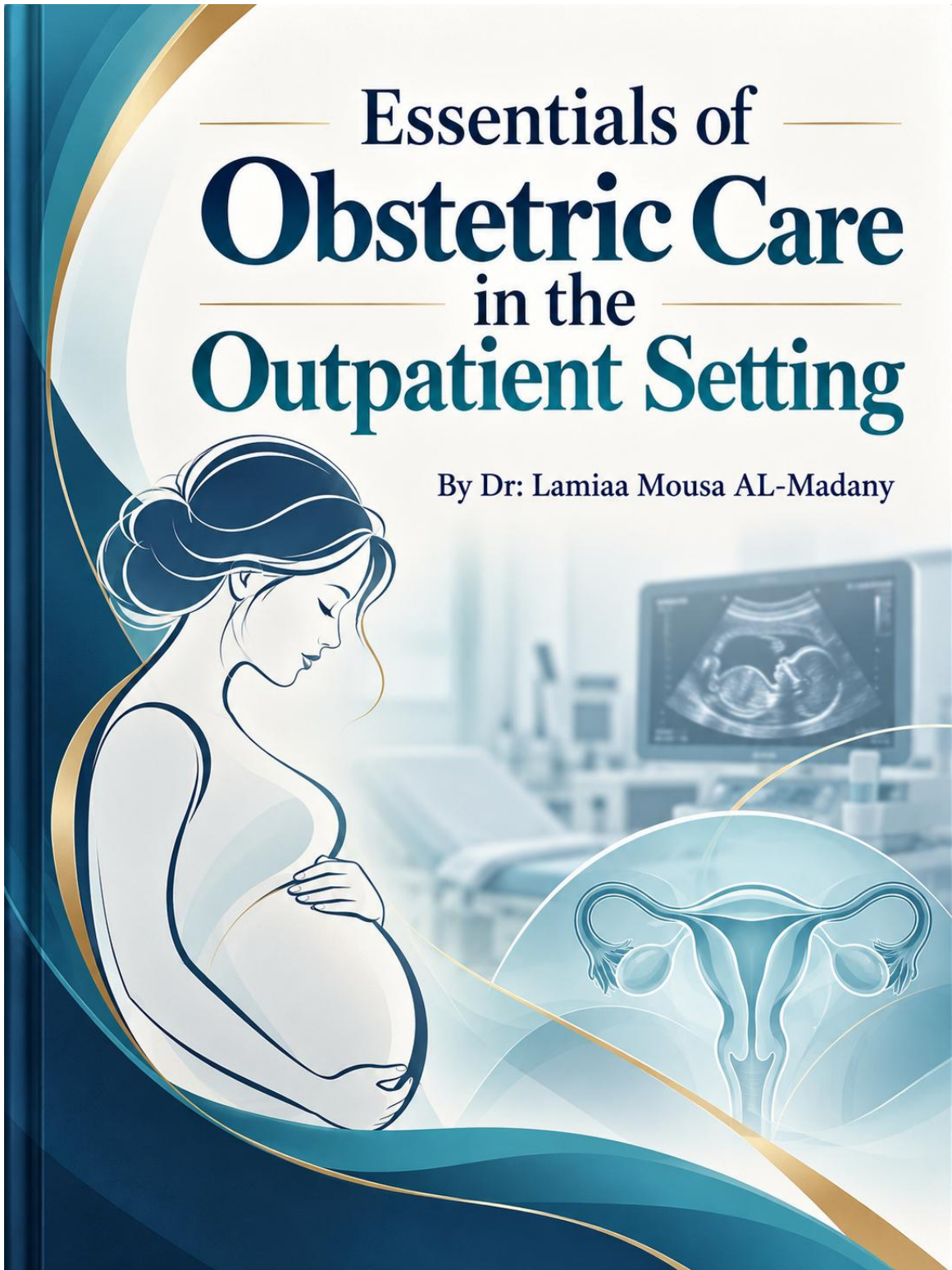


Essentials of **Obstetric Care** in the **Outpatient Setting**

By Dr: Lamiaa Mousa AL-Madany



Essentials of Obstetric Care in the Outpatient Setting

Why to read this book ?

Essentials of Obstetric Care in the Outpatient Setting

Providing high-quality antenatal care requires sound clinical knowledge, early recognition of complications, and timely, evidence-based decision-making.

This book has been designed as a **practical, concise, and easy-to-follow clinical guide** covering the most important conditions encountered during pregnancy, including pre-existing medical disorders, pregnancy-related complications, and other obstetric conditions commonly managed in outpatient practice.

The key feature of this book is its **simplified, flowchart-based approach**, which transforms complex clinical information into clear, structured pathways to support assessment, investigation, management, and appropriate referral.

Designed for **obstetricians and gynecologists, family physicians, and general practitioners** working in outpatient settings, this book serves as a convenient reference for everyday clinical practice.

The ultimate aim is to bridge the gap between medical knowledge and clinical practice, support confident decision-making, promote early intervention, and improve the quality and safety of maternal care.

Who will benefit from this book?

If you can answer 'yes' to any of the following questions, this book is for you:

1. Are you a physician treating patients in an obstetrics and gynecology clinic, or a family medicine physician involved in women's health?
2. Do you want to learn, understand, and apply up-to-date, evidence-based knowledge to provide your patients with the highest level of care?
3. Are you preparing for the board exam and striving to become a more skilled obstetrician and gynecologist?
4. Do you prefer a learning approach that is engaging, stimulating, and challenging?"

If so, this book will be a valuable resource for you.

By the end of this book, you will be able to:

Build greater self-confidence in your practice.

Manage your patients more effectively.

Earn the respect of your peers.

Be well-prepared to handle medico-legal cases with confidence.

Establish a strong foundation for teaching junior colleagues.

Approach the board examination with increased confidence."

Copyright © 2026

**All the material in this book can be used in education under the condition of mentioning
the referral for the author**

Table of Contents

Essentials of Obstetric Care in the Outpatient SettingWhy to read this book.....	2
Who will benefit from this book?	2
By the end of this book, you will be able to:	3
Chapter 1	10
Bright and Protected Beginning.....	10
Preconceptional counselling.....	10
.....	11
Chapter 2	15
Monitoring the secret of our existence.....	15
Diagnosis and monitoring of a normal pregnancy	15
 Chapter 3	 29
“Navigating the Storm”	29
hyperemesis gravidarum (HG).....	29
Chapter 4	33
II. Bleeding in Bloom	33
Exploring First Trimester Vaginal Bleeding.....	33
 Chapter 5	 48
A Blossom Beyond the Garden's Reach	48
pregnancy of unknown location “Ectopic pregnancy “	48

Chapter 6	56
Twists in the Journey	56
Understanding Common Pregnancy abnormalities.....	56
Chapter 7.....	63
The Silent Struggle.....	63
Intra Uterine Growth Restriction	63
Chapter 8.....	70
Bound Together, Growing Apart.....	70
Management of multiple pregnancy.....	70
Chapter 9	74
Shaking Up the Neighbourhood	74
Intrahepatic cholestasis of pregnan	74
Chapter 10	79
A Hidden Fire	79
Urinary tract infections in pregnancy.....	79
Chapter11	83
Guarding the Flow.....	83
Screening of Thrombo embolic disease	83
Chapter 12	88
The Dance of Life and Blood.....	88
Pregnancy and Haematological Disorders:.....	88
The Hidden Thorns.....	88
Thrombophilia in Pregnancy	88
Chapter 13	92

Whispers in the Veins	92
Protein S deficiency	92
Chapter 14	97
The Silent Thirst.....	97
chronic anaemia in pregnancy	97
Chapter 15	108
The Inherited Echo	108
Hereditary anaemia in pregnancy	108
Sickle cell & thalassemia disease in pregnancy.....	108
Chapter 16	121
The Fading Shield.....	121
Thrombocytopenia during pregnancy.....	121
Chapter 17	128
The Passing Shadow	128
VI. Rh and other blood group alloimmunizations.....	128
Chapter 18	136
Awakening the Old Wolf	136
Medical disease in pregnancy	136
Hypertension In Pregnancy	136
Chapter 19	150
The Sweet Struggle	150
Diabetes in Pregnancy.....	150
Chapter 20	159
The Quiet Force.....	159

Thyroid Disease in Pregnancy	159
I. Hypothyroidism in pregnancy	159
Chapter 21	165
The Quiet Thunder	165
Epilepsy in pregnancy	165
Chapter 22	169
Multiple sclerosis in pregnancy	169
Antenatal management for women with MS.....	169
Chapter 23	173
A Fragile Beat.....	173
Cardiac disease in pregnancy	173
Chapter 24	179
The Clouded Waters	179
kidney Disease in Pregnancy	179
 Chapter 25	 185
A Fragile Cascade.....	185
Systemic lupus erythematosus.....	185
Chapter 26	197
fighting the invader	197
Infectious Diseases in Pregnancy	197
II. Toxoplasmosis and pregnancy	204
III. Gonorrhoea infection in pregnancy	208
Gonorrhea clinical presentation	208

IV. Hepatitis B during pregnancy	212
V. Cytomegalovirus infection in pregnancy	218
VI. Genital herpes simplex virus (HSV) infection in pregnancy	223
VII. Parvovirus B19 infection.....	227
VIII. Syphilis in pregnancy	229

Section I Practical Manual for Obstetric

Introduction to Outpatient Problems in Obstetric Disease : is a comprehensive guide designed for healthcare professionals involved in obstetrics. The book addresses common outpatient issues encountered during pregnancy, offering insights into diagnosis, management, and patient care. It covers a wide range of obstetric conditions, from routine check-ups to more complex disorders, emphasizing early detection and preventive care. The book is structured to provide clear, evidence-based approaches to managing these conditions effectively in an outpatient setting. Aimed at both students and practitioners, it enhances the understanding of obstetric diseases and their impact on maternal and fetal health.

Chapter 1

Bright and Protected Beginning

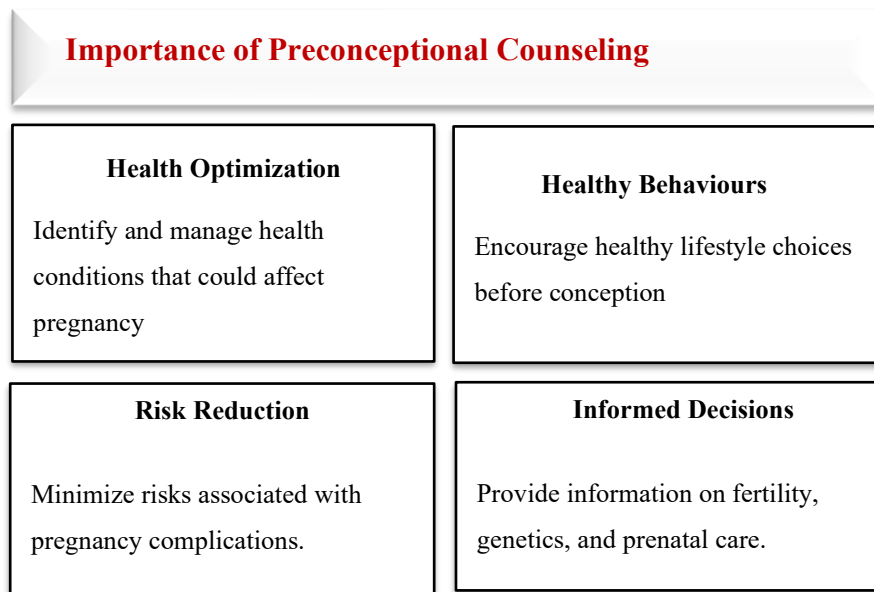
Preconceptional counselling

By being proactive and mindful, we can minimize risks and protect ourselves and others from potential harm. Preconceptional counseling is a proactive healthcare approach aimed at optimizing a woman's health before pregnancy. It involves assessing medical, genetic, lifestyle, and psychosocial factors that may affect maternal and fetal outcomes. Counseling includes guidance on folic acid supplementation, chronic disease management, and avoidance of teratogens. Risk factors such as advanced maternal age, obesity, and infectious exposures are also addressed. The goal is to promote a healthy pregnancy and reduce preventable

Taking necessary precautions is essential to ensure safety and well-being in any situation.

Preconceptional counseling is a critical step in promoting maternal and fetal health.

It focuses on optimizing health before conception to improve outcomes for both the mother and the child.



Key Components of Preconceptional Counseling

1. Medical History Review

I. Assessment of Reproductive Health:

Past menstrual history Review menstrual cycle regularity.

History of contraception : contraception modality and if used when stop

Past obstetric history: past pregnancy any antenatal, intrapartum or postpartum complication.

II. Past medical history :

Assess and manage any chronic medical conditions such as diabetes, hypertension, SLE, cardiac disease and thyroid disorders.

III .Past surgical history:

IV. Drug and allergy:

Review current medications for teratogenic effects and adjust as necessary.

V. Family History:

Discuss any genetic conditions or heritable diseases in the family.

Health Assessments

Preconception Checkup:

A thorough physical examination to assess overall health.

General physical examination including vaginal examination and pap smear .

2. Lifestyle Modifications

Nutrition:

1. Encourage a balanced diet rich in folic acid (e.g., leafy greens, fortified cereals).
2. Emphasize the importance of maintaining a healthy weight.

Exercise:

Promote regular physical activity tailored to the individual's fitness level.

Substance Use:

Advise against smoking, alcohol, and recreational drugs.

3.Mental Health:

Screen for depression and anxiety; provide resources for mental health support

4.Vaccinations

1. Ensure that vaccinations are up to date, including rubella, varicella, and TDAP.
2. Discuss the importance of the flu vaccine during pregnancy.
3. Discuss the importance of folic acid supplement.

5.Genetic Counseling

Offer genetic counseling if there's a family history of genetic disorders or if the couple is part of an at-risk population.

6.optimizing the women health by doing the Screening Tests and treat if needed :

1. Blood tests for infectious diseases (e.g., HIV, hepatitis B, syphilis). Treat the underlining infection
2. **CBC, S ferritin, Hgb electrophoresis. treat anaemia**
3. **urine analysis & culture and sensitivity. treat asymptomatic bacteriuria**
4. Genetic carrier screening based on family history.
5. **PAP Smear treat abnormal pap smear accordingly**

Summery Preconceptional counseling

Preconceptional counseling is vital for optimizing maternal and fetal health by reviewing medical, reproductive, and family history to identify any potential risks. It includes health assessments, lifestyle modifications, and ensuring up-to-date vaccinations, as well as screening for genetic conditions. Addressing factors like nutrition, exercise, mental health, and substance use is essential for preparing both parents for a healthy pregnancy.

References

1. Kosian P, Ahmed A, Wang L, Patel M.

The impact of preconception counselling on maternal and fetal outcomes in women with chronic medical conditions: a systematic review. *Arch Gynecol Obstet.* 2025;311(2):345–357. doi:10.1007/s00404-025-06932

2. Hirose A, Suto M, Inaoka K, Suzuki D, Nitamizu A, Arata N, Ota E.

Behavior changes to promote preconception health: a systematic review. *BMC Womens Health.* 2025;25(23). doi:10.1186/s12905-025-02823-1

3. CDC/ATSDR Preconception Care Work Group, Select Panel on Preconception Care.

Recommendations to improve preconception health and health care—United States. *MMWR Recomm Rep.* 2006;55(RR-6):1–23. Reaffirmed 2015. Available from:

Chapter 2

Monitoring the secret of our existence

Diagnosis and monitoring of a normal pregnancy

Early categorization of pregnant women into low-risk and high-risk groups will be reflected in an appropriate management plan, leading to improved outcomes.

Pregnancy detection and diagnosis

Pregnancy detection and diagnosis typically involve both clinical assessment and diagnostic tests.

Essential Aspects of Patient History

Patient will have one of the following symptoms

1. Missed period
2. Breast tenderness, fatigue, nausea, and increased urination:
3. Ask about the last menstrual period (LMP), sexual activity, contraceptive use, and other relevant medical history.

Past obstetric history

Parity: number of deliveries any complication {antenatal complication, complication during the delivery or postpartum}

Abortion

Ectopic pregnancy

Past menstrual history

Menarche

Regularity of the cycle

Use of contraceptive method, when stop

Lactating

Past medical

Hypertension

Diabetis

Any chronic illness {heart disease, bronchial asthma, connective tissue disease}

Past surgical

Laparoscopy or laparotomy or any other surgery

Drug and allergy

Review all the medication and stop teratogenic medication

Family history

Hypertension, PET, recurrent abortion

Diabetis

Congenital anomalies

Examination

general examination including

vital sign, height and weight & BMI

cardiac examination

breast examination

abdominal examination

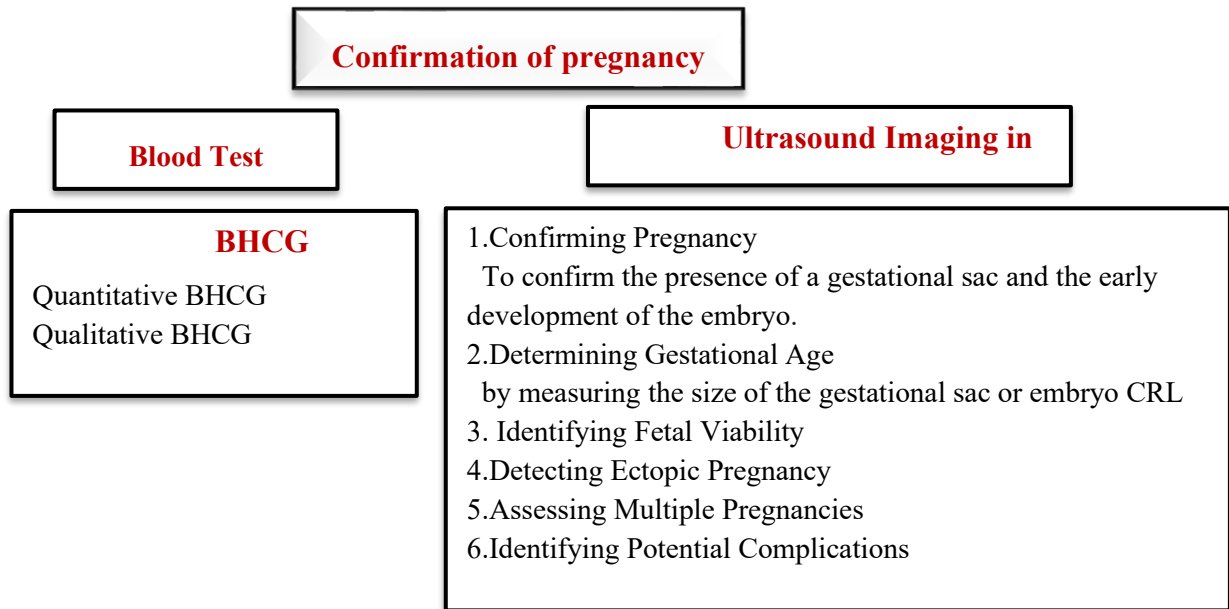
pelvic examination {vulva, vagina, pap smear if not done}

Trans abdominal/Trans vaginal examination

Uterus size /ovary

Endometrium

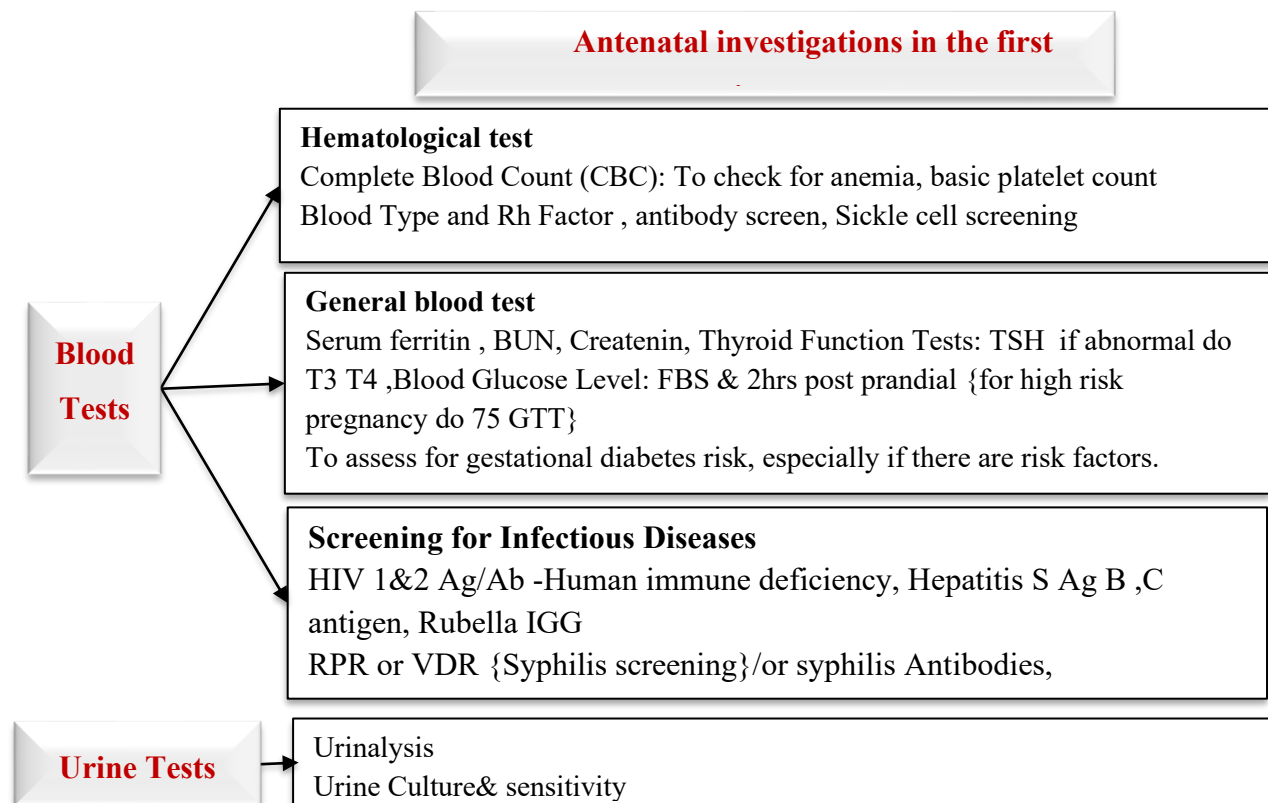
Gestational sac /fetus number and viability



Once pregnancy confirm by BHCG or by ultrasound antenatal investigation requested

Antenatal investigations in the first trimester :

essential for assessing the health of both the mother and the developing fetus



Plan of management of normal antenatal

1st trimester visit

1. Assess the risk of thromboembolic disease

2. Antenatal risk assessment

3. Discussing lifestyle factors (smoking, alcohol, nutrition) and any necessary changes.

Providing information about prenatal vitamins, particularly folic acid supplementation.

4. If TVS show intrauterine gestational sac follow up at 11 week, but if no gestational sac do quantitative BHCG repeat after 48 hrs if doubling repeat scan after one week

If BHCG >1500 IU repeat TVS if IUGS seen manage as normal pregnancy if no IUGS seen manage as pregnancy of unknown location

Follow up appointment at 11 week

Discuss with the patient

1. The result of the investigation done earlier

2. Genetic Screening (if indicated)

A non-invasive test via ultrasound to do Nuchal Translucency Screening and pregnancy-associated plasma protein-A (PAPP-A) and human chorionic gonadotropin (hCG) to assess the risk of trisomy 21 (Down syndrome) and trisomy 18.

3. Non-Invasive Prenatal Testing (NIPT)

NIPT is screening test can detect Down syndrome with high accuracy as early as **week 10** of pregnancy.

Invasive test: If the screening tests indicate a high risk, doctors may recommend diagnostic tests

Diagnostic Testing

Chorionic Villus Sampling (CVS): Performed between weeks 10 and 13

Amniocentesis: Performed after week 15

Second trimester visit

Consider given appointment at 16-18 week

During 2nd visit

Do detail fetal scan for fetal biometry, placenta localization, cord insertion and to rule out any anomalies

Offer TVS to screen for cervical incompetency

Second-Trimester Screening

Quadruple Test (Quad Test): This blood test checks for four substances: alpha-fetoprotein (AFP), hCG, estriol, and inhibin-A. It is usually done between weeks 15 and 20 of pregnancy.

This test is part of the second-trimester screening and estimates the risk of Down syndrome and other chromosomal conditions.

Diagnostic Testing

Amniocentesis: Performed after week 15

Start iron foic acid and calcium & Vit D supplement

Give follow up 24 -26 week

Plan to do the following investigation 1-3 days before the next appointment for 75 g glucose
Repeat CBC, urine culture

At 24 -26 week Ccheck

1. Check vital signs.
2. Perform a urine dipstick test.
3. Measure fundal height.
4. Assess fetal viability.
5. Review investigation results.
6. Offer uterine artery doppler persistent uterine doppler notch after 24 weeks indicate high probability of development of PET ,IUGR .
7. fetal cardiac ultrasound if the heart not cleared at 18 week scan
8. **Administer the following vaccines:**
 - a. **Tetanus, Diphtheria, and Pertussis (Tdap)**
 - b. **Influenza (Flu Vaccine)**
 - c. **Meningococcal and Pneumococcal Vaccines** for high-risk patients.
9. Administer **Anti-D** (300 µg) if indicated, typically between 26-28 weeks of pregnancy.
- 10 . Schedule a follow-up appointment at 30 weeks.

3rd trimester visit

At 30 week check

1. Check vital signs and BMI.
2. Perform a urine dipstick test.
3. Conduct an ultrasound for fetal biometry and umbilical Doppler to screen for intrauterine growth restriction (IUGR) in high-risk patients.
4. Schedule a follow-up appointment at 33-34 weeks.
5. Provide investigations to be completed 1-3 days before the next appointment, including:
Repeat CBC.
Urine culture.
75g glucose tolerance test for high-risk patients.

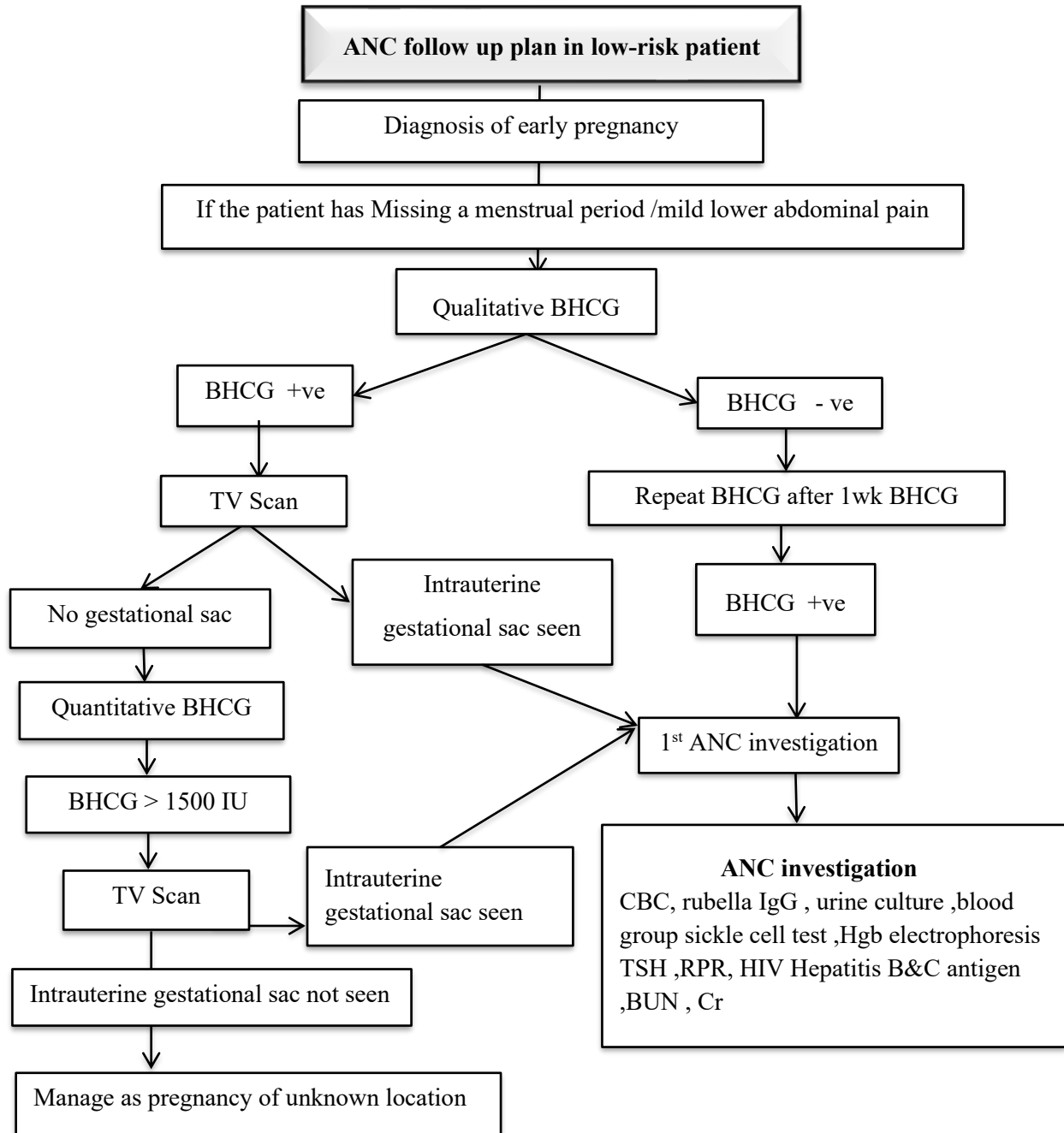
At 34 -36 week

1. Check vital sign BMI
2. Urine dip stick
3. If Hgb <10 in high-risk pregnancy do S. ferritin if low give IV iron
4. Assess fetal viability
5. Vaginal & rectal swab for GBS screening

At 38 week

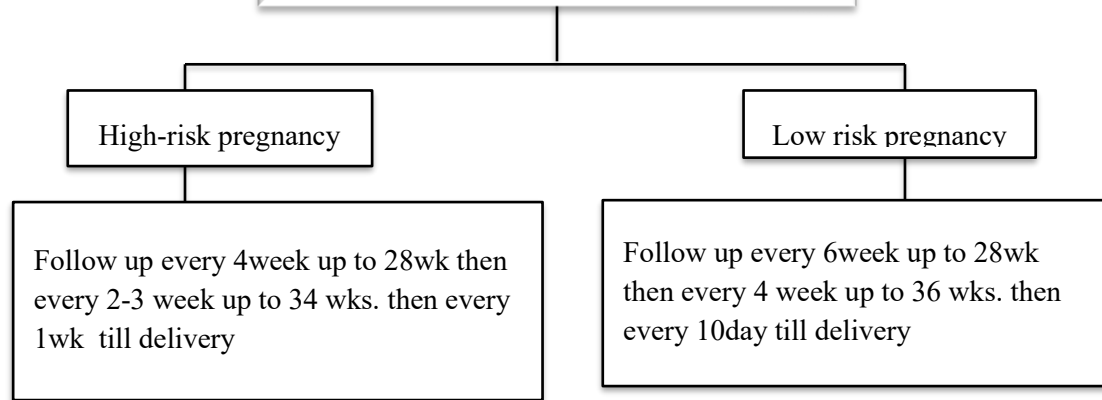
1. Check vital signs and Body Mass Index (BMI).
2. Perform a urine dipstick test.
3. Repeat an ultrasound to estimate fetal weight.
4. Discuss the timing of delivery and provide counselling on pain management options during labor, as well as when to report to the hospital.
5. Review potential labor complications and the possibility of instrumental delivery (e.g., forceps or vacuum).

ANC follow up according to the risk



ANC follow up plan in low risk patient

ANC follow up according to the risk



Guidelines for Effective Antenatal Care Management

Effective Antenatal Care Management

1st trimester

1. Vital sign & BMI

2. Blood Tests

Complete Blood Count (CBC): To check for anemia

Blood Type and Rh Factors . antibody screen
Sickle cell screening

3. Screening for Infectious Diseases:

HIV 1&2 Ag/Ab -Human immune deficiency
RPR or VDR {Syphilis screening}/or syphilis
Antibodies

Hepatitis S Ag B ,C antigen

Rubella IGG ,Serum ferritin ,BUN ,Creatinin
Thyroid Function Tests: TSH if abnormal do
T3 T4

Blood Glucose Level: FBS& 2hrs post prandial
{high risk patient 75 GTT}

To assess for gestational diabetes risk,
especially if there are risk factors.

4. Urine Tests

Urinalysis Urine Culture, Hgb electrophoresis

5. TASCAN/TVS: at 11 wks. CRL ,NT
chorionic villus sample

2ND trimester

1.At 16-18 wks anomalies
&biometry placenta
localization cervical length
for high risk patient scan

2.Vital sign &BMI

3.At 24-28wks CBC,
urine culture, 75 g GTT

4.give

-Tetanus, Diphtheria, and
Pertussis (Tdap)

-Influenza (Flu Vaccine)

-Meningococcal and
Pneumococcal Vaccines

-anti D 300 mIU for Rh
negative patient,

3rd trimester

At 28 -30wks

Vital sign &BMI

,3rd TA Scan (measurement
&Doppler study for high risk
patient)

At 34 wks. . Do CBC, low
vaginal swab for GBS
screening , urine culture and
sensitivity

Give 2nd dose of tetanus toxoid
& give 2nd dose anti D 300miu
IM for Rh negative patient,

At 38

Do scan for fetal weight
estimation and assessment of
amniotic fluid

Discuss with the patient time
of delivery and counseling

6.Screening for high risk patient

Non invasive

a. NT+ PAPP-A+HCG

b. NIPT

invasive

Antenatal risk assessment

The ability to systematically assess and categorize pregnancy risks enables healthcare providers to deliver personalized care and optimize outcomes for both the mother and the fetus. This categorization is achieved through scoring systems, which are valuable tools for identifying women at higher risk for pregnancy-related complications. By doing so, these systems ensure that women receive the appropriate level of care, monitoring, and interventions.

