

Delivery of the Macrosome Fetus at the Institute of Social Hygiene Hospital in Dakar

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Abstract

Objectives: To determine the frequency of fetal macrosomia, to specify the epidemiological and clinical profile of the patients, the methods of delivery, to assess the maternal and perinatal prognosis and the factors associated with complications and the route of delivery at the Maternity of the Social Hygiene Institute Hospital of Dakar. **Material and Methods:** This was a retrospective, descriptive and analytical study concerning macrosomia deliveries carried out at the Maternity Hospital of the Institute of Social Hygiene between January 1, 2019 and December 31, 2022. The parameters studied were epidemiological and clinical data, delivery characteristics and maternal and perinatal complications. **Results:** During the study period, we recorded 213 macrosomia deliveries out of a total of 7878 deliveries, representing a frequency of 2.7% of deliveries. The average age of the patients was 29 years old with extremes of 18 and 47 years old. The average gestation was 3 with extremes of 1 and 8. The parity was between 1 and 7 with an average of 1.7. Primipara represented 50.3% of the study population. In our series, maternal history was dominated by gestational diabetes (29.7%) and the history of macrosomia delivery concerned 11.7% of the study population. The majority of patients (83.5%) had benefited from at least 4 prenatal consultations (CPN) and pregnancy monitoring was most often provided by a midwife (61.6%). In most patients (63%), the term of pregnancy on admission was between 37 and 40 weeks + 6 days. In our series, the majority of patients (52.1%) were referred. The diagnosis of macrosomia was most often made in the postnatal period (65.3%). The cephalic presentation (93%) was the most frequent. Childbirth was most often performed by a specialist doctor (85%). Caesarean section was the main way of delivery (59.6%) and it was most often planned (37.1%). The indications for caesarean section were dominated by feto-pelvic disproportion by fetal macrosomia (50.4%) followed by moderately narrowed pelvises (13.5%) and

scarred uteri (12.6%). In our series, the Apgar score at the first minute was most often greater than 7 (94.4%). We also recorded 2 stillbirths (0.9%) including a fresh stillbirth and a macerated stillbirth. Almost all of the newborns (95.3%) had an Apgar score at the fifth minute greater than or equal to 7. In our series, the weight of the newborns was between 4000 and 5700 grams with an average of 4194 grams. Most newborns (71.3%) had a birth weight between 4000 and 4299 grams. We also recorded 4 newborns (1.9%) weighing more than or equal to 5000 grams. Live births were 211 (99%) and most newborns (63.9%) had no complications. Fifty of them were resuscitated at birth (23.5%) and we recorded 10 cases of neonatal asphyxia (4.7%) and 2 perinatal deaths, *i.e.*, a perinatal mortality of 9.4 per 1000 live births. Perinatal complications were more frequent in cases of maternal pathology ($p = 0.0001$), overterm ($p = 0.0003$), caesarean section ($p = 0.0002$), and when the diagnosis of macrosomia was retrospective ($p = 0.00006$). We recorded 15 perineal tears (7.2%), one case of postpartum hemorrhage (0.4%) and one uterine rupture (0.4%). Maternal complications were more frequent in patients who came to consult on their own ($p = 0.42$), pauciparous women ($p = 0.11$), and when the birth weight was greater than or equal to 5000 grams ($p = 0.13$). We have not recorded any maternal deaths. **Conclusion:** The frequency of fetal macrosomia is increasing more and more in our practice and the main risk factor is gestational diabetes. A good follow-up of the pregnancy and monitoring of the work allowed us to record low rates of maternal and perinatal complications.

