

Quality Control of Second Trimester Ultrasound Examinations in the Gynecology and Obstetrics Department of the University Teaching Hospital Yalgado Ouedraogo (UTH-YO) of Ouagadougou, Burkina Faso

Ouattara Adama^{1,2*}, Nde Ouédraogo Nina Astrid^{1,2}, Lankoandé Bako Natacha³,
Ouédraogo Smaila^{1,2}, Bayala René-Philippe Yi Dia², Tougma Sanou Aline³,
Sawadogo Yobi Alexis^{1,2}, Millogo Traoré Françoise^{1,2}, Ouédraogo Marie Charlemagne^{1,2},
Ouédraogo Ali^{1,2}, Thieba Bonané Blandine^{1,2}

¹Training and Research Unit in Health Sciences (TRU/HS), University Ouaga 1 Pr Joseph KI ZERBO, Ouagadougou, Burkina Faso

²Department of Gynecology and Obstetrics, The University Teaching Hospital Yalgado Ouedraogo of Ouagadougou (UTH-YO), Ouagadougou, Burkina Faso

³Department of Gynecology and Obstetrics, The Bogodogo University Teaching Hospital of Ouagadougou (UTH-B), Ouagadougou, Burkina Faso

Email: *ouattzangaadama@yahoo.fr

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Abstract

Objective: To evaluate the quality of second trimester ultrasound examinations in patients consulting in the gynecology and obstetrics department at the University Teaching Hospital Yalgado Ouedraogo (UTH-YO) of Ouagadougou. **Method:** Our study took place from January 1st to March 31st 2017, in the department of Obstetrics and Gynecology of the University Teaching Hospital Yalgado Ouedraogo of Ouagadougou. This was a descriptive study on the records of the second trimester ultrasound of pregnancy, with analysis of the iconography. We used the criteria of the Technical Committee of Fetal Echography (TCFE) of France to analyse all the ultrasound reports brought by the patients. **Results:** Three hundred ultrasound reports were collected over three months. It revealed that, in terms of patient identification, 100% of the reports bore the surname and first name of the pregnant woman; 88% and 94.67% of the ultrasound scans bore the surname and first name of the ultrasound specialist respectively. Only 2% presented the brand and type of ultrasound scanner. The study of the quality of the appointment showed that 52% of the ultrasounds had been performed at the right time, between 20 Gestational Age (GA) and 25 GA. For the quality of the iconography, referring to

the recommendations of the Technical Committee of Fetal Echography (TCFE) of France and taking into account the data confirmed by the literature, we found that the quality was slightly acceptable either respectively for biometric and morphological sections. **Conclusion:** The quality of the ultrasound reports of the second trimester ultrasounds in patients consulting in the obstetrics and gynecology department of the University Hospital Yalgado OUEDRAOGO was not totally satisfactory.

Keywords

Ultrasonography, Second Trimester, Reports, UTH-YO

1. Introduction

Thirty years ago, there were no exploration techniques for prenatal diagnosis or fetal treatment. The possibilities for investigation of the embryo and fetus were very limited and were limited to measuring uterine height, palpation, approximate assessment of amniotic fluid volume, somewhat subjective perception of active movements by the mother, hearing of fetal heart sounds through an obstetrical stethoscope and sometimes, at the end of pregnancy, an often disappointing radiological examination. At that time, the discovery of growth retardation, fetal malformation or fetal death was most often, for obstetricians, a nasty surprise during delivery [1].

This situation changed fundamentally during the 1970s when several prenatal diagnostic techniques appeared successively, one of the most revolutionary in its simplicity and the extent of its possibilities was undoubtedly ultrasound. Ultrasound thus appears as a remarkable and indispensable extension of the clinical examination. Moreover, ultrasound has contributed to the entry of obstetrics into a modern era; it is one of the pillars of perinatal medicine [1] [2] [3] [4].