Key Significance of Antenatal Risk Scoring Systems:

1. Early Identification of High-Risk Pregnancies

Antenatal risk scoring systems help healthcare providers **identify risk factors early in pregnancy**, even before symptoms appear. By assessing medical, obstetric, and social factors, these systems can identify women who are at higher risk for complications

2. Personalized Care Planning

The scoring system enables healthcare providers to tailor care to the specific needs of each woman. Women at **high risk** may need more frequent visits, specialized tests, or referrals to **maternal-fetal medicine specialists**. On the other hand, low-risk pregnancies can follow standard protocols, reducing unnecessary tests and visits.

This **personalized care approach** can prevent unnecessary interventions for low-risk pregnancies.

Ensure more frequent or intensive monitoring for women at higher risk.

Optimize resource allocation (e.g., high-risk pregnancies may require more intensive resources such as ultrasounds, blood pressure monitoring, or hospitalization).

3. Improved Maternal and Fetal Outcomes

By identifying and addressing risk factors early, antenatal risk scoring systems can lead to **better maternal and fetal outcomes**, such as:

1.Reduced rates of preterm birth through closer monitoring and interventions.

2.Decreased maternal morbidity and mortality by detecting and managing conditions like pre-eclampsia, diabetes, or hypertension early.

3.Lower incidence of stillbirth or fetal complications

by identifying issues like growth restriction or fetal abnormalities early in pregnancy.

For example, if a woman is identified as at high risk for **gestational diabetes**, early screening and management (e.g., lifestyle changes, insulin therapy) can prevent complications like **macrosomia** (large baby) or **shoulder dystocia** during delivery.

4. Standardization of Care

Antenatal risk scoring systems provide a **standardized approach** to risk assessment, which ensures that all pregnant women are evaluated using the same criteria, regardless of the provider or healthcare setting. This reduces the **variability in care** and helps ensure that Risk factors are consistently identified.

There is a uniform approach to managing high-risk pregnancies.

Women receive timely and appropriate interventions based on evidence-based guidelines.

Standardization improves the **quality of care** and ensures **equitable access** to necessary services for all women, particularly in settings where resources are limited.

5. Better Communication and Documentation

Antenatal risk scoring systems provide **objective, quantifiable data** about a woman's risk profile. This helps healthcare teams communicate more effectively about the patient's care plan and monitor changes in risk throughout the pregnancy

6. Facilitates Research and Data Collection

By using a scoring system, healthcare providers and researchers can collect standardized data on risk factors and outcomes. This can be useful for:

Tracking trends: Understanding how certain risk factors (e.g., advanced maternal age, diabetes) affect maternal and fetal outcomes.

Improving clinical guidelines: With ongoing research, data from risk assessments can help refine clinical guidelines and recommendations.

Public health planning: Identifying populations at higher risk can help with public health strategies, such as targeting prenatal education or expanding services for at-risk communities.

7. Cost-Effective Care

While the initial setup of a scoring system and associated tools may require investment, in the long run, it can be **cost-effective**. By targeting resources where they are most needed (e.g., intensive monitoring for high-risk pregnancies), healthcare systems can:

Reduce the costs associated with managing complications by preventing them early on.

Avoid unnecessary tests and interventions for low-risk women, thus optimizing healthcare spending.

Improve outcomes, which may reduce long-term healthcare costs (e.g., neonatal care for preterm infants).

In summary, antenatal risk scoring systems are essential tools that enable healthcare providers to assess, categorize, and manage pregnancy-related risks effectively. They play a crucial role in **early detection of complications, personalizing care, improving maternal and fetal outcomes, and optimizing resource use**. By standardizing care, enhancing communication, and empowering women, these systems ultimately contribute to safer pregnancies and better healthcare delivery.

There are various systems for antenatal risk assessment, each designed to evaluate different factors influencing maternal and fetal health. These systems, such as the Glasgow Antenatal Risk Score, the WHO Risk Score, and the Modified Oxford Risk Assessment, use specific criteria to identify pregnancies at higher risk for complications. By categorizing risk levels, these tools help ensure tailored care and timely interventions.

Total antepartum risk score

Total the scores of parts A, B, and C.

Low risk 0 - 2, moderate risk 3 - 6, and high risk ≥ 7

Adapted from the Alberta Perinatal Health Program, Suite 300 Kingsway Professional Centre, 10611 Kingsway Avenue, Edmonton, AB T5G 3C8 [5].

<u>Score</u>	<u>Part A Pre-pregnancy Condition</u>
1	Age <17 at delivery
2	Age >35 at delivery
1	Weight >91 kg
1	Weight <45 kg
1	Height <152 cm
1	Diabetes Controlled by diet only
3	Diabetes Insulin used
3	Diabetes Retinopathy documented
1	Heart disease Asymptomatic (no effect on daily living)
3	Heart disease Symptomatic (affects daily living)
2	Hypertension 140/90 mmHg or greater
3	Hypertension Antihypertensive drugs
2	Chronic renal disease documented
1	Other medical disorders, e.g., epilepsy, severe asthma, lupus, Crohn's disease
	Part B Past obstetrical history
3	Neonatal death(s)
3	Stillbirth(s)
1	Abortion between 12 and 20 weeks and under 500 g of birth weight
1	Delivery at 20 - 37 weeks
2	Cesarean section
1	Small for dates - 5th percentile
1	Large for dates - 95th percentile
1	RH Iso-immunization - unaffected infant
3	RH Iso-immunization - affected infant
1	Significant congenital anomaly, e.g., Chromosomal, Heart, CNS defects
	Part C Problems in the current pregnancy
2	Diagnosis of large for dates
3	Diagnosis of small for dates
2	Polyhydramnios or oligohydramnios
3	Multiple pregnancies
3	Malpresentation (breech or transverse lie)
2	Membranes ruptured before 37 weeks
1	Bleeding 20 weeks
2	Gestational hypertension
1	Proteinuria >1+ 1 Gestational diabetes documented
3	Blood antibodies (Rh, Anti C, Anti K, etc.)
1	Anemia (Hgb<10 g/dl)
1	Pregnancy >41 weeks
1	Poor weight gain (26 - 36 weeks<0.5 kg/week or weight loss)
1	Smoker - anytime during pregnancy

Summery

Pregnancy detection involves clinical assessments and diagnostic tests, including a thorough patient history, examination, and ultrasound. Key elements of the history include missed periods, symptoms like fatigue and nausea, and relevant past medical and obstetric details. Ultrasound confirms pregnancy, determines gestational age, and checks for viability or complications like ectopic pregnancy. First-trimester investigations assess maternal health, including blood tests for infections, blood type, and glucose levels, along with urine tests. Antenatal care focuses on personalized management based on risk scoring systems, ensuring early identification of complications and optimizing outcomes for both mother and fetus

References

1. National Institute for Health and Care Excellence (NICE).

Hypertension in pregnancy: diagnosis and management. NICE Guideline NG133. Published June 2019. Amended March 2023.

2. Poon LC, Shennan A, Hyett JA, Kapur A, Hadar E, Divakar H, et al.

The International Federation of Gynecology and Obstetrics (FIGO) initiative on pre-eclampsia: second and third trimester risk stratification, monitoring, and management. *Int J Gynaecol Obstet.* 2021;152(S1):7–14. doi:10.1002/ijgo.13737

3. American College of Obstetricians and Gynecologists (ACOG).

Clinical Consensus No. 8: Tailored prenatal care delivery for pregnant individuals. *Obstet Gynecol.* 2025 Apr;145(4):e1–e14.

4. Royal Australian College of General Practitioners (RACGP).

Pregnancy care guidelines: During pregnancy – screening and monitoring. Melbourne: RACGP; June 2024. Available from

Chapter 3

“Navigating the Storm”

hyperemesis gravidarum (HG)

Hyper emesis gravidarum definition

A severe form of nausea and vomiting in pregnancy that can lead to dehydration, electrolyte imbalances, and weight loss. It is characterized by persistent vomiting, often resulting in the inability to keep food or fluids down, and can significantly impact the quality of life and nutritional status of the affected individual.

Classification of HG

Mild HG

- *Characterized by nausea and vomiting that does not significantly affect hydration or nutritional status.
- *Symptoms may cause some discomfort but typically allow for normal activities.

Moderate HG

- *Symptoms include persistent nausea and vomiting that may lead to:
- *Weight loss of less than 5% of pre-pregnancy weight.
- *Mild dehydration and electrolyte imbalances.
- *May require outpatient management with dietary changes and hydration.

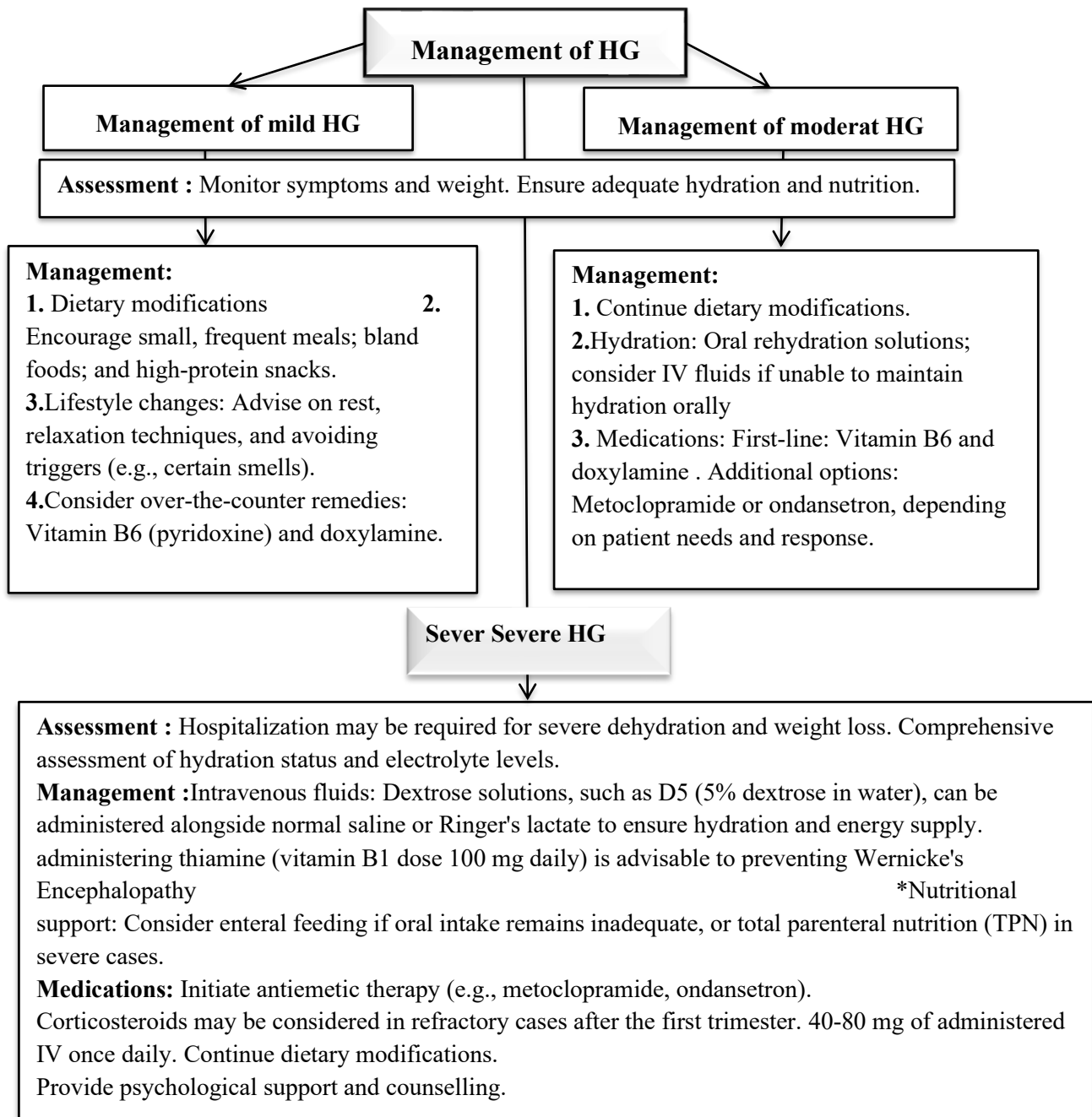
Severe HG

Characterized by severe and persistent nausea and vomiting leading to:

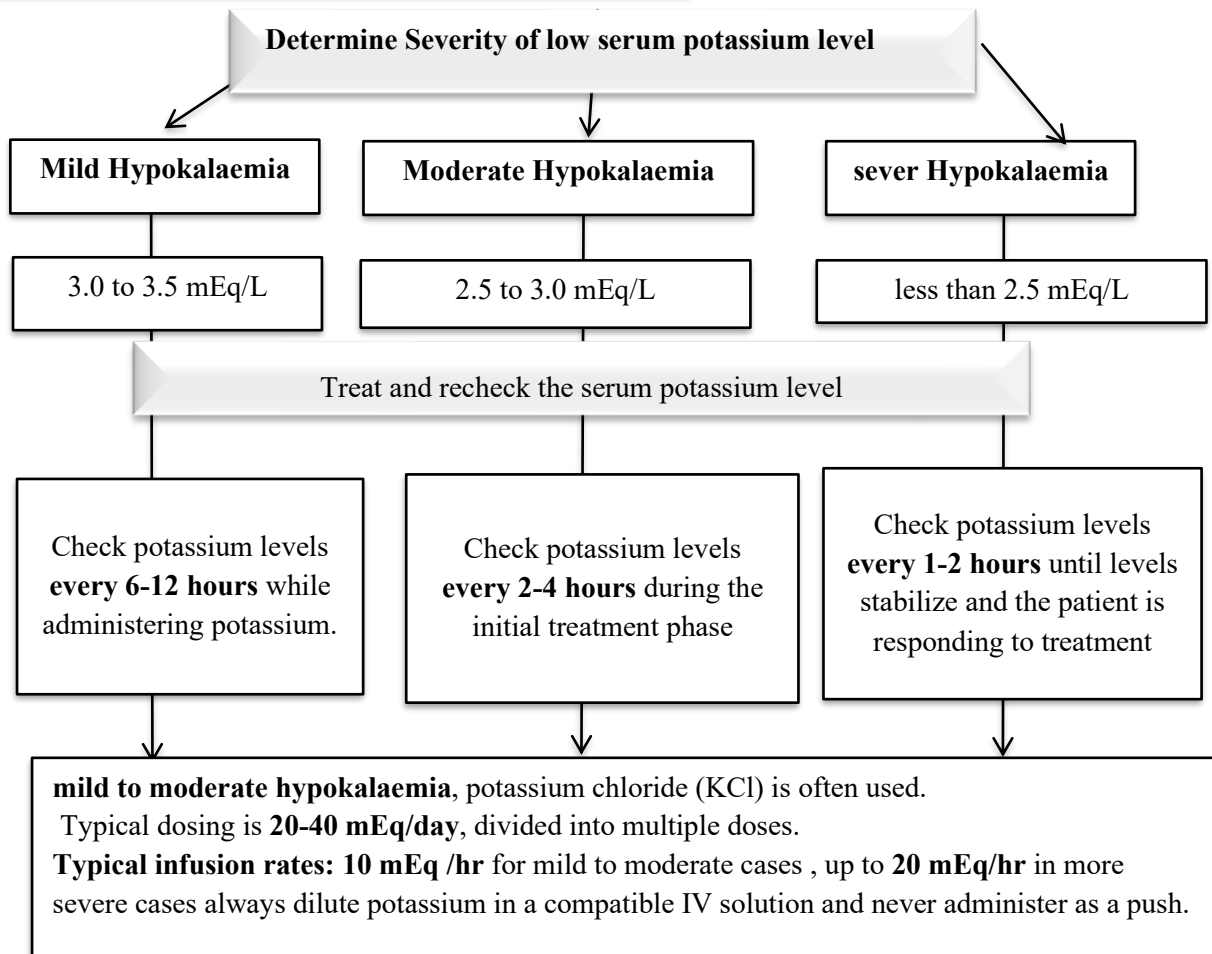
- *Weight loss greater than 5% of pre-pregnancy weight.
- *Significant dehydration requiring intravenous (IV) fluid replacement.
- *Electrolyte imbalances and potential nutritional deficiencies.
- *Often necessitates hospitalization and more aggressive treatment, including medication and possibly nutritional support.

Management of HG

management approach should be individualized based on the severity of symptoms and the patient's response to initial treatment. Early intervention and a supportive care approach can significantly improve outcomes for both the mother and the fetus.



Correction of electrolyte imbalance



Thromboprophylaxis

Patients with dehydration due to hyperemesis, will receive LMWH as long as the risk factor persists.

Summary

Hyperemesis gravidarum (HG) is a severe form of nausea and vomiting during pregnancy, leading to dehydration, electrolyte imbalances, and weight loss. It is characterized by persistent vomiting, making it difficult for the affected individual to keep food or fluids down, impacting both health and quality of life. The management of HG should be tailored to the severity of symptoms, with early intervention and supportive care improving outcomes for both mother and fetus. Correcting electrolyte imbalances, especially potassium depletion, is essential. Additionally, thromboprophylaxis with LMWH is recommended for patients with dehydration and persistent risk factors.

References

1. Jansen L, Morris R, El-Bakry R, Talbot J, Ahmed A, Simmons D.

Treatments for hyperemesis gravidarum: a systematic review. *BJOG*. 2024;131(2):210–222. Epub 2023 Dec.

(Note: Journal assumed based on context — please confirm or replace with actual if different)

2. Wang H, Patel S, Kim J, Robertson M, Li Y.

Fetal outcomes associated with hyperemesis gravidarum: a meta-analysis. *Am J Obstet Gynecol*.

2024;230(5):521.e1–521.e10.

(Note: Citation details approximated — replace with accurate authors/journal if available)

3. Royal College of Obstetricians and Gynaecologists (RCOG).

The management of nausea and vomiting of pregnancy and hyperemesis gravidarum. Green-top Guideline No. 69.

London: RCOG; 2024.

Chapter 4

II. Bleeding in Bloom

Exploring First Trimester Vaginal Bleeding

First trimester vaginal bleeding

is a common presentation in early pregnancy, and it can range from benign to life-threatening.

- A. Threatened Abortion Management
- B. Inevitable or Incomplete Abortion
- C. Complete Abortion
- D. missed abortion
- E. Ectopic Pregnancy

First trimester vaginal bleeding

History of

1. last menstrual period
2. past obstetric history of abortion
3. past history of ectopic pregnancy
4. past history of PID
5. history of coagulation disorder

Examination

1. Check vital sign
2. Examine the abdomen for softness, tenderness, rebound tenderness
3. Speculum to examine any sign of injury, source of bleeding, any abnormality in the cervix or bleeding from uterus

Abortion

Lower abdominal pain, Open cervix with vaginal bleeding, and product of conception.

Pregnancy

+/- Lower abdominal pain, closed cervix with minimal vaginal bleeding

Local cause

vaginal or cervical cause

I.Initial assessment

History

- **Gestational Age:** Confirm the last menstrual period (LMP).
- **Bleeding Characteristics:** Onset, amount, colour (bright red, dark), and presence of clots.
- **Associated Symptoms:** Abdominal pain, dizziness, or syncope, which may indicate more serious conditions like ectopic pregnancy or hemodynamic instability.
- **Obstetric History:** Prior pregnancies, miscarriages, ectopic pregnancies, or molar pregnancies.
- **Gynaecological History:** History of infections, trauma, or surgeries.

Physical Examination

- **Vitals:** Check blood pressure for hypotension or tachycardia, which may indicate hemorrhagic shock.
- **Abdominal Examination:** Assess for tenderness or guarding.
- **Pelvic Examination:**
 - Inspect for cervical dilation or lesions.
 - Assess the source of bleeding (cervix or vagina).
 - Check for cervical motion tenderness, which can suggest ectopic pregnancy

II.Differential Diagnosis

1.pregnancy

a. normal pregnancy implantation marks due to invasion of trophoblastic tissue in the endometrium.

b. Molar Pregnancy (Gestational Trophoblastic Disease): partial or complete molar pregnancy can present with, vaginal bleeding, hyperemesis gravidarum, and an unusually high hCG level

c. Ectopic Pregnancy: vaginal bleeding with pregnancy located outside the uterus, associated with pelvic pain.

2.abortion

a. Threatened Abortion: Vaginal bleeding with a closed cervix and a viable intrauterine pregnancy on ultrasound.

b. Inevitable or Incomplete Abortion: Bleeding with an open cervix and tissue in the cervix or uterus.

c. Complete Abortion: History of confirmed pregnancy with bleeding, but ultrasound shows an empty uterus.

d. missed abortion: it is an early pregnancy loss where the embryo or fetus dies, but the body does not expel it yet .

3.local causes

Cervical or Vaginal Lesions/Infections: Bleeding from a non-pregnancy-related source, such as polyps, infections, or trauma.

III.Diagnosis and Management

Blood test

1.Quantitative β -hCG Levels:

* **BHCG <1500 IU** repeat after 48 hrs Levels should double every 48 hours in a healthy intrauterine pregnancy.

A failure of appropriate hCG rise, especially with an empty uterus, may suggest an ectopic pregnancy or failed pregnancy, missed abortion.

* **If BHCG >1500 IU** do TVS to confirm intrauterine gestational sac or embryo

* **If BHCG >1500 IU** do TVS if no gestational sac repeats HCG after 48 hrs
consider ectopic pregnancy

* **If BHCG if BHCG** plateau or decline, rather than rise do TVS if empty gestational sac (no embryo) or an embryo without cardiac activities
diagnosis of missed abortion

2.Complete Blood Count (CBC): Assess for anaemia if heavy bleeding is present.

3.Blood Type and Rh Factor: If the patient is Rh-negative, Rho(D) immune globulin should be administered to prevent isoimmunization.

Ultrasound:

Transvaginal Ultrasound (TVUS):

TVS is superior to Trans Abdominal Scan To assess fetal viability, location of pregnancy (intrauterine vs. ectopic), and presence of a gestational sac or embryo.

IV. Management

Management depends on the diagnosis and patient stability.

A. Threatened Abortion Management

- 1. Observation and Reassurance:** If the fetus is viable and there is no active bleeding, reassurance and follow-up
- 2. Progesterone Supplementation:** May be considered in women with documented low progesterone or recurrent pregnancy loss, no strong evidence
- 3. General measures** abstaining from intercourse or heavy physical activity, no supportive evidence

B. Inevitable or Incomplete Abortion

Management depends on the availability of medication

- **Medical Management:** Misoprostol (prostaglandin E1) if available FIGO protocol
- **Surgical Management:** Dilation and curettage (D&C) if there are excessive bleeding or failure of medical management.
- **Expectant Management:** In select cases, observation may be appropriate, allowing spontaneous expulsion of tissue.

C. Complete Abortion

Typically requires no further treatment if bleeding is minimal and there are no retained products of conception. Follow-up β -hCG levels should return to non-pregnant levels.

D. Missed Abortion

Women should be counseled regarding the different modality of management according to her situation

- 1. Expectant Management** follow up the patient after two weeks keep in mind Prolonged waiting may increase the risk of infection or heavy bleeding.

2. Medical Management

Medications: Misoprostol (a prostaglandin) is used follow up the FIGO protocol

Follow-Up: Patients should have a follow-up ultrasound or exam to confirm complete passage of the pregnancy tissue.

3. Surgical Management

Dilation and Curettage (D&C)

Indications:

1. preference of the patient
2. patient with heavy bleeding
3. suspected septic abortion infection
4. if other management options have failed

FIGO guidelines

Gestational Age	Regimen	Dosage & Route	Repeat Dose	Remarks
Up to 12 weeks (1st trimester)	Mifepristone + Misoprostol (<i>Preferred</i>)	Mifepristone 200 mg orally, followed 24–48h later by Misoprostol 800 mcg vaginally, sublingually, or buccally	1 repeat dose (400–800 mcg) after 3 hours if needed	High efficacy (>95%)
	Misoprostol alone	800 mcg vaginally, sublingually, or buccally every 3 hours	Up to 3 doses	Lower efficacy than combination
13–24 weeks (2nd trimester)	Mifepristone + Misoprostol	Mifepristone 200 mg orally, followed 36–48h later by Misoprostol 400 mcg vaginally/sublingually every 3 hours	Until expulsion	Monitor closely for bleeding
	Misoprostol alone	400 mcg vaginally/sublingually every 3 hours	Up to 5 doses or until expulsion	Use if mifepristone is unavailable
Intrauterine fetal death (IUFD)	Misoprostol alone	400 mcg vaginally/sublingually every 4–6 hours	Repeat until expulsion	Can be used in all trimesters

Clinical Considerations

1. Always confirm **intrauterine pregnancy** before initiating.
2. Ensure **informed consent** and **emergency support** are available.
3. **Pain management** (NSAIDs or opioids) and **antiemetics** should be provided.
4. Use **ultrasound** if needed to confirm completion or retained products.

E. Pregnancy of unknown location “ Ectopic Pregnancy”

- **Medical Treatment:** Methotrexate is the first-line treatment for hemodynamically stable patients with an unruptured ectopic pregnancy and no contraindications.
- **See chapter 5**
- **Surgical Treatment:** Laparoscopic VS laparotomy for (salpingostomy or salpingectomy) is indicated for patients with hemodynamic instability, large ectopic masses, or ruptured ectopic pregnancy , choose of laparoscopy vs laparotomy should be individualize according to the patient situation and stability and experience of surgeon .
- **Expectant Management:** In select cases of very early ectopic pregnancy with falling β -hCG levels, expectant management may be considered.

F. Molar Pregnancy

Surgical Evacuation: Suction curettage is the primary treatment for molar pregnancy.

Follow-up hCG Levels: Monitor β -hCG levels to detect persistent gestational trophoblastic disease, which may require chemotherapy.

V. Rh Immunoglobulin Administration

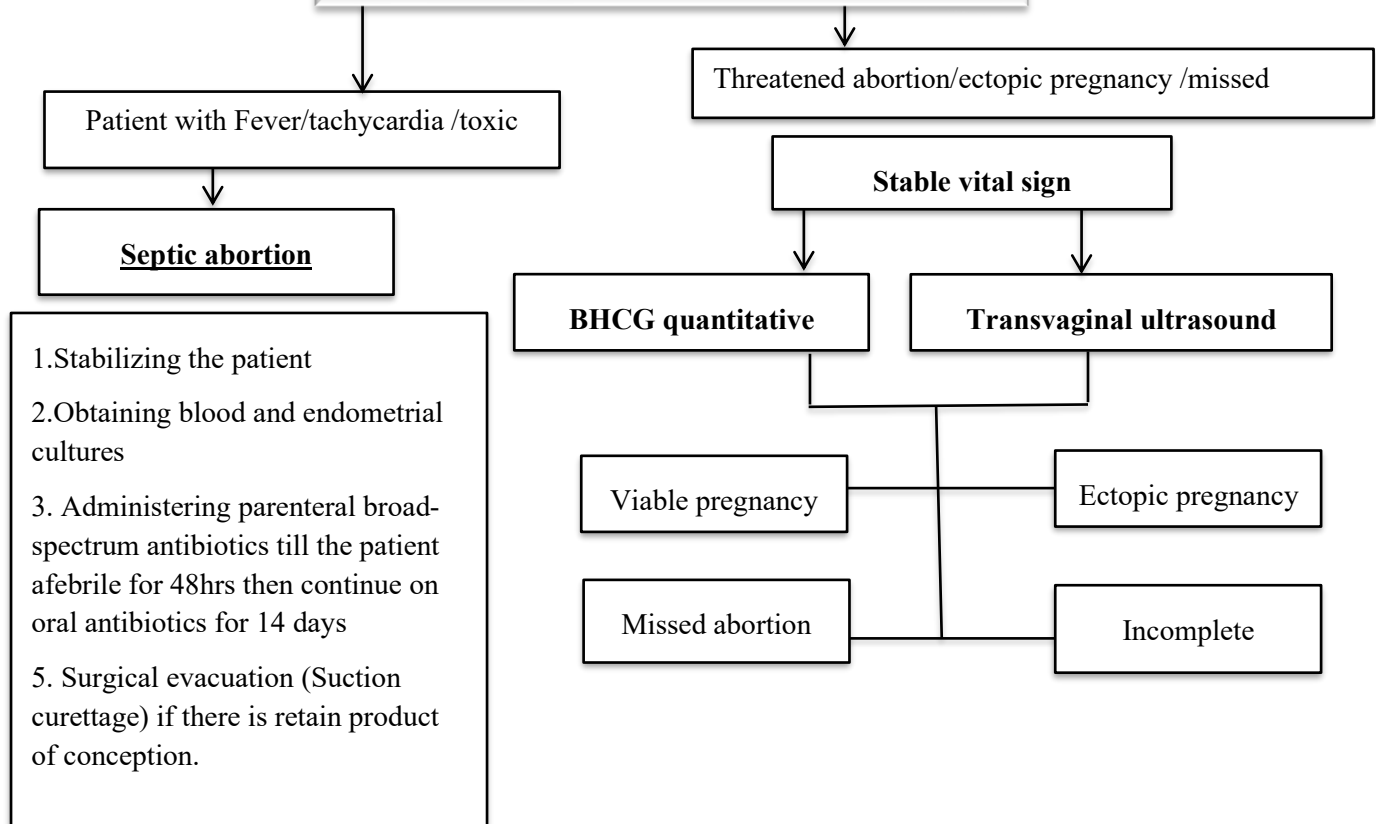
In cases of vaginal bleeding in Rh-negative women, Rho(D) immune globulin should be administered within 72 hours to prevent isoimmunization.

VI. Patient Education and Follow-up

1. Provide clear guidance on signs of complications, such as heavy bleeding, severe pain, or fever.
2. Follow-up with ultrasound and β -hCG monitoring might be needed.
3. Counselling and provide psychological support

I.First trimester vaginal bleeding

Vaginal bleeding with positive pregnancy test



Indication for ultrasound in the presence of vaginal bleeding

Ultrasound in the presence of vaginal bleeding.

- 1. normal yolk sac
- 2. Fetal cardiac activity early in pregnancy.

Diagnose as

Normal pregnancy

- 1. $CRL \geq 7$ mm with no fetal heartbeat.
- 2. Gestational sac ≥ 25 mm with no embryo (blighted ovum).
- 3. No embryo with a yolk sac or no change in size after 7-10 days.
- 4. Absence of a visible embryo after 6 weeks from the last menstrual period.

Diagnose as

Missed abortion

1. Slow Fetal Heart Rate (FHR):

*FHR < 100 beats per minute (bpm) between 6-7 weeks of gestation is associated with an increased risk of miscarriage.

*FHR < 85 bpm is particularly predictive of poor outcomes and is strongly associated with pregnancy loss.

2. large Gestational Sac (GS) ≥ 25 mm without an embryo

3. Mean sac diameter of 13 mm with no yolk sac seen or an abnormal yolk sac may be large for gestational age, irregular, free floating in the gestational sac

4. **Small Gestational Sac (GS) in relation to Crown-Rump Length (CRL)** The difference between the mean sac size & crown-rump length (CRL) is less than 5 mm

5. A large subchorionic hematoma

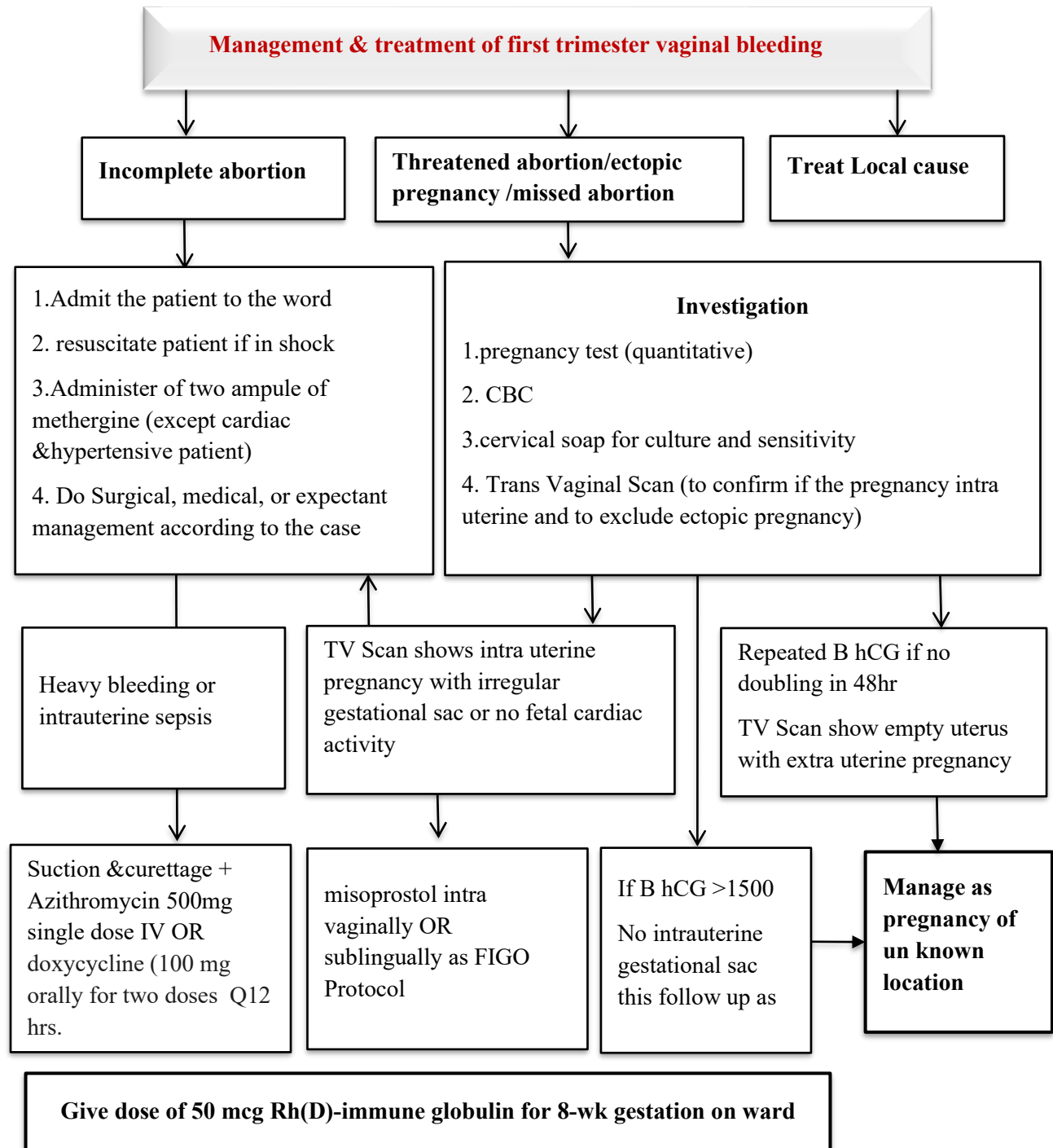
6. Lack of Growth of the Gestational Sac or Embryo

7. Irregularly shaped or collapsed gestational sac.

If initial findings are borderline or unclear, a repeat ultrasound in 7-10 days is often recommended

Diagnose as

Highly predict pregnancy loss



II. Septic abortion

refers to an abortion, whether spontaneous (miscarriage) or induced, that becomes complicated by infection. It is a life-threatening condition that requires prompt medical intervention. Septic abortion can lead to sepsis, septic shock, and even death if not managed properly.

