Cardiovascular disease in pregnancy classified after the WHO risk-index: a retrospective observation of different anaesthetic methods during cesarean sections

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Background and objective: The management of patients with cardiovascular disease (CVD) from preconceptional counselling to postnatal treatment is difficult as CVD during pregnancy is associated with an increased risk for maternal and neonatal complications. Due to the growing number of pregnancies affected by CVD there is an increasing attention in obstetrics and anesthesia during delivery in this special patient group.

Fig. 1: Development of cardiac surgery in the last century

Risk class	Risk of pregnancy by medical condition
I	No detectable increased risk of maternal mortality and no/mild increase in morbidity.
II	Small increased risk of maternal mortality or moderate increase in morbidity.
III	Significantly increased risk of maternal mortality or severe morbidity. Expert counselling required. If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth, and the puerperium.
IV	Extremely high risk of maternal mortality or severe morbidity; pregnancy contraindicated. If pregnancy occurs termination should be discussed. If pregnancy continues, care as for class III.

Fig. 2: WHO index for pregnancy risk in cardiac patients modified by Thorne et al. (2006)

Results: During the 15-year observation period, a total of 163 women affected by CVD were examined. Cesarean section was performed in 100 (61.3 %) of the cases, while 73 patients (73 %) received neuraxial anesthesia and 27 (27 %) general anesthesia for cesarean delivery. There was no maternal in-hospital death recorded. Patients were classified into groups according to the severity of their disease by the WHO Risk Index (Fig. 2). In low risk patients, spinal anesthesia seems to be the favoured procedure, with increasing risk. In contrast, patients with higher risk, especially in risk class 4 more often received a general anesthesia. As outcome parameter, we considered the APGAR Score for the children as well as length of stay in hospital (LOS) for the mothers. Generally, an increased WHO risk class of the mother was correlated with lower APGAR scores of the neonates. There is no statistical significance between the kind of anesthesia and the APGAR Score, as the decision for the kind of anesthesia varies depending on the WHO-class. We can just see a slight trend favouring the PDA. LOS in the hospital was correlated with the WHO risk class of the delivering mother ($p < 0.05$).

Fig. 3: Kind of anaesthesia in dependence of WHO risk index. General Anesthesia (ITN), Spinal Anesthesia, (SPN), Peridural Anesthesia (PDA)

Fig. 4: APGAR in dependence of kind of anaesthesia

Fig. 5: Length of Stay (LOS) in dependence of WHO risk index and the kind of delivery, numbers show the amount of patients

Conclusion: The WHO risk index and its modification by Thorne could be an appropriate tool for the anaesthesiologist to evaluate the risk of child bearing in CVD patients and hence choose the safest mode of delivery depending on the severity of their disease. It is recommended to establish an interdisciplinary team of physicians for counselling and adequate supervision of the pregnancy and birth-giving process of mothers with CVD and to advise women with a CVD to deliver in a centre with adequate equipment and expertise in this field.