Hypertensive disorders of pregnancy

Learning objectives: By the end of this lecture, you need to:

1- **Understand the classification of hypertension in pregnancy.**
2- **Differentiate the different risks associated with various types of hypertensive disorders in pregnancy.**
3- **Determine the pathophysiology of pre-eclampsia.**
4- **Be aware of the clinical presentation and management of each type.**
5- **Realize the long-term risks to both mother and her fetus / newborn from pre-eclampsia.**

Epidemiology:

Hypertension is common in pregnancy:

- Approximately 1/10 women will have one or more episodes of raised blood pressure prior to delivery.
  - The majority have a benign condition called **gestational hypertension (GH),** which is not associated with adverse outcomes.
  - One-third of these women (3% overall) will develop **pre-eclampsia**.
- Pre-eclampsia is a leading cause of maternal death.
- The World Health Organization (WHO) estimates that globally between 50,000 and 75,000 women die of this condition each year, making it an important cause of maternal death in low – mid resources countries.
- Pre-eclampsia is frequently accompanied by fetal growth restriction (FGR), which is responsible for considerable perinatal morbidity and mortality.
- An increasing number of women enter pregnancy with chronic hypertension, and this is associated with increased risks for both mother and baby, including an increased risk of pre-eclampsia and FGR.
- Hypertension during pregnancy keep being the second or occasionally the third cause of maternal death in Iraq.

Classifications of hypertension during pregnancy:

Pregnant women who develop or present with hypertension in pregnancy have one of three conditions:

- **Non-proteinuric pregnancy-induced hypertension (gestational hypertension)**: is hypertension that arises for the first time in the second half of pregnancy and in the absence of proteinuria. It is **not** associated with adverse pregnancy outcome, usually associated with mild to moderate increases in blood pressure and mostly do not require treatment.

  But around 1/3 of women who present with gestational hypertension will progress to pre-eclampsia
- **Pre-eclampsia (proteinuric – pregnancy induced hypertension)**.
- **Chronic hypertension**: Women who have confirmed hypertension in the first half of pregnancy most likely have chronic hypertension:
  1- **Essential hypertension**; the majority will have this type but this is a diagnosis of exclusion.
  2- **Secondary hypertension**: look for the causes.

Chronic hypertension, of whatever type, can predispose to the later development of superimposed pre-eclampsia. Even in the absence of superimposed pre-eclampsia, chronic hypertension is associated with

increased maternal and fetal morbidity and pregnancies complicated by chronic hypertension should therefore be regarded as high risk.

Why chronic hypertensions could be masked occasionally during pregnancy? Because the physiological fall in blood pressure in the first trimester secondary to peripheral vasodilatation can mask chronic hypertension. For example, a first trimester blood pressure of 138/88 mmHg, which is within normal limits, raises the suspicion of an underlying hypertensive tendency.

Severity of hypertension:

- **Mild**: diastolic **blood pressure 90–99 mmHg, systolic blood pressure 140–149 mmHg**.
- **Moderate**: **diastolic blood pressure 100–109 mmHg, systolic blood pressure 150–159 mmHg**.
- **Severe**: **diastolic blood pressure ≥110 mmHg, systolic blood pressure ≥160 mmHg**

While recently hypertension was classified as hypertension and severe hypertension.

Reducing the risk of hypertensive disorders in pregnancy:

- **Symptoms of pre-eclampsia:** Advise pregnant women to see a healthcare professional immediately if they experience symptoms of pre-eclampsia. Symptoms include: severe headache, problems with vision, such as blurring or flashing before the eyes, severe pain just below the ribs, vomiting, sudden swelling of the face, hands or feet.
- The ability of Doppler ultrasound uterine artery waveform analysis early in pregnancy to identify women at risk of pre-eclampsia (and other adverse pregnancy outcomes) has been investigated with varying success.
- **Antiplatelet agents:** Advise pregnant women at high risk of pre-eclampsia to take 75–150 mg of aspirin daily from 12 weeks until the birth of the baby. Women at high risk are those with any of the following:

  - hypertensive disease during a previous pregnancy
  - chronic kidney disease
  - autoimmune disease such as systemic lupus erythematosus or antiphospholipid syndrome
  - type 1 or type 2 diabetes
  - chronic hypertension