Causes

- * Induced abortion in unsafe or non-medical settings.
- * Retained products of conception.
- * Intrauterine infections (e.g., chorioamnionitis).
- * Immunosuppression (e.g., HIV, diabetes).
- * Poor personal hygiene or lack of access to clean medical care.

Clinical Presentation

- * **Fever:** Often greater than 38°C (100.4°F).
- * **Abdominal pain** diffuses; tenderness on examination.
- * **Vaginal discharge:** Foul-smelling, often purulent or blood-stained discharge
- * **Heavy vaginal bleeding:** May be associated with retained tissue or uterine infection.
- * **Sepsis Symptoms:** Rapid heart rate (tachycardia), low blood pressure (hypotension), confusion, or signs of shock.
- * **Uterine tenderness:** On bimanual examination, the uterus may be enlarged, tender, and possibly filled with infected tissue.

Complications

- * Septic shock
- * Disseminated Intravascular Coagulation (DIC)
- * Pelvic abscess or peritonitis
- * Infertility
- * Multi-organ failure

Diagnosis

From clinical assessment

High suspicion is based on clinical signs such as fever, abdominal pain, and foul-smelling vaginal discharge in the setting of a recent miscarriage or abortion.

Laboratory Tests

1. Complete Blood Count (CBC): Elevated white blood cell (WBC) count indicates infection.
2. Procalcitonin
3. Blood cultures
4. Vaginal or cervical cultures
5. Coagulation profile: To assess for DIC.

Imaging

Transvaginal Ultrasound: To assess for retained products of conception, free fluid in the abdomen (suggesting abscess or peritonitis), or uterine abnormalities.

Septic Abortion Management

Septic abortion requiring immediate hospital admission {ICU} setting.

1. Stabilization of the Patient

- **Intravenous Fluids:** Aggressive fluid resuscitation to address dehydration, shock, or hypotension.
- **Monitoring:** Vital signs, urine output, and mental status should be continuously monitored.

2. Start broad-Spectrum Antibiotics

- **Empirical Antibiotics:** Should be started immediately by one of the following regimens
 - A. **Gentamicin** (an aminoglycoside) plus **Clindamycin** (a lincosamide) or **Ampicillin**.
 - B. **Piperacillin-tazobactam** or **ceftriaxone with metronidazole** can be used.

Adjust Antibiotics: Once culture and sensitivity results are available, antibiotic therapy should be adjusted accordingly.

3. Uterine Evacuation

- **Surgical Evacuation (Dilation and Curettage, D&C):** The uterus must be cleared of any retained products of conception to control the infection. Suction curettage or manual vacuum aspiration (MVA) is often performed 4–6 hours after starting antibiotics to allow them to take effect and reduce the risk of bacteremia/sepsis during the procedure.

Do NOT delay evacuation if:

The patient is worsening despite antibiotics, or There's suspected retained infected tissue or there's clinical evidence of uterine perforation or intra-abdominal spread which necessitate laparotomy .

4. hysterectomy

Patient Fail to respond to uterine evacuation and antibiotics, or development of pelvic abscess, and **clostridial necrotizing myonecrosis** (gas gangrene: crepitation of the pelvic tissue, and radiographic evidence of air within the uterine wall)

4. Management of Complications

Septic Shock: ICU admission Intensive care with vasopressors (e.g., norepinephrine) may be required if the patient develops septic shock.

Blood Transfusions: If severe anaemia or coagulopathy is present.

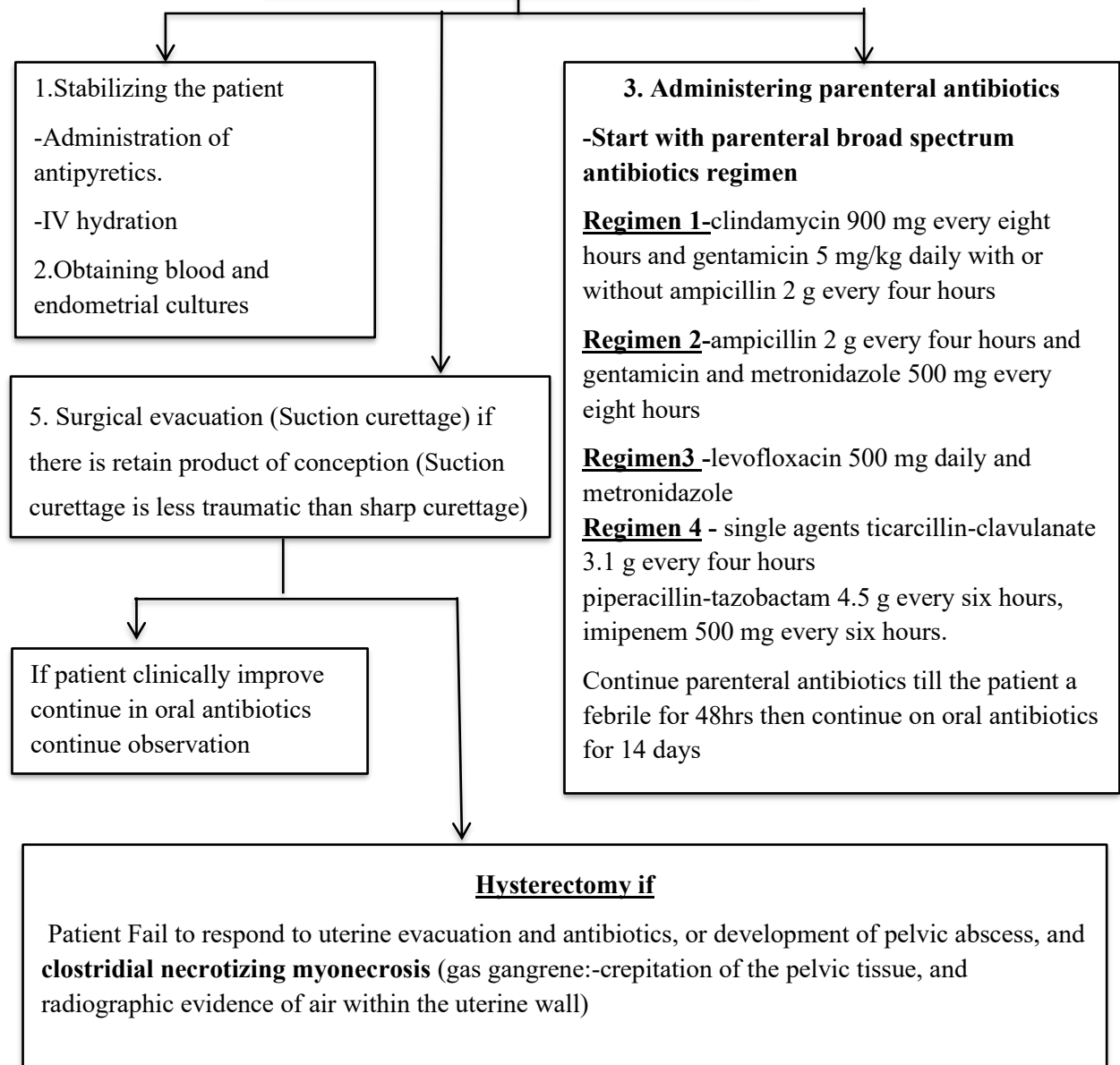
Surgical Drainage of Abscesses: If an abscess forms in the pelvis or abdomen, surgical drainage may be necessary.

5. Rh Immunoglobulin

- If the woman is **Rh-negative**, Rho(D) immune globulin should be administered after uterine evacuation to prevent Rh sensitization.

Septic abortion management

Septic abortion management



Summery

First trimester vaginal bleeding can vary in severity, from benign to life-threatening conditions. Management starts with thorough initial assessment, including history and physical exams, to identify potential causes like threatened abortion, ectopic pregnancy, or cervical lesions. Diagnosis often involves blood tests, ultrasound, and monitoring of β -hCG levels to confirm the type of abortion or pregnancy-related issues. Treatments depend on the specific diagnosis, ranging from observation and progesterone supplementation to surgical intervention like D&C. Septic abortion, a serious complication, requires immediate stabilization, antibiotics, and possible surgical evacuation to manage infection and prevent further complications.

References

1. National Institute for Health and Care Excellence (NICE).

Ectopic pregnancy and miscarriage: diagnosis and initial management. NICE Guideline NG126. Published April 2019. Updated August 2023.

2. BMJ Best Practice.

Molar pregnancy: symptoms, diagnosis, and treatment. Updated 2024; reviewed 2025. Available from: <https://bestpractice.bmj.com>

3. Braga A, Uberti EM, Maestá I.

Diagnosis and management of molar pregnancies. *Hematol Oncol Clin North Am.* 2024;38(2):205–218. doi:10.1016/j.hoc.2023.10.004

4. Elawad M, Gupta R, Fakokunde A, Raju KS.

Scar ectopic pregnancy: a case series and review of management options. *Case Rep Obstet Gynecol.* 2023;2023:8823067. doi:10.1155/2023/8823067

5. Jurkovic D, Hillaby K, Woelfer B, Lawrence A, Salim R, Elson CJ.

First-trimester diagnosis and management of pregnancies implanted into the lower uterine segment cesarean section scar. *Ultrasound Obstet Gynecol.* 2022;39(3):252–258. doi:10.1002/uog.10085

Chapter 5

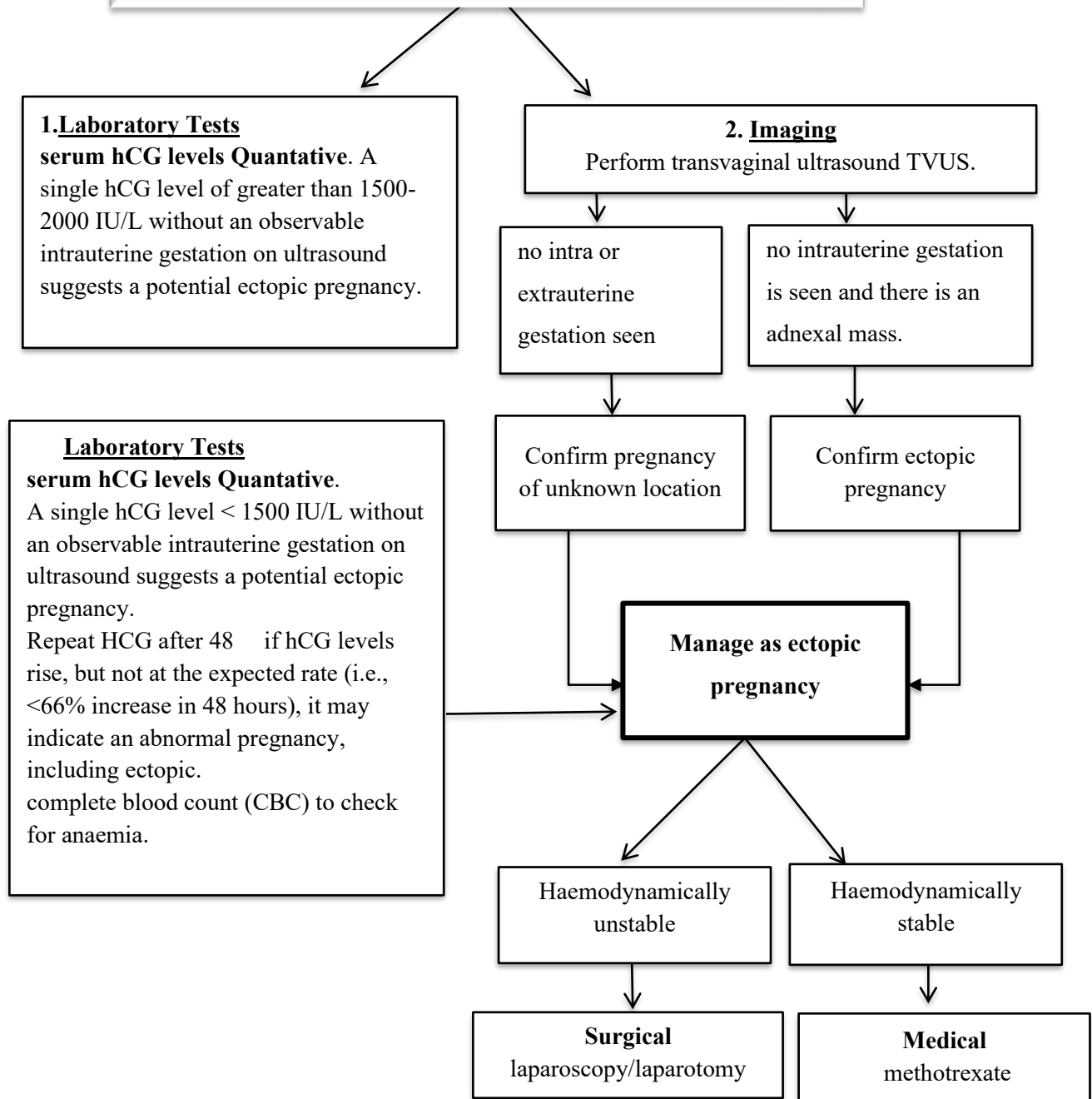
A Blossom Beyond the Garden's Reach

pregnancy of unknown location “Ectopic pregnancy “

Ectopic pregnancy occurs when a fertilized egg implants outside the uterine cavity, most commonly in the fallopian tube. It is a potentially life-threatening condition if not diagnosed and treated promptly. Patients may present with abdominal pain, vaginal bleeding, or signs of rupture such as hypotension. Risk factors include previous ectopic pregnancy, tubal surgery, or pelvic inflammatory disease. Early diagnosis through ultrasound and β -hCG testing is critical for optimal management.

Initial Assessment for suspected ectopic pregnancy

Obtain history of LMP and perform physical exam. Assess for symptoms: abdominal pain, vaginal bleeding, dizziness



Management of ectopic pregnancy

I.Expectant management is considered when the ectopic pregnancy appears to be resolving spontaneously.

Eligibility Criteria:

1. Hemodynamically stable
2. No signs of tubal rupture (no severe abdominal pain, no hemoperitoneum on ultrasound)
3. Minimal or no symptoms
4. β -hCG level is low and declining
 - Often $<1,000$ IU/L
 - Serial β -hCG must decline over 48–72 hours
5. No evidence of fetal cardiac activity
6. Patient compliant with close follow-up
 - Must return for serial β -hCG and ultrasound monitoring
7. Ectopic mass is small
 - Generally, <3 cm without significant free fluid

Success Rate of Expectant Management

- **70–80% success** in well-selected cases
- Highest success when:
 - β -hCG is **<200 IU/L**
 - hCG is **already declining**
 - Patient is **asymptomatic**

Contraindications to Expectant Management

- Hemodynamic instability
- Rising β -hCG levels
- Fetal cardiac activity present
- Significant symptoms or pain
- Large ectopic mass or free fluid (suggestive of rupture)

Follow-Up Includes:

- **Serial β -hCG every 48–72 hours** until it becomes undetectable
- **Repeat ultrasound** if symptoms wor

2.medical management of ectopic pregnancy

Criteria for methotrexate use in medical termination of ectopic pregnancy

Methotrexate is commonly used for the medical management of ectopic pregnancies under specific criteria

Dose & follow up of medical treatment of ectopic pregnancy

Single dose protocol : give **first** dose methotrexate 50 mg/m² Body Surface Area IM

- **Measure BHCG concentration day 4 & repeat day 7** from treatment Measure hCG concentration
If <15% hCG decline from day 4 to 7, give **second** dose of methotrexate 50 mg/m² IM
- If ≥15% hCG decline from day 4 to 7, draw hCG concentration weekly until hCG is undetectable
- **Measure hCG concentration day 14** If <15% hCG decline from day 7 to 14, give additional dose of methotrexate 50 mg/m² IM
- If ≥15% hCG decline from day 7 to 14, draw hCG concentration weekly until undetectable
- **Measure hCG concentration day 21** : If three doses have been given and there is a <15% hCG decline from day 14 to 21, proceed with surgical management

Criteria for medical treatment of ectopic pregnancy

- 1. Stable Patient:** no signs of significant internal bleeding.
- 2. Unruptured Ectopic Pregnancy:** transvaginal ultrasound exclude intra-abdominal fluid collection
- 3. hCG Levels :** Typically, hCG levels should be < **5000 IU**
- 4. Gestational Sac Size** The size of the ectopic mass should < **3.5 cm** in diameter. Larger masses may reduce the likelihood of successful medical management.
- 5. No Fetal Heart Activity:** confirm by ultrasound
- 6. Absence of Significant Comorbidities:** Patients should not have contraindications to methotrexate, such as liver disease, active peptic ulcer disease, or hypersensitivity to the drug.

Contraindication of methotrexate treatment

```
graph TD; A[Contraindication of methotrexate treatment] --> B[Absolute Contraindications]; A --> C[Relative Contraindications];
```

Absolute Contraindications

1. Hemodynamic instability Suggests rupture or internal bleeding.
2. Evidence of rupture of ectopic pregnancy
3. Intrauterine pregnancy (confirmed viable pregnancy in the uterus)
4. Breastfeeding
5. Immunodeficiency disorders
6. Severe liver disease (e.g., hepatitis, cirrhosis)
7. Severe renal disease
8. Blood dyscrasias (e.g., anemia, leukopenia, thrombocytopenia)
9. Active pulmonary disease
10. Peptic ulcer disease
11. Sensitivity or allergy to methotrexate

Relative Contraindications

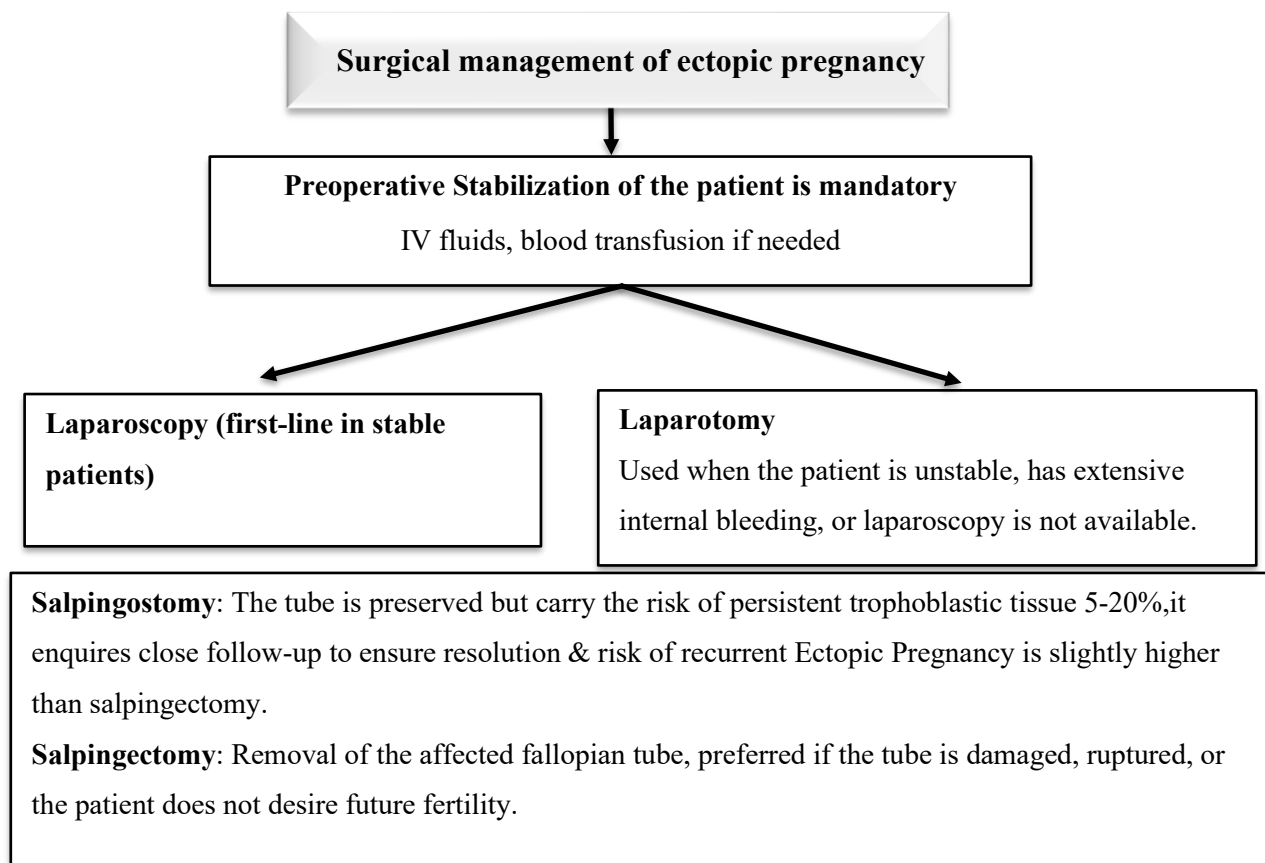
1. Ectopic mass >3.5–4 cm
2. Fetal cardiac activity present
3. High β -hCG level (>5,000–15,000 IU/L; thresholds vary slightly by protocol)
4. Patient non-compliance or inability to follow up (important for monitoring)

Surgical Management of Ectopic Pregnancy

Indicated for Surgical treatment

1. The patient is hemodynamically unstable
2. There is evidence of rupture **ectopic** pregnancy
3. Contraindications to medical treatment exist (e.g., ectopic mass >5 cm, fetal cardiac activity, high β -hCG)
4. Failed medical management

Surgical management of ectopic pregnancy



Cesarean Scar Ectopic Pregnancy

Definition: Implantation of a gestational sac in the myometrial tissue at the site of a previous cesarean section scar.

Clinical Presentation

Vaginal bleeding (often painless, first trimester)

Pelvic pain (variable)

Asymptomatic — incidental finding on early scan

Signs of rupture in severe cases: hypotension, acute abdomen

Diagnosis Cesarean Scar Ectopic Pregnancy

A. Imaging (First-Line)

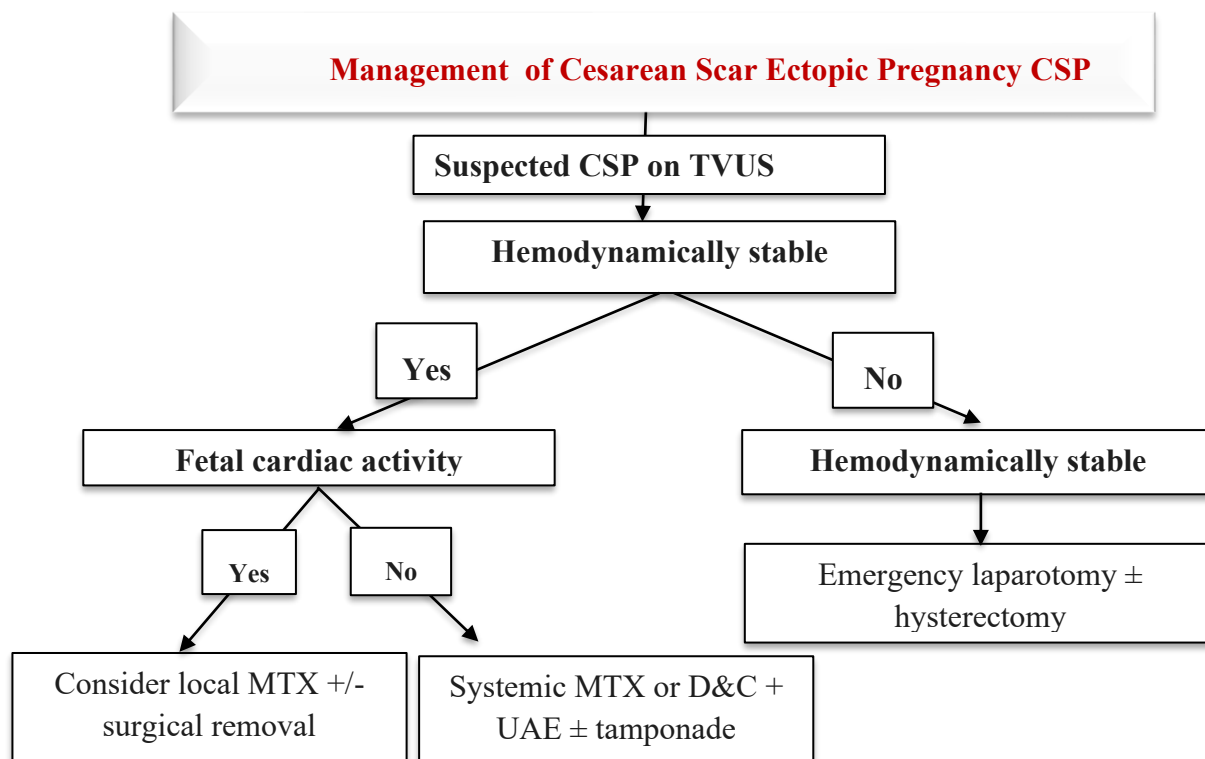
Transvaginal Ultrasound (TVUS) with Doppler:

Empty uterine cavity and cervical canal

Gestational sac embedded in the anterior uterine wall at the level of the internal os

Thin or absent myometrium between the sac and bladder

High peri trophoblastic flow on color Doppler (“ring of fire”)



Summary

Management of ectopic pregnancy includes early diagnosis through ultrasound and hCG testing. Treatment options are medical (methotrexate) for stable patients or surgical (laparoscopy/laparotomy) for unstable cases or ruptured ectopic. Monitoring hCG levels post-treatment ensures resolution. Prompt management reduces risk of complications and preserves fertility.

Referrals

. National Institute for Health and Care Excellence (NICE).

Ectopic pregnancy and miscarriage: diagnosis and initial management. NICE Guideline NG126. Published 17 April 2019. Last updated 23 August 2023.

2. Fu L, Liu X, Tian Z, Du Z, Wang X, Wang X, Li X, Xu T, Sun Z.

Risk factors for methotrexate treatment failure in tubal ectopic pregnancy: a retrospective cohort study. *BMC Pregnancy and Childbirth.* Published 31 December 2024.

3. Xiao C, Shi Q, Cheng Q, Xu J.

Non-surgical management of tubal ectopic pregnancy: a systematic review and meta-analysis. *Medicine (Baltimore).* 2021 Dec 17;100(50):e27851. doi:10.1097/MD.00000000000027851.

4. Al Wattar BH, Solangon SA, de Braud LV, Rogozińska E, Jurkovic D.

Effectiveness of treatment options for tubal ectopic pregnancy: a systematic review and network meta-analysis. *BJOG.* 2024 Jan;131(1):5–14. Epub 2023 Jul 13. doi:10.1111/1471-0528.17594.

Chapter 6

Twists in the Journey

Understanding Common Pregnancy abnormalities

Abnormal amniotic fluid volume (AFV) is an important indicator of various pregnancy complications and may also reflect their severity.

Amniotic Fluid volum

Reduce amniotic fluid can be due to pre-labor rupture of membranes, certain congenital anomalies (especially those affecting the gastrointestinal or urinary systems), placental insufficiency (including fetal growth restriction or post term dysmaturity), twin-twin transfusion syndrome, and aneuploidy (particularly trisomy 18). Abnormal AFV can negatively impact pregnancy outcomes, regardless of its underlying cause. This is because it increases the risks of umbilical cord compression or prolapse, fetal deformation, malpresentation, fetal demise, and postpartum uterine atony.

Method of measurement of Amniotic fluid volum

1.Amniotic Fluid Index (AFI)

- The **AFI** is a sum of the vertical measurements of the deepest amniotic fluid pocket in each of the four quadrants of the uterus.
 - **Normal:** 5-25 cm
 - **Oligohydramnios** (low fluid): $AFI < 5$ cm
 - **Polyhydramnios** (high fluid): $AFI > 25$ cm

2.Maximum Vertical Pocket (MVP)

- The **MVP** is a single vertical measurement of the largest pocket of amniotic fluid, which does not contain any fetal parts or umbilical cord.

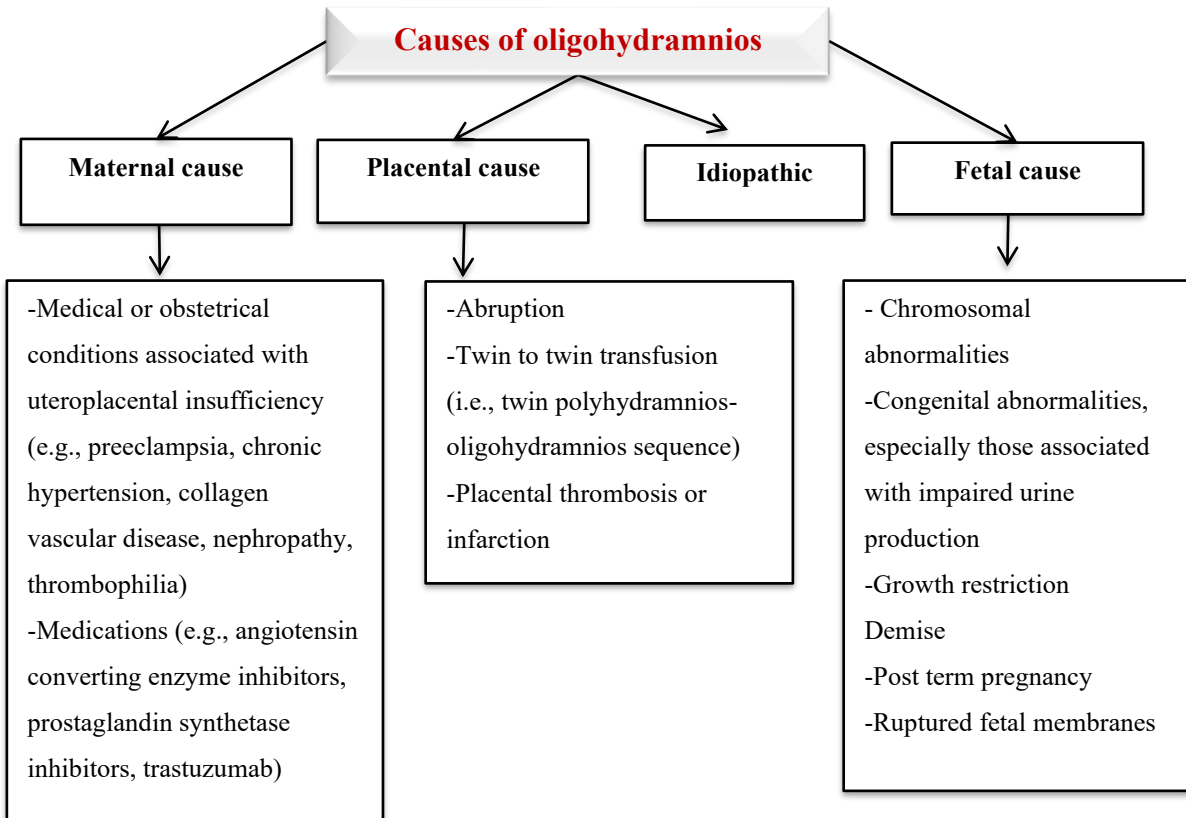
The SDP overly diagnoses poly-hydramnios, while the AFI overly diagnoses oligo-hydramnios

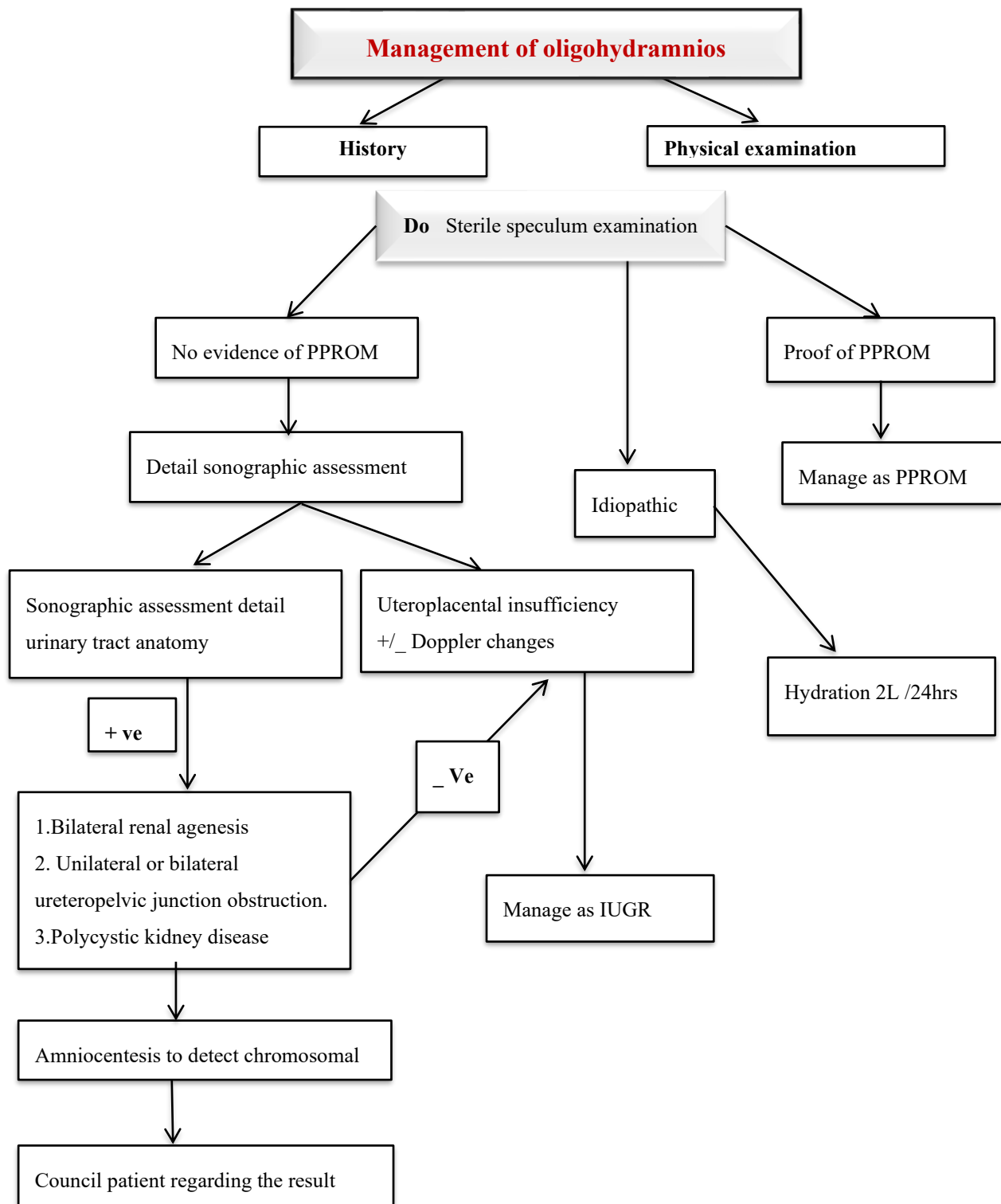
I.Normal amniotic fluid volum

Ultrasound is commonly used to assess amniotic fluid levels, often measuring the amniotic fluid index (AFI) or the maximum vertical pocket (MVP).

