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The role of cervical ultrasound in the management of Threatened Premature Delivery (TPD) in Africa: Experience at the University Teaching Hospital of Bogodogo (UTH-B) in Burkina Faso

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Abstract
Introduction: The threat of premature delivery is very frequent in our labour context. Obstetric ultrasound is an essential tool in its management. To describe the predictive values of vaginal ultrasound of the cervix in the management of this pathology in an African university hospital, we conducted the present study.
Methods and Patients: This was a prospective cross-sectional study from December 2021 to May 2022 at the Bogodogo University Hospital in Burkina Faso. Our series included all pregnant women who consulted us for a threat of preterm delivery between the 28th and 34th weeks of amenorrhoea and who actually had a cervical measurement on admission to the department. The results were analysed using Epi info 3.3.2 software and the significance level was set at 5%.
Results: The frequency of threatened premature delivery was 1 in 37.7 deliveries. The mean age of the patients was 26.7 years, with extremes of 17 and 40 years. For a threshold of 25 mm for cervical length on ultrasound, the negative predictive value was 96.29% and the positive predictive value was 52.94%.
Conclusion: Vaginal ultrasound of the cervix has a good negative predictive value for threatened preterm birth at a threshold of 25 mm. Its systematic use in other birthing rooms should improve the management of threatened preterm birth in countries with limited resources, through better selection of patients for hospitalisation.

Keywords: Ouagadougou, cervical ultrasound, threat of preterm birth

1. Introduction
The rate of Preterm Birth (PTB) continues to rise despite the many advances made in obstetrics to improve pregnancy monitoring [1]. Preterm birth risk scores have proved disappointing, as they have both low sensitivity and poor negative predictive value. Similarly, the systematic practice of vaginal touching during antenatal consultations does not reduce the incidence of prematurity, and also leads to unnecessary hospitalisation [2].
Better identification of patients at risk of preterm birth is an essential prerequisite for reducing the incidence of prematurity. Endovaginal ultrasound of the uterine cervix is now part of this strategy, providing a new approach to the diagnosis and prognosis of threatened preterm birth [5, 6, 8]. In the present study, we report the experience of an African university hospital on the role of ultrasound measurement of the cervix in the management of threatened preterm birth.

2. Patients and Methods
Our study took place in the gynaecology-obstetrics department of the Bogodogo University Teaching Hospital in Ouagadougou (UTH-B). It was a prospective and descriptive study over a 6-month period from 1 December 2021 to 30 May 2022. Our study included all single or twin pregnancies of chronological age between 28 and 34 weeks of amenorrhea (WA) with intact membranes that were followed up until delivery in the department. We excluded from the study cases of threat who did not benefit from cervical measurement and those who did not give birth in the department.
Ultrasound was performed using a 5 and 7 MHz Endovaginal probe in a supine patient with an empty bladder. After placing the probe on the cervix, in sagittal section, the operator located the internal os (IO), the cervical canal and the external os (EO).

He then released pressure on the probe until the image faded, then gentle pressure was applied again to recreate a clear image of the cervix. The length of the cervix was then measured by placing a first cursor at the internal os (IO) and a second cursor at the external os (EO). At least two measurements were taken, and the smallest cervical length was recorded in the obstetrical record.

- Patients were then managed according to the department's protocol, which included bed rest, antenatal corticosteroid therapy (betamethasone, 2 injections of 12 mg at 24-hour intervals) and 48-hour tocolytic treatment with nicardipine or salbutamol. The threshold value for cervical length was set at 25 mm.
- Data were collected on a data collection form from the patient's computerised obstetrical record. They were then processed using Excel software Epi info version (6.04fr). The statistical test used to analyse the cross-tabulation of our variables was Pearson's chi-2 test and Fisher's test. The confidence level used was 95% with a risk of error of 5%. The difference is statistically significant if the p-value (level of significance) is less than 0.05.

3. Results

3.1 Frequency

During the study period, we recorded 122 cases of Threatened Premature Delivery (TPD) with intact membranes between 28 and 34 weeks of amenorrhoea for 3968 deliveries, i.e. 01 PAD for 37.7 deliveries. The frequency of TPD represented 3.07% of deliveries.

