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OBG 512

COMPLICATIONS IN PREGNANCY

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Course code: OBG 512

Course title: Complications in Pregnancy

Course credit load: 1 Unit

Series 1: Hypertensive Disorders in Pregnancy

- **Part 1.1: Classification and Differentiation of Hypertensive Disorders**
    - Sub Part 1.1.1: Forms of hypertensive disorders of pregnancy
    - Sub Part 1.1.2: Differentiating pre-eclampsia from eclampsia
    - Sub Part 1.1.3: Effect of pre-eclampsia and eclampsia on maternal and foetal outcome
- **Part 1.2: Clinical Features and Evaluation of Eclampsia**
    - Sub Part 1.2.1: Signs and symptoms of eclampsia
    - Sub Part 1.2.2: Evaluation of a patient with eclampsia
    - Sub Part 1.2.3: Complications of pre-eclampsia and eclampsia
- **Part 1.3: Management of Pre-eclampsia and Eclampsia**
    - Sub Part 1.3.1: Antihypertensive therapy
    - Sub Part 1.3.2: Anticonvulsant therapy
    - Sub Part 1.3.3: Supportive care in management

Introduction

Picture a woman arriving at the labour ward with a severe headache she initially dismissed as ordinary tiredness, her blood pressure now dangerously elevated. Recognising and managing hypertensive disorders of pregnancy, from the earliest signs of gestational hypertension to the genuine emergency of an eclamptic seizure, is among the most important, life-saving skills in the whole of obstetric practice. This Series lays the essential foundation for the whole of this course on complications in pregnancy, beginning with the hypertensive disorders that remain among the leading causes of maternal death worldwide.

The aim of this Series is to equip you with a thorough understanding of the classification, clinical features, evaluation, and management of hypertensive disorders of pregnancy, including pre-eclampsia and eclampsia.

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We shall commence this Series by examining the classification of hypertensive disorders of pregnancy and how to differentiate pre-eclampsia from eclampsia. Next, we will consider the clinical features and evaluation of eclampsia. Finally, we will conclude by examining the management of pre-eclampsia and eclampsia, including antihypertensive, anticonvulsant, and supportive care.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 1.1:** list the various forms of hypertensive disorders of pregnancy,
- **SLO 1.2:** differentiate between pre-eclampsia and eclampsia,
- **SLO 1.3:** describe the effect of pre-eclampsia and eclampsia on foetal and maternal outcome,
- **SLO 1.4:** list the signs and symptoms of eclampsia,
- **SLO 1.5:** describe how to evaluate a patient with eclampsia,
- **SLO 1.6:** explain the role of antihypertensives and anticonvulsants in the management of eclamptic patients, and
- **SLO 1.7:** illustrate the role of supportive care in management of patients with these conditions.

1.1 Classification and Differentiation of Hypertensive Disorders

1.1.1 Forms of hypertensive disorders of pregnancy

Hypertensive disorders of pregnancy are classified into four principal categories: chronic hypertension (present before pregnancy or diagnosed before 20 weeks of gestation), gestational hypertension (new-onset hypertension after 20 weeks without proteinuria or other features of pre-eclampsia), pre-eclampsia (new-onset hypertension after 20 weeks with proteinuria or other evidence of maternal organ dysfunction), and chronic hypertension with superimposed pre-eclampsia (pre-existing hypertension in which new features of pre-eclampsia subsequently develop).

Correctly classifying a woman's specific hypertensive disorder carries genuine, direct implications for the intensity of antenatal surveillance required, the anticipated clinical course, and the specific management approach most appropriate, meaning careful, accurate classification at the point of diagnosis represents a genuinely essential first step in the safe management of any pregnant woman presenting with elevated blood pressure.

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Fill in the blank: Gestational hypertension is new-onset hypertension after 20 weeks without _____ or other features of pre-eclampsia. Chronic hypertension with superimposed pre-eclampsia describes pre-existing hypertension in which new features of pre-eclampsia subsequently _____.

1.1.2 Differentiating pre-eclampsia from eclampsia

Pre-eclampsia is defined as new-onset hypertension after 20 weeks of gestation accompanied by proteinuria or other evidence of maternal organ dysfunction, including renal impairment, liver dysfunction, neurological features, hematological complications, or uteroplacental dysfunction, representing a multisystem disorder rather than an isolated elevation of blood pressure alone.

Eclampsia is specifically defined as the occurrence of seizures in a woman with pre-eclampsia, not attributable to any other identifiable cause, representing a genuinely serious progression and complication of the underlying pre-eclamptic process, with the transition from pre-eclampsia to eclampsia sometimes occurring with alarming rapidity, and, in a genuinely important minority of cases, occurring without the classic warning signs typically expected to precede it.

Fill in the blank: Pre-eclampsia is a multisystem disorder involving new-onset hypertension with proteinuria or other evidence of maternal organ _____. Eclampsia is specifically defined as the occurrence of _____ in a woman with pre-eclampsia, not attributable to any other cause.

1.1.3 Effect of pre-eclampsia and eclampsia on maternal and foetal outcome

Pre-eclampsia and eclampsia carry substantial risk to maternal health, including progression to eclampsia itself, HELLP syndrome (haemolysis, elevated liver enzymes, and low platelets), placental abruption, disseminated intravascular coagulation, stroke, and, in the most severe cases, maternal death, with pre-eclampsia and eclampsia together remaining among the leading direct causes of maternal mortality worldwide and in Nigeria specifically.

Foetal outcomes associated with pre-eclampsia and eclampsia include foetal growth restriction (reflecting placental insufficiency from the underlying disease process), preterm birth (whether spontaneous or, more commonly, medically indicated given the severity of the maternal condition), and an increased risk of stillbirth, meaning the specific timing of delivery in these conditions always requires a genuinely careful balance between maternal and foetal risk.

Fill in the blank: HELLP syndrome comprises haemolysis, elevated liver enzymes, and low _____. The timing of delivery in pre-eclampsia and eclampsia always requires a genuinely careful balance between maternal and _____ risk.

Category	Defining Features
Chronic Hypertension	Hypertension present before pregnancy or diagnosed before 20 weeks of gestation; persists beyond 12 weeks postpartum.

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Category	Defining Features
Gestational Hypertension	New-onset hypertension after 20 weeks of gestation without proteinuria or systemic features of preeclampsia; resolves postpartum.
Preeclampsia/Eclampsia	Hypertension after 20 weeks with proteinuria or evidence of systemic involvement (renal, hepatic, neurological, hematological); eclampsia refers to seizures in a woman with preeclampsia.
Chronic Hypertension with Superimposed Preeclampsia	Women with chronic hypertension who develop new-onset proteinuria or systemic features consistent with preeclampsia.

Table 1.1: Classification of hypertensive disorders of pregnancy.

Pilot questions 1.1

1. List the various forms of hypertensive disorders of pregnancy. (Linked to SLO 1.1)
2. Explain why accurate classification of hypertensive disorders matters clinically. (Linked to SLO 1.1)
3. Differentiate between pre-eclampsia and eclampsia. (Linked to SLO 1.2)
4. Describe the maternal complications of pre-eclampsia and eclampsia. (Linked to SLO 1.3)
5. Describe the foetal outcomes associated with pre-eclampsia and eclampsia. (Linked to SLO 1.3)

1.2 Clinical Features and Evaluation of Eclampsia

1.2.1 Signs and symptoms of eclampsia

Warning signs and symptoms that may precede eclamptic seizures include severe headache (often described as unlike any headache previously experienced), visual disturbance (blurred vision, flashing lights, or, in severe cases, temporary loss of vision), epigastric or right upper quadrant pain (reflecting liver involvement), and hyperreflexia with clonus on examination, each representing a specific, recognised warning sign warranting urgent clinical attention.

The eclamptic seizure itself typically presents as a generalised tonic-clonic seizure, though it is genuinely important to recognise that a proportion of eclamptic seizures occur without any clearly preceding warning signs, and that eclampsia can occur antepartum, intrapartum, or, less commonly recognised, postpartum, meaning ongoing vigilance for these specific warning signs should continue throughout the entire peripartum period, not solely during pregnancy itself.

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Fill in the blank: Warning signs preceding eclamptic seizures include severe headache, visual disturbance, and epigastric or right upper quadrant pain reflecting _____ involvement. Eclampsia can occur antepartum, intrapartum, or, less commonly recognised, _____.

1.2.2 Evaluation of a patient with eclampsia

Evaluation of a woman with eclampsia proceeds simultaneously with initial resuscitation rather than delaying treatment, including assessment of airway, breathing, and circulation, blood pressure measurement, and neurological assessment, alongside urgent laboratory investigation including full blood count, liver and renal function tests, coagulation studies, and urinalysis for proteinuria, together confirming the diagnosis and assessing the severity of associated multisystem involvement.

Foetal assessment (where the pregnancy has not yet been delivered) including continuous foetal heart rate monitoring should proceed alongside maternal evaluation and stabilisation, though genuine maternal stabilisation must always take clear priority over foetal assessment or delivery, given that effective maternal resuscitation itself directly benefits foetal wellbeing through restored uteroplacental perfusion.

Fill in the blank: Evaluation of eclampsia includes urgent laboratory investigation including full blood count, liver and renal function tests, and _____ studies. Maternal stabilisation must always take clear priority over foetal assessment, given that effective resuscitation itself benefits foetal wellbeing through restored uteroplacental _____.

1.2.3 Complications of pre-eclampsia and eclampsia

Complications of severe pre-eclampsia and eclampsia include HELLP syndrome, disseminated intravascular coagulation, acute kidney injury, pulmonary oedema, cerebral haemorrhage, and, in the most severe cases, maternal death, with each specific complication requiring its own targeted assessment and management alongside the broader treatment of the underlying hypertensive disorder itself.

Recurrent seizures and status eclampticus (repeated seizures without full recovery of consciousness between episodes) represent particularly serious, genuinely life-threatening complications requiring immediate, escalated management, with prompt recognition and treatment of any recognised complication essential given the potentially rapid, sometimes genuinely unpredictable clinical deterioration these specific conditions can cause.

Fill in the blank: Complications of severe pre-eclampsia and eclampsia include HELLP syndrome, disseminated intravascular coagulation, and acute kidney _____. Status eclampticus describes repeated seizures without full recovery of _____ between episodes.

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Key Points
Warning Signs: Severe headache, visual disturbances (blurred vision, scotomata), epigastric or right upper quadrant pain, hyperreflexia, altered mental status, seizures.
Evaluation: Blood pressure monitoring, urine protein assessment, laboratory tests (CBC, liver function, renal function, coagulation profile), fetal monitoring, neurological assessment.
Complications: Maternal risks include intracranial hemorrhage, pulmonary edema, renal failure, hepatic rupture, disseminated intravascular coagulation (DIC); fetal risks include growth restriction, hypoxia, preterm birth, and perinatal death.

Box 1.2: Warning signs, evaluation, and complications of eclampsia.

Pilot questions 1.2

1. List the signs and symptoms that may precede eclamptic seizures. (Linked to SLO 1.4)
2. Describe the timing of eclampsia in relation to delivery. (Linked to SLO 1.4)
3. Describe how to evaluate a patient with eclampsia. (Linked to SLO 1.5)
4. Explain why maternal stabilisation takes priority over foetal assessment. (Linked to SLO 1.5)
5. List the complications of pre-eclampsia and eclampsia. (Linked to SLO 1.5)

1.3 Management of Pre-eclampsia and Eclampsia

1.3.1 Antihypertensive therapy

Antihypertensive therapy in severe pre-eclampsia and eclampsia is indicated to reduce severely elevated blood pressure to a safer range, reducing the risk of maternal cerebral haemorrhage, with commonly used agents including intravenous labetalol, oral or intravenous hydralazine, and oral nifedipine, each with an established safety and efficacy profile in this specific, acute clinical context.

The specific target blood pressure during acute treatment aims to achieve a controlled, gradual reduction rather than an overly rapid fall, given the recognised risk of compromising uteroplacental perfusion if blood pressure is lowered too quickly or too far, meaning antihypertensive treatment in this specific context requires genuinely careful, closely monitored titration rather than aggressive, unmonitored correction.

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Fill in the blank: Antihypertensive therapy in severe pre-eclampsia reduces severely elevated blood pressure to reduce the risk of maternal cerebral _____. Blood pressure reduction should be controlled and gradual, given the risk of compromising uteroplacental _____ if lowered too quickly.

1.3.2 Anticonvulsant therapy

Magnesium sulphate is the anticonvulsant of choice for both the treatment of eclamptic seizures and the prevention of first or recurrent seizures in severe pre-eclampsia, working through a mechanism that is not entirely fully understood but includes reducing neuronal excitability and inducing cerebral vasodilation, with robust evidence establishing its genuine superiority over alternative anticonvulsant agents in this specific clinical context.

Magnesium sulphate therapy requires careful, structured monitoring for signs of magnesium toxicity, including loss of deep tendon reflexes, respiratory depression, and, in severe toxicity, cardiac arrest, with calcium gluconate available as the specific antidote should toxicity genuinely develop, meaning regular clinical assessment of reflexes, respiratory rate, and urine output throughout magnesium administration is a genuinely essential component of safe treatment.

Fill in the blank: Magnesium sulphate is the anticonvulsant of choice for treating eclamptic seizures and preventing seizures in severe _____. Calcium _____ is available as the specific antidote should magnesium toxicity develop.

1.3.3 Supportive care in management

Supportive care for a woman with severe pre-eclampsia or eclampsia includes careful fluid balance monitoring (avoiding both under- and over-hydration, each carrying specific risks given the recognised association between pre-eclampsia and both reduced intravascular volume and an increased risk of pulmonary oedema), continuous or frequent monitoring of vital signs, urine output, and neurological status, and a calm, quiet environment to reduce external stimulation that could genuinely precipitate a further seizure.

Delivery remains the only genuinely definitive treatment for pre-eclampsia and eclampsia, with the specific timing individualised according to gestational age, disease severity, and maternal and foetal condition, and supportive care throughout labour and the immediate postpartum period continuing given the recognised, genuine risk of eclampsia and its complications persisting or even first developing during this specific period.

Fill in the blank: Supportive care includes careful fluid balance monitoring, avoiding both under- and over-hydration given the risk of pulmonary _____. Delivery remains the only genuinely definitive treatment for pre-eclampsia, with timing individualised according to gestational age and disease _____.

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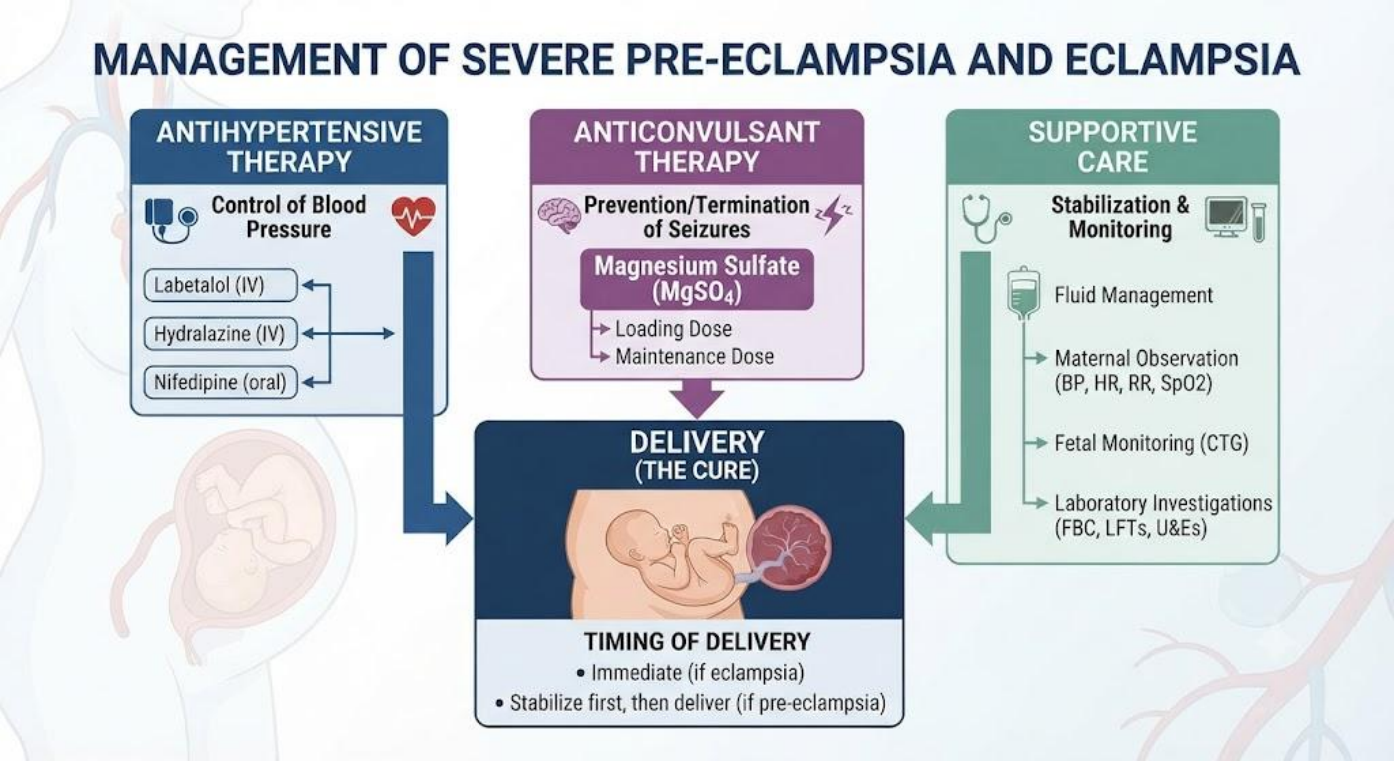

Figure 1.3: The three pillars of management in severe pre-eclampsia and eclampsia, converging on delivery.

