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Interest and Perspectives of Ultrasound Surveillance of Pregnancy in the third trimester in Urban Areas: A case series from the Kinshasa University Hospital, The Democratic Republic of Congo

Intérêt et perspectives de la surveillance échographique de la grossesse au troisième trimestre en milieu urbain : une série des cas des Cliniques Universitaires de Kinshasa, République démocratique du Congo

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Résumé

Contexte et objectif

Bien que l'échographie au 3e trimestre ait un intérêt incontestable dans la surveillance de la grossesse, elle n'est pas systématiquement réalisée en routine et les données y relatives sont peu documentées. L'objectif de la présente étude a été de décrire les découvertes échographiques et l'issue de la grossesse. *Méthodes.* Il s'agissait d'une série descriptive des gestantes qui avaient accouché aux Cliniques Universitaires de Kinshasa, ayant réalisé au moins une échographie au troisième trimestre. Les paramètres d'intérêt englobaient l'issue de la grossesse et les données néonatales. *Résultats.* Cent et cinq gestantes ont été enrôlées. Les découvertes échographiques au 3e trimestre comprenaient les présentations fœtales vicieuses (12,3 %) et les insertions placentaires basses (8,7 %) ayant indiqué la césarienne respectivement dans 100 % et 55, 6 % des cas. 13,6 % des Manning étaient pathologiques et une indication d'une césarienne d'urgence a notée dans 2,3 % des cas. La croissance du diamètre abdominal transverse (DAT) a été la plus proche du poids de naissance avec eutrophie dans 72,4 %. La concordance du sexe vu à l'échographie à celui découvert à la

Summary

Context and objective

Although 3rd trimester ultrasound is of undeniable value in pregnancy monitoring, it is not routinely performed, and is poorly documented. The aim of the present study was to describe ultrasound findings and pregnancy outcome. *Methods.* This was a series of pregnant women who had given birth at the Kinshasa University Hospital, and who had undergone at least one ultrasound scan in the third trimester. Parameters of interest included pregnancy outcome and neonatal data. *Results.* One hundred and five pregnant women were enrolled. Sonographic findings in the 3rd trimester included vicious fetal presentations (12.3 %) and low placental insertions (8.7 %), which indicated caesarean section in 100 % and 55.6 % of cases, respectively. Mannings were pathological in 13.6 % of cases, and an indication for emergency caesarean section was noted in 2.3% of cases. The Transverse abdominal diameter (TAD) growth was closest to birth weight, with eutrophy in 72.4 %. The concordance between the sex seen on ultrasound and that discovered at birth was 92.7 %. The majority of deliveries (55.2 %) were by caesarean section, indicated mainly for acute fetal distress. The average weight at term was 3,128.9 g. *Conclusion.* Ultrasound monitoring of pregnancy in the third trimester is essential to assess growth through fetal biometry, placental localization and fetal presentation. The various anomalies and positional defects detected by the third-trimester ultrasound were often the

naissance de 92, 7 %. La majorité des accouchements (55,2 %) ont eu lieu par césarienne, indiquée principalement pour souffrance fœtale aiguë. Le poids moyen à terme était de 3128,9 g. *Conclusion.* La surveillance échographique de la grossesse au troisième trimestre trouve sa raison d'être dans l'évaluation de la croissance par la biométrie fœtale, la localisation placentaire ainsi que la présentation fœtale. Les divers anomalies et vices de position objectivés à l'issue de l'échographie du troisième trimestre ont été, le plus souvent, l'élément déterminant de la décision du mode d'accouchement.

Mots-clés : échographie, grossesse, surveillance, troisième trimestre
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determining factor in deciding on the mode of delivery.

