http://www.cjmb.org doi 10.34172/cjmb.2011

Open Access Editorial

APMI Press
Aras Part Medical International Press
A scientific publishing imprint of PMC Pharmaceutique France

Crescent Journal of Medical and Biological Sciences
Vol. 13, No. 4, October 2026, 162–163
eISSN 2148-9696

Fetal Cardiac Function Assessment in Preeclampsia: Are Conventional Doppler Parameters Enough?

Ebu Bekir Sıddık Yılmaz[1*], **Rüveyda Yıldız**[2]

Preeclampsia remains a major cause of maternal and perinatal morbidity and mortality and represents a complex disorder of placental and cardiovascular maladaptation. In current clinical practice, fetal surveillance in pregnancies complicated by preeclampsia relies largely on fetal growth assessment, cardiotocography, and Doppler evaluation of the fetoplacental circulation. Umbilical artery (UA) Doppler reflects placental vascular resistance, whereas middle cerebral artery (MCA) Doppler and the cerebroplacental ratio (CPR) provide information about fetal circulatory redistribution. In more advanced cases of placental insufficiency, ductus venosus assessment may provide additional information on fetal hemodynamic deterioration (1). These tools are indispensable in modern perinatal medicine. Nevertheless, an important question remains: do they fully characterize the fetal cardiovascular response to preeclampsia?

The distinction between vascular adaptation and myocardial function may be particularly relevant. Increased placental vascular resistance exposes the fetal heart to altered loading conditions and increased afterload. Conventional Doppler can identify changes in downstream vascular resistance and redistribution of cardiac output, but these measurements do not directly quantify myocardial performance. Therefore, fetal myocardial dysfunction could theoretically coexist with relatively preserved conventional Doppler findings, particularly during earlier stages of cardiovascular adaptation.

The myocardial performance index (MPI), or Tei index, offers an attractive method for investigating this additional dimension of fetal physiology. By incorporating isovolumetric contraction time (IVCT), isovolumetric relaxation time (IVRT), and ejection time (ET), MPI provides a combined assessment of systolic and diastolic cardiac performance (2). However, evidence regarding its role in preeclampsia has not been entirely consistent. An earlier study reported no significant difference in modified MPI between fetuses of preeclamptic and uncomplicated pregnancies. In contrast, subsequent investigations demonstrated abnormalities in cardiac time intervals and tissue Doppler parameters suggestive of subclinical systolic and diastolic dysfunction (3,4). This heterogeneity probably reflects differences in disease severity, gestational age, fetal growth, methodology, and measurement technique.

Recent findings have renewed interest in this question. In our prospective study of 224 pregnancies complicated by preeclampsia, severe disease was associated with higher Tei index, IVCT, and IVRT, and shorter ET compared with non-severe preeclampsia. IVRT and the Tei index also showed relatively strong cohort-specific discrimination for severe disease, whereas discrimination for neonatal intensive care unit admission was limited (5). These findings should not be interpreted as evidence that cardiac functional parameters can replace established Doppler surveillance. Rather, they suggest that myocardial performance may reflect a component of fetal cardiovascular stress that is not completely represented by vascular Doppler parameters alone.

The emerging evidence from myocardial deformation imaging further supports this possibility. A recent systematic review and meta-analysis evaluating fetal cardiac function in preeclampsia found consistent evidence of impaired right ventricular global longitudinal

Ebu Bekir Sıddık Yılmaz, MD, is an Obstetrician and Gynecologist and currently a fellow in Perinatology at Ankara City Hospital, Ankara, Türkiye. He graduated from Kırıkkale University Faculty of Medicine and completed his residency training in Obstetrics and Gynecology in 2022. He subsequently worked as an obstetrician-gynecologist before beginning his fellowship training in Perinatology. His academic and clinical interests include preeclampsia, fetal growth restriction, fetal Doppler ultrasonography, fetal echocardiography, and fetal cardiac function. His research particularly focuses on fetal cardiovascular adaptation in placental disorders and the potential role of advanced Doppler and cardiac functional parameters in predicting disease severity and perinatal outcomes. He has authored and co-authored scientific articles published in international peer-reviewed journals.