- **Advise pregnant women with more than 1 moderate risk factor for pre-eclampsia** to take 75–150 mg of aspirin daily from 12 weeks until the birth of the baby. Factors indicating moderate risk are:

  - Nulliparity
  - age 40 years or older
  - pregnancy interval of more than 10 years
  - body mass index (BMI) of 35 kg/m2 or more at first visit
  - family history of pre-eclampsia
  - multi-fetal pregnancy

- **Diet:** Do not recommend salt restriction during pregnancy solely to prevent gestational hypertension or pre-eclampsia

- **Lifestyle:** Give the same advice on rest, exercise and work to women with chronic hypertension or at risk of hypertensive disorders during pregnancy as healthy pregnant women.

Assessment of proteinuria in hypertensive disorders of pregnancy:

- Interpret proteinuria measurements for pregnant women in the context of a full clinical review of symptoms, signs and other investigations for pre-eclampsia.
- Use an automated reagent-strip reading device for dipstick screening for proteinuria in pregnant women in secondary care settings.
- If dipstick screening is positive (1+ or more), ((use albumin:creatinine ratio or protein:creatinine ratio to quantify proteinuria in pregnant women))
- Do not use first morning urine void to quantify proteinuria in pregnant women
- Do not routinely use 24-hour urine collection to quantify proteinuria in pregnant women

Management of gestational hypertension

Assessment and treatment of gestational hypertension:

- In women with gestational hypertension, a full assessment should be carried out in a **secondary care** setting by a healthcare professional who is trained in the management of hypertensive disorders of pregnancy.

Management of pregnancy with gestational hypertension:

	Degree of hypertension	
	Hypertension: **blood pressure of 140/90–159/109 mmHg**	**Severe hypertension:** **blood pressure of ≥ 160/110 mmHg**
Admission to hospital	Do not routinely admit to hospital	Admit, but if BP falls below 160/110 mmHg then manage as for hypertension
Antihypertensive pharmacological treatment	Offer pharmacological treatment if BP remains above 140/90 mmHg	Offer pharmacological treatment to all women labetalol, nifedipine, or methyldopa if labetalol or nifedipine are not suitable. Base the choice on side-effect, fetal risk & the woman's preferences.
Target BP once on antihypertensive treatment	Aim for BP of 135/85 mmHg or less	Aim for BP of 135/85 mmHg or less

BP measurement	Once or twice a week (depending on BP) until BP is 135/85 mmHg or less	Every 15–30 minutes until BP is less than 160/110 mmHg
Dipstick proteinuria testing	Once or twice a week (with BP measurement)	Daily while admitted
Blood tests	CBC, liver function & renal function at presentation and then weekly	CBC, liver function & renal function at presentation and then weekly
PlGF-based testing	Do PlGF testing on 1 occasion if there is suspicion of pre-eclampsia	Do PlGF if there is suspicion of pre-eclampsia
Fetal assessment	Fetal heart auscultation at every antenatal appointment US of the fetus at diagnosis &, if normal, repeat every 2-4 weeks, if clinically indicated Carry out a CTG only if clinically indicated	Fetal heart auscultation at every antenatal appointment Carry out US of the fetus at diagnosis &, if normal, repeat every 2 weeks, if severe hypertension persists Carry out a CTG at diagnosis and then only if clinically indicated

Timing of birth:

- Do not offer planned early birth before 37 weeks to women with GH if BP is lower < 160/110 mmHg, unless there are other medical indications.
- For women with GH whose blood pressure is < 160/110 mmHg after 37 weeks, timing of birth, and maternal and fetal indications for birth should be agreed between the woman and the senior obstetrician.
- If planned early birth is necessary, offer a course of antenatal corticosteroids and magnesium sulfate if indicated.

Postnatal investigation, monitoring and treatment:

- In women with GH who have given birth, measure blood pressure:

  - daily for the first 2 days after birth
  - at least once between day 3 and day 5 after birth
  - as clinically indicated if antihypertensive treatment is changed after birth.

- In women with gestational hypertension who have given birth:

  - continue antihypertensive treatment if required
  - reduce antihypertensive treatment if their blood pressure falls below 130/80 mmHg.