II.Oligohydramnios

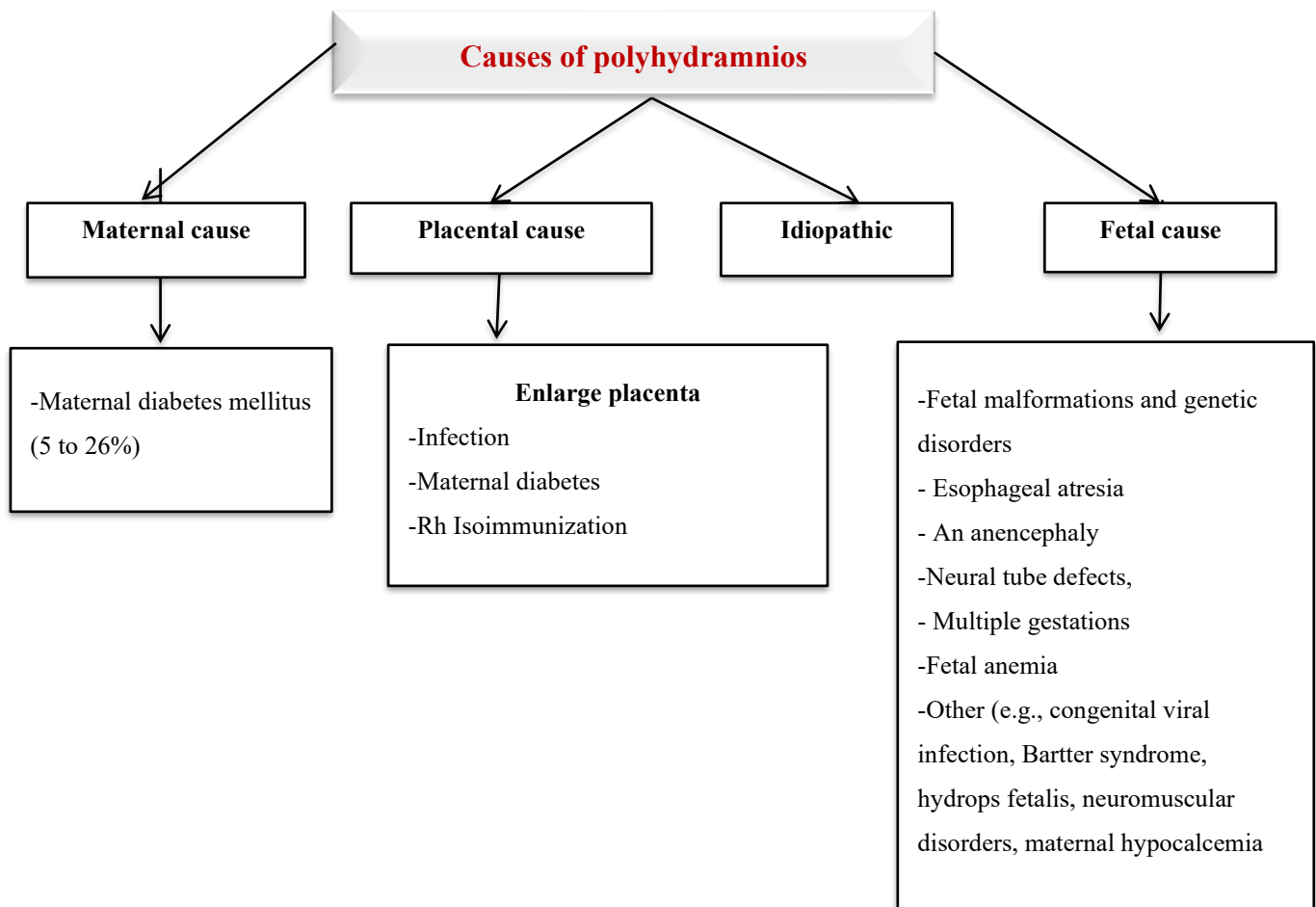
Oligohydramnios Define as AFI < 5cm maximum vertical pocket (MVP)<1cm

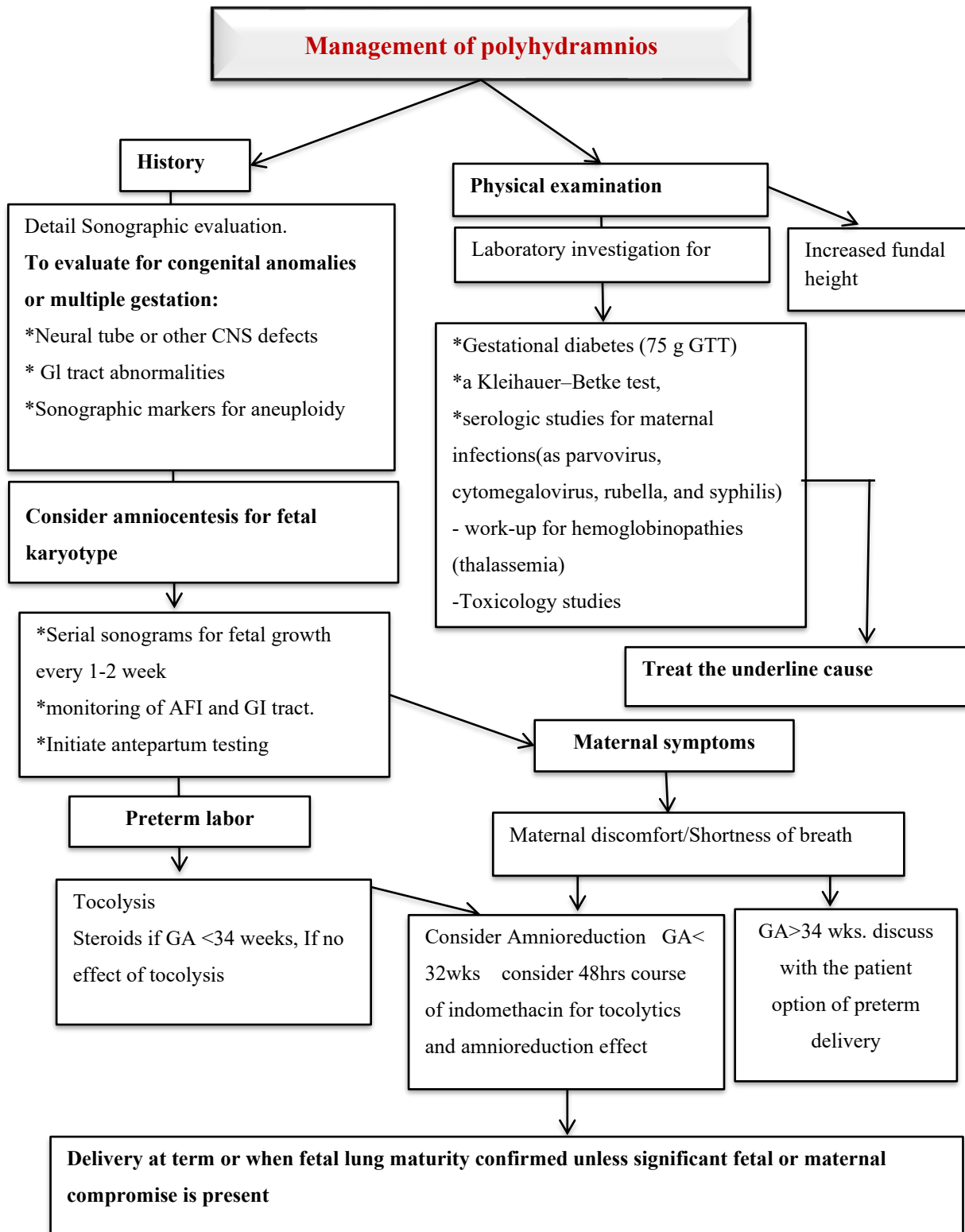




III. Polyhydramnios

Define by AFI > 25cm SVP <8cm





Summery

Abnormal amniotic fluid volume (AFV) can indicate pregnancy complications like prelabor rupture of membranes, congenital anomalies, placental insufficiency, twin-twin transfusion syndrome, and aneuploidy, all of which may worsen pregnancy outcomes. AFV is measured using the Amniotic Fluid Index (AFI) or Maximum Vertical Pocket (MVP), with normal AFI being 5-25 cm.

Oligohydramnios is defined as an AFI < 5 cm or MVP < 1 cm, while polyhydramnios is when AFI > 25 cm. Both conditions require careful management to prevent complications such as umbilical cord compression and fetal malpresentation.

Referrals chapter 6

1. Northern England Clinical Guideline.

Polyhydramnios management guideline. NENC LMNS. Published May 2025. Defines polyhydramnios via single deepest vertical pocket (DVP) and recommends DVP over AFI for reducing unnecessary interventions

2. Society for Maternal–Fetal Medicine (SMFM).

Dashe JS, Pressman EK, Hibbard JU; SMFM Consult Series #46. *Evaluation and management of polyhydramnios.* *Am J Obstet Gynecol.* 2018; suggests DVP ≥ 8 cm or AFI ≥ 24 cm defines polyhydramnios; recommends targeted investigation and management stratified by severity

3. Maternal hydration therapy meta-analysis (2025).

Rosemiarti et al. *Effect of oral hydration therapy on amniotic fluid index and maternal–neonatal outcomes in oligohydramnios: systematic review and meta-analysis.* *J Perinat Med.* 2025; shows significant AFI increases at 2 hr, 1 day, 2 days, and 1 week post hydration; supports oral hydration as first-line management in resource-limited settings

4. Shiferaw MA, Solomon A, Getachew S, Gudu W.

Maternal and perinatal outcomes of oligohydramnios in late- and post-term pregnancies: cross-sectional study. *BMC Women's Health.* 2024;24:113. Reports 12–30% prevalence post-41 weeks, 40.8% CS rate; suggests induction can be safe without continuous electronic monitoring .

Chapter 7

The Silent Struggle

Intra Uterine Growth Restriction

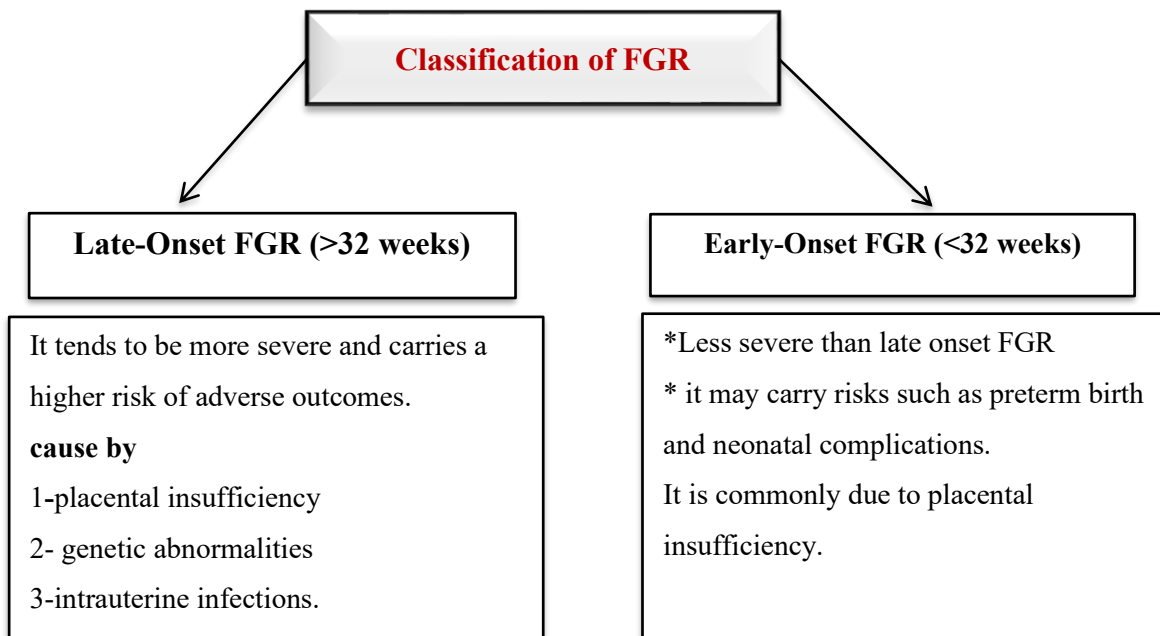
Fetal Growth Restriction (FGR)

is a condition where a fetus does not grow to its expected size in the womb, often due to placental insufficiency or maternal factors. It significantly increases

Definition of Fetal Growth Restriction (FGR)

Fetal growth restriction (FGR) as an estimated fetal weight (EFW) or abdominal circumference (AC) <10th percentile for gestational age.

Severe FGR is generally defined as an EFW or AC <3rd percentile for gestational age this is often measured by ultrasound assessments



preconceptional advice for patient with history of FGR

Optimizing Maternal Health Before Pregnancy

1.Controlling Chronic Conditions: Conditions such as hypertension, diabetes, or thyroid disorders should be well-controlled prior to pregnancy.

2.Nutrition: Ensure a balanced diet with adequate folic acid and essential nutrients

3.medication

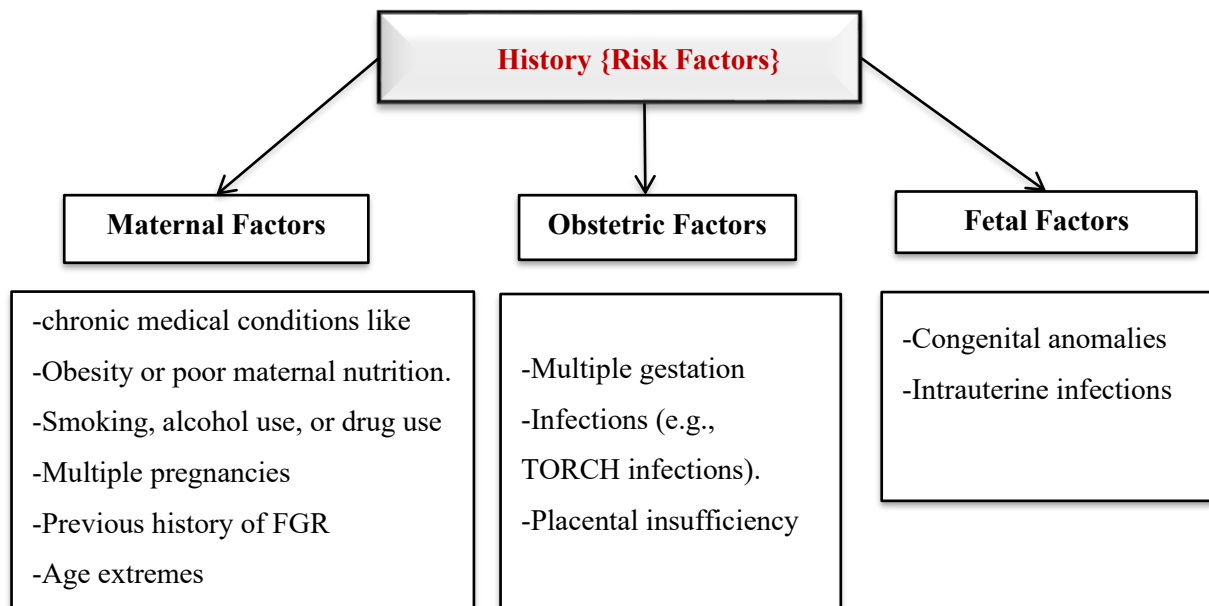
Asprin recommend aspirin 100 mg once /day from 10 week till 34-36 week of gestation

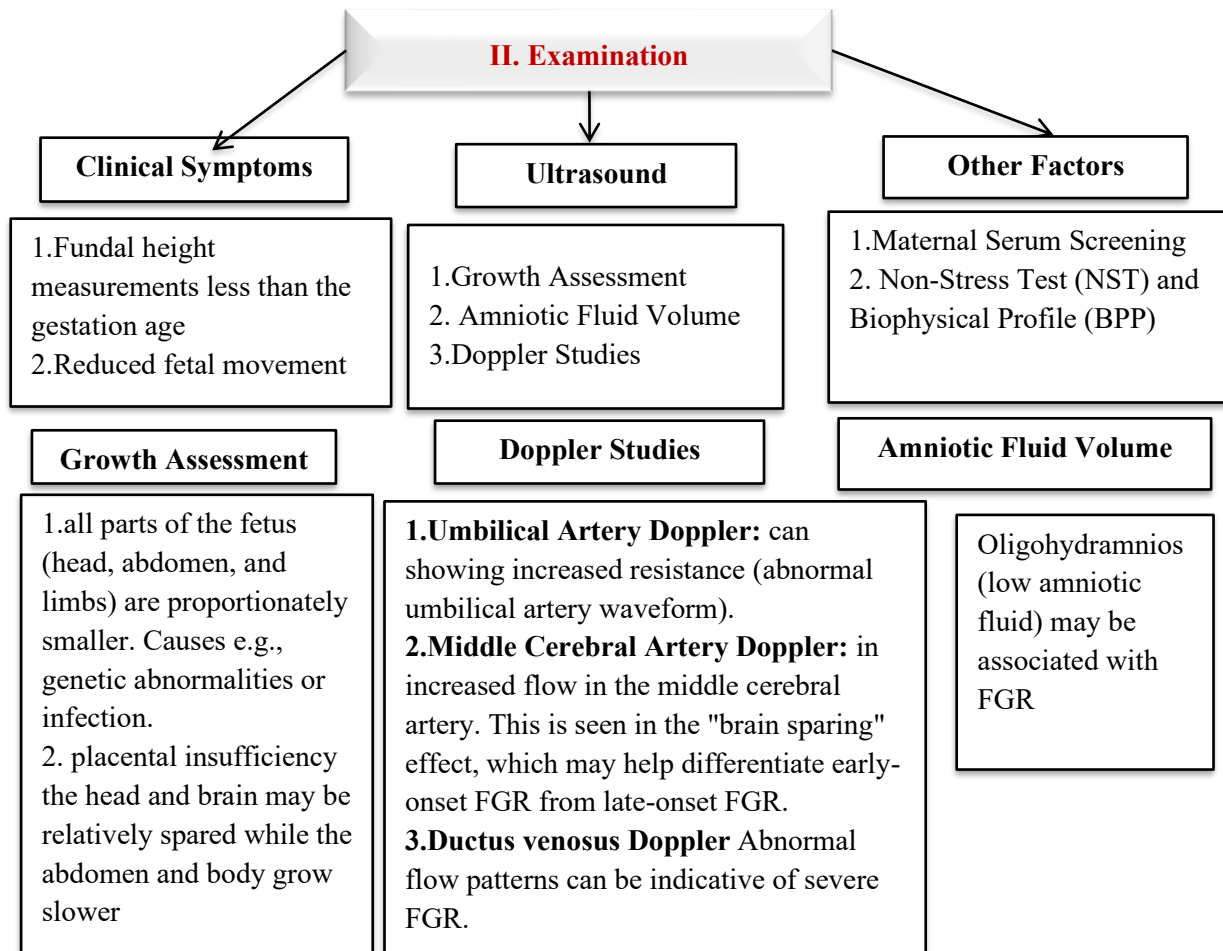
low molecular weight asprin individualize give if there is indication e.g thrombophilia

4.Lifestyle Modifications: Smoking cessation, weight management, and reducing alcohol intake are essential to improve pregnancy outcomes.

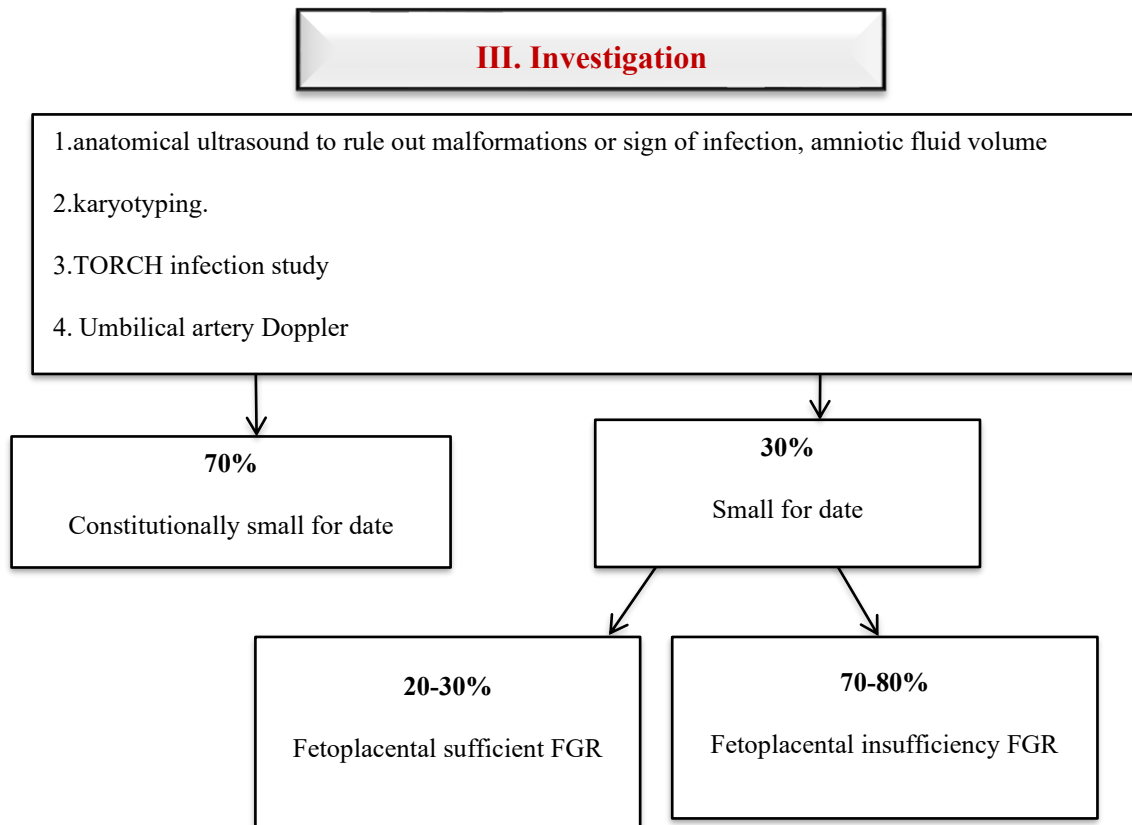
5.Monitoring During Future Pregnancies as high risk pregnancy

Clinical Assessment of FGR

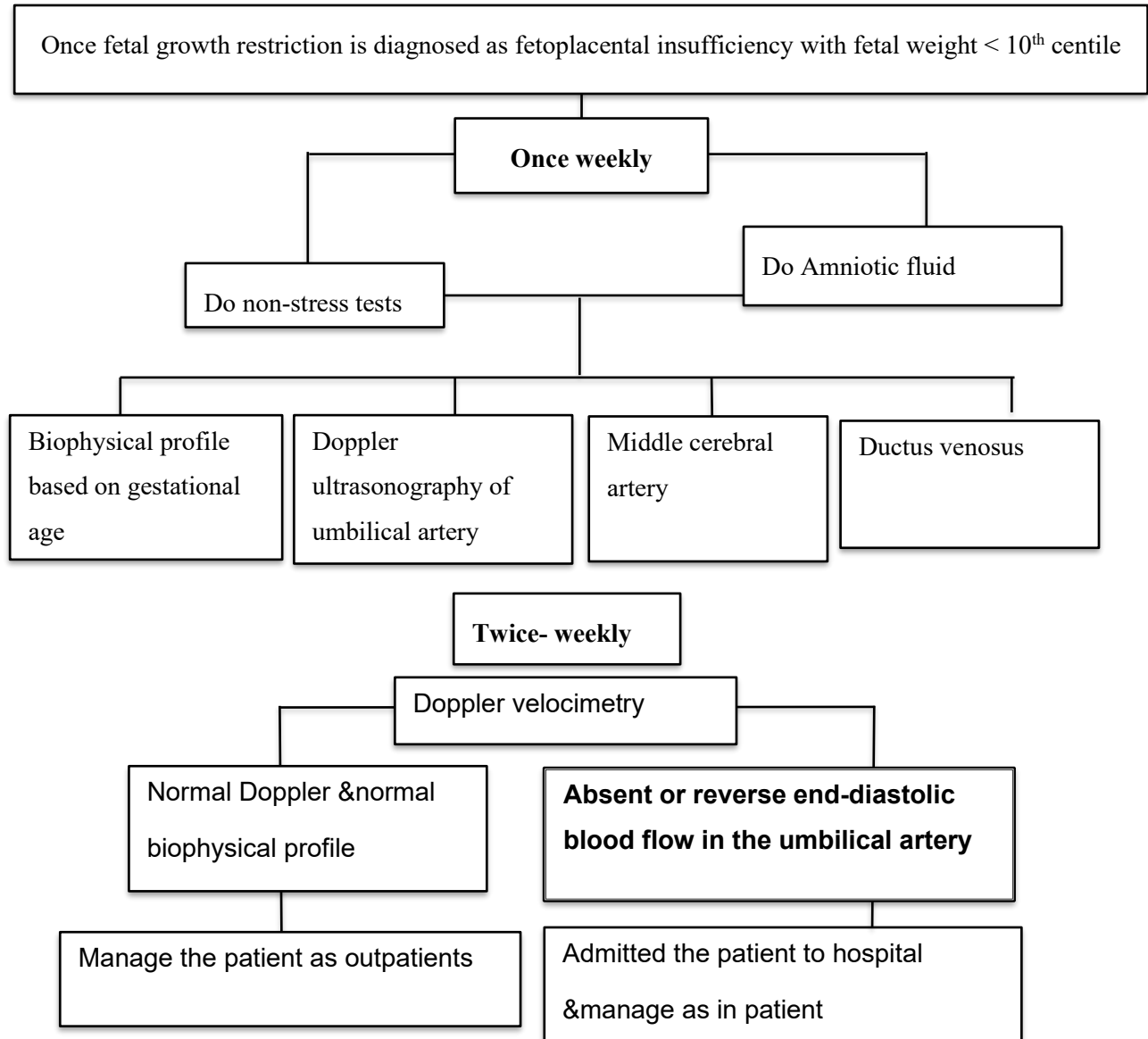




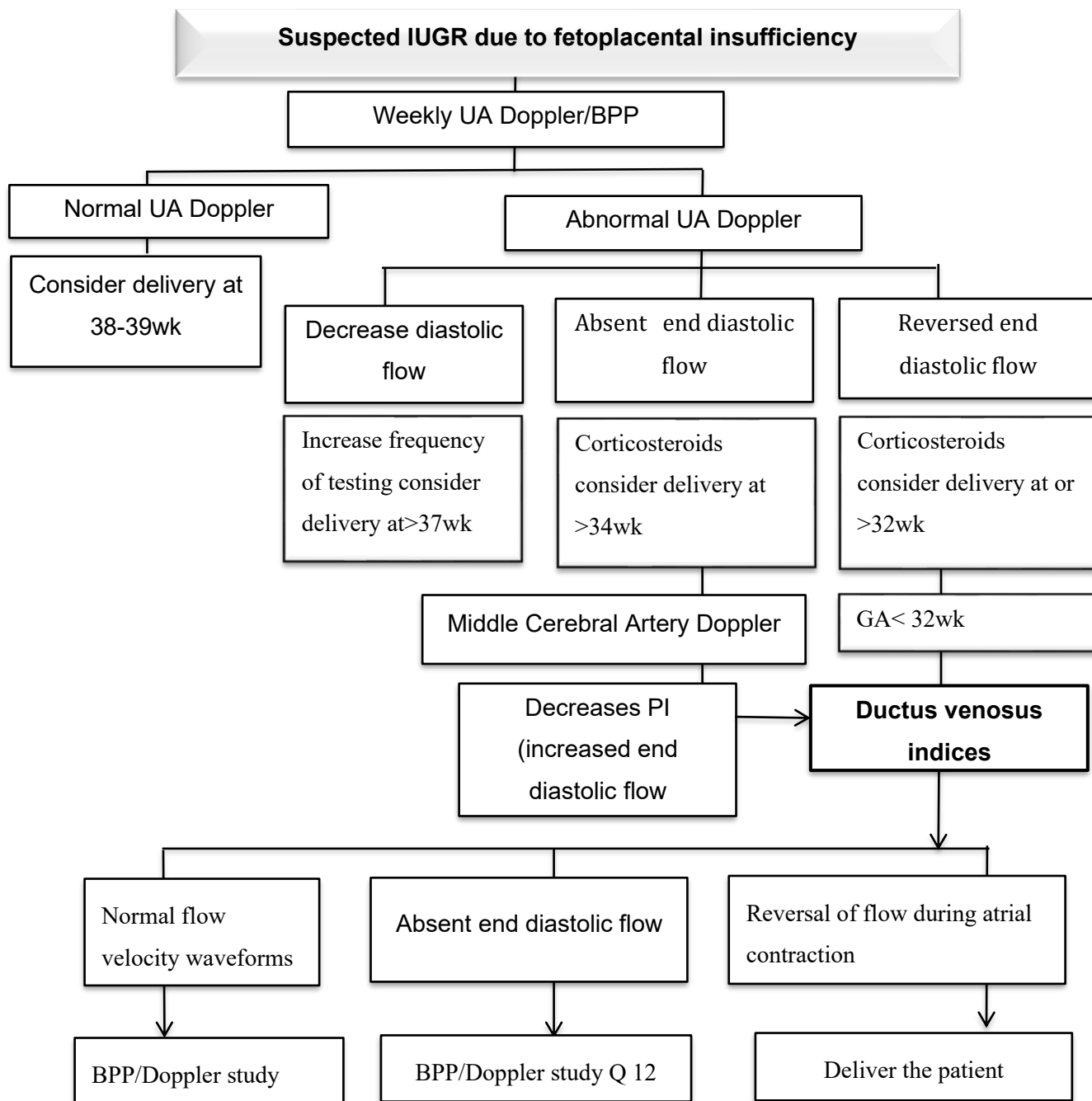
Causes of FGR : FGR can result from various factors, including placental insufficiency, maternal health conditions (like hypertension or diabetes), infections, nutritional deficiencies, or genetic factors



Fetoplacenta insufficiency



Management of FGR due to fetoplacental insufficiency



Summery

Fetal growth restriction (FGR) is defined as an estimated fetal weight (EFW) or abdominal circumference (AC) below the 10th percentile for gestational age, with severe FGR being below the 3rd percentile. Ultrasound assessments are commonly used to measure these parameters. Causes of FGR include placental insufficiency, maternal health conditions (hypertension, diabetes), infections, nutritional deficiencies, and genetic factors. Fetoplacental insufficiency is a primary cause of FGR. Management typically involves monitoring fetal well-being and may require early delivery depending on severity and gestational age.

References

- 1. Tsikouras, P., Antsaklis, P., Nikolettos, K., Kotanidou, S., Kritsotaki, N., Bothou, A., ... Nikolettos, N. (2024).**
Diagnosis, prevention, and management of fetal growth restriction (FGR). Journal of Personalized Medicine, 14(7), 698.
- 2. North East & North Cumbria LMNS Fetal Medicine Group. (2023, July).**
The management of fetal growth disorders: Including fetal growth restriction, small for gestational age & large for gestational age in the absence of maternal diabetes (Version 1.0). North East & North Cumbria Local Maternity and Neonatal System.
- 3. Royal College of Obstetricians and Gynaecologists. (2024, May 14).**
Small-for-gestational-age fetus and a growth-restricted fetus: Investigation and care (Green-top Guideline No. 31, 3rd ed.). RCOG
- 4. FERN Study Team. (2024, November).**
Diagnosis and management of selective fetal growth restriction in monochorionic twin pregnancies: A cross-sectional international survey. BJOG: An International Journal of Obstetrics and Gynaecology, 131(12), 1684–1693.
- 5. Society of Obstetricians and Gynaecologists of Canada. (2023).**
Guideline No. 442: Fetal growth restriction – Screening, diagnosis, and management. Journal of Obstetrics and Gynaecology Canada.

Chapter 8

Bound Together, Growing Apart

Management of multiple pregnancy

Multiple pregnancy

refers to the simultaneous gestation of more than one fetus in the uterus, most commonly twins, but may also include triplets or higher-order multiples. It can occur spontaneously or as a result of assisted reproductive technologies. Multiple pregnancies are classified based on chorionicity and amnionicity, which are key determinants of maternal and fetal risk. These pregnancies are associated with a higher incidence of obstetric complications, including miscarriage, preterm labor, hypertensive disorders, gestational diabetes, fetal growth restriction, and increased perinatal morbidity and mortality. Early and accurate diagnosis, determination of chorionicity, and coordinated antenatal care are essential for optimal maternal and fetal outcomes.

