

MACROSOMIA , PREDICTION AND MODE OF DELIVERY

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ABSTRACT

The concept of fetal macrosomia and its adverse outcomes has been recognized in medicine and literary reports throughout the ages , Attempts at perinatal diagnosis of macrosomia have been useful in some cases. The mode of delivering a borderline macrosomia is a matter of discrepancy. Fetal macrosomia has been defined in several different ways including birth weight of [4000-4500 gm] or birth weight greater than 90% for gestational age after correcting for sex and ethnicity. Based on these definitions macrosomia affect 1- 10 % of pregnancies. It's an analytic study aims to detect the possibility of antenatal prediction of fetal macrosomia and the decision for the safe mode of delivery . The study was done at the obstetric unit of Misurata Teaching Hospital–Libya, over a period of two years from the first of January 2010 till December 2011. During this period, a total of 17234 deliveries occurred. 100 patients whom delivered babies weighing >4, 500 kg were included in this study. They were randomly selected. maternal complications were observed. The 100 macrosomic infants delivered in the study period were their birth weight >4500 gm constituted 0,7% of all deliveries; There was a statistically significant increased incidence of macrosomia in the age group 30–40 years which is 50%. The highest incidence of macrosomic pregnancy in women P1 to P3 41% and then P4 to P6 which is 32% and the incidence decreases. In grand multiparous women and also in primigravida were it 13% in both, The complications were recorded in 20% of all deliveries ,in particular shoulder dystocia 4% of all macrosomic births, various bone fracture is 3%of all deliveries which occurred more frequently with operative vaginal deliveries. The ability to estimate the fetal weight appears to be of great importance in identification of macrosomic fetus Clinical estimation along with ultrasound estimation can serve a useful guide to prevent maternal and fetal complications. Most of complicated cases of macrosomic deliveries are from the unpredicted group.

KEY WORDS: fetal macrosomia, maternal and fetal complications, multiparity, diabetes mellitus.

INTRODUCTION

Historical Background

The concept of fetal macrosomia and its adverse outcomes has been recognized in medicine and literary reports throughout the ages. The 16th century monk and physician, Francois Rabelais, told the story of the birth of Gargantua, (a giant baby). Several years later, Gargantua's wife died giving birth to Pantagruel "for he was so amazingly large and so heavy that he could not come into the world without suffocating his mother"⁽¹⁾. In 1891 Ortega reported the birth of a 24.13pound (10.9 kg) male infant. In 1916, Belcher claimed to have delivered the largest infant, 25-pound (11.3 kg) stillborn^(1,2,3).

Definitions & Associations

The term macrosomia is used to describe new born with excessive birth weight (> 4.500 kg). Attempts at perinatal diagnosis of macrosomia have been useful in some cases. The mode of delivering a borderline macrosomia is a matter of discrepancy^(4,5) The accurate diagnosis of fetal macrosomia can be made by

measuring birth weight after delivery, therefore the condition is confirmed retrospectively, i.e. after delivery of infant.

Fetal macrosomia has been defined in several different ways including birth weight of [4000-4500 gm] or birth weight greater than 90% for gestational age after correcting for sex and ethnicity. Based on these definitions macrosomia affect 1-10 % of pregnancies⁽¹⁾. The pathophysiology of macrosomia is related to the associated maternal and fetal condition that accounts for its development^(6,7,8).

In general poorly controlled diabetes ,maternal obesity and excessive maternal weight gain during pregnancy are all associated with fetal macrosomia^(13,14,15,16,17).

Strategies to predict macrosomia

The three major strategies used to predict macrosomia are *clinical risk factors, *clinical estimation by Leopold's maneuvers and *ultrasonography. But each method has substantial limitations.

1) Clinical risk factors for fetal macrosomia

A number of risk factors for fetal macrosomia have been recognized. the strongest risk factor is maternal diabetes which result in a twofold increase in the incidence of macrosomia. Many risk factors are highly prevalent among parturient even when two of these risk factors are present, the risk of macrosomia is only 32%. Furthermore, 34%of macrosomic infants are born to mothers without any risk factors and 38% of

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pregnant women have at least one risk factor^(18,19,20). These risk factors include. Maternal Diabetes, Excessive weight gain, Male fetus, Multiparty, Previous macrosomia, Prolonged gestation, Maternal obesity, Family history of big baby, Parental stature and Maternal impaired glucose tolerance, prolonged 2nd stage^(9,10,21). Clinical estimation of fetal macrosomia, the volume of amniotic fluid, the size and the configuration of the uterus and the maternal body habits. Regarding Clinical estimation of the size of the fetus by manual palpation through the abdominal wall, several studies have documented mean error of about 300gm^(10,11, 21,22).

