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Hypertensive Disorders in Pregnancy: An Overview

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Abstract: ***Hypertensive disorders in pregnancy are common medical complication of pregnancy. Maternal and perinatal mortality and morbidity associated with these conditions are very high. Hypertension is the most common medical problem encountered during pregnancy, complicating 2-3% of pregnancies. Hypertensive disorders during pregnancy are classified into 4 categories, as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy: 1) chronic hypertension, 2) preeclampsia-eclampsia, 3) preeclampsia superimposed on chronic hypertension, and 4) gestational hypertension or pregnancy-induced hypertension (PIH). Aetiology of these disorders is not known. Several theories are postulated. Now it is believed to be an exaggerated response to inflammatory reaction of pregnancy. No single test has so far been identified for prediction. Depending on clinical factors like family history of hypertension, past history of hypertension aspirin in low dose is used to minimize the incidence. In eclampsia magnesium sulphate is the anticonvulsant of choice worldwide. Antihypertensive drugs like methyl dopa, labetalol, and hydralazine are used to lower blood pressure to a safe level. Delivery should be planned at the oportunate time. Factors to be considered for timing of delivery are gestational age, maternal, and fetal conditions. HELLP syndrome is another complication of preeclampsia. Diagnosis and management of HELLP syndrome are reviewed.***

Keywords: Hypertension, preeclampsia, eclampsia, HELLP syndrome, magnesium sulphate

1. Introduction

Hypertensive disorders in pregnancy are common medical complication encountered during pregnancy. Incidence various, but on an average it effects about 5% to 10% of all pregnancies.[1] Hypertensive disorders in its different types and severity affects the course and outcome of pregnancy. These disorders are associated with a high maternal and perinatal mortality and morbidity worldwide. In India these disorders account for about 5% of all maternal death.[2] Blood pressure should be measured accurately and preferably by the same observer to avoid inter observer variation, in sitting position or in left lateral recumbent position. Blood pressure cuff should be of appropriate size and it should be placed at the level of the woman's heart. The observer should keep his/ her eyes at the level of the mercury column. Following initial measurement second measurement should the taken after at least 6 hour of rest. Hypertension is defined as systolic blood pressure (SBP) of 140 mm of Hg or more or diastolic blood pressure (DBP) of 90 mm of Hg or more. Edema in lower extremities is found in many conditions during pregnancy and hence has no significance in hypertensive disorders. Proteinuria is defined as concentration of protein > 300mg/ 24 hours urine collection or a concentration of 30mg/dl (1+ an dipstick) or more, in at least two random urine samples collected 4 hours apart.[3]

Classifications of Hypertensive Disorders in Pregnancy

The most recent revised classification for hypertensive disorders in pregnancy is by the International Society for the Study of Hypertension in Pregnancy (ISSHP) [4] in 2014:

1) Chronic hypertension
2) Gestational hypertension
3) Pre-eclampsia – de novo or superimposed on chronic hypertension
4) White coat hypertension.

The American College of obstetricians and Gynaecologists Committee on Terminology proposed a classification in 1972, which has been modified by the National High Blood Pressure Education programme working group in 2000. It is of simple, concise and clinically relevant.[1]

Classification of Hypertensive Disorders of Pregnancy

a) Gestational hypertension: Hypertension developing after 20 weeks of gestation or during the first 24 hours postpartum without proteinuria. It includes BP ≥140/90 mmHg for the first time during pregnancy, which returns to normal <12 weeks' postpartum and without proteinuria.[6]

b) Transient hypertension: Transient hypertension refers to hypertension occurring in late pregnancy without any other features of preeclampsia and with normalization of blood pressure postpartum. The pathophysiology of transient hypertension is unknown, but it may be a harbinger of chronic hypertension later in life. Hypertension resolves by 12 weeks post-partum.

c) Chronic hypertension: These are gravidae with hypertension as defined by a BP ≥140/90 mmHg before pregnancy or diagnosed before 20 weeks' gestation (not attributable to gestational trophoblastic disease), or hypertension first diagnosed after 20 weeks' gestation and persistent after 12 weeks' postpartum. Chronic HT may lead to ventricular hypertrophy, cardiac decompensation, cerebrovascular accidents and renal damage. It may cause about 25% of superimposed pre-eclampsia.

d) Pre-eclampsia: The minimum criteria for diagnosis of pre-eclampsia are a blood pressure (BP) ≥140/90 mmHg after 20 weeks' gestation and proteinuria ≥300 mg/24 h or ≥1+ with dipstick.

e) Eclampsia: Pre-eclampsia with the onset of convulsions is called eclampsia. In eclamptics, seizures cannot be attributed to other causes in a woman with pre-eclampsia, which are generalised, and may appear before, during or after labour.