Keywords

Fetal Macrosomia, Diabetes, Cesarean Section, Maternal-Fetal, IHS Prognosis

1. Introduction

Fetal macrosomia, like obesity, has been on the rise since the 1980s. There has been a gradual increase in the average birth weight of newborns, the average birth weight for a given gestational age, and the proportion of fetuses above the 90th percentile for a given gestational age in many countries, such as Canada [1], the United States [2], the United Kingdom [3] [4], and Norway [5]. In Africa, the same case is noted, for example, in Tunisia, the incidence is 10.94% [6]. The delivery of a macrosomic infant is a high-risk delivery for both mother and newborn. Indeed, it is associated with formidable obstetric complications, in particular shoulder dystocia, which is often responsible for elongation of the brachial plexus and postpartum hemorrhage. In our practice, we have seen in recent years an increase in cases of macrosomia deliveries. Indeed, in Senegal, its frequency which was 1.57% in the study by Badji in 1996 [7] rose to 4.1% in the study by Kane in 2021 [8]. This finding led us to ask ourselves whether this was a particular obstetric development. To answer it and evaluate our practice in this field, we proposed to carry out this study whose specific objectives were to determine the frequency

of fetal macrosomia, to specify the epidemiological profile of the patients, the clinical data and the modalities of childbirth and to assess the maternal and perinatal prognosis.

2. Patients and Methods

2.1. Type, Scope and Period of Study

This was a retrospective, descriptive and analytical study concerning macrosomia deliveries at the Maternity Hospital of the Social Hygiene Institute Hospital between January 1, 2019 and December 31, 2022.

2.2. Patient Selection Criteria

The study involved all patients who gave birth at the Maternity Unit of the Social Hygiene Institute Hospital during the study period. We included all patients who gave birth to a newborn weighing greater than or equal to 4000 grams. We did not include patients who were admitted after delivery to another maternity ward. We conducted an exhaustive census of all patients who met the inclusion criteria.

2.3. Data Collection and Analysis

The data was collected from birth registers, Neonatology hospitalization registers and patient records. They were entered on a computerized sheet and analyzed using SPSS 20.0 and Excel 2010 software. The qualitative variables were described in number and percentage and the quantitative variables in average with the standard deviation and the extremes. Regarding the analytical part of our study, Fisher's test was used to compare the proportions and the difference was statistically significant when the P-value was less than 0.05. The parameters studied were the following socio-demographic characteristics, history, clinical and paraclinical data, delivery data, characteristics of the newborn and maternal and perinatal complications.

3. Results

3.1. Descriptive Results

3.1.1. Frequency

During the study period, we recorded 213 macrosomia deliveries out of a total of 7878 deliveries, *i.e.*, a frequency of 2.7% of deliveries (**Figure 1**).

3.1.2. Socio-Demographic Characteristics of Patients

The average age of the patients was 29 years old with extremes of 18 and 47 years old. The age groups of 20 to 29 years (45.5%) and 30 to 39 years (44.1%) were the most represented. In our series, most patients were married (91.6%). The level of education was known in 178 patients (83.5%). They most often had a primary (30%) or secondary (23.9%) level. One hundred and seventeen patients (54.9%) had a medical history. It was most often gestational diabetes (29.7%), pre-gestational diabetes (19.8%). The average parity was 1.7 with extremes of 1 and 7. The

primiparous were the most represented (50.3%). Patients with a history of macrosomia delivery accounted for 11.7%.

