Fetal macrosomia Maternal and Perinatal outcome

Raida Muhammed Al-Wazzan* *(C.A.B.O.G) .* ***Samar Daoud Sarsam**** *(C.A.B.O.G)*

Abstract

Background: Fetal macrosomia represent a continuing challenge in obstetrics and increasing in it's occurrence as well as it is associated with maternal and perinatal complications.

Objective : To determine the maternal and perinatal outcome related to fetal macrosomia.

Design: A prospective case control study.

Patients and methods) :10th March-31st May, 2006

A prospective case control study had done over the period from 10th March to 31st May, 2006 in Al-Batool maternity teaching hospital in Mosul city .The study group consisted from 633 singleton alive newborns with gestational age ≥37weeks weighing 4000 grams and heavier and mothers of these newborns compared with control group which consisted from 4155 singleton alive newborn with gestational age ≥37weeks weighing 2500-3999 grams and mothers of these newborns .The obstetrical outcome variables which compared between the two groups include mode of delivery, indication of caesarean section and maternal and perinatal complications.

Results :

Macrosomic newborns (≥4000grams) delivered in this study account for (12.45%) of total deliveries. Newborns with a birth weight of ≥4500grams constitute 2.65% from all deliveries .Male Newborns (65.24%) was higher and statistically differed among the study group (p value=0.001).

Instrumental vaginal delivery (P value=0.010,Odd ratio :2.12, 95 %CI :1.19-3.76) and cesarean section delivery (P value=0.000,Odd ratio:1.63, 95 %CI : 1.34-1.98), mainly the emergency cesarean section (18.79%), were significantly different among the study group .Failure of progress of labour and cephalopelvic disproportion were the main indications in study group and showed statistical significant difference between the two groups.

Among the study group, there was neither maternal death nor uterine rupture but there was higher occurrence of postpartum hemorrhage, genital tract trauma and shoulder dystocia which were significantly different when it compared with control group .Erb's palsy was the main perinatal complication and was statistically different among macrosomic group (P value=0.000) .

Conclusion: Fetal macrosomia was associated with higher rate of instrumental vaginal delivery and caesarean section mainly due to failure of progress of labour and cephalopelvic disproportion .There were higher rate of postpartum haemorrhage, genital tract trauma as well as shoulder dystocia with neither maternal death nor uterine rupture in study group . Among macrosomic newborn, Erb's pulsy was the main perinatal complication .

Key words : Macrosomia, birth weight, maternal complications, perinatal complications, caesarean section, birth injury, shoulder dystocia, Erb's palsy.

Al - Kindy Col Med J 2011 ; Vol .7 . No. (1) p :50-55

Introduction:

Fetal macrosomia represent a continuing challenge in obstetrics[1] .(It id defined as birth weight of ≥4000 grams or ≥4500 grams or above the 90th centile for gestational age after correcting for the neonatal sex and ethnicity[1,2 3,4,5,6].(It's incidence is variable and affects 1-20 %of all pregnancies[3] (and it is reportedly increasing[2,6,7] .(Excessive maternal weight gain, obesity, increasing age and parity, gestational diabetes, diabetes mellitus, prolonged pregnancy and history of previous macrosomic birth are risk factors for fetal macrosomia[1,2,9,10(as well as genetic and ethnic factors[3,6](and climate[3(have some influence on the birth weight .Male newborns comprise a greater proportion of macrosomic infants[2,4,8(as male newborn weigh more than female newborn by 128 grams after adjusting for gestational age[8(,which could be due to genetic disposition or other utero-placental and fetal factors[4].(

The condition is confirmed only retrospectively[4 (as the clinical examination and assessment of risk factors as well as ultrasonographic examination cannot exclude or confirm the possibility of macrosomia with sufficient specificity and sensitivity[1,4] .(Delivering a big baby can be distressing for mother, baby and obstetric staff[6].(It affects the maternal prognosis as it increased risk of a prolonged first[9(and second stage of labour[9,10(, obstructed labour[10(, instrumental vaginal

delivery[4,6,9,10], caesarean delivery[1,2,4,5,6,11,12,13], genital tract trauma[2,4,5,6] and postpartum hemorrhage[1,3,4,6,9,12], as well as fetal macrosomia associated with increased the risk of shoulder dystocia and complications resulting from it which can affect the mother and newborn[1,4,6,13] .However, most cases of shoulder dystocia occur in fetuses of normal birth weight[1,4].

