Pregnancy in Women with Congenital Heart Disease

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i Sahlgrenska universitetssjukhuset/lokal Arvid Carlsson, Medicinaregatan 3, Göteborg den 18 februari kl 13.00, deltagande via länk zoom webinar.

av

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Avhandlingen baseras på följande delarbeten

I   Eva Furenäs, Peter Eriksson, Ulla-Britt Wennerholm, Mikael Dellborg. Effect of maternal age and cardiac disease severity on outcome of pregnancy in women with congenital heart disease.
International Journal of Cardiology 243 (2017) 197-203

II   Eva Furenäs, Peter Eriksson, Ulla-Britt Wennerholm, Mikael Dellborg. Cardiac Complications during Pregnancy Related to Parity in Women with Congenital Heart Disease.
Cardiology 2020;145:533-541

III Eva Furenäs, Peter Eriksson, Ulla-Britt Wennerholm, Georgios Lappas, Annika Rosengren, Mikael Dellborg. Pregnancy in women with congenital heart disease; a nationwide population based register study
In manuscript

IV Eva Furenäs, Peter Eriksson, Ulla-Britt Wennerholm, Mikael Dellborg. Pregnancy in healthy population: dynamics of NTproBNP and hs-cTroponin T. *Open Heart 2020;7:e001293. doi:10.1136/openhrt-2020-001293*

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Pregnancy in Women with Congenital Heart Disease

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ABSTRACT

Background: The survival for children born with congenital heart disease (CHD) has increased and the majority reach adult age. Having a cardiac problem raise questions on the probability of successful pregnancies and predictors associated with unfavorable outcome. Heart biomarkers are used in emergency care to evaluate patients with chest symptoms. However, normal levels during pregnancy have not been established.

Aims: The aims of the thesis were to study risk of cardiac, obstetric and neonatal outcome of pregnancy in women with CHD, and evaluate two risk-classifications. To obtain additional diagnostic tools when evaluating pregnant women with chest symptoms.

Methods: The participants in Paper I and II were single CHD-center cohorts of 232 and 307 women respectively, with 496 and 580 pregnancies respectively. The women were classified according to two prevalent risk classifications (CARPREG and mWHO). In Paper I we evaluated maternal age and the applicability of risk classifications on cardiac, obstetric and neonatal outcomes of pregnancy. Paper II addressed parity as a covariate for cardiac events. In Paper III national registries, National Patient Register, Medical Birth Register and Cause of Death register were used. Women with CHD born 1953-1997 with first singleton birth 1973-2015 were compared with matched controls without a diagnosis of CHD. Outcomes were cardiac, obstetric and neonatal complications. In Paper IV 196 pre-pregnancy healthy women were recruited from antenatal maternal outpatient clinics. Blood samples were analyzed for heart biomarkers N-terminal pro Brain Natriuretic Peptide (NTproBNP) and high sensitive cardiac Troponin T (hs-cTNT) on four occasions during and after pregnancy.

Results: In Paper I in 496 CHD pregnancies, there were 14% cardiac complications, 14% obstetric and 15% neonatal complications, comparable with previous single- and multicenter publications. Severe complications were rare. Age above 35 years was not associated with worse outcome. The two risk classifications had moderate diagnostic accuracy of 0.71 and 0.65 respectively. In Paper II we analyzed the effect of parity in 307 CHD women. We found a high odds ratio of 5.5 (95% CI, 1.8-16.9) to have the same cardiac outcome of a second pregnancy as the first, if the risk classification remained the same. In Paper III both cardiac, obstetric and neonatal adverse events were more common in 6´131 CHD women than in 158´343 controls, but with low absolute numbers. Severe complications were very rare. Maternal all-cause mortality during pregnancy and one year postpartum was 3/10´000. Perinatal death was 55/10´000 to be compared with 38/10´000 in controls. During the observation time-period the number and complexity of CHD diagnoses increased, as did age at first birth and maternal weight. In Paper IV we established the 95th percentile levels of NTproBNP and hs-cTNT for pre-pregnancy healthy women to be below the cut-off levels for the suspicion of heart failure and myocardial ischemia. Existing cut-off levels can be used also in pregnant women in the emergency room.

Conclusion: Two established risk classifications had moderate diagnostic accuracy. The maternal outcome of a second pregnancy can be expected to be the same as of the first, if in stable cardiac situation. The absolute risks for adverse outcome of pregnancy in women with CHD are low, but higher than in controls. Existing cut-off levels of heart biomarkers can be used also during pregnancy, in pre-pregnancy healthy women.

Keywords: congenital heart disease, pregnancy, risk classification, parity, heart biomarker.