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Identification of risk factors for neonatal macrosomia at EHS Nouar Fadela -oran (Algeria)

D.Bouabida , S Zelmat ,I.Belalaoui ,C.Zaoui

Neonatology Department EHS "Nouar Fadela" - Oran

summary

Introduction : A newborn is said macrosome if the birth weight is higher than the 90th percentile according to the reference curves. It is a population at risk exposed to neonatal complications that can compromise the vital prognosis and / or functional.

Objective : to estimate the hospital prevalence of macrosomia and to identify the risk factors for its occurrence.

Patients and methods : this is a cross-sectional, descriptive and analytical study ; carried out at the neonatology department " Nouar Fadela ".

Results : during the period from April 15, 2015 to March 15, 2017, 6741 deliveries were made. We collected 889 newborns in this study including 425 mothers-newborns macrosomes, a hospital prevalence of 6.3%. For maternal characteristics: on average, mothers were 30 ± 5.70 years old and had a BMI of 27.4 ± 4.9 kg / m^2. The high way was the main outcome of delivery of newborns macrosomes. For the characteristics of the newborns: the birth weight (PN) varied between 4000gr and 5900gr with an average PN of: 4172 ± 339 gr. Neonatal morbidity in macrosomes is dominated by: hypoglycemia in 19.3% versus 10.6% in eutrophic patients; deep hematomas in 3.8% vs 1.9% and brachial plexus palsy (PPB) in 2.1% versus 0.2 in eutrophic patients. Lethality was noted in 0.9% of cases compared to 0.6% in eutrophic patients. A number of epidemiological elements have been found in the genesis of macrosomia: obesity, weight gain, history of macrosomia, diabetes and the advanced term.

Conclusion : Macrosomia remains a risky situation, which is worrying because of its morbidity and neonatal mortality.

Key words : macrosomia, gestational diabetes, obesity, acute fetal distress, in utero death.

Introduction

Fetal macrosomia (MF) is usually defined by a birth weight of more than 4000 grams, thanks to the classic curves of weight according to the term, in utero by ultrasound or after birth) [1] . Thus, a newborn (NN) is macrosomic when birth weight is greater than the 90 th percentile for gestational age (GA) according to the reference curves for a population that corresponds to the English term Large for Gestational Age (LGA, high weight for age) [1] .

Macrosomia is heterogeneous in terms of phenotype, clinical and biological, and in terms of etiologies.

Macrosomia constitutes a real public health problem not only related to its prevalence in developed and developing countries, but also to its strong association with infant morbidity and mortality (traumatic, haematological , metabolic complications , etc.).

Through this work our objective was to estimate the frequency of neonatal macrosomia neonatology EHS "Nouar Fadela" and identify the risk factors for its occurrence : maternal age, antecedent of a delivery of a macrosome, obesity, diabetes ...).

Patients and methods

This is a cross-sectional study, nested in the cohort of pregnant women who gave birth during the period from April 15, 2015 to March 15, 2017 included in the neonatalogy service "Nouar Fadéla".

Inclusion criteria : all newborns at term (over 37 weeks of amenorrhea (SA)), whose birth weight was greater than the 50 th percentile for gestational age were enrolled in the study.

Exclusion criteria : stillbirths macrosomes (difficulty determining their gestational age) and neonates under 37 SA.

We developed survey cards that were completed through an interview with the mother. They comprise three parts:

- maternal characteristics : age, occupation, marital status, socio-economic level, parity, gesture, obstetrical history (abortion, stillbirth, previous diabetes, pregnancy diabetes),
- the characteristics of current pregnancy and childbirth (weight at the beginning and end of pregnancy (prégestational weight, weight gain), maternal height, blood pressure, screening for diabetes (hypoglycemia, glycated hemoglobin, blood glucose), pregnancy monitoring, antecedent of macrosomia),

- and characteristics of newborns (weight, height, head circumference) and current neonatal complications.

Statistical analysis

Data entry and descriptive and analytical analysis of the data were performed using **Statistical Package for Social Sciences (SPSS) version 20** . The Chi **2** test was used for the comparison of the results. The threshold of $p < 0.05$ was considered statistically significant.

Results

We collected 889 cases that were the subject of this study including 425 mother-newborn pairs macrosomes or a hospital prevalence of 6.3%.