Pilot questions 1.3

1. Describe the antihypertensive agents used in severe pre-eclampsia. (Linked to SLO 1.6)
2. Explain why blood pressure reduction should be controlled and gradual. (Linked to SLO 1.6)
3. Describe the role and mechanism of magnesium sulphate in eclampsia. (Linked to SLO 1.6)
4. Describe the monitoring required during magnesium sulphate therapy. (Linked to SLO 1.6)
5. Illustrate the role of supportive care in managing pre-eclampsia and eclampsia. (Linked to SLO 1.7)

Series Summary

This Series has covered the classification of hypertensive disorders of pregnancy and how to differentiate pre-eclampsia from eclampsia, followed by the clinical features and evaluation of eclampsia. It concluded with the management of pre-eclampsia and eclampsia, including antihypertensive, anticonvulsant, and supportive care.

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You should now be able to list the forms of hypertensive disorders of pregnancy, differentiate pre-eclampsia from eclampsia, describe their effect on maternal and foetal outcome, list the signs and symptoms of eclampsia, describe its evaluation, and explain the role of antihypertensives, anticonvulsants, and supportive care in management (Linked to SLOs 1.1 to 1.7).

Glossary of Terms

- **Chronic hypertension:** hypertension present before pregnancy or diagnosed before 20 weeks of gestation.
- **Eclampsia:** the occurrence of seizures in a woman with pre-eclampsia, not attributable to any other cause.
- **Gestational hypertension:** new-onset hypertension after 20 weeks of pregnancy without proteinuria or other features of pre-eclampsia.
- **HELLP syndrome:** haemolysis, elevated liver enzymes, and low platelets, a severe complication of pre-eclampsia.
- **Magnesium sulphate:** the anticonvulsant of choice for treating and preventing seizures in severe pre-eclampsia and eclampsia.
- **Pre-eclampsia:** new-onset hypertension after 20 weeks of pregnancy with proteinuria or other evidence of maternal organ dysfunction.
- **Status eclampticus:** repeated eclamptic seizures without full recovery of consciousness between episodes.
- **Superimposed pre-eclampsia:** the development of new pre-eclamptic features in a woman with pre-existing chronic hypertension.
- **Clonus:** involuntary, rhythmic muscular contractions elicited on examination, a sign of neuromuscular irritability in pre-eclampsia.
- **Hyperreflexia:** exaggerated deep tendon reflexes, a recognised clinical sign of severe pre-eclampsia.
- **Magnesium toxicity:** a complication of magnesium sulphate therapy, including loss of reflexes, respiratory depression, and cardiac arrest.
- **Uteroplacental perfusion:** blood flow to the uterus and placenta, which must be preserved during antihypertensive treatment.

Concept Check Questions [Series 1]

Objective questions

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1. Gestational hypertension is new-onset hypertension after 20 weeks without _____.
2. Eclampsia is specifically defined as the occurrence of _____ in a woman with pre-eclampsia.
3. HELLP syndrome comprises haemolysis, elevated liver enzymes, and low _____.
4. Magnesium sulphate is the anticonvulsant of choice for treating eclamptic seizures and preventing seizures in severe _____.
5. Calcium _____ is available as the specific antidote should magnesium toxicity develop.

Short-answer questions

6. Explain why accurate classification of hypertensive disorders matters clinically. (Linked to SLO 1.1)
7. Describe the foetal outcomes associated with pre-eclampsia and eclampsia. (Linked to SLO 1.3)
8. Describe the timing of eclampsia in relation to delivery. (Linked to SLO 1.4)
9. Explain why maternal stabilisation takes priority over foetal assessment. (Linked to SLO 1.5)
10. Explain why blood pressure reduction should be controlled and gradual. (Linked to SLO 1.6)

Long-answer questions

11. List the forms of hypertensive disorders of pregnancy and differentiate pre-eclampsia from eclampsia. (Linked to SLO 1.1, SLO 1.2)
12. Describe the effect of pre-eclampsia and eclampsia on maternal and foetal outcome. (Linked to SLO 1.3)
13. List the signs and symptoms of eclampsia and describe how to evaluate a patient with eclampsia. (Linked to SLO 1.4, SLO 1.5)
14. Explain the role of antihypertensives and anticonvulsants in managing eclamptic patients. (Linked to SLO 1.6)
15. Illustrate the role of supportive care in managing pre-eclampsia and eclampsia. (Linked to SLO 1.7)

Answers to Concept Check Questions [Series 1]

Objective questions

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1. Proteinuria.
2. Seizures.
3. Platelets.
4. Pre-eclampsia.
5. Gluconate.

Short-answer questions

6. It directly guides the intensity of surveillance, anticipated clinical course, and appropriate management approach.
7. Foetal growth restriction, preterm birth, and increased risk of stillbirth from placental insufficiency.
8. Eclampsia can occur antepartum, intrapartum, or postpartum, requiring ongoing vigilance throughout the peripartum period.
9. Effective maternal resuscitation directly benefits foetal wellbeing through restored uteroplacental perfusion.
10. Lowering blood pressure too quickly or too far risks compromising uteroplacental perfusion.

Long-answer questions

11. **Basic response:** Hypertensive disorders are classified as chronic, gestational, pre-eclampsia, or superimposed, with eclampsia specifically defined as seizures in a woman with pre-eclampsia.

Value-added response: Accurate classification directly guides the intensity of surveillance and management approach for an individual woman.

12. **Basic response:** Pre-eclampsia and eclampsia carry substantial maternal risk including HELLP syndrome and stroke, and foetal risk including growth restriction and stillbirth.

Value-added response: Delivery timing always requires careful balance between maternal and foetal risk in these conditions.

13. **Basic response:** Warning signs include headache, visual disturbance, and epigastric pain, with evaluation combining resuscitation, examination, and urgent laboratory investigation.

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Value-added response: Maternal stabilisation always takes priority, as it directly benefits foetal wellbeing through restored perfusion.

14. **Basic response:** Antihypertensives reduce severe hypertension carefully and gradually, while magnesium sulphate is the anticonvulsant of choice for seizure treatment and prevention.

Value-added response: Magnesium sulphate requires careful monitoring for toxicity, with calcium gluconate available as the specific antidote.

15. **Basic response:** Supportive care includes careful fluid balance, continuous monitoring, and a calm environment, with delivery remaining the only definitive treatment.

Value-added response: Supportive care and vigilance for complications must continue through labour and the immediate postpartum period.

Answers to Pilot Questions [Series 1]

Part 1.1

1. Chronic hypertension, gestational hypertension, pre-eclampsia, and chronic hypertension with superimposed pre-eclampsia.
2. It directly guides the intensity of surveillance and appropriate management for the individual woman.
3. Pre-eclampsia is hypertension with organ dysfunction; eclampsia is seizures occurring in a woman with pre-eclampsia.
4. Progression to eclampsia, HELLP syndrome, placental abruption, DIC, stroke, and maternal death.
5. Foetal growth restriction, preterm birth, and increased risk of stillbirth from placental insufficiency.

Part 1.2

1. Severe headache, visual disturbance, epigastric or right upper quadrant pain, and hyperreflexia with clonus.
2. Eclampsia can occur antepartum, intrapartum, or postpartum, requiring ongoing vigilance throughout.

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3. Simultaneous resuscitation and assessment, urgent laboratory investigation, and foetal monitoring alongside maternal care.
4. Effective maternal resuscitation directly benefits foetal wellbeing through restored uteroplacental perfusion.
5. HELLP syndrome, DIC, acute kidney injury, pulmonary oedema, cerebral haemorrhage, and maternal death.

Part 1.3

1. Intravenous labetalol, oral or intravenous hydralazine, and oral nifedipine.
2. Lowering blood pressure too quickly risks compromising uteroplacental perfusion.
3. Magnesium sulphate reduces neuronal excitability and induces cerebral vasodilation, superior to alternative agents.
4. Regular assessment of reflexes, respiratory rate, and urine output, given the risk of magnesium toxicity.
5. Careful fluid balance, continuous monitoring, and a calm environment, alongside delivery as the definitive treatment.

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References and Attributions [Series 1]

Textual References

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Figures, Plates, Tables, and Boxes

- Table 1.1: Classification of hypertensive disorders of pregnancy. AI-generated using the prompt: "Create a clean reference table titled Classification of Hypertensive Disorders of Pregnancy, listing the four categories with defining features. Simple clinical reference table style with outside border."
- Box 1.2: Warning signs, evaluation, and complications of eclampsia. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Eclampsia: Warning Signs, Evaluation, and Complications, listing key points for each category. Clinical reference box style."
- Figure 1.3: The three pillars of management in severe pre-eclampsia and eclampsia, converging on delivery. AI-generated using the prompt: "Create a professional medical diagram titled Management of Severe Pre-eclampsia and Eclampsia, showing antihypertensive, anticonvulsant, and supportive care pillars converging on delivery. Clean clinical educational diagram style."

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Series 2: Antepartum Haemorrhage and Placental Complications

- **Part 2.1: Antepartum Haemorrhage: Definition and Clinical Presentations**
    - Sub Part 2.1.1: Definition and causes of antepartum haemorrhage
    - Sub Part 2.1.2: Clinical presentation of placenta praevia
    - Sub Part 2.1.3: Clinical presentation of placental abruption
- **Part 2.2: Diagnosis of Antepartum Haemorrhage**
    - Sub Part 2.2.1: Clinical assessment of a woman with APH
    - Sub Part 2.2.2: Role of ultrasound in diagnosing placenta praevia
    - Sub Part 2.2.3: Ultrasound and clinical findings in diagnosing placental abruption
- **Part 2.3: Management of Antepartum Haemorrhage**
    - Sub Part 2.3.1: Initial emergency management of APH
    - Sub Part 2.3.2: Management of placenta praevia
    - Sub Part 2.3.3: Management of placental abruption

Introduction

In the last Series, we explored hypertensive disorders of pregnancy. We now turn to antepartum haemorrhage, bleeding after 24 weeks of gestation that ranges from the reassuring, physiological show of early labour to the genuine, life-threatening emergency of placenta praevia or placental abruption. Learning to recognise, differentiate, and manage these two principal causes of antepartum bleeding is a genuinely essential skill for anyone practising obstetrics.

The aim of this Series is to equip you with a thorough understanding of antepartum haemorrhage, its definition, causes, clinical presentation, diagnosis, and management, with particular focus on placenta praevia and placental abruption.

We shall commence this Series by examining the definition of antepartum haemorrhage and the clinical presentations of placenta praevia and placental abruption. Next, we will consider the diagnosis of antepartum haemorrhage, including the role of ultrasound. Finally, we will conclude by examining the management of antepartum haemorrhage, including its two principal causes.

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Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 2.1:** define antepartum haemorrhage,
- **SLO 2.2:** describe the clinical presentation of placenta praevia,
- **SLO 2.3:** describe the clinical presentation of placental abruption,
- **SLO 2.4:** describe the clinical assessment of a woman with antepartum haemorrhage,
- **SLO 2.5:** describe the use of ultrasound and clinical findings in the diagnosis of placenta praevia and placental abruption,
- **SLO 2.6:** describe the initial emergency management of antepartum haemorrhage, and
- **SLO 2.7:** describe the management of placenta praevia and placental abruption.

2.1 Antepartum Haemorrhage: Definition and Clinical Presentations

2.1.1 Definition and causes of antepartum haemorrhage

Antepartum haemorrhage (APH) is defined as genital tract bleeding occurring after 24 weeks of gestation and before the birth of the baby, a genuinely important obstetric presentation given the potential for both major maternal haemorrhage and significant foetal compromise, with the two principal causes being placenta praevia (an abnormally located placenta) and placental abruption (premature separation of a normally located placenta), together accounting for the great majority of significant cases.

Other, less common causes of antepartum haemorrhage include a 'show' (blood-stained mucus discharge signalling the onset of labour, genuinely physiological rather than pathological), local causes such as cervical ectropion, cervical polyp, or cervical malignancy, and vasa praevia (a rare but genuinely catastrophic condition in which foetal blood vessels traverse the membranes near the cervical os, unprotected by placental tissue or umbilical cord), each requiring specific consideration in the differential diagnosis of a bleeding pregnant woman.

Fill in the blank: Antepartum haemorrhage is defined as genital tract bleeding occurring after _____ weeks of gestation and before birth. The two principal causes of APH are placenta praevia and placental _____.

2.1.2 Clinical presentation of placenta praevia

Placenta praevia classically presents with painless vaginal bleeding, often recurrent, typically occurring in the second half of pregnancy, with the bleeding characteristically unprovoked,

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though it may occasionally be triggered by sexual intercourse or vaginal examination, reflecting disruption of the fragile, abnormally sited placental vessels within the lower uterine segment.

On examination the uterus is typically soft and non-tender, with the foetal presenting part often high or malpositioned (given the abnormally located placenta occupying the lower uterine segment and physically obstructing normal engagement), and, given the genuine risk of provoking catastrophic haemorrhage, digital vaginal examination should never be performed in a woman with suspected placenta praevia until this diagnosis has first been confidently excluded by ultrasound.

Fill in the blank: Placenta praevia classically presents with painless vaginal bleeding, characteristically _____, though it may occasionally be triggered by intercourse or examination. Digital vaginal examination should never be performed in suspected placenta praevia until confidently excluded by _____.

2.1.3 Clinical presentation of placental abruption

Placental abruption classically presents with painful vaginal bleeding, often accompanied by continuous, severe abdominal pain and uterine tenderness, with the volume of visible vaginal bleeding sometimes considerably underestimating the true extent of blood loss, given that a proportion of the haemorrhage may remain concealed behind the placenta rather than escaping through the cervix.

On examination the uterus is typically tender and, in more severe abruption, firm or 'woody' to palpation (reflecting a couvelaire uterus, in which blood infiltrates the myometrium itself), with foetal heart rate abnormalities or, in severe cases, foetal death representing a genuinely important, recognised complication given the disruption to placental blood flow this condition causes.

Fill in the blank: Placental abruption classically presents with painful vaginal bleeding, often with continuous abdominal pain and uterine _____. A firm, 'woody' uterus on palpation in severe abruption reflects a _____ uterus, where blood infiltrates the myometrium.

Feature	Placenta Praevia	Placental Abruption
Pain	Typically painless	Sudden onset, severe abdominal pain
Bleeding	Bright red, recurrent, external bleeding	Dark red, often concealed or mixed with external bleeding
Uterine Findings	Soft, non-tender uterus	Firm, tender, “board-like” uterus
Presentation	Malpresentation common (breech, transverse)	Fetal distress or demise more likely

Table 2.1: Comparison of placenta praevia and placental abruption clinical presentation.