The birth weight is an important factor affecting perinatal morbidity and mortality[2,10, 11,12] mainly because of fetal asphyxia and birth trauma[2,6,11] specifically brachial or facial paralysis and clavicle or humerus fractures[1,7] .Brachial plexus injury)Erb's palsy (is commonly associated with shoulder dystocia, although significant percentage of palsy-type injuries occur without association to shoulder dystocia[1] .The majority of Erb's palsy injuries resolve completely within one month of birth .In 5 %of children, the plexus damage persists for more than one year but persistent handicap is unusual[1].

Recent research has shown that fetal macrosomia often demands the attention of different medical disciplines[4] as adverse consequences may extend to later stages in life, including the later development of overweight and possibly breast cancer[7].

Method:

A prospective case control study had done in Al-Batool maternity teaching hospital in Mosul city, which serves as a tertiary referral center where the total number of annual deliveries was 21920 .

During the study period)10th March-31st May, 2006(, 5084 consecutive deliveries were studied .A 633 singleton alive newborns with gestational age of ≥37 weeks weighing 4000 grams or heavier and mothers of these newborns were served as a study group and 4155 singleton alive newborns with gestational age of ≥37 weeks weighing between 2500 grams and 3999 grams and mothers of these newborns were served as control group .296 deliveries were excluded as it was not met criteria of selection for the study and control group)156 cases with birth weight of newborn was less than 2500grams, 84 cases were multiple pregnancy and 56 cases were stillbirth .(Gestational age calculated from the first trimester or second trimester ultrasound)if available (and from the first day of last menstrual period.

The obstetrical outcome variables which compared between the two groups include mode of delivery and indication of caesarean section and maternal and perinatal complications.

In the study center, partogram was used for monitoring progress of labour and expectant management was done for third stage of labour in most of cases . Postpartum hemorrhage was defined as an estimated blood loss over 500 milliliters as determined at the time of delivery .Genital tract trauma in the study includes perineal, vaginal, cervical laceration and vulval haematoma.

Shoulder dystocia defined as the need for ancillary obstetric maneuvers other than gentle downward traction after delivery of the fetal head .

The perinatal variables)birth injury, low Apgar score)<7 (at 1and 5 minutes, admission to intensive care unit, perinatal death(were compared between the two groups.

All data were analyzed statistically using statistical program)Minitab version 11 .(The statistical differences between variables in the study were tested using The $\chi 2$ test and Fisher test .P value <0.05 was considered significant.

Results:

During the study period, the rate of macrosomic deliveries was 12.45) %n =633.(Newborns with a birth weight of ≥4500grams constituted 2.65% from all deliveries .The heaviest newborn weight delivered at time of study was 5750 grams. Male sex constituted higher percentage 65.24 % among study group and the ratio of male to female 1.87/1.00 was significantly differed among macrosomic newborns) p value 0.001.(There was higher rate of instrumental vaginal delivery in mothers of macrosomic newborn which was significantly differed from control group)P value=0.010,Odd ratio:2.12, 95 %CI:1.19-3.76 .(33.3 %of instrumental vaginal delivery in study group was done for newborns weight 4500 grams and higher, the heaviest newborn delivered by vacuum extraction with no injury was 5000 grams and there was no failure in delivery in study group which differed from control group where failure in delivery occurred in 0.14% (n=6) but of no statistical significance (p value 0.339) In addition to that there were higher rate of caesarean section and significantly differed from control group (P value=0.000,Odd ratio:1.63, 95 %CI :1.34-1.98) mergency caesarean section showed significant difference among study group .There were no significant statistical difference in breech, face vaginal delivery between two groups as shown in Table (1).

Table (1) : Mode of delivery

Mode of delivery	Macrosomic newborn)n=633(No% .		Control newborn)n=4155(No % .		P - value	Odd Ratio)OR(	CI 95)%OR(
All Vaginal delivery	473	74.72	3441	82.81	0.000	0.61	0.50 -0.74
Normal vaginal delivery	452	71.40	3359	80.84	0.000	0.59	0.49 -0.71
Breech vaginal delivery	6	0.95	22	0.52	0.198	1.79	0.73 -4.39
Face vaginal delivery	0	0	13	0.31	0.159	-----	-----
Instrumental vaginal delivery	15	2.36	47	1.13	0.010	2.12	1.19 -3.76
Caesarean section	160	25.27	714	17.18	0.000	1.63	1.34 -1.98
Emergency caesarean section	119	18.79	361	8.68	0.000	2.83	1.95 -4.12
Elective caesarean section	41	6.47	353	8.5	0.000	0.35	0.25 -0.51

Failure of progress of labour was the main indication of emergency caesarean section in study group and showed statistical difference between the two groups seen in Table (2) .