Keywords: ultrasound, pregnancy, monitoring, third trimester

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Introduction

Surveillance of pregnancy is necessary to enable early detection of high-risk pregnancies (1), those that are highly likely to become complicated or terminate in the birth of an abnormal child, and is the key determinant of perinatality (2). Even tough approximately 55 % pregnancies are considered low risk, these pregnancies are at risk of at least 4 abnormal conditions—small for gestational age (SGA, defined as birthweight at the <10th percentile for gestational age), large for gestational age (LGA, defined as birthweight at the >90th percentile), oligohydramnios, or polyhydramnios— all of which are associated with adverse perinatal outcomes, including stillbirth and neonatal death (3).

Apart from the assessment of fetal weight and amniotic fluid, third trimester ultrasound performs other functions that could additionally justify its existence, such as detection of fetal abnormalities, evaluation of the placenta and fetal position, or even the so-called psychosocial benefits. Detecting fetal abnormalities in late pregnancy is indeed an important function that has not been studied in depth. Third trimester ultrasound could detect those abnormalities undiagnosed during the second trimester or those that only develop in the third trimester, like lissencephaly or achondroplasia (4).

In middle and low-income countries, perinatal mortality is a major public health concern. In the Democratic Republic of Congo (DRC), the infant mortality rate is 79 per thousand, one of the highest rates in Africa (5-6).

To face up this disaster, health strategies recommend prevention of obstetrical conditions that can lead to adverse obstetrical

and neonatal outcomes of pregnancy and this prevention is based on a regular medical follow-up including clinical examination and paraclinic assessment (including ultrasound), mandatory or directed, mainly for growth troubles.

While it is now evident that ultrasound monitoring plays an important role in the evolution of pregnancy, there are still questions about its impact on improving pregnancy management in the third trimester, moreover, on pregnancy outcomes, given its accessibility in our environments, in the light of the WHO guidelines regarding the third sustainable development goal (3- 4, 6-7).

The aim of this study is to highlight the importance of the third-Trimester ultrasound, and to consider prospects regarding its practice in the obstetrics in our environment, where inaccessibility and ignorance would not be the only pitfalls for its routine use.

Methods

This was a descriptive case series of pregnant women who had given birth at the Kinshasa University Hospital, from January to August 2015. Inclusion criteria were to have given birth either by vaginal delivery or cesarean, and performed at least one third-Trimester ultrasound. Ultrasound reports and additional data from medical records, antenatal care, delivery ward and maternity weree used. From files gathered during this period, 105 complete ultrasound records were selected for the present work. The variables of interest for the study were maternal (age, parity, gravidity, antenatal care record, ultrasound report, etc.), fetal (chorionicity, biometry, presentation, amniotic fluid, placental location, Manning, malformations, etc.) and neonatal (APGAR score, birth weight, neonatal intensive care unit admission, etc.). Data were entered using Microsoft Office Excel 2007 and then exported to a database in SPSS 18.0 (Statistical Package for Social Sciences) for analysis. Descriptive statistics were used to summarize all study variables. Categorical variables were reported as frequencies and percentages, and averages were used for quantitative variables. Strict confidence was guaranteed during all data processing.

Results

Population

From January 1 to August 31, 2015, 311 obstetric ultrasounds were performed in the Gyneco-Obstetrics Department of the Kinshasa University Hospital. Among those ultrasounds, 188 were performed during the third-Trimester, of which 105 could match with complete medical records that enabled to carry out the present study.

The average age of mothers was 32 years, with extremes of 16 and 47 years. Most mothers (68.6 %) were in the age range between 18 and 35 years.

The gravidity was between 1 and 8, with 73.3 % of multigravida. The parity was between 1 and 7; the maximum frequency was observed in pauciparous (45.7 %), followed by primiparous (33.3 %).

Almost all women (99.1 %) attended their antenatal care, and the majority (56.2 %) visited 3 to 7 times during their pregnancy.

Most women did not present any pathology during pregnancy (40 %); the most common diseases in pregnant women were malaria and urogenital infections, in equal proportions (20.9 % each).

Of the 104 pregnant women who attended their antenatal care, the majority was made up of those who performed 3 or 4 ultrasounds during pregnancy, that is to say 30.8% for each group; multigravida accounted for the largest share (73.1 %).