2) Leopold maneuvers

Are techniques developed to determine fetal presentation, lie and size. They are also limited by many factors as mentioned before for fundal height measurement, however these maneuvers provide the clinical with the general appreciation of fetal size and other important information.

Previous studies designed to evaluate Leopold maneuver with fundal height measurement for prenatal diagnosis of possible macrosomia report sensitivities of 10-43%. Specificities of 99-99.8 % and positive predictive value of 28-53 %⁽¹²⁾.

3) Ultrasonography

Ultrasound scans for assessment of fetal growth usually starts at the end of second trimester and is repeated there-after every 4 weeks or more if needed Baseline measurement of fetal abdominal circumference at 26 weeks expressed as a percentile can be compared with later scans to provide evidence for growth acceleration⁽⁸⁾.

Ultrasonographic measurements to obtain estimated fetal weights are indicated when clinical assessment indicate a uterine size greater than that expected for the gestational age .An examination within 1-2 weeks of delivery showing an abdominal circumference of 35cm or larger should alert the clinician to anticipate a fetus with birth weight of 4,000gm or more.

The definitive diagnosis can only be made after delivery of the neonate. Ultrasonography of the fetus and its size can be useful for identifying macrosomic infants. In 1999 jazayeri et al showed that abdominal circumference measurements made within 2 weeks of delivery can be predictive of a birth weight greater than 4,000gm⁽²⁷⁾.

A measurement of 35 cm or more identified more than 90% of neonates with birth weight greater than 4000gm and occurred in only 18% of the population. An abdominal circumference measurement within two weeks of delivery had a sensitivity & specificity & positive and negative predictive values of approximately 90%. Abdominal circumference measurement in patients at risk for macrosomia can provide some clues to the size of the fetus and thus allows appropriate preparation for delivery. Recent studies have confirmed that appropriately performed abdominal cir-

cumference by ultrasonography in the third trimester is the best way of predicting fetal weight. Measurements without doubt, the usefulness of this technique depends on the care used to measure the variable & the quality of the image obtained in late third trimester and the cut off used to define the neonates at risk⁽²⁸⁾. The term (fetal macrosomia) is misleading, because birth weight never known with certainty until after delivery, the most commonly proposed criteria for macrosomia is birth weight greater than either 4000gm or 4500gm this represented.

10.9 % and 1.8% of infants born in USA respectively . The most clinically useful definition of macrosomia is a weight below which macrosomic complications such as shoulder dystocia doesn't occur. Unfortunately, studies showed that one half of all cases of shoulder dystocia occur at birth weight of less than the commonly used cut-off 4000gm⁽²⁵⁾. Furthermore, almost one half of all cases of permanent brachial plexus injuries occur in infants weighing less than 4500gm⁽²⁾. The predictive accuracy of fetal weight estimates is poor at greater than 5000gm, most authors agree that prophylactic cesarean section should be offered^(26,27).

AIM OF THE STUDY

It's an analytic study aimed to detect the possibility of antenatal prediction of fetal macrosomia and the decision for the safe mode of delivery in Misurata Teaching Hospital, Misurata-Libya.

MATERIAL AND METHODS

The study was done at the obstetric unit of Misurata Teaching Hospital-Libya, over a period of two years from the first of Jan. 2012 till the end of Dec 2013. During this period, a total of 17234 deliveries occurred .

100 patients whom delivered babies weighing >4, 500 kg were included in this study and they were randomly selected. maternal complications were observed and analyzed macrosomia expectation based upon estimated fetal weights by Leopold maneuvers or by USS estimation or previous macrosomia or family history of macrosomia or mixed factors. Gestational age at delivery was calculated from the last menstrual period or ultrasonic estimations carried out before the twenty weeks of gestation. The delivery of the baby was conducted by specialized obstetrician. The delivery of the macrosomic infant was attended by apediatrician. After birth the baby was transferred to neonatology unit where a careful assessment made on the basis of Apgar score. A good physical examination for the major congenital anomalies, birth weight detection, and a specimen of cord blood was obtained for glucose determination to exclude hypoglycemia.