Table (2) : Indications of emergency caesarean section

Indication	Macrosomic newborn)n=119(No% .		Control newborn)n=361(No % .		P- value	Odd Ratio)OR(	CI 95)%OR(
Failure of progress of labour	47	39.49	74	20.49	0.000	2.53	1.63 -3.93
Fetal distress	26	21.84	111	30.7	0.062	0.63	0.39 -1.00
Fetal malpresentation	30	25.2	87	24.09	0.807	1.06	0.66 -1.71
≥ two caesarean section	3	2.52	42	11.63	0.003	0.20	0.06 -0.58
Others	13	10.92	47	13.01	0.549	0.82	0.43 -1.57

While Table (3) showed significant difference in cephalopelvic disproportion among macrosomic group from control group in the indication of elective caesarean section.

Table (3) :Indications of elective caesarean section

Indication	Macrosomic newborn)n=41(No	%	Control newborn)n=353(No	%	P- value	Odd Ratio)OR(	CI 95)%OR(
≥two caesarean section	22	53.65	220	62.32	0.281	0.7	0.37 -1.34
Cephalopelvic disproportion	12	29.26	20	5.66	0.000	6.89	3.34 -14.19
Others	7	17.07	113	32.01	0.049	0.44	0.19 -1.00

There was no cases of maternal mortality or uterine rupture reported in both groups during the study period but there was higher occurrence and significant difference among study group in postpartum hemorrhage, genital tract trauma and shoulder dystocia among mothers of macrosomic newborns compared to women with control group newborns)p value 0.000 (as shown in Table)4.(

Table (4) : Maternal complications between two groups

Maternal complication	Macrosomic newborn (n=633) N	%	Control newborn (n=4155) N	%	P - value	Odd Ratio (OR)	(OR)%CI 95
Postpartum hemorrhage	22	3.47	52	1.25	0.000	2.84	1.75 -4.61
Genital tract trauma	15	2.37	13	0.31	0.000	7.73	4.10 -14.58
Retained placenta	1	0.16	6	0.14	0.934	1.09	0.13 -8.97
Shoulder dystocia	19	3.00	3	0.07	0.000	42.97	20.81-88.69
Bladder and ureter injury	0	0	0	0	*	------	
Maternal death	0	0	0	0	*	------	

*Not applicable.

Studying neonatal complications showed Erb's palsy as the main and significantly differed among macrosomic group than control group (0.47 %Vs 0%) and all the cases followed shoulder dystocia. We did not find a higher rate of low Apgar score in the first and fifth minute, admission to intensive care unit of newborns as well as in perinatal morbidity and mortality when comparison was done between the two groups as shown in Table (5).

Table (5) : Neonatal complications between two groups

Neonatal complication	Macrosomic newborn (n=633) No	%	Control newborn (n=4155) No	%	P - value	Odd Ratio (OR)	CI (OR)%95
Apgar score at 1 minute (<7)	32	5.05	265	6.37	0.199	0.78	0.53 -1.14
Apgar score at 5 minutes (<7)	7	1.11	42	1.01	0.825	1.09	0.49 -2.45
Admission to intensive care unite	45	7.11	273	6.57	0.612	1.09	0.78 -1.43
Fracture of clavicle	0	0	0	0	*	-----	
Fracture of long bones	0	0	0	0	*	------	
Erb's palsy	3	0.47	0	0	0.000	-----	
Facial palsy	0	0	0	0	*	------	
Seizures	0	0	0	0	*	------	
Total morbidity	42	6.64	307	7.39	0.497	0.89	0.63 -1.24
Death	2	0.32	10	0.24	0.725	1.31	0.28 -5.98
Total complications	12	1.9	52	1.25	0.189	1.52	0.81 -2.85

.Not applicable*

Discussion:

In this study, any newborn delivered weighing ≥4000 grams was considered macrosomic as in other studies[2,3,5,6,11,14,15,16] and their rate was 12.45 %which is higher than other studies done in different regions as in Turkey (6.21%)[11] and Canada (10%)[3] but lower than Denmark (15%)[3] and Swedish (20%)[7]. For newborns weighing ≥4500 grams, the rate was equal to 2.65 %which was higher than 1.04 %reported in Oral et al study[11]. These variation could be attributed to difference in climate and race and genetic factors in different regions[3]. The heaviest newborn delivered during study period weigh 5750 grams which was lower than 6452 grams reported in Karimu et al study[17].