Obstetric ultrasound

1. Fetal biometry

The biparietal diameter (BPD), transverse abdominal diameter (TAD), femoral length (FL) and estimated fetal weight were the only fetal measurements that were considered for the present study.

The majority of the fetuses were eutrophic (68.6 % according to the BPD, 72.4 % according to the TAD, 62.9 % according to the FL and 71.4 % according to the estimated fetal weight).

2. *Placenta position*

Placenta praevia represented 8.7 % and the wide majority (91.3 %) had normal placenta position.

The type 1 placenta praevia (lateral placenta previa) was the most represented at 44.4 %, followed by types 2 (marginal placenta previa) and 4 (total placenta previa), ex aequo at 22.2 %; the outcome of the pregnancy was caesarean section in 55.6 % of cases, the main indication of which was hemorrhage, with prematurity being the main adverse outcome (**Table 1)**

Table 1. Low-lying placenta

N°	Placenta previa	GA (WG)	GA at delivery (WG)	Delivery route	C-section indication	APGAR score	Weight at birth (grams)	Morbidity elements	NICU transfert	Pregnants ID
1	Type 1	35	39 (term)	Vaginal	-	7/8/10	2900 (C10-90)	Double tight circular cord	No	P2G3A1s 33 yrs
2	Type 3	32	36 (premature)	C-section	Hemorrhagic PP	4/6/10	3950 (>C90)	-	Yes	P4G8A4i 44 yrs
3	Type 2	36	36 (premature)	C-section	SCFD and preciosity	9/9/10	3100 (C10-90)	-	No	P1G3A2s 37 yrs
4	Type 4	31	34 (premature)	C-section	Hemorrhagic PP	7/8/9	2100 (C10-90)	Prematurity	Yes	P1G2A1 31 yrs
5	Type 4	35	37 (term)	-	-	9/10/10	3200 (>C90)	-	No	P3G4A1 (EP) 26 yrs
6	Type 1	36	36 (premature)	Vaginal	-	8/9/9	2700 (C10-90)	-	No	P2G2 29 yrs
7	Type 2	30	30 (premature)	C-section	Hemorrhagic PP	8/8/8	1400 (C10-90)	Prematurity	Yes	P5G6A1D1 39 yrs
8	Type 1	41	41 (term)	C-section	AFD	8/9/9	2900 (<C10)	-	No	P1G5A4 38 yrs
9	Type 1	38	38 (term)	Vaginal	-	7/9/10	3500 (C10-90)	Neonatal jaundice	Yes	P2G3A1s 32 yrs

GA = Gestational Age ; WG = Weeks of gestation ; WB = Weight at Birth ; NICU = Neonatal intensive care unit ; PGA(s or i)D = Parity Gravidity Abortion (spontaeous or induced) Death ; EP = ectopic pregnancy ; C10, C90 = 10^{th}, 90^{th} centile ; SCFD = severe chronic fetal distress ; AFD = Acute Fetal Distress ; yrs = years (years old)

3. *Fetal presentation*

Malpresentations accounted for 12.3 % (8.2 % for breech and 4.1 % for transverse presentations) and the presentation was cephalic in 87.7 % of cases of the reported presentations. The whole breech presentations (100%) resulted in a caesarean delivery, with prematurity as the main adverse outcome; all of the transverse presentations (100 %) resulted in a caesarean delivery (**Table 2**).