- If a woman has taken methyldopa to treat GH, stop within 2 days after the birth and change to an alternative treatment if necessary
- For women with GH who did not take antihypertensive treatment and have given birth, start antihypertensive treatment if their blood pressure is 150/100 mmHg or higher
- All women with GH need a medical review with their specialist 6–8 weeks after the birth.

Pre-eclampsia:

Incidence:

Pre-eclampsia complicates approximately 2–3% of pregnancies.

Definition:

Pre-eclampsia is defined as:

- ✓ hypertension of at least **140/90 mmHg**
- ✓ recorded on at least **two separate occasions** and at least **4 hours apart**
- ✓ & in the presence of at **least 300 mg protein** in a **24-hour collection of urine**
- ✓ arising **> 20th week of pregnancy**
- ✓ in a previously normotensive woman
- ✓ resolving completely by the sixth postpartum week.

Risk factors for pre-eclampsia:

➢ First pregnancy	➢ Booking proteinuria (of ≥1+ on more than one occasion or quantified at ≥0.3 g/24 h)
➢ Multiparous with a previous history of pre-eclampsia	➢ Multiple pregnancy
➢ Pre-eclampsia in any previous pregnancy	➢ Certain underlying medical conditions: - pre-existing hypertension - pre-existing renal disease - pre-existing diabetes - antiphospholipid antibodies
➢ 10 years or more since last baby	
➢ Age 40 years or more	
➢ Body mass index (BMI) ≥ 35	
➢ Family history of pre-eclampsia (in mother or sister)	
➢ Booking diastolic blood pressure of 80 mmHg or more	

Pathophysiology:

Pre-eclampsia only occurs in Pregnancy.

- Described also in pregnancies lacking a fetus (as molar pregnancies) or in the absence of a uterus (abdominal pregnancies).
- This suggesting that it is the presence of trophoblast tissue that provides the stimulus for the disorder.
- The development of pre-eclampsia is a two-stage process, which originates in early pregnancy (**Figure 1**):

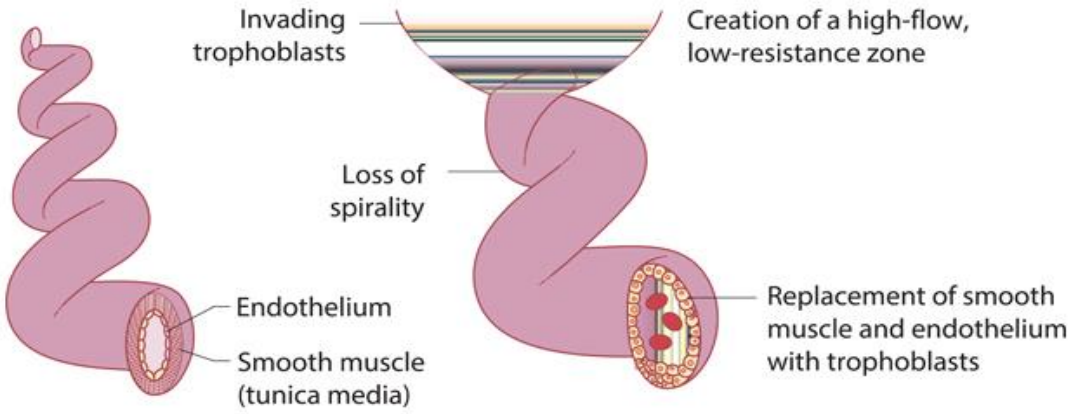

Figure 1: Physiological change of spiral arteries by invading trophoblasts.

In the first stage:

- trophoblast invasion is patchy and the spiral arteries retain their muscular walls.
- This prevents the development of a high-flow, low-impedance uteroplacental circulation and leads to uteroplacental ischaemia (**Figure 2**).
- The reason why trophoblasts invade less effectively in these pregnancies (in pre-eclampsia) is not known but may reflect an abnormal adaptation of the maternal immune system.