Pilot questions 2.1

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- Define antepartum haemorrhage. (Linked to SLO 2.1)
- List the causes of antepartum haemorrhage. (Linked to SLO 2.1)
- Describe the clinical presentation of placenta praevia. (Linked to SLO 2.2)
- Explain why digital vaginal examination should be avoided in suspected placenta praevia. (Linked to SLO 2.2)
- Describe the clinical presentation of placental abruption, including the concept of concealed haemorrhage. (Linked to SLO 2.3)

2.2 Diagnosis of Antepartum Haemorrhage

2.2.1 Clinical assessment of a woman with APH

Initial assessment of any woman presenting with antepartum haemorrhage follows the ABCDE approach established throughout this broader curriculum, with immediate assessment of maternal haemodynamic stability taking priority, alongside assessment of foetal wellbeing by continuous cardiotocography once the pregnancy has reached a viable gestational age, given the genuine potential for either placenta praevia or placental abruption to cause significant maternal haemorrhage and foetal compromise.

A careful history characterising the specific pattern, quantity, and any associated pain of the bleeding helps distinguish between the two principal causes, though clinical presentation alone cannot always reliably differentiate placenta praevia from placental abruption with complete confidence, meaning ultrasound assessment remains a genuinely essential component of definitive diagnosis in the great majority of cases.

Fill in the blank: Initial assessment of APH follows the ABCDE approach, with immediate assessment of maternal haemodynamic _____ taking priority. Clinical presentation alone cannot always reliably differentiate placenta praevia from placental _____ with complete confidence.

2.2.2 Role of ultrasound in diagnosing placenta praevia

Transvaginal ultrasound is the diagnostic investigation of choice for placenta praevia, offering superior accuracy to transabdominal scanning for precisely localising the placental edge relative to the internal cervical os, and, contrary to intuitive concern, is genuinely safe to perform even in the presence of active vaginal bleeding, given the probe's actual distance from the cervix during correct examination technique.

Placenta praevia is classified according to the specific relationship between the placental edge and the internal os, ranging from minor praevia (the placental edge not covering the os) to major praevia (the placenta partially or completely covering the os), with this specific classification

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directly guiding both the anticipated risk of significant haemorrhage and the recommended mode of delivery.

Fill in the blank: Transvaginal ultrasound is genuinely safe to perform even in the presence of active vaginal bleeding, given the probe's actual distance from the _____ during correct technique. Placenta praevia classification directly guides the anticipated haemorrhage risk and recommended mode of _____.

2.2.3 Ultrasound and clinical findings in diagnosing placental abruption

Unlike placenta praevia the diagnosis of placental abruption remains principally clinical, based on the characteristic history and examination findings, as ultrasound has genuinely limited sensitivity for detecting an abruption, particularly an acute, recent one, meaning a normal ultrasound scan should never be used to confidently exclude this diagnosis when the clinical picture remains genuinely suggestive.

Where ultrasound findings are present, they may include a retroplacental haematoma (a collection of blood between the placenta and the uterine wall) or evidence of placental thickening, though the genuine absence of these specific findings does not reliably exclude abruption, reinforcing why clinical assessment, rather than imaging alone, remains genuinely central to this specific diagnosis.

Fill in the blank: The diagnosis of placental abruption remains principally clinical, as ultrasound has genuinely limited _____ for detecting an abruption. Ultrasound findings of abruption may include a _____ haematoma, a collection of blood between the placenta and uterine wall.

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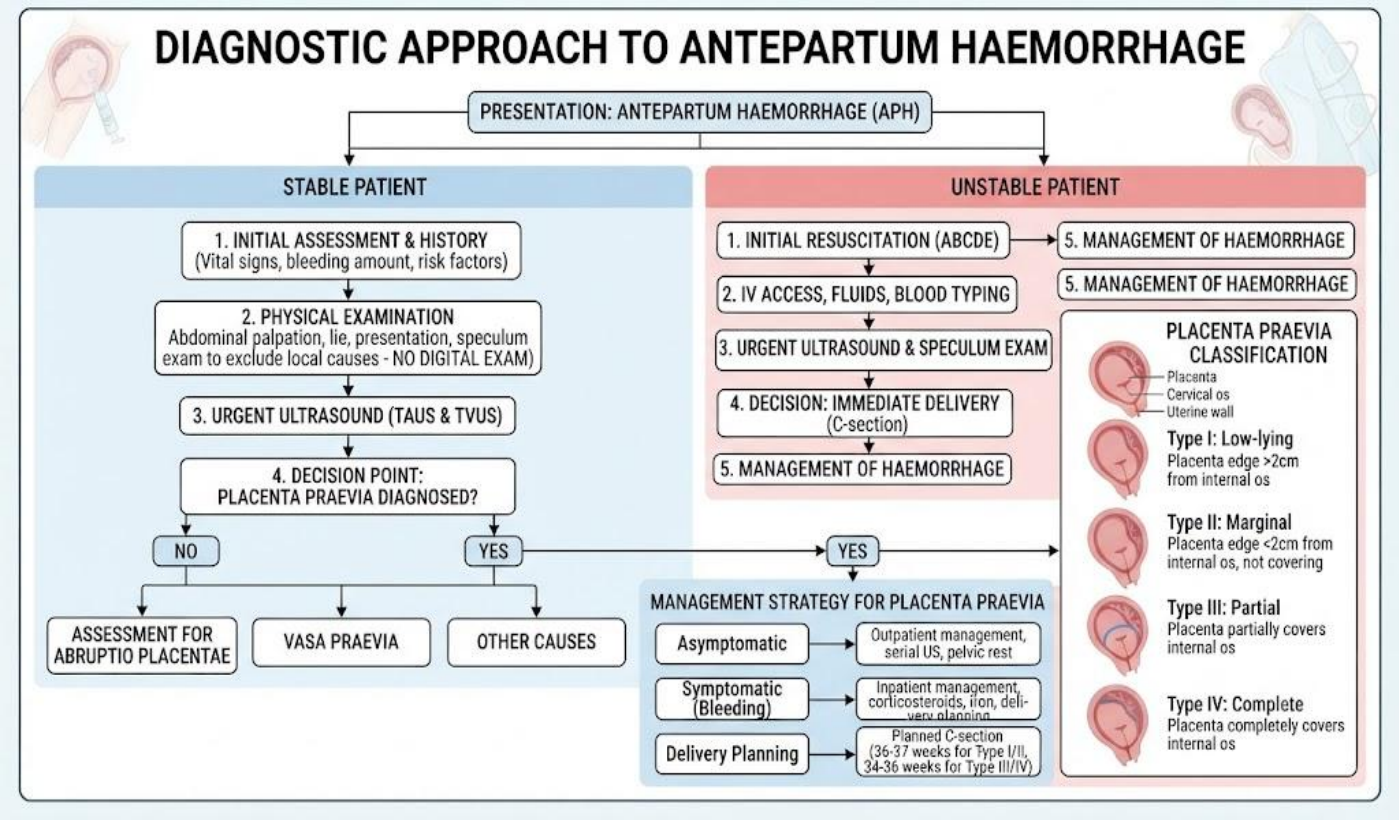

Figure 2.2: Diagnostic pathway for antepartum haemorrhage, including placenta praevia classification.

Pilot questions 2.2

1. Describe the initial clinical assessment of a woman with antepartum haemorrhage. (Linked to SLO 2.4)
2. Explain why clinical presentation alone cannot always reliably differentiate the causes of APH. (Linked to SLO 2.4)
3. Describe the role of transvaginal ultrasound in diagnosing placenta praevia. (Linked to SLO 2.5)
4. Describe the classification of placenta praevia by relationship to the internal os. (Linked to SLO 2.5)
5. Explain why the diagnosis of placental abruption remains principally clinical. (Linked to SLO 2.5)

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2.3 Management of Antepartum Haemorrhage

2.3.1 Initial emergency management of APH

Initial emergency management of significant antepartum haemorrhage follows the same fundamental resuscitation principles applied to any obstetric haemorrhage, with immediate wide-bore intravenous access, fluid and, where indicated, blood product resuscitation, and continuous maternal and foetal monitoring, with urgent senior obstetric and anaesthetic involvement essential given the genuine potential for rapid clinical deterioration in either condition.

Anti-D prophylaxis should be given to any rhesus-negative woman with antepartum haemorrhage, given the genuine risk of feto-maternal haemorrhage and subsequent rhesus sensitisation that any episode of antepartum bleeding can cause, a specific, easily overlooked but genuinely important component of comprehensive APH management that should never be forgotten amid the more immediately pressing concerns of haemodynamic stabilisation.

Fill in the blank: Initial emergency management of significant APH includes immediate wide-bore intravenous access and continuous maternal and _____ monitoring. Anti-D prophylaxis should be given to any rhesus-negative woman with APH given the risk of feto-maternal haemorrhage and subsequent rhesus _____.

2.3.2 Management of placenta praevia

Management of placenta praevia depends on the severity of bleeding and gestational age at presentation, with conservative management (admission, monitoring, and corticosteroids if preterm) appropriate for stable bleeding, and delivery, almost always by caesarean section given the risk of catastrophic haemorrhage with attempted vaginal delivery, planned electively for a major praevia at an appropriate gestation.

Where major placenta praevia is confirmed, particularly with a history of previous caesarean section, specific consideration of the placenta accreta spectrum, discussed elsewhere in this broader curriculum, is genuinely essential, with antenatal identification allowing advance planning of delivery at a specialist centre with appropriately experienced multidisciplinary teams and blood bank support.

Fill in the blank: Delivery in placenta praevia is almost always by _____ section given the risk of catastrophic haemorrhage with attempted vaginal delivery. Major placenta praevia with a history of previous caesarean section requires specific consideration of the placenta _____ spectrum.

2.3.3 Management of placental abruption

Management of placental abruption depends on the severity of the abruption and the condition of both mother and foetus, with significant abruption, particularly with maternal haemodynamic compromise or foetal compromise, requiring immediate resuscitation and expedited delivery, generally by emergency caesarean section unless vaginal delivery is genuinely imminent.

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Placental abruption carries a substantial risk of disseminated intravascular coagulation, given the release of tissue factor from the damaged placental bed into the maternal circulation, meaning coagulation studies should be performed as a genuinely routine component of assessment in any woman with suspected or confirmed abruption, with prompt correction of any coagulopathy identified essential alongside the broader management of the abruption itself.

Fill in the blank: Significant placental abruption with maternal or foetal compromise requires immediate resuscitation and expedited _____. Placental abruption carries a substantial risk of disseminated intravascular coagulation, given release of _____ factor from the damaged placental bed.

Category	Details
Emergency Principles	Immediate maternal resuscitation (ABC approach); secure IV access; fluid and blood replacement; monitor maternal vitals and fetal heart rate; rapid assessment of bleeding severity; prepare for delivery if maternal/fetal compromise
Placenta Previa	Avoid vaginal examination; confirm diagnosis with ultrasound; hospital admission if bleeding; corticosteroids for fetal lung maturity; planned caesarean delivery
Placental Abruption	Stabilize mother; monitor for DIC; expedite delivery if severe or fetal distress; vaginal delivery possible if stable and progressing, otherwise caesarean
Vasa Praevia	Suspect with painless bleeding and fetal distress; confirm with ultrasound; emergency caesarean delivery
Local Genital Causes (e.g., trauma, infection)	Identify and treat source; repair trauma; antibiotics if infection; supportive care

Box 2.3: Emergency management and specific approach for placenta praevia and placental abruption.

Pilot questions 2.3

1. Describe the initial emergency management principles for significant antepartum haemorrhage. (Linked to SLO 2.6)
2. Explain why anti-D prophylaxis should be given following antepartum haemorrhage in a rhesus-negative woman. (Linked to SLO 2.6)
3. Describe the management of placenta praevia according to severity and gestation. (Linked to SLO 2.7)
4. Describe the management of placental abruption. (Linked to SLO 2.7)

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5. Explain the risk of disseminated intravascular coagulation in placental abruption. (Linked to SLO 2.7)

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Series Summary

This Series has covered the definition of antepartum haemorrhage and the clinical presentations of placenta praevia and placental abruption, followed by the diagnosis of antepartum haemorrhage, including the role of ultrasound. It concluded with the management of antepartum haemorrhage, including its two principal causes.

You should now be able to define antepartum haemorrhage, describe the clinical presentation of placenta praevia and placental abruption, describe the clinical assessment and diagnostic role of ultrasound, and describe the initial emergency management and specific treatment of placenta praevia and placental abruption (Linked to SLOs 2.1 to 2.7).

Glossary of Terms

1. **Antepartum haemorrhage (APH):** genital tract bleeding occurring after 24 weeks of gestation and before the birth of the baby.
2. **Concealed haemorrhage:** bleeding from placental abruption that remains behind the placenta rather than escaping through the cervix.
3. **Couvelaire uterus:** a firm, 'woody' uterus resulting from blood infiltrating the myometrium in severe placental abruption.
4. **Major placenta praevia:** placenta praevia in which the placenta partially or completely covers the internal cervical os.
5. **Minor placenta praevia:** placenta praevia in which the placental edge does not cover the internal cervical os.
6. **Placenta praevia:** an abnormally located placenta implanted wholly or partly within the lower uterine segment.
7. **Placental abruption:** premature separation of a normally located placenta before delivery of the baby.
8. **Retroplacental haematoma:** a collection of blood between the placenta and the uterine wall, a possible ultrasound finding in abruption.
9. **Vasa praevia:** a rare condition in which foetal blood vessels traverse the membranes near the cervical os, unprotected by placenta or cord.
10. **Anti-D prophylaxis:** administration of anti-D immunoglobulin to a rhesus-negative woman to prevent sensitisation following a sensitising event.

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11. **Show:** passage of blood-stained mucus from the cervix, a physiological sign of the onset of labour.
12. **Disseminated intravascular coagulation (DIC):** an acquired coagulopathy, a recognised complication of severe placental abruption.

Concept Check Questions [Series 2]

Objective questions

1. Antepartum haemorrhage is defined as genital tract bleeding occurring after _____ weeks of gestation.
2. Digital vaginal examination should never be performed in suspected placenta praevia until confidently excluded by _____.
3. A firm, 'woody' uterus on palpation in severe abruption reflects a _____ uterus.
4. Transvaginal ultrasound is genuinely safe to perform even in the presence of active vaginal bleeding, given the probe's actual distance from the _____.
5. Anti-D prophylaxis should be given to any rhesus-negative woman with APH given the risk of feto-maternal haemorrhage and subsequent rhesus _____.

Short-answer questions

- Explain why digital vaginal examination should be avoided in suspected placenta praevia. (Linked to SLO 2.2)
- Describe the clinical presentation of placental abruption, including the concept of concealed haemorrhage. (Linked to SLO 2.3)
- Describe the classification of placenta praevia by relationship to the internal os. (Linked to SLO 2.5)
- Explain why the diagnosis of placental abruption remains principally clinical. (Linked to SLO 2.5)
- Explain the risk of disseminated intravascular coagulation in placental abruption. (Linked to SLO 2.7)

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Long-answer questions

1. Define antepartum haemorrhage and describe the clinical presentation of placenta praevia and placental abruption. (Linked to SLO 2.1, SLO 2.2, SLO 2.3)
2. Describe the clinical assessment of a woman with antepartum haemorrhage. (Linked to SLO 2.4)
3. Describe the use of ultrasound and clinical findings in diagnosing placenta praevia and placental abruption. (Linked to SLO 2.5)
4. Describe the initial emergency management of antepartum haemorrhage. (Linked to SLO 2.6)
5. Describe the management of placenta praevia and placental abruption. (Linked to SLO 2.7)

Answers to Concept Check Questions [Series 2]

Objective questions

6. 24.
7. Ultrasound.
8. Couvelaire.
9. Cervix.
10. Sensitisation.

Short-answer questions

11. It carries a genuine risk of provoking catastrophic haemorrhage from the abnormally sited placental vessels.
12. Painful bleeding with abdominal pain and uterine tenderness, with visible bleeding sometimes underestimating true blood loss when concealed.
13. Minor praevia (edge not covering the os) to major praevia (partially or completely covering the os).

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14. Ultrasound has limited sensitivity for detecting abruption, and its absence does not reliably exclude the diagnosis.
15. Release of tissue factor from the damaged placental bed into the maternal circulation triggers widespread coagulation activation.

Long-answer questions

16. **Basic response:** APH is bleeding after 24 weeks, with placenta praevia presenting as painless bleeding and abruption as painful bleeding with uterine tenderness.

