

Contribution of Scanopelvimetry in the Prognosis of Childbirth at the Radiology and Imaging Department of the Mother-Child University Hospital the “Luxembourg”

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Abstract

Original Research Article

Aim: To study the contribution of scanopelvimetry to the prognosis of childbirth in the radiology and medical imaging department of the Mother-Child University Hospital “Le Luxembourg” **Materials and Methods:** This was a descriptive cross-sectional study with prospective collection involving 30 patients, who had performed CT scan for a suspected pelvic anomaly in the radiology and medical imaging department of the Mother-Child University Hospital “Le Luxembourg” between April 2021 and September 2022. The variables measured were sociodemographic data, the gynecological and obstetrical history of the pregnant woman, the reasons for requesting scanopelvimetry and the result of scanopelvimetry. **Results:** The prevalence of scanopelvimetry was 3.32% compared to all scans performed. The most represented age group was 21 to 30 years old (66.7%), second gestation was in the majority (46.7%), the majority of pregnant women did not have a living child (46.6%), cesarean section was the most represented obstetric history (46.7%), clinical suspicion of a narrowed pelvis was the most represented clinical information with 33.4%, promontor-retropubic diameter (PRP) measured at 11 mm was the most represented (46.7%), the median transverse diameter at 11 mm was the most represented (43.3%), the majority of pregnant women had a Magnin index between 21 and 22 cm (56.7%), cesarean section was the most represented method of delivery, i.e. 53.3% of cases. **Conclusion:** Le scanner hélicoïdal multi barrettes permet une nouvelle approche de la pelvimétrie répondant aux exigences des obstétriciens en privilégiant l’étude morphologique du bassin. La scanopelvimétrie permet au gynécologue obstétricien à partir des mensurations du bassin obstétrical d’évaluer le pronostic de l’accouchement, donc de planifier avec la patiente la voie d’accouchement.

Keywords: scanopelvimetry, “Le Luxembourg”, Prognosis of Childbirth, gynecological and obstetrical history of the pregnant woman, sociodemographic data.

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1. INTRODUCTION

Scanopelvimetry is a radiological means of exploring the bony pelvis in women with the aim of analyzing its structures and carrying out certain measurements which are necessary for the obstetrician to decide on the acceptability or not of birth through the natural route in certain pregnant women presenting specific obstetric situations: scarred uterus, breech presentation, macrosomia (estimated baby weight greater than 4.5 kg), acquired or congenital deformities of the bony pelvis [1].

Indeed, the morphological study of the pelvis, interesting as it is, does not provide information in establishing the prognosis of childbirth and it alone would not be sufficient to define the obstetric qualities of a pelvis. Nor to guide the course of action to be taken. It must be erased in all cases before scanopelvimetry [2].

Safe motherhood is one of the current priorities aimed at improving maternal and child health [3]. This is why the World Health Organization (WHO) recommended in 1986 labor monitoring and early

detection of dystocia as one of the most appropriate approaches to reduce maternal and infant mortality [4].

The birth canal, always stressed by the fetus during normal childbirth, can constitute an obstacle to progression, or can in certain cases lead to often serious consequences, among others: fetal trauma, vesico-vaginal or uro-fistulas, genito-digestive, symphyseal relaxation, fetal and/or maternal death [5]. According to the World Health Organization (WHO), dystocia ranks 6th with 8% of the direct causes of maternal mortality [6]. Indeed, alongside hemorrhages, infections and complications of high blood pressure during pregnancy, dystocia occupies a preponderant place among the preventable causes of maternal mortality [7]. Years of insecurity and political instability – as well as incomplete civil registration records – make it difficult to update figures, but those that are available are alarming. In 2017, the United Nations (UN) estimated the maternal mortality rate in Mali at 562 deaths per 100,000 live births [8].

Scanopelvmetry is becoming a common examination in daily medical practice, particularly in cases of suspected pelvic dystocia [9].

In Africa, few studies have been devoted to scanopelvmetry. With the aim of making a contribution to improving prenatal assessment, we carried out this study.

2. MATERIALS AND METHODS

2.1. Type and Period of Study

This was a descriptive, cross-sectional study with prospective collection.

The study took place over a period of 18 months from April 15, 2021 to September 15, 2022.