The development and availability of ultrasound technology poses a new problem in terms of reliability, quality of iconography and reporting [5] [6] [7]. Indeed, the strict framework surrounding obstetrical ultrasound scans in developed countries is still being implemented [5] [7]. In France, the Technical Committee of Fetal Echography (TCFE) created to ensure the harmonization of practices in France, published recommendations in 2005 for the quality of screening ultrasounds during the three trimesters of pregnancy [8].

In our context, the practice of second trimester ultrasound (T2) has not yet been the subject of a harmonization of practice with a view to a national consensus, the ultrasound practitioners being of diversified training and profile. Second trimester ultrasound is an important part of pregnancy monitoring. It makes it possible to study the morphology of the fetus and to assess the prognosis of the evolution of pregnancy [8]. Through this study, we propose to analyze the second trimester ultrasounds reports brought by patients who consult in the obstetrical gynecology department of the University Hospital Yalgado OUEDRAOGO (UTH-YO).

2. Materials and Methods

Our study took place from January 1st to March 31st, 2017 in the obstetrical gynecology department of the University Hospital Yalgado OUEDRAOGO (UTH-YO). This was a cross-sectional study with descriptive purpose on the second trimester pregnancy ultrasound reports that the patient brought with them during their consultation. We did the analysis of the iconographies looking at both the morphologic and the biometric settings. To achieve our objectives, we conducted our study in a hospital setting, hence the choice of the UTH-YO maternity department. We were interested in all pregnant women at the consultation or in delivery and the labor room who were in possession of their second trimester ultrasound report. The calculated sample size was 220 ultrasound scans. It was calculated according to the formula: $n = (Z1 - a/2)^2 \times P \times (1 - P)/i^2$. Thus, the final size of the sample is 220 ultrasounds. To increase the power of the study, we corrected $n = 300$ ultrasounds reports. The patients included in our sample met the following criteria:

- patient of childbearing age,
- patient carrying a pregnancy beyond the second trimester,
- patient seen in the department of obstetrics and gynecology during the study period,
- patient with a second trimester ultrasound of pregnancy report done by a practitioner other than those involved in the study.

We did not include in our study the ultrasounds performed on twin pregnancies as well as on stopped pregnancies. We collected the ultrasounds reports from the patients received in the Gynecology and obstetrics department after a presentation on the objectives of the study. We used a standardized collection sheet as a data collection instrument.

After the collection of the ultrasounds reports and especially the iconographies were analyzed by three people including 3 doctors holding the National Inter-University Diploma (NIUD) in gynecological and obstetrical ultrasound in France. It must be said that before the study began, the attending physicians in charge had held about ten training sessions with the entire study group. During this mini training, the different images and recommendations of the Technical Committee of Fetal Echography (TCFE) on second trimester (T2) ultrasound were the subject of extensive exchanges to put everyone on the same level. The data were captured and analyzed on a microcomputer using the Epi info software version 7.1.4.0. The tables and graphs were produced in Excel and Word 2013. The oral informed consent of the gestants was obtained prior to the start of this investigation. To ensure confidentiality in this study, no sonographer or structure name to identify a health professional was mentioned on a data collection sheet. The data will be used exclusively to make recommendations for the harmonization of the practice for the benefit of pregnant women. We also got the approval of the Ethics Committee on Research.

Based on the recommendations of the Technical Committee of Fetal Echo-

graphy (TCFE), we studied each component of the reports and used the Salomon and Nicolaides scores to evaluate the sections provided in the iconography [8] [9] [10]. We considered acceptable control when for an item analyzed, the completion rate exceeded 75%, and not acceptable when it was less than 75%. For the evaluation of the iconography, we assigned to each criterion from 1 to 6 points and each image could be worth a maximum of 10, 12, 16 or 21 points. The overall score was a maximum of 107 for morphology and 52 for biometrics. We considered that the cuts provided, were of good quality when the score obtained was higher than 75% of the maximum mark. **Table 1** and **Table 2** and **Figure 1** represent the evaluation criteria.