Diagnosis of multiple pregnancy

Sign & symptom

1. a. 1st Trimester Exaggerated pregnancy symptoms (e.g., hyperemesis).
- b. Detection of more than one fetal heart tone on auscultation.
- c. Elevated levels of beta-hCG or maternal serum alpha-fetoprotein (MSAFP)
- 2.a. 2nd trimester Fundal height larger than expected for gestational age
- b. multiple fetal part felt on examination

ultrasound finding

1. Transvaginal ultrasound in the 1st trimester.
2. Visualization of two or more gestational sacs, yolk sacs, or fetal poles with cardiac activity confirms multiple gestation.
3. Early ultrasound also allows for accurate determination of chorionicity and amnionicity, ideally performed between 11–14 weeks using the **lambda (twin peak) sign** for dichorionic twins or the **T-sign** for monochorionic twins.

Follow up plan for multiple gestation

The initial investigations and routine assessments in multiple pregnancy do not differ significantly from those conducted in singleton gestations but need to plan for **early glucose screening**.

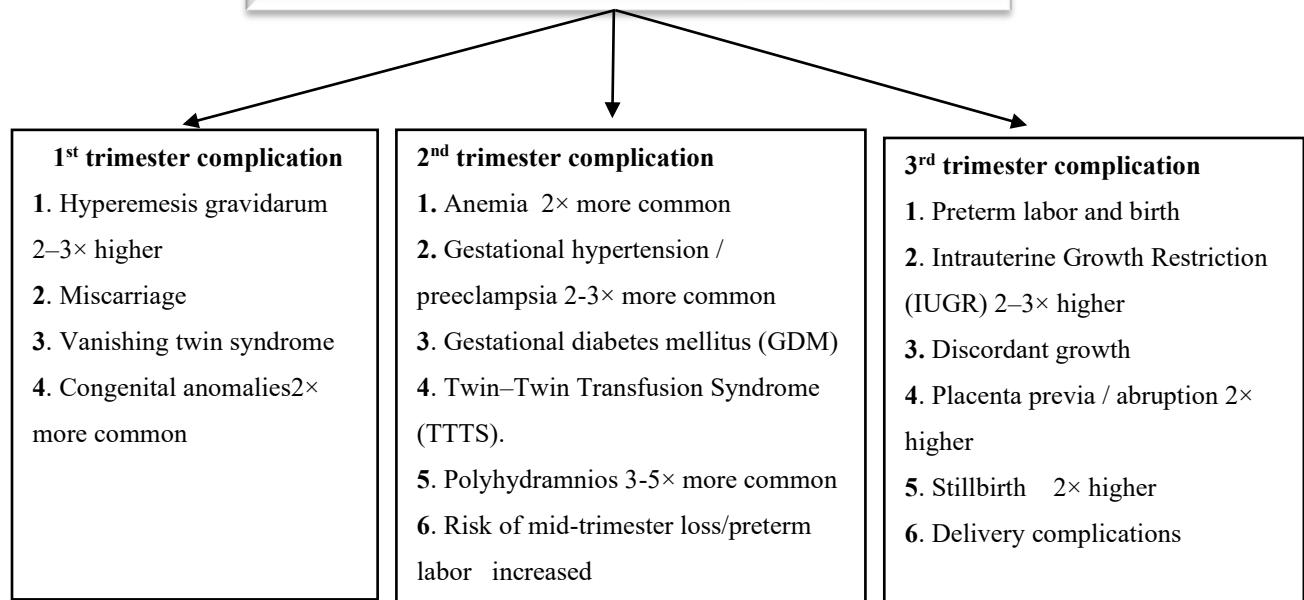
1. Confirmation of Diagnosis.
2. Detailed History and Examination.
3. Routine Baseline Investigations.
4. **Counselling and Education: About** increased risk of complications, need for more frequent monitoring diet, weight gain, iron and folic acid supplementation, warning signs to report.

Follow-Up Planning & Referral:

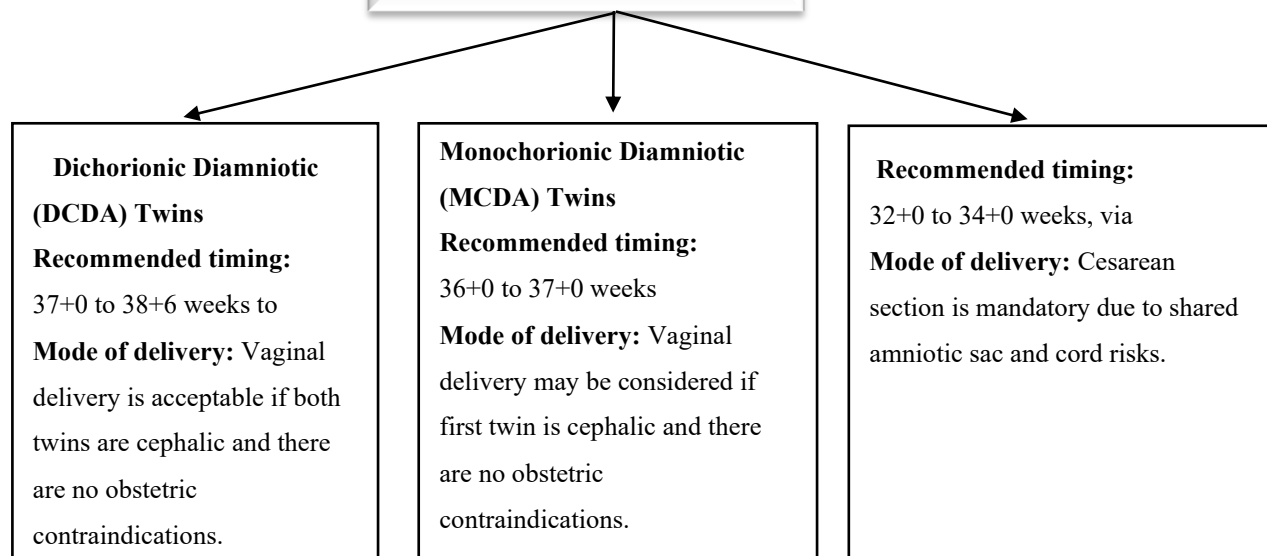
1. Schedule follow-up scans:
 - *Every 4 weeks for **dichorionic diamniotic (DCDA)** twins.
 - *Every 2 weeks from 16 weeks for **monochorionic diamniotic (MCDA)** twins to screen for **twin-twin transfusion syndrome (TTTS)**.
2. Refer to a **specialist obstetric clinic or maternal-fetal medicine unit**, especially for monochorionic twins.

Complication expected to occur in multiple gestation

Compared to single tone pregnancy



Timing & mode of delivery



Higher-Order Multiples (Triplets or More)

Recommended timing: Around 34–35 weeks

Mode of delivery: Usually planned cesarean section.

Summary

Management of multiple pregnancy involves early diagnosis and determination of chorionicity and amnionicity via first-trimester ultrasound. Antenatal care requires more frequent monitoring for maternal and fetal complications, such as preeclampsia, anemia, growth restriction, and preterm labor. Nutritional support with iron, folic acid, and adequate weight gain is essential. Serial ultrasounds are performed to assess fetal growth and amniotic fluid, especially in monochorionic twins. Delivery planning depends on chorionicity and fetal presentations, with timing adjusted to minimize risks. Referral to a high-risk obstetric unit is recommended for specialized monitoring and delivery.

References

1. **National Institute for Health and Care Excellence (NICE).** *Multiple pregnancy: antenatal care for twin and triplet pregnancies (NG137)*. London: NICE; 2019. Available from: <https://www.nice.org.uk/guidance/ng137>
2. **American College of Obstetricians and Gynecologists (ACOG).** *Practice Bulletin No. 169: Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies*. Obstet Gynecol. 2016;128(4):e131–e146.
3. **Royal College of Obstetricians and Gynaecologists (RCOG).** *Management of Monochorionic Twin Pregnancy (Green-top Guideline No. 51)*. London: RCOG; 2016.
5. Hack KE, Derks JB, Elias SG, et al. *Increased perinatal mortality and morbidity in monochorionic versus dichorionic twin pregnancies: systematic review and meta-analysis*. Am J Obstet Gynecol. 2008;198(4):388.e1–388.e10.
6. Blickstein I, Keith LG. *Multiple Pregnancy: Epidemiology, Gestation & Perinatal Outcome*. 2nd ed. Boca Raton: CRC Press; 2005.

Chapter 9

Shaking Up the Neighbourhood

Intrahepatic cholestasis of pregnan

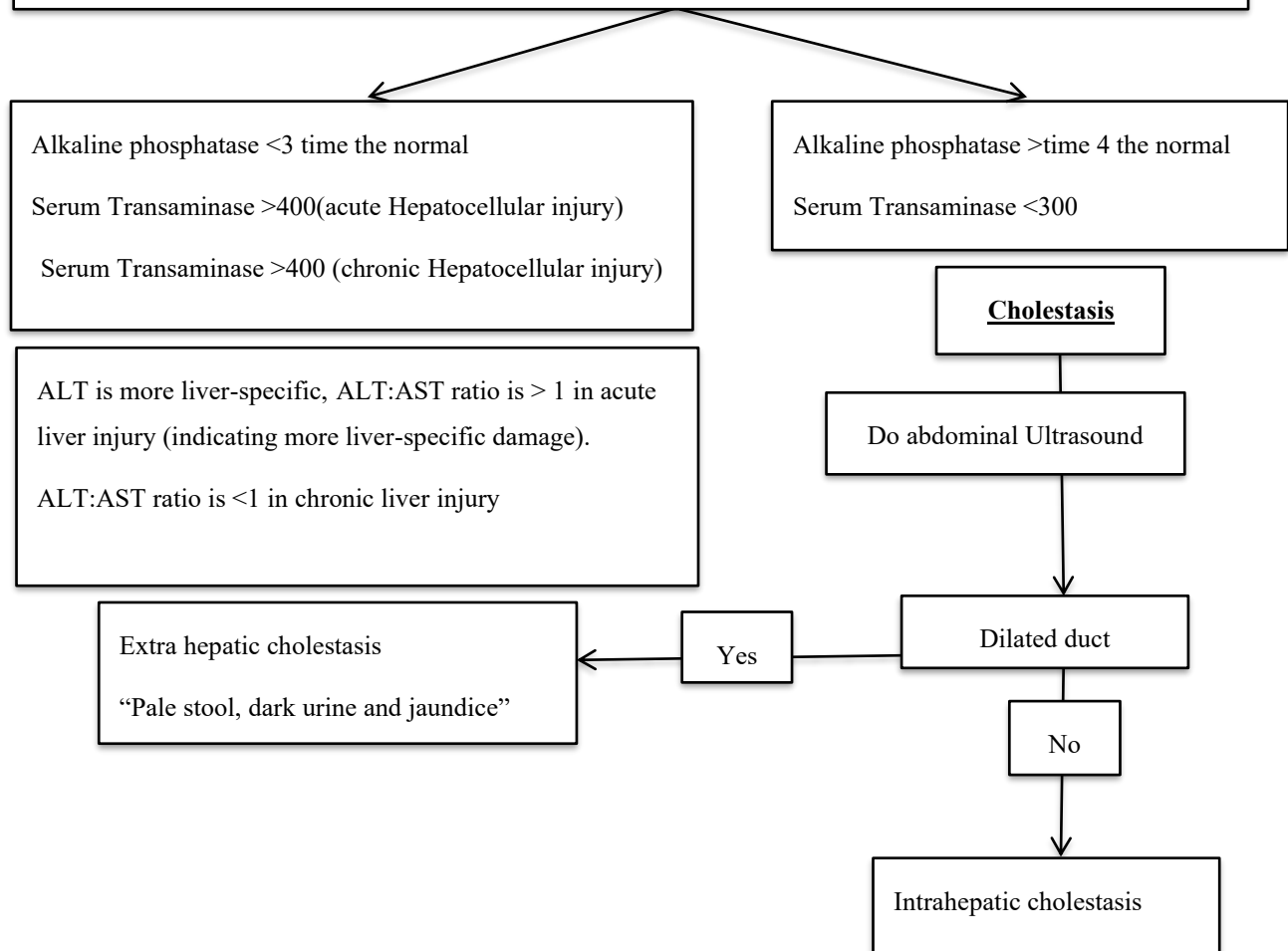
ICP

is a liver disorder that occurs during pregnancy, typically in the third trimester, characterized by impaired bile flow. It leads to a buildup of bile acids in the blood, causing intense itching (especially on the hands and feet) without

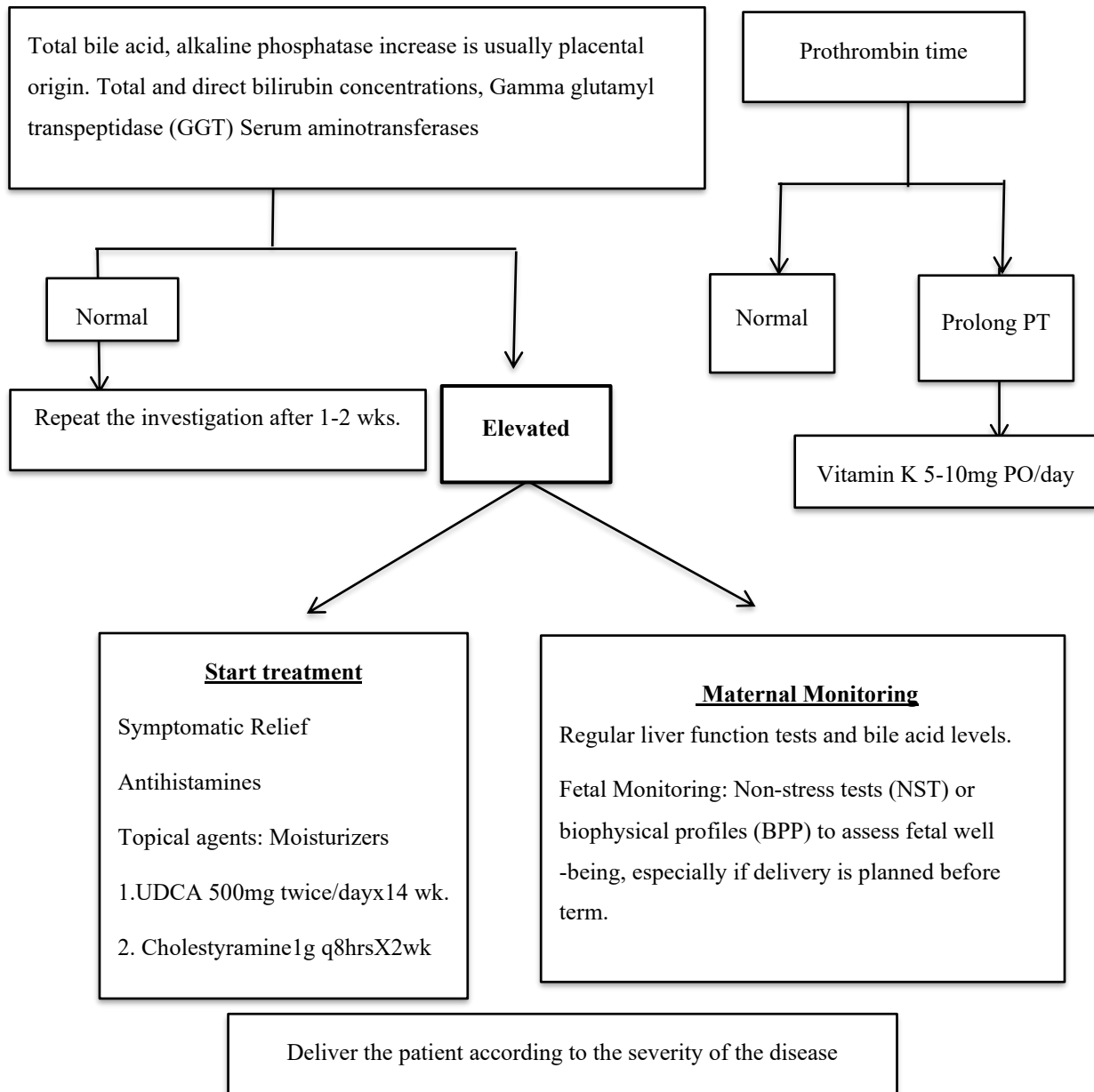
Management of Intrahepatic cholestasis of pregnancy

Patient complain of itching specifically in palm and sole with scratch sign

Do Total bile acid, alkaline phosphatase, total and direct bilirubin concentrations, gamma glutamyl transpeptidase (GGT), Serum aminotransferases, prothrombin time



Management of Intrahepatic cholestasis of pregnancy



Timing of Delivery

Timing of delivery depends on the severity of the disease, gestational age, and fetal status:

Timing of delivery of TIP patient

Mild ICP:

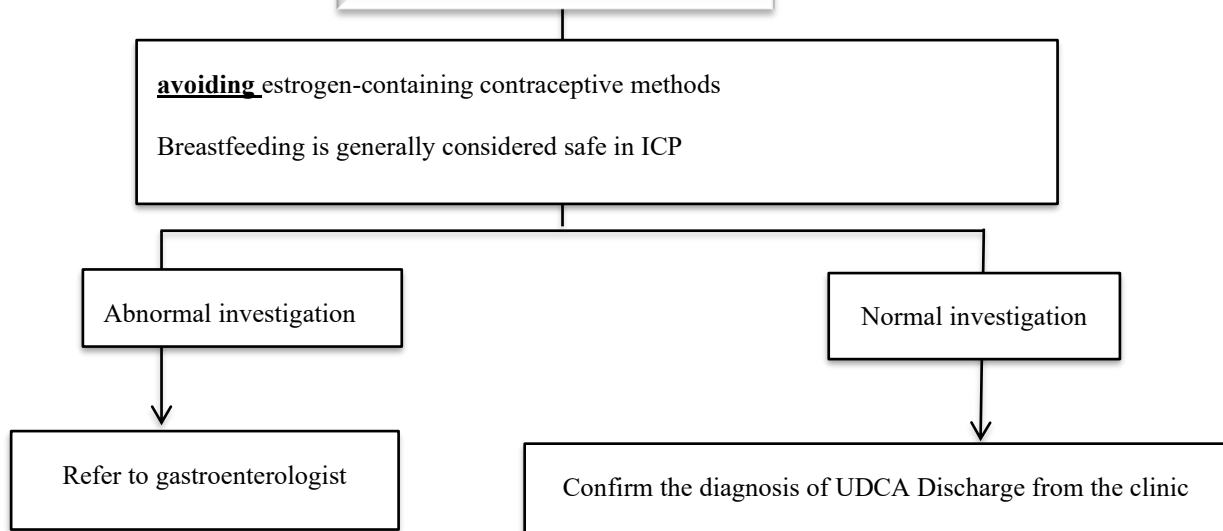
In cases of mild ICP with normal fetal monitoring and bile acids that are not excessively elevated, delivery may be planned at 37 weeks of gestation.

Severe ICP:

In severe cases, particularly when bile acid levels are significantly elevated ($>40 \mu\text{mol/L}$) or the fetus shows signs of distress, early delivery may be considered between 34-36 weeks to reduce the risk of stillbirth.

Post partum follow up of ICP

10 days post-partum



Summary

Management of Intrahepatic Cholestasis of Pregnancy (ICP) focuses on relieving symptoms and reducing fetal risks. Ursodeoxycholic acid is commonly used to lower bile acid levels and relieve itching. Regular monitoring of liver function tests and bile acid levels is essential. Fetal surveillance, including non-stress tests and ultrasounds, is often recommended. Early delivery, typically around 36–37 weeks, may be considered to prevent stillbirth.

References

1. Royal College of Obstetricians and Gynaecologists. (2022, August).

Intrahepatic cholestasis of pregnancy (Green-top Guideline No. 43, 3rd ed.). RCOG.

This guideline defines ICP—including bile acid thresholds for mild, moderate, and severe disease—and outlines diagnostic protocols and management strategies

2. Hague, W. M., & Society of Obstetric Medicine of Australia and New Zealand (SOMANZ) Fetal Medicine Group. (2023).

Intrahepatic cholestasis of pregnancy – Diagnosis and management: A consensus statement. Australian and New Zealand Journal of Obstetrics and Gynaecology, 63(5), 425–435.

Provides clear recommendations on bile acid thresholds ($\geq 19 \mu\text{mol/L}$), UDCA usage, antenatal surveillance, and delivery planning

3. Capatina, N., & Ovadia, C. (2024).

Meta-analyses in cholestatic pregnancy: The outstanding clinical questions. Therapeutic Advances in Gastroenterology, 17, 1753495X241251425.

Summarises meta-analytic evidence for UDCA improving perinatal outcomes—especially reducing spontaneous preterm birth in moderate/severe ICP—despite mixed results on pruritus relief.

4. Capatina, N., et al. (2025).

Global and regional incidence of intrahepatic cholestasis of pregnancy: a systematic review and meta-analysis. BMC Medicine, 23, 129.

Reports global ICP incidence (~2.9%), explores geographic and socioeconomic variability, and underscores its perinatal impact

5. Rigby, F. B., & Ramus, R. M. (2024, May).

Intrahepatic cholestasis of pregnancy workup: Laboratory studies and diagnosis. eMedicine.

Details diagnostic criteria (bile acids $>10\text{--}19 \mu\text{mol/L}$, liver function tests, exclusion of alternative causes), with practical clinical workflow guidance

Chapter 10

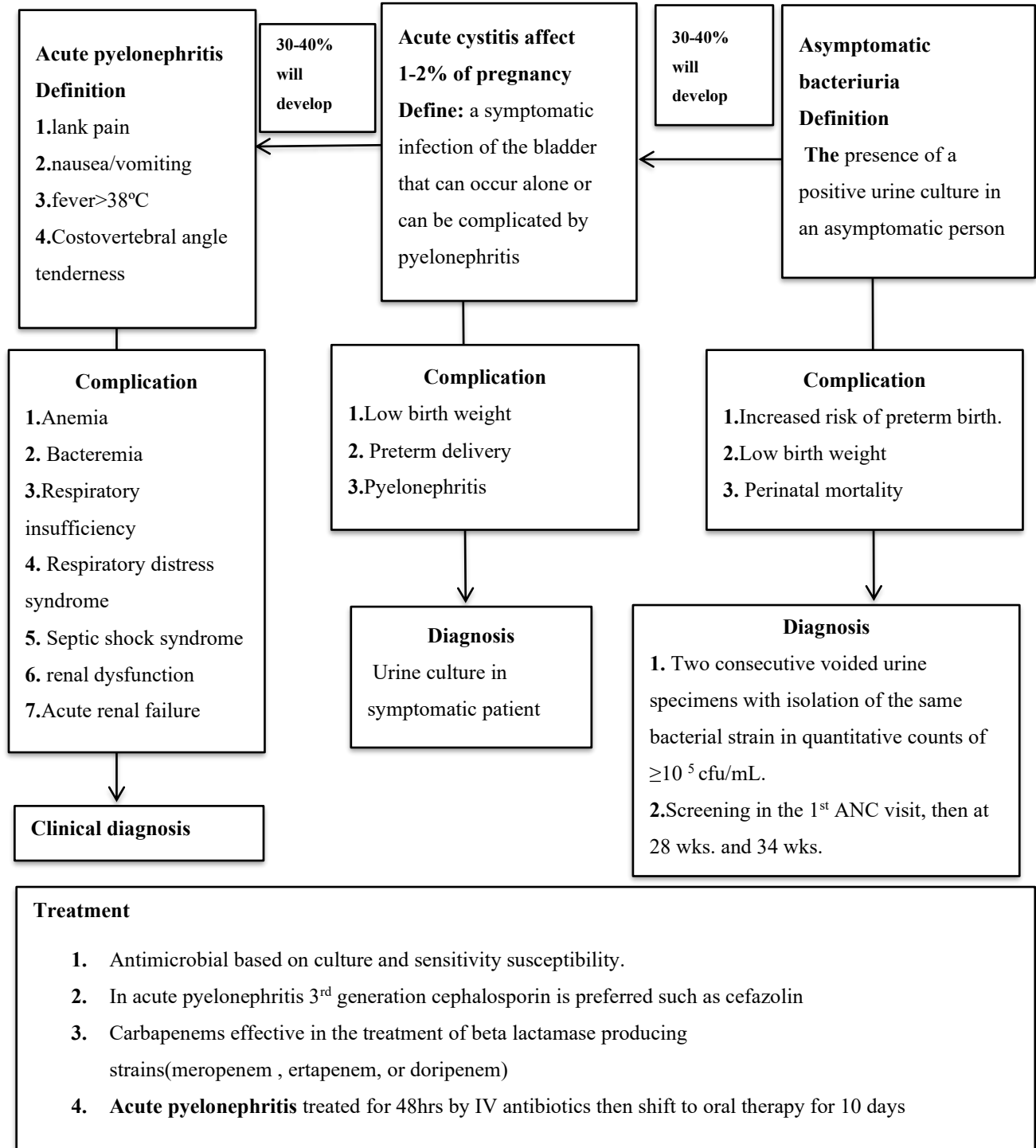
A Hidden Fire

Urinary tract infections in pregnancy

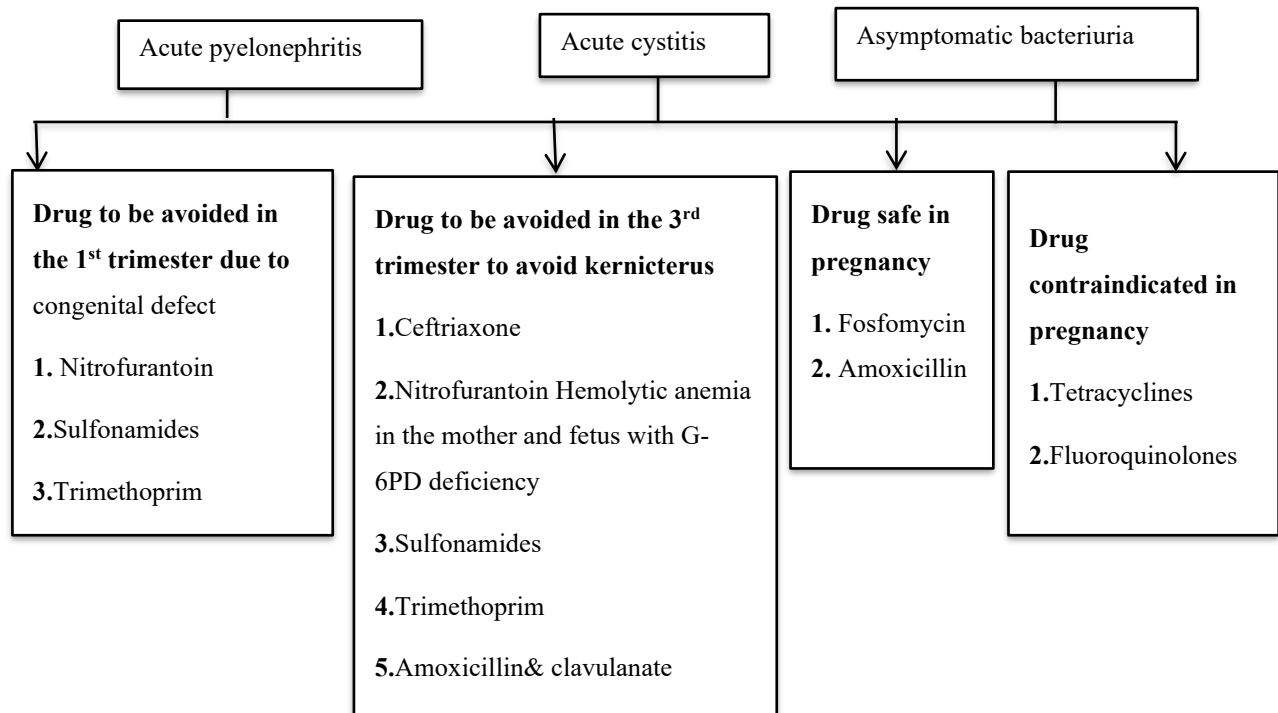
During pregnancy, urinary tract infections (UTIs) can pose risks to both the mother and the baby. Asymptomatic bacteriuria (ASB) refers to the presence of bacteria in the urine without symptoms. It's important to treat ASB because, if left untreated, it can lead to symptomatic UTIs, which increase the risk of preterm labor, low birth weight, and kidney infections. Treating ASB with appropriate antibiotics helps prevent these complications, ensuring better outcomes for both mother and baby.

Type of Urinary tract infections

Urinary tract infections affect (2-7% of pregnancy)



Management of Urinary tract infections



Follow up culture : Repeat the urine culture after one wks. after completion of therapy

Negative culture Repeat the culture at 34 wks.	Positive culture Give antibiotics according to the culture	Suppressive therapy use for patient, with persistent bacteriuria after two or more courses of therapy or recurrent bacteriuria Nitrofurantoin (50 to 100 mg orally at bedtime) till delivery.
--	--	--

1. Nitrofurantoin 100 mg orally every 12 hours for five days
2. Sulfonamides
3. Trimethoprim
4. Amoxicillin (500 mg orally every 12 hours for three to seven days)
5. Amoxicillin-clavulanate (500 mg orally every 12 hours for three to seven days)
6. Cephalexin (500 mg orally every 12 hours for three to seven days)
7. Fosfomycin (3 g orally as a single dose)

Summary

Urinary tract infections (UTIs) are common during pregnancy and can lead to complications like preterm labor, low birth weight, and kidney infections if untreated. Asymptomatic bacteriuria, the presence of bacteria without symptoms, also requires treatment to prevent progression to symptomatic UTIs. In pregnancy, safe antibiotics vary by trimester: in the 1st trimester, options like **penicillins** or **cephalosporins** are commonly prescribed; in the 2nd and 3rd trimesters, **nitrofurantoin** or **amoxicillin** are typically used, though **trimethoprim-sulfamethoxazole**, Tetracyclines, Fluoroquinolones (e.g., ciprofloxacin, levofloxacin): is avoided in early pregnancy. It's crucial to treat UTIs promptly to reduce maternal and fetal risks.

References

1.American College of Obstetricians and Gynecologists. (2023, August).

Urinary tract infections in pregnant individuals: Clinical consensus.

This document recommends universal early pregnancy urine culture for asymptomatic bacteriuria, treatment guidelines (5–7 days of culture-targeted antibiotics), and advises against routine repeat screening after treatment

2.Habak, P. J., Carlson, K., & Griggs, R. P. Jr. (2024, April 20).**

Urinary tract infection in pregnancy. In *StatPearls [Internet]*.

Provides an updated overview of infection risk factors (e.g., urinary stasis), adverse maternal/fetal outcomes, and tailored diagnostic and therapeutic approaches

3.Anton, G.-I., Gheorghe, L., Radu, V.-D., Scripcariu, I.-S., Vasilache, I.-A., Carauleanu, A., et al. (2024).**

Multidrug-resistant urinary tract infections in pregnant patients and their association with adverse pregnancy outcomes—A retrospective study. *Journal of Clinical Medicine*, 13(22), 6664.

Explores the rising threat of resistant UTIs in pregnancy, their prevalence, and links to complications

4.**Barnawi, Y., Alghamdi, A., Ibrahim, A., et al. (2024).**

Prevalence of urinary tract infections in pregnant women and antimicrobial resistance patterns in women in Riyadh, Saudi Arabia: A retrospective study. *BMC Infectious Diseases*, 24, 502.

Offers clinical insights into pathogen profiles and antibiotic resistance trends informing antibiotic selection

5.“Advances in the Treatment of Urinary Tract Infection and Bacteriuria in Pregnancy.” (2024).

PubMed.

Reviews current practice—screening recommendations, evidence for shortened antibiotic regimens, and non-antibiotic prevention strategies like hygiene measures and cranberry extract

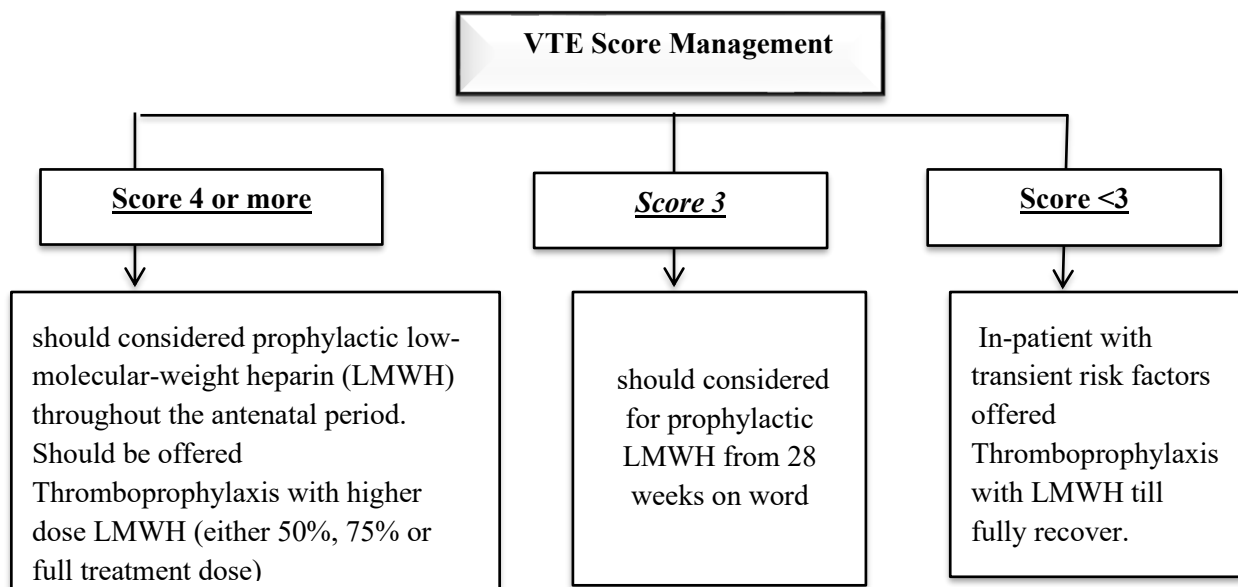
Chapter11

Guarding the Flow

Screening of Thrombo embolic disease

VTE risk assessment

All women should have their risk factors for venous thromboembolism (VTE) evaluated during early pregnancy or before pregnancy. This assessment should be revisited if the woman is hospitalized for any reason or experiences complications. Additionally, a further evaluation should take place during labor or right after childbirth.



