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Challenges in Management of Advanced Heart Disease

Cardiovascular disease is a leading cause of maternal death. The normal cardiovascular hemodynamic adaptations to pregnancy are remarkable, but tolerated without difficulty in the majority of women. However, in women with cardiovascular dysfunction, these adaptations may precipitate cardiovascular decompensation. Risk stratification of pregnancy risk should preferably take place before conception. Management of these women requires multidisciplinary involvement of all key areas, including cardiology, nursing, maternal/fetal medicine and obstetric anesthesia. For higher-risk lesions, pregnancy should be managed in centers with expertise in this field.

There are numerous contributors of this rising risk, including advancing maternal age, pre-existing cardiovascular risk factors, the rise in multifetal pregnancies and survival to fertility age among childhood cancer survivors and women with congenital heart disease. Unlike most cardiovascular conditions, there are no large randomized controlled trials to guide decision-making, and guidelines are based principally on expert consensus.

It is increasingly likely that a cardiologist will be called upon to manage these women, so it is incumbent upon them to understand the basic cardiovascular hemodynamics of pregnancy and fundamental risk stratification and management of these conditions.

In the United States, disease and dysfunction of the heart and vascular system as "cardiovascular disease" is now the leading cause of death in pregnant women and women in the postpartum period accounting for 4.23 deaths per 100,000 live births, a rate almost twice that of the United Kingdom. The most recent data indicate that cardiovascular diseases constitute 26.5% of U.S. pregnancy-related deaths¹.

CHD was the most common form of heart disease complicating pregnancy in the Western world (accounting for 74% of cases in the Canadian Cardiac Disease in Pregnancy [CARPREG] registry and 66% of cases in the European Registry on Pregnancy and Cardiac Disease [ROPAC] registry), whereas in less developed countries, rheumatic heart disease plays a larger role^{2,3}

Hemodynamics of Pregnancy

The normal cardiovascular hemodynamic adaptations to pregnancy are remarkable but tolerated without difficulty in the majority of women. In women with cardiovascular dysfunction, however, these adaptations may precipitate cardiovascular decompensation. Hemodynamic changes begin in the first trimester, with a 30–50 % rise in cardiac output, driven by an increase in stroke volume and, to a lesser extent, heart rate. Systemic vascular resistance falls as a result of endogenous vasodilators, as well as flow into the low-resistance uteroplacental unit. During labor and delivery, cardiac output is further increased because of auto transfusion from the contracting uterus as well as an increase in heart rate because of maternal pain during labor.

Multidisciplinary Care

The care of pregnant women with heart disease involves several stakeholders with different perspectives but common goals: pre-conceptional counselling is important followed by delivery of a healthy baby and a mother free of cardiac complications. This team should include an obstetric anesthesiologist, maternal fetal medicine specialist, nursing staff and a cardiologist with expertise in the management of pregnant women

Anticoagulation for Mechanical Heart Valves

Women with mechanical heart valves have an elevated risk of complications during pregnancy and only a 58 % chance of a having an uncomplicated pregnancy with a live birth. The use of anticoagulants during pregnancy is challenging and influenced by a hypercoagulable state and changes in the volume of distribution and creatinine clearance

Acute MI During Pregnancy

Fortunately, pregnancy-associated acute MI (PAMI) is uncommon, although its incidence is increasing and inhospital mortality remains high at 4.5 %The management of PAMI is individualized. However, in the presence of hemodynamic instability, heart failure or refractory chest pain, angiography is warranted. As a high proportion of PAMI cases are caused by SCAD, in which coronary angiography can propagate dissection, methods to reduce coronary manipulation are recommended such as avoiding deep catheter engagement of the coronary ostia and gentle contrast injections. Coronary CT may have an emerging role in the population of patients who are at a lower risk with suspected CAD, and provides additional data on the vessel wall such as presence of plaque, intramural hematoma or dissection.

Mode of Delivery

Despite the increased hemodynamic burden of labor and delivery, including a further increase in heart rate, stroke volume and cardiac output, vaginal delivery remains the optimal method of delivery. Cesarean section increases the risk of maternal infection, leads to great hemodynamic shifts and blood loss, brings a risk of surgical injury and raises the likelihood of thrombotic events. Although there is no consensus over absolute contraindications for vaginal delivery, cesarean section can be considered for some women with certain cardiac conditions, including preterm labor in those receiving full oral anticoagulation, Marfan's syndrome with an aorta over 45 mm, acute or chronic aortic dissection, and intractable heart failure. Generally, cesarean section is reserved for obstetrical indications

Impact on Fetal Outcomes

Fetal outcomes are also impaired in some mothers with CHD. Higher chances of IUGR with Low Burth Weight babies. More incidences of preterm labour, increased risk of miscarriage or intrauterine demise, and increased perinatal mortality. Decreased maternal cardiac output and maternal cyanosis are significantly associated with an increase in fetal complications^{4,5}.

Conclusion

Cardiovascular disease is a leading cause of maternal death. Cardiovascular training programs are increasingly providing education on the management of cardiovascular disorders during pregnancy and it is increasingly likely that cardiologists will be called upon to manage these women.

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