RESULTS

The 100 macrosomic infants delivered in the study period were their birth weight >4500gm constituted 0,7% of all deliveries; 100 of their mothers were booked patients ,and the other were un booked or their information were not complete. (Table 1) sets out the

identified characteristics of the mothers in the study. There was a statistically significant increased incidence of macrosomia in the age group 31–40 years which is 50% which is slightly higher in compare with other study SAMJ 1995 the peak incidence at 30–39 yr were 39,9%. It may be due to the increase in maternal age associated with increased medical disease such as diabetes mellitus which is one of most common cause of foetal macrosomia. The parity distribution as we seen below in (table 1&2). The highest incidence of macrosomic pregnancy in women P1 to P3 41% and then P4 to P6 which is 32% and the incidence decrease In grand multiparous women and also in primi-gravida were it 13% in both, were the incidence is 63,9% in P1-P4 in the above study which is higher than our result.

(Table 1) Maternal characteristics

Maternal age	No. of patients
<20yr	1
20-25yr	10
26-30yr	37
31-35yr	25
36-40yr	25
>40yr	2
Maternal parity	No. of patients
PG	13
P1 –P3	41
P4 –P6	32
P7 –P10	13
>P10	1
Family history of macrosomia	No. of patients
Positive F/H	64
Negative F/H	36

In most of the cases the weight gain during pregnancy is 10kg -16kg (81%), as shown in (table 2).

(Table 2) Maternal weight pre pregnancy, at term and weight gain during pregnancy

Maternal wt. (No.)	Patient wt. Pre-pregnancy (No.)	Patient Wt. at term (No.)
<70kg	15	0
71kg-80kg	51	7
81kg-90kg	23	33
91kg-100kg	10	44
>100kg	1	16
Wt. gain during pregnancy	No. of patient	
<10 kg	2	
10kg -15kg	43	
16kg -20kg	38	
21kg -25kg	13	
>25 kg	4	

The most common medical disorder that associated with fetal macrosomia is Diabetes mellitus which is 32% of cases in this study mostly Gestational DM. (Table 3) illustrate the incidence of other medical dis-

ease which is less frequent, HTN is about 5% but it in most of cases is essential hypertension, thyroid disease 1 case was hypothyroidism on treatment, 2 cases of renal disorder recurrent UTI, 1 case asthmatic mild and 3 cases of blood disorder. From (table 3), 17% of diabetic pregnancies on insulin and 11% on diet control, most of these patient weren't to be diabetic pre pregnancy and 3% diagnosed intrapartum.

(Table 3) Medical disorders and type of DM control

Medical disease	No. of patient	Type of DM control	
Diabetes	32	Diet	11
		Insulin	17
HTN	5		
Thyroid D.	1		
Renal D.	2		
Br. Asthma	1		
Blood D.	3		

The prolonged pregnancy increase incidence of fetal macrosomia because continued delivery of nutrient and oxygen to the fetus, we found the incidence was 51% GA from 37wk to 40wk and 43% in GA from 40wk to 42wk so we found about half of macrosomic babies are postdate (table 4).

(Table 4) Gestational age at time of delivery, mode of delivery, birth weight and fetal sex

Time of delivery	No. of patient
<37wk	3
37wk-40wk	51
40wk-42wk	43
>42wk	3
Mode of delivery	No. of patient
NVD	43
Vacuum extraction	7
Forceps delivery	4
C/S delivery	46
Fetal weight at delivery	No. of patient
>4.5 kg -5kg	80
5.1kg -5.5kg	13
5.6kg -6kg	6
>6 kg	2
Fetal sex	No. of patient
Male	66
Female	34

Forty six percent of fetuses were delivered by cesarean section, 29% were elective because of big baby or for excess of another causes, and 17% were emergency cesarean section and most of them unpredicted, vaginal delivery 54%, 43% normal vaginal delivery (NVD) in this group the patients were higher birth order and had H/O delivery of macrosomic baby, other operative vaginal delivery occur in 11% of cases which represent 20% of all vaginal delivery, the intervention include vacuum extraction 7% and low forceps 4% (table 4).

The highest incidence of birth weight were 80% the babies weighing more than 4500gm to 5kg, and 13%

birth weight 5.1kg to 5.5kg, above 5.5kg about 8%. As we found in this study most of babies who birth weight more than 5kg delivered by caesarean section. The male fetus heavier than female fetus at any gestational age, in our study the incidence of males 66%, where the females 34%. The complication were recorded in 20% of all deliveries, details are in (table 5).

