HHS Public Access

Author manuscript

JACC Heart Fail. Author manuscript; available in PMC 2024 September 01.

Published in final edited form as:

JACC Heart Fail. 2023 September ; 11(9): 1229–1230. doi:10.1016/j.jchf.2023.04.013.

Ischemic and Nonischemic Heart Failure After Pregnancy-Induced Hypertension:

Another Piece of the Puzzle*

Natalie A. Bello, MD, MPH

Smidt Heart Institute, Cedars-Sinai Medical Center, Los Angeles, California, USA.

Keywords

cardio-obstetrics; heart failure; preeclampsia; pregnancy-induced hypertension; sex-specific risk factors

Hypertension has long been understood to be a leading contributor to the development of both ischemic and nonischemic heart failure. More recently, attention has turned to better understanding the role pregnancy-induced hypertensive disorders may play in the development of heart failure. Previously thought to be transient conditions that were self-limited to the 40 weeks of pregnancy, pregnancy-induced hypertensive disorders, including gestational hypertension and preeclampsia/eclampsia, are now recognized to be associated with a heightened risk of future heart failure.[1,2] Along with other sex-specific reproductive factors, pregnancy-induced hypertensive disorders may be an important, previously underappreciated risk factor for the development of heart failure that partially explain why traditional risk prediction models underperform in women compared with men. Unfortunately, given a lack of reproductive history in most existing cohort studies and clinical trials, examining this association overall and by heart failure subtypes has been a challenge that few prior studies have been able to address.

In this issue of JACC: *Heart Failure*, Mantel et al[3] add to the evidence base by providing information about the incidence of ischemic and nonischemic heart failure after pregnancies exposed to gestational hypertension and/or preeclampsia using data from the Swedish Medical Birth Register in conjunction with several other country-wide health databases.

This longitudinal, population-based cohort study examined 79,334 primiparous Swedish women with a history of gestational hypertension and/or preeclampsia identified using ICD codes and 396,334 women with no history of pregnancy-induced hypertension matched by maternal age and year of delivery. The investigators included a blanking period of 6 months postpartum before initiating follow-up for the development of ischemic and nonischemic

*Editorials published in JACC: *Heart Failure* reflect the views of the author and do not necessarily represent the views of JACC: *Heart Failure* or the American College of Cardiology.

ADDRESS FOR CORRESPONDENCE: Dr Natalie A. Bello, Smidt Heart Institute, Cedars-Sinai Medical Center, 127 South San Vicente Boulevard, Suite 3100, Los Angeles, California 90048, USA. NatalieAnn.Bello@cshs.org.

heart failure to exclude individuals who developed peripartum cardiomyopathy. After a median follow-up of 13.2 years, women with a history of pregnancy-induced hypertension had a 1.7-fold (95% CI: 1.51–1.91) higher hazard of developing heart failure (3.3 vs 1.8 per 10,000 person-years) compared with women who remained normotensive during pregnancy, and when examined by subtype, nonischemic heart failure was more common than ischemic heart failure in both cases and control subjects, though the associations between exposure to pregnancy-induced hypertension were stronger for ischemic than nonischemic heart failure (adjusted HR: 2.08 [95% CI: 1.44–3.00] vs 1.60 [95% CI: 1.40–1.83]). Further, women who developed heart failure in this cohort did so early in their lifespan, between ages 45 and 50 years, and interestingly, incidence rates and rate differences between cases and control subjects were highest within the first 6 years following a hypertensive pregnancy exposure.

Although this study adds important information about the increased risk of heart failure after pregnancy-induced hypertension, there are several limitations that should be noted. First, it does not prove a causal association between pregnancy-induced hypertension and heart failure, though there does appear to be a strong association as has been shown in other studies looking at heart failure overall. And although proving causation will be a challenge, an important next step will be to determine how much of this association is mediated by the development of chronic medical conditions such as hypertension postpartum. When left untreated, high blood pressure contributes to the development of both structural and functional cardiac abnormalities that can directly increase risk for the development of symptomatic heart failure, not only through its associations with myocardial infarction and ischemic heart disease, but also through its contribution to cardiac remodeling and diastolic abnormalities. Although many potential prepregnancy confounders such as diabetes, renal failure, lupus, and rheumatoid arthritis were included in the adjusted models, in addition to age, body mass index, and smoking status, postpregnancy comorbidities were not. Individuals with a history of pregnancy-induced hypertension are at increased risk of developing sustained hypertension, which as previously noted is an important risk factor for the development of both ischemic and nonischemic heart failure, and they may synergistically interact with one another.[4]

The other 2 notable limitations may act to bias the findings of this study toward the null. Although individuals with chronic hypertension before pregnancy were excluded from this study, those with hypertension from conception to 20 weeks were not excluded. The potential misclassification of individuals with chronic hypertension as normotensive may reduce the observed HRs for both ischemic and nonischemic heart failure. Lastly, the blanking period of 6 months postpartum to exclude individuals with peripartum cardiomyopathy also acts to diminish the associated hazard for nonischemic heart failure given the known heightened risk for peripartum cardiomyopathy in individuals with a history of preeclampsia.[5] Thus, the increased rate of ischemic heart failure relative to nonischemic heart failure, particularly in the earliest postpartum time period, is likely to be an overestimation of relative risk, and an underestimation of the absolute risk for nonischemic heart failure.

This work by Mantel et al[3] contributes an important missing piece of the puzzle of our understanding of heart failure risk after pregnancy-induced hypertensive disorders,

by adding information about risk for ischemic and nonischemic heart failure subtypes. Confirming prior work showing that pregnancy-induced hypertensive disorders are a previously underrecognized risk factor for heart failure, this study provides additional weight to our evidence base and support for future studies examining the impact of the addition of this piece of reproductive history as a risk factor in heart failure prediction models, as well as potential interventional studies aimed at examining strategies for reducing heart failure risk after impacted pregnancies. There are many additional pieces that still need to be added to our puzzle to complete the full picture of our understanding of heart failure risk in women.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

Dr Bello has received grant support from National Institutes of Health grants K23-HL136853 and R01-HL153382.

REFERENCES

1. Okoth K, Chandan JS, Marshall T, et al. Association between the reproductive health of young women and cardiovascular disease in later life: umbrella review. BMJ. 2020;371:m3502. 10.1136/bmj.m3502 [PubMed: 33028606]
2. Lo CCW, Lo ACQ, Leow SH, et al. Future cardiovascular disease risk for women with gestational hypertension: a systematic review and meta-analysis. J Am Heart Assoc. 2020;9: e013991. 10.1161/jaha.119.013991 [PubMed: 32578465]
3. Mantel Ä, Sandström A, Faxén J, et al. Pregnancy-induced hypertensive disorder and risks of future ischemic and nonischemic heart failure. J Am Coll Cardiol HF. 2023;11:1216–1228.
4. Yeh JS, Cheng HM, Hsu PF, et al. Synergistic effect of gestational hypertension and postpartum incident hypertension on cardiovascular health: a nationwide population study. J Am Heart Assoc. 2014;3:e001008. 10.1161/JAHA.114.001008 [PubMed: 25389282]
5. Bello N, Rendon ISH, Arany Z. The relationship between pre-eclampsia and peripartum cardiomyopathy: a systematic review and meta-analysis. J Am Coll Cardiol. 2013;62:1715–1723. 10.1016/j.jacc.2013.08.717 [PubMed: 24013055]