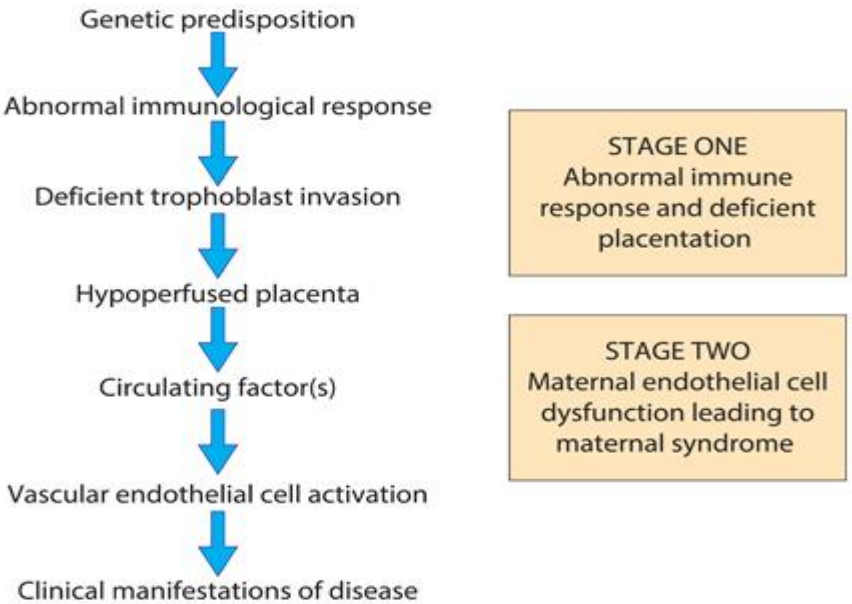

Figure 2: The proposed aetiology of pre-eclampsia.

In the second stage:

- uteroplacental ischaemia results in oxidative and inflammatory stress.
- with involvement of secondary mediators.
- leading to endothelial dysfunction, vasospasm and activation of the coagulation system.
- Pre-eclampsia is a truly multisystem disorder, affecting multiple organ systems, often concurrently.

- **Cardiovascular system**

- **Normal pregnancy** is characterized by **marked peripheral vasodilatation** resulting in a fall in total peripheral resistance despite an increase in plasma volume and cardiac rate.
- **Pre-eclampsia** is characterized by **marked peripheral vasoconstriction**, resulting in hypertension.
- The intravascular high pressure and loss of endothelial cell integrity results in greater vascular permeability and contributes to the formation of **generalized oedema**.

- **Renal system**

- In the kidney, a highly characteristic lesion called **glomeruloendotheliosis** is seen. This is relatively specific for pre-eclampsia (it is not seen with other hypertensive disorders).
- **Glomeruloendotheliosis** is associated with impaired glomerular filtration and selective loss of intermediate weight proteins, such as albumin and transferrin, leading to **proteinuria**.
- This is turn causes a reduction in plasma oncotic pressure and **exacerbates the development of oedema**.

- **Haematological system**

- Pre-eclampsia is association with **increased fibrin deposition** and a **reduction in the platelet count** may accompany due to diffuse vascular damage and occasionally predate the onset of disease.

- **The liver**

- Subendothelial fibrin deposition in the liver is associated with **elevation of liver enzymes**.
- This can be associated with **haemolysis** and a **low platelet count** due to platelet consumption (and subsequent widespread activation of the coagulation system).
- The presence of these finding is called **HELLP syndrome** (haemolysis, elevation of liver enzymes and low platelets).

HELLP Syndrome:

- HELLP syndrome is an acronym for **h**aemolysis, **el**evation of liver enzymes and **l**ow **p**latelets.
- Women with HELLP syndrome typically present with epigastric pain, nausea and vomiting.
- It is severe form of pre-eclampsia.
- HELLP syndrome is associated with a range of serious complications including acute renal failure, placental abruption and stillbirth.
- HELLP syndrome is a particularly, occurring in just 2–4% of women with the disease. It is associated with a high fetal loss rate (of up to 60%).
- The management of HELLP syndrome involves stabilizing the mother, correcting any coagulation deficits and assessing the fetus for delivery.

- **Neurological system**

- The development of convulsions in a woman with pre-eclampsia is defined as **eclampsia**.
- Vasospasm and cerebral oedema have both been implicated in the pathogenesis of eclampsia.
- Retinal haemorrhages, exudates and papilloedema are characteristic of hypertensive encephalopathy and are rare in pre-eclampsia, suggesting that hypertension alone is not responsible for the cerebral pathology.