3.2 Social and demographic characteristics

- **Age:** The average age of our pregnant women was 26.7 years, with extremes of 17 and 40 years. The 19 to 29 age group was the most represented.
- **Parity :** Our pregnant women, 78.7% were nulliparous, 4.9% were multiparous and 16.4% were primiparous.
- **Number of fetuses:** In our series, 114 patients (93.4%) were carrying a single pregnancy and 08 patients (6.6%) were carrying a twin pregnancy.

Professional status of patients

In our series, 96 patients (78.7%) had a professional activity. The remaining 26 patients (21.3%) had no professional activity.

Patient history

In our series, 49.1% of our pregnant patients had a history of aspiration or curettage for voluntary termination of pregnancy**.**

3.3 Clinical and therapeutic characteristics of patients

- **Gestational age on admission:** In our series, 62.3% of our pregnant women had a gestational age on admission of between 33 and 34 weeks of amenorrhea and 37.7% between 28 and 32 weeks of amenorrhea.
- **Baumgarten score on admission:** In our series and at patient admission 65.6% of our pregnant women had a Baumgarten score greater than 6, 6.5% had a score between 3 and 6, 27.3% had a score of 3 or less.
- **Tocolysis:** Seventy-five-point four percent (75.4%) of our pregnant women were treated with nicardipine and 24.6% had benefited from tocolysis with salbutamol.

3.4 Prognostic criteria and prediction of preterm birth

The incidence of preterm birth as a function of cervical length for a threshold of 25mm is shown in Table 1.

Table 1: Incidence of preterm birth according to cervical length for a threshold of 25mm

Uterine cervix	Premature delivery	Delivery ≥ 37 WA	Total
Uterine cervix < 25 mm	36	32	68
Uterine cervix ≥ 25 mm	2	52	54
Total	38	84	122

WA: Week of amenorrhea

P=0.001, Positive Predictive Value (PPV)=52.94%, Negative Predictive Value NPV=96.29%, Sensitivity=94.73%, Specificity=61.90%.

4. Discussions

Since the introduction of cervical ultrasound in the management of TPD, many studies have evaluated ultrasound measurement of cervical length to predict the risk of preterm birth. The studies generally show a very high negative predictive value for Endovaginal ultrasound, with cervical length thresholds chosen differently from one study to another. The threshold is generally determined using an ROC (Receiver Operating Characteristic) curve, which explains the different threshold values in different studies [9, 10].

In our series with a threshold of 25 mm, the results show that ultrasound measurement of cervical length has an NPV of 96.30% with p=0.001. The positive predictive value, although less effective, remains significantly interesting (PPV=52.94%, p=0.001). Sensitivity was 94.73% and specificity 61.90%.

Our results are close to those of Rosenberg [9, 10] who reported at the same threshold an NPV of 89%, a PPV of 50%, a sensitivity of 75% and a specificity of 73%. They are also close to those of Iams [6] who evaluated the risk of premature delivery after tocolysis in 48 single pregnancies and 12 twin pregnancies. In this series the sensitivity was 100%, the specificity 44%, the PPV 55% and the NPV 100%. The results of Iams show that all patients hospitalised for PAD with a long cervix delivered at term.

In our series, among the 54 patients with a cervix ≥ 25 mm (considered as long cervix), 02 patients delivered prematurely. After analysis of the records, the patients had several risk factors: Twin pregnancies obtained by in vitro fertilisation, gravidic arterial hypertension and a history of curettage.

These data show that in a population at risk of premature delivery, patients with a long cervix, i.e. greater than or equal to 25 mm, most often deliver at term. A certain number of preterm deliveries may occur on a cervix considered long, particularly in patients with a high number of risk factors.

Our results are in line with the literature, where cervical shortening increases the risk of preterm birth. The shorter the cervix, the greater the risk of preterm birth. Numerous sources report that the frequency of preterm delivery before 35 weeks' gestation is 20% for a cervix length of less than 20mm, and 7% for a cervix length of less than 30mm [3, 4, 7]. The introduction of this tool would be very welcome in our hospitals, in order to make a rigorous selection of patients for hospitalisation in a context where there is a shortage of space.

5. Conclusion

Endovaginal ultrasound of the uterine cervix is an effective tool for selecting true threats of preterm birth at a threshold of 25 mm. Thanks to its good negative predictive value, it avoids unnecessary hospitalisation and tocolysis. Its systematic use in other birthing rooms should improve the management of

threatened preterm birth in countries with limited resources, where hospitals have insufficient capacity.

Conflict of Interest
Not available

Financial Support
Not available

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