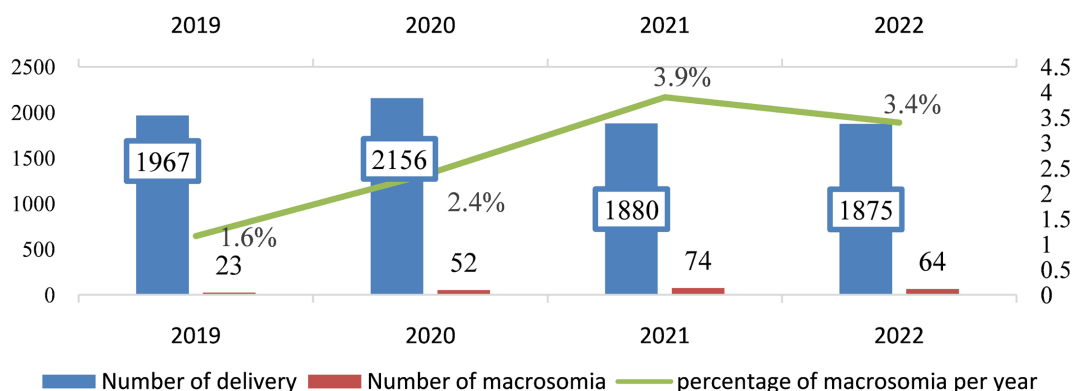


Figure 1. Frequency of macrosomia delivery at the Social Hygiene Institute Hospital (IHS) from January 2019 to December 2022 (N = 213).

3.1.3. Clinical and Paraclinical Data on Admission

In our series, all the patients had benefited from at least one prenatal consultation (CPN). Those who had made 4 CPN or more were in the majority (83.5%). Pregnancy follow-up was most often provided by a midwife (61.6%). The average gestational age at admission was 39 WA + 2 days with extremes of 37 WA + 6 days and 44 WA + 2 days. The diagnosis of macrosomia was most often made in the postnatal period (65.3%). During our study, 111 patients (52.1%) had undergone obstetrical ultrasound in the third trimester. The results of the fetal biometry are recorded in **Table 1**.

Table 1. Results of obstetric ultrasound (N = 111).

Results of Obstetric Ultrasound	Number	Frequency (%)
Biparietal diameter (mm)		
- <95	6	5.4
- 95 to 99.9	23	20.7
- ≥100	22	19.9
- Unspecified	60	54
Transverse abdominal diameter (mm)		
- <100 mm	15	13.5
- ≥100 mm	35	31.6
- Unspecified	61	54.9
Femoral length (mm)		
- <77	21	19
- ≥77	34	30.6
- Unspecified	56	50.4
Total	111	100

3.1.4. Birth Data

Labor monitoring revealed 23 mechanical dystocia (10.8%) and 50 non-reassuring fetal states (23.4%). Caesarean section was the main way of delivery (59.6%). It was most often a scheduled caesarean section (37.1%) (Figure 2). Indications for caesarean section were dominated by fetal-pelvic disproportion due to fetal macrosomia (50.4%) followed by moderately narrowed pelvises (13.5%). The Apgar scores at the first and fifth minutes were most often greater than 7 with respective proportions of 94.4% and 95.3%. In our series, the weight of newborns varied between 4000 and 5700 grams with an average of 4194 grams. Most newborns (71.3%) had a birth weight between 4000 and 4299 grams. We also recorded 4 newborns (1.9%) weighing more than or equal to 5000 grams (Table 2).

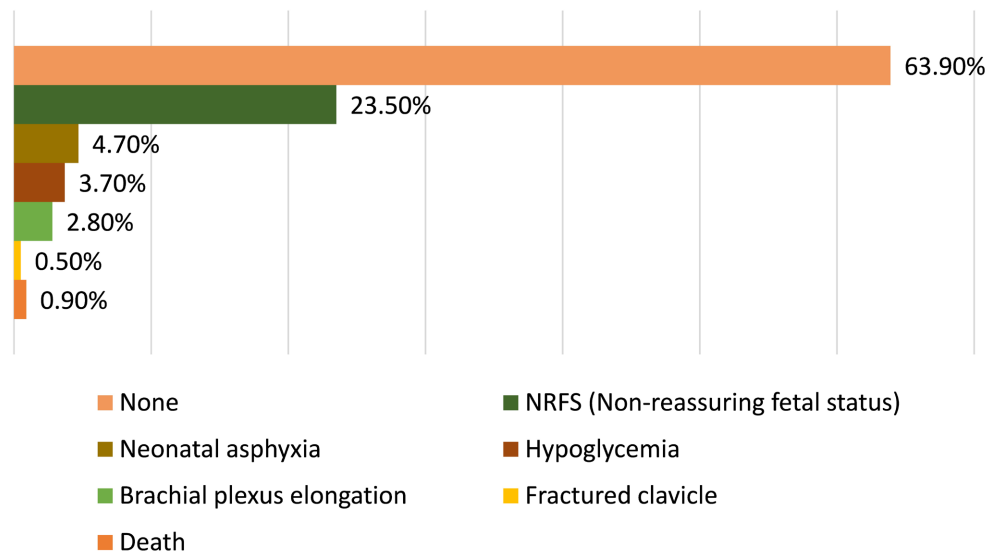


Figure 2. Distribution according to perinatal complications (N = 213).