3. Results

• Population characteristics

The average age of the patients was 29 years with extremes of 18 and 45 years. The age group most represented was 25 to 29 years of age. Housewives were the most represented in our sample with a rate of 38%. The number of patients residing in urban areas was 258% or 86%. A total of 198 patients or 66% had used a hormonal method of contraception. The most common medical history among pregnant women was high blood pressure (13.3%). The most frequent surgical history was cesarean section (40%).

• Study of ultrasound reports

The distribution of echographic reports according to identification was presented in **Table 3**.

The identification check was acceptable only for patient and sonographer identification. For ultrasound identification, the satisfaction rate did not reach 10% for any identification parameter.

• Adequacy of the appointment

The distribution of ultrasound scans according to the period during which they were performed were presented in **Table 4**.

Table 1. Fetal biometric assessment criteria [3] [9] [10].

Criteria	Cephalic image	Abdominal image	Femoral image
1	Symmetrical cut	Symmetrical cut	Two clearly identifiable ends
2	Thalami visible	Visible stomach	Angles greater than 45 degrees
3	Visible Cavum septi pellucidi	Visible portal sinus	Femoral section occupying more than half of the overall image
4	Cerebellum not visible	Kidneys not visible	Correctly placed markers
5	Cephalic section occupying more than half of the global image	Abdominal section occupying more than half of the overall image	
6	Correctly placed markers and ellipses	Correctly placed markers and ellipses	

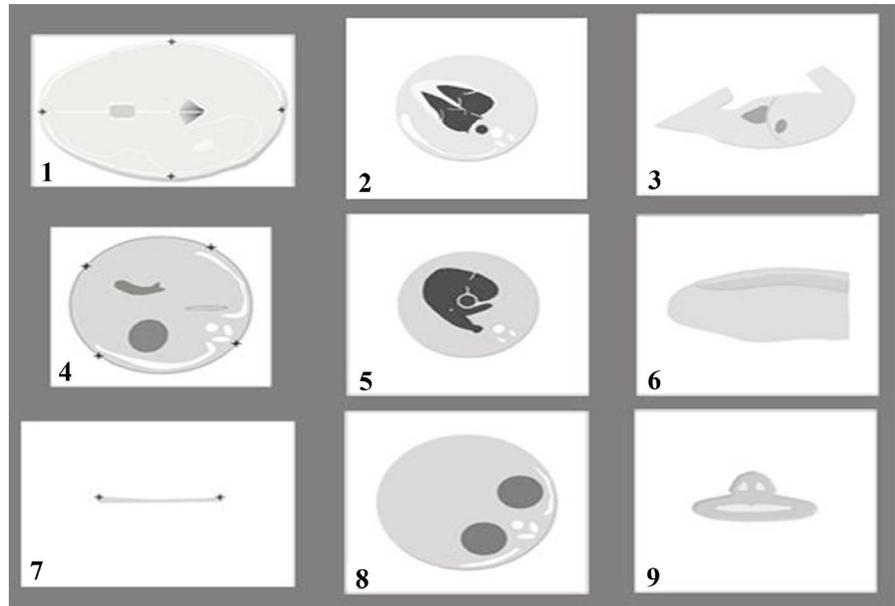


Figure 1. Schematic representation of mandatory cuts [3] [9] [10].

Table 2. Quality criteria for morphology [3] [9] [10].

Criteria	4-cavities	Large vessels	Kidneys	Stomach/Diaphragm	Spines	Face
1	4 visible cavities	Bifurcation of the visible pulmonary artery	Circular view of the first kidney	Visible heart	Visible dorsal spine	Upperlip visible
2	Visible heart tip	Visible ascending aorta	Circular view of the second kidney	Visible stomach	Visible sacrum	2 visible nostrils
3	Cross of the visible heart	Right ventricle visible	Rear kidney free of vertebral shadow cone	Spine not visible	Visible vertebral alignment of the dorsal spine with the sacrum	2 labial angles seen
4	A visible pulmonary vein	Wrapping of the pulmonary artery around the aorta	Visible cortico-medullary or pyelon differentiation	Diaphragm interface seen from front to back	Skin continuity	
5	Visible descending aorta			Thigh and neck visible	Amniotic fluid beyond the skin	
6	Area of interest occupying more than half of the image					

Table 3. Distribution echographic reports of according to identification (n = 300).

