The treatment of hypertension in pregnancy

Umbareen Siddiqi

Felicity Plaat

Learning objectives

After reading this, you should:

- know the different types of hypertensive disorders and their implications in pregnancy
- be aware of the various treatment options
- understand the management of acute severe hypertension and eclampsia in pregnancy

Abstract

Maternal deaths from complications of pregnancy; so-called 'direct deaths', including hypertensive disorders, are now less than from indirect causes, (medical conditions that may be exacerbated by pregnancy). The direct death rate in the UK has fallen significantly over the past 5 years. The death rate from hypertensive disorders is at its lowest ever: 0.25/100 $\times$ 10^3 maternities [95%CI 0.09–0.55]. In other words there is one death from hypertensive disorders for every 400,000 maternities. Having been one of the leading direct causes of maternal mortality, it now lags behind thromboembolic disease, haemorrhage and amniotic fluid embolism. This improvement is likely to reflect careful management not a fall in incidence as hypertensive disorders remain one of the commonest complications of pregnancy.

The precise trigger for pre-eclampsia has yet to be elucidated but the pathophysiology involves abnormal placentation and an exaggerated inflammatory response causing a multisystem disorder. Raised or rising blood pressure in a pregnant woman should alert the clinician to look for the development of pre-eclampsia. Diagnosis and treatment of hypertensive disorders in pregnancy is vital they are associated with both a worse maternal and fetal outcome. Current recommendations suggest that all pregnant women with a systolic blood pressure greater than 160 mmHg should have immediate antihypertensive therapy and treatment should be initiated at lower pressures if the overall clinical picture suggests rapid deterioration. Regional anaesthesia is recommended for both labour analgesia and operative delivery. In the presence of compromised placental function and intrauterine growth restriction, regional blockade has the beneficial effect of improving placental blood flow.

Keywords Hypertension; labetalol; magnesium sulphate; methyldopa; pre-eclampsia; pregnancy; proteinuria; regional anaesthesia

Royal College of Anaesthetists CPD Matrix: 2B05

Hypertension is the commonest medical disorder encountered in obstetric practice. It complicates 10–15% of pregnancies. Pre-eclampsia and eclampsia occur in 4% of pregnancies. Mortality however has fallen to the lowest level recorded in the UK.[1]

Umbareen Siddiqi *FRCA is a Specialist Registrar in Anaesthetics at Queen Charlotte's and Chelsea Hospital, London, UK. Conflicts of interest: none declared.*

Felicity Plaat *FRCA is a Consultant Anaesthetist at Queen Charlotte's and Chelsea Hospital, London, UK. Conflicts of interest: none declared.*

Worldwide 160,000 women die each year and approximately 20% of special care baby unit (SCBU) cots are occupied by the offspring of women with these conditions.

Classification: Hypertension is defined as a blood pressure of 140/90 mmHg or higher on two separate occasions, at least 4 hours apart.

Pre-existing or chronic hypertension: This is defined as hypertension diagnosed prior to pregnancy or before 20 weeks' gestation. Hypertension newly diagnosed during pregnancy but which does not resolve post-partum, is also classified as chronic hypertension. There is an increased risk of superimposed pre-eclampsia, intrauterine growth restriction and placental abruption, associated with this condition.

Gestational hypertension (GH): The term refers to hypertension occurring at more than 20 weeks' gestation but without significant proteinuria or other features of pre-eclampsia, that resolves within 6 weeks of delivery. About 15% of women developing hypertension at more than 20 weeks will develop pre-eclampsia: this risk increases the earlier, after 20 weeks, that hypertension develops. GH tends to recur in subsequent pregnancies. It is associated with better maternal and fetal outcomes than pre-eclampsia. The treatment of pre-existing hypertension and GH is the same.

Pre-eclampsia and eclampsia: Although the classic triad of hypertension, proteinuria and oedema denote pre-eclampsia but the absence of one or more does not exclude the diagnosis.

Mild/moderate pre-eclampsia: BP of 140/90 mmHg or higher, proteinuria (>0.3 g/24 hours) without renal, hepatic or coagulation dysfunction.

Severe pre-eclampsia: BP of 160/110 mmHg or higher, significant proteinuria (>1 g/litre), in the presence of biochemical evidence of renal, hepatic and coagulation dysfunction.

Eclampsia: One or more seizures occurring in the presence of pre-eclampsia (see also Figure 1).