Clinical presentation:

- The **classic symptoms** of pre-eclampsia include a frontal headache, visual disturbance and epigastric pain.
- However, the majority of women with pre-eclampsia are **asymptomatic** or only complain of general vague 'flu-like' symptoms.
- **Clinical examination** should include a complete obstetric and neurological examination.
- **Hypertension** is usually the first sign but occasionally is absent or transient until the late stages of the disease.
- **Dependent oedema** of the feet is very common in healthy pregnant women. However, rapidly progressive oedema of the face and hands may suggest pre-eclampsia.
- **Epigastric tenderness** is a worrying sign and suggests liver involvement.
- **Neurological examination** may reveal hyperreflexia and clonus in severe cases.
- **Urine testing for protein** should be considered part of the clinical examination.

Management and treatment:

General principles regarding pre-eclampsia

- Assessment of women with pre-eclampsia should be performed by a healthcare professional trained in the management of hypertensive disorders of pregnancy.
- Carry out a full clinical assessment at each antenatal visit for women with pre-eclampsia, and offer admission to hospital for surveillance and any interventions needed if there are concerns for the wellbeing of the woman or baby. Concerns could include any of the following:

- sustained systolic blood pressure of 160 mmHg or higher
- any maternal biochemical or haematological investigations that cause concern, for example, a new and persistent:
    - rise in creatinine (90 micromol/litre or more, 1 mg/100 ml or more) or
    - rise in alanine transaminase (over 70 IU/litre, or twice upper limit of normal range) or
    - fall in platelet count (under 150,000/microlitre)
- signs of impending eclampsia
- signs of impending pulmonary oedema
- other signs of severe pre-eclampsia
- suspected fetal compromise

- any other clinical signs that cause concern.

- There is no cure for pre-eclampsia other than to end the pregnancy by delivering the baby (and placenta). This can be a significant problem if pre-eclampsia occurs early in pregnancy, particularly at gestations below 34 weeks.
- Management strategies are **aimed at minimizing risk to the mother in order to permit continued fetal growth**. In severe cases this is often not possible.
- The principles of management of pre-eclampsia are:
- Early recognition of the symptomless syndrome.
- Awareness of the serious nature of the condition in its severest form.
- Adherence to agreed guidelines for admission to hospital, investigation and the use of antihypertensive and anticonvulsant therapy.
- Well-timed delivery to prevent serious maternal or fetal complications.
- Postnatal follow-up and counselling for future pregnancies.
- A diagnosis of pre-eclampsia usually requires admission.

Management of pregnancy with pre-eclampsia:

➢ **Investigations: To monitor maternal complications:**

- **Full blood count** (with particular emphasis on **falling platelet** count and **rising haematocrit**).
- If platelet values are normal, additional **clotting studies** are not indicated.
- **Serum renal profile** (including serum uric acid levels).
- **Serum liver profile**.
- Frequent repeat proteinuria quantification is probably unhelpful once a diagnosis of pre-eclampsia has been made.

The management plan of pregnancy complicated by pre-eclampsia:

	Degree of hypertension	
	Hypertension: **blood pressure of 140/90–159/109 mmHg**	**Severe hypertension:** **blood pressure of 160/110 mmHg or more**
Admission to hospital	Admit if any clinical concerns for the wellbeing of the woman or baby or if high risk of adverse events suggested by the fullPIERS or risk prediction models	Admit, but if BP falls below 160/110 mmHg then manage as for hypertension

