Letter to the Editor

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Pulmonary Artery Diameter During Pregnancy

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Dear Editor

Pregnancy is associated with various physiological adaptations, including alterations in the cardiovascular system and hemodynamic parameters. Reduction of systemic vascular resistance and mean arterial pressure, an increase in plasma volume, heart rate, and cardiac output are among normal physiological changes that occur throughout pregnancy (1).

Vascular changes are an important part of physiological adaptations during pregnancy. It has been shown that under the influence of hormonal factors, aortic stiffness decreases and its diameter increases during gestation (2). Pulmonary vasculature may also be affected during pregnancy. Due to constraints regarding the use of imaging modalities for pregnant women, limited data are available about alterations of the pulmonary vascular tree throughout gestation.

In this study, we aim to evaluate changes in the diameters of the main pulmonary artery (MPA) and its right and left branches in pregnant women compared with non-pregnant participants, to provide data that can improve our understanding of the physiological changes of pregnancy.

This cross-sectional retrospective study was conducted from August 2016 to July 2017, in Shahid Faghihi and Namazi Hospitals, Shiraz University of Medical Sciences (SUMS), Shiraz, Iran. We included two groups: (1) Study Group: 30 pregnant women aged between 20 to 40 years old suspected of pulmonary thromboembolism (PTE); (2) Control Group: 53 matched non-pregnant women in a similar age range suspected of PTE. Cases with a previous history of pulmonary or cardiac disease with possible effect on pulmonary vasculature, including any chronic lung disease, systemic or pulmonary hypertension, cardiac surgery, PTE, or abnormal echocardiography, were excluded. Both groups were followed for 3 months. Ethics Committee of SUMS approved this research (IR.SUMS.MED.REC.1399.472).

All participants were evaluated using pulmonary computed tomographic angiography (CTA). Diameters of main (MPA), right (RPA), and left (LPA) pulmonary arteries, and ascending (AA) and descending aorta (DA) were assessed by INFINITT PACS software (INFINITT Healthcare, South Korea) and compared between the two groups. Additionally, the ratio of diameters of MPA to AA was calculated and compared. CTA images were evaluated by two physicians separately, a radiologist and a pulmonologist. Data was analyzed using SPSS Software (SPSS Inc., Chicago, Ill., USA). Descriptive statistics, Mann-Whitney, and the T-test were used for this purpose.

Study participants had no significant underlying cardiopulmonary disease. For all cases, PTE was ruled out using lung CTA. All patients were followed for 3 months, and none of them developed any pulmonary or cardiac event.

After comparison of diameters of selected vessels (Table 1), no significant statistical difference was found between pregnant and non-pregnant participants regarding values of diameters of MPA (P-value: 0.259), RPA, and LPA (P-values: 0.108 and 0.27, respectively), AA (P-value: 0.365), and DA (P-value: 0.495). In addition, no significant difference was found between the two groups regarding mean values of ratios of diameters of MPA to AA (0.99±0.11 and 0.98±0.17 for pregnant and non-pregnant women, respectively; P-value: 0.7) (Table 2).

Table 1. Comparison of diameters of MPA, RPA, LPA, AA, and DA between the two study groups. A P-value level less than 0.05 was considered significant.

Variable (Diameter of) (mm)	Study Group	Mean(mm)	Standard Deviation	Minimum(mm)	Maximum(mm)	P-value
Main Pulmonary Artery (MPA)	Pregnant	28.373	3.564	21.24	35.00	0.259
	Non-pregnant	27.301	4.414	19.00	40.80	
Left Pulmonary Artery (LPA)	Pregnant	19.560	2.615	14.58	25.54	0.27
	Non-pregnant	18.243	2.533	14.00	24.34	
Right Pulmonary Artery (RPA)	Pregnant	19.840	2.176	15.00	23.71	0.108
	Non-pregnant	18.775	3.185	13.32	29.50	
Ascending Aorta (AA)	Pregnant	28.604	2.763	22.01	33.81	0.365
	Non-pregnant	27.955	3.297	20.84	34.60	
Descending Aorta (DA)	Pregnant	21.575	2.521	16.49	27.23	0.495
	Non-pregnant	21.232	1.985	17.19	25.66	

Research on 126 adult non-pregnant cases (19 to 46 years old) with normal lung parenchyma, normal echocardiography, and normal pulmonary pressure reported mean diameters of MPA, RPA, and LPA, 29.5, 19.8, and 22.1 mm, respectively (3). Nevertheless, few previous studies evaluated physiological changes of the pulmonary vascular tree during pregnancy. A previous cohort study evaluated the diameter of the MPA of 69 pregnant women, early in pregnancy, during gestation, and after delivery. Participants of this study had normal echocardiographic findings. Results of this work showed that the diameter of the pulmonary artery can increase up to 10 mm during pregnancy, particularly between the 2nd and 3rd trimesters (4). Volume overload and a decrease in vascular resistance were suggested as possible explanations (4). A decrease in pulmonary vascular resistance keeps pulmonary artery pressure unchanged during normal pregnancy (5). Our findings showed that the diameters of major pulmonary vessels were greater in pregnant than non-pregnant participants, although the difference was not statistically significant.

Our study had some limitations. We assessed a small sample size. Secondly, due to the retrospective nature of our work and ethical concerns, we included only patients who underwent pulmonary CTA based on physician suspicion, and we could not recruit cases at different gestational ages.

Table 2. Ratio of diameters of MPA to AA

Variable (Diameter) (mm)	Study Group	Mean	Standard Deviation	Minimum	Maximum	P-value
Main pulmonary artery (MPA) / Ascending aorta (AA)	Pregnant	0.99	0.11	0.74	1.23	0.7
	Non-pregnant	0.98	0.17	0.69	1.70	

CONCLUSION

We showed that physiological alterations in the diameters of major branches of pulmonary vessels are not statistically significant during pregnancy. However, future investigations are required to achieve more certainty on this finding.

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