The Problems of Managing the Compromised Pregnancy

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Over 48 million babies are born to first time mothers worldwide every year. Almost 1 in 5 of these pregnancies are complicated by preeclampsia, spontaneous preterm birth and/or fetal growth restriction (FGR). In approximately half of the affected pregnancies, the disease is so severe that either mother and/or baby requires admission to an intensive care unit (levels 2 and 3) or that the pregnancy results in maternal or perinatal mortality (for example preeclampsia is associated globally with an estimated 50,000-100,000 deaths annually). All three conditions can have lifelong consequences for the child with predispostion to cardiovascular diseases and diabetes as an adult.

Prevention of these complications would have global health, economic and societal impact. The prerequisite to effective prevention is accurate prediction of high risk women who would benefit from preventative therapy. Currently, there is no screening method to accurately predict which first time mothers will develop these complications. At present antenatal care consists of serial consultations at standardized intervals, the primary objectives being to detect early signs of preeclampsia, spontaneous preterm birth and/or FGR. Action is then taken when clinically evident signs or symptoms are found. Many of the affected pregnancies present acutely with no apparent prodromal signs. The development of a reliable and valid screening test would enable antenatal care to be tailored to a woman's risk status and the implementation of disease prevention strategies. This would enable first time mothers to be streamed according to their level of obstetric risk, matching the intensity of their prenatal care to their clinical need.

Although preeclampsia and FGR have complex aetiologies, inadequate/abberant placental function is key to the pathogenesis and this provides the potential for screening/predictive tests. Failure of trophoblast invasion to transform the uterine arteries in early placentation, restricts the maternal blood supply to the placenta. Subsequent development and function of the placenta is hindered by irregular maternal blood flow, resulting in inadequate nutrient transfer to the fetus, raised fetoplacental vascular resistance and widespread endothelial cell dysfunction. In preeclampsia, but not FGR, this culminates in maternal multi-organ failure. Uteroplacental phenotyping is being advocated as a predictive/diagnostic tool, and in leading centres, Placenta Clinics have been established. Current placental screening strategies for preeclampsia/FGR involve maternal serum hormone measurements (i.e. placental secretory function), placental macroscopic morphology (by ultrasound) and uterine artery Doppler velicometry. The role of MR assessment of placental size, morphology and function is unproven.

Once preeclampsia/FGR is suspected or diagnosed (and in FGR one of the problems is the difficulty in distinguishing the small but normal fetus from the fetus which is not growing to its genetic growth potential), one of the greatest challenges is the timing of delivery. The risks of remaining in utero have to be balanced with those of premature delivery. Obstetricians rely on ultrasound assessment of fetal growth and wellbeing, and in preeclampsia, haematological studies and biochemical tests of renal and liver function.