Antihypertensive pharmacological treatment	Offer pharmacological treatment if BP remains above 140/90 mmHg	Offer pharmacological treatment to all women Base the choice on any pre-existing treatment, side-effect profiles, risks (including fetal effects) and the woman's preference
Target blood pressure once on antihypertensive treatment	Aim for BP of 135/85 mmHg or less	Aim for BP of 135/85 mmHg or less
Blood pressure measurement	At least every 48 hours, and more frequently if the woman is admitted to hospital	Every 15–30 minutes until BP is less than 160/110 mmHg, then at least 4 times daily while the woman is an inpatient, depending on clinical circumstances
Dipstick proteinuria testing [a]	Only repeat if clinically indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis	Only repeat if clinically indicated, for example, if new symptoms and signs develop or if there is uncertainty over diagnosis
Blood tests	Measure CBC, liver function & renal function twice a week	Measure CBC, liver function and renal function 3 times a week
Fetal assessment	Fetal heart auscultation at every antenatal appointment US assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks Do CTG at diagnosis & then only if clinically indicated	Fetal heart auscultation at every antenatal appointment US of the fetus at diagnosis and, if normal, repeat every 2 weeks Do CTG at diagnosis and then only if clinically indicated

- **monitor fetal complications:**
  - **Ultrasound assessment**: for fetal size, amniotic fluid volume, maternal and fetal Dopplers.
  - **Antenatal cardiotocography**: used in conjunction with ultrasound surveillance. A loss of baseline variability or decelerations of the fetal heart may indicate fetal hypoxia.

➢ **Treatment of hypertension:**

- **The aim of antihypertensive therapy is to lower the blood pressure and reduce the risk of maternal cerebrovascular accident and other complications without reducing uterine blood flow and compromising the fetus. *****
- There are a variety of antihypertensives used in the management of pre-eclampsia.

- **Methyldopa** is a centrally acting antihypertensive agent. It has a long-established safety record in pregnancy. However, it can only be given orally, it takes upwards of 24 hours to take effect and has a range of unpleasant side-effects including sedation and depression. These properties limit its usefulness, but it is the most widely used in Iraq, since labetalol is not always available.
- **Labetalol** is an alpha-blocking and beta-blocking agent. It has a good safety record in pregnancy and can be given orally and intravenously. It is the **first drug of choice in most national guidelines**.
- **Nifedipine** is a calcium-channel blocker with a rapid onset of action. It can, however, cause severe headache that may mimic worsening disease.
- In severe cases of fulminating disease, an **intravenous** infusion of **hydralazine or labetalol** can be used.

Timing of birth in women with pre-eclampsia

Weeks of pregnancy	**Timing of birth**
Before 34 weeks	Continue surveillance unless there are indications for planned early birth. Offer intravenous magnesium sulfate and a course of antenatal corticosteroids accordingly
From 34 to 36 $^{+6}$ weeks	Continue surveillance unless there are indications for planned early birth. When considering the option of planned early birth, take into account the woman's and baby's condition, risk factors (such as maternal comorbidities, multi-fetal pregnancy) and availability of neonatal unit beds.
37 weeks onwards	Initiate birth within 24–48 hours.

- Planned early birth could be due to any of the following known features of severe pre-eclampsia:

  - inability to control maternal blood pressure despite using 3 or more classes of antihypertensives in appropriate doses
  - maternal pulse oximetry less than 90%
  - progressive deterioration in liver function, renal function, haemolysis, or platelet count

- ongoing neurological features, such as severe intractable headache, repeated visual scotomata, or eclampsia
- placental abruption
- reversed end-diastolic flow in the umbilical artery doppler velocimetry, a non-reassuring cardiotocograph, or stillbirth.

Treatment and prevention of eclampsia:

- Eclampsia is defined as the presence of tonic–clonic convulsions and/or coma in a woman with pre-eclampsia and in the absence of any other identifiable cause.
- **Types**
  - Antepartum eclampsia 50%.
  - Intrapartum eclampsia 25%.
  - Postpartum eclampsia 25% occurs within 48 hours of delivery. It is usually the most dangerous one.
- **Differential Diagnosis:**
  - Epilepsy.
  - Intracranial haemorrhage.
  - Meningitis.
  - Brain tumours.
- Eclampsia is associated with significant maternal morbidity, in particular cerebrovascular events. Cerebral haemorrhage has been reported to be the most common cause of death in patients with eclampsia and stroke is known to be the most common cause of death (45%) in women with haemolysis, elevated liver enzymes and low platelets (HELLP) syndrome.
- **prevention/risk factors/warning signs:**
  - **Prevention**: low threshold for administration of **magnesium sulphate** in women with preeclampsia who are thought to be unstable or suffering from severe pre-eclampsia. However, remember all patients with preeclampsia regardless of perceived severity are at risk of eclampsia.
  - **Risk factors**: difficult to predict, uncontrolled hypertension, two or fewer prenatal care visits, primigravidity, obesity, black ethnicity, history of diabetes and age <20 years.
  - **Warning signs**: epigastric pain and right upper quadrant tenderness, headache, uncontrolled hypertension, agitation, hyper-reflexia and clonus, facial (especially periorbital) oedema, poor urine output, papilloedema (Imminent eclampsia).

