

Comparative Study of Early Neonatal Complications between the First and Second Twin during Twin Vaginal Deliveries at the Yaounde Gynaeco-Obstetric and Pediatric Hospital, and the Yaounde Central Hospital

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Abstract

Introduction: Twin birth is the expulsion of two fetuses and their appendages out of the woman's reproductive tract. It's a high-risk delivery because of the high frequency of maternal, fetal and neonatal complications. Few studies exist on the comparative prognoses of twins. Our objective was to compare early neonatal complications in first and second twins. **Methods:** We carried out a cross-sectional prospective study from January 2 to April 30, 2020 (4 months) at the Yaounde Gynaeco-Obstetric and Pediatric Hospital, and the Yaounde Central Hospital. Data collected were analyzed using IBM SPSS version 23. Descriptive statistics were done in frequencies and percentages, means and standard deviations. Paired-sample student's t-test were used to compare means. McNemar's Chi-square and Fisher's exact tests were used to compare proportions. Statistical significance was set at p-values less than 0.05. **Results:** Of a total of 2183 deliveries during the study period, 43 (1.96%) were twin vaginal deliveries. Among the 43 women, 41 consented to have their newborns participate in the study. Overall, APGAR scores were better for the first twins at the first (p = 0.004) and fifth (p = 0.031) minutes than for the second twins. Although both twins had complications and that there were 4 neonatal deaths of the second twin, there was no relationship between studied complications and the rank of the twin (p = 0.310). **Conclusion:** As the

APGAR score seemed to be better for first twins, clinicians should pay more attention during twin births, in order to improve the prognosis of the second twin.

Keywords

Comparison, Vaginal Birth, Rank of Twin, Early Neonatal, Complications

1. Introduction

Twin pregnancy is defined as the simultaneous development of two embryos in the uterus. It is a high-risk pregnancy and requires special attention [1]. The frequency of twin birth varies according to regions and studies: 0.01% of births in France [2], 0.82% in Tunisia [3], 2.54% in Bamako [4] and 1.8% in Yaounde, Cameroon [5]. In twin births, maternal and fetal complications are high [6] [7]. The mortality rate is multiplied by three, particularly because of arterial hypertension and its complications [5]. Prematurity is the most frequent complication, and is multiplied by 7 compared to singleton pregnancies [8]. The main causes of intrauterine growth retardation are twin-to-twin transfusion syndrome, malformations, neurological abnormalities and renal vascular disease [9] [10]. There is equally an increased risk of fetal malformations. In addition, the risk of chromosomal abnormalities may be increased depending on the type of placentation [5]. The prognosis of twin pregnancies is poor compared to singleton pregnancies, but few studies have focused on comparing the prognoses between the first and the second twin. To improve the prognoses of twins, we carried out this study with general objective to compare the early neonatal prognosis of the first twin with that of the second twin.

2. Methods

2.1. Design, Period, Duration and Site of the Study

It was a descriptive cross-sectional study, carried out from January 2 to April 30, 2020 (4 months), with prospective data collection at the Yaounde Gynaeco-Obstetric and Pediatric Hospital, and the Yaounde Central Hospital. The obstetrics and gynecology unit of each of these 2 reference facilities performs around 350 deliveries per month, this allowed us to easily reach the minimum sample size.

2.2. Sampling

Sampling was consecutive and exhaustive. Our target population consisted of newborns from vaginal twin deliveries performed in both hospitals. We included all newborns from twin births of at least 28 weeks of gestation. We excluded twins aged more than 7 days. The minimum sample size was estimated using Cochran's formula [11]: $n = \left[\left(Z_{\alpha/2} \right)^2 p (1-p) \right] / d^2$ with n as minimal sample

size, d as level of precision = 5%, p as prevalence of the event in Cameroon by Kouam *et al.* [5] cited by SARAF [12] = 1.8% and Z as standardized significance level = 1.96. After numerical application, the minimal sample size was estimated at 28 pairs of twins.

2.3. Procedure

After obtaining administrative authorizations from the hospitals involved, and ethical clearance, we went to Gynecology and Obstetrics Units and began participant recruitment. Any woman who gave birth to twins was identified. After presentation and explanation of the purpose and benefits of the study, their opinion was sought to participate in the study. After going through the information sheet, an informed consent form was signed and the investigation began. Recruitment was done in the labor room, in neonatology unit and in the operating room (if retained second twin). The data collected from the mothers were medical history, clinical examination, and complementary examinations. Data were recorded on a structured and pre-tested data collection form. For the mothers, we collected: sociodemographic characteristics, gynaeco-obstetric history, history of the current pregnancy, clinical and paraclinical evaluation data. Data about twins were the APGAR score and early neonatal complications.

