.5% of mothers had gestational diabetes and/or impaired glucose tolerance. Obviously, a larger proportion of fetal macrosomia was contributed by other factors such as those mentioned. Thus, analysis of this relationship must consider the influence of other factors that may affect birth weight such as leptin, insulin-like growth factor I and insulin level as reported in (12) study. Increased maternal pre-pregnancy weight and especially excessive weight gain exceeding 25% during pregnancy have been suggested as an independent factor to increase the risk of fetal macrosomia (2, 13) Unfortunately, none of the patients in this study had their pregnancy weight documented. The importance of proper documentation of height and weight in the antenatal records should be emphasized because it may contribute to the clinical prediction of macrosomia. Spellacy et al showed that postdate pregnancy is also an important risk factor for macrosomia (14). Our result is consistent with this finding, as 30.6% of the macrosomic infants were delivered after term in contrast with 22,3% in control group. Nevertheless, the accuracy of the gestational age in this study is limited because the last menstrual period (LMP) is still used commonly by both mothers and doctors to date the pregnancy. Early pregnancy scan would improve the detection rate of postdate pregnancy and, thus, macrosomia can be anticipated and managed appropriately. In another study, Berard et al reported that parity is a significant factor in macrosomia (15). This is also in line with our observation of 62.2% deliveries by parous women. In our study, 23% of the women had previous macrosomia. The history of previous macrosomia was shown by a significant predictor of macrosomia by Essel et al (1). We also noticed that mothers of macrosomic infants were statistically older than control group. This is due probably to increase of frequency of diabetes in this group of age. Nevertheless, Essel et al. (1) showed that the risk of macrosomia did increase with maternal age. There were also trends to predict macrosomia clinically by palpation and measuring the fundal height, but its usefulness has previously been questioned because of the high dependence on examiner skill and patient size (16). Therefore these are poor indicators of fetal weight. Ultrasonic investigation is helpful in estimating birth weight with a margin of error of 10–15% (17). However, this would be of value only if performed after 38 weeks of gestation. This is because normal fetal growth is linear whereas macrosomic fetus has accelerated growth towards term (18). There were more boys than girls when macrosomia is concerned and this has been proved in other studies (1). The reason for this phenomenon has not been well explained so far.

Many studies reported a higher rate of vaginal delivery compared to caesarean delivery when macrosomia is concerned (19, 20). Our study is no exception, with 73.7% of vaginal delivery of macrosomic infants and a relatively low rate of elective caesarean section. Nevertheless, there is always room for improvement as some reports demonstrated almost 80% rate of vaginal delivery (20). Therefore macrosomia is not a contraindication for vaginal delivery because many studies have shown a high rate of vaginal delivery without fetal complications. We don't think that elective induction of labor at 38 weeks of gestation should be of advice, to avoid extreme fetal excess of weight since there is evidence that elective induction of labor increased the operative delivery rate (21). Vaginal delivery of macrosomic infant is more likely to occur if the cervix is favorable. Other studies, did show that clinical assessment of the cervix using the Bishop's score thus

influences the mode of labor induction. Prostaglandin and oxytocin are used for induction of labor when the cervix is unfavorable and uterine contractions are weak. Naturally this does not favor vaginal delivery and more than 80% of these inductions failed resulting in emergency caesarean delivery (22). Thus, the ultimate factors that influence the outcome of induction are the cervical condition and strength of uterine contractions (23). Ninety eight per cent of macrosomic babies delivered either vaginally or by caesarean section do not have complications. The rate of shoulder dystocia in our setting is relatively low (1·9%) compared to other studies (19). Apgar scores were also good in more than 90% of both vaginal and caesarean deliveries. More than 65% of mothers who delivered either vaginally or by caesarean section did not have any complication (24). A broad spectrum of opinion exists regarding the use of prophylactic caesarean delivery in cases of prior diagnosed macrosomia.

Generally, vaginally delivery is still the safer mode of delivery for the mother, whereas caesarean section no doubt could prevent a few shoulder dystocias from occurring (25, 26). Therefore, the obstetrician has to weigh constantly the risks and benefits of vaginal versus caesarean delivery in the best interest of the mother first, then only that of the infant, before deciding on the mode of delivery for the macrosomic fetus.

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