Incidence and Risk Factors for HDP

Some of the risk factors increasing the likelihood of HDPs are[6]:

- Nulliparous women (in about 7.6% of nulliparous, severe in 3.3%);
- Wide variation between ethnic groups/populations (3 times × as common in Negroid as Caucasians),
- Parity (incidence about 5% in singleton and 13% in twin gestations),
- Chronic hypertension,
- Multi-foetal gestation,
- High maternal age (>35 years) and
- Obesity.

Gestational Hypertension

Gestational hypertension, formerly known as pregnancy-induced hypertension or PIH, is the new onset of hypertension after 20 weeks of gestation. The diagnosis requires that the patient have:

- Elevated blood pressure (systolic ≥ 140 or diastolic ≥ 90 mm Hg, the latter measured using the fifth Korotkoff sound)
- Previously normal blood pressures
- No protein in the urine
- No manifestations of preeclampsia/ eclampsia.

Also known as transient hypertension, gestational hypertension is actually diagnosed retrospectively when the patient does not develop preeclampsia and if blood pressure returns to normal by the 12-week postpartum visit. Fifty percent of women diagnosed with gestational hypertension between 24 and 35 weeks develop preeclampsia.[7]

Chronic Hypertension in Pregnancy

Chronic hypertension in pregnancy is diagnosed when pregnancy occurs in an already hypertensive women or when hypertension develops before 20 weeks of pregnancy or when hypertension persists even after 12 weeks of delivery. Chronic hypertension is a risk factor for development of superimposed preeclampsia at a later stage of pregnancy. The reported incidence of superimposed preeclampsia is about 10% -25%. Chronic hypertension in pregnancy is usually primary or essential hypertension. Secondary hypertension is mostly due to chronic kidney disease, adrenal disease, or collagen disease etc. It is important to remember that many hypertensive women have greater decrease in blood pressure during early pregnancy than normotensive women[8]. Mid pregnancy fall in blood pressure is observed in about 30-40% of women, even in women with chronic pregnancy hypertension. In our observation in 43.43% of women fall in blood pressure started from early pregnancy and maximum fall was around 20 weeks of pregnancy, then gradually elevated in third trimester [9]. Diagnosis of chronic hypertension is likely to miss unless proper history of pre-pregnancy blood pressure is known. It is a complex disorder involving genetic, immunological and environmental factors. [10]

PRE ECLAMPSIA

Preeclampsia is a multisystem disorder. Preeclampsia is gestational hypertension with proteinurea. Incidence varies from 3-7% of all pregnancies. Preeclampsia may superimpose with essential hypertension. The pathogenesis of Preeclampsia is still not fully understood and hence management is early detection, symptomatic treatment and delivery.

Risk factors for development of Pre-eclampsia

Maternal age 35 years of age	Multiple pregnancy	Previous history of pre eclampsia/eclampsia
Family history of hypertension	Pre-existing hypertension	Preexisting vascular disease
Primigravida	Diabetes mellitus	Fetal hydrops
Hydotidiform mode	Pre-existing kidney disease	Fetal Trisomy

Prediction and Prevention of Preeclampsia and Associated Complications

1) No first or second trimester test or set of tests can reliably predict the development of all cases of preeclampsia; however, a combination of maternal risk factors, BP, placental growth factor (PlGF), and uterine artery Doppler can select women who may benefit from 150 mg/d of aspirin to prevent preterm (before 37 weeks gestation) but not term preeclampsia. ISSHP supports first trimester screening for risk of preeclampsia when this can be integrated into the local health system although the cost effectiveness of this approach remains to be established.[11]
2) ISSHP recommends that women with established strong clinical risk factors for preeclampsia (ie, prior preeclampsia, chronic hypertension, pregestational diabetes mellitus, maternal body mass index >30 kg/m^2, antiphospholipid syndrome, and receipt of assisted reproduction) be treated, ideally before 16 weeks but definitely before 20 weeks, with low-dose aspirin (defined as 75–162 mg/d, as studied in randomized controlled trials).
3) We recommend at this stage against the routine clinical use of rule-in or rule-out tests (specifically PlGF or sFlt-1 [soluble fms-like tyrosine kinase-1]/PlGF ratio) for preeclampsia, which should continue to be evaluated within the context of clinical trials.
4) Women considered at increased risk for preeclampsia as above should receive supplemental calcium (1.2–2.5 g/d) if their intake is likely to be low (<600 mg/d), in addition to aspirin. When intake cannot be assessed or predicted, it is reasonable to give calcium.

Management

1) Regardless of the hypertensive disorder of pregnancy, BP requires urgent treatment in a monitored setting when severe (>160/110 mm Hg); acceptable agents for this include oral nifedipine or intravenous labetalol or hydralazine. Oral labetalol may be used if these treatments are unavailable.
2) Regardless of the hypertensive disorder of pregnancy, BPs consistently at or >140/90 mm Hg in clinic or office (or ≥135/85 mm Hg at home) should be treated, aiming for a target diastolic BP of 85 mm Hg in the office (and systolic BP of 110–140 mm Hg) to reduce the likelihood

of developing severe maternal hypertension and other complications, such as low platelets and elevated liver enzymes with symptoms. Antihypertensive drugs should be reduced or ceased if diastolic BP falls <80 mm Hg. Acceptable agents include oral methyldopa, labetalol, oxprenolol, and nifedipine, and second or third line agents include hydralazine and prazosin.