2.2. Study Population

We identified 30 patients during our study period who met the inclusion criteria.

2.3. Materials and Techniques for Carrying Out Examinations

A HITACHI brand Aquilion 16 device (multi-strip scanner) was used.

During the examination, the pregnant woman was placed in a supine position, her head towards the stand, her thighs slightly flexed. Millimetric helical acquisitions (0.5 to 1 mm) were performed over the entire pelvis without injection of contrast product. The landmarks were the upper end of the iliac wings for the upper limit and the greater trochanters for the lower limit. The voltage was at a low dose to minimize risks and the sections are reconstructed at a thickness of 2.5 mm and a reconstruction increment of 1.6 mm is used to obtain 50% overlapped images and thus improve multi-reconstruction. Planar. The average acquisition time was 5 seconds.

2.4. DATA COLLECTION AND ANALYSIS

Data collection was carried out based on the results of the scanopelvmetry.

These data were collected on a survey sheet see in the appendix and the parameters studied were:

- Sociodemographic data,
- The personal, medical, gynecological and obstetric history of the pregnant woman.
- The reasons for requesting scanopelvmetry.
- The result of the scanopelvmetry, diameters: Promonto-retropubic, medial transverse, maximal transverse, sacral cord, bispinous and Magnin index).

The text and tables were entered using Microsoft Office 2020 software. The statistical analysis of the data was carried out using SPSS v26 software.

2.5. Ethical Considerations

During the prospective phase, we informed the pregnant women about the importance of pelvimetry, the dangers of pelvic narrowing and the objectives of the study. Their consent was thus obtained and assurance was given that no results reported would allow the pregnant woman to be identified.

3. RESULTS

We collected a total of 1203 pelvic examinations during our study period, including 40 cases of scanopelvmetry. We retained 30 cases meeting our criteria, i.e. a frequency of 2.5%.

3.1. Sociodemographic Characteristics

Table I: Distribution of Patients by Age

AGE	NUMBER	PERCENTAGE
18-20	5	16.6
21-30	20	66.7
31-40	5	16.6
TOTAL	30	100%

The age group of 21 to 30 years was in the majority, i.e. 66.7% with an average age of 24.33 years, extremes of 15 to 35 and a standard deviation of 4.286.

Table 2. Distribution of Patients According to the Number of Pregnancies

NUMBER OF PREGNANCIES	NUMBER	PERCENTAGE
1	10	33.3
2	14	46.7
3	3	10.0
4	3	10.0
TOTAL	30	100%

The second gestation was in the majority with 46.7%.

Table 3. Distribution of Patients According to the Number of Living Children

NUMBER OF LIVING CHILDREN	NUMBER	PERCENTAGE
0	14	46.6
1	12	40.0
2	3	10.0
3	1	3.3
TOTAL	30	100%

The majority of pregnant women had zero (0) living children with 46.6%

Table 4. Distribution of Patients According to Obstetric History

OBSTETRIC HISTORY	NUMBER	PERCENTAGE
CAESAREAN SECTION	14	46.6
DYSTOCIA	3	10.00
ABORTION	2	06.66
NO HISTORY KNOWN	11	36.66
TOTAL	30	100%

Caesarean section was the most represented obstetric history with 46.7% (n=14).

Table 5. Distribution of Patients According to Scanopelvimetry Indications

SCANOPELVIMETRY INDICATION	NUMBER	PERCENTAGE
PELVIC STUDY	7	23.30
SEAT POSITION	1	03.30
DELIVERY PROGNOSIS	5	16.60
SUSPECTED NARROW PELVIS	10	33.40
SCARRED UTERUS	7	23.30
TOTAL	30	100%

Clinical suspicion of a narrowed pelvis was the most represented clinical information with 33.4%.

Table 6. Distribution of Patients According to Promonto Retro Pubic Diameter (Prp) Measurement

PROMONTO RETRO PUBIC MEASURE	NUMBER	PERCENTAGE
8 mm	1	03,30
10 mm	11	36,60
11 mm	14	46,60
12 mm	3	10.00
13 mm	1	03,30
TOTAL	30	100%

The promonto-retropubic (PRP) diameter measured at 11 mm was the most represented (46.7%).

