UPDATED MANAGEMENT OF HYPERTENSION WITH PREGNANCY

Osama M Warda MD

Prof. of Obstetrics & Gynecology

Mansoura University

OBJECTIVE OF THIS TALK

- Revise our knowledge about the following items according to the evidence-bsed recommendattions regarding diagnosis & management of hypertentive disorders in pregnancy;
  - the terminology
  - the diagnosis & management
  - drug preferance

OUR REFERENCE

NICE National Institute for Health and Care Excellence

NICE guideline

Hypertension in pregnancy: diagnosis and management

NICE guideline
Published: 25 June 2019
www.nice.org.uk/guidance/ng133

AGENDA

- CHAPTER -1. DEFINITIONS
- CHAPTER-2 PREVENTIVE MEASURES
- CHAPTER-3 HOW TO DIAGNOSE PROTEINURIA
- CHAPTER-4 MANAGEMENT OF CHRONIC HYPERTENSION IN PREGNANCY
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Chapter -1

Definitions

DEFINITIONS

- *Hypertension:* Blood pressure of 140 mmHg systolic or higher, or 90 mmHg diastolic or higher [NICE 2019]
- *Chronic hypertension* Hypertension that is present **at the booking visit**, or **before 20 weeks**, or if the woman is **already taking antihypertensive medication** when referred to maternity services. It can be primary or **secondary** in etiology.
- *Eclampsia:* A convulsive condition associated with pre-eclampsia.
- *Gestational hypertension* : New hypertension presenting after 20 weeks of pregnancy without significant proteinuria.
- *HELLP syndrome* Hemolysis, elevated liver enzymes and low platelet count.

DEFINITIONS

Pre-eclampsia : New onset of hypertension after 20 weeks of pregnancy and the coexistence of 1 or more of the following new-onset conditions:

A- proteinuria (urine protein/creatinine ratio of **30 mg/mmol** or more or or **albumin/creatinine ratio** of 8 mg/mmol or more, or **at least 1 g/litre [2+] on dipstick testing)** or ;

B- **other maternal organ dysfunction:**

1— **renal insufficiency** (creatinine 90 micromol/litre or more, 1.02 mg/100 ml or more)

2— **liver involvement** (elevated transaminases [alanine aminotransferase or aspartate aminotransferase over 40 IU/litre] with or without right upper quadrant or epigastric abdominal pain)

3— **neurological complications** such as eclampsia, altered mental status, blindness, stroke, clonus, severe headaches or persistent visual scotomata

4— **hematological complications** such as thrombocytopenia (platelet count below 150,000/ microlitre), disseminated intravascular coagulation or hemolysis

C-Uteroplacental dysfunction such as **fetal growth restriction**, **abnormal umbilical artery doppler waveform analysis, or stillbirth.**

EDEMA IS NO LONGER A DIAGNOSTIC SIGN OF PREECLAMPSIA

DEFINITIONS

- *Severe hypertension :* Blood pressure over 160 mmHg systolic or over 110 mmHg diastolic.
- *Severe pre-eclampsia:* Pre-eclampsia with severe hypertension that does not respond to treatment or is *associated with* ongoing or recurring severe headaches, visual scotomata, nausea or vomiting, epigastric pain, oliguria, as well as progressive deterioration in laboratory blood tests such as rising creatinine or liver transaminases or falling platelet count, or failure of fetal growth or abnormal Doppler findings.

CHAPTER -2

PREVENTIVE MEASURES

Reducing the risk of hypertensive disorders in pregnancy

- **[A].** Advise pregnant women to seek a medical care immediately if they experience *symptoms of pre-eclampsia*. Symptoms include:

1. severe headache
2. problems with vision, such as blurring or flashing before the eyes
3. severe pain just below the ribs
4. vomiting
5. sudden swelling of the face, hands or feet.

Reducing the risk of hypertensive disorders in pregnancy

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Professor of Obs/Gyn

[B]. Aniplatelets 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:

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

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[C]. **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:**

1. first pregnancy
2. age 40 years or older
3. pregnancy interval of more than 10 years
4. body mass index (BMI) of 35 kg/m2 or more at first visit
5. family history of pre-eclampsia
6. multi-fetal pregnancy

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[D].Drugs. Do not use the following to prevent hypertensive disorders during pregnancy:

1. nitric oxide donors
2. progesterone
3. diuretics
4. low molecular weight heparin.