Table 2. Fetal Malpresentations

N°	Presentation	GA (WG)	GA at delivery (WG)	Delivery route	C-section indication & comorbidities	APGAR score	Weight at birth (grams)	NICU transfert	Pregnants ID
Breech									
1	Breech	36	36 (premature)	C-section	Macrosomia + breech + 1x scarred uterus	9/9/10	3500	No	P4G4 38 yrs
2	Brrech - footling	40	40 (term)	C-section	Breech & primiparity	8/9/9	2700	No	P1G1 27 yrs
3	Breech	37	38 (term)	C-section	Macrosomia & breech	7/8/9	3480	No	P4G4 38 yrs
4	Brrech	36	36	C-section	2x scarred	9/9/9	2750	No	P2G2

			(premature)		uterus & breech				37 yrs
5	Breech	32	36 (premature)	C-section	Hemorrhagic PP	4/6/10	3950	Yes	P4G8A4p 44 yrs
6	Breech	35	36 (premature)	C-section	-	9/10/10	3200	No	P3G4A1 (EP) 26 yrs
7	Breech - frank	30	30 (premature)	C-section	Hemorrhagic PP	8/8/8	1400	Yes	P5G6A1D1 39 yrs
8	Breech - frank	38	38 (term)	C-section	Breech & greater fundal height	8/9/9	3850	Yes	P4G4 36 yrs
Transverse lie									
1	Transverse lie, right sided head	35	36 (premature)	C-section	1x scarred uterus & fetal macrosomia	8/9/10	4150	No	P4G5A1 39 yrs
2	Transverse lie, right sided head	31	34 (premature)	C-section	Hemorrhagic PP ; myomatous uterus	7/8/9	2100	Yes	P1G2A1 31 yrs
3	Transverse lie	38	-	-	-	-	-	-	-
4	Transverse lie, left sided head	39	39 (term)	C-section	-	-	3100	No	P3G3 30 yrs

GA = Gestational Age ; WG = Weeks of gestation ; WB = Weight at Birth ; NICU = Neonatal intensive care unit ; PGA(s or i)D = Parity Gravidity Abortion (spontaeous or induced) Death ; EP = ectopic pregnancy ; C10, C90 = 10^{th}, 90^{th} centile ; SCFD = severe chronic fetal distress ; AFD = Acute Fetal Distress ; yrs = years (years old).

4. *Fetal anomalies*

The vast majority (92.4 %) of the performed ultrasounds did not notice any fetal pathology or anomaly, however circular cord and a macrosomia were observed in 2.9 % and 1.9 % of cases, respectively. Single cases of dyschondroplasia and microcephaly were also found in the present series (**Table 3**).

Table 3. Fetal pathologies diagnosed at ultrasound exam

Fetal pathology	**Number of cases**	**Percentage**
None	100	95,24
Macrosomia	2	1,91
Growth restriction	1	0,95
Microcephaly	1	0,95
Dyschondroplasia	1	0,95
Total	**105**	**100**

Pregnancy outcome

The majority of deliveries (55.2 %) were performed by caesarean section.

Acute fetal distress was the leading indication for caesarean delivery, accounting for 19.3 % of cases; followed by cases of macrosomia and breech presentation on scarred uterus, (15.8 %) and the abruptio placenta (14 %) (**Table 4**).

Table 4. C-section indication

Indication	**Number of cases**	**Percentage**
AFD	11	19,3
Macrosomia & breech with 1x scarred uterus	9	15,79
Abruptio placentae	8	14,04
CPD	3	5,26
Precious pregnancy	3	5,26

CFD	2	3,51
Hemorrhagic PP	2	3,51
Narrow pelvis	2	3,51
Scarred uterus	2	3,51
Dehiscence of/recent/poor quality uterine scar	2	3,51
Cervical dystocia	2	3,51
Macrosomia	2	3,51
Macrosomia	1	
Macrosomia & breech	1	
Fetal malposition	2	3,51
malposition fœtale	1	
malposition fœtale & rupture utérine incomplète	1	
Transverse lie	2	3,51
Breech	2	3,51
PROM with scarred uterus	1	1,75
Primary uterine inertia	1	1,75
Oligoamnios with scarred uterus	1	1,75
Total number of C-sections performed	**57**	**100**

AFD/CFD = Acute/Chronic fetal distress ; CPD = cephalo-pelvic disproportion ; PP = placenta previa ; PROM = premature rupture of membranes

The average birth weight was 3061.1g. The wide majority of newborns (89.6 %) were eutrophic at birth, i.e. with a weight between 2500 and 4000g at birth.