Value-added response: Concealed haemorrhage in abruption means visible bleeding can significantly underestimate true blood loss.

17. **Basic response:** Assessment follows ABCDE principles with maternal stability prioritised, alongside continuous foetal monitoring.

Value-added response: Clinical presentation alone cannot always reliably differentiate the two causes, making ultrasound essential.

18. **Basic response:** Transvaginal ultrasound is the investigation of choice for praevia, while abruption diagnosis remains principally clinical given limited ultrasound sensitivity.

Value-added response: A normal scan should never be used to confidently exclude abruption when the clinical picture remains suggestive.

19. **Basic response:** Emergency management follows standard obstetric haemorrhage resuscitation principles, with anti-D prophylaxis for rhesus-negative women.

Value-added response: Urgent senior obstetric and anaesthetic involvement is essential given the potential for rapid deterioration.

20. **Basic response:** Placenta praevia management depends on severity and gestation, generally delivered by caesarean section, while abruption requires expedited delivery.

Value-added response: Abruption carries substantial DIC risk, requiring routine coagulation studies and prompt correction of any coagulopathy identified.

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Answers to Pilot Questions [Series 2]

Part 2.1

11. Genital tract bleeding occurring after 24 weeks of gestation and before birth of the baby.
12. Placenta praevia and placental abruption, the two principal causes, alongside show, local causes, and vasa praevia.
13. Painless, often recurrent vaginal bleeding, typically unprovoked, in the second half of pregnancy.
14. It carries a genuine risk of provoking catastrophic haemorrhage from the abnormally sited placental vessels.
15. Painful bleeding with abdominal pain and uterine tenderness, with visible bleeding sometimes underestimating true blood loss when concealed.

Part 2.2

1. ABCDE approach with maternal haemodynamic stability prioritised, alongside continuous foetal monitoring.
2. Clinical presentation alone cannot always reliably differentiate the two causes with complete confidence.
3. It offers superior accuracy for localising the placental edge relative to the internal os and is safe even with active bleeding.
4. Minor praevia (edge not covering the os) to major praevia (partially or completely covering the os).
5. Ultrasound has limited sensitivity for detecting abruption, so a normal scan does not reliably exclude the diagnosis.

Part 2.3

6. Wide-bore intravenous access, fluid and blood product resuscitation, and continuous maternal and foetal monitoring.
7. Any episode of antepartum bleeding carries a risk of feto-maternal haemorrhage and subsequent rhesus sensitisation.

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8. Conservative management for stable bleeding, with delivery by caesarean section planned electively or as an emergency.
9. Immediate resuscitation and expedited delivery, generally by emergency caesarean section, for significant compromise.
10. Release of tissue factor from the damaged placental bed triggers widespread coagulation activation and DIC.

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References and Attributions [Series 2]

Textual References

11. Cunningham, F. G., Leveno, K. J., Dashe, J. S. et al. (2022). Williams Obstetrics (26th ed.). McGraw Hill.
12. Royal College of Obstetricians and Gynaecologists (2018). Green-top Guideline No. 27a: Placenta Praevia and Placenta Accreta Spectrum. RCOG Press.
13. Royal College of Obstetricians and Gynaecologists (2011). Green-top Guideline No. 63: Antepartum Haemorrhage. RCOG Press.
14. World Health Organization (2018). Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors (2nd ed.). WHO Press.

Figures, Plates, Tables, and Boxes

1. Table 2.1: Comparison of placenta praevia and placental abruption clinical presentation. AI-generated using the prompt: "Create a clean reference table titled Placenta Praevia versus Placental Abruption, comparing pain, bleeding, uterine findings, and presentation. Simple clinical reference table style with outside border."
2. Figure 2.2: Diagnostic pathway for antepartum haemorrhage, including placenta praevia classification. AI-generated using the prompt: "Create a professional medical flowchart titled Diagnostic Approach to Antepartum Haemorrhage, showing assessment pathway and placenta praevia classification. Clean clinical educational diagram style."
3. Box 2.3: Emergency management and specific approach for placenta praevia and placental abruption. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled APH Management, listing emergency principles and specific management for each cause. Clinical reference box style."

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Series 3: Preterm Labour and Membrane Disorders

- **Part 3.1: Preterm Labour and Cervical Incompetence**
    - Sub Part 3.1.1: Definition and causes of preterm labour
    - Sub Part 3.1.2: Diagnosis and management of preterm labour
    - Sub Part 3.1.3: Cervical incompetence
- **Part 3.2: Premature Rupture of Membranes**
    - Sub Part 3.2.1: Definition and aetiology of PROM
    - Sub Part 3.2.2: Diagnosis of PROM
    - Sub Part 3.2.3: Management of PROM
- **Part 3.3: Cord Prolapse**
    - Sub Part 3.3.1: Definition and risk factors for cord prolapse
    - Sub Part 3.3.2: Clinical features and diagnosis of cord prolapse
    - Sub Part 3.3.3: Emergency management of cord prolapse

Introduction

In the last Series, we explored antepartum haemorrhage and placental complications. We now turn to preterm labour and the disorders of the membranes that so often accompany it, from cervical incompetence and premature rupture of membranes through to cord prolapse, one of the most genuinely time-critical emergencies in the whole of obstetric practice. Recognising and acting on these conditions promptly can make a genuine, life-saving difference to the baby.

The aim of this Series is to equip you with a thorough understanding of preterm labour, cervical incompetence, premature rupture of membranes, and cord prolapse.

We shall commence this Series by examining preterm labour and cervical incompetence. Next, we will consider premature rupture of membranes, its aetiology, diagnosis, and management. Finally, we will conclude by examining cord prolapse, its risk factors, clinical features, and emergency management.

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Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 3.1:** describe the definition and causes of preterm labour,
- **SLO 3.2:** describe the diagnosis and management of preterm labour,
- **SLO 3.3:** describe cervical incompetence,
- **SLO 3.4:** define premature rupture of membranes,
- **SLO 3.5:** explain the aetiology of premature rupture of membranes,
- **SLO 3.6:** describe how to diagnose and manage cases of premature rupture of membranes,
- **SLO 3.7:** describe the risk factors and clinical features of cord prolapse, and
- **SLO 3.8:** describe the emergency management of cord prolapse.

3.1 Preterm Labour and Cervical Incompetence

3.1.1 Definition and causes of preterm labour

Preterm labour is defined as the onset of regular uterine contractions with cervical change occurring between 24 and 37 completed weeks of gestation, representing a genuinely significant obstetric problem given its direct contribution to preterm birth, itself a leading cause of neonatal morbidity and mortality, particularly in resource-limited settings where neonatal intensive care support may be genuinely limited.

Causes and risk factors for preterm labour include multiple pregnancy, polyhydramnios, infection (including chorioamnionitis and, more distantly, urinary tract or periodontal infection), previous preterm birth, cervical incompetence, uterine anomaly, and, in a genuinely significant proportion of cases, no clearly identifiable cause at all, reflecting the complex, often multifactorial nature of this specific condition.

Fill in the blank: Preterm labour is defined as the onset of regular uterine contractions with cervical change occurring between 24 and _____ completed weeks of gestation. Causes of preterm labour include multiple pregnancy, polyhydramnios, infection, and previous preterm _____.

3.1.2 Diagnosis and management of preterm labour

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Diagnosis of preterm labour combines clinical assessment of regular, painful uterine contractions with evidence of cervical change, either on digital examination or, increasingly, transvaginal ultrasound measurement of cervical length, with fetal fibronectin testing (a biochemical marker) also used in some settings to help predict the likelihood of imminent preterm delivery, particularly valuable given its high negative predictive value in reassuring against genuine, imminent preterm birth.

Management of confirmed preterm labour includes antenatal corticosteroids to accelerate foetal lung maturation, magnesium sulphate for neuroprotection if delivery is genuinely imminent before 32 weeks, and, in carefully selected cases, tocolytic medication to briefly delay delivery, allowing time for corticosteroids to take effect or for transfer to a facility with appropriate neonatal care, though tocolysis does not itself meaningfully improve overall neonatal outcome.

Fill in the blank: Fetal fibronectin testing is particularly valuable given its high negative predictive value in reassuring against genuine, imminent preterm _____. Antenatal corticosteroids are given to accelerate foetal lung _____.

3.1.3 Cervical incompetence

Cervical incompetence (cervical insufficiency) describes a cervix that dilates painlessly in the absence of contractions during the second trimester, typically resulting in second-trimester pregnancy loss or extremely preterm birth, generally resulting from previous cervical trauma (including previous cervical surgery such as loop electrosurgical excision procedure or cone biopsy) or, less commonly, a congenital connective tissue abnormality of the cervix.

Management of confirmed or strongly suspected cervical incompetence includes cervical cerclage (a surgical suture placed around the cervix to provide mechanical support), typically inserted electively in the late first trimester in a woman with a history strongly suggestive of this condition, or, in some cases, inserted as an emergency procedure where premature cervical dilatation is identified during a current pregnancy before membrane rupture has occurred.

Fill in the blank: Cervical incompetence describes a cervix that dilates painlessly in the absence of contractions during the _____ trimester. Cervical cerclage is a surgical _____ placed around the cervix to provide mechanical support.

Category	Key Points
Causes	Multiple pregnancy, polyhydramnios, uterine anomalies, cervical incompetence, infections (chorioamnionitis, urinary tract), placental abruption, maternal medical disorders (hypertension, diabetes), lifestyle factors (smoking, poor nutrition)
Diagnosis	Clinical features: regular uterine contractions before 37 weeks, cervical dilatation/effacement; investigations: transvaginal ultrasound for cervical length, fetal fibronectin testing, exclusion of differential diagnoses (e.g., UTI, abruption)

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Category	Key Points
Management	Maternal stabilization; corticosteroids for fetal lung maturity; tocolytics to delay labour (short-term); magnesium sulfate for neuroprotection; antibiotics if infection suspected; neonatal intensive care preparedness; individualized decision on delivery timing

Table 3.1: Causes, diagnosis, and management of preterm labour.

Pilot questions 3.1

- Define preterm labour. (Linked to SLO 3.1)
- List the causes and risk factors for preterm labour. (Linked to SLO 3.1)
- Describe the diagnosis of preterm labour, including fetal fibronectin testing. (Linked to SLO 3.2)
- Describe the management of confirmed preterm labour. (Linked to SLO 3.2)
- Describe cervical incompetence and its management with cervical cerclage. (Linked to SLO 3.3)

3.2 Premature Rupture of Membranes

3.2.1 Definition and aetiology of PROM

Premature rupture of membranes (PROM) is defined as rupture of the amniotic membranes before the onset of labour, further classified as term PROM (occurring at or beyond 37 weeks) or preterm PROM (occurring before 37 weeks), with the latter carrying substantially greater clinical significance given its direct association with preterm birth and its associated complications.

The aetiology of PROM is genuinely multifactorial, with subclinical intrauterine infection believed to play a genuinely central role in a significant proportion of cases, particularly preterm PROM, alongside other recognised contributing factors including polyhydramnios, multiple pregnancy, previous PROM in an earlier pregnancy, cervical incompetence, and, in some cases, no clearly identifiable underlying cause at all.

Fill in the blank: Premature rupture of membranes occurring before 37 weeks is termed preterm _____. Subclinical intrauterine _____ is believed to play a genuinely central role in the aetiology of a significant proportion of PROM cases.

3.2.2 Diagnosis of PROM

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Diagnosis of PROM is principally clinical, based on a history of a sudden gush or continuous trickle of clear fluid from the vagina, confirmed on sterile speculum examination by direct visualisation of amniotic fluid pooling in the posterior vaginal fornix, or, where this specific finding is genuinely equivocal, by fluid leaking through the cervical os with maternal coughing or gentle fundal pressure.

Where the diagnosis remains genuinely uncertain following clinical examination, specific biochemical tests, detecting placental alpha microglobulin-1 or insulin-like growth factor binding protein-1 in vaginal fluid, offer high sensitivity and specificity for confirming genuine amniotic fluid rupture, though digital vaginal examination should generally be avoided in suspected PROM, particularly preterm PROM, given the genuine risk of introducing infection into an already compromised, open communication with the amniotic cavity.

Fill in the blank: Diagnosis of PROM is confirmed on sterile speculum examination by direct visualisation of amniotic fluid pooling in the posterior vaginal _____. Digital vaginal examination should generally be avoided in suspected PROM given the risk of introducing _____.

3.2.3 Management of PROM

Management of term PROM generally involves either expectant management for a defined period, awaiting spontaneous labour, or induction of labour, given the recognised, progressively increasing risk of intrauterine infection the longer the interval between membrane rupture and delivery, with the specific approach guided by maternal preference and local protocol where the woman herself is otherwise well and there is no specific indication for more urgent delivery.

Management of preterm PROM is genuinely more complex, generally involving expectant management to allow further foetal maturation where genuinely safe to do so, combined with antenatal corticosteroids, prophylactic antibiotics (shown to prolong the latency period and reduce infection-related complications), and close, structured monitoring for signs of chorioamnionitis or foetal compromise, with delivery expedited immediately should either of these specific complications develop.

Fill in the blank: Management of term PROM involves expectant management or induction, given the progressively increasing risk of intrauterine _____ with prolonged rupture. Management of preterm PROM includes antenatal corticosteroids and prophylactic _____ to prolong the latency period.

Category	Details
Definition	**Term PROM**: Rupture of membranes at ≥37 weeks before onset of labour. **Preterm PROM (PPROM)**: Rupture of membranes before 37 weeks before onset of labour.
Diagnosis	History of sudden fluid leakage; sterile speculum exam showing pooling; confirm with tests (nitrazine, ferning, amnisure); avoid digital exam to reduce infection risk.

Category	Details
Management – Term PROM	Induction of labour within 24 hours to reduce risk of chorioamnionitis; monitor maternal and fetal well-being.
Management – Preterm PROM	Expectant management if no infection or fetal compromise; corticosteroids for fetal lung maturity; antibiotics to prolong latency; magnesium sulfate for neuroprotection if <32 weeks; delivery if infection, fetal distress, or advanced gestation.

Box 3.2: Comparison of term and preterm premature rupture of membranes.

Pilot questions 3.2

1. Define premature rupture of membranes and distinguish term from preterm PROM. (Linked to SLO 3.4)
2. Explain the aetiology of PROM. (Linked to SLO 3.5)
3. Describe the clinical diagnosis of PROM. (Linked to SLO 3.6)
4. Explain why digital vaginal examination should generally be avoided in suspected PROM. (Linked to SLO 3.6)
5. Describe the management of term and preterm PROM. (Linked to SLO 3.6)

3.3 Cord Prolapse

3.3.1 Definition and risk factors for cord prolapse

Umbilical cord prolapse occurs when the umbilical cord descends below the presenting part, typically following rupture of membranes, risking cord compression between the presenting part and the maternal pelvis, or exposure of the cord to the relatively cold external environment causing vasospasm, either of which can rapidly cause acute foetal hypoxia if not promptly recognised and managed.

Recognised risk factors for cord prolapse include malpresentation (particularly transverse lie or breech presentation, given the poorer fit of these presenting parts against the pelvic inlet compared with a well-applied cephalic presentation), polyhydramnios, multiple pregnancy, a long umbilical cord, and artificial rupture of membranes performed with a high, poorly applied presenting part, each increasing the space available for the cord to prolapse below the presenting part.

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Fill in the blank: Umbilical cord prolapse risks cord compression or exposure to the external environment causing _____. Malpresentation, particularly transverse lie or breech presentation, is a recognised risk factor given the poorer fit of the presenting part against the pelvic _____.

3.3.2 Clinical features and diagnosis of cord prolapse

Cord prolapse typically presents with sudden foetal heart rate abnormality, particularly variable decelerations or bradycardia, occurring immediately or shortly after rupture of membranes, with the diagnosis confirmed by vaginal examination revealing a palpable, pulsating umbilical cord below or alongside the presenting part, occasionally visible protruding through the vaginal introitus in more advanced cases.

Cord prolapse represents a genuine obstetric emergency requiring immediate recognition and action given the rapidly evolving risk of foetal hypoxia and death if the cord compression is not promptly relieved, meaning any woman with a sudden, otherwise unexplained foetal heart rate abnormality following rupture of membranes should always have cord prolapse specifically, urgently excluded by immediate vaginal examination.