Reducing the risk of hypertensive disorders in pregnancy

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[E]. Nutritional supplements; Do not recommend the following supplements solely with the aim of preventing hypertensive disorders during pregnancy:

1. Magnesium
2. folic acid
3. antioxidants (vitamins C and E)
4. fish oils or algal oils
5. garlic.

Reducing the risk of hypertensive disorders in pregnancy

Osama M Warda
Professor of Obs/Gyn

[F]. DIET. Do not recommend salt restriction during pregnancy solely to prevent gestational hypertension or pre-eclampsia

[G]. 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.

The only evidence -based recommendation for prevention of preeclampsia is ASPIRIN 75-150 mg daily started at 12th week until delivery of the baby or at least 35 weeks gestation.

CHAPTER -3

HOW TO DIAGNOSE PROTEINURIA

Assessment of proteinuria in hypertensive disorders of pregnancy

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

Assessment of proteinuria in hypertensive disorders of pregnancy

6. If using *protein/creatinine ratio* to quantify proteinuria in pregnant women:

a)- use *30 mg/mmol* as a threshold for significant proteinuria*

b)- if the result is ≧*30 mg/mmol* and there is still uncertainty about the diagnosis of pre-eclampsia, consider re-testing on a new sample, alongside clinical review

7. If using *albumin/creatinine ratio* as an alternative to protein/creatinine ratio to diagnose pre-eclampsia in pregnant women with hypertension:

a)- use 8 mg/mmol as a diagnostic threshold

b)- if the result is 8 mg/mmol or above and there is still uncertainty about the diagnosis of pre-eclampsia, consider re-testing on a new sample, alongside clinical review

* 1mmol/L= 18.018 mg/dL

CHAPTER -4

Management of chronic hypertension in pregnancy

Management of chronic hypertension in pregnancy

Pre-pregnancy advice

1-Discuss with the woman the risks and benefits of treatment of hypertension before pregnancy .

2-Women who take ACE inhibitors or angiotensin II receptor blockers (ARBs) should be informed that :

a). there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy .

b). alternative antihypertensive treatment, if they are planning pregnancy.

3-Women taking ACE inhibitors or ARBs if they become pregnant must stop treatment (preferably within 2 working days of notification of pregnancy) and offered alternatives.

Angiotensin-converting enzyme inhibitor (ACE inhibitors) drugs include :

- Benazepril (Lotensin),
- Captopril (Capoten),
- Enalapril/Enalaprilat (Vasotec oral and injectable),
- Fosinopril (Monopril),
- Lisinopril (Zestril and Prinivil), Moexipril (Univasc),
- Perindopril (Aceon),
- Quinapril (Accupril),
- Ramipril (Altace), and
- Trandolapril (Mavik).

Examples of angiotensin II receptor blockers include:

- Azilsartan (Edarbi)
- Candesartan (Atacand)
- Eprosartan.
- Irbesartan (Avapro)
- Losartan (Cozaar)
- Olmesartan (Benicar)
- Telmisartan (Micardis)
- Valsartan (Diovan)

Management of chronic hypertension in pregnancy

Pre-pregnancy advice

- **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

- Advise women who take antihypertensive treatments **other than *ACE inhibitors, ARBs, thiazide or thiazide-like diuretics*** that the limited evidence available has not shown an increased risk of congenital malformation with such treatments

Management of chronic hypertension in pregnancy

Treatment

1-Pregnant women with chronic hypertension should' have advice on:

a). weight management b).exercise c). healthy eating

d) lowering salt in their diet.

2- Continue with existing antihypertensive treatment **if safe in pregnancy**, or switch to an alternative treatment, **unless**:

- sustained systolic blood pressure is less than 110 mmHg or
- sustained diastolic blood pressure is less than 70 mmHg or
- the woman has symptomatic hypotension

Management of chronic hypertension in pregnancy

Treatment

3- 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.