Table 2. Distribution according to the birth weight of macrosome newborns at the Social Hygiene Institute Hospital between January 2019 and December 2022 (N = 213).

Birth Weight (grams)	Number	Frequency (%)
4000 - 4299	152	71.3
4300 - 4499	32	15
4500 - 4999	25	11.8
≥5000	4	1.9
Total	213	100

3.1.5. Neonatal Prognosis

We recorded 75 perinatal complications (35.2%) distributed as follows: 50 cases of EFNR (23.5%), 10 cases of neonatal asphyxia (4.7%), 6 cases of brachial plexus elongation (2.8 %) and 8 neonatal hypoglycemia (3.7%) and one clavicle fracture (0.5%) (Figure 2). There were 2 perinatal deaths, giving a perinatal mortality of 9.4 per 1000 live births.

3.1.6. Maternal Prognosis

In our series, most women delivered (92%) had presented no complications. We noted 15 perineal tears (7.2%), one case of postpartum hemorrhage (0.4%) and one uterine rupture (0.4%). We have not recorded any maternal deaths.

3.2. Analytical Results

3.2.1. Factors Influencing Delivery Route

During our study, cesarean section was more frequent in multiparous (72%) and primiparous (66.3%) compared to pauciparous (45.6%) with a statistically significant link between delivery route and parity ($p = 0.007$). The cesarean section rate was all the higher as the birth weight was high ($p = 0.01$).

3.2.2. Factors Associated with Maternal and Perinatal Complications

In our series, the risk factors for perinatal complications found were the existence of maternal pathologies ($p = 0.0001$), the term exceeded ($p = 0.0003$), delivery by cesarean section ($p = 0.0002$), fetal weight ($p = 0.0009$) and postnatal diagnosis of macrosomia ($p = 0.00006$). Maternal complications were more frequent in a woman in labor who came to consult on their own ($p = 0.42$), pauciparous women ($p = 0.11$), and those who had given birth to a newborn whose birth weight was greater than or equal to 5000 grams ($p = 0.13$).

4. Discussion

4.1. Epidemiology

4.1.1. Frequency

In our series, the frequency of fetal macrosomia was estimated at 2.7% of deliveries. A similar rate was found by Diouf [9] in 2010 at the Center Hospitalier National de Pikine. In recent years, there has been a gradual increase in macrosomia delivery rates. Indeed, in 1996, Badji [7] found at the Gynecological and Obstetrical Clinic of Le Dantec University Hospital a rate of 1.57%. However, these frequencies recorded in our practice are significantly lower than those found by Azzam [10] in 2015 in Morocco, which was 26.8%. This trend could be explained by the increase in recent years in the incidence of metabolic diseases in our developing countries, in particular diabetes and obesity, which are the main etiological factors of fetal macrosomia.

4.1.2. Patient Characteristics

The epidemiological profile of our patients does not differ from those found in the literature [7] [11]-[13]. Advanced maternal age is associated with a higher risk of fetal macrosomia [14]. In fact, the incidence of diabetes, which is the main risk factor for macrosomia, increases with advancing age. Thus, during our study, 24.4% of patients who gave birth to macrosomia were aged greater than or equal to 35 years. A history of fetal macrosomia was found in 11.7% of our patients. This rate is higher than that observed by Chaouki [12] in Dakar (0.4%) and Boulanger [11] in France (6.7%). The history of macrosomia is, according to the American

College of Obstetricians and Gynecologists, the main factor incriminated in the occurrence of fetal macrosomia with a positive predictive value of 95%. Maternal diabetes, whether gestational or pre-pregnant, is a known risk factor for macrosomia due to fetal hyperinsulinism reactive to maternal hyperglycemia [13] [15]-[17]. According to Ballard [18], the incidence of fetal macrosomia in a population of diabetic women is 45% compared to only 8% in a control population of non-diabetic patients. This is confirmed by our results. Indeed, in our series, nearly half of the patients (49.5%) had diabetes with 29.7% gestational diabetes and 19.8% pre-gestational diabetes.