The mean term weight was 3128.9g, with extremes ranging from 2100 to 4700g.

For cases in which the gender was sought by ultrasound, the majority was represented by males, in 66.7 %. Ultrasound gender matched the observed gender at birth in 92.7 % of cases.

Discussion

A descriptive cross-sectional study that focuses on the third-Trimester ultrasound is presented herein. The clustering of record sources (antenatal care, ultrasound, delivery ward and maternity records) within the Gyneco-Obstetrics Department was key to the identification of a maximum number of cases for the present study. The variables studied were determined according to the various publications on third-Trimester ultrasound.

Growth disorders

Fetal growth disorders influence the outcome of pregnancy and even perinatal morbidity and mortality.

The association of emergency caesarean sections and instrumental deliveries with head circumference and fetal weight has been established (8-10), but the different biometrics have neither the same influence nor the same sensitivity for the effective detection of growth disorders that have a definite impact on perinatal events. Also, thresholds for these values – especially individually – cannot accurately predict neonatal complications (11-12).

The TAD appeared to be the most reliable parameter for detecting fetal growth disorders in the present study, and showed the best correlation with the birth weight (72.4 % eutrophic according to TAD).

These results sustain that third-trimester fetal biometry provides better information on fetal growth when all parameters are put together rather than individually considered (13-15), and also the suspicion of macrosomia tends to be an inaccurate factor (16).

Placenta position

Placenta previa accounted for 8.7 %. Type 1 (lateral placenta previa) was the most represented (44.4 %). The outcome of the pregnancy was caesarean in most cases (55.6 %), the main indication of which was hemorrhage, with prematurity as the main complication.

Fetus position/presentation

The link between breech presentation and placenta previa was not assessed in the present study. All of the transverse presentations (100 %) resulted in a cesarean delivery. We thought that the internal version manoeuver associated with an intraoperative ultrasound could be beneficial for extraction. A clinical study would be needed to evaluate how effective these maneuvers could be in decreasing caesarean deliveries related to the transverse presentation, as in a study conducted with impressive outcome at the Jason Sendwe Hospital in 2014 (17).

Fetus anomalies

Single suspected cases of dyschondroplasia and microcephaly were also found in the present series.

The case of suspected dyschondroplasia presented a fetal hypertrophy except at the limbs, the rest of the ultrasound parameters being normal. The pregnancy was at 37 weeks when this first and only ultrasound was performed on a 38-year-old P6 G6 who did not have any issue during her pregnancy. However, delivery (at 39 weeks) was vaginal and no malformation was observed at birth, with normal newborn parameters.

The case of microcephaly was not confirmed at birth either. This was a 38-year-old P5 G5 whose pregnancy was normal and who gave birth to a new-born with normal parameters.

Our study has some shortcomings: The study period was short and the study only looked at the third-trimester records. A broader period of study would provide better insights on third-trimester ultrasound data. Furthermore, having second-trimester reports could be useful for a better understanding and consistency of third-trimester outcomes.

Conclusion

Ultrasound monitoring of pregnancy in the third-trimester is useful for assessing growth through fetal biometry, determining placenta and fetal positions. Use of ultrasound in the third-trimester appears important to improve pregnancy monitoring and outcome. In perspective, it is essential that a clear, precise and even concise health policy sets the guidelines for ultrasound practice in our settings.

Conflict of interests

We, here in, assume that there is no interest conflict for this paper.

Contribution for authors

Lotoy JB: design, data collection, statistical analysis, draft the manuscript

Zinga BI: design, data collection and draft the manuscript

Mpoy JO: data collection, statistical analysis, draft the manuscript

Lotoy JPI: data collection, draft the manuscript

All authors approved the final and revised manuscript

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