Comprehensive Research Experience for Medical Students
Summer Research Program 2019

Supervisor/Project Information Form
Due February 20 2019 by email to crems.programs@utoronto.ca

Supervisor Name: Dr. Nir Melamed

Project Title: The Predictive Value of Sonographic Placental Study for Placental Complications in Women with Chronic Kidney Disease

Hospital/Research Institution: Sunnybrook Health Sciences Centre

Email: nir.melamed@sunnybrook.ca

Field of Research (2 keywords): preeclampsia, kidney disease

Department: OBGYN

School of Graduate Studies Appointment (IMS, LMP, IHPME etc)? Yes: If YES, please name: IMS

Project Title: The Predictive Value of Sonographic Placental Study for Placental Complications in Women with Chronic Kidney Disease

Brief Project Description (<300 words):

BACKGROUND

Preeclampsia (PET) and fetal growth restriction (FGR) are two common pregnancy complications that are attributed to placental dysfunction.[1, 2] One of the most important tools for the prediction of these complications in women at high risk for PET and FGR is a sonographic placental study that involves assessment of placental dimensions, placental morphology, umbilical cord, and uterine artery Doppler.[3-7]

Women with chronic kidney disease (CKD) represent one of the most challenging groups of pregnant patients who are at a very high-risk of pregnancy complications, including PET and FGR.[8-11] Therefore, early screening for these complications in women with CKD is of major importance. However, data on the prediction of placental complications in this very high-risk

group are limited. Specifically, there are no data are on the rate of sonographic placental abnormalities and their predictive value for placental complications in this population. We hypothesize that the predictive value of this tool will be especially high in women with CKD given the higher baseline risk (i.e., pre-test probability) PET and FGR in this population. The Pregnancy and Kidney Disease (PreKid) Clinic at a Sunnybrook Health Sciences Centre has the largest population of young pregnant women with CKD in North America, and as such, is uniquely poised to expand knowledge in this most vulnerable patient population.

OBJECTIVE

To determine the rate and predictive value of sonographic placental abnormalities for PET and FGR in women with CKD.

METHODS

Study design: Retrospective cohort study.

Population: Women with CKD and a singleton pregnancy followed in Sunnyrbook (2010-2018).

Primary outcome: Early onset PET.

Secondary outcome: Overall PET, FGR, preterm birth, placental abruption, and perinatal mortality and morbidity.

Protocols: All pregnant women in Sunnybrook who are at high risk of PET or FGR, including women with CKD, undergo sonographic placental study between 16-22 weeks. The placental study includes assessment of placental dimensions, placental morphology, umbilical cord, and uterine artery Doppler.

Data analysis:

The predictive value of the components of the placental study (in isolation or combined) for the primary and secondary outcomes will be determined using bivariate and multivariable analysis.

REFERENCES

1. Lausman A, Kingdom J, Maternal Fetal Medicine C. Intrauterine growth restriction: screening, diagnosis, and management. J Obstet Gynaecol Can 2013;35:741-48.
2. Magee LA, Pels A, Helewa M, Rey E, Von Dadelszen P, Canadian Hypertensive Disorders of Pregnancy Working G. Diagnosis, evaluation, and management of the hypertensive disorders of pregnancy. Pregnancy Hypertens 2014;4:105-45.
3. Proctor LK, Toal M, Keating S, et al. Placental size and the prediction of severe early-onset intrauterine growth restriction in women with low pregnancy-associated plasma protein-A. Ultrasound Obstet Gynecol 2009;34:274-82.

4. Costantini D, Walker M, Milligan N, Keating S, Kingdom J. Pathologic basis of improving the screening utility of 2-dimensional placental morphology ultrasound. Placenta 2012;33:845-9.
5. Myers JE, Kenny LC, Mccowan LM, et al. Angiogenic factors combined with clinical risk factors to predict preterm pre-eclampsia in nulliparous women: a predictive test accuracy study. BJOG 2013;120:1215-23.
6. Milligan N, Rowden M, Wright E, et al. Two-dimensional sonographic assessment of maximum placental length and thickness in the second trimester: a reproducibility study. J Matern Fetal Neonatal Med 2015;28:1653-9.
7. Wright E, Audette MC, Ye XY, et al. Maternal Vascular Malperfusion and Adverse Perinatal Outcomes in Low-Risk Nulliparous Women. Obstetrics and gynecology 2017;130:1112-20.
8. Hladunewich MA, Melamad N, Bramham K. Pregnancy across the spectrum of chronic kidney disease. Kidney international 2016;89:995-1007.
9. Williams D, Davison J. Chronic kidney disease in pregnancy. British Medical Journal 2008;336:211-15.
10. Alkhunaizi A, Melamed N, Hladunewich MA. Pregnancy in advanced chronic kidney disease and end-stage renal disease. Curr Opin Nephrol Hypertens 2015;24:252-9.
11. Zhang JJ, Ma XX, Hao L, Liu LJ, Lv JC, Zhang H. A Systematic Review and Meta-Analysis of Outcomes of Pregnancy in CKD and CKD Outcomes in Pregnancy. Clinical journal of the American Society of Nephrology : CJASN 2015;10:1964-78.