Maternal characteristics : ***Maternal*** age varied between 26 years and 45 years with an average age of 30.33 ± 6.03 years. On the other hand, the predominant age group was between 26 and 35 years old.

Regarding maternal height, it varied between 145 cm and 175 cm with an average in our sample of 163.9 ± 6.4 cm. The predominant waist size was over 165 cm with a rate of 80.7% in mothers of newborns macrosomes vs 76% in mothers of eutrophic neonates

Multiparity was observed in 44.2% of neonates born to macrosomes vs 55.8% of neonates of eutrophic mothers. In our study population, obesity accounted for 24.9% of mothers of newborn macrosomes versus 14.4% of mothers of eutrophic NNs.

However, we consider 15 kg as the limit weight gain during pregnancy, we found 75 (17.6%) of mothers of newborns macrosomic who had excessive weight gain . Parturient mothers of newborns term macrosomes (TAs) accounted for 291 (68.5%) cases, while 134 (31.5%) cases had a timeout (DT).

Maternal medical history (Table.1)

Table 1 : Medical Maternal History

ATCD	macrosomic N = 425		No Macrosomes N = 464		Meaning threshold P
	NOT	%	NOT	%	
Abortion (ABRT)	69	16.2	60	12.9	NS
Death in utero (MIU)	19	4.5	22	4.7	NS
Gestational Diabetes	**88**	**20.7**	**48**	**10.3**	**<0.0001**
Chronic diabetes	23	**5.4**	10	2.2	**<0.01**
Hypertension (hypertension)	79	18.6	72	15.5	NS
Macrosomie antecedent	170	**40.0**	53	11.4	**<0.0001**

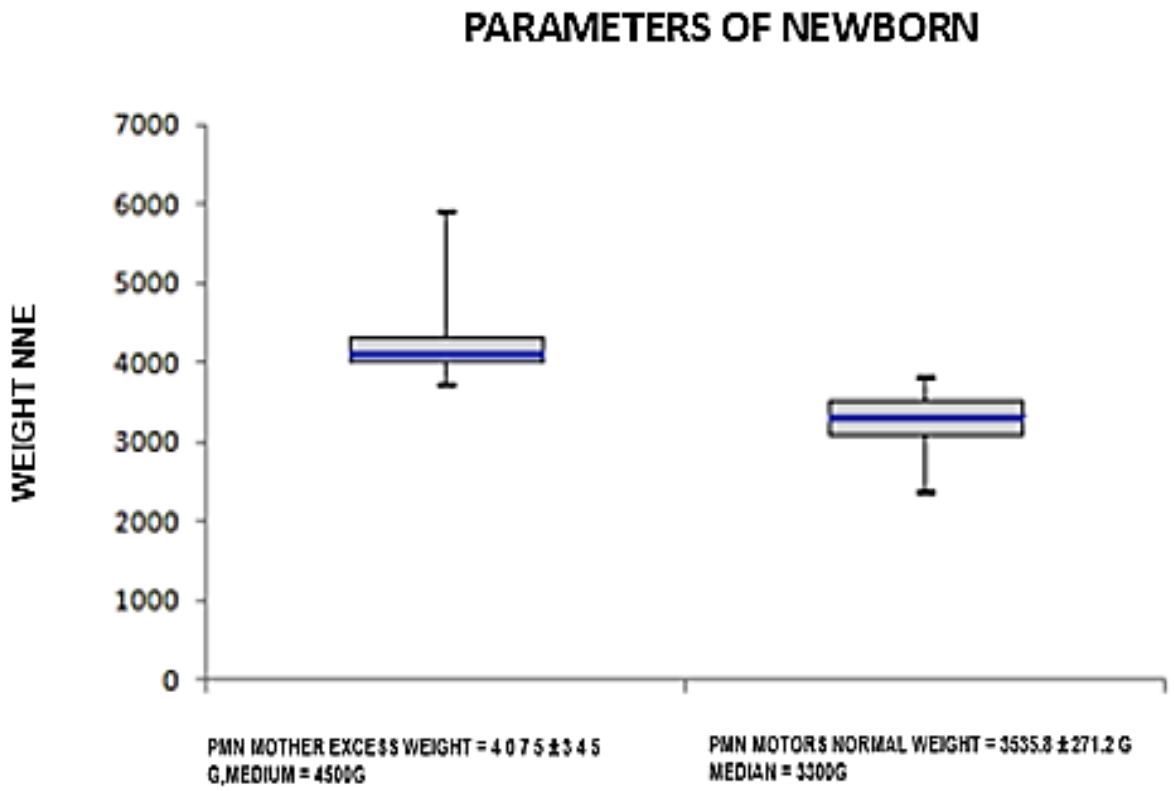
Evolution of the work and decision of the mode of delivery