2.4. Statistical Analysis

Data reported on data collection forms were entered and analyzed using IBM SPSS version 23 software. Data collected were analyzed using IBM SPSS version 23. Descriptive statistics were done in frequencies and percentages, means and standard deviations. Paired-sample student's t-test was used to compare means. McNemar's Chi-square and Fisher's exact tests were used to compare proportions. Statistical significance was set at p-values less than 0.05.

2.5. Ethical Considerations

Prior to the study, we obtained an ethical clearance N° 1810 CEI-UDo/06/2019/T of June 06, 2019 from the Institutional Review Board of Research Ethics for Human Health of the University of Douala. Research authorizations were obtained from the administrations of the concerned hospitals. The informed consent, and the anonymity of the mothers of the twins were ensured before any recruitment. Data were only used for research.

3. Results

3.1. Generalities

Out of a total of 2183 deliveries performed during the study period in the 2 hospitals, 131 were deliveries of multiple pregnancies, of which 43 (1.96%) were twin vaginal delivery. Of the 43 twin births, 41 women gave their consent to participate to the study. The mean age of the mothers was 28.44 ± 5.40 years, ranging from 18 and 42. The mean parity is 1.98 ± 1.62 years with extremes of 1 and 6.

3.2. Gestational Age, Time for Expulsion of the Second Twin

Out of 41 deliveries, 24 (58.54%) were at term (delivered between 37 and 42 completed weeks of gestation), and 25 (60.98%) second twins were expelled 30 minutes after the first (**Table 1**).

3.3. Comparison According to Fetal Presentation, Mode of Delivery, Anthropometric Data and Complications of the Twins

The association between fetal presentation, mode of delivery, APGAR score and anthropometric data and complications of twins, with the rank of twins is found in **Table 2**.

Table 1. Distribution of births according to the gestational age of pregnancy and the time taken between the delivery of the first and the second twins.

Variable	Frequency (N = 41)	Percentage (%)
Gestational age (weeks)		
[28 - 34[	2	4.87
[34 - 37[	15	36.58
[37 - 42[	24	58.54
Second twin expulsion time (in minutes)		
[0 - 15[	10	24.39
[15 - 30[	6	14.63
≥30	25	60.98

Table 2. Distribution of twins according to fetal presentation, mode of delivery, APGAR score, anthropometric data and complications.

Variables	First twins N = 41 n(%)	Second twins N = 41 n(%)	p-value
Fetal presentations			
Cephalic	41 (100)	23 (56.10)	<0.001
Breech	0 (0)	18 (43.90)	
Mode of delivery of twins			
Vaginal delivery	41 (100)	38 (92.68)	0.241
Cesarean section	0 (0)	3 (7.32)	
APGAR Score at 1 minute			
0 - 3	0 (0)	1 (2.44)	0.004
4 - 6	4 (9.76)	16 (39.02)	
7 - 10	37 (90.24)	24 (58.54)	

Continued

APGAR Score at 5 minutes			
0 - 3	0 (0)	0 (0)	
4 - 6	4 (9.76)	9 (21.95)	0.031
7 - 10	37 (90.24)	32 (78.05)	
Anthropometric characteristics of twins (Mean \pm SD)*			
Weight (Kilograms)	2.72 \pm 0.41	2.63 \pm 0.40	0.010
Height (centimeters)	44.61 \pm 5.87	44.20 \pm 5.87	0.127
Head circumference (centimeters)	33.30 \pm 1.40	32.78 \pm 1.83	0.011
Arm circumference (centimeters)	10.65 \pm 0.98	10.38 \pm 1.15	0.026
Chest circumference (centimeters)	32.80 \pm 1.62	32.20 \pm 2.04	0.014
Twin neonatal complications			
Prematurity	17 (41.46)	17 (41.46)	0.823
neonatal infection	1 (2.44)	2 (4.88)	0.556
neonatal asphyxia	6 (14.63)	13 (31.71)	0.067
Intrauterine growth restriction	5 (12.20)	6 (14.63)	0.746
Stillbirth	0 (0)	4 (9.76)	0.116

*Comparing means with p-values from paired samples t-test.

Cephalic fetal presentations seemed to be more frequent for the first twins than for the second ($p < 0.001$). Three second twins (7.31%) were delivered through a caesarian section following vaginal delivery of the first twin. APGAR scores less than 7/10 at the first minutes were reported in 4 (9.76%) first twins and in 17 (41.46%) second twins. Also, APGAR scores less than 7/10 at the fifth minutes were reported in 4 (9.76%) first twins and in 9 (21.95%) second twins. There was a statistically significant association between the rank of twins and APGAR scores at the first and fifth minutes ($p = 0.004$ and $p = 0.031$ respectively), seeming to be better for the first twins compared to the second.