Fill in the blank: Cord prolapse typically presents with sudden foetal heart rate abnormality, particularly variable decelerations or _____. Diagnosis is confirmed by vaginal examination revealing a palpable, _____ umbilical cord below or alongside the presenting part.

3.3.3 Emergency management of cord prolapse

Immediate management of cord prolapse focuses on relieving pressure on the compressed cord, achieved by manual elevation of the presenting part using a gloved hand within the vagina, maternal repositioning into a knee-chest or exaggerated Sims' position, and, where genuinely available, bladder filling with saline to further elevate the presenting part away from the compressed cord while preparations for emergency delivery are made.

Emergency delivery is required without delay once cord prolapse is confirmed, almost always by emergency caesarean section unless vaginal delivery is genuinely imminent and can be safely, rapidly achieved, with continuous manual elevation of the presenting part maintained throughout transfer to theatre and until the moment of delivery itself, given the genuinely time-critical nature of this specific obstetric emergency.

Fill in the blank: Immediate management of cord prolapse includes manual elevation of the presenting part and maternal repositioning into a knee-chest or exaggerated _____ position. Emergency delivery is required without delay, almost always by emergency _____ section.

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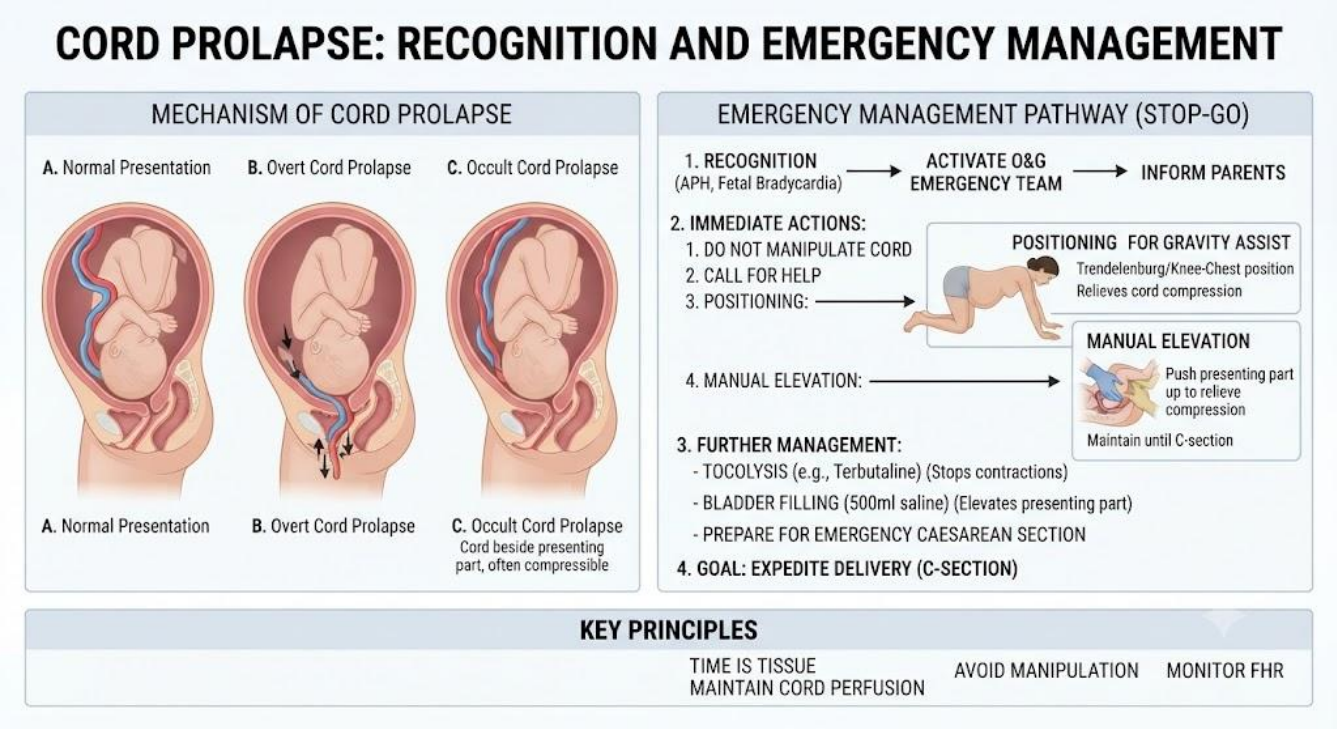

Figure 3.3: Cord prolapse mechanism and emergency management pathway.

Pilot questions 3.3

1. Define umbilical cord prolapse and explain the mechanism of foetal compromise. (Linked to SLO 3.7)
2. List the risk factors for cord prolapse. (Linked to SLO 3.7)
3. Describe the clinical features and diagnosis of cord prolapse. (Linked to SLO 3.7)
4. Describe the immediate measures used to relieve cord compression. (Linked to SLO 3.8)
5. Describe the definitive emergency management of cord prolapse. (Linked to SLO 3.8)

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Series Summary

This Series has covered preterm labour and cervical incompetence, followed by premature rupture of membranes, its aetiology, diagnosis, and management. It concluded with cord prolapse, its risk factors, clinical features, and emergency management.

You should now be able to describe the definition, causes, diagnosis, and management of preterm labour, describe cervical incompetence, define PROM and explain its aetiology, diagnosis, and management, and describe the risk factors, features, and emergency management of cord prolapse (Linked to SLOs 3.1 to 3.8).

Glossary of Terms

1. **Cervical cerclage:** a surgical suture placed around the cervix to provide mechanical support in cervical incompetence.
2. **Cervical incompetence (cervical insufficiency):** painless cervical dilatation in the absence of contractions during the second trimester.
3. **Chorioamnionitis:** infection of the amniotic membranes and fluid, a recognised complication of prolonged membrane rupture.
4. **Cord prolapse:** descent of the umbilical cord below the presenting part, typically following rupture of membranes.
5. **Fetal fibronectin:** a biochemical marker used to help predict the likelihood of imminent preterm delivery.
6. **Preterm labour:** the onset of regular uterine contractions with cervical change between 24 and 37 weeks of gestation.
7. **Preterm PROM:** premature rupture of membranes occurring before 37 weeks of gestation.
8. **Term PROM:** premature rupture of membranes occurring at or beyond 37 weeks of gestation.
9. **Tocolysis:** medication used to briefly delay preterm delivery, allowing time for corticosteroid administration or transfer.
10. **Antenatal corticosteroids:** medication given to accelerate foetal lung maturation in anticipated preterm birth.
11. **Latency period:** the interval between membrane rupture and the onset of labour.

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12. **Variable decelerations:** a pattern of foetal heart rate deceleration associated with cord compression.

Concept Check Questions [Series 3]

Objective questions

1. Preterm labour is defined as onset of contractions with cervical change occurring between 24 and _____ completed weeks.
2. Cervical incompetence describes a cervix that dilates painlessly in the absence of contractions during the _____ trimester.
3. Premature rupture of membranes occurring before 37 weeks is termed preterm _____.
4. Digital vaginal examination should generally be avoided in suspected PROM given the risk of introducing _____.
5. Cord prolapse risks cord compression or exposure to the external environment causing _____.

Short-answer questions

- Describe the diagnosis of preterm labour, including fetal fibronectin testing. (Linked to SLO 3.2)
- Describe cervical incompetence and its management with cervical cerclage. (Linked to SLO 3.3)
- Explain the aetiology of PROM. (Linked to SLO 3.5)
- Describe the management of term and preterm PROM. (Linked to SLO 3.6)
- Describe the immediate measures used to relieve cord compression. (Linked to SLO 3.8)

Long-answer questions

1. Describe the definition, causes, diagnosis, and management of preterm labour. (Linked to SLO 3.1, SLO 3.2)
2. Describe cervical incompetence and its management. (Linked to SLO 3.3)

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3. Define PROM, explain its aetiology, and describe its diagnosis and management. (Linked to SLO 3.4, SLO 3.5, SLO 3.6)
4. Describe the risk factors and clinical features of cord prolapse. (Linked to SLO 3.7)
5. Describe the emergency management of cord prolapse. (Linked to SLO 3.8)

Answers to Concept Check Questions [Series 3]

Objective questions

6. 37.
7. Second.
8. PROM.
9. Infection.
10. Vasospasm.

Short-answer questions

11. Clinical assessment of contractions and cervical change, cervical length ultrasound, and fetal fibronectin testing to predict imminent delivery.
12. Painless second-trimester cervical dilatation, managed with cervical cerclage inserted electively or as an emergency.
13. Genuinely multifactorial, with subclinical intrauterine infection believed to play a central role, alongside polyhydramnios and previous PROM.
14. Term PROM uses expectant management or induction; preterm PROM uses expectant management with corticosteroids and prophylactic antibiotics.
15. Manual elevation of the presenting part, maternal repositioning, and bladder filling with saline where available.

Long-answer questions

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16. **Basic response:** Preterm labour is diagnosed by contractions with cervical change, managed with corticosteroids and, in selected cases, tocolysis.

Value-added response: Fetal fibronectin testing offers high negative predictive value, useful for reassuring against imminent preterm birth.

17. **Basic response:** Cervical incompetence causes painless second-trimester dilatation, managed with cervical cerclage as prevention.

Value-added response: Cerclage may be inserted electively based on history, or as an emergency if premature dilatation is identified in the current pregnancy.

18. **Basic response:** PROM is rupture before labour onset, multifactorial in aetiology, diagnosed clinically and managed by expectant care or induction depending on gestation.

Value-added response: Preterm PROM management balances the benefits of prolonging pregnancy against the risks of infection, guided by close monitoring.

19. **Basic response:** Cord prolapse risk factors include malpresentation and polyhydramnios, presenting with sudden foetal heart rate abnormality after membrane rupture.

Value-added response: Any sudden, unexplained foetal heart rate abnormality after membrane rupture should prompt urgent exclusion of cord prolapse.

20. **Basic response:** Emergency management includes manual elevation of the presenting part and maternal repositioning, followed by expedited delivery.

Value-added response: Continuous manual elevation must be maintained throughout transfer to theatre given the time-critical nature of this emergency.

Answers to Pilot Questions [Series 3]

Part 3.1

11. Onset of regular contractions with cervical change between 24 and 37 completed weeks of gestation.
12. Multiple pregnancy, polyhydramnios, infection, previous preterm birth, cervical incompetence, and uterine anomaly.

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13. Clinical assessment, cervical length ultrasound, and fetal fibronectin testing with high negative predictive value.
14. Antenatal corticosteroids, magnesium sulphate for neuroprotection if imminent before 32 weeks, and selected tocolysis.
15. Painless second-trimester dilatation, managed with cervical cerclage inserted electively or as an emergency.

Part 3.2

1. Rupture of membranes before labour onset; term PROM occurs at or beyond 37 weeks, preterm PROM before 37 weeks.
2. Genuinely multifactorial, with subclinical intrauterine infection believed to play a central role in many cases.
3. History of fluid loss confirmed by sterile speculum examination showing pooling in the posterior fornix.
4. It carries a genuine risk of introducing infection into an already compromised, open communication with the amniotic cavity.
5. Term PROM uses expectant management or induction; preterm PROM uses expectant management with corticosteroids and antibiotics.

Part 3.3

6. Descent of the cord below the presenting part, risking compression or vasospasm causing acute foetal hypoxia.
7. Malpresentation, polyhydramnios, multiple pregnancy, long cord, and artificial rupture with a high presenting part.
8. Sudden foetal heart rate abnormality after membrane rupture, confirmed by palpating a pulsating cord on examination.
9. Manual elevation of the presenting part, maternal repositioning, and bladder filling where available.
10. Immediate emergency delivery, almost always by emergency caesarean section, with continuous manual elevation maintained.

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References and Attributions [Series 3]

Textual References

11. Cunningham, F. G., Leveno, K. J., Dashe, J. S. et al. (2022). Williams Obstetrics (26th ed.). McGraw Hill.
12. Royal College of Obstetricians and Gynaecologists (2019). Green-top Guideline No. 73: Preterm Prelabour Rupture of Membranes. RCOG Press.
13. Royal College of Obstetricians and Gynaecologists (2014). Green-top Guideline No. 50: Umbilical Cord Prolapse. RCOG Press.
14. World Health Organization (2015). WHO Recommendations on Interventions to Improve Preterm Birth Outcomes. WHO Press.

Figures, Plates, Tables, and Boxes

1. Table 3.1: Causes, diagnosis, and management of preterm labour. AI-generated using the prompt: "Create a clean reference table titled Preterm Labour: Causes, Diagnosis, and Management, listing key points for each category. Simple clinical reference table style with outside border."
2. Box 3.2: Comparison of term and preterm premature rupture of membranes. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Term versus Preterm PROM, comparing definition, diagnosis, and management. Clinical reference box style."
3. Figure 3.3: Cord prolapse mechanism and emergency management pathway. AI-generated using the prompt: "Create a professional medical diagram titled Cord Prolapse: Recognition and Emergency Management, showing mechanism, manual elevation, positioning, and management pathway. Clean clinical educational diagram style."

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Series 4: Postpartum Haemorrhage and Labour Management

- **Part 4.1: Postpartum Haemorrhage: Definitions, Causes, and Mortality**
    - Sub Part 4.1.1: Definitions and classification of postpartum haemorrhage
    - Sub Part 4.1.2: Causes of postpartum haemorrhage
    - Sub Part 4.1.3: Contribution of PPH to maternal mortality
- **Part 4.2: Complications and Prevention of PPH**
    - Sub Part 4.2.1: Complications of postpartum haemorrhage
    - Sub Part 4.2.2: Active management of the third stage of labour
    - Sub Part 4.2.3: Risk factors and antenatal identification
- **Part 4.3: Management of Postpartum Haemorrhage**
    - Sub Part 4.3.1: Principles of managing postpartum haemorrhage
    - Sub Part 4.3.2: Role of uterotonics including misoprostol
    - Sub Part 4.3.3: Surgical escalation for PPH

Introduction

In the last Series, we explored preterm labour and membrane disorders. We conclude this course, and this journey through Complications in Pregnancy, with postpartum haemorrhage, the world's leading direct cause of maternal death, and, remarkably, one of the most genuinely preventable and treatable obstetric emergencies when recognised and managed promptly. This Series brings together everything you have learned throughout this course about recognising complications early and acting decisively when they arise.

The aim of this Series is to equip you with a thorough understanding of postpartum haemorrhage, its definitions, causes, contribution to maternal mortality, complications, prevention, and management.

We shall commence this Series by examining the definitions, causes, and contribution of postpartum haemorrhage to maternal mortality. Next, we will consider its complications and the role of active management of the third stage in prevention. Finally, we will conclude by examining the management of postpartum haemorrhage, including the role of uterotonics.

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Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 4.1:** define the various forms of postpartum haemorrhage,
- **SLO 4.2:** describe the causes of postpartum haemorrhage,
- **SLO 4.3:** describe the contribution of postpartum haemorrhage to maternal mortality,
- **SLO 4.4:** list the complications of postpartum haemorrhage,
- **SLO 4.5:** describe the role of active management of the third stage of labour in preventing postpartum haemorrhage,
- **SLO 4.6:** explain the principles of managing postpartum haemorrhage, and
- **SLO 4.7:** discuss the role of uterotonics, including misoprostol, in the management of postpartum haemorrhage.

4.1 Postpartum Haemorrhage: Definitions, Causes, and Mortality

4.1.1 Definitions and classification of postpartum haemorrhage

Postpartum haemorrhage (PPH) is traditionally defined as blood loss of 500 millilitres or more following vaginal delivery, or 1000 millilitres or more following caesarean section, though this widely used definition has recognised limitations, as visual estimation of blood loss is notoriously inaccurate and tends to significantly underestimate true blood loss, particularly at higher volumes, prompting some authorities to favour definitions incorporating haemodynamic instability instead.

PPH is further classified as primary (occurring within 24 hours of delivery, the great majority of cases) or secondary (occurring from 24 hours up to six weeks postpartum, generally from retained products of conception or endometritis), and, by severity, as minor (500 to 1000 millilitres) or major (over 1000 millilitres), a classification of considerable practical importance as it directly guides the intensity of the required clinical response.

Fill in the blank: Postpartum haemorrhage is traditionally defined as blood loss of _____ millilitres or more following vaginal delivery. Secondary PPH occurs from 24 hours up to _____ weeks postpartum.