Identification elements	Staff	Percentage %
Patient		
▪ Last Name		
yes	300	100.0
No	0	0.0
▪ First Name		
Yes	300	100.0

Continued

No	0	0.0
▪ Age		
Yes	158	52.7
No	142	47.3
Sonographer		
▪ Last Name		
yes	284	94.7
No	16	5.3
▪ First Name		
yes	264	88.0
No	36	12.0
▪ Adresse		
Yes	120	40.0
No	180	60.0
▪ Qualification		
Yes	226	75.3
No	74	24.67
Ultrasound scanner		
▪ Date of start up		
Yes	6	2.00
No	294	98.00
▪ Brand name		
Yes	6	2.0
No	294	98.0
▪ Type		
Yes	0	0.0
No	300	100.0

Table 4. Distribution of ultrasound scans according to the period during which they were performed (n = 300).

Gestational age	Staff	Percentage %
[15 - 20 GA[76	25.3
[20 - 25 GA]	156	52.0
]25 - 30 GA]	68	22.7
total	300	100.0

The ideal period of 20 - 25 GA was respected in half of the cases (52%). The control reveals an unacceptable quality of this item.

- **Study of iconography**

The distributions of iconography according to their presence were presented in **Table 5**.

The most frequently provided images are those of biometry with 67.3% for the abdomen, 73.3% for the femur and 85.3% for the BIP/CP. While morphology pictures are provided, at most, in only 10% of ultrasound scans.

The results of the qualitative analysis of the biometric iconography according to Nicolaides' criteria had been represented in the **Table 6** below.

According to our evaluation criteria, based on Salomon's work, the control revealed that the quality of biometrics was not very acceptable (good images rate below 75%).

The overall average score was 26.2/52 for all three biometric images, which was not acceptable.

The results of the qualitative analysis of morphological iconography according to Nicolaides' criteria were represented in the following **Table 7**.

According to our evaluation criteria, based on Nicolaides' work, the control revealed that the quality of the morphology was not acceptable (good images rate below 75%).

According to the same criteria, the average overall score for the 6 morphological images was 43.1/107, which was not acceptable.

The distribution of ultrasound scans according to the quality of the content of the conclusion is illustrated in **Table 8**.

The content control of the conclusion was acceptable in all items except the biometric data synthesis which was done in 4.6% of the ultrasounds.

Table 5. Distribution of ultrasound scans according to the presence or not of TCFE recommended images (n = 300).

Cliché recommended	number	Percentage %
Biparietal diameter/Cranial perimeter		
• Provided	256	85.3
• Not provided	44	14.6
Femur		
• Provided	220	73.3
• Not Provided	80	26.7
Abdomen		
• Provided	202	67.3
• Not Provided	98	32.7
Spines		
• Provided	30	10.0
• Not Provided	270	90.0
Stomach/diaphragm		
• Provided	12	4.0
• Not Provided	188	96.0

Continued

Kidneys		
• Provided	4	1.3
• Not Provided	296	98.7
Four cavities		
• Provided	2	0.7
• Not Provided	298	99.3
Face		
• Provided	2	0.7
• Not Provided	298	99.3
Large vessels		
• Provided	0	0.0
• Not Provided	300	100.0

Biparietal diameter/Cranial perimeter = BIP/CP.

Table 6. Quality of biometric sections provided in the iconographies.