4-When using medicines to treat hypertension in pregnancy, aim for a target blood pressure of 135/85 mmHg

Management of chronic hypertension in pregnancy

Treatment

5-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.

6- Offer pregnant women with chronic hypertension aspirin 75–150 mg once daily from 12 weeks.

7- 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.

Management of chronic hypertension in pregnancy

Antenatal appointments

a) - weekly appointments if hypertension is poorly controlled.

b) - appointments every 2 to 4 weeks if hypertension is well-controlled

Management of chronic hypertension in pregnancy

Timing of birth

1-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 .

3- If planned early birth is necessary , offer a course of antenatal corticosteroids and magnesium sulfate (for fetal neuroprotection) if indicated.

Management of chronic hypertension in pregnancy

Postnatal investigation, monitoring and treatment

1- Measurement of blood pressure:

a) daily for the first 2 days after birth. Then at least once between day 3 and day 5 after birth

b) as clinically indicated if antihypertensive treatment is changed after birth

2- Adjustment of blood pressure:

a) aim to keep blood pressure lower than 140/90 mmHg . Continue antihypertensive treatment, if required .

b) Women taken methyldopa to treat chronic hypertension during pregnancy, stop within 2 days after the birth and change to an alternative antihypertensive treatment.

c) Revise antihypertensive treatment 2 weeks after the birth, with their GP or specialist, then another visit after 6-8 weeks postnatal.

Osama M Warda
Professor of Obs/Gyn

CHAPTER-5

Management of gestational hypertension

Management of gestational hypertension

Osama M Warda
Professor of Obs/Gyn

A. Assessment of cases:

In women with gestational hypertension, take account of the following risk factors that require additional assessment and follow-up:

1 - nulliparity

2- age 40 years or older

3- pregnancy interval of more than 10 ys.

4- family history of pre-eclampsia

5 - multi-fetal pregnancy

6 - BMI of ≧ 35 kg/m2

7 - gestational age at presentation

8 - previous history of pre-eclampsia or gestational hypertension

9- pre-existing vascular disease

10 - pre-existing kidney disease

Management of gestational hypertension

B- management according to the following table

1/3	DEGREE OF HYPERTENSION	
	Hypertension: BP of 140/90–159/109 mmHg	Severe hypertension: BP of 160/110 mmHg or more
• 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
• Target BP 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	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

Management of gestational hypertension

B- management according to the following table; continued

2/3	DEGREE OF HYPERTENSION	
• Dipstick proteinuria testing *	Once or twice a week (with BP measurement)	Daily while admitted
• Blood tests	Measure full blood count, liver function and renal function at presentation and then weekly	Measure full blood count, liver function and renal function at presentation and then weekly
• PlGF-based testing	Carry out PlGF-based testing on 1 occasion to help rule out pre-eclampsia in women presenting with suspected pre-eclampsia	Carry out PlGF-based testing on 1 occasion to help rule out pre-eclampsia in women presenting with suspected pre-eclampsia

Management of gestational hypertension

B- Management according to the following table; continued

3/3	DEGREE OF HYPERTENSION	
Fetal assessment	• Offer fetal heart auscultation at every antenatal appointment • Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 to 4 weeks, if clinically indicated • Carry out a CTG only if clinically indicated	• Offer fetal heart auscultation at every antenatal appointment • Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks, if severe hypertension persists • Carry out a CTG at diagnosis and then only if clinically indicated

- Use an automated reagent reading device for dipstick screening for proteinuria in a secondary care setting.
- Abbreviations; BP= blood pressure, CTG= cardiotocography, PlGF= placental growth factor.

Management of gestational hypertension

C- Choice of antihypertensive medications

- Consider labetalol to treat gestational hypertension. Consider nifedipine for women in whom labetalol is not suitable, and methyldopa if labetalol or nifedipine are not suitable. Base the choice on side-effect profiles, risk (including fetal effects) and the woman's preferences.
- Do not offer bed rest in hospital as a treatment for gestational hypertension.