Received 2 September 2026, **Accepted** 27 September 2026, **Available online** 16 October 2026

[1]Division of Perinatology, Department of Obstetrics and Gynecology, Ankara City Hospital, Ankara, Türkiye.
[2]Department of Obstetrics and Gynecology, Şanlıurfa City Hospital, Şanlıurfa, Türkiye.
*Corresponding Author: Ebu Bekir Sıddık Yılmaz, Email: drebubekiryilmaz71@gmail.com

strain. At the same time, alterations in several conventional functional indices were less consistent (6). Speckle-tracking echocardiography may therefore identify subtle myocardial dysfunction that is not captured by conventional measurements. However, dependence on image quality, equipment, software, acquisition technique, and operator expertise currently limits widespread clinical application.

The crucial question is therefore not whether cardiac functional assessment should replace UA, MCA, CPR, or ductus venosus Doppler. It should not. Rather, the question is whether myocardial assessment provides incremental prognostic information when added to established fetal surveillance. A fetus may demonstrate increased placental resistance, cerebral redistribution, myocardial dysfunction, or combinations of these abnormalities, potentially representing different components or stages of cardiovascular adaptation. Integrating vascular and cardiac information could therefore provide a more comprehensive representation of fetal cardiovascular status than either approach alone.

Before such an approach can enter routine practice, several important gaps must be addressed. Standardized acquisition techniques and gestational-age-specific reference ranges are required, particularly for MPI and deformation imaging. Longitudinal studies should determine whether deterioration in myocardial function precedes, accompanies, or follows abnormalities in conventional Doppler parameters. Most importantly, future studies should evaluate whether adding cardiac functional parameters to established surveillance models improves the prediction of clinically meaningful outcomes, including fetal compromise, emergency delivery, neonatal intensive care unit admission, and perinatal morbidity.

Conventional Doppler remains the cornerstone of fetal hemodynamic assessment in preeclampsia, but it may not tell the entire cardiovascular story. The fetal heart is not merely a passive recipient of placental dysfunction; it actively adapts to altered loading conditions and hypoxemic stress. Moving from an isolated assessment of vascular resistance toward an integrated evaluation of fetoplacental circulation and myocardial performance may represent the next step in understanding fetal adaptation to preeclampsia. Whether this additional information can ultimately improve clinical decision-making and timing of delivery remains a question that prospective, externally validated studies must answer.

Competing Interests
The authors declare no competing interests.

Ethical Issues
Not applicable.

Funding
No specific funding was received for this work.

Authors' Contribution
Conceptualization: Ebu Bekir Sıddık Yılmaz.
Investigation: Ebu Bekir Sıddık Yılmaz, Rüveyda Yıldız.
Writing–original draft: Ebu Bekir Sıddık Yılmaz.
Writing–review & editing: Rüveyda Yıldız.

References

1. Sotiriadis A, Hernandez-Andrade E, da Silva Costa F, et al. ISUOG Practice Guidelines: role of ultrasound in screening for and follow-up of pre-eclampsia. Ultrasound Obstet Gynecol. 2019;53(1):7-22. doi:10.1002/uog.20105
2. Maheshwari P, Henry A, Welsh AW. The fetal modified myocardial performance index: is automation the future? Biomed Res Int. 2015;2015:215910. doi:10.1155/2015/215910
3. Api O, Balcin Emeksiz M, Api M, Ugurel V, Unal O. Modified myocardial performance index for evaluation of fetal cardiac function in pre-eclampsia. Ultrasound Obstet Gynecol. 2009;33(1):51-57. doi:10.1002/uog.6272
4. Uyan Hendem D, Oluklu D, Beser DM, et al. Evaluation of fetal cardiac functions in preeclampsia: Does the severity or proteinuria affect fetal cardiac functions? J Ultrasound Med. 2023;42(10):2415-2424. doi:10.1002/jum.16268
5. Yılmaz EBS, Özler MR, Sağlam E, et al. Fetal cardiac function and Doppler parameters in relation to preeclampsia severity and neonatal outcomes. Sci Rep. 2026. doi:10.1038/s41598-026-73236-w
6. Loza-Hernandez F, Ochoa-Lantigua P, Loza-Peñafiel H, Sanchez-Cobo D. Fetal cardiac function and global longitudinal strain in preeclampsia: a systematic review and meta-analysis. Prenat Diagn. 2026;46(2):201-209. doi:10.1002/pd.70061

© 2026 The Author(s); This is an open-access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.