PREECLAMPSIA AND MATERNAL CARDIAC FUNCTION

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Preeclampsia is a pregnancy-specific systemic disorder that affects 2% to 5% of all pregnancies. Defective placentation is associated with persistence of a high-resistance uterine circulation, impaired placental perfusion and a placental 'stress' response leading to the development of preeclampsia. According to this theory, the maternal syndrome of preeclampsia constitutes the end-stage of a pathogenic cascade beginning earlier in pregnancy with the initial insult, a failure in trophoblast invasion, being localized to the placenta. It has been proposed that placental dysfunction disorders such as early-onset preeclampsia comprise a disease entity, which is distinct from late-onset preeclampsia. The latter has been attributed as "maternal" preeclampsia, while the first has been dubbed as "placental" preeclampsia – a rather simplistic dichotomy. There are inconsistencies with the placental origins hypothesis, especially when considering the lack of a causative association with abnormal placental histology or lack of impaired fetal growth in the majority of cases (a TED Talk video clip on this topic can be accessed here: http://bit.ly/2i1SqDk).

An alternative explanation is that placental dysfunction is secondary to maternal cardiovascular maladaptation in pregnancy. After all, the primary derangement in preeclampsia involves the cardiovascular system due to the widespread and profound effects on the heart and endothelial system. The concept that placental dysfunction is secondary to a maternal disorder is not new when one considers the clinical similarities between preeclampsia and gestational diabetes - both pregnancy-specific conditions that are cured by birth (Table). It is accepted that gestational diabetes develops when the maternal pancreas is unable to manage the increasing glucose load of pregnancy. Emerging evidence demonstrates that pregnancy presents a substantial cardiovascular load on the maternal heart, and that cardiovascular dysfunction precedes the disorder, predominates in the clinical syndrome and persists for several decades postpartum. Placental dysfunction is fundamental to the pathophysiology of pregnancy complications such as

preeclampsia, but to date, the placenta has been considered in isolation without regard to the fact that it's functioning is dependent on adequate perfusion by the maternal circulation.

The involvement of the cardiovascular system in the pathogenesis of preeclampsia and placental dysfunction has significant implications for screening, triage, diagnosis, peripartum care and postnatal management of women at risk of preeclampsia. This talk will cover the clinical relevance and optimal assessment of cardiovascular function in pregnancy with specific emphasis on preeclampsia and placental dysfunction.

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Table: Comparison of general outlines of gestational diabetes and preeclampsia as pregnancy related disorders

	Gestational Diabetes	Preeclampsia
Definition and diagnosis		
Maternal organ system	Endocrine	Cardiovascular
Definition	New onset hyperglycemia after 20wks	New onset hypertension after 20wks
Diagnosis	High glucose level	High BP
Pre-pregnancy disease	Results in a more severe pregnancy phenotype	Results in a more severe pregnancy phenotype
Clinical characteristics		
Predisposing factors	Same as for diabetes	Same as for cardiac disease
Screening test	GTT (measure of pancreatic function)	BP (measure of cardiac function)
Screening performance	Improves with testing in later pregnancy	Improves with testing in later pregnancy
Organ function	Relative insulin insufficiency	Relative cardiovascular insufficiency
Disease amelioration	Reduce load (lower carbs)	Reduce load (lower BP)
Disease cure	Birth	Birth
Pregnancy outcome		
Fetal outcome (short term)	Macrosomia in severe/early GDM	SGA in severe/early PE
Infant outcome (long term)	Increased risk of obesity and early-onset diabetes	Increased risk of cardiovascular disease
Maternal short term outcome	Most normoglycaemic Occasional hyperglycemia	Most normotensive Occasional hypertension
Maternal long term outcome	50% risk of diabetes within 10 years	30% risk of hypertension within 10 years