Table 7. Distribution of Patients According to the Median Transverse Diameter Measurement

MEDIAN TRANSVERSE DIAMETER	NUMBER	PERCENTAGE
8 mm	0	0
10 mm	4	13.33
11 mm	12	40.00
12 mm	10	33.33
13 mm	4	13.33
TOTAL	30	100%

The median transverse diameter measured at 11 mm was the most represented (40%).

Table 8. Distribution of Patients According to the Magnin Index

MAGNIN INDEX	NUMBER	PERCENTAGE
<21 mm	2	06.66
21-22 mm	17	56.66
>23mm	11	36.66
TOTAL	30	100%

The majority of pregnant women had a Magnin index of between 21 and 22 cm, i.e. 56.7% of cases.

Table 9. Distribution of Patients According to Method of Delivery

METHOD OF DELIVERY	NUMBER	PERCENTAGE
NATURAL BIRTH	14	46.66
PROPHYLACTI CAESAREAN SECTION	16	53.33
TOTAL	30	100%

Caesarean section was the most common method of delivery, accounting for 53.3% of cases.

OBSERVATION 1

This is a 25-year-old, married with no known medical or surgical history. She was admitted for a CT

scan with indication: Clinical suspicion of a narrowed pelvis at 35 weeks + 5 days of ultrasound age with a cephalic presentation, posterior back. In whom the Magnin index = 22.1 cm (favorable). She gave birth vaginally without complications.

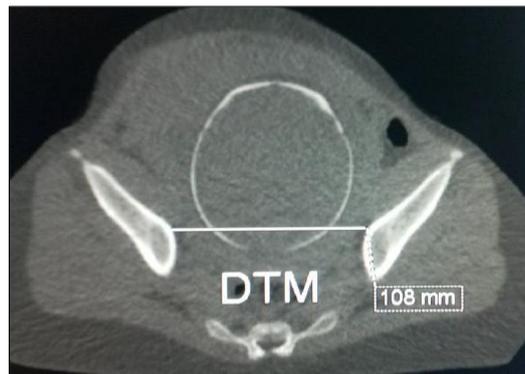


Figure 1: CT scan showing the measurement of the median transverse diameter of the pelvis.

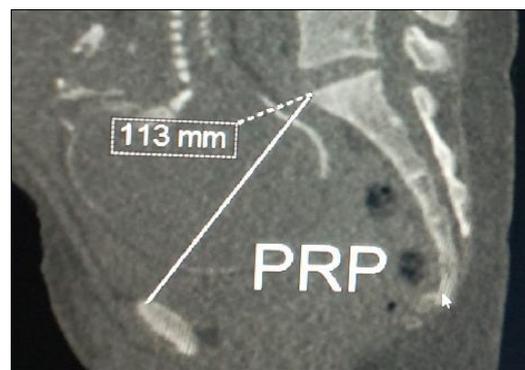


Figure 2: CT scan showing sagittal section of the promoto-retropubic diameter measurement of the pelvis

OBSERVATION 2

This is an 18-year-old, married with no known medical or surgical history. She was admitted for a scanopelvimetry with indication: study of the pelvis at 37

weeks of ultrasound age with a cephalic presentation, anterior back.

In whom the Magnin index = 22 cm (favorable). She gave birth vaginally without complications.



Figure 3: CT scan showing a sagittal section of the sacral arrow diameter measurement

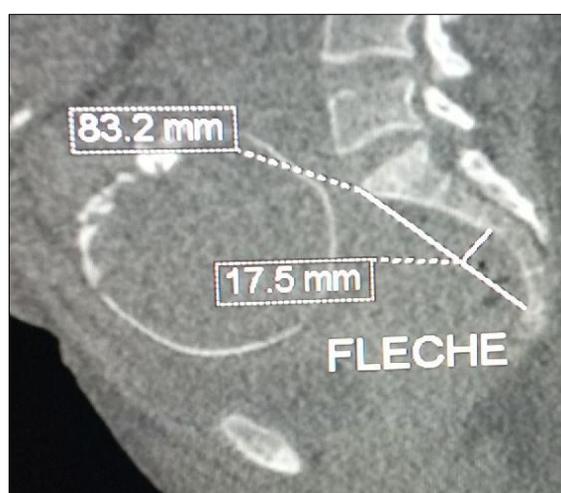


Figure 4: CT scan showing a sagittal section measuring the diameter of the pelvic chord.