4.1.2 Causes of postpartum haemorrhage

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The causes of postpartum haemorrhage are traditionally summarised by the mnemonic of the four Ts: tone (uterine atony, failure of the uterus to contract adequately after delivery, by far the most common cause, accounting for the great majority of cases), tissue (retained placental fragments or membranes preventing adequate uterine contraction), trauma (laceration of the genital tract, uterus, or, rarely, uterine rupture), and thrombin (an underlying or acquired coagulation disorder).

Uterine atony occurs when the myometrium fails to contract effectively around the spiral arteries supplying the placental bed after delivery, a mechanism that normally achieves rapid, effective haemostasis, meaning any factor impairing this contractile mechanism, whether uterine overdistension from multiple pregnancy or polyhydramnios, prolonged labour, or grand multiparity, substantially increases the risk of significant postpartum bleeding.

Fill in the blank: The four Ts summarising the causes of postpartum haemorrhage are tone, tissue, trauma, and _____. Uterine atony occurs when the myometrium fails to contract effectively around the spiral arteries supplying the placental _____.

4.1.3 Contribution of PPH to maternal mortality

Postpartum haemorrhage remains the single leading direct cause of maternal death worldwide and in Nigeria, contributing disproportionately to maternal mortality in low-resource settings where timely access to blood products, skilled emergency obstetric care, and appropriately equipped facilities cannot always be guaranteed, reflecting the interplay between a fundamentally treatable clinical condition and the health system barriers that so often prevent that treatment being delivered in time.

The great majority of deaths from postpartum haemorrhage are considered preventable with timely, appropriate care, and the disproportionate burden borne by Nigerian women reflects a combination of factors including delayed recognition, inadequate blood product availability, delays in reaching an appropriately resourced facility, and delayed escalation once a woman has arrived, echoing the three delays framework encountered elsewhere in this broader curriculum.

Fill in the blank: Postpartum haemorrhage remains the single leading direct cause of maternal _____ worldwide and in Nigeria. The great majority of deaths from PPH are considered _____ with timely, appropriate care.

Timing	Severity	Causes (Four Ts)
Primary PPH (within 24 hours of birth)	**Minor: 500–1000 mL blood loss Major: >1000 mL blood loss**	**Tone – uterine atony (most common) Tissue – retained placenta or membranes Trauma – lacerations, uterine rupture, inversion Thrombin – clotting disorders**

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Timing	Severity	Causes (Four Ts)
Secondary PPH (24 hours – 12 weeks postpartum)	**Usually less severe but recurrent bleeding episodes**	**Tone – subinvolution of placental site Tissue – retained products of conception Trauma – infection or delayed healing of trauma Thrombin – underlying bleeding disorder**

Table 4.1: Classification and causes of postpartum haemorrhage.

Pilot questions 4.1

- Define postpartum haemorrhage and its classification by timing and severity. (Linked to SLO 4.1)
- Explain the limitations of visual estimation of blood loss in defining PPH. (Linked to SLO 4.1)
- Describe the causes of postpartum haemorrhage summarised by the four Ts. (Linked to SLO 4.2)
- Describe the mechanism of uterine atony. (Linked to SLO 4.2)
- Explain the contribution of postpartum haemorrhage to maternal mortality in Nigeria. (Linked to SLO 4.3)

4.2 Complications and Prevention of PPH

4.2.1 Complications of postpartum haemorrhage

Significant postpartum haemorrhage can result in hypovolaemic shock, disseminated intravascular coagulation from consumption of clotting factors during massive haemorrhage and replacement, acute kidney injury from prolonged hypoperfusion, and, in the most severe cases, death, with survivors of major PPH also at risk of longer-term complications including anaemia, prolonged hospital stay, and, rarely, Sheehan's syndrome (pituitary infarction causing subsequent hypopituitarism).

Emergency peripartum hysterectomy performed as a last resort to control life-threatening haemorrhage that has not responded to less invasive measures represents a further, life-altering complication of severe PPH, ending future fertility, and, alongside the psychological impact of a

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genuinely life-threatening emergency during childbirth, underscores why prevention and prompt, effective initial management of PPH matter so greatly.

Fill in the blank: Pituitary infarction from severe hypotension during major PPH, causing subsequent hypopituitarism, is termed _____ syndrome. Emergency peripartum _____ may be required as a last resort to control life-threatening haemorrhage.

4.2.2 Active management of the third stage of labour

Active management of the third stage of labour comprises prophylactic administration of a uterotonic agent immediately after delivery of the baby, controlled cord traction to assist delivery of the placenta, and, traditionally, early cord clamping, though this latter component is now typically modified to allow brief delayed clamping where the baby does not require immediate resuscitation, without compromising the overall haemorrhage-preventing benefit of the package as a whole.

Robust evidence consistently demonstrates that active management of the third stage substantially reduces the risk of postpartum haemorrhage compared with expectant, physiological management, and is now recommended as routine practice for essentially all deliveries, making it, alongside skilled attendance at every birth, one of the single most effective and genuinely preventive interventions available for reducing the burden of postpartum haemorrhage.

Fill in the blank: Active management of the third stage comprises uterotonic administration, controlled cord traction, and, traditionally, early cord _____. Active management substantially reduces the risk of postpartum haemorrhage compared with _____ management.

4.2.3 Risk factors and antenatal identification

Recognised risk factors for postpartum haemorrhage include a previous history of PPH, multiple pregnancy, polyhydramnios, prolonged labour, grand multiparity, placenta praevia or accreta spectrum disorders, and pre-eclampsia, with antenatal identification of these risk factors allowing appropriate advance planning, including delivery at an appropriately resourced facility and, where indicated, cross-matching of blood in anticipation of potential haemorrhage.

Although risk factor identification is valuable for planning, a substantial proportion of postpartum haemorrhage occurs in women with no identifiable antenatal risk factor at all, meaning every delivery, regardless of the presence or absence of recognised risk factors, should be managed with genuine preparedness for the possibility of significant haemorrhage, including immediate availability of uterotonic drugs and a clear local protocol for escalation.

Fill in the blank: Recognised risk factors for PPH include previous history of PPH, multiple pregnancy, and placenta praevia or _____ spectrum disorders. Every delivery should be managed with genuine _____ for the possibility of significant haemorrhage, regardless of risk factors.

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Reference Box
Complications: Shock, multi-organ failure, Sheehan's syndrome, disseminated intravascular coagulation (DIC), death
Active Management: Uterotonics (oxytocin, misoprostol), controlled cord traction, uterine massage, tranexamic acid, timely surgical intervention
Risk Factors: Prolonged labour, multiple pregnancy, polyhydramnios, macrosomia, uterine atony, retained placenta, coagulopathy

Box 4.2: Complications, prevention, and risk factors for postpartum haemorrhage.

Pilot questions 4.2

1. List the complications of postpartum haemorrhage. (Linked to SLO 4.4)
2. Describe emergency peripartum hysterectomy as a complication of PPH. (Linked to SLO 4.4)
3. Describe the components of active management of the third stage of labour. (Linked to SLO 4.5)
4. Explain the evidence supporting active management of the third stage in preventing PPH. (Linked to SLO 4.5)
5. List the risk factors for postpartum haemorrhage and explain why universal preparedness matters. (Linked to SLO 4.5)

4.3 Management of Postpartum Haemorrhage

4.3.1 Principles of managing postpartum haemorrhage

The general principles of managing postpartum haemorrhage follow a structured, simultaneous approach: call for help immediately, resuscitate (following the ABCDE approach with wide-bore intravenous access and fluid or blood product resuscitation as needed), monitor (vital signs, blood loss, and urine output), and, in parallel rather than sequentially, identify and treat the specific underlying cause according to the four Ts framework, with all of these actions genuinely occurring simultaneously by different members of a well-coordinated team.

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Uterine massage (firm, bimanual massage of the uterine fundus through the abdominal wall) is a simple, immediate first step to stimulate uterine contraction while other members of the team establish intravenous access, prepare uterotonic drugs, and call for additional senior help, reflecting the genuinely time-critical nature of the initial minutes of major postpartum haemorrhage management.

Fill in the blank: The general principles of managing PPH include calling for help, resuscitating, monitoring, and identifying and treating the underlying _____. Uterine massage is a simple, immediate first step to stimulate uterine _____.

4.3.2 Role of uterotonics including misoprostol

Uterotonic drugs are central to the management of postpartum haemorrhage from uterine atony, with oxytocin generally the first-line agent given its rapid onset and favourable side-effect profile, followed by ergometrine (contraindicated in hypertension) and carboprost (a prostaglandin analogue, used with caution in asthma) as second and third-line options where bleeding continues despite initial treatment.

Misoprostol (a prostaglandin E1 analogue) is a particularly valuable uterotonic agent in resource-limited settings, given its low cost, stability at room temperature without requiring refrigeration, and oral or sublingual route of administration not requiring injection equipment or trained personnel to administer intravenously, making it an important and practical option for both prevention and treatment of postpartum haemorrhage in settings where injectable oxytocin may not always be readily available.

Fill in the blank: Oxytocin is generally the first-line uterotonic given its rapid onset and favourable _____ profile. Misoprostol is particularly valuable in resource-limited settings given its low cost and _____ at room temperature.

4.3.3 Surgical escalation for PPH

Where bleeding continues despite uterotonic drugs and correction of any other identified cause, escalation includes bimanual uterine compression, uterine balloon tamponade (a relatively simple, effective technique using an inflated balloon catheter to apply direct pressure to the placental bed from within the uterine cavity), and, if bleeding still continues, surgical options including compression sutures (such as the B-Lynch suture), uterine artery ligation, and, as a last resort to save the woman's life, hysterectomy.

A major haemorrhage protocol providing pre-defined balanced ratios of blood products (red cells, fresh frozen plasma, and platelets), rather than red cells alone, should be activated in any woman with major, ongoing postpartum haemorrhage, with prompt, decisive escalation through this structured pathway genuinely essential given the potential for rapid, life-threatening deterioration if bleeding remains inadequately controlled.

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Fill in the blank: Uterine balloon tamponade applies direct pressure to the _____ bed from within the uterine cavity. A major haemorrhage protocol provides pre-defined balanced ratios of red cells, fresh frozen plasma, and _____.

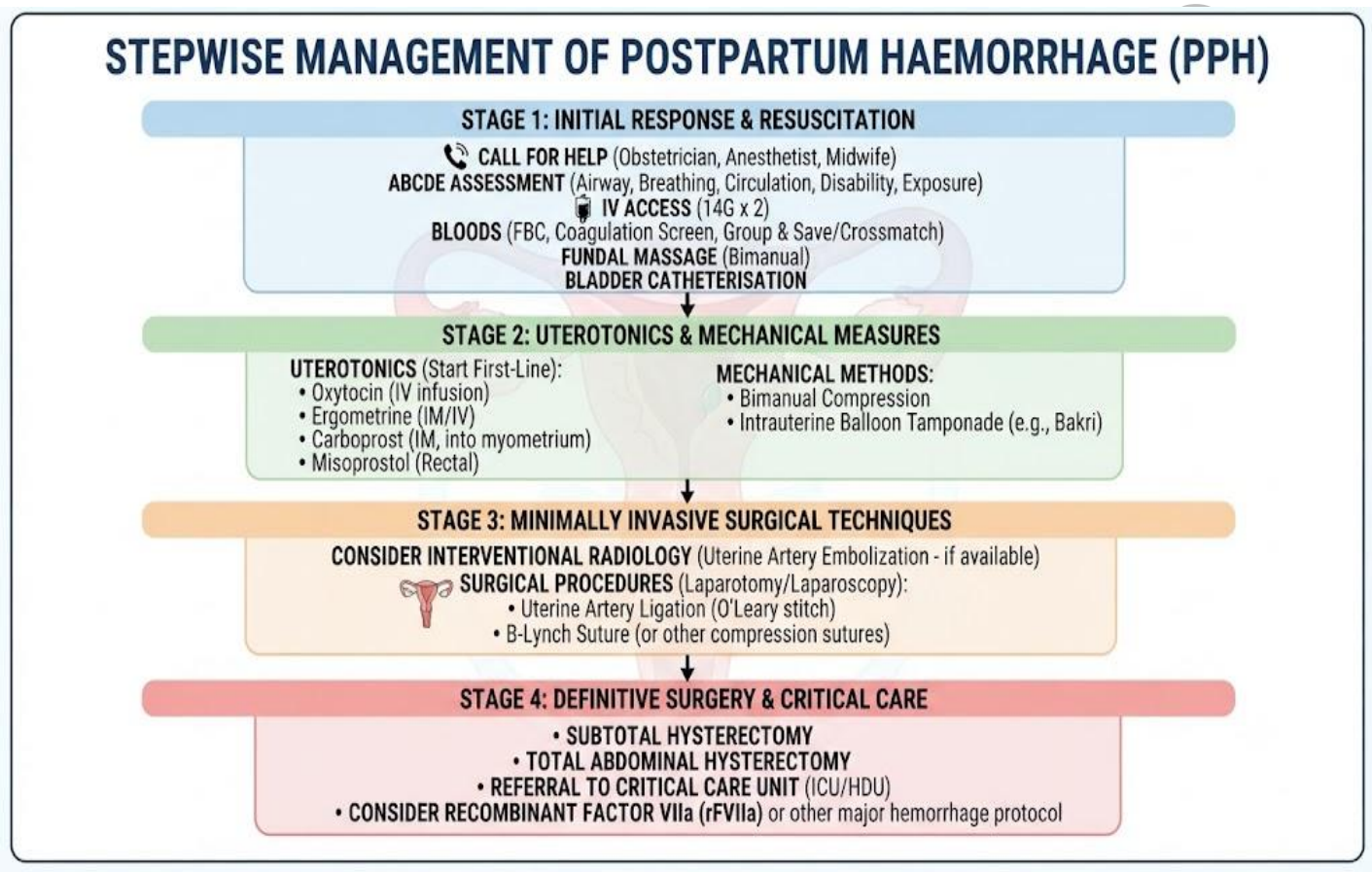

Figure 4.3: Stepwise escalation pathway for the management of postpartum haemorrhage.

Pilot questions 4.3

1. Enumerate the general principles of managing postpartum haemorrhage. (Linked to SLO 4.6)
2. Describe the role of uterine massage in the immediate management of PPH. (Linked to SLO 4.6)
3. Describe the first, second, and third-line uterotonic drugs used in PPH. (Linked to SLO 4.7)
4. Explain why misoprostol is particularly valuable in resource-limited settings. (Linked to SLO 4.7)

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5. Describe the surgical escalation pathway when bleeding continues despite uterotonic drugs. (Linked to SLO 4.6)

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Series Summary

This Series has covered the definitions, causes, and contribution of postpartum haemorrhage to maternal mortality, followed by its complications and the role of active management of the third stage in prevention. It concluded with the management of postpartum haemorrhage, including the role of uterotonics.

You should now be able to define postpartum haemorrhage, describe its causes and contribution to maternal mortality, list its complications, describe the role of active management of the third stage, and explain the principles of managing PPH, including the role of uterotonics (Linked to SLOs 4.1 to 4.7).

Glossary of Terms

1. **Active management of the third stage:** a package of care comprising uterotonic administration, controlled cord traction, and cord clamping, reducing PPH risk.
2. **Carboprost:** a prostaglandin analogue used as a third-line uterotonic in the management of postpartum haemorrhage.
3. **Ergometrine:** a uterotonic drug used in postpartum haemorrhage, contraindicated in hypertension.
4. **Major haemorrhage protocol:** a pre-defined institutional protocol providing balanced ratios of blood products in significant haemorrhage.
5. **Misoprostol:** a prostaglandin E1 analogue used as a uterotonic, valued for its stability and ease of administration in resource-limited settings.
6. **Postpartum haemorrhage:** blood loss of 500 millilitres or more after vaginal delivery, or 1000 millilitres or more after caesarean section.
7. **Primary postpartum haemorrhage:** postpartum haemorrhage occurring within 24 hours of delivery.
8. **Secondary postpartum haemorrhage:** postpartum haemorrhage occurring from 24 hours up to six weeks after delivery.
9. **Sheehan's syndrome:** pituitary infarction resulting from severe hypotension during major postpartum haemorrhage, causing subsequent hypopituitarism.
10. **Uterine atony:** failure of the uterus to contract adequately after delivery, the most common cause of postpartum haemorrhage.