Quality of the anatomical cut	Staff	Percentage %
BIP/CP		
• Satisfactory	64	25
• Unsatisfactory	192	75
Abdomen		
• Satisfactory	50	24.8
• Unsatisfactory	152	75.2
Femur		
• Satisfactory	2	4.3
• Unsatisfactory	218	95.4

Table 7. Quality of morphological sections provided in the iconographies.

Quality of the cut	Staff	Percentage %
Spine cutting		
• Satisfactory	14	46.7
• Unsatisfactory	16	53.3
Stomach/diaphragm cut		
• Satisfactory	0	0,0
• Unsatisfactory	12	100.0
Kidney cut		
• Satisfactory	0	0,0
• Unsatisfactory	4	100.0
Face cut		
• Satisfactory	0	0,0

Continued

• Unsatisfactory	2	100.0
Cut 4 cavities		
• Satisfactory	0	0.0
• Unsatisfactory	2	100.0
Large vessel cutting		
• Satisfactory	0	-
• Unsatisfactory	0	-

Table 8. Distribution of ultrasound scans according to the quality of the content of the conclusion (n = 300).

	number	Percentage
Number of fetuses		
• No	10	3.3
• Yes	290	96.7
Particularities of the examination conditions		
• No	6	2.0
• Yes	294	98.0
Synthetic elements of biometrics		
• No	286	95.4
• Yes	14	4.6
Morphological characteristics		
• No	12	4.0
• Yes	288	96.0

4. Discussion**• The characteristics of the population**

The characteristics of the patients allowed us to confirm that all age categories, as well as all socio-professional categories were studied. In fact, the pregnant women came from both rural areas (14%) and urban areas (86%). For age, the patients were between 18 and 45 years of age. The average age was 29.

As for the profession, housewives represented the largest group of our population with 55 patients, 36.66%, followed by civil servants (20%) and students (12.66%).

Observation of the proportion of women with a history of contraception showed that 34% of the pregnant women in our study population had a history of contraceptive use. Referring to the literature, this rate seems slightly high. Indeed Raj [11] in 2013 in Nepal had reported a rate of 21%. The difference between the results could be explained by the fact that our sample consisted of patients aged 18 to 45, all of whom had already had at least one pregnancy unlike Raj's sample, which was a population aged 15 to 24. On the other hand, Kennedy [12], in 2013 had a rate of 37%, a rate that is much closer to ours, because the

population concerned, like ours, included all age categories.

- **Study of ultrasound reports**

The patient's first and last name are mentioned in all ultrasound scans. This would reflect the fact that patient identification is an aspect of ultrasound reporting that is of very good quality. However, this quality can be improved as the patient's age only appears in 52.67%. The sonographer's surname, first name and qualification are mentioned in 94.67; 88% and 75.33% of ultrasound scans respectively. Such results would reflect an acceptable quality of this component, in line with the recommendations of the TCFE. Only the sonographer's address is present in only 40% of ultrasound scans.

It must be said that identification is an important aspect of quality for both the patient and the provider, because ultrasound has many medical and technical aspects.

The device used to perform the ultrasound only had its mark mentioned in 3 ultrasounds, or 2%. These results are very far from those of Delma [5] in 2014 which found the mark in 61.53%. This could be explained by the fact that, during his study, he would have considered the marks printed on the photographs rather than mentioned in the minutes.

Indeed, in our study we counted the marks mentioned in the report, in accordance with the recommendations of the TCFE [1].

Our results are closer to those of ZOUNGRANA [7] in 2012. This reinforces us in the idea that mentioning the brand of the device is not sufficiently anchored in the practice of our sonographers.

The type of the device does not appear in any ultrasound scan this result is the same as that of Delma [5] and that of Zoungrana [7] in Ouagadougou in 2012; which could mean that little importance is given to the characteristics of the ultrasound scanner. Yet this information would be useful for the practitioner to judge how much credit he or she would give to a particular outcome before making key decisions about its management.