Management of gestational hypertension

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Professor of Obs/Gyn

D- Timing of birth

- Do not offer planned early birth before 37 weeks to women with gestational hypertension whose blood pressure is lower than 160/110 mmHg, unless there are other medical indications.
- For women whose blood pressure is *lower than 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 .

CHAPTER-6

MANAGEMENT OF PRE-ECLAMPSIA

MANAGEMENT OF PREECLAMPSIA

A- ASSESSMENT OF PREECLAMPSIA

1- should be performed by a healthcare professional trained in the management of hypertensive disorders of pregnancy.

2- full clinical assessment at each antenatal appointment for women with pre-eclampsia, **and offer admission to hospital for any of the following:**

a - sustained systolic blood pressure of 160 mmHg or higher

b - any maternal biochemical or hematological 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*

c- signs of impending eclampsia.

d- signs of impending pulmonary oedema

e - other signs of severe pre-eclampsia

f- suspected fetal compromise

g - any other clinical signs that cause concern

MANAGEMENT OF PREECLAMPSIA

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A- ASSESSMENT OF PREECLAMPSIA; (continued.),

3- Consider using either the full PIERS or PREP-S validated risk prediction models to help guide decisions about the most appropriate place of care (such as the need for in utero transfer) and thresholds for intervention.

4- When using a risk prediction model, take into account that:

a - full PIERS is intended for use at any time during pregnancy

b - PREP-S is intended for use only up to 34 weeks of pregnancy

c- Full PIERS and PREP-S models do not predict outcomes for babies.

Interpretation
The fullPIERS model identifies women at increased risk of adverse outcomes up to 7 days before complications arise and can thereby modify direct patient care (eg, timing of delivery, place of care), improve the design of clinical trials, and inform biomedical investigations related to pre-eclampsia.

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

B- Treatment of pre-eclampsia

	Degree of hypertension	
	Hypertension: BP of 140/90–159/ 109 mmHg	Severe hypertension: BP 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 full PIERS or PREP-S 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
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

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

B- Treatment of pre-eclampsia (CONTINUED)

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 **	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 full blood count, liver function and renal function twice a week	Measure full blood count, liver function and renal function 3 times a week

MANAGEMENT OF PREECLAMPSIA

Osama M Warda
Professor of Obs/Gyn

B- Treatment of pre-eclampsia (CONTINUED)

Fetal assessment	Offer fetal heart auscultation at every antenatal appointment Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks Carry out a CTG at diagnosis and then only if clinically indicated	Offer fetal heart auscultation at every antenatal appointment Carry out ultrasound assessment of the fetus at diagnosis and, if normal, repeat every 2 weeks Carry out a CTG at diagnosis and then only if clinically indicated

** Use an automated reagent-strip reading device for dipstick screening for proteinuria in a secondary care setting.

Abbreviations: BP, blood pressure; CTG, cardiotocography.

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

Timing of birth

1- Thresholds for considering planned early birth (<37 weeks) could include (but are not limited to) any of the following known features of severe pre-eclampsia:

a) inability to control maternal blood pressure despite using 3 or more classes of antihypertensives in appropriate doses

b) maternal pulse oximetry less than 90%

c) progressive deterioration in liver function, renal function, hemolysis, or platelet count

d) ongoing neurological features, such as severe intractable headache, repeated visual scotomata, or eclampsia

e) placental abruption

f) reversed end-diastolic flow in the umbilical artery doppler velocimetry, a non-reassuring cardiotocograph, or stillbirth.

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

Timing of birth (continued)

2- A team of senior obstetrician, anaesthist, and neonatal specialist.

3-Offer intravenous magnesium sulfate and a course of antenatal corticosteroids if indicated, if early birth is planned for women with preterm pre-eclampsia .

4-Decide on timing of birth in women with pre-eclampsia as recommended in table

Weeks of pregnancy	Time of birth
< 34 weeks	Continue surveillance unless there are indications for planned early birth. Offer intravenous magnesium sulfate and a course of antenatal corticosteroids.
34-36w^{+6}	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. Consider a course of antenatal corticosteroids.
≧ 37 W	Initiate birth within 24-48 hours

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

Postnatal investigation, monitoring and treatment*

1- Blood Pressure:

a). In women who did not take antihypertensive treatment and have given birth, measure blood pressure:

- at least 4 times a day while the woman is an inpatient

-at least once between day 3 and day 5 after birth & on alternate days until normal, if blood pressure was abnormal on days 3–5.

b). In women who did not take antihypertensive treatment and have given birth, start antihypertensive treatment if blood pressure is 150/100 mmHg or higher.

c). Ask women who have given birth about *severe headache* and *epigastric pain* each time blood pressure is measured .

