

Uterine artery pulsatility index assessment at 11 and 13+6 weeks gestation: A comparative study in Ecuador

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Abstract

Early detection of preeclampsia remains a challenge to the health system to reduce maternal and neonatal mortality rates. Using the mean uterine artery pulsatility index (MeanUAPI) with other maternal markers could contribute to comprehensive care during pregnancy. We performed a cross-sectional study in 579 women to evaluate if there is a difference in MeanUAPI values using two different insonation routes by pulsed Doppler transabdominal (TA) and transvaginal (TV) in patients without risk factors between 11-13 + 6 weeks of pregnancy in two cities located in highlands of Ecuador. The average age was 29 years. A total of 376 (65%) patients were evaluated via TA with a MeanUAPI of 1.61 points. While 203 (35%) were evaluated via TV with a MeanUAPI of 1.57 points, the statistical test did not find a statistically significant difference between the two ways ($p=0.406$). Therefore, any route could be used to predict preeclampsia with this method during this period.

Keywords: Mean uterine pulsatility index; uterine artery Doppler; preeclampsia; Ecuador.

Introduction

Preeclampsia is one of the leading causes of maternal and neonatal mortality rates in low and middle countries. Currently, evidence has demonstrated that abnormal placentation and uterine hypoxia are linked with a high prevalence; likewise, studies have pointed to adolescent pregnancy as a significant cause-related [1,2]. Therefore, early detection of hypertensive diseases during pregnancy could reduce adverse health outcomes and the impact on the health system in terms of mortality, cost, and quality care. Nowadays, studies have documented how using doppler ultrasound evaluation in pregnant since via transabdominal (TA) and transvaginal (TV) in the first trimester joint other biomarkers could predict preeclampsia and intrauterine growth retardation (IUGR) [3, 4, 5]. Furthermore, available researchers have indicated that MeanUAPI values using two different insonation routes have significantly different values, higher for the TV approach [3, 6]. In Latin America and the Caribbean region (LAC), preeclampsia is the primary hypertensive disorder and the most significant cause of maternal deaths, and a similar or worst situation occurs in Ecuador. [7, 8].

Moreover, it is the leading cause of the maternal mortality

rate. In this context, a few studies have been conducted to determine the relation between pulsatility index changes and preeclampsia. [9, 10]. This study aimed to assess if there is a significant difference in the quantification of MeanUAPI between 11-13+6 weeks of gestation in pregnant women without risk factors through TA and TV pulsed Doppler insonation.

Materials and Methods

A cross-sectional study was selected for this study. In 2019, a total of 579 patients who received medical care in two maternal units in Quito (altitude 2850 mt) and Ambato (altitude 2577 mt) were included according to inclusion criteria (uncomplicated pregnancy between 11 - 13 + 6 weeks adjusted for CCL, no comorbidities, no personal or family history of preeclampsia and gestational hypertension). The Doppler ultrasound was performed by a physician's gynecologist professionally trained following the protocol recommended by the International Society of Ultrasound in Obstetrics & Gynecology (ISUOG). All TA ultrasounds were realized using Samsung HS40 equipment, while TV ultrasound was performed with a Voluson E8 Expert BT 14 ultrasound machine GE Healthcare Technologies. Measures of MeanUAPI from the right and left uterine artery, fetal caudal skull length (CCL), and chronologi-

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cal gestational age concerning CCL were calculated in each patient. Data were analyzed using JAMOV 1.2.17.0 software. All participants signed the informed consent.

Results

Of the 579 patients enrolled in this research, 376 were evaluated by TA and 203 by TV. The average age was 29 years (SD 7.19), and the mean CRL was 65 mm (SD 8.22). The average gestational age was 12.4 weeks (SD 0.56). A 4.1% (24) corresponded to the group 11-11 + 6 weeks, 51.1% (296) corresponded to the group 12- 2 + 6 weeks and 44.7% (259) to the group of 13-13 + 6 weeks. The average value for the Mean UAPI measured TA was 1.60 (95% IC: 1.53-1.68), while for the mean UAPI measured TV, it was 1.56 (95% IC: 1.50-1.62) (**Table 1**). Statistical analysis by Student's test; did not find a statistically significant value comparing the two assessment ways TA and TV (*p-value* 0.406).

Table 1: Main characteristics of patients by doppler evaluation and gestational age.

N=579	mean	min	max	P
Age	29.0	14	47	
LCC	65.8	45	84	
TV=203	1.60	0.64	3.69	0.406
TA=376	1.56	0.46	3.34	
Gestational age	Count	% of Total	Cumulative %	
11-16+6	24	4.1	4.1	
12-12+6	296	51.1	55.3	
13-13+6	259	44.7	100.0	

TTV: Transvaginal. TA: Transabdominal, MeanUAPI: mean pulsatility index of the uterine arteries.

Discussion

This study's results show no significant difference between the MeanUAPI values in pregnant women without risk factors between 11-13 + 6 weeks measured by pulsed Doppler in different pathways. Thus, this would be the first work in Latin America to carry out this comparative study. Although there are studies that have found values with a significant difference in MeanUAPI according to the ultrasound approach, higher values obtained for the TV approach [11]. The methodological measurement performed on the same patient and at the same time could explain the different results found in our study, which was performed in two groups of patients in two different units, and with two different ultrasound equipment. The choice of the evaluation route would depend on factors that technically limit the study, for example, the patient's body mass index. We recommended that MoH include in national practice guidelines for pregnant women to measure MeanU-

API in this context, as other researchers have recommended [12].

Conclusions

Our study did not find significant differences between the values of the MeanUAPI measured by Doppler ultrasound using the TA route versus the VT route. Therefore, performing the Doppler study of the uterine arteries in the first trimester of pregnancy evaluation could predict preeclampsia or IUGR early using any approach.

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