4.2. Birth Data

In fetal macrosomia, the choice of delivery route requires an accurate ultrasound estimate of the fetal weight and a good clinical evaluation of the fetopelvic confrontation at the end of pregnancy. In our series, we recorded 40.4% vaginal delivery including 2 instrumental extractions by suction cup and 59.6% caesarean section. The way of delivery was significantly influenced by parity ($p = 0.007$) and birth weight ($p = 0.0004$). In Senegal, Badji [7] had found a caesarean section rate comparable to ours of around 57.2%. The same observation was made in a study carried out in 2013 at the National Hospital Center (CHN) of Pikine by Diouf with a caesarean section rate of 56% [9]. These high rates of caesarean section reported in the literature would be related to the frequent fetopelvic disproportion in cases of fetal macrosomia. Indeed, in our series, it was the first indication for caesarean section (50.4%). This is explained by the fact that 28.7% of newborns had a weight greater than or equal to 4300 grams and for 1.9% of them, this weight was greater than or equal to 5000 grams. In our study, the average weight of newborns was 4194 grams, comparable to those found in many studies carried out in Africa [19] [20].

4.3. Maternal and Perinatal Prognosis

Concerning the Apgar score, our results are comparable to those recorded by Coulibaly [21] and Keita [22] with 81.1% and 90.3% of newborns who had an Apgar score greater than or equal to 7. This reflects good management of the pregnancy, a judicious choice of delivery route and optimal monitoring of labour. Our rate of perinatal complications was comparable to those found by Meryem [23] and Zinzindohoua [24], which were 31.1% and 30.4% respectively. The elongation of the brachial plexus, a formidable accident in the delivery of the macrosomia was found in our series in 6 newborns (2.8%). This rate is lower than that recorded by Panel [25] which was 9.6%. This complication is most often due to difficulty in delivery of the shoulders with excessive traction on the fetal head. A good appreciation of the prognosis of childbirth and a judicious choice of the way of delivery would make it possible to avoid it. The prevalence of neonatal hypoglycemia was 3.7% in our work. This rate is comparable to that obtained by Ndiaye [20] which was 4%. This is a frequent accident in macrosomia newborns due to hyperinsu-

linism, which justifies the need for early breastfeeding and routine blood glucose testing from birth to prevent it. We recorded 2 perinatal deaths, *i.e.*, a perinatal mortality of 9.4 per 1000 live births. It involved a fresh stillbirth secondary to an acute non-reassuring fetal condition and a macerated stillbirth in the context of gestational diabetes with overterm. This rate is lower than those reported by Zinzindohoua [24], Badji [7], and Ouarda [26] which were respectively 81, 40, and 12 deaths per 1000 live births. This relatively low perinatal death rate that we recorded could be explained by good follow-up of the pregnancy and a judicious choice of delivery route. Indeed, in our practice, when the fetal weight is greater than or equal to 4300 grams, delivery is always done by cesarean section.

In our series, maternal complications were observed in 8% of cases. This rate is lower than those recorded by Panel [25] and Zinzindohoua [24] which were respectively around 13.1% and 27.3%. These complications were dominated by perineal tears (7.2%), often related to excessive stress on the perineum during fetal expulsion, which often justifies the performance of an episiotomy to prevent them.

5. Conclusion

The delivery of the macrosomia fetus is becoming more and more frequent in our practice. Improving the rate of antenatal diagnosis by ultrasound would reduce maternal and perinatal complications.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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