There was a statistically significant difference ($p = 0.010$) between the mean weights of first and second twins (2.27 Kg and 2.63 Kg respectively). Though the mean heights between twins were not statistically significantly different, other anthropometric measurements were found to be statistically different among first and second twins (head, arm and chest circumferences).

Concerning neonatal complications, our study found no statistical association between the rank of twins and prematurity, neonatal infection, neonatal asphyxia and intrauterine growth restriction. Stillbirth was registered in 4 (9.76%) of second twins.

4. Discussion

4.1. Generalities

Our frequency of 1.96% of twin births was higher than 0.82% found by Dhia *et al* in Tunisia [3]. This difference could be explained by the retrospective nature of their study and their large sample size. In addition, the frequency of twin births varies by continent: 0.65% in Asia, 1.14% in Europe, 2.2% in Africa [13] [14]. This frequency depends on external factors (action of ovulation inducers, diet rich in phytoestrogens, use of medically assisted reproduction techniques and the region of origin) and internal factors (heredity, ethnicity, maternal age, and parity). The mean age of our participants was 28.44 ± 5.40 years, close to 27.8 years found by Kouame in Ivory Coast [15] and Meye *et al* in Gabon [16].

4.2. Term of Birth, Time Limit for Expulsion of the Second Twin

In 25 out of 41 mothers (60.97%), the time interval between the expulsion of the 2 twins was greater than 30 minutes (Table 1). This result shows that the diagnosis of retained second twin shouldn't be taken too soon in the presence of reassuring fetal heart rhythm.

4.3. Comparison According to Fetal Presentations, APGAR Scores, Mode of Delivery, Anthropometric Data, and Neonatal Complications of Twins

Cephalic fetal presentation was statistically significantly more frequent for the first twins than for the second ($p \leq 0.001$) (Table 2). The frequency of cephalic presentations of the first and second twins combined was 43.52% in Ouattara's study in Ouagadougou [17]. In our study, 43.90% of second twins had a breech presentation (Table 2). The most represented mode of delivery was the vaginal route for all first twins and 92.69% of second twins (Table 2). In Catillon's study [18], the mode of delivery had no impact on neonatal morbidity and mortality, it was not influenced by the rank of the twin, and vaginal delivery with a prolonged interval was not a poor prognostic factor of morbidity of the second twin [19].

APGAR scores seemed better for the first twins at the first ($p = 0.004$) and fifth ($p = 0.031$) minutes, than for the second (Table 2). This was also found by Zedini *et al.* [20] and Turan *et al.* [21]. Cheibany [22] in 2016, found a difference only at the fifth minute. This difference could be explained by the fact that caesarean delivery of the first twins was excluded from our study and that only the vital prognosis of the second twin during childbirth influenced its mode of delivery.

Similar to our study which showed a statistically significant difference concerning means of anthropometric measurements among twins except for height (Table 2), Cheibany *et al* [22] in 2016 found an association between the mean weight and twin rank.

As in other studies[11] [15] [18] [23], prematurity was the major complication

of twin pregnancies in our study. The vital prognosis of the second twin was the most committed. Neonatal asphyxia and intrauterine growth retardation were also frequent, but as in the study by Kouame in Ivory coast [15] and Ben *et al* in Tunis [24], no complication was associated with the rank of the twin (**Table 2**). In fact, in the human species, the two fetuses are generally conceived at the same time, which gives them the same gestational age at delivery. Their exposure to the same maternal environment gives them almost equal chances of developing similar complications. In this study, 4 stillbirths of the second twin were registered, all intrapartum deaths. This could be explained by complications of premature placental detachment associated with delivery of first twin, especially with monoamniotic twins, characterized by rapid deterioration of fetal heart rhythms. Also, healthcare provider skills in promptly delivering the second twin vaginally, no matter its presentation, is of paramount importance.

Limitations

Our study's small sample size might not be adequately representative of the target population. As a result, we recommend large scale multicenter studies on twin neonatal complications in our context. Also, the retrospective nature of our study might include a recall bias in reporting variables such as expulsion time interval between twins. Our study only assessed major neonatal complications in these twins in a short run. We recommend future studies assess a more exhaustive list of neonatal complications in an immediate, early and late timeline.

5. Conclusion

Although prematurity, neonatal asphyxia and intrauterine growth retardation were frequent in both twins, only APGAR scores at the first and fifth minutes were significantly associated with the rank of twin. To reduce the risk of neonatal morbidity, clinicians should be more attentive during the delivery of twin pregnancies and mainly of the second twin.

Data Availability

The authors declare that data and materials shall be available only on request.