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11. **Uterine balloon tamponade:** a technique using an inflated balloon catheter to apply direct pressure to the placental bed from within the uterine cavity.
12. **The three delays:** a framework describing delay in deciding to seek care, reaching a facility, and receiving adequate care, contributing to preventable maternal death.

Concept Check Questions [Series 4]

Objective questions

1. Secondary postpartum haemorrhage occurs from 24 hours up to _____ weeks postpartum.
2. The four Ts summarising the causes of postpartum haemorrhage are tone, tissue, trauma, and _____.
3. Postpartum haemorrhage remains the single leading direct cause of maternal _____ worldwide and in Nigeria.
4. Active management of the third stage comprises uterotonic administration, controlled cord traction, and, traditionally, early cord _____.
5. Uterine balloon tamponade applies direct pressure to the _____ bed from within the uterine cavity.

Short-answer questions

- Explain the limitations of visual estimation of blood loss in defining PPH. (Linked to SLO 4.1)
- Describe emergency peripartum hysterectomy as a complication of PPH. (Linked to SLO 4.4)
- Explain the evidence supporting active management of the third stage in preventing PPH. (Linked to SLO 4.5)
- Describe the role of uterine massage in the immediate management of PPH. (Linked to SLO 4.6)
- Explain why misoprostol is particularly valuable in resource-limited settings. (Linked to SLO 4.7)

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Long-answer questions

1. Define postpartum haemorrhage and describe its causes and contribution to maternal mortality. (Linked to SLO 4.1, SLO 4.2, SLO 4.3)
2. List the complications of postpartum haemorrhage. (Linked to SLO 4.4)
3. Describe the role of active management of the third stage of labour in preventing postpartum haemorrhage. (Linked to SLO 4.5)
4. Explain the principles of managing postpartum haemorrhage. (Linked to SLO 4.6)
5. Discuss the role of uterotonics, including misoprostol, in the management of postpartum haemorrhage. (Linked to SLO 4.7)

Answers to Concept Check Questions [Series 4]

Objective questions

6. Six.
7. Thrombin.
8. Death.
9. Clamping.
10. Placental.

Short-answer questions

11. Visual estimation is notoriously inaccurate and tends to significantly underestimate true blood loss, particularly at higher volumes.
12. It is a last-resort intervention to control life-threatening haemorrhage, ending future fertility with lasting psychological impact.
13. Robust evidence consistently demonstrates it substantially reduces PPH risk compared with expectant management.

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14. Firm bimanual massage stimulates uterine contraction as an immediate first step while other resuscitation measures are arranged.
15. It is low cost, stable without refrigeration, and can be given orally or sublingually without specialist equipment.

Long-answer questions

16. **Basic response:** PPH is defined by blood loss volume and classified by timing and severity, with causes summarised by the four Ts, and remains the leading direct cause of maternal death.

Value-added response: Most PPH deaths are preventable with timely care, reflecting health system barriers rather than an inherently untreatable condition.

17. **Basic response:** Complications include hypovolaemic shock, DIC, acute kidney injury, Sheehan's syndrome, hysterectomy, and death.

Value-added response: Emergency hysterectomy carries lasting fertility and psychological consequences beyond the immediate haemorrhage itself.

18. **Basic response:** Active management of the third stage substantially reduces PPH risk and is recommended as routine practice for essentially all deliveries.

Value-added response: This intervention, alongside skilled birth attendance, represents one of the most effective preventive measures available.

19. **Basic response:** Management follows calling for help, resuscitation, monitoring, and treating the cause, with oxytocin first-line and misoprostol valuable where resources are limited.

Value-added response: Surgical escalation through balloon tamponade, compression sutures, and hysterectomy provides a structured pathway for ongoing bleeding.

20. **Basic response:** Uterotonics, from oxytocin through ergometrine and carboprost to misoprostol, form the pharmacological cornerstone of managing uterine atony.

Value-added response: Misoprostol's low cost and stability without refrigeration make it a genuinely practical option in resource-limited settings for both prevention and treatment.

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Answers to Pilot Questions [Series 4]

Part 4.1

11. 500 mL or more for vaginal delivery, or 1000 mL or more for caesarean section; primary within 24 hours, secondary from 24 hours to six weeks; minor or major by volume.
12. Visual estimation tends to significantly underestimate true blood loss, particularly at higher volumes.
13. Tone (uterine atony, most common), tissue (retained products), trauma (laceration or rupture), and thrombin (coagulation disorder).
14. Failure of the myometrium to contract effectively around the spiral arteries supplying the placental bed.
15. It is the leading direct cause of maternal death, disproportionately affecting low-resource settings with limited access to timely care.

Part 4.2

1. Hypovolaemic shock, DIC, acute kidney injury, Sheehan's syndrome, hysterectomy, and death.
2. A last-resort intervention to control life-threatening haemorrhage, ending future fertility with lasting psychological impact.
3. Prophylactic uterotonic administration, controlled cord traction, and, traditionally, early cord clamping.
4. Robust evidence shows it substantially reduces PPH risk compared with expectant management, now recommended for essentially all deliveries.
5. Previous PPH, multiple pregnancy, polyhydramnios, prolonged labour, grand multiparity, and placenta praevia or accreta; a substantial proportion occur without identifiable risk factors.

Part 4.3

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6. Call for help, resuscitate, monitor, and simultaneously identify and treat the underlying cause according to the four Ts.
7. Firm bimanual massage stimulates uterine contraction as an immediate first step while other resuscitation measures are arranged.
8. Oxytocin first-line, ergometrine second-line (avoided in hypertension), and carboprost third-line (used with caution in asthma).
9. It is low cost, stable without refrigeration, and can be given orally or sublingually without specialist equipment.
10. Bimanual compression, balloon tamponade, compression sutures, uterine artery ligation, and hysterectomy as a last resort.

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References and Attributions [Series 4]

Textual References

11. Cunningham, F. G., Leveno, K. J., Dashe, J. S. et al. (2022). Williams Obstetrics (26th ed.). McGraw Hill.
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Figures, Plates, Tables, and Boxes

1. Table 4.1: Classification and causes of postpartum haemorrhage. AI-generated using the prompt: "Create a clean reference table titled Postpartum Haemorrhage Classification and Causes, showing timing, severity, and the four Ts. Simple clinical reference table style with outside border."
2. Box 4.2: Complications, prevention, and risk factors for postpartum haemorrhage. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled PPH Complications and Prevention, listing complications, active management, and risk factors. Clinical reference box style."
3. Figure 4.3: Stepwise escalation pathway for the management of postpartum haemorrhage. AI-generated using the prompt: "Create a professional medical flowchart titled Stepwise Management of Postpartum Haemorrhage, showing escalation from uterine massage through hysterectomy. Clean clinical educational diagram style."

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Series 5: Multiple Gestations and Abnormal Presentations

- **Part 5.1: Multiple Pregnancy**
    - Sub Part 5.1.1: Types and diagnosis of multiple pregnancy
    - Sub Part 5.1.2: Complications of multiple pregnancy
    - Sub Part 5.1.3: Management of multiple pregnancy
- **Part 5.2: Breech Presentation**
    - Sub Part 5.2.1: Types and diagnosis of breech presentation
    - Sub Part 5.2.2: Causes and risk factors for breech presentation
    - Sub Part 5.2.3: Management of breech presentation
- **Part 5.3: Unstable and Abnormal Lies and Presentations**
    - Sub Part 5.3.1: Unstable lie
    - Sub Part 5.3.2: Transverse and oblique lie
    - Sub Part 5.3.3: Management of unstable and abnormal lies

Introduction

In the last Series, we explored postpartum haemorrhage and labour management. We conclude this course, and this journey through Complications in Pregnancy, with multiple gestations and abnormal presentations, from twin pregnancy and its specific complications, through breech presentation, to the unstable and abnormal lies that demand particular vigilance as term approaches. This final Series brings together the anatomical, physiological, and emergency management principles woven throughout this entire course.

The aim of this Series is to equip you with a thorough understanding of multiple pregnancy, breech presentation, and unstable and abnormal lies and presentations.

We shall commence this Series by examining multiple pregnancy, its types, complications, and management. Next, we will consider breech presentation, its types, causes, and management. Finally, we will conclude by examining unstable, transverse, and oblique lie, bringing this course to a close.

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Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 5.1:** describe the types and diagnosis of multiple pregnancy,
- **SLO 5.2:** describe the complications of multiple pregnancy,
- **SLO 5.3:** describe the management of multiple pregnancy,
- **SLO 5.4:** describe the types and diagnosis of breech presentation,
- **SLO 5.5:** describe the causes and risk factors for breech presentation,
- **SLO 5.6:** describe the management of breech presentation,
- **SLO 5.7:** describe unstable lie and transverse or oblique lie, and
- **SLO 5.8:** describe the management of unstable and abnormal lies and presentations.

5.1 Multiple Pregnancy

5.1.1 Types and diagnosis of multiple pregnancy

Multiple pregnancy arises either from fertilisation of two separate ova (dizygotic twins, always dichorionic and diamniotic, each foetus having its own placenta and amniotic sac) or from division of a single fertilised ovum (monozygotic twins, in which chorionicity and amnionicity depend on precisely when the division occurs), with chorionicity, rather than zygosity, the single most important determinant of the risk profile of any twin pregnancy.

Diagnosis and, critically, chorionicity determination is most accurately established by ultrasound in the first trimester, using the presence or absence of the lambda sign (a triangular projection of placental tissue where the dividing membrane meets the placenta, present in dichorionic and absent in monochorionic pregnancies), a distinguishing sonographic feature that becomes progressively more difficult to identify with confidence at later gestation.

Fill in the blank: Chorionicity, rather than zygosity, is the single most important determinant of the _____ profile of any twin pregnancy. Chorionicity is most accurately established by ultrasound in the first trimester using the _____ sign.

5.1.2 Complications of multiple pregnancy

Multiple pregnancy carries substantially increased risk of almost every major obstetric complication compared with singleton pregnancy, including preterm birth (the leading cause of perinatal morbidity and mortality in twins, with monochorionic twins delivering earlier on average than dichorionic twins), hypertensive disorders, gestational diabetes, and postpartum

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haemorrhage, reflecting the combined effect of increased uterine distension and greater placental mass.

Twin-to-twin transfusion syndrome (TTTS) is a complication unique to monochorionic twin pregnancies, resulting from unbalanced blood flow through shared placental vascular anastomoses, causing one twin (the donor) to become progressively volume-depleted with oligohydramnios while the other (the recipient) becomes volume-overloaded with polyhydramnios, a condition requiring specialist referral and, in significant cases, laser ablation of the causative anastomoses.

Fill in the blank: The leading cause of perinatal morbidity and mortality in twin pregnancy is _____ birth. Twin-to-twin transfusion syndrome is unique to _____ twin pregnancies.

5.1.3 Management of multiple pregnancy

Antenatal management of multiple pregnancy involves more frequent surveillance than for a singleton pregnancy, with the specific schedule determined by chorionicity, monochorionic pregnancies requiring more intensive ultrasound surveillance, typically fortnightly from around 16 weeks, specifically to detect twin-to-twin transfusion syndrome at the earliest possible stage, when intervention offers the greatest chance of a good outcome for both twins.

Decisions around timing and mode of delivery in multiple pregnancy are individualised according to chorionicity, presentation of the leading twin, and any complicating factors identified during pregnancy, with uncomplicated dichorionic twin pregnancy generally delivered somewhat earlier than a singleton pregnancy, and vaginal delivery a reasonable option when the leading twin presents cephalically, though the decision ultimately requires careful, individualised discussion between the woman and her obstetric team.

Fill in the blank: Monochorionic twin pregnancies typically require ultrasound surveillance _____ from around 16 weeks. The mode of delivery in twin pregnancy depends substantially on the presentation of the _____ twin.

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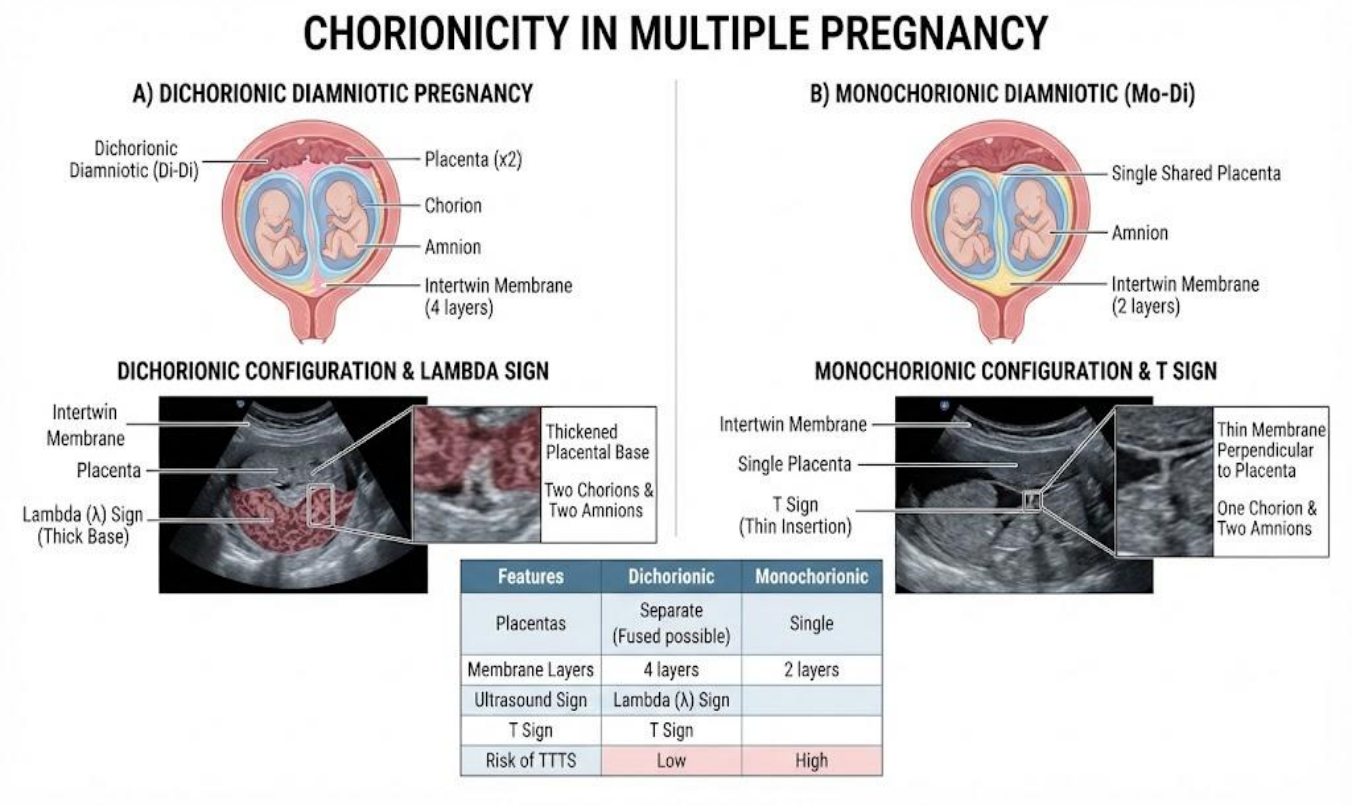

Figure 5.1: Chorionicity patterns in multiple pregnancy and their ultrasound identification.

Pilot questions 5.1

- Describe the origin and chorionicity of dizygotic and monozygotic twins. (Linked to SLO 5.1)
- Explain how chorionicity is determined by ultrasound and why timing matters. (Linked to SLO 5.1)
- Describe the complications associated with multiple pregnancy. (Linked to SLO 5.2)
- Describe the pathophysiology of twin-to-twin transfusion syndrome. (Linked to SLO 5.2)
- Describe the principles of antenatal surveillance and delivery planning in multiple pregnancy. (Linked to SLO 5.3)

5.2 Breech Presentation

5.2.1 Types and diagnosis of breech presentation

Breech presentation describes the foetus presenting buttocks or feet first, classified as extended (frank) breech, the most common type, with the hips flexed and knees extended, flexed (complete) breech, with both hips and knees flexed, or footling breech, with one or both feet

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presenting below the buttocks, each carrying somewhat different implications for the feasibility and safety of vaginal breech delivery.