- **Management:**

General measures:

- Hospitalization is mandatory.
- Call for help
- Initial approach is to focus on airway, breathing and circulation.
- 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**.** The tongue is protected from biting by a plastic mouth gauge.
- Efficient nursing in a single quiet semi-dark room to prevent any auditory or visual stimuli.
- A Foley's catheter is applied. The hourly output of urine is charted.
- Oxygen is administered during and after fits.

- Observation for maternal vital signs, general condition, urine output and uterine contraction, in addition to fetal heart monitoring.

Medical measures:

- **Magnesium sulphate** is indicated as the first-line anticonvulsant and should be administered as soon as possible either in women at risk of eclampsia or when eclampsia occurs. A loading dose of 4 g should be given intravenously over 5 to 15 minutes, followed by an infusion of 1 g/hour generally for 24 hours after delivery. If the woman has had an eclamptic fit, the infusion should be continued for 24 hours after the last fit. Recurrent fits should be treated with a further dose of 2–4 g given intravenously over 5 to 15 minutes. Do not use diazepam, phenytoin or other anticonvulsants as an alternative to magnesium sulfate in women with eclampsia.
- Magnesium sulphate has a narrow therapeutic range and overdose can cause respiratory depression and ultimately cardiac arrest. The antidote is 10 ml 10% calcium gluconate given slowly intravenously. Before each maintenance does of Magnesium sulphate, the following criteria should be checked:
  - **Knee jerk should be present,**
  - Respiratory rate not less than 16 / min.
  - Urine output not less than 30 ml/hour.
- **Antihypertensive** / chose intravenous type.
- Steroid: to enhance lung maturity if delivery is needed before term.

Obstetric measures:

- The policy is that there is no conservative treatment in eclampsia and the patient should be delivered but convulsions should be controlled first.
- Vaginal delivery is preferred, but caesarean section could be the choice when there is obstetrical indication or vaginal delivery is expected to be prolonged.

Additional points in management

- Iatrogenic premature delivery of the fetus is often required in severe pre-eclampsia.
- If her condition allows, the mother should be transferred to a centre with adequate facilities to care for her baby, and prior to 34 weeks' gestation **steroids** should be given intramuscularly to the mother to reduce the chance of neonatal respiratory distress syndrome.
- Delivery **before term** is often by **caesarean section**.
- Such patients are at particularly high risk for thromboembolism and should be given prophylactic subcutaneous heparin and with **antithromboembolic** stockings.
- In the case of **spontaneous or induced labour** and if clotting studies are normal, **epidural anaesthesia** is indicated as it helps control blood pressure.
- **Ergometrine is avoided** in the management of the third stage as it can significantly increase blood pressure.
- **Postnatally**, blood pressure and proteinuria will resolve. However, in a minority of cases one or both persist beyond 6 weeks and this suggests the presence of underlying chronic hypertension or renal disease.
- Additionally, a careful search should be made postnatally for underlying medical disorders in women who present with severe pre-eclampsia before 34 weeks' gestation.

Chronic hypertension:

- **Essential hypertension**: is the underlying cause of chronic hypertension in 90% of cases.