Pathogenesis: The pivotal role of placenta in pathogenesis of the disorder has long been recognised, and removal of placenta results in the resolution of the disease, (but not immediately). Abnormal placentation with inadequate trophoblast invasion of the spiral arteries is thought to cause placental ischaemia with

Please cite this article in press as: Siddiqi U, Plaat F, The treatment of hypertension in pregnancy, Anaesthesia and intensive care medicine (2016), http://dx.doi.org/10.1016/j.mpaic.2016.11.005

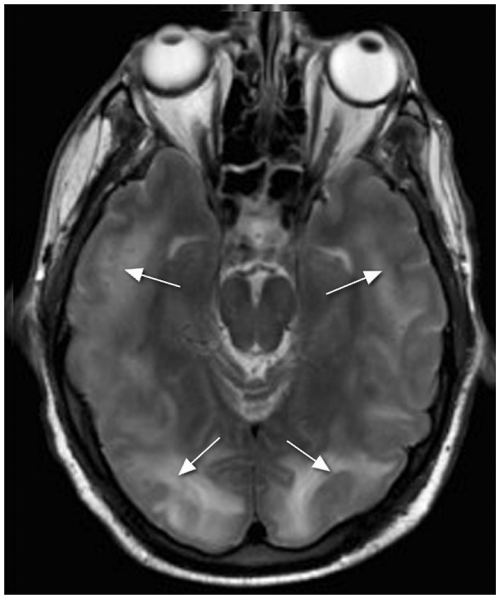

Figure 1 Magnetic resonance image showing multiple cortico-subcortical areas of hyper-intense signal (arrows) involving the occipital and parietal lobes bilaterally and pons in a patient with posterior reversible encephalopathy syndrome, a complication of eclampsia.

exaggerated release of circulating inflammatory mediators culminating in widespread endothelial cell dysfunction. Maternal renal, cardiovascular, hepatic, coagulation and central nervous systems are affected and there is fetal growth retardation.

Management

General measures

Pregnant women with hypertension require closer antenatal surveillance to check for the development of pre-eclampsia. They require regular measurement of blood pressure, urinalysis for proteinuria, plasma urate levels and uterine artery Doppler blood flow analysis. Haemoglobin concentration, platelet count, coagulation function, plasma urea and creatinine and liver function tests should be regularly checked in women who develop pre-eclampsia.

Fetal monitoring in the form of fetal growth and biophysical profile with ultrasound scans to detect intrauterine growth restriction should be performed every 4 weeks after 24–26 weeks' gestation. These women should have an early referral to an obstetric anaesthetic clinic. Not only are they at increased risk of obstetric intervention, requiring anaesthetic input but management of the condition itself may include regional blockade and this should be discussed antenatally.

Management of chronic hypertension, GH and mild/moderate pre-eclampsia

In normal pregnancy blood pressure falls in the first trimester before the increase in cardiac output compensates for the decrease in systemic vascular resistance. Systemic blood pressure continues to decrease during the second trimester up to 22–24 weeks, after which there is a steady rise to pre pregnant levels by term. Because of the initial decrease, hypertension may not be detected till later in pregnancy. A combination of anti-hypertensive agents is preferable to monotherapy to minimize side effects, for example labetalol or methyldopa with long-acting nifedipine.

The drugs used, their dose and route of administration along with the mode of action and side effects are given in Table 1.

Management of pre-eclampsia depends on prevention of seizures, blood pressure prevention of pulmonary oedema.

Prevention of seizures

The Royal College of Obstetricians and Gynaecology recommends that all maternity units should be equipped with a protocol for the management of eclampsia and acute severe hypertension and that regular fire drills should be conducted.[2] Magnesium sulphate is the drug of choice for reducing the risk of seizures in severe pre-eclamptics, controlling new onset seizures and reducing the risk of their recurrence.[3] In eclampsia convulsions are thought to be a result of cerebral vasospasm and reduced cerebral blood flow and this is reversed by the vasodilator property of magnesium. Intracranial hypertension and vasogenic oedema may also occur.[4] The prophylactic use of magnesium in severe pre-eclampsia is associated with a trend towards lower maternal morbidity and mortality.[5] and The World Health Organization (WHO) now recommends magnesium sulphate therapy for prevention of eclampsia in women with severe pre-eclampsia.

Fluid management

Because of a predisposition to pulmonary oedema, fluid input should be limited to 2 litres/24 hours, (~80 ml/hour). Although temporary renal dysfunction is common, the need for dialysis is rare, and permanent dysfunction extremely rare: fluid overload poses a much greater threat in this condition. Invasive monitoring, (invasive blood pressure and central venous pressure) is indicated if there is uncertainty regarding fluid status, (especially when haemorrhage is superimposed on pre-eclampsia. Making assessment of fluid balance especially challenging), non-invasive monitoring is problematic, and in severe cases where intensive care is likely to be required.

Colloid fluid challenges to maintain urine output at 0.5 ml/kg/hour should be given with caution and require central venous pressure monitoring.

Control of hypertension

Recent reports on maternal mortality indicate that the foremost cause of mortality due to hypertensive disorders is intracerebral haemorrhage and inadequate management was the main type of substandard care identified. Hence the recommendation that all pregnant women with a systolic BP of 160 mmHg or higher should be immediately started on antihypertensive therapy.[6]

Management of these women should be in a area where critical care can be delivered. Oral (labetalol) or intravenous, (labetalol or hydralazine), anti-hypertensives should be given according to the clinical condition.

Delivery of the fetus

The severity of the condition will determine timing and hence mode of delivery.

Please cite this article in press as: Siddiqi U, Plaat F, The treatment of hypertension in pregnancy, Anaesthesia and intensive care medicine (2016), http://dx.doi.org/10.1016/j.mpaic.2016.11.005