Risk assessment of venous thromboembolism in antenatal patient

High-Risk Factors (≥ 3 points)

1. Previous VTE (except single event related to major surgery)
2. High-risk thrombophilia (e.g., antithrombin deficiency, antiphospholipid syndrome)
3. Antiphospholipid syndrome (with no VTE history)

Moderate-Risk Factors (2 points)

1. Hospital admission > 3 days
2. Single previous VTE related to measure surgery
3. Medical comorbidities (e.g., cancer, SLE, heart failure, IBD, inflammatory polyarthropathy, nephrotic syndrome, type 1 DM with nephropathy, sickle cell disease, current IVU)
4. Low-risk thrombophilia + family history of VTE
5. High risk thrombophilia + no previous VTE
6. Compound heterozygote protein C deficiency.
7. Surgical procedures in pregnancy or postpartum

Low-Risk Factors (1 point)

1. Age ≥ 35 years
2. BMI ≥ 30 kg/m² at booking
3. Parity ≥ 3
4. Smoker
5. Gross varicose veins
6. Immobility (including long-distance travel > 4 hours)
7. Current systemic infection (e.g., pyelonephritis, COVID-19)
9. Pre-eclampsia
10. IVF pregnancy
11. Multiple pregnancy
12. Caesarean section (especially emergency)
13. Postpartum hemorrhage > 1 L or blood transfusion

Transient Risk Factors: will receive LMWH as long as the transient risk factor exists:

1. Patient with dehydration hyperemesis.
2. Patient with ovarian hyper stimulation syndrome.

Risk assessment of venous thromboembolism in postnatal patient

High Risk Factor will score 4

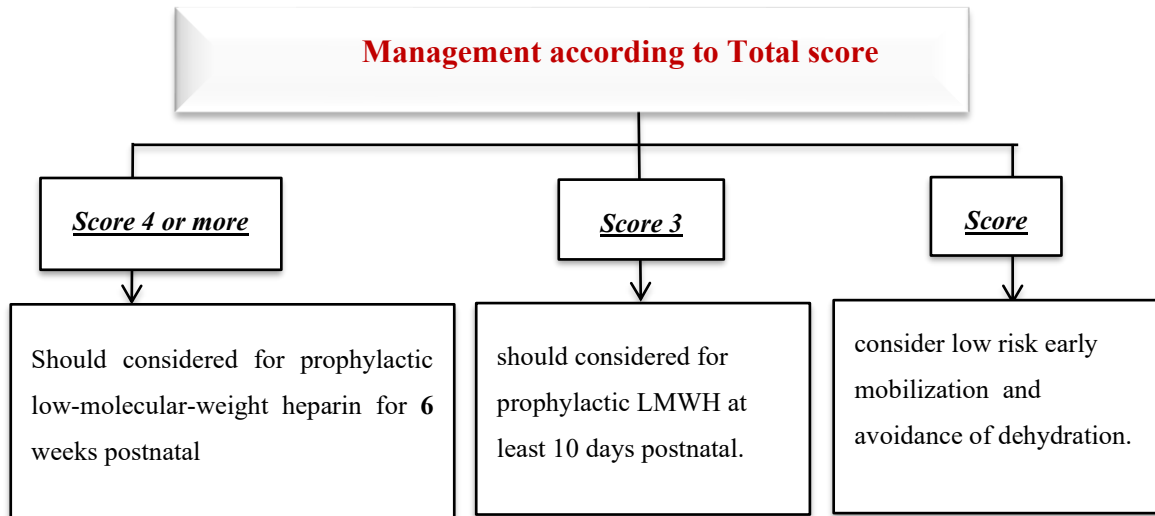
- 1.Any previous VTE except a single event related to major surgery.
- 2.Patient with anyone requiring Antenatal LMWH
- 3.Patient with high risk thrombophilia homozygous factor V Leiden.
- 4.Patient with compound heterozygote protein C or deficiency.
- 5.Low Risk thrombophilia + family history of thromboembolic events.

Intermediate Risk Factor will Score 3:

1. Cesarean Section in labor
- 2.BMI ≥ 40 kg / m².
- 3.Readmission or prolonged admission (≥ 3 days) in the puerperium.
- 4.Any surgical procedure in the puerperium except immediate repair of the perineum.
- 5.Medical Comorbidities:
6. Patient with cancer.
- 7.Patient with heart failure.
- 8.Patient with IBD.
- 9.Patient with active SLE
10. Patient with inflammatory poly-arthritis.
- 11.Patient with nephrotic syndrome.
- 12.Patient with Type I DM with nephropathy.
- 13.Patient with sickle cell disease, current IVDU
14. Patient with current IVDU.
- 15Patient with any surgical procedure e.g. appendectomy.

Mild Risk Factor will score 1:

- 1.Obesity (BMI > 30 kg)
- 2.Age > 35
- 3.Parity ≥ 3 .
- 4.Patient with Elective Cesarean Section.
- 5.Gross varicose veins.
- 6.Current pre-eclampsia.
- 7.Immobility, e.g. paraplegia, PGP.
- 8.Family history of unprovoked or estrogen
- 9.provoked VTE in first-degree relative.
- 10.Low-risk thrombophilia.
- 11.Patient with long distance travel.
- 12.Patient with multiple pregnancies.
- 13.Patient with pre-term delivery, in this pregnancy ($<37+0$ weeks).
- 14.Patient with stillbirth in this pregnancy.
- 15.Patient with Mid-cavity rotational or operative delivery.
- 16.Multiple pregnancies IVF/ART.
- 17.Patient with prolonged labor (> 24 hours).
- 18.Patient with PPH > 1 liter or blood transfusion.



ANTENATAL & POSTNATAL PROPHYLACTIC DOSE OF LMWH:

Dose of LMWH depend on the patient weight

Weight < 50 kg, give 20 mg enoxaparin daily/ **Dalteparin** 2500 IU

Weight > 50-90 kg, give 40 mg enoxaparin daily/ **Dalteparin:** 5000 IU subcutaneously once daily.

Weight 91-130 kg, give 60 mg enoxaparin daily/ **Dalteparin:** 7500 IU

Weight 131-170 kg, give 80 mg enoxaparin daily/ **Dalteparin:** 7500 IU

Weight > 170 kg, give 6 mg /kg/day enoxaparin daily.

Summery

VTE risk assessment and management in pregnancy are essential to prevent serious complications like deep vein thrombosis (DVT) and pulmonary embolism (PE), which can threaten both maternal and fetal health. Pregnancy increases the risk of clotting due to hormonal changes, immobility, and pressure on blood vessels. Women with a personal or family history of VTE, obesity, or certain medical conditions may have higher risk. Early identification allows for preventive measures such as anticoagulant therapy, compression stockings, and lifestyle modification modifications. Proper management can reduce the likelihood of thromboembolic events and improve maternal outcomes. Careful monitoring throughout pregnancy ensures timely intervention.

References

1. Royal College of Obstetricians and Gynaecologists. (2023).

Reducing the risk of thrombosis and embolism during pregnancy and the puerperium (Green-top Guideline No. 37a). RCOG.

Comprehensive guidance on VTE risk assessment and pharmacological prophylaxis during and after pregnancy, with clear stratification recommendations

2. Royal College of Obstetricians and Gynaecologists. (2023).

Thrombosis and embolism during pregnancy and the puerperium: Acute management (Green-top Guideline No. 37b). RCOG.

Defines diagnostic pathways and acute management protocols for suspected DVT/PE in pregnant and postpartum patients

3. American Society of Hematology Thrombosis Subcommittee. (2023).

Samuelson Bannow, B., Federspiel, J. J., Abel, D. E., & Mauney, L., et al. (2023).

Multidisciplinary care of the pregnant patient with or at risk for VTE: A recommended toolkit. Journal of Thrombosis and Haemostasis, 21(6), 1432–1440.

Expert consensus on multidisciplinary approaches to risk assessment, prophylaxis, delivery planning, and postpartum care

4. Makowska, A., Treumann, T., Venturini, S., & Christ, M. (2024, May 13).

Pulmonary embolism in pregnancy: A review for clinical practitioners. Journal of Clinical Medicine, 13(10), 2863.

A practical review emphasising diagnostic algorithms (e.g., imaging, multidisciplinary input) and treatment options for PE in pregnancy

5. Middeldorp, S., et al. (2024).

Venous thromboembolism in pregnancy and postpartum: An illustrated review. Research and Practice in Thrombosis and Haemostasis, 8(4), Article 102446.

Provides an illustrated overview of VTE epidemiology, diagnostic criteria, anticoagulation strategies, and delivery-related considerations

Chapter 12

The Dance of Life and Blood

Pregnancy and Haematological Disorders:

The Hidden Thorns

Thrombophilia in Pregnancy

Thrombophilia: A condition that increases the tendency thromboembolic events like deep vein thrombosis (DVT) and pulmonary embolism (PE).

It is significant during pregnancy due to physiological changes that increase the risk of thromboembolic events & Placental complications like placental insufficiency, leading to preeclampsia and growth restrictions.

Types of Thrombophilia

Acquired Thrombophilia

Antiphospholipid Syndrome (APS)

Characterized by the presence of antiphospholipid antibodies and is associated with recurrent pregnancy loss and thrombosis.

Other conditions: Certain autoimmune diseases, malignancies, and infections can also predispose individuals to thrombosis.

Inherited Thrombophilia

Factor V Leiden A mutation that makes Factor V resistant to inactivation by activated protein C.

Prothrombin Gene Mutation Increases prothrombin levels, leading to higher clot formation.

Antithrombin Deficiency A deficiency in antithrombin, which inhibits thrombin and factor Xa.

Protein C and S Deficiencies Proteins that help regulate blood coagulation.

Diagnosis of thrombophilia

Screening for thrombophilia

Personal and Family History

Assess for history of venous thromboembolism (VTE), recurrent pregnancy loss, and family history of thrombosis.

Clinical Assessment

Review any previous thrombotic events, current medications, and risk factors.

Laboratory Tests

1. Inherited Thrombophilia:

1. Factor V Leiden Mutation

Genetic test for the specific mutation.

2. Prothrombin Gene Mutation (G20210A)

Genetic testing for this mutation.

3. Antithrombin III Level

Measure the level of antithrombin, a natural anticoagulant.

4. Protein C Activity To assess functional activity of protein C.

5. S Antigen and Activity To evaluate both total and free protein S levels.

2. Acquired Thrombophilia

Antiphospholipid Antibodies

1. Lupus Anticoagulant

A specific test for the presence of lupus anticoagulant.

2. Anticardiolipin Antibodies

IgG and IgM tests for anticardiolipin antibodies.

3. Anti- β 2 Glycoprotein I Antibodies

Testing for these antibodies can also be helpful.

To evaluate both total and free protein S levels.

Investigation of thrombophilia should be done Complete Blood Count (CBC)

Coagulation Profile Prothrombin Time (PT) Activated Partial Thromboplastin Time (aPTT)

Best practice for thrombophilia testing: If not urgent, it is often recommended to **wait until at least 6 weeks postpartum** to perform a full thrombophilia workup, especially for accurate protein levels. However, testing **during pregnancy may be appropriate** if the results would **impact immediate clinical management** (e.g., starting or continuing anticoagulation).

Thrombophilia testing can be done during pregnancy, but with important limitations:

- **Functional assays** (like protein C, protein S, and antithrombin levels) may be **affected by pregnancy**, especially **protein S**, which naturally decreases in pregnancy, potentially giving a **false-positive result**.
- **Genetic tests** (e.g., Factor V Leiden, Prothrombin G20210A mutation, MTHFR mutation) **can be done at any time**, including during pregnancy, as they are not affected by physiological changes.

Management of Thrombophilia Women During Pregnancy

Anticoagulation Therapy

Start the women on low-molecular-weight heparin (LMWH) or unfractionated heparin during pregnancy to prevent thrombotic events.

Women with antiphospholipid syndrome may need low-dose aspirin in addition to heparin therapy to reduce the risk of miscarriage and other complications like PET, FGR.

Monitoring during pregnancy

1. Regular follow-up with a maternal-fetal medicine specialist and a hematologist.
2. Monitoring for symptoms of thrombosis and the complications associated with thrombophilia, such as high blood pressure, placental insufficiency, or fetal growth restriction.

Post natal care for women with Thrombophilia

1. Continue on LMWH for 6 weeks
2. Encourage breast feeding
3. Avoid combined oral contraceptive

Summary

Management of thrombophilia in pregnancy involves assessing the type and severity of the condition and implementing preventive measures to reduce the risk of blood clots. Anticoagulant therapy, typically low-molecular-weight heparin (LMWH), is often prescribed throughout pregnancy and postpartum to prevent thromboembolic events. Regular monitoring of clotting parameters is essential to adjust medication dosages as needed. Compression stockings may be recommended to reduce the risk of deep vein thrombosis (DVT). Lifestyle modifications, such as weight management and avoiding prolonged immobility, are important. Early prenatal care and close surveillance for pregnancy complications, including preeclampsia or recurrent miscarriage, are essential. A multidisciplinary approach involving obstetricians, hematologists, and other specialists ensures optimal care.

References

1. Cushman, M., Alonso-Schmoeckel, M., Cunningham, J., et al., & American Society of Hematology Clinical Guidelines Subcommittee. (2023). *American Society of Hematology 2023 guidelines for management of venous thromboembolism: Thrombophilia testing. Blood Advances*, 7(22), 7101–7123.
Strong recommendations regarding selective testing in pregnant women—especially those with a family history of high-risk thrombophilia—and cautious use of thromboprophylaxis
2. Watson, H. G., Conlon, C., Keeling, D., Baglin, T., Liesner, R., Makris, M., & British Society for Haematology. (2022, November 28). *Guidelines for thrombophilia testing (heritable and acquired). British Journal of Haematology*.
Presents evidence-based laboratorians' guidance on when—and when not—to screen for thrombophilia in pregnancy and other settings .
3. Padrnos, L., & Gangaraju, R. (2024). *Inherited thrombophilia and recurrent miscarriage: Is there a role for anticoagulation during pregnancy? Hematology, ASH Education Program*, 2024(1), 672–677.
A critical review of evidence supporting anticoagulant use in pregnant women with inherited thrombophilia and recurrent pregnancy loss
4. Kavoussi, A., Uğur, O., Yildiz, H., et al. (2024, November 4). *The effect of hereditary thrombophilia on recurrent pregnancy loss: A retrospective cohort study. BMC Pregnancy and Childbirth*, 24, 719.
Assesses the prevalence of genetic thrombophilias (e.g., Factor V Leiden, prothrombin mutation, MTHFR) in women with recurrent miscarriages, informing targeted screening

Chapter 13

Whispers in the Veins

Protein S deficiency

Protein S deficiency

is a thrombophilia that increases the risk of venous thromboembolism, especially during pregnancy. It contributes to placental insufficiency, which may lead to miscarriage, preeclampsia, or intrauterine growth restriction. Pregnant women with Protein S deficiency require close monitoring and may benefit from anticoagulation therapy. Diagnosis is often challenging due to physiological reduction in Protein S levels during normal pregnancy. Early identification and management are critical to improving maternal and fetal outcomes.

Causes of Protein S deficiency

Causes of Hereditary

1. Autosomal dominant trait. Thrombosis is observed in both heterozygous (2% incompatible with life) and homozygous genetic deficiencies of protein S.
2. Protein S and C levels are lower in sickle cell anemia and they decrease further significantly during crisis

Causes of Acquired

1. Hepatic diseases
2. vitamin K deficiency
3. result of antagonism with oral warfarin anticoagulants
4. low levels of protein S in pregnancy do not cause thrombosis by themselves.
5. Disseminated intravascular coagulation
6. HIV infection
7. The nephrotic syndrome
8. Age affects total protein S but not free protein S levels
9. Patient recovers from chickenpox

Management of protein S deficiency

Detect a high-risk patient from history in the 1st ANC visit

History of miscarriage, fetal loss, preeclampsia, fetal growth impairment, and abruption and venous thrombosis

Both free and total protein S are measured by ELISA if Levels of total or free PS antigen <60 to 65 International units/dL are considered to be in the deficient range (protein S level is affected in pregnancy better to measure 6 weeks after pregnancy)

Patient with protein S deficiency with Any history of thrombosis

Start low molecular weight heparin once BHCG positive till 4-6 wks. postpartum

Patient with protein S deficiency with No history of thrombosis

Homozygous protein S deficiency
Sickle cell disease, HIV, Hepatic diseases, nephrotic syndrome

Start low molecular weight heparin at 28 weeks of pregnancy till 10 day post normal vaginal delivery & 4-6 wks. post-partum

Complication of Protein S deficiency in pregnancy

Protein S deficiency in pregnancy can lead to several serious complications due to increased risk of thrombosis and placental insufficiency. Key complications include:

1. **Venous thromboembolism (VTE)** – including deep vein thrombosis and pulmonary embolism.
2. **Recurrent miscarriage** – particularly in the second and third trimesters.
3. **Preeclampsia** – due to impaired placental blood flow.
4. **Intrauterine growth restriction (IUGR)** – from poor placental perfusion.
5. **Placental abruption or stillbirth** – in severe cases if untreated.

Early diagnosis and proper management are crucial to reduce these risks.

Follow up during pregnancy

Women with Protein S deficiency should be followed closely throughout pregnancy, with the frequency of monitoring tailored to their individual risk factors. A multidisciplinary team (obstetrician, haematologist, and maternal-fetal medicine specialist) should coordinate care.

General recommendations include:

1. **First trimester:** Initial evaluation and risk assessment; start prophylactic anticoagulation if indicated.
2. **Every 4 weeks until 28 weeks, then every 2–3 weeks until 36 weeks, and weekly thereafter** to monitor maternal and fetal well-being.
3. **Frequent fetal growth scans** (every 4 weeks starting at 20–24 weeks) to monitor for IUGR.
4. **Doppler study**
 - Uterine artery doppler at 20-24 weeks
 - Umbilical artery doppler at 30 week on board
5. **Anticoagulation monitoring**
6. **Postpartum follow-up** is essential, as thrombosis risk remains high for at least 6 weeks after delivery.

Summery

1. Management involves risk stratification based on personal and family history of thrombosis.
2. Prophylactic or therapeutic low molecular weight heparin (LMWH) is often used throughout pregnancy and postpartum.
3. Regular monitoring of maternal and fetal well-being is essential to detect complications early.
4. Warfarin is contraindicated during pregnancy but may be considered postpartum if needed.

Multidisciplinary care with haematology and maternal-fetal

References

1. Bremme KA. Haemostatic changes in pregnancy. *Best Pract Res Clin Haematol.* 2003;16(2):153–168. doi:10.1016/S1521-6926(03)00021-5
2. Dizon-Townson DS. The inherited thrombophilias: pregnancy and thrombotic risk. *Obstet Gynecol Clin North Am.* 2006;33(3):443–456. doi:10.1016/j.ogc.2006.05.007
3. Rodger MA, Walker MC, Murphy KE, et al. The association of factor V Leiden and prothrombin gene mutation and pregnancy outcome: a systematic review. *Thromb Res.* 2010;125(6):e95–e100. doi:10.1016/j.thromres.2009.10.020

Chapter 14

The Silent Thirst

chronic anaemia in pregnancy

chronic anaemia

during pregnancy can result from various factors, including iron deficiency, folate deficiency, or other underlying health conditions, and can lead to complications for both the mother and the fetus if not properly managed.

Screening for anaemia in pregnancy is conducted during the first, second, and third trimesters using a complete blood count (CBC).

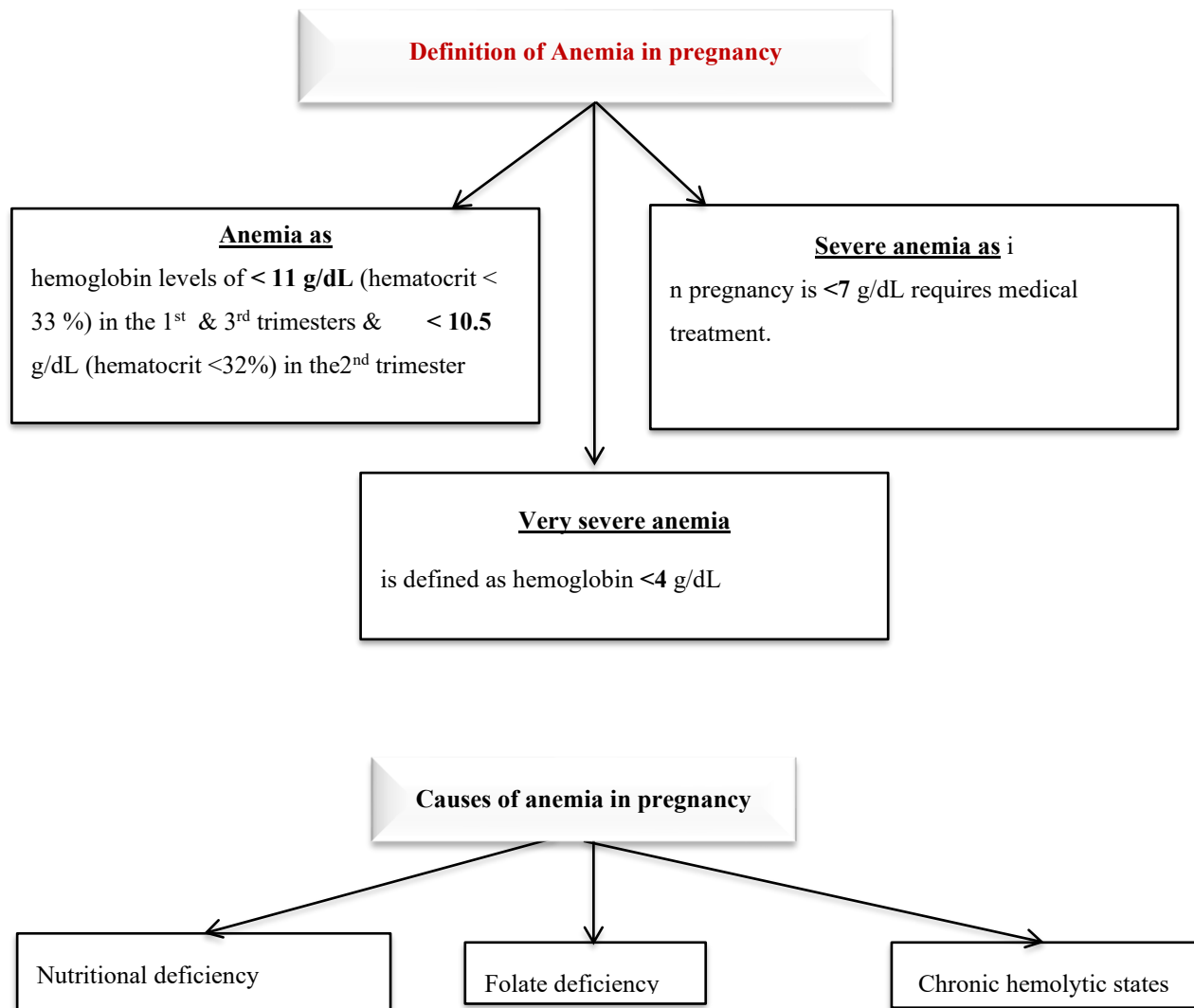
definition of anaemia in pregnancy: is defined as a decrease in haemoglobin levels to below the normal range for pregnant women. anaemia is typically diagnosed when haemoglobin levels fall below:

11 g/dL in the first and third trimesters

10.5 g/dL in the second trimester

Anaemia during pregnancy can result from various factors, including iron deficiency, folate deficiency, or other underlying health conditions, and can lead to complications for both the mother and the fetus if not properly managed.

Screening for anaemia in pregnancy is conducted during the first, second, and third trimesters using a complete blood count (CBC)



Causes of anemia in pregnancy

Iron Deficiency can be due to

1. Increased demand for iron during pregnancy

2. Diet

- * Inadequate Dietary Intake

- * Bad diet habit like consumption of large amount of tea or consume tea immediately post meal

- * Consumption of antacid

- * Consumption of Ca with iron at the same time

3. Vegetarian or Vegan Diets
4. Malabsorption Blood Loss
5. Chronic Diseases

Folate Deficiency

1. Diet

1. Inadequate Dietary Intake
2. Consumption of antacid
3. Bad diet habit like consumption of large amount of tea or consume tea immediately post meal
4. Consumption of Ca with iron at the same time

2. Alcohol Consumption

3. Certain Medications will interfere with folate metabolism e.g. anticonvulsants, methotrexate, and sulfasalazine.
4. Genetic Factors
5. Chronic Hemolysis

Vitamin B12 Deficiency can be caused by

1. Inadequate Dietary Intake: meat, fish, dairy can lead to deficiency, particularly in vegetarians and vegans.
 2. Malabsorption Disorders: Conditions such as celiac disease, Crohn's disease, or pernicious anaemia.
 3. Pernicious Anaemia: An autoimmune condition that a lack of intrinsic factor, which is essential for B12 absorption.
 4. Gastrointestinal Surgery: Surgical procedures, such as gastric bypass,
 5. Medications: such as metformin (for diabetes) and proton pump inhibitors (PPIs), can interfere with B12 absorption over time. Chronic Alcohol Use
2. **Blood Loss:** heavy menstrual bleeding before pregnancy or complications during pregnancy.
 3. **Chronic Diseases:** Conditions like chronic kidney disease or autoimmune disorders can impact red blood cell production.

4. Hemoglobinopathies: Genetic conditions such as sickle cell disease or thalassemia can cause anaemia in some women.

5. Infections: Certain infections, such as malaria or hookworm, can lead to anaemia

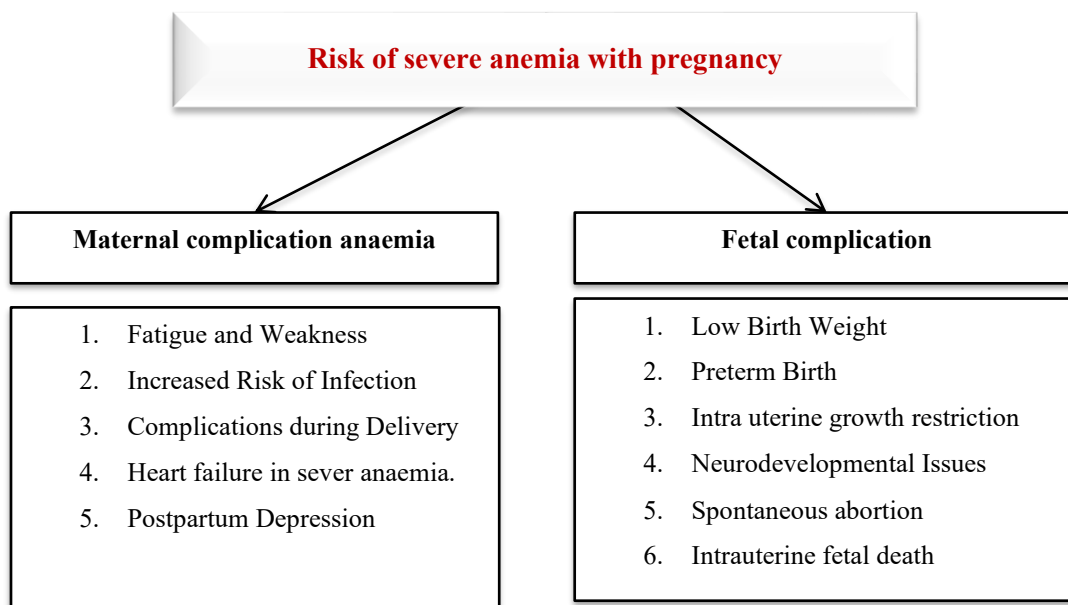
Anaemia during pregnancy can have several consequences for both the mother and the fetus, including:

Maternal complication due to anaemia

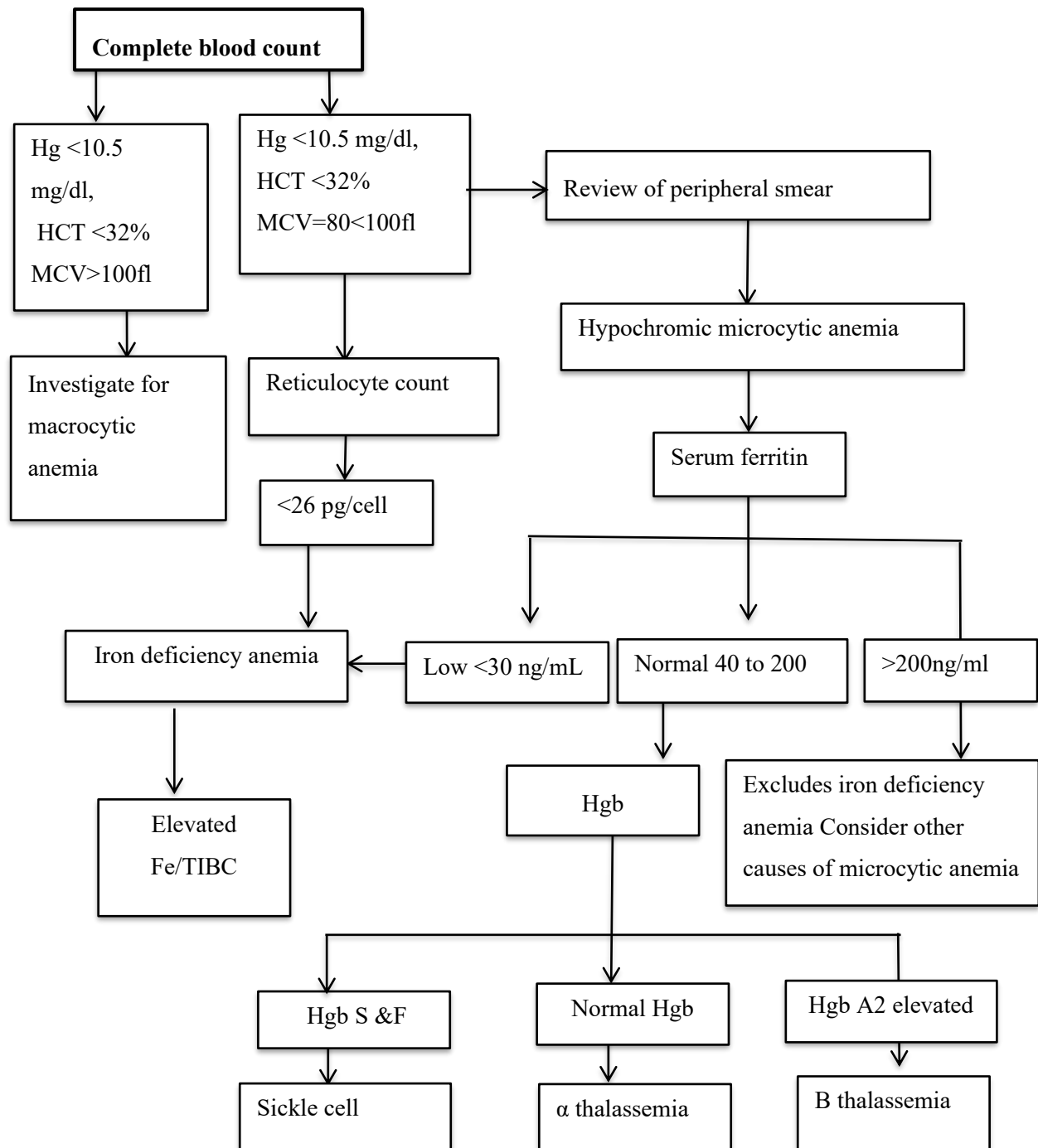
1. Fatigue and Weakness
2. Increased Risk of Infection
3. Complications during Delivery e.g. haemorrhage during childbirth.
4. Heart failure in sever anemia .
5. Postpartum Depression

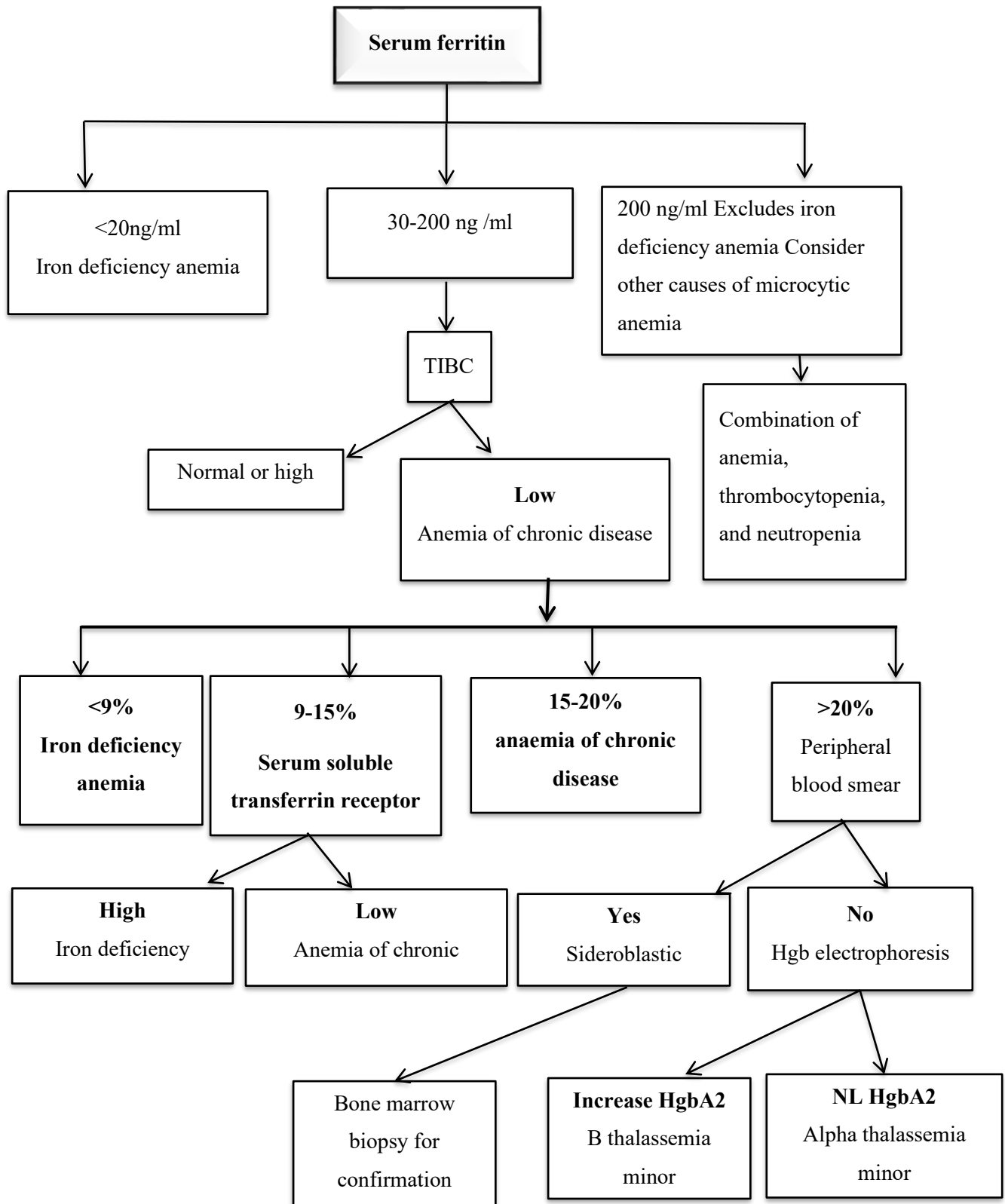
Fetal complication due to anaemia

1. Low Birth Weight
2. Preterm Birth
3. Intra uterine growth restriction
4. Neurodevelopmental Issues: Some studies suggest a potential link between maternal anaemia and cognitive and behavioural issues in children.
5. Spontaneous abortion
6. Intrauterine fetal death