3) Women with preeclampsia should be assessed in hospital when first diagnosed; thereafter, some may be managed as outpatients once it is established that their condition is stable and they can be relied on to report problems and monitor their BP.
4) Women with preeclampsia who have proteinuria and severe hypertension, or hypertension with neurological signs or symptoms, should receive magnesium sulfate ($MgSO_4$) for convulsion prophylaxis.
5) Fetal monitoring in preeclampsia should include an initial assessment to confirm fetal well-being. In the presence of fetal growth restriction, a recommended schedule for serial fetal surveillance with ultrasound is detailed within these recommendations.
6) Maternal monitoring in preeclampsia should include BP monitoring, repeated assessments for proteinuria if it is not already present, clinical assessment including clonus, and a minimum of twice weekly blood tests for hemoglobin, platelet count, and tests of liver and renal function, including uric acid, the latter being associated with worse maternal and fetal outcomes.

ECLAMPSIA

Eclampsia is defined as the development of convulsion and/ or unexplained coma during pregnancy or postpartum in patients with signs and symptoms of preeclampsia. Reported incidence of eclampsia in Western World is 1 in 2000-3448 pregnancies. In India incidence varies from 0.5 to 3.7 percent. in different hospitals.[12-14] Imaging studies of brain shows vasogenic edema of brain. This suggests that hypertensive encephalopathy plays central role in causation of convulsion in eclampsia.[12] Antepartum eclampsia is reported to ranges from 38 to 53 percent and post-partum eclampsia ranges from 11 to 44 percent. Patients with late post-partum eclampsia or eclampsia developing at or before 20 weeks of gestation are likely to create confusion. In these two atypical eclampsia cerebral imaging like CT scan or MRI is helpful to excludes any cerebral pathology.[14]

A women with eclampsia should be managed in a tertiary level hospital. The objectives for management of eclampsia include – control of convulsion, prevent further convulsion, control of blood pressure and delivery after adequate stabilization of the patient. The treatment of eclampsia consists of the control of convulsions by intravenously/intramuscularly administered loading dose of magnesium sulphate, followed by a continuous infusion of magnesium sulphate; lowering the BP by intermittent intravenous or oral administration of antihypertensive medication whenever the diastolic pressure is considered dangerously high; fluid therapy, with avoidance of diuretics, limitation of intravenous fluid administration unless fluid loss is excessive, and expedited delivery.

Management of Eclampsia

General measures include:

1) Care for respiratory system by:
- Head-down tilt to help drainage of bronchial secretion,
- Frequent change of patient position,
- Keep upper respiratory tract clear by aspiration of mucous through a plastic airway,
- Prophylactic antibiotic and
- Oxygen is administered during and after fits.

2) The tongue is protected from biting by a plastic mouth gauge.
3) After sedation, a self-retained Foley's catheter is applied. The hourly output of urine is charted. Proteinuria, haematuria and specific gravity are noticed.[15]

Magnesium sulfate is the drug of choice because it is more effective in preventing recurrent seizures than phenytoin (Dilantin) or diazepam (Valium). If a patient has already received a prophylactic loading dose of magnesium sulfate and is receiving a continuous infusion, an additional 2 g should be given intravenously. Otherwise, a 6-g loading dose is given intravenously over 15 to 20 minutes, followed by maintenance infusion of 2 g per hour. A total of 8 g of magnesium sulfate should not be exceeded over a short period of time.[16-18]

2. Conclusion

In conclusion, although many pregnant women with high blood pressure have healthy babies without serious problems, high blood pressure can be dangerous for both the mother and the fetus. Women with pre-existing, or chronic, high blood pressure are more likely to have certain complications during pregnancy than those with normal blood pressure. However, some women develop high blood pressure while they are pregnant (often called gestational hypertension). HDP are common in India; various risk factors increase the occurrence. The basic management objectives should be facilitating the birth of an infant who subsequently thrives and complete restoration of health to the mother. This comprises obstetric management, adequate foetal surveillance, antihypertensive management, anticonvulsant therapy, the anaesthetic management of labour and safe analgesia for labour and anaesthesia for delivery. Antihypertensive drugs and magnesium therapy are used to control hypertension and prevent seizures. The effects of high blood pressure range from mild to severe. High blood pressure can harm the mother's kidneys and other organs, and it can cause low birth weight and early delivery. In the most serious cases, the mother develops preeclampsia-or "toxemia of pregnancy"- which can threaten the lives of both the mother and the fetus.

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