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

Postnatal investigation, monitoring and treatment (cont.)

1- Blood pressure:

d). In women who took antihypertensive treatment and have given birth, measure blood pressure:

- at least 4 times a day while the woman is an inpatient

- every 1–2 days for up to 2 weeks after transfer to community care until the woman is off treatment and has no hypertension

e) . For women with pre-eclampsia who have taken antihypertensive treatment and have given birth:

- continue antihypertensive treatment

- consider reducing antihypertensive treatment if their blood pressure falls below 140/90 mmHg

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

MANAGEMENT OF PREECLAMPSIA

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Postnatal investigation, monitoring and treatment (cont.)

1- Blood pressure:

f). If a woman has taken methyldopa to treat pre-eclampsia, stop within 2 days after the birth and change to an alternative treatment if necessary

g). Transfer to community care if all of the following criteria have been met:

- there are no symptoms of pre-eclampsia
- blood pressure, with or without treatment, is 150/100 mmHg or less
- blood test results are stable or improving .

MANAGEMENT OF PREECLAMPSIA

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Professor of Obs/Gyn

Postnatal investigation, monitoring and treatment (cont.)

2- Hematological and biochemical monitoring:

a). In women who have pre-eclampsia *with mild or moderate hypertension*, or *after step-down from critical care*:

- measure *platelet count, transaminases and serum creatinine* 48–72 hours after birth or step-down. Do not repeat if results are normal at 48–72hrs.

b). If biochemical and hematological indices are *outside the reference range* , repeat platelet count, transaminases and serum creatinine measurements as *clinically indicated until results return to normal* .

c). Carry out a urinary reagent-strip test *6–8 weeks* after the birth.

d). Offer women who still have proteinuria (1+ or more) at 6–8 weeks after the birth, a further review with their GP or specialist at 3 months after the birth to assess kidney function.

e) Consider referring women with *an abnormal kidney function assessment* at 3 months for a specialist kidney assessment.

Osama M Warda
Professor of Obs/Gyn

CHAPTER-7

FETAL MONITORING

FETAL MONITORING

Osama M Warda
Professor of Obs/Gyn

Fetal monitoring in chronic hypertension

1- carry out an ultrasound for fetal growth and amniotic fluid volume assessment, and umbilical artery doppler velocimetry at 28 weeks, 32 weeks and 36 weeks.

2- only carry out cardiotocography if clinically indicated.

Fetal monitoring in gestational hypertension

1- carry out an ultrasound for fetal growth and amniotic fluid volume assessment and umbilical artery doppler velocimetry at diagnosis and if normal repeat every 2 to 4 weeks, if clinically indicated.

2- only carry out cardiotocography if clinically indicated.

FETAL MONITORING

Fetal monitoring in pre-eclampsia or severe gestational hypertension

1- Carry out cardiotocography at diagnosis of pre-eclampsia or severe gestational hypertension.

2- If conservative management of pre-eclampsia or severe gestational hypertension is planned, carry out all the following tests at diagnosis:

a). ultrasound for fetal growth and amniotic fluid volume assessment

b). umbilical artery doppler velocimetry.

3-If the results of all fetal monitoring are normal, do not routinely repeat cardiotocography unless clinically indicated .

4- Repeat cardiotocography if any of the following occur:

a). the woman reports a change in fetal movement

b). vaginal bleeding

c) abdominal pain

e). deterioration in maternal condition.

FETAL MONITORING

Fetal monitoring in pre-eclampsia or severe gestational hypertension

5- Repeat ultrasound for fetal growth and amniotic fluid volume assessment or umbilical artery doppler velocimetry every 2 weeks, with subsequent surveillance and monitoring determined by the findings of these scans.