- **Adequacy of the appointment**

We found that a little more than half (52%) of the ultrasound scans were performed between 20 and 25 weeks of amenorrhea. We find this score unacceptable. According to the recommendations of the TCFE [1], 2nd trimester screening ultrasounds must be performed between 20 and 25 weeks of fitting. This is the ideal time to screen for most fetal anomalies.

Our low score could be explained by the fact that, in our context, few prescribers and even fewer patients attach importance to the accuracy of the ultrasound appointment. It must also be recognized that even if the ultrasound is prescribed in good time, the financial means may be lacking to respect the ideal term of realization. This calls on the health authorities to subsidize this examination, which is a compulsory complement to the clinical examination. Moreover, Moifo *et al.* [13] in Yaoundé in 2013 found that only 52.56% of sonographers knew the term for performing a systematic first trimester ultrasound. This result

does not concern the second quarter but may nevertheless be a relevant indicator that would explain the low rate of ultrasound examinations performed at the right time.

- **Study of iconography**

The most frequently provided images are those of biometry with 67.3% for the abdomen, 73.3% for the femur and 85.3% for the BIP/CP. While morphology pictures are provided, at most, in only 10% of ultrasound scans. Fuchs *et al.* [14] in France, found that 100% of biometric and 95% of morphological images were provided. These figures, which are much higher than ours, can be explained by the specific nature of the French context. Indeed, the recommendations of the various TCFE reports in 2005 and 2010, as well as the legislative framework would encourage sonographers to provide these images. However Delma [5] in Ouagadougou found 79.3% femoral cuts, 80.04% abdominal cuts and 98.7% BIP/CP anatomical cuts. These closer results corroborate ours and can be explained by the fact that our studies were conducted within the same framework.

Our study revealed that the quality of biometrics was not acceptable. Indeed, the rate of good biometric images was less than 75%; with 25% for the BIP/CP cut; 24.8% for the abdomen cut and 4.3% for the femur cut. The overall average score was 26.2/52 for all three biometric images. Daher [15] in Paris in 2013 found a score of 45.5/52. This result reveals a major shortcoming in the performance of T2 ultrasound scans. Indeed, the morphological analysis of the fetus constitutes the fundamental element of the systematic ultrasound of the second trimester. An unacceptable quality would, in a stricter context than ours, have medico-legal consequences. The quality of the morphology should be excellent.

The study revealed that the quality of the morphology was also not acceptable, with less than 75% of images of good quality. Of the 6 morphological images, only the cut of the spine showed a non-zero percentage (46.7%) of good images. The average overall score for the 6 morphological images was 43.1/107. Fuchs [14], in France found a score of 90.9/107. This very important gap between our results and those of Fuchs [14] could be explained by the French medical practice framework which is very different from ours. But a study on the link between the location and quality of the ultrasound would be more appropriate to draw conclusions. In our study, morphological clichés were rarely provided (between 0% and 10%) which could explain why their quality is declining.

The difference between the rate of biometric sections provided and that of morphological sections (67.3% to 85.3% for biometrics against 0% to 10% for morphology), can be explained by the fact that biometric sections would be easier to perform, and/or would be considered by ultrasound specialists as almost indispensable. Moreover, these images would be of greater interest in the dating of pregnancy than in the quality of the conception product.

5. Conclusion

The objective of our study was to study the quality of second trimester ultrasound examinations in patients consulting in the Obstetrics and Gynecology

Department of the University Teaching Hospital Yalgado Ouedraogo. We found that patient and practitioner identification was of acceptable but perfectible quality, and that ultrasound identification was not mentioned in most cases. Our study also revealed that almost half of the ultrasounds were not performed at the optimal gestational age that the information provided on the fetus and its appendages was not complete and that the iconography provided was of poor quality for most sections. Practitioners should apply to improve ultrasound reports and especially to work together to harmonize practices, a guarantee of better maternal and child health in Burkina Faso.

Conflicts of Interest

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

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