Figure 5: CT scan showing a sagittal section of the measurement of the subsacro subpubic diameter of the pelvis

OBSERVATION 3

This is a 23-year-old married patient with no known medical or surgical history. She was admitted for a CT scan with indication: scarred uterus at 36 weeks

ultrasound age. In whom the Magnin index = 22.1 cm (favorable). She underwent a prophylactic cesarean section.



Figure 6: CT scan: Axial section showing the measurement of the bispinous diameter.

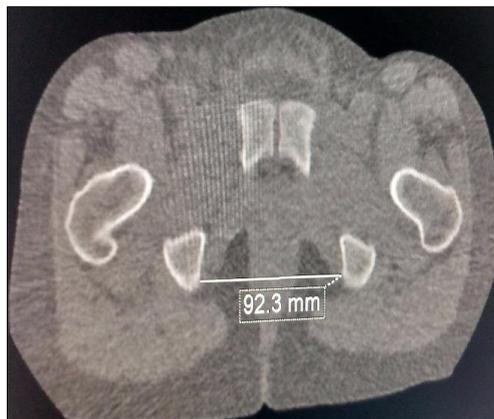


Figure 7: CT scan: Axial section showing the measurement of the bi-ischial diameter.

4. DISCUSSION

This was a cross-sectional descriptive study with prospective collection, which had limitations.

4.1. Limits of Our Study

The limits were:

- The multiple breakdowns of the scanning device
- The absence of a CT image storage system for a long period.

4.2. Epidemiological Aspects

In total, we collected 30 cases of scanopelvimetry out of 1203 pelvic scans carried out in the radiology department of the Mother-Child Hospital Center “Le Luxembourg” during our study period, i.e. an overall frequency of 2.5%. This frequency is comparable to that of TRAORE Y, who found in his study 36 cases of scanopelvimetry out of 9237 generalized scans carried out in the radiology and medical imaging department of the Mother-Child Hospital Center “Le Luxembourg” in Bamako, Mali [10].

4.3. Age

The age between 21-30 years was the most represented, i.e. 66.7% of cases. This relatively young interval is explained by the high rate of marriage and entry into sexual life; this result is comparable to that of

Dicko A [9], who found 79.16% age between 20-35 years and Kalapo F [11], who found 80% age between 20 - 35 years. Our result is slightly lower than that of Chaoui. A [12], who found 92.97% age between 17-32 years. This could be due to its sample size.

4.4. Clinical Data

In our study primigravidae represented respectively 46.7% of cases, Kalapo F [11], found 40% of primigravida cases, Traore Y [10], found 69.4% primigravidae. Our result is comparable to those of the previously cited authors.

Indications

In our study, 30.0% of prescribers requested scanopelvimetry with the clinical information “clinical suspicion of pelvic stricture”. This result is comparable to that of Kalapo F [11], found 50% cases. This demonstrates radio-clinical concordance.

The Anatomical Classification of the Pelvis

In our study, strictures of the upper strait were the most frequent, i.e. 36.7%. This result is comparable to those of Kalapo F [11], who found 40%, Cissé CT [7], who found 40% and Traore Y [10]. Generalized strictures reached 36.7% of patients

4.5. Anatomopathological Data

The Magnin index

In our study, the Magnin index was between 21 -23 in 56.7%; It was less than 21 in 06.7% and 36.6% of pregnant women had a Magnin index greater than or equal to 23 cm. These results are comparable to those of Kalapo F [11], who found a Magnin index less than 20 in 10%, that between 20-23 in 40% and a Magnin index greater than or equal to 23 cm in 50% of pregnant women.

4.6. Indication of the Route of Delivery Based on the Radiological Result

The radiological conclusion is that 10.1% of cases were poor pelvis cases and 36.7% of cases were normal pelvis cases.

In 53.4% of pelvises diagnosed radiologically with indication for prophylactic cesarean section whose Magnin index was between 21 - 23 cm. There were 50.0% of pregnant women who had had a cesarean section in favor of a narrowed pelvis; this result could be explained by the inadequacy of the clinic with regard to scanopelvimetry. This expresses the importance of Scanopelvimetry which allows, through prophylactic cesarean section, to spare the newborn from complications such as acute fetal suffering or even in-utero fetal death.

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