Male newborn constitute the higher number among macrosomic newborn which correlated with many other studies[2,3,4,8,10] but not with Abudu et-al study[12] where they failed to show this difference.

Normal vaginal delivery was achieved in 71.4 %of study cases which was less than (79.1 %reported in Diani et al study[14], and higher than (36.8 %reported in Moreira et al study[6] where they reported high rate of caesarean delivery.

Unlike Fakhri study[3] where no instrumental delivery was tried to deliver women with macrosomic newborn, vacuum extraction after thorough evaluation was done to deliver 2.36 %of study group in a rate near to Moreira et al study[6]) 2.7 (%which was significantly differed from control group and this difference failed to be shown in Batallan et al study[13]. Fortunately, in this study, there was no failure in delivery in contrast to Gopalani et al study[18] result which showed the association between fetal macrosomia and higher rate of failure of instrumental delivery which could be attributed to good decision and the well training doctor who did vacuum delivery.

As other studies[1,2,4,6,9,11,12], this study showed higher rate of caesarean section among study group (Odd ratio:1.63, 95 %CI:1.34-1.98 (on contrary to Ekabua et al study[10] which failed to show such difference (due to high rate of assisted vaginal deliveries among macrosomic newborn (and this difference was mainly due to emergency caesarean section as in other studies [9,12,14]. Failure of progress of labour and cephalopelvic disproportion were the main indications among study group which corresponded to Fakhri study[3] in this point but differed from it in point of no higher rate of indication due to fetal distress.

Postpartum haemorrhage was occurred among women delivering macrosomic newborn, with statistical difference as in many other studies[1,3,4,6,9,12] except Batallan et al study[13] which showed no difference due to their routine use of active management of third stage of labour .Genital tract trauma was more among the study group (2.34 (%and fortunately it was much lower than Panel et al study[15] and Diani et al study[14] who reported 5.55 %and 10.4 %respectively, which may be attributed to high rate of instrumental vaginal delivery in their studies. Vaginal delivery of macrosomic newborns complicated by shoulder dystocia in 3 %of cases which is similar to rate (2.8 % reported in Fhakri study[3] and fortunately it was much lower than Panel et al study[15] where occurred in 9.5 % which could be explained by the high rate of instrumental vaginal deliveries .On the other hand it was higher than it's incidence in Wollschlaeger et al study[4] where reported as 0.7 %which attributed to study design in selection of non-diabetic mother .

In spite of the higher rate of the above complications in study group, there was, like other studies[15,16], no maternal death nor uterine rupture/dehiscence which may be due to the proper use of partogram and the judicious use of oxytocics drug in the hospital and proper management of complications .

Unlike Diani et al study[14] who reported no perinatal death (in expense of reporting high rate of morbidity(and Ouarda et al study[16] where perinatal death occurred in 1.2%, this study reported two perinatal death (0.32 (%among macrosomic newborns .Fetal morbidity among the study group was occurred in 6.64 %which was higher than 3.6 %reported by Ouarda et al study[16], apparently it could be due to the high rate of mortality .Regarding Apgar score at one and five minutes, there was no significant difference between the two groups and it was corresponding to other studies[4,5,13,16] but differed from Jolly et al study[9] where they showed statistical difference between both groups and not correspond to Fhakri study[3] where showed low Apgar score among control group more than study group . Admission of macrosomic newborns to intensive care unit showed no stastical difference between both groups which wasn't correspond to Jolly et al study[9] where they showed statistical difference explained by higher number of newborn with low Apgar score.

Among macrosomic newborns, the Erb's palsy was the main neonatal complication which is statistically differed with an rate of 0.47%, which was higher than 0.31 %reported in Wollschlaeger et al study[4] but it was much lower than Fhakri study[3] and Oral et al study[11] who reported in 0.9 %and 2.4 %respectively which may be explained by proper management of shoulder dystocia .In this study, Long-term prognosis of Erb's palsy could not be evaluated due to loss of newborns from follow-up as they were discharged from the hospital .Proper management of shoulder dystocia result in no case of macrosomic newborn had fracture clavicle or humerus and this differed from other studies which reported these complications[2,4,11,14].

Conclusion:

Fetal macrosomia was associated with higher rate of instrumental vaginal delivery and caesarean section mainly due to failure of progress of labour and cephalopelvic disproportion .There were higher rate of postpartum haemorrhage, genital tract trauma as well as shoulder dystocia with neither maternal death nor uterine rupture in study group .Among macrosomic newborn, Erb's pulsy was the main perinatal complication .