Authors' contributions

Fouelifack, Bashir Kadidja and Foumane contributed to the conception and design of the article and revising it critically. Fouelifack, Nguefack and Bashir Kadidja collected data and drafted the article. Fouelifack, Bashir Kadidja, Dongmo Tiodjou and Fouedjio conducted the statistical analysis and interpretation of the results. All authors wrote or reviewed and approved the final manuscript.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Appendix

Data Collection Form

A-Sociodemographic characteristics

- 1- Participant code.....
- 2- Hospital: 1. YCH 2. YGOPH
- 3-Age of mother:
- 4- Profession: 1. civil servant 2. private sector 3. trader 4. student 5. housewife
6. other.....
- 5-Highest level of education: 1. primary 2. secondary 3. university 4. none
- 6- Marital status: 1. married 2. single 3. divorced 4. widowed 5. cohabiting
- 7- Region of origin: 1. Center 2. Littoral 3. West 4. South west 5. South 6. East
7. Far North 8. North 9. North West 10. Adamaoua
- 8-Religion: 1 Catholic 2 Protestant 3 Muslim 4 Jehovah's Witness 5 others.....
- 9- Place of residence: 1 urban 2 semi urban 3 rural _

B-Admission at labour room: 1 from home 2 referred

C-Maternal history:

- 10- Gravid formula: G.... P....
- 11-Family history of twin pregnancy 1. Yes 2. No
- 12-Gestational diabetes 1. Yes 2. No
- 13 - High blood pressure 1. Yes 2. No
- 14- Contraceptive method: 1 barrier 2 hormonal 3 natural
- 15- Current pregnancy desired: 1. Yes 2. No
- 16- Numbers of antenatal visits:
- 17- Date of last period:
- 18- Probable date of delivery:
- 19- Place of antenatal visits: 1. YCH 2. YGOPH 3. others
- 20- Pathologies during pregnancy and treatment 1. Yes 2. No If yes, which ones....
- 21- Prophylaxis:
Anti-anaemia: 1. Yes 2. No
Anti-malaria: mosquito bed nets 1. Yes 2. No,
Intermittent preventive treatment 1. Yes 2. No
Anti-tetanus toxoid: 1. Yes 2. No
- 22- Normal morphological assessments (obstetrical ultrasounds) 1. Yes 2. No
- 23- Normal biological tests: 1. Yes 2. No

D-History of childbirth

- Vital signs: BP: Pulse: RR: Temperature:
- 24- Gestational age at delivery:
 - 25- Labor duration in hours: 1. >14 hours 2. 13 8 hours 3. <6 hours
 - 26- Premature rupture of membranes: 1. Yes 2. No
 - 27- Amniotic fluid normal: 1. Yes 2. No

- 28- Symphysio-fundal height.....
 - 29- Abdominal circumference
 - 30- Baseline fetal heart rate normal 1. Yes 2. No
 - 31- Cervical dilation at entry: 1 (1 - 3 cm) 2 (4 - 7 cm) 3 (7 - 10 cm)
 - 33- Delivery route vaginal: 1. Yes 2. No
 - 34- Fetal presentation:
 first twin: 1 cephalic 2 breech 3 others
 second twin: 1 cephalic 2 breech 3 others
 - 36- Dystocia: 1. Yes 2. No If yes, type: mechanical 1. Yes 2. No, dynamic 1. Yes 2. No
 - 37- Instrumental delivery: 1. Yes 2. No
 - 38- Cesarean section 1. Yes 2. No If Yes, indication:
 - 39- Time interval between fetal vaginal expulsions of twin 1 and 2:
 1.1—5 minutes 2.6—10 minutes 3.11—15 minutes 4. > 16 minutes
- E-Newborn status at birth: 1st twin and 2nd twin**

	First twin	Second twin
APGAR 1 st , 5th and 10th minutes		
Hemodynamic parameters	Cardiac frequency Respiratory rate Temperature Blantyre	Cardiac frequency Respiratory rate Temperature Blantyre
Anthropometric parameters	Weight Cranial perimeter Size Thoracic perimeter Weight Upper arm circumference	Weight Cranial perimeter Size Thoracic perimeter Weight Upper arm circumference
Sex		
Visible deformation		
Conclusion	Healthy symptomatic	Healthy Symptomatic

If symptomatic:
 Reason for consultation of the first twin: 1. fever 2. APGAR < 7 3. convulsion
 4. Other...
 Reason for consultation of the first second: 1. fever 2. APGAR < 7 3. Convulsion
 4. Other...
 Physical examination:

	First twin	Second twin
Active tone		
Passive tone		
Archaic reflexes	Present Blunt Absent	Present Blunt Absent
Diagnostic	Prematurity Neonatal asphyxia Neonatal infection IUGR	Prematurity Neonatal asphyxia Neonatal infection IUGR
Death		
Hospitalization		
Parental notice 7 days later		