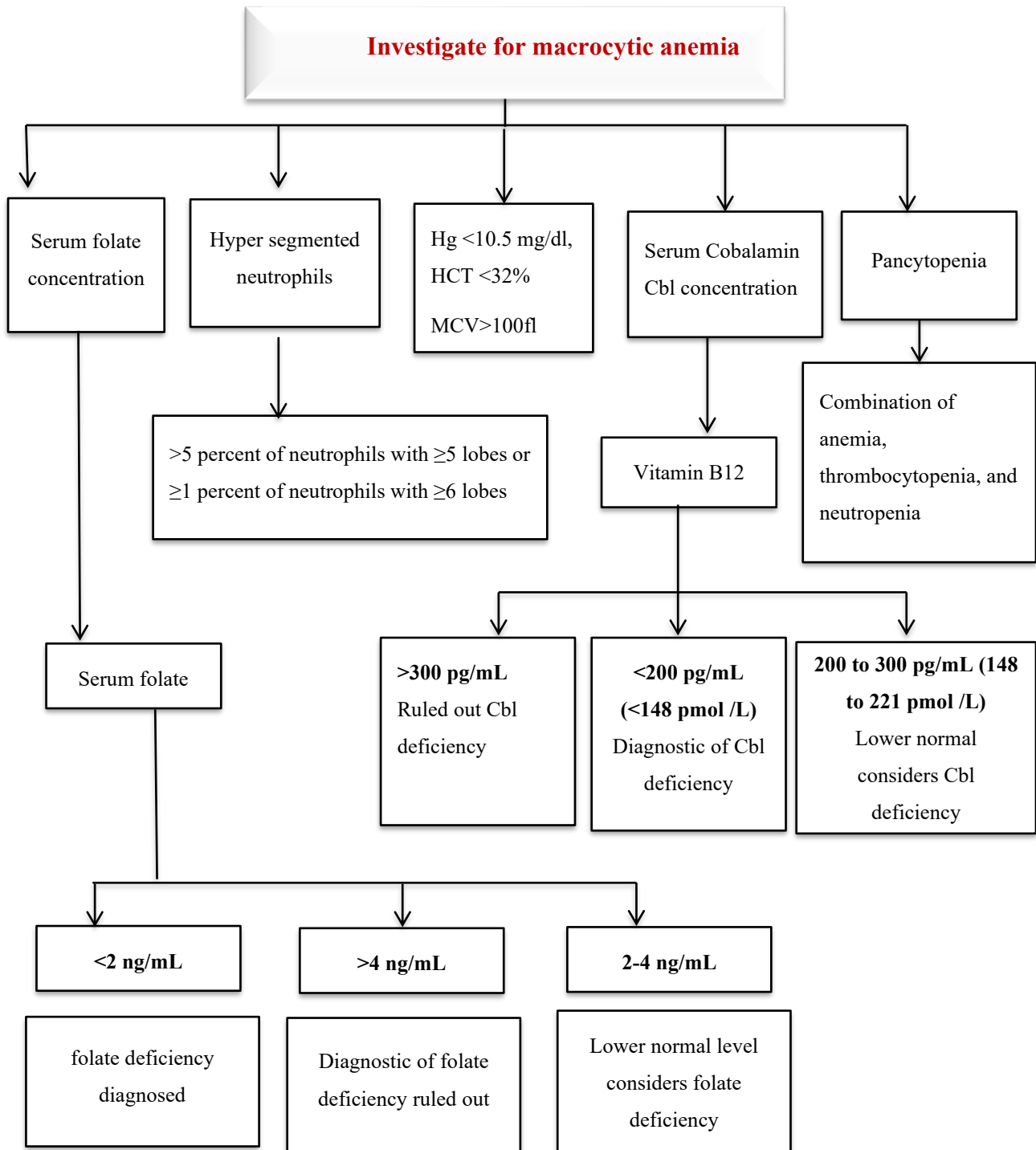


Investigation of anaemia

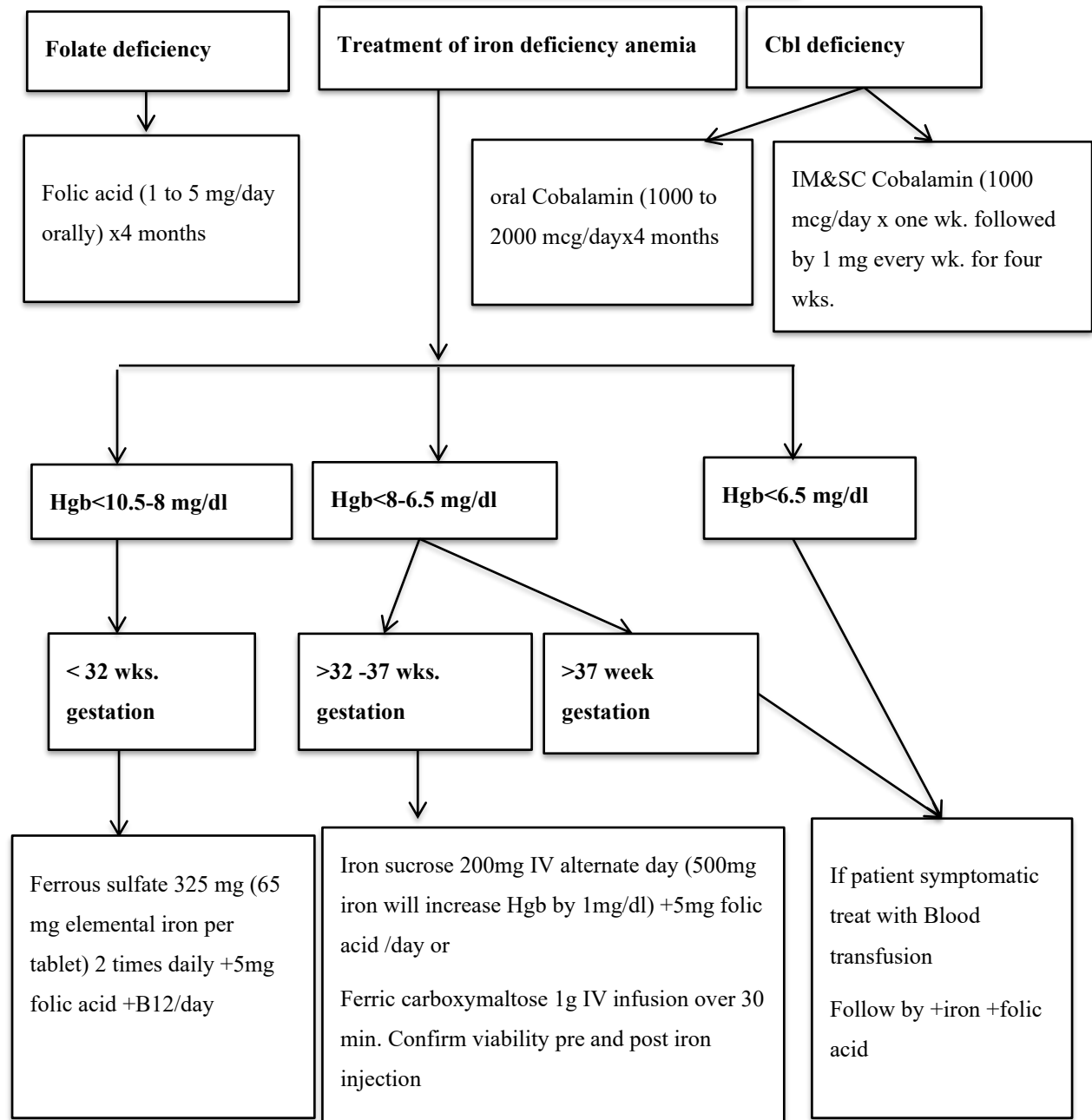




Investigate for macrocytic anemia



Treatment of anemia in pregnancy



Suggested regimen for iron deficiency anemia

1. For haemoglobin (Hgb) levels between 8 and 10.5 mg/dL, the recommended treatment is:

Ferrous Sulfate: 325 mg (which contains 65 mg of elemental iron) taken twice daily.

Additionally, administer 5 mg of folic acid and a daily dose of vitamin B12.

4o mini

2. For patients with haemoglobin (Hgb) levels between 6.5 and 8 mg/dL during pregnancy (less than 37 weeks gestation), the treatment options are as follows:

Iron Sucrose: Administer 200 mg IV on alternate days (note: 500 mg of iron will increase Hgb by approximately 1 mg/dL) plus 5 mg of folic acid per day.

Ferric Carboxylates: Administer 1 g via IV infusion over 30 minutes.

Additionally, confirm fetal viability both before and after the iron injection.

3. The dosage for ferric carboxymaltose is as follows: each ampule contains 500 mg, which can raise hemoglobin (Hgb) levels by approximately 1 g within 1 to 2 weeks. The maximum dose should not exceed 1 g per week. The deficiency should be calculated and administered as 1 g per week.

Dietary advice for iron deficiency anemia

A diet rich in iron includes a variety of foods.

Heme Iron (more easily absorbed)

- **Red Meat:** Beef, lamb
- **Poultry:** Chicken, turkey
- **Fish and Shellfish:** Salmon, tuna, shrimp, oysters, clams

Non-Heme Iron (plant-based sources)

- **Legumes:** Lentils, chickpeas, beans (kidney, black, pinto)
- **Nuts and Seeds:** Pumpkin seeds, sesame seeds, almonds
- **Tofu and Tempeh**

- **Whole Grains:** Quinoa, brown rice, fortified cereals, oats
- **Dark Leafy Greens:** Spinach, kale, Swiss chard, collard greens
- **Dried Fruits:** Apricots, raisins, prunes

Tips for Enhancing Iron Absorption

- **Combine with Vitamin C:** Foods like citrus fruits, strawberries, bell peppers, and broccoli can enhance iron absorption when eaten with iron-rich foods.
- **Avoid Inhibitors:** Limit consumption of calcium-rich foods, tea, coffee, and high-Fiber foods at the same time as iron sources, as they can inhibit absorption.

Follow up of patient started on medication

- 1.If gestational age ≥ 37 or more repeat CBC at the time of delivery
- 2.If gestational age < 34 week repeat CBC after 4 week

Summary

Treatment of anemia in pregnancy focuses on correcting the underlying cause and ensuring adequate oxygen supply to both mother and baby. Iron deficiency anemia, the most common type, is typically treated with iron supplements, often combined with vitamin C to enhance absorption. For vitamin B12 or folate deficiencies, appropriate supplementation is provided. In more severe cases, intravenous iron or blood transfusions may be necessary. Regular monitoring of hemoglobin and iron levels is essential to ensure proper treatment. A balanced diet rich in iron, folate, and vitamin B12 is recommended encouraged. Managing anemia effectively helps prevent complications like preterm birth, low birth weight, and maternal fatigue.

References

1. Levy, A. T., Weingarten, S. J., Robinson, K., Suner, T., McLaren, R. A. Jr., & Saad, A., et al. (2024).

Recombinant erythropoietin for the treatment of iron deficiency anemia in pregnancy: A systematic review. International Journal of Gynecology & Obstetrics, 168(1), 35–42.

2. Mintsopoulos, T., & colleagues. (2024).

Identification and treatment of iron-deficiency anemia in pregnancy and postpartum: A systematic review and quality appraisal of guidelines using AGREE II. International Journal of Gynecology & Obstetrics.

3. American Society of Hematology. (2024, November 5).

Contemporary screening and treatment practices for iron deficiency in pregnancy. Blood, 144(Suppl 1), 5011.

4. Divyang S. Bhudhrani & Payal Godria. (2024).

Safety and efficacy of ferric carboxymaltose in management of iron deficiency anemia in pregnant and peripartum women. International Journal of Reproduction, Contraception, Obstetrics and Gynecology.

5. How I treat anemia in pregnancy: iron, cobalamin, and folate. (2017; analysis updated 2024).

Santos-Smith, J. Blood, 129(8), 940–? (review).

Offers an evidence-based algorithm for diagnosis (Hb, ferritin <15–30 ng/mL) and outlines duration of therapy (oral iron + replenishment postpartum)

Chapter 15

The Inherited Echo

Hereditary anaemia in pregnancy

Sickle cell & thalassemia disease in pregnancy

Sickle Cell Disease & thalassemia Severity

is essential to ensure a healthy pregnancy and to manage potential risks. Involve a multidisciplinary team, including obstetricians, hematologists, and maternal-fetal medicine spec

Risks of sickle cell disease During Pregnancy

1. Increased Complications
2. Pain crises
3. Infections
4. Preterm labor
5. Preeclampsia
6. Fetal growth restriction
7. Increase the risk of VTE

Antenatal care for patients with sickle cell disease (SCD)

1.Early and Regular Prenatal Visits

Frequency of Visits: every 2-4 weeks initially, then Biweekly in the third trimester to monitor the health of both the mother and fetus.

Comprehensive Evaluation: Each visit should include a thorough assessment of maternal health, fetal growth, and any complications.

2. Monitoring of Sickle Cell Disease

Blood Tests: Regular complete blood counts to monitor haemoglobin levels, white blood cell counts, and platelets.

Hydration Status: Assess hydration and encourage fluid intake to help prevent crises.

3. Management of Sickle Cell Crises

Pain Management: Develop a pain management plan, including safe analgesics and strategies for managing crises.

Education: Educate the patient about recognizing signs of a crisis and when to seek help.

4. Regular Monitoring: It's important to monitor iron levels through blood tests, including serum ferritin and transferrin saturation, to assess whether iron deficiency is present.

5. Infection Prevention

Vaccinations: Ensure vaccinations are up to date, especially pneumococcal and influenza vaccines.

Prophylactic Antibiotics: Consider prophylactic antibiotics, especially in the second and third trimesters.

6. Monitoring for Complications

Ultrasound Assessments: Regular ultrasounds to monitor fetal growth and amniotic fluid levels. Assess for any signs of fetal growth restriction or other abnormalities.

Screening for Preeclampsia: Monitor blood pressure closely, especially in the second and third trimesters.

7. Nutritional Counselling

Emphasize a well-balanced diet rich in folic acid, iron, and hydration to support maternal and fetal health.

Discuss the importance of avoiding dehydration and maintaining adequate caloric intake.

8.supplement

Give folic acid 5 mg orally once every one day

Give iron according to the level of serum ferritin

Give aspirin 100mg as prophylactic for PET

Give low molecular heparin as prophylactic from VTE /PE

9.Encourage participation in support groups for individuals with SCD.

10. Planning for Delivery

Discuss delivery options, considering the need for a planned delivery if there are significant complications.

Create a birth plan that includes the management of SCD during labor and delivery.

Consider blood transfusions in SCD & thalassemia patients:

1.Severe Anaemia

Haemoglobin Levels: Transfusions may be indicated if haemoglobin levels drop significantly (often below 7-8 g/dL) and the patient shows symptoms of anaemia, such as fatigue or shortness of breath.

2. Sickle Cell Crises

3.Acute Chest Syndrome

4.Severe Pain Crises

5.transfusion may be considered if there is significant anaemia.

Preoperative Management

- **Elective Surgery:** Patients with SCD may require transfusions before surgery to ensure adequate haemoglobin levels and reduce the risk of complications.
- **Emergency Surgery:** In urgent situations, transfusions may be necessary to stabilize the patient.

Stroke Prevention

- **History of Stroke:** Patients with a history of stroke may receive regular blood transfusions as part of a chronic transfusion program to maintain haemoglobin S levels below less than 30%.

Hyperhaemolysis Crisis

- **Increased Homolysis:** Transfusions may be necessary if there is a rapid drop in haemoglobin levels due to increased haemolysis.

1. Management of Iron Overload

Chronic Transfusion Therapy

Splenic Sequestration

Acute Splenic Sequestration

Guidelines for Transfusion

Type of Blood Products: Usually, packed red blood cells (PRBCs) are used.

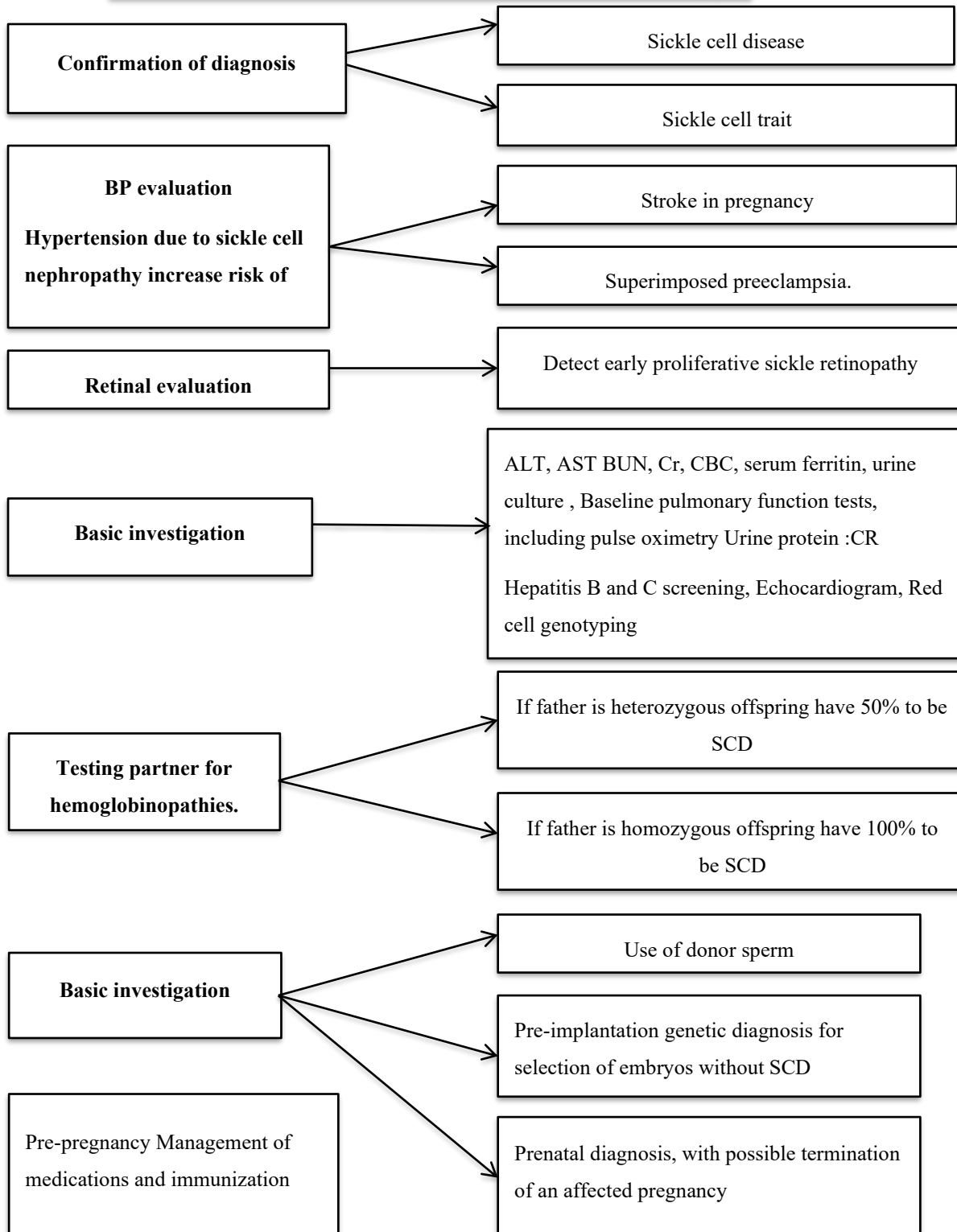
Crossmatching: Ensure proper crossmatching to prevent transfusion reactions.

Monitoring: Continuous monitoring during and after transfusion for any adverse reactions is critical.

Postpartum Planning

Discuss the importance of postpartum care, including monitoring for complications like infection or crises. Establish a plan for breastfeeding, taking into account any potential pain management needs.

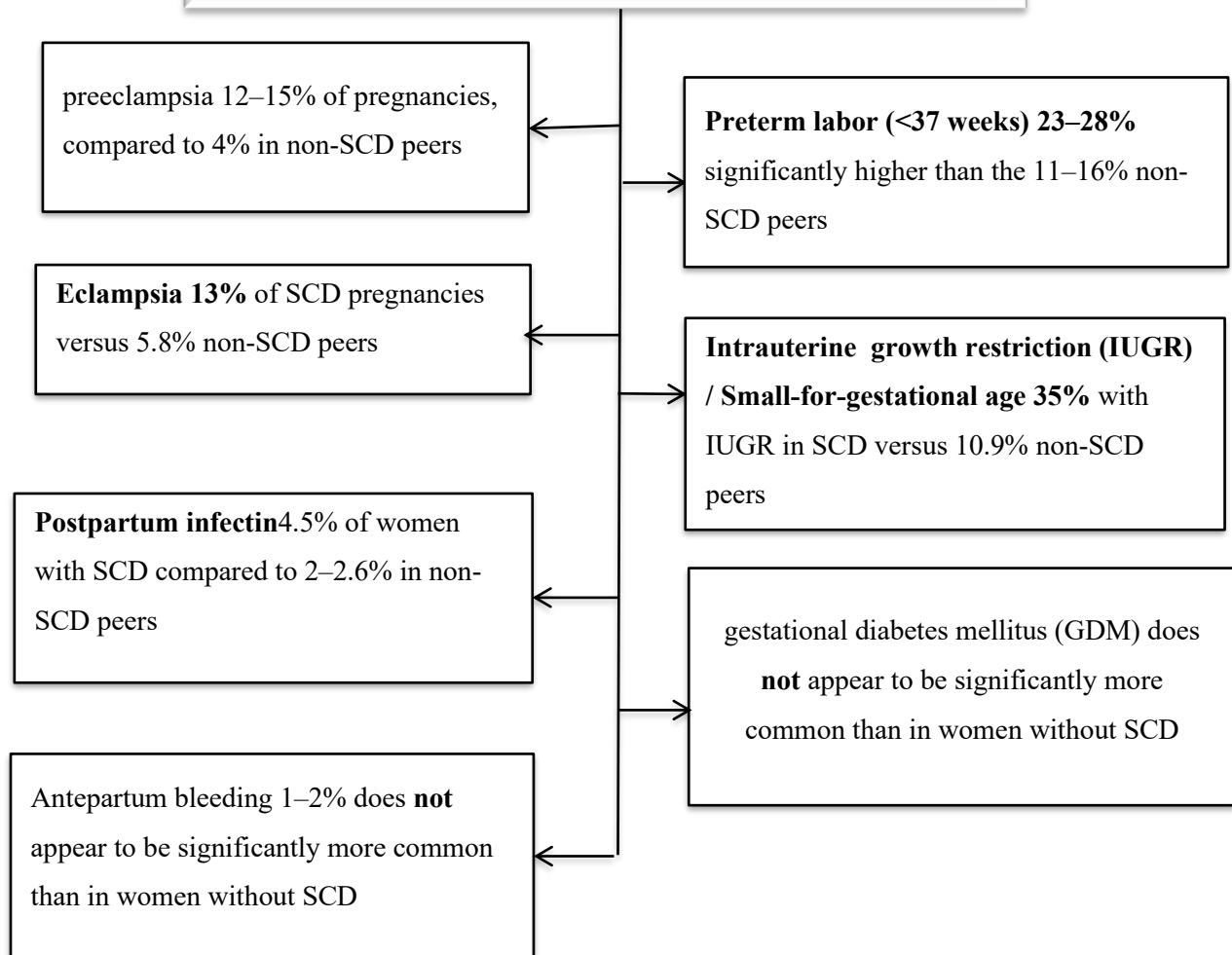
Pre-pregnancy evaluation of sickle cell disease



Prepregnancy Management of medications & immunization in sickle cell disease patient

Immunization	Give the vaccine for polyvalent pneumococcal; Hemophilus influenza type B, and meningococcal vaccines avoid pregnancy for four weeks after administration of a live vaccine.
Folic acid	Recommended dose 5mg /day
Iron chelators	Discontinue iron chelation therapy once conceive
Hydroxyurea	Discontinue hydroxyurea three months before conception
ACE inhibitors and ARBs	Discontinue this medication because it is teratogenicity
Prophylactic penicillin	penicillin therapy may be continued during pregnancy
Analgesia	NSAIDs avoided after 30 wks. because of the risk of premature closure of ductus arteriosus

Risk of sickle cell disease on pregnancy



Prenatal care of sickle cell disease “HbSS, HbSC, HbS/beta-thal

I.Early Pregnancy Assessment

1.Baseline Evaluation:

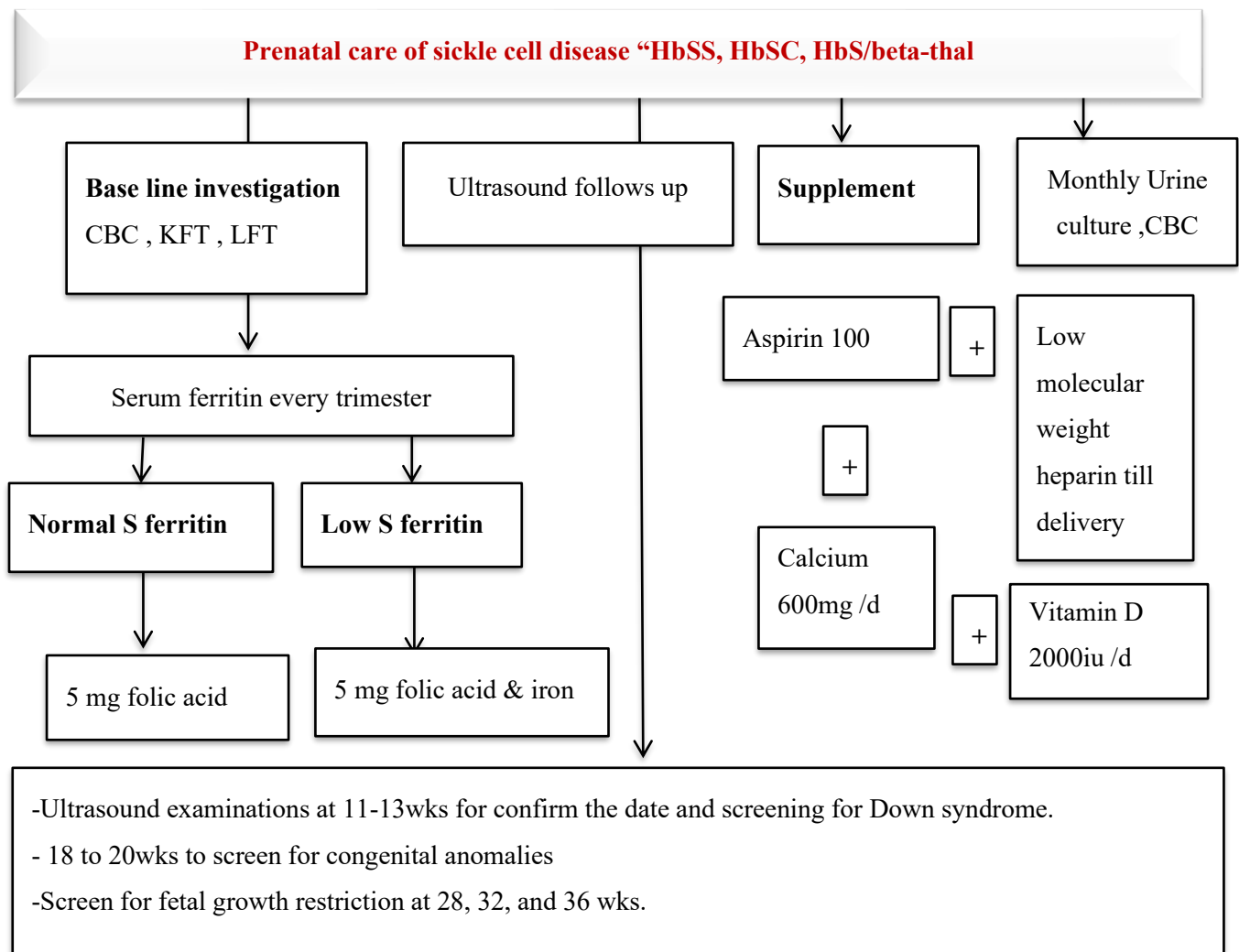
1.1. Perform a thorough medical assessment

1.2.perform complete investigation

a complete blood count (CBC), liver and kidney function tests

1.3. a review of any previous complications from SCD (e.g., prior strokes, organ damage, pain crises).

- **Fetal Monitoring:** Ultrasound to assess the gestational age and any fetal abnormalities. It's also important to monitor fetal growth, as SCD pregnancies are at risk for intrauterine growth restriction (IUGR).
- **Hemoglobin Electrophoresis:** Confirm the type of sickle cell disease (e.g., HbSS, HbSC, or HbS β 0-thalassemia).



2.Management of sickle cell disease during pregnancy

Management of sickle cell disease is A Multidisciplinary Team Approach include obstetricians, hematologists, maternal-fetal medicine specialists, genetic counselors, and pain management experts.

Prevention and monitoring

1. Prevention of painful crisis by hydration

2. Infection Prevention and Monitoring

Regular screenings for infections (urinary tract infections by urine culture & sensitivity and respiratory infections prevention by pneumococcal vaccinations)

3. Prevention of anemia

By Regular monitoring of hemoglobin levels is necessary.

If severe anemia occurs, blood transfusions may be considered.

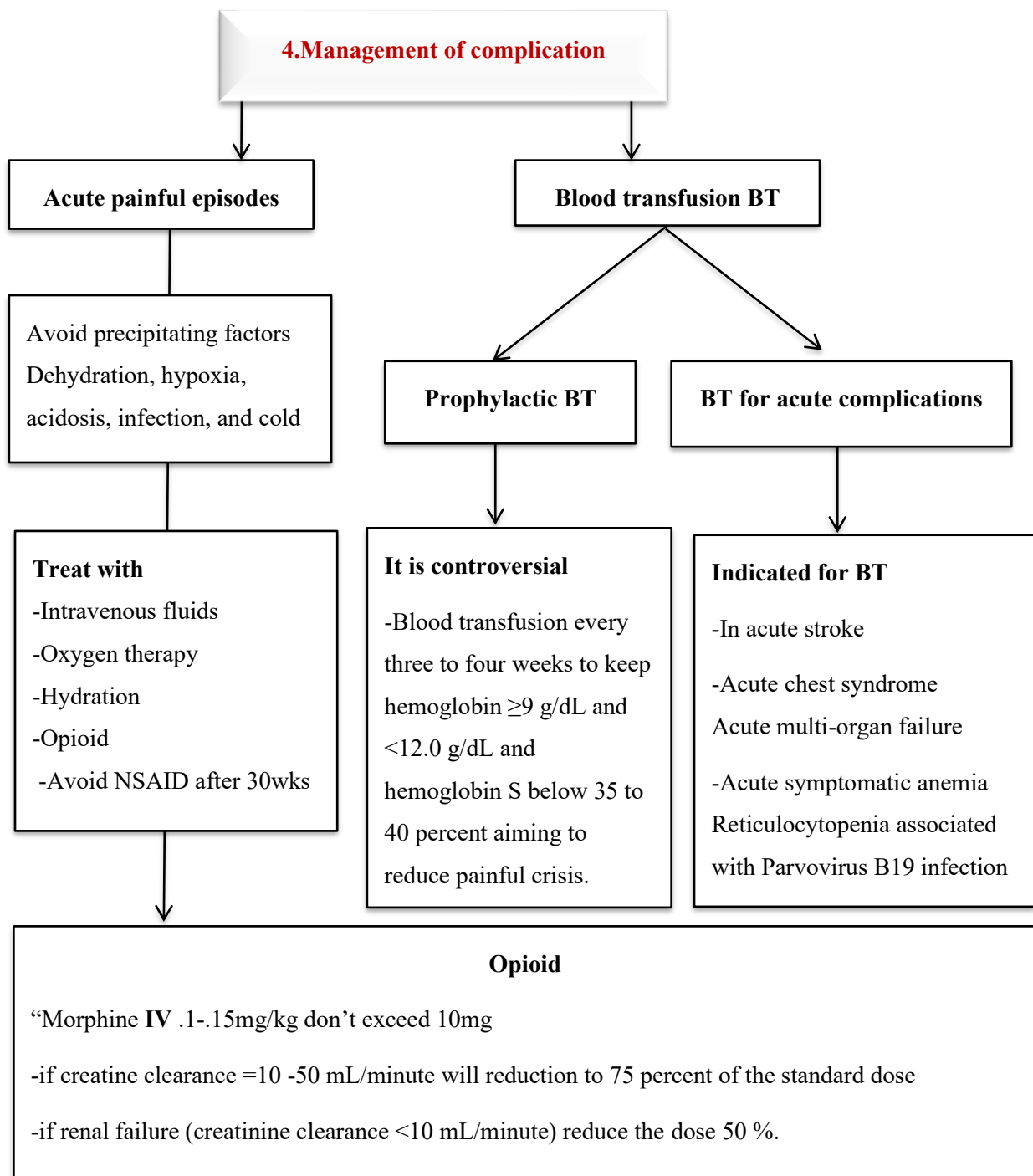
Iron supplementation should only be given if iron deficiency is confirmed

-by Folic Acid Supplementation 5mg from the 1st trimester on ward

3. prevention of thromboembolic disease

Give low molecular weight heparin according to the patient weight

5. prevention of hypertensive disease in pregnancy by given 100mg aspirin



Delivery Plan

1.Mode of Delivery: the aim to have vaginal delivery, keep the cesarean delivery for obstetric indication

2.Pain Management during Labor: Epidural analgesia is often the preferred method of pain relief during labor, as it allows for effective pain control without the risks associated with systemic opioids.