The majority of deliveries of newborn macros omes were high 314 cases (73.3%) vs 111cas (26.1%) by the vaginal route with a significant difference (p = 0.005).

Characteristics of newborns

Male predominance was 61.7% and 58.8% respectively in macrosomes and eutrophics

Fig.1 : Parameters of newborns macrosomes



Distribution of neonatal morbidity

With respect to neonatal complications : 66% were returned to their mothers and 34% of newborns were hospita Lisé s. (**Table 2**)

Table 2: Distribution of Neonatal Morbidities

Neonatal complications	macrosomic		Meaning threshold P	Odds ratio
	Yes NOT (%)	No NOT(%)		
Hypoglycaemia (<0.40 g / l)	82 (19.3)	49 (10.6)	**<0.0001**	**2,025 [1.38 to 2.96]**
Hypocalcemia (<80 mg / l)	7 (1.6)	16 (3.4)	NS	NS
hyperbilirubinemia	45 (10.6)	115 (24.8)	<0.0001	1.85 [1.03-2.0 3]
polycythemia	1 (0.2)	2 (0.4)	NS	NS
Perinatal asphyxia (AFN)	23 (5.4)	45 (9.7)	NS	NS
Respiratory distress	42 (9.9)	124 (26.7)	<0.0001	2.09 [1.59 to 2.74]
Hypertrophic cardiomyopathy (MHC)	3 (0.7)	4 (0.9)	NS	NS
Paralysis of the brachial plexus (PPB)	9 (2.1)	1 (0.2)	**0,007**	**10.01 [1.26 to 79.39]**
Clavicle fracture	3 (0.7)	1 (0.2)	NS	
Humeral fracture	5 (1.2)	0 (0)		
Blood bump	37 (8.7)	58 (12.5)	NS	
hematoma	16 (3.8)	9 (1.9)	NS	
Death	5 (0.9)	3 (0.6)	NS	

Risk factors of neonatal macrosomia

Table 3 : Multi-Varied Analysis of Risk Factors for Macrosomia Retained

Risk factors for macrosomia		macrosomic N = 425		No Macrosomes N = 464		MULTI-VARIED ANALYSIS	
		NOT	(%)	NOT	(%)	GROSS GOLD [95% CI]	P-Value
Child's sex	Male	310	(72.9)	273	(58.8)	1	
	Feminine	115	(27.1)	191	(41.2)	2.168 [1.501-2.802]	<0.0001
BMI of mother	Normal	02	0.5	9	1.9	0.477 [0.099 to 2.293]	NS
	malnutrition	145	34.1	232	50	1	
	overweight	172	40.5	156	33.6	1.575 [1.138 to 2.178]	
	Obesity	106	24.9	67	14.4	1.816 [1.198 to 2.752]	0.005
Term	37 - 39 SA	291	(68.5)	363	(78.2)	1	
	40 - 42 SA	134	(31.5)	101	(21.8)	1.81 [1.30 - 3.11]	<0.0001
Diabetes	No	337	(79.3)	416	(89.7)	1	
	Yes	88	(26.1)	48	(10.3)	2,070 [1,37 - 2.96]	<0.0001
Weight gain	<15 KG	350	(82.4)	414	(89.2)	1	
	> 15 KG	75	(17.6)	50	(10.8)	1.80 [1.18 - 2.75]	0.006
Macrosomie	No	255	(60.0)	411	(88.6)	1	<0.0001
ATCD	Yes	170	(40.0)	53	(11.4)	4.41 [3.06-6.36]	

Discussion

In our study the hospital prevalence of neonatal macrosomia was 6.3%. Our results remain close to those found by the majority of studies [1]. On the other hand, some authors report a higher frequency [1,2]. This increase can be linked to a higher maternal weight gain during pregnancy, increased frequencies of maternal obesity and diabetes, and diet. But other authors report a lower frequency especially in African countries [3]. These variations in frequency between the series could be explained by the size of the sample, the insufficient follow-up, the lack of hygiene. life during pregnancy as well as the low socio-economic level. [3-4]

Compared to literature data, age and multiparity were not statistically significant as risk factors in our study.