6- Write a care plan that includes all of the following:

a). the timing and nature of future fetal monitoring

b). fetal indications for birth and if and when antenatal corticosteroids should be given

c). plans for discussion with neonatal pediatricians and obstetric anesthetists.

FETAL MONITORING

Osama M Warda
Professor of Obs/Gyn

Women who need additional fetal monitoring

1- Carry out an ultrasound for fetal growth and amniotic fluid volume assessment and umbilical artery doppler velocimetry starting *at between 28 and 30 weeks* (or at least 2 weeks before previous gestational age of onset if earlier than 28 weeks) and repeating 4 weeks later in women with **previous**:

a) severe pre-eclampsia

b) pre-eclampsia that resulted in birth before 34 weeks

c) pre-eclampsia with a baby whose birth weight was less than the 10th centile

d) intrauterine death

e) placental abruption

2- In these women , carry out cardiotocography only if clinically indicated

CHAPTER-8

INTRA-PARTUM CARE

INTRAPARTUM CARE

1- Blood pressure:

a). Measurement: hourly, in women with hypertension. Every 15–30 minutes until blood pressure is less than 160/110 mmHg in women with severe hypertension.

b). Continue use of antenatal antihypertensive treatment during labor

2- Hematological and biochemical monitoring :

Determine the need for hematological and biochemical tests during labor using the same criteria as in the antenatal period even if regional analgesia is being considered .

3- Care during epidural analgesia . Do not preload women who have severe pre-eclampsia with intravenous fluids before establishing low-dose epidural analgesia or combined spinal epidural analgesia.

INTRAPARTUM CARE

4- Management of second stage of labor :

a). Do not routinely limit the duration of the second stage of labor in women with controlled hypertension.

b). Consider operative or assisted birth in the second stage of labor for women with severe hypertension whose hypertension *has not responded to initial treatment*.

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شكرا لحسن الاستماع

CHAPTER-9

CRITICAL CARE SETTINGS

Medical management of severe hypertension, severe pre-eclampsia or eclampsia in a *critical care setting*

Osama M Warda
Professor of Obs/Gyn

1-ANTICONVULSANTS:

a). ***intravenous magnesium sulfate***: given to woman in a critical care setting who has *severe hypertension* or *severe pre-eclampsia* has or *previously had an eclamptic fit.*

b). Consider giving intravenous magnesium sulfate to women with severe pre-eclampsia who are in a critical care setting if birth is planned within 24 hours.

c). Consider the need for magnesium sulfate treatment, if *1 or more of the following features* of severe pre-eclampsia is present:

- ongoing or recurring severe headaches
- visual scotomata
- nausea or vomiting
- epigastric pain
- oliguria and severe hypertension
- progressive deterioration in laboratory blood tests (such as rising creatinine or liver transaminases, or falling platelet count

Medical management of severe hypertension, severe pre-eclampsia or eclampsia in a *critical care setting*

Osama M Warda
Professor of Obs/Gyn

1-ANTICONVULSANTS:

d). MgSO4 Dosage: Use the Collaborative Eclampsia Trial regimen for administration of magnesium sulfate :

- A loading dose of **4 g** should be given intravenously *over 5 to 15 minutes*, followed by an infusion *of 1 g/hour maintained for 24 hours*. 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.

Medical management of severe hypertension, severe pre-eclampsia or eclampsia in a *critical care setting*

Osama M Warda
Professor of Obs/Gyn

2- ANTIHYPERTENSIVES:

a). Treat women with severe hypertension who are in critical care during pregnancy or after birth immediately with 1 of the following:

i- labetalol (oral or I.V.) **ii- oral nifedipine** **iii- I.V. hydralazine**

b). In women with severe hypertension who are in critical care, monitor their response to treatment:

i- blood pressure falls ii- fetal /maternal adverse effects

iii- to modify treatment according to response

c). Consider using up to *500 ml crystalloid fluid before or at the same time* as the first dose of intravenous hydralazine in the antenatal period.