(Table 5) Feto-Maternal complications

Feto-maternal injury	No. of patient
Dystocia	4
Erb's palsy	2
Bone fracture	3
Birth asphyxia	2
Soft tissue trauma	3
Birth canal injury	7

In our study 39% of patient predicted to be pregnant with macrosomic fetus mainly by clinical assessment in some cases based on the history of big baby or family history of big baby or in combination. Twenty percent of patients were not predicted, as macrosomic until delivery, and majority of these patient has had feto-maternal complications. Eighteen percent were suspected that are macrosomic by mixed factors. In patients had H/O delivery of macrosomia, in only 3% of them were predicted by USS (table 6).

(Table 6) Antenatal prediction of macrosomic foetus

Mode of prediction	No. of patient
USS ass.	12
Clinical ass.	10
History of macrosomia	8
Mixed factor USS + Clinical + H/O big baby	58
Unpredicted	12

DISCUSSION

Macrosomia was associated with wide range of adverse pregnancy outcomes. In order to make the diagnosis of fetal macrosomia antenatally, it is vital to be aware of predisposing factors in our environment these were found to be as follows; about half of patients in their 3rd decade of life, multiparous, over weight pre-pregnancy, and obese at term (BMI >30kg/m²).

Weight gain during pregnancy was high 38% gained from 16kg-20kg which is high in comparison with normal weight gain for normal pre-pregnancy BMI, and most of them had history of delivery of macrosomic baby, also we found in our study 43% post-date and 3% post-term⁽⁸⁾, the incidence of gestational diabetes mellitus was 32% which is significantly high which is the strongest risk factor for macrosomic baby and other feto-maternal risks as shoulder dystocia, neonatal hypoglycemia, systemic maternal complications of DM⁽¹¹⁾.

According to the results of this study feto-maternal complications tended to increase in vaginal births, the most serious encountered complications in macrosomic babies were developed Erb's palsy in neonatal

period which was 2% of all macrosomic deliveries which was out of 4% of shoulder dystocia, other most serious fetal complication was Birth asphyxia [defined as a one minute Apgar score less than 7] among macrosomic infants delivery was 2% which result due to unpredicted macrosomia prolonged labour fetal distress and end by urgent cesarean section delivery. Maternal complication which was 7% birth canal injury which include extended episiotomy, 1st, 2nd, 3rd, 4th degree perineal tears, 3rd and 4th degree perineal tears were complicated by anal sphincter incontinence later on.

Macrosomia is associated with considerable maternal morbidity and high neonatal mortality and morbidity⁽⁸⁾, we found antenatal prediction was associated with an increase incidence of cesarean section delivery which was 46% without decrease in shoulder dystocia and other birth traumas⁽⁹⁾.

Cesarean section delivery suggested as the mode of delivery to minimize the risk of birth trauma that associated with macrosomia. Cesarean section did not improve the outcome in uncomplicated pregnancies⁽⁸⁾.

The rate of Perinatal and maternal morbidity and mortality can be reduced by the antenatal diagnosis, the risk factors leading to macrosomia must be thoroughly evaluated by the clinician, since majority of factors which lead to delivery of macrosomic babies are preventable⁽¹⁰⁾.

We believed that the unacceptable high Perinatal morbidity rate and maternal morbidity rate can be avoided if midwife and labour room doctors are properly trained in the concept of active management of labour, and early diagnosis of failure to progress, clinical suspicion of large baby, coupled with slow active phase of labour, especially arrest of cervical dilatation over a-2 hour period in the presence of adequate uterine contractions, and constitutes an early sign of failure to progress which should not be ignored. In 2nd stage of labour, intervention is required if there is no descent of the presenting part after 30 minute of bearing down, or patient undelivered after 45 minute of pushing⁽⁸⁾.

CONCLUSION

In the study we found out that most of the cases of macrosomia are antenatally estimated. History of previous delivery of big baby and maternal diabetes are significant predisposing factors.

Maternal obesity and weight gain during pregnancy are strongly related to fetal macrosomia. The ability to estimate the fetal weight appears to be of great importance in identification of macrosomic fetus clinical estimation along with ultrasound estimation can serve a useful guide in an experienced obstetrician.

Most of complicated cases of macrosomic deliveries are from the unpredicted group. It is agreed that real-time ultrasound scan give best estimate of fetal weight if available and should be used routinely for any patient whom at risk of having macrosomic fetus.

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