Diagnosis of breech presentation is generally made by abdominal palpation, identifying the harder, more mobile foetal head at the fundus rather than the pelvis, with the diagnosis confirmed and the specific type of breech further characterised by ultrasound, which also allows assessment of foetal size, any structural anomaly, and the position of the foetal legs, all genuinely relevant to subsequent management planning.

Fill in the blank: Extended (frank) breech, the most common type, has the hips flexed and _____ extended. Diagnosis of breech presentation is generally made by abdominal palpation, identifying the harder, more mobile foetal _____ at the fundus.

5.2.2 Causes and risk factors for breech presentation

Breech presentation is common earlier in pregnancy, given the relatively greater amount of amniotic fluid relative to foetal size allowing free foetal movement, but becomes progressively less common as pregnancy advances towards term, with persistent breech presentation at term often reflecting an underlying cause, though in many cases no specific cause is genuinely identified.

Recognised risk factors for breech presentation at term include prematurity, multiple pregnancy, uterine anomaly (such as a bicornuate uterus), placenta praevia, polyhydramnios or oligohydramnios, and foetal anomaly, each in some way altering the normal, expected process by which a foetus adopts a cephalic presentation as pregnancy advances towards term.

Fill in the blank: Breech presentation is common earlier in pregnancy given the relatively greater amount of amniotic _____ relative to foetal size. Recognised risk factors for breech presentation at term include prematurity, multiple pregnancy, and uterine _____.

5.2.3 Management of breech presentation

External cephalic version (ECV) (a procedure attempting to manually turn the foetus to a cephalic presentation by applying gentle, sustained external pressure to the maternal abdomen, generally performed from around 36 weeks) should be offered to any woman with a persistent breech presentation at term, given its recognised ability to reduce the likelihood of caesarean section, with success rates genuinely variable but generally favourable in appropriately selected women.

Where ECV is unsuccessful, declined, or contraindicated the choice between planned vaginal breech delivery and planned caesarean section requires careful, individualised discussion, considering the specific type of breech, foetal size, maternal pelvis, and the availability of a genuinely experienced attendant for vaginal breech delivery, with planned caesarean section now more commonly selected in many settings given the somewhat more favourable perinatal outcome evidence associated with this approach.

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Fill in the blank: External cephalic version attempts to manually turn the foetus to a cephalic presentation, generally performed from around _____ weeks. Planned caesarean section is now more commonly selected for breech presentation in many settings given more favourable _____ outcome evidence.

Category	Key Points
Types	• Frank breech (hips flexed, knees extended) • Complete breech (hips and knees flexed) • Footling breech (one or both feet presenting)
Risk Factors	• Prematurity • Uterine anomalies (septate uterus, fibroids) • Placenta previa • Polyhydramnios or oligohydramnios • Multiple pregnancy • Fetal anomalies (anencephaly, hydrocephalus)
Management	• External cephalic version (ECV) at 36–37 weeks • Planned caesarean section (especially for primigravida or footling breech) • Vaginal breech delivery only in selected cases with experienced obstetrician • Continuous intrapartum monitoring

Table 5.2: Types, risk factors, and management of breech presentation.

Pilot questions 5.2

1. Describe the types of breech presentation. (Linked to SLO 5.4)
2. Describe how breech presentation is diagnosed. (Linked to SLO 5.4)
3. Explain why breech presentation is common earlier in pregnancy but less common at term. (Linked to SLO 5.5)
4. List the risk factors for breech presentation at term. (Linked to SLO 5.5)
5. Describe the role of external cephalic version and the choice of delivery mode for breech presentation. (Linked to SLO 5.6)

5.3 Unstable and Abnormal Lies and Presentations

5.3.1 Unstable lie

Unstable lie describes a foetal lie that changes repeatedly and unpredictably between longitudinal, transverse, and oblique orientations after 36 weeks of gestation, a stage of

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pregnancy at which the lie would normally be expected to have settled into a stable, longitudinal orientation, reflecting some factor allowing the foetus continued, excessive freedom of movement within the uterine cavity.

Causes of unstable lie include multiparity (with reduced uterine and abdominal wall tone allowing greater foetal mobility), polyhydramnios, placenta praevia, and uterine or pelvic abnormality, with unstable lie carrying genuine clinical significance given the increased risk of cord prolapse or malpresentation should spontaneous rupture of membranes occur while the lie remains unstable and unfavourable.

Fill in the blank: Unstable lie describes a foetal lie that changes repeatedly and unpredictably after _____ weeks of gestation. Unstable lie carries genuine clinical significance given the increased risk of cord _____ should membranes rupture while the lie remains unfavourable.

5.3.2 Transverse and oblique lie

Transverse lie describes the foetal long axis lying at right angles to the maternal long axis, with the foetal shoulder typically the presenting part, while oblique lie describes an intermediate orientation between longitudinal and transverse, both genuinely unstable orientations that, if persisting into labour, prevent normal vaginal delivery and represent a genuine risk factor for cord prolapse or, rarely, uterine rupture if labour is allowed to progress with the foetus in this specific orientation.

Causes of transverse and oblique lie closely mirror those of unstable lie more generally, including multiparity, polyhydramnios, placenta praevia, and uterine or pelvic abnormality, with careful, structured antenatal assessment of foetal lie at every visit from around 36 weeks genuinely essential to identify this specific finding before labour begins, allowing appropriate advance planning.

Fill in the blank: Transverse lie describes the foetal long axis lying at right angles to the maternal long axis, with the foetal _____ typically the presenting part. Structured antenatal assessment of foetal lie at every visit from around 36 weeks is genuinely essential to identify this finding before _____ begins.

5.3.3 Management of unstable and abnormal lies

Management of unstable, transverse, or oblique lie persisting towards term includes attempted external cephalic version where genuinely appropriate, admission to hospital from around 37 to 38 weeks in many protocols, given the recognised risk of cord prolapse should spontaneous rupture of membranes occur at home with an unstable lie, and elective caesarean section where the lie remains genuinely unstable or abnormal at the point labour is anticipated or actually begins.

Should spontaneous rupture of membranes occur with a persistently transverse or oblique lie, or the lie remains genuinely unstable, emergency caesarean section is generally required, with vigilant, immediate assessment for cord prolapse specifically essential given the substantially

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increased risk this specific clinical scenario carries, reflecting the same fundamental emergency principles established elsewhere throughout this broader curriculum.

Fill in the blank: Management of unstable lie includes admission to hospital from around 37 to 38 weeks in many protocols, given the risk of _____ should membranes rupture at home. Emergency caesarean section is generally required should spontaneous rupture of membranes occur with a persistently transverse or _____ lie.

Category	Details
Definition	**Unstable lie**: Fetal lie that changes repeatedly after 37 weeks. **Abnormal lie**: Persistent non-longitudinal lie (transverse or oblique) beyond 37 weeks.
Causes	Multiparity; polyhydramnios; placenta previa; pelvic tumors; uterine anomalies; fetal anomalies; prematurity; lax abdominal wall
Management – Unstable Lie	Close antenatal monitoring; hospital admission near term; exclude contraindications; external cephalic version (ECV) if appropriate; plan delivery in a facility with immediate access to caesarean section
Management – Abnormal Lie	If transverse/oblique persists at term → caesarean section; ECV may be attempted if suitable; avoid vaginal delivery due to risk of cord prolapse and obstructed labour

Box 5.3: Unstable, transverse, and oblique lie: causes and management.

Pilot questions 5.3

1. Define unstable lie and explain its clinical significance. (Linked to SLO 5.7)
2. Distinguish transverse lie from oblique lie. (Linked to SLO 5.7)
3. List the causes of unstable, transverse, and oblique lie. (Linked to SLO 5.7)
4. Describe the antenatal management of unstable, transverse, or oblique lie persisting towards term. (Linked to SLO 5.8)
5. Describe the emergency management required should membranes rupture with an unstable or abnormal lie. (Linked to SLO 5.8)

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Series Summary

This Series has covered multiple pregnancy, its types, complications, and management, followed by breech presentation, its types, causes, and management. It concluded with unstable, transverse, and oblique lie, bringing this course on Complications in Pregnancy to a close.

You should now be able to describe the types, diagnosis, complications, and management of multiple pregnancy, describe the types, causes, and management of breech presentation, and describe unstable, transverse, and oblique lie and their management (Linked to SLOs 5.1 to 5.8).

Glossary of Terms

1. **Chorionicity:** the number of placentas in a multiple pregnancy, the most important determinant of its risk profile.
2. **External cephalic version (ECV):** a procedure attempting to manually turn a breech foetus to a cephalic presentation by external pressure.
3. **Extended (frank) breech:** the most common type of breech presentation, with hips flexed and knees extended.
4. **Footling breech:** a type of breech presentation with one or both feet presenting below the buttocks.
5. **Lambda sign:** a sonographic finding indicating dichorionic twin pregnancy, seen at the site where the dividing membrane meets the placenta.
6. **Oblique lie:** a foetal lie at an intermediate orientation between longitudinal and transverse.
7. **Transverse lie:** a foetal lie in which the long axis lies at right angles to the maternal long axis.
8. **Twin-to-twin transfusion syndrome:** unbalanced blood flow through shared placental vascular anastomoses in monochorionic twin pregnancy.
9. **Unstable lie:** a foetal lie that changes repeatedly and unpredictably after 36 weeks of gestation.
10. **Monochorionic twins:** twins sharing a single placenta, carrying a higher risk profile than dichorionic twins.
11. **Dichorionic twins:** twins each with their own separate placenta, always the case in dizygotic twin pregnancy.

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12. **Cord prolapse:** descent of the umbilical cord below the presenting part, a recognised risk of unstable or abnormal lie.

Concept Check Questions [Series 5]

Objective questions

1. Chorionicity is the single most important determinant of the _____ profile of any twin pregnancy.
2. The leading cause of perinatal morbidity and mortality in twin pregnancy is _____ birth.
3. Extended (frank) breech, the most common type, has the hips flexed and _____ extended.
4. External cephalic version is generally performed from around _____ weeks.
5. Unstable lie describes a foetal lie that changes repeatedly and unpredictably after _____ weeks of gestation.

Short-answer questions

- Describe the pathophysiology of twin-to-twin transfusion syndrome. (Linked to SLO 5.2)
- Explain why breech presentation is common earlier in pregnancy but less common at term. (Linked to SLO 5.5)
- Describe the role of external cephalic version and the choice of delivery mode for breech presentation. (Linked to SLO 5.6)
- Distinguish transverse lie from oblique lie. (Linked to SLO 5.7)
- Describe the emergency management required should membranes rupture with an unstable or abnormal lie. (Linked to SLO 5.8)

Long-answer questions

1. Describe the types, diagnosis, and complications of multiple pregnancy. (Linked to SLO 5.1, SLO 5.2)

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2. Describe the management of multiple pregnancy. (Linked to SLO 5.3)
3. Describe the types, diagnosis, causes, and risk factors for breech presentation. (Linked to SLO 5.4, SLO 5.5)
4. Describe the management of breech presentation. (Linked to SLO 5.6)
5. Describe unstable, transverse, and oblique lie, and their management. (Linked to SLO 5.7, SLO 5.8)

Answers to Concept Check Questions [Series 5]

Objective questions

6. Risk.
7. Preterm.
8. Knees.
9. 36.
10. 36.

Short-answer questions

11. Unbalanced blood flow through shared placental anastomoses causes donor twin volume depletion and recipient twin volume overload.
12. Greater amniotic fluid relative to foetal size allows free movement earlier, but this reduces as pregnancy advances towards term.
13. ECV reduces the likelihood of caesarean section; where unsuccessful, planned caesarean is now often preferred given more favourable outcome evidence.
14. Transverse lie is at right angles to the maternal axis; oblique lie is an intermediate orientation between longitudinal and transverse.
15. Emergency caesarean section is generally required, with vigilant, immediate assessment for cord prolapse.

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Long-answer questions

16. **Basic response:** Multiple pregnancy is classified by chorionicity, determined by first-trimester ultrasound, and carries increased risk of preterm birth and other complications.

Value-added response: Twin-to-twin transfusion syndrome, unique to monochorionic pregnancy, requires specialist surveillance and, in severe cases, laser ablation.

17. **Basic response:** Management involves more frequent surveillance determined by chorionicity, with delivery timing and mode individualised.

Value-added response: Monochorionic pregnancies require more intensive surveillance to detect TTTS at the earliest possible stage.

18. **Basic response:** Breech presentation is classified as extended, flexed, or footling, diagnosed by palpation and ultrasound, with risk factors including prematurity and multiple pregnancy.

Value-added response: Persistent breech at term often reflects an underlying cause, though many cases have no clearly identified explanation.

19. **Basic response:** ECV should be offered to reduce caesarean section likelihood, with the choice between vaginal breech delivery and caesarean individualised where ECV is unsuccessful.

Value-added response: Planned caesarean section is now more commonly selected in many settings given more favourable perinatal outcome evidence.

20. **Basic response:** Unstable, transverse, and oblique lie share similar causes, managed with ECV where appropriate, hospital admission near term, and caesarean section if the lie remains abnormal.

Value-added response: Emergency caesarean section and vigilant assessment for cord prolapse are required should membranes rupture with an unfavourable lie.

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Answers to Pilot Questions [Series 5]

Part 5.1

11. Dizygotic twins arise from two ova, always dichorionic diamniotic; monozygotic twins arise from one ovum, with chorionicity depending on timing of division.
12. By ultrasound in the first trimester using the lambda sign; this distinguishing feature becomes harder to identify with confidence at later gestation.
13. Preterm birth, hypertensive disorders, gestational diabetes, and postpartum haemorrhage, all increased compared with singleton pregnancy.
14. Unbalanced blood flow through shared placental anastomoses causes donor twin volume depletion and recipient twin volume overload.
15. More frequent surveillance determined by chorionicity, with delivery timing and mode individualised according to chorionicity and presentation.

Part 5.2

1. Extended (frank), flexed (complete), and footling breech, each carrying different implications for vaginal delivery.
2. By abdominal palpation, identifying the harder, more mobile foetal head at the fundus, confirmed by ultrasound.
3. Greater amniotic fluid relative to foetal size allows free movement earlier in pregnancy, reducing as pregnancy advances.
4. Prematurity, multiple pregnancy, uterine anomaly, placenta praevia, abnormal amniotic fluid volume, and foetal anomaly.
5. ECV is offered to reduce caesarean likelihood; where unsuccessful, caesarean section is now often preferred given outcome evidence.

Part 5.3

6. A lie that changes repeatedly and unpredictably after 36 weeks, significant given the increased risk of cord prolapse.
7. Transverse lie is at right angles to the maternal axis; oblique lie is an intermediate orientation.
8. Multiparity, polyhydramnios, placenta praevia, and uterine or pelvic abnormality.

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9. Attempted ECV where appropriate, hospital admission from 37 to 38 weeks, and elective caesarean section if the lie remains abnormal.
10. Emergency caesarean section, with vigilant, immediate assessment for cord prolapse.

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References and Attributions [Series 5]

Textual References

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12. National Institute for Health and Care Excellence (2019). Twin and Triplet Pregnancy: NICE Guideline NG137. NICE.
13. Royal College of Obstetricians and Gynaecologists (2017). Green-top Guideline No. 20a: External Cephalic Version and Reducing the Incidence of Breech Presentation. RCOG Press.
14. Royal College of Obstetricians and Gynaecologists (2006). Green-top Guideline No. 20b: The Management of Breech Presentation. RCOG Press.

Figures, Plates, Tables, and Boxes

1. Figure 5.1: Chorionicity patterns in multiple pregnancy and their ultrasound identification. AI-generated using the prompt: "Create a professional medical diagram titled Chorionicity in Multiple Pregnancy, showing dichorionic and monochorionic configurations with lambda and T sign ultrasound findings. Clean clinical educational diagram style."
2. Table 5.2: Types, risk factors, and management of breech presentation. AI-generated using the prompt: "Create a clean reference table titled Breech Presentation: Types, Risk Factors, and Management, listing key points for each category. Simple clinical reference table style with outside border."
3. Box 5.3: Unstable, transverse, and oblique lie: causes and management. AI-generated using the prompt: "Create a simple single-column reference box with an outside border titled Unstable and Abnormal Lies, listing definitions, causes, and management. Clinical reference box style."

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