Medical management of severe hypertension, severe pre-eclampsia or eclampsia in a *critical care setting*

Osama M Warda
Professor of Obs/Gyn

3- CORTICOSTEROIDS:

a). For fetal lung maturity: If early birth is considered likely within 7 days in women with pre-eclampsia, offer a course of antenatal corticosteroids (24 mg betamethasone/or dexamethasone IM on 2 divided doses 24 hrs. apart).

b). For treatment of HELLP syndrome: ***Do not use*** dexamethasone or betamethasone for the treatment of HELLP syndrome

4- FLUID BALANCE & VOLUME EXPANSION:

a). *Do not use* volume expansion in women with severe pre-eclampsia unless hydralazine is the antenatal antihypertensive.

b). Limit maintenance fluids to 80 ml/hour unless there are other ongoing fluid losses (for example, hemorrhage).

Medical management of severe hypertension, severe pre-eclampsia or eclampsia in a *critical care setting*

5- CESAREAN SECTION VERSUS INDUCTION OF LABOR:

Choose mode of birth for women with severe hypertension, severe pre-eclampsia or eclampsia according to *the clinical circumstances and the woman's preference.*

6- REFERRAL TO CRITICAL CARE: according to the following table:

Level 3 care	**Severe pre-eclampsia and *needing ventilation***
Level 2 care	Step-down from level 3 or severe pre-eclampsia with any of the following complications: 1- eclampsia 2- HELLP syndrome 3 - hemorrhage 4 - hyperkalemia 5- severe oliguria 6 - coagulation support 7 - IV antihypertensive treatment 8- initial stabilization of severe hypertension 9 - evidence of cardiac failure 10-abnormal neurology
Level 1 care	1-Pre-eclampsia with hypertension 2-Ongoing conservative antenatal management of severe preterm hypertension 3-Step-down treatment after the birth

Osama M Warda
Professor of Obs/Gyn

CHAPTER-10

THE POST-NATAL PERIOD

Antihypertensive treatment during the postnatal period, *including during breastfeeding*

1- Advise women with hypertension who wish to breastfeed that their treatment can be adapted to accommodate breastfeeding, and that the need to take antihypertensive medication does not prevent them from breastfeeding.

2- Explain to women with hypertension who wish to breastfeed that:

a).antihypertensive medicines can pass into breast milk

b). most antihypertensive medicines taken while breastfeeding only lead to very low levels in breast milk, so the amounts taken in by babies are very small and would be unlikely to have any clinical effect

c). most medicines are *not tested in pregnant or breastfeeding women*, so disclaimers in the manufacturer's information are not because of any specific safety concerns or evidence of harm. Make decisions on treatment together with the woman, based on her preferences.

Antihypertensive treatment during the postnatal period, *including during breastfeeding*

3- As antihypertensive agents have the potential to transfer into breast milk:

a). consider monitoring the blood pressure of babies, especially those born preterm, who have symptoms of low blood pressure for the first few weeks

b). when discharged home, advise women to monitor their babies for drowsiness, lethargy, pallor, cold peripheries or poor feeding.

4. Offer enalapril -to treat hypertension in women during the postnatal period, with appropriate monitoring of maternal renal function and maternal serum potassium.

5- For women of black African or Caribbean family origin with hypertension during the postnatal period, consider antihypertensive treatment with:

- **nifedipine or amlodipine if the woman has previously used this to successfully control her blood pressure**

Antihypertensive treatment during the postnatal period, *including during breastfeeding*

6- If blood pressure is not controlled with a single medicine, consider a combination of nifedipine (or amlodipine) and enalapril, If this combination is *not tolerated or is ineffective,* consider either:

a). adding atenolol or labetalol to the combination treatment or

b).swapping 1 of the medicines already being used for atenolol or labetalol

7- During the postnatal period, use medicines that are taken once daily when possible.

8- Where possible, avoid using diuretics or angiotensin receptor blockers in women in the postnatal period who are breastfeeding or expressing milk.