Recommendations:

1. As the main indication for emergency caesarean section among women with macrosomic newborn was the failure of progress of labour; therefore, partogram is essential during labour for any pregnant women suspected to have fetal macrosomia .
2. Decision of instrumental vaginal delivery must be taken by the experienced registrar on call in cases suspected to have fetal macrosomia.
3. Active management of third stage of labour to decrease incidence of postpartum hemorrhage.
4. As the problem of difficult shoulder delivery cannot be completely avoided, each department should have a strategy to handle such a situation .
5. Follow up studies on long term result of complicated macrosomic newborn is recommended.

References:

1. Haram K, Pirhonen J, Bergsjø P .Suspected big baby :a difficult clinical problem in obstetrics . Acta Obstet Gynecol Scand 2002;81:185–94.
2. Tomic V,Bosnjak K, Petrov B, Diki M, et al . Macrosomic births at Mostar clinical hospital :a 2-year review .Bosn J Basic Med Sci 2007;7)3:(271-4.
3. Fakhri M .Studying the relationship between macrosomia and maternal infant complications . 25th International Congress of the Medical Women's International Association .Sydney, Australia JUNE; 2005.
4. Wollschlaeger K, Nieder J, Köppe I, Härtlein K. A study of fetal macrosomia .Arch Gynecol Obstet 1999; 263:51–55.
5. Hirnle L, Kowalska M, Petrus A, Hirnle G, et al . The analysis of risk factors for fetal macrosomia and the complications in the course of pregnancy and delivery of macrosomic baby .Ginekol Pol 2007; 78)4:(280-3.
6. Moreira R, Bornia R, Cunha A, Sieczko L,et al . Delivery assistance in fetal macrosomia .Rev Bras Saude Mater Infant 2003; 3)4:(387-92.
7. Surkan P, Hsieh C, Johansson A, Dickman P, et al .Reasons for increasing trends in large for gestational age births .Obstet Gynecol 2004;104)4:(720-6.
8. Storms MR, Van Howe RS .Birth weight by gestational age and sex at a rural referral center .J Perinatol 2004;24)4:(236-40.
9. Jolly MC, Sebire NJ, Harris JP, Regan L, et al . Risk factors for macrosomia and its clinical consequences :a study of 350,311pregnancies . Eur J Obstet Gynecol Reprod Biol 2003; 111)1:(9-14.
10. Ekabua JE, Ukombe EB, Agan TU, Iklaki CU, et al .A Seven year clinical review of macrosomic births in Calabar .Mary Slessor Journal of Medicine 2004;4)1(:32-6.
11. Oral E, Cada A, Gezer A, Kaleli S, et al .Perinatal and maternal outcomes of fetal macrosomia .Eur J Obstet Gynecol Reprod Biol 2001;99)2:(167-71.
12. Abudu OO, Awonuga AO .Fetal macrosomia and pregnancy outcome in Lagos .Int J Gynaecol Obstet 1989;28)3:(257-62.
13. Batallan A, Goffinet F, Paris-Llado J, Fortin A, et al .Fetal macrosomia :management, obstetrical and neonatal results .Gynecol Obstet Fertil 2002;30)6:(483-91.
14. Diani F, Venanzi S, Zanconato G, Murari S, et al. A .Fetal macrosomia and management of delivery .Clin Exp Obstet Gynecol 1997; 24)4:(212-4.
15. Panel P, de Meeus JB, Yanoulopoulos B, Deshayes M, et al .Delivery of large infants . Management and results of198cases.J Gynecol Obstet Biol Reprod)Paris (1991; 20)5:(729-36.
16. Ouarda C, Marzouk A, Ben Youssef L, Chelli M . Neonatal and maternal prognosis in the delivery of a single large fetus at term .Apropos of 497 cases .J Gynecol Obstet Biol Reprod)Paris (1989;18)3 :(360-6.
17. Karimu AL, Ayoade G, Nwebube NI .Arrest of descent in second stage of labour secondary to macrosomia :a case report .J Obstet Gynaecol Can 2003; 25)8:(668-70.
18. Gopalani S, Bennett K, Critchlow C .Factors predictive of failed operative vaginal delivery . Am J Obstet Gynecol 2004;191)3:(896-902.

*Department of Obstetric and Gynecology, College of medicine, University of Mosul, Iraq

** Department of Obstetric and Gynecology, College of medicine, Al-Kindi University, Iraq