Exceeding the term was observed in 32% of demacrosome mothers, which is consistent with most studies [5]. This can be explained by a failure of an early ultrasound to date the pregnancy, the inaccuracy of the patients. rules and the irregular nature of prenatal consultations. [1.5-6]

As for the rate of 25% of cases of obesity found in our series, it is similar to that found in the literature [7]. And the risk of giving birth to a macrosome is multiplied 2 in overweight and obese pregnant women. While in the literature this risk is multiplied by 3 with a weight gain range varying between 12-18 Kg. [8]. In our series the weight gain was 15 kg and the risk is multiplied by 2. The excessive weight gain can be explained by a modification of the maternal metabolism because it is dependent on food thus explaining the macrosomy by anabolism . [9,10]

Whatever the type of diabetes, our results are similar to those in the literature [9], but the percentage of gestational diabetes in our series is higher compared to studies. This can be explained mainly by the ethnic and genetic variations of populations, but also, to a lesser extent, by the diversity of strategies and screening methods used. [10,11]

The antecedent of macrosomia is the most incriminated factor. However, its pathophysiology is not yet elucidée.Ceci confirms that a woman who gave birth to a macrosome recurrence most often with a risk multiplied by six (OR = 6). And in our series, this one is multiplied by 5. [4,11-13]

Male predominance has been reported by most authors, with a relative risk doubling and our results are consistent with most studies [11]. For. According to them, the female fetus is genetically more resistant to insulin and less sensitive to the trophic effects of insulin and is therefore smaller [11, 17,19]

(**Table 3**)

The majority of childbirths of macrosomes were eutocic (73.9% vs 65.7% controls) high with a significant difference. This rate of caesarean section in the macrosome group is high compared to most studies [20]. As a result, macrosomia increases the risk of caesarean section (p = 0.005). This rate varies by study. [20,22

As shown by the majority of Moroccan series, the delivery of a macrosome is initially spontaneous. The use of forceps is rare, unlike in European and American countries, where the use of forceps is more frequent. [20,23 -24]

With regard to neonatal morbidity, that is dominated by hypoglycemia, and our results are similar to those of the literature. [25]

There is a linear relationship between birth weight, shoulder dystocia and PPB, which is consistent with our results. [26-27]

Lethality is noted in 1% of cases in our series. The overall neonatal mortality rate, in our study, is similar to that found in some studies, because most pregnancies were not followed. [28-29]

This study has limitations. First, the data was retrospectively collected from a single center rather than multiple centers, so our sample could not be representative and the results could not be generalized.

Also, the comparison of our results with other studies should be made with caution. In fact, the differences may be related to differences in methodology and / or sample size and pediatric macrosomia definition.

Conclusion

Macrosomia remains a risky situation, which is worrying because of its morbidity and neonatal mortality. Several maternal factors can influence its occurrence. In our context A number of epidemiological elements have been found in the genesis of macrosomia: obesity, weight gain, history of macrosomia, diabetes and the advanced term.

to improve the fœto-maternal prognosis. First, it is necessary to: Motivate the regular monitoring of all pregnancies. Second, the screening of gestational diabetes in order to. Treat and balance diabetes for diabetic women. Third, monitor weight gain and improve it with new, easy-to-use tools, such as maternal weight curves and collaboration between nutrition professionals, dietician and nutritionist. to deepen, in order to optimize the care of women.

From this study our perspectives are:

Screen out pregnant women at risk of giving birth to a macrosome to improve the quality of life, reduce health expenses, evaluate the performance of screening for fetal macrosomia and measure the impact on obstetric practices, multidisciplinary management of delivery and establish a protocol for the management of macrosomes with complications.

Declaration of interests

The authors declare that they have no conflict of interest in relation to this article.

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