CHAPTER-11

ADVICE AND FOLLOW UP

Advice and follow-up at transfer to community care

1- Risk of recurrence of hypertensive disorders of pregnancy :

Advise women with hypertensive disorders of pregnancy that the overall risk of recurrence in future pregnancies is approximately 1 in 5 (see table)

	Type of hypertensive disorder in CURRENT pregnancy		
Prevalence of hypertensive disorder in a future pregnancy	**Any hypertension in pregnancy**	**Pre-eclampsia**	**Gestational hypertension**
1- Any hypertension	Approximately 21% (1 in 5 women	Approximately 20% (1 in 5 women	Approximately 22% (1 in 5 women)
2- Pre-eclampsia	Approximately 14% (1 in 7 women	- approximately 16% (1 in 6 women) If birth was at 28–34 weeks: approximately 33% (1 in 3 women) If birth was at 34–37 weeks: approximately 23% (1 in 4 women)	Approximately 7% (1 in 14 women)

Advice and follow-up at transfer to community care

1- Risk of ***recurrence*** of hypertensive disorders of pregnancy : (continued)

	Type of hypertensive disorder in CURRENT pregnancy		
Prevalence of hypertensive disorder in a future pregnancy	**Any hypertension in pregnancy**	**Pre-eclampsia**	**Gestational hypertension**
Gestational hypertension	Approximately 9% (1 in 11 women	Between approximately 6 and 12% (up to 1 in 8 women)	Between approximately 11 and 15% (up to 1 in 7 women)
Chronic hypertension	Not applicable	Approximately 2% (up to 1 in 50 women	Approximately 3% (up to 1 in 34 women)

Advice and follow-up at transfer to community care

2. Long term risk of cardiovascular disease:

	Type of hypertensive disorder in current or previous pregnancy			
Risk of future cardiovascular disease	***Any hypertension in pregnancy***	***Pre-eclampsia***	***Gestational hypertension***	***Chronic hypertension***
1- Major adverse cardiovascular event	Risk increased (up to approximately 2 times)	Risk increased (approximately 1.5–3 times)	Risk increased (approximately 1.5–3 times)	Risk increased (approximately 1.7 times)
2- Cardiovascular mortality	Risk increased (up to approximately 2 times)	Risk increased (approximately 2 times)	(no data)	(no data)

Advice and follow-up at transfer to community care

2. Long term risk of cardiovascular disease: (continued)

	Type of hypertensive disorder in current or previous pregnancy			
Risk of future cardiovascular disease	***Any hypertension in pregnancy***	***Pre-eclampsia***	***Gestational hypertension***	***Chronic hypertension***
3- Stroke	Risk increased (up to approximately 1.5 times)	Risk increased (approximately 2–3 times)	Risk may be increased	Risk increased (approximately 1.8 times)
4- Hypertension	Risk increased (approximately 2–4 times)	Risk increased (approximately 2–5 times)	Risk increased (approximately 2–4 times)	not applicable)

Advice and follow-up at transfer to community care

- Advise women to discuss how to reduce their risk of cardiovascular disease, including hypertensive disorders, with their GP or specialist. This may include:

a). avoiding smoking, b). maintaining a healthy lifestyle,
c). maintaining a healthy weight,

- In women who have had pre-eclampsia or hypertension with early birth before 34 weeks, consider pre-pregnancy counselling to discuss possible risks of recurrent hypertensive disorders of pregnancy, and how to lower them for any future pregnancies

Advice and follow-up at transfer to community care

3- Body mass index and recurrence of hypertensive disorders of pregnancy :

Advise women who have had pre-eclampsia to *achieve and keep a BMI within the healthy range before their next pregnancy (18.5–24.9 kg/m2).*

4- Inter-pregnancy interval and recurrence of hypertensive disorders of pregnancy :

Advise women who have had pre-eclampsia that the likelihood of recurrence increases with an inter-pregnancy interval greater than 10 years.

Advice and follow-up at transfer to community care

5- Long-term risk of end-stage kidney disease

Tell women with a history of pre-eclampsia who have no proteinuria and no hypertension at the postnatal review (6–8 weeks after the birth) that although the relative risk of end-stage kidney disease is increased, the absolute risk is low and no further follow-up is necessary

6- Thrombophilia and the risk of pre-eclampsia

Do not routinely perform screening for thrombophilia in women who have had pre-eclampsia.

Thank you for your attendance

Mansoura University Hospitals