- However, before a diagnosis is made, other causes need to be excluded (secondary hypertension), renal causes account for over 80% of cases of secondary hypertension.
- Appropriate investigations include serum creatinine, electrolytes, urine analysis (blood, protein and glucose), protein quantification and renal ultrasound. Autoantibody screen and cardiac investigations including electrocardiography (ECG) and echocardiography should be considered where there is clinical suspicion (history, examination or investigation results) of a secondary cause.
- **Causes, include:**

Renal disease	Vascular disorders	Endocrine disease
Polycystic disease	Coarctation of the aorta	Conn's syndrome
Diabetic nephropathy	Phaeochromocytoma	Cushing's syndrome
Chronic glomerulonephritis	Collagen vascular disease	Diabetes mellitus
Nephrotic and nephritic syndrome	Systemic sclerosis	Systemic lupus erythematosus
Renal artery stenosis	Rheumatoid disease	Idiopathic

- The **maternal risks** of pre-existing hypertension include:
  - pre-eclampsia, abruption, heart failure and intracerebral haemorrhage.
  - pre-eclampsia develops in around one-third of women with pre-existing hypertension and is more likely to affect those with severe hypertension and/or renal disease.

Management

Pre-pregnancy advice:

- Offer women with chronic hypertension referral to a specialist in hypertensive disorders of pregnancy to discuss the risks and benefits of treatment.
- Advise women who take angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs):
  - that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy.
  - to discuss alternative antihypertensive treatment if they are planning pregnancy.
- Stop antihypertensive treatment in women taking ACE inhibitors or ARBs if they become pregnant (preferably within 2 working days of notification of pregnancy) and offer alternatives.
- Advise women who take thiazide or thiazide-like diuretics:
  - that there may be an increased risk of congenital abnormalities and neonatal complications if these drugs are taken during pregnancy.
  - to discuss alternative antihypertensive treatment with the healthcare professional responsible for managing their hypertension, if they are planning pregnancy.

Treatment of chronic hypertension:

- Offer pregnant women with chronic hypertension advice on:

- weight management
- exercise
- healthy eating
- lowering the amount of salt in their diet.

- Offer antihypertensive treatment to pregnant women who have chronic hypertension and who are not already on treatment if they have:

  - sustained systolic blood pressure of 140 mmHg or higher or
  - sustained diastolic blood pressure of 90 mmHg or higher.

- When using medicines to treat hypertension in pregnancy, aim for a target blood pressure of 135/85 mmHg.
- Consider labetalol to treat chronic hypertension in pregnant women. Consider nifedipine for women in whom labetalol is not suitable, or methyldopa if both labetalol and nifedipine are not suitable. Base the choice on any pre-existing treatment, side-effect profiles, risks (including fetal effects) and the woman's preference.
- Offer pregnant women with chronic hypertension aspirin 75–150 mg once daily from 12 weeks.
- Offer placental growth factor (PlGF)-based testing to help rule out pre-eclampsia between 20 weeks and up to 35 weeks of pregnancy, if women with chronic hypertension are suspected of developing pre-eclampsia.

Antenatal appointments:

- In women with chronic hypertension, schedule additional antenatal appointments based on the individual needs of the woman and her baby. This may include:

  - weekly appointments if hypertension is poorly controlled
  - appointments every 2 to 4 weeks if hypertension is well-controlled.

Timing of birth:

- Do not offer planned early birth before 37 weeks to women with chronic hypertension whose blood pressure is lower than 160/110 mmHg, with or without antihypertensive treatment, unless there are other medical indications.
- For women with chronic hypertension whose blood pressure is ≤ 160/110 mmHg after 37 weeks, with or without antihypertensive treatment, timing of birth and maternal and fetal indications for birth should be agreed between the woman and the senior obstetrician.
- If planned early birth is necessary, we need to offer a course of antenatal corticosteroids and magnesium sulfate if indicated.

Postnatal investigation, monitoring and treatment:

- In women with chronic hypertension who have given birth, measure blood pressure:

  - daily for the first 2 days after birth

- at least once between day 3 and day 5 after birth
- as clinically indicated if antihypertensive treatment is changed after birth.

- In women with chronic hypertension who have given birth:

  - aim to keep blood pressure lower than 140/90 mmHg
  - continue antihypertensive treatment, if required
  - offer a review of antihypertensive treatment 2 weeks after the birth, with their GP or specialist.

- If a woman has taken methyldopa to treat chronic hypertension during pregnancy, stop within 2 days after the birth and change to an alternative antihypertensive treatment.
- Offer women with chronic hypertension a medical review 6–8 weeks after the birth.
- Breastfeeding is encouraged and medication should be changed to those drugs that are considered safe.

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