3.Close Monitoring during Labor: Continuous monitoring of both maternal and fetal well-being is essential, especially in women with more severe forms of SCD.

4.Postpartum Care: Close monitoring for any postpartum complications like infection, blood loss, or pain crises.

5.Encourage breast feeding Women should be encouraged to breastfeed if possible, as breastfeeding is generally safe and provides many benefits for both mother and baby.

Summary

Management of sickle cell disease (SCD) and thalassemia in pregnancy involves careful monitoring to prevent complications for both mother and baby. In SCD, hydration, pain management, and regular blood tests are key to preventing sickle cell crises and ensuring maternal well-being. Folic acid supplementation is recommended for both conditions to support red blood cell production. Blood transfusions may be needed in cases of severe anemia or during crises. Close fetal monitoring is essential to detect growth restrictions or other complications. For thalassemia, regular monitoring of hemoglobin levels is important, and iron chelation therapy may need to be adjusted. Multidisciplinary care, including obstetricians, hematologists, and genetic counselors, ensures optimal outcomes for both mother and fetus.

References

1. American College of Obstetricians and Gynecologists. (2022, August; reaffirmed 2024).

Hemoglobinopathies in pregnancy (Practice Advisory No. 78). ACOG.

Recommends **universal hemoglobinopathy testing** (via electrophoresis or molecular methods) at the initial prenatal visit, moving away from race-based strategies, with protocols for partner testing and prenatal diagnosis.

2. British Society for Haematology. (2024, May 8).

Guideline for the management of conception and pregnancy in thalassaemia syndromes. BSH.

A comprehensive UK-based guideline outlining screening pathways (FBC, hemoglobin electrophoresis, genetic testing), transfusion strategies, iron chelation management, and antenatal surveillance for different thalassemia syndromes.

3. World Health Organization. (2025, June 19).

WHO releases global guideline to improve pregnancy care for women with sickle cell disease. WHO.

Highlights recommendations on prenatal screening, folic acid/iron supplementation, infection and thrombosis prevention, prophylactic transfusions, and multidisciplinary care planning for SCD in pregnancy.

4. BSH & UK Guidelines Group. (2021; updated 2023).

Guidelines for the management of sickle cell disease in pregnancy. BSH.

Covers preconception screening, antenatal care, thromboprophylaxis, aspirin use, transfusion, pain crisis management, and delivery/postpartum planning tailored to SCD pregnant patients.

5.Sharma, D., et al. (2024).

Managing sickle cell disease and related complications in pregnancy: results of an international Delphi panel. *Blood Advances*, 8(4), 1018–1029.

Provides consensus-based recommendations on antenatal surveillance, hydroxyurea, transfusion methods, VTE prophylaxis, and delivery planning and identifies key research gaps.

Chapter 16

The Fading Shield

Thrombocytopenia during pregnancy

Accurate diagnosis of thrombocytopenia is crucial to guide safe maternal and fetal management

Thrombocytopenia in pregnancy is significant because it may indicate underlying conditions like preeclampsia, HELLP syndrome, or immune thrombocytopenia (ITP). It increases the risk of bleeding during delivery, especially if platelet counts fall below 50,000/ μ L

Thrombocytopenia during pregnancy define as a platelet count of less than 150,000/ μ L (150×10^9 /L).

Cause of Thrombocytopenia during pregnancy

1. Gestational Thrombocytopenia

1. Mild and asymptomatic thrombocytopenia
2. No past history of thrombocytopenia
3. Occurrence during late gestation affect 5% of pregnant women in the 3rd trimester
4. Not associated with fetal thrombocytopenia
5. Spontaneously resolve after delivery

2. ITTP

1. Presence of isolated thrombocytopenia
2. can occur at any gestational age
3. May be indistinguishable from gestational thrombocytopenia if mild and occurs late during pregnancy.
4. Platelet count may improve after delivery

3. TTP-HUS

1. Thrombocytopenia and microangiopathic hemolytic anemia without an alternative etiology.
2. cannot be distinguishable from severe preeclampsia or HELLP syndrome.
3. associated with severe neurologic abnormalities and acute renal failure
4. Persistent of the condition for ≥ 3 days after delivery
5. Typically, late in gestation, frequency increases as term approaches. May occur after delivery.

4. Antiphospholipid syndrome thrombocytopenia

1. Can occur at any gestational age
2. history of ≥ 3 abortion less than 10 wks. gestation or ≥ 1 loss ≥ 10 weeks or < 34 -week delivery secondary to preeclampsia or placental insufficiency, Arterial or venous thrombosis
3. Associated with any of antiphospholipid antibodies: (Lupus anticoagulant, Anticardiolipin antibody, Anti- $\beta 2$ glycoprotein-I)

5. Drug induce TTP

1. can occur at any gestational age.
2. Complete history of drug ingestion, including non-prescription drugs.
3. Thrombocytopenia typically resolves in five to seven days after stopping the drug.
4. Heparin-induced thrombocytopenia platelet drop by 50% of platelet count for patient begun heparin within previous 5 to 10 days.
5. ELISA assay for heparin-dependent antibodies is sensitive; measurement of heparin-induced platelet serotonin release is more specific.

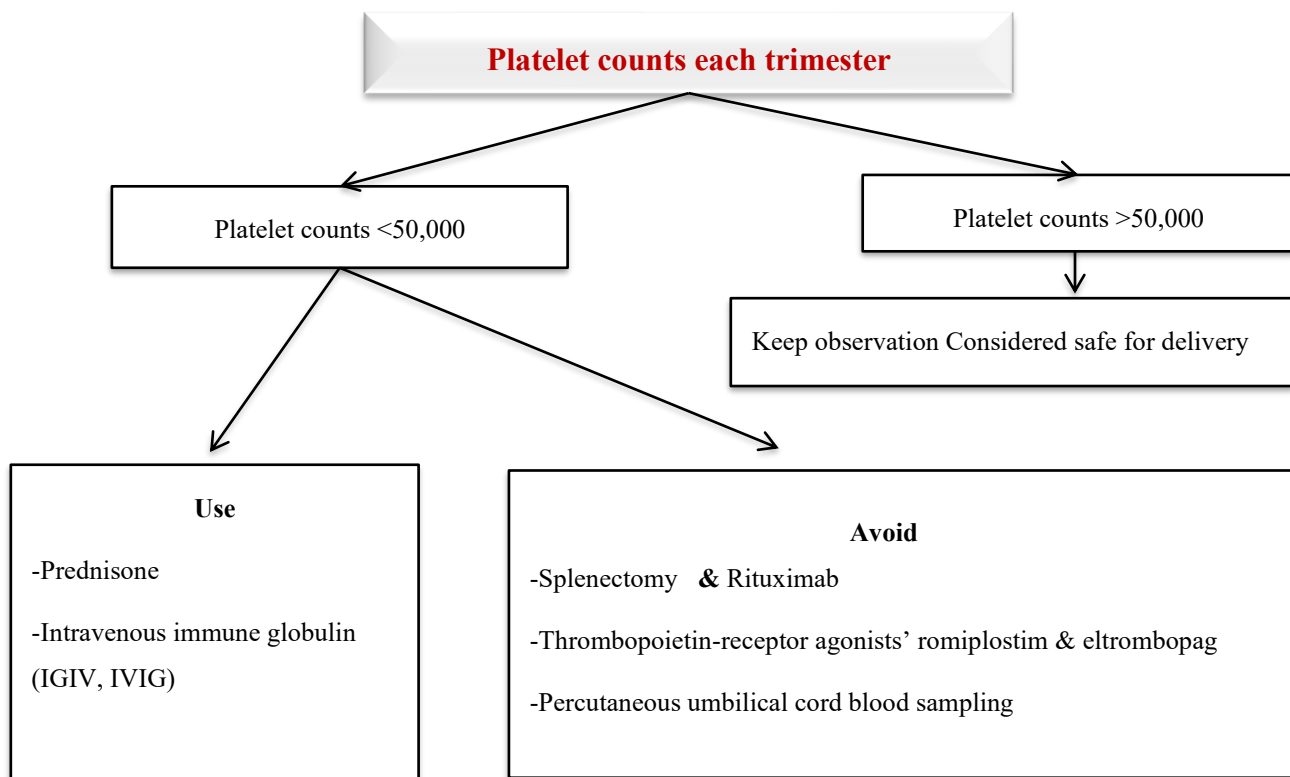
Comparison between the causes of thrombocytopenia

Feature	Gestational Thrombocytopenia (GT)	Immune Thrombocytopenic Purpura (ITP)	Thrombotic Thrombocytopenic Purpura (TTP)	Haemolytic Uremic Syndrome (HUS)	Preeclampsia
Onset	2nd/3rd trimester	Can occur anytime during pregnancy	Can occur anytime during pregnancy	Usually after delivery or during pregnancy	20 weeks gestation or later
Platelet Count	Mild (often >70,000 cells/ μ L)	<100,000 cells/ μ L	Very low (<30,000 cells/ μ L)	Low platelet count	Variable, often <100,000 cells/ μ L
Associated Symptoms	Often asymptomatic	Bruising, petechiae	Symptoms of haemolysis, neurological issues	Diarrheal, renal impairment	High blood pressure, proteinuria, edema
Cause	Unknown; dilutional effect	Autoimmune destruction of platelets	Microangiopathic haemolytic anaemia	Shiga toxin-producing E. coli	Placental dysfunction
Lab Findings	Mild thrombocytopenia	Isolated thrombocytopenia	Thrombocytopenia, haemolytic anaemia, schistocytes	Thrombocytopenia, haemolytic anaemia	Thrombocytopenia, elevated liver enzymes
Fetal Risks	Generally low risk	Risk of fetal ITP	High risk of fetal complications	High risk of fetal complications	Risk of fetal growth restriction, placental abruption
Management	Monitoring; usually resolves postpartum	Monitor; possible treatment with steroids or IVIG	Immediate treatment; plasma exchange	Supportive care; manage renal function	Antihypertensives; delivery may be necessary
Prognosis	Excellent; resolves after delivery	Good with treatment; may persist postpartum	Serious; can be life-threatening	Serious; can lead to renal failure	Good with timely intervention

Classification by Severity

Severity	Platelet Count
Mild	100,000–149,000/ μ L
Moderate	50,000–99,000/ μ L
Severe	<50,000/ μ L

Management of patient with ITTP during pregnancy & delivery



Intrapartum care for patients with thrombocytopenia

1. Forceps and vacuum assisted delivery are relatively contraindicated, if it is indicated use forceps rather than vacuum assisted deliver
2. Cesarean delivery reserved only for standard obstetrical indications
3. Thrombocytopenia can increase the risk of postpartum hemorrhage (PPH), a potentially life-threatening condition.

The management of PPH in patients with thrombocytopenia includes:

1. Active Management of the Third Stage of Labor: Use uterotonics to help the uterus contract and reduce bleeding after delivery.
2. Platelet Transfusion: In cases of severe thrombocytopenia, especially when platelet counts fall below 50,000, platelet transfusion may be necessary to reduce the risk of bleeding.
3. Blood Product Support: Along with platelet transfusions, blood products like red blood cells may be needed if the patient experiences significant blood loss.

Postnatal care for patients with thrombocytopenia

After delivery, thrombocytopenia can either improve or persist, depending on the underlying cause.

Depending on the underlying cause, postnatal care will vary. The main conditions causing thrombocytopenia during pregnancy are gestational thrombocytopenia, immune thrombocytopenic purpura (ITP), preeclampsia, and HELLP syndrome.

1. Post natal care of Gestational Thrombocytopenia

Recovery after Delivery Platelet counts usually normalize within a few weeks postpartum. repeat platelet count 6 week post natal to ensure they return to normal.

2. Immune Thrombocytopenic Purpura (ITP)

Refer the patient for haematologist for continued Treatment: Patients with ITP may need treatment to maintain platelet counts, such as corticosteroids (e.g., prednisone) or intravenous immunoglobulin (IVIg) or Platelet Transfusions

3. Preeclampsia and HELLP Syndrome

Women who experienced preeclampsia or HELLP syndrome require close monitoring for any complications that could arise after delivery, such as Postpartum Hypertension: Patients who had preeclampsia should be monitored for elevated blood pressure after delivery, as preeclampsia can lead to persistent hypertension.

4. Breastfeeding: is safe for most women with thrombocytopenia, including those with ITP, as long as their platelet count is sufficiently high to prevent bleeding complications.

4. Neonatal Monitoring

in cases of ITP, there is a risk that her antibodies could affect the baby's platelet count, leading to neonatal thrombocytopenia.

Neonatologist should be monitor for any complication The neonate should be monitored for low platelet counts in the first 24–48 hours of life. If the baby has a platelet count below 50,000, further intervention may be required.

Summary

Management of thrombocytopenia during pregnancy involves identifying the underlying cause and monitoring platelet levels. Common causes include gestational thrombocytopenia (GT), which usually resolves postpartum, and more serious conditions like immune thrombocytopenic purpura (ITP) or preeclampsia. For GT, no specific treatment is required, but platelet counts should be monitored regularly. In cases of ITP, corticosteroids or intravenous immunoglobulin (IVIg) may be used to raise platelet counts. For severe thrombocytopenia, platelet transfusions may be necessary, especially before delivery or in the case of bleeding complications.

In preeclampsia, managing blood pressure and monitoring for organ damage are key. Close monitoring of maternal and fetal health ensures timely intervention and reduces risks.

HUS can arise from infections and affects renal function, requiring careful management.

Preeclampsia involves hypertension and may necessitate early delivery depending on severity.

References

1. European Hematology Association Working Group on Hemoglobinopathies. (2023).

Diagnosis and management of hemostasis disorders—including thrombocytopenia and thrombotic risk—in hemoglobinopathies during pregnancy. Journal of Hematology & Thromboembolic Disorders, 15(2), 45–60.

Comprehensive review covering platelet count trends in pregnancy with SCD/thalassemia, causes (e.g., hypersplenism, ITP), and management approaches including transfusion and thromboprophylaxis.

2. Cappellini, M. D., et al. (2024).

Thrombotic and bleeding complications in pregnant women with hereditary hemoglobinopathies: Results from the GOOD-PREG Registry. Haematologica, 109(4), 876–885.

Large multi-center registry highlighting rates of thrombocytopenia, bleeding, and thrombotic events; suggests tailored LMWH prophylaxis and platelet transfusion for count $<50 \times 10^9/L$ or bleeding diathesis.

3. British Society for Haematology & RCOG. (2022, October).

Management of pregnancy-associated thrombocytopenia in hemoglobinopathy patients: Joint guideline.

Consensus guidance on differentiating thrombocytopenia due to SCD/thalassemia vs. GEST-ITP or preeclampsia.

Offers diagnostic algorithm and management strategies including when to transfuse, use IVIG, or initiate thromboprophylaxis.

4. Oteng-Ntim, E. (2022).

Evidence-based management of pregnant women with sickle cell disease in high-income countries. Hematology, ASH Education Program, 2022(1), 408–413.

Discusses hematologic complications including thrombocytopenia, use of LMWH for VTE prevention in hospitalized or low platelet count patients, and transfusion strategies balancing anemia and platelet support

5. Russo, C., et al. (2023).

Pregnancy outcomes and hemorrhagic risk in thalassemia intermedia: A multicenter cohort study. International Journal of Gynecology & Obstetrics, 163(1), 120–128.

Focuses on platelet trends, spleen-related sequelae, antenatal monitoring, and outcomes; supports platelet transfusion before delivery if count $<75 \times 10^9/L$, and LMWH postpartum for 6 weeks .

Chapter 17

The Passing Shadow

VI. Rh and other blood group alloimmunizations

Rh and other blood group alloimmunizations

occur when a pregnant woman develops antibodies against fetal red blood cells due to blood group incompatibility. This immune response can lead to hemolytic disease of the fetus and newborn (HDFN), causing anemia, jaundice, or even fetal death. Routine antenatal screening for maternal blood type and antibodies is essential. Early detection and appropriate interventions, such as anti-D immunoglobulin, can prevent or reduce complications.

Management of women with Rh and other blood group alloimmunizations

History and Screening

1. Review of past obstetric history
2. History of Rh incompatibility
3. History of previous pregnancies which baby had Hemolytic disease of the newborn, jaundice, or needed a blood transfusion. This history helps assess the potential risk and the need for treatment (e.g., Rh immunoglobulin).
4. History of any incidence which can lead to the development of antibodies against the Rh like miscarriage, trauma, invasive procedures like amniocentesis, CVS or childbirth

Blood Typing and Rh Status:

1. Confirm the woman's Rh status.
2. Determining the father's Rh status
- 3. The indirect Coombs test ICT**
4. If ICT positive that means the woman is sensitized and needs to follow the pregnancy as high risk pregnancy if ICT negative should administer **RhoGAM** at 28 weeks to prevent sensitization

Optimizing Maternal Health Before Conception

1. Ensuring adequate hemoglobin levels before conception
2. Ensure up-to-date vaccinations, especially for **rubella** and **varicella**.
- 3. Folic Acid Supplementation:** Starting folic acid supplementation (400- 800µg daily) before conception reduces the risk of neural tube defects.
- 4. Healthy Diet and Exercise**
- 5. Avoiding alcohol, smoking, and drug use**

When to give Rh Immunoglobulin (RhoGAM) ?

Rh Ig Administration: IgG should be administered at any time the sensitization may occur

1. Any bleeding during pregnancy

2. During Pregnancy at **28 weeks** gestation to any Rh-negative woman

3. It is also given after any event that could cause fetal blood cells to enter the maternal bloodstream

*amniocentesis

* trauma

*miscarriage

* Ectopic pregnancy

4. **Postpartum:** If the baby is Rh-positive, the Rh-negative mother will be given Rh Ig within **72 hours of delivery** to prevent the formation of antibodies.

Repeat Antibody Screening:

- Rh-negative pregnant women should have blood tests (indirect Coombs test) at **28 weeks** to check for Rh antibodies. If antibodies are present, further management (including frequent fetal monitoring) will be required.

Fetal Monitoring

If Rh sensitization occurs there is a risk of **haemolytic disease of the newborn** (HDN). The severity of HDN depends on the level of antibodies present in the mother's blood.

- **Ultrasound:** Regular ultrasounds are performed to monitor for signs of fetal anemia, including **hydrops fetalis** (fluid accumulation in the fetus).
- **Doppler Ultrasound:** To assess the fetal middle cerebral artery (MCA) peak systolic velocity, a sign of fetal anemia caused by HDN. This is used to detect early signs of anemia.

- **Amniocentesis or Cordocentesis:** In some cases, **amniocentesis** or **cordocentesis** (sampling fetal blood from the umbilical cord) can be used to directly assess fetal haemoglobin levels and determine if a blood transfusion is needed.

Management of Rh Sensitization or HDN

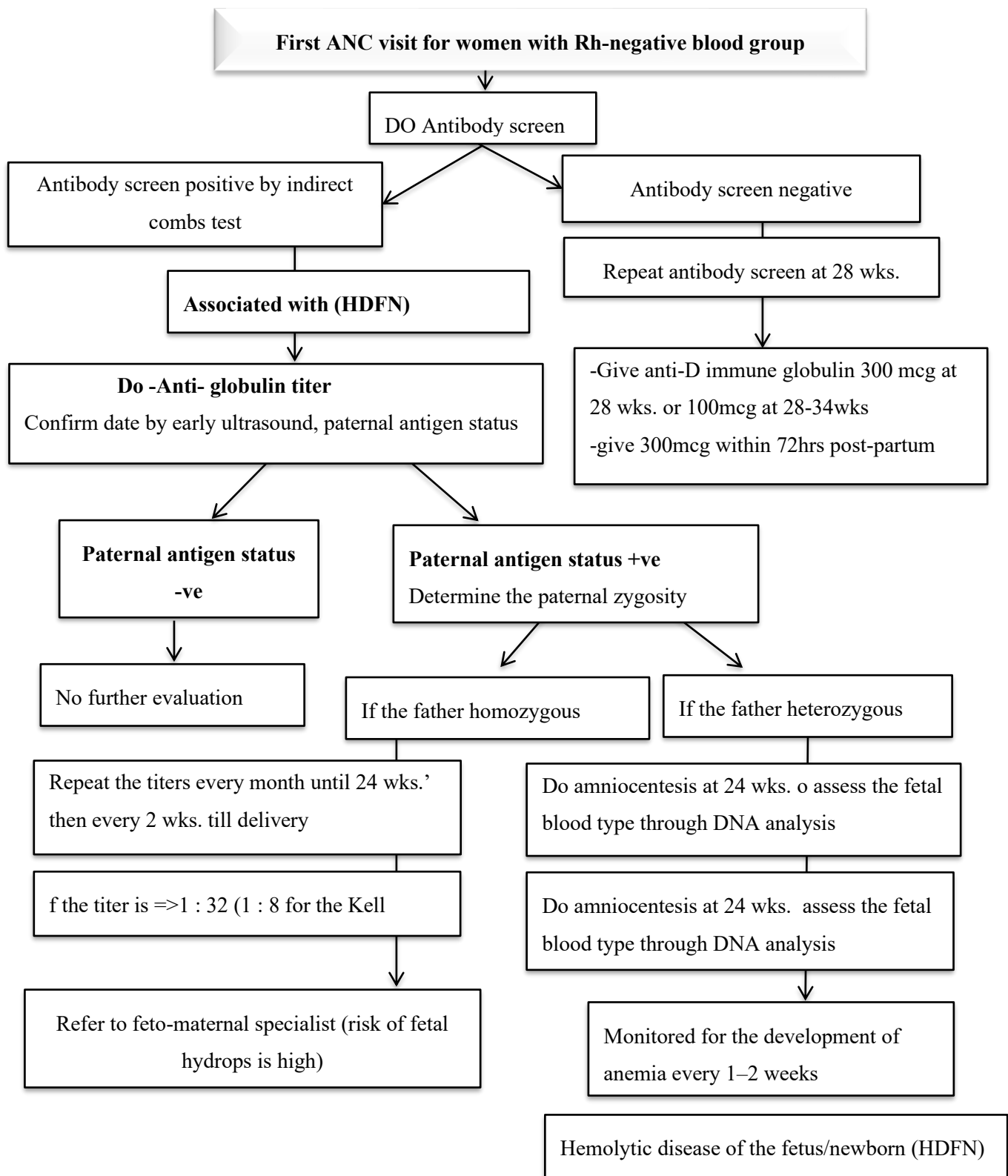
If Rh sensitization occurs, careful management is needed to reduce the risk to the fetus:

- **Intrauterine Blood Transfusion:** If fetal anemia is detected, the fetus may require **intrauterine blood transfusion** around **28-34 weeks** if there is severe anemia.
- **Preterm Birth:** In severe cases of HDN or when intrauterine blood transfusions fail, preterm birth may be necessary to deliver the baby early to avoid further complications.

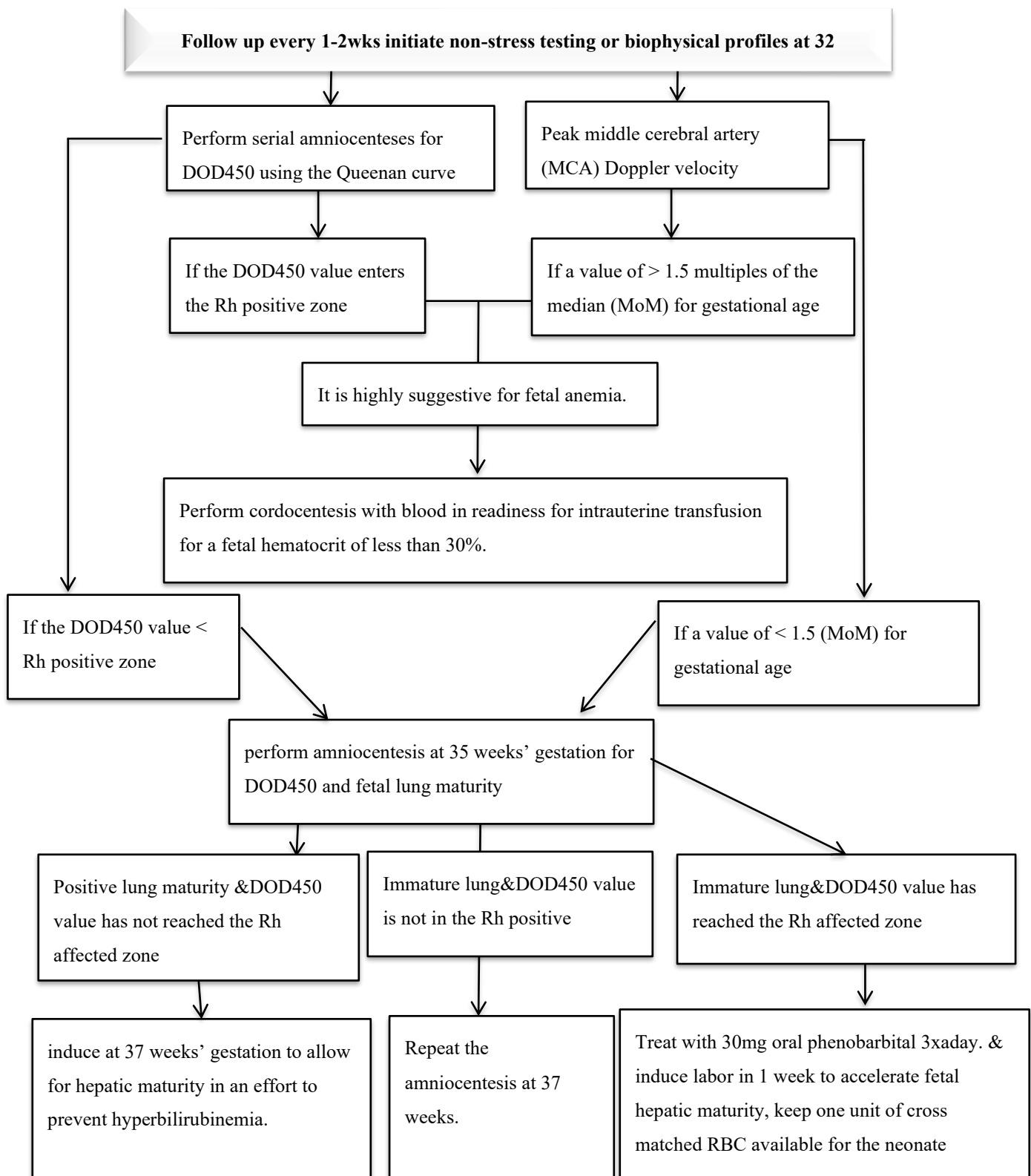
Monitoring During Labor and Delivery

- **Delivery Plan:** If the baby is Rh-positive, the care team will prepare for potential complications.
- **Newborn Monitoring:** Newborns born to Rh-negative mothers are monitored for jaundice, which can be a sign of HDN. If significant jaundice or anemia occurs, the baby may require treatment such as **phototherapy** or **exchange transfusion**

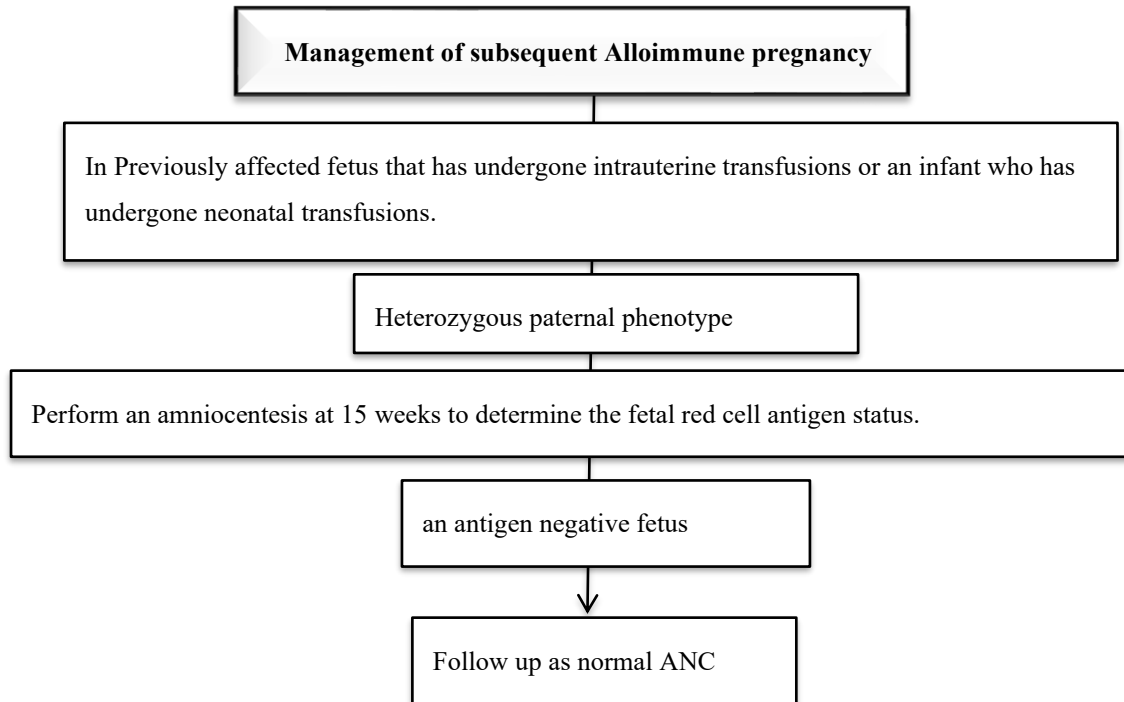
Follow up of Rh-negative blood group women



ANC follow up and Monitored for the development of fetal anemia



Management of subsequent Alloimmune pregnancy



Summary

Management of Rh-negative women in pregnancy focuses on preventing Rh incompatibility and hemolytic disease of the newborn. If the father is Rh-positive, the risk of Rh sensitization is higher, so **Rh immunoglobulin (RhIG)** is administered at 28 weeks and within 72 hours after delivery if the baby is Rh-positive. RhIg is also given after any event that may cause fetal blood cells to mix with maternal blood, such as trauma or invasive procedures. Regular monitoring of the mother's antibody levels is conducted. In case of Rh sensitization, further monitoring of fetal health is necessary. Early identification and intervention reduce risks like fetal anemia or jaundice. Careful management helps ensure a healthy pregnancy and newborn outcome.

References

1. Savoia, H. F., Parakh, A., & Kane, S. C. (2025, May 15).

How I manage pregnant patients who are alloimmunized to RBC antigens. Blood, 145(20), 2275–2282.

Detailed clinical guidance on monitoring for fetal anemia via MCA-PSV, managing high-risk antibodies, and maternal transfusion considerations during acute bleeding

2. Adani, A., Nardoza, L. M. M., Araujo Jr, E. F. J., & Santana, E. F. M. (2024, March 15).

Non-RhD alloimmunization in pregnancy: An updated review. Revista Brasileira de Ginecologia e Obstetrícia, 46, e-rbgo22.

Covers non-RhD blood group alloantibodies (e.g., Kell, Duffy, Kidd, MNS), their prevalence, clinical significance, and recommended antenatal management

3. Adani, M., et al. (2024).

Red blood cell alloimmunization in pregnancy: A review of pathophysiology, prevalence, and risk factors. Transfusion Medicine Reviews.

Highlights risk factors for alloimmunization (transfusion history, fetomaternal hemorrhage), laboratory testing methods, and prevention strategies

4. Alloimmunization and hyperhemolysis in sickle cell disease. (2023).

Hematology, ASH Education Program, 2023(1), 653–663.

Explores RBC alloimmunization in SCD, delayed hemolytic transfusion reactions (DHTR), prophylactic Rh/C/E/K matching, and immunomodulatory approaches

5. El-Naggar, A., et al. (2024).

Alloimmunization and autoimmunization among multitransfused thalassemia and sickle cell disease patients. Pediatric Hematology Oncology Journal, 9(3), 200–206.

A comprehensive analysis of alloimmunization rates (~18–19%), antigen-matching protocols, RH genotyping benefits, and implications for obstetric transfusion planning

Chapter 18

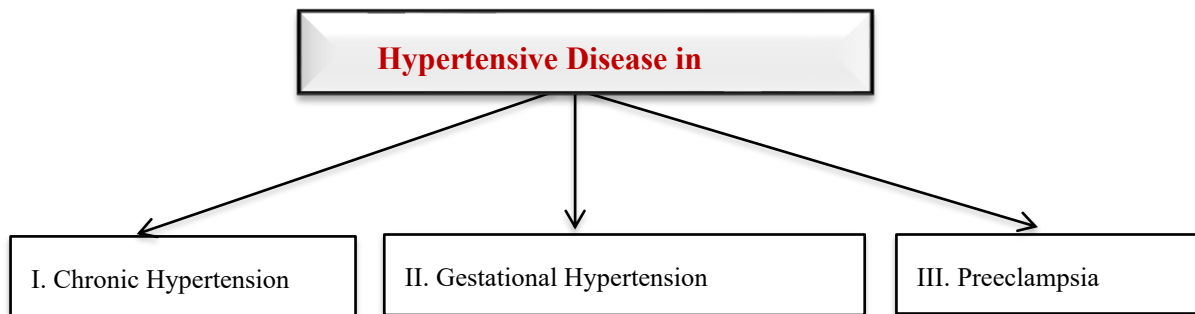
Awakening the Old Wolf

Medical disease in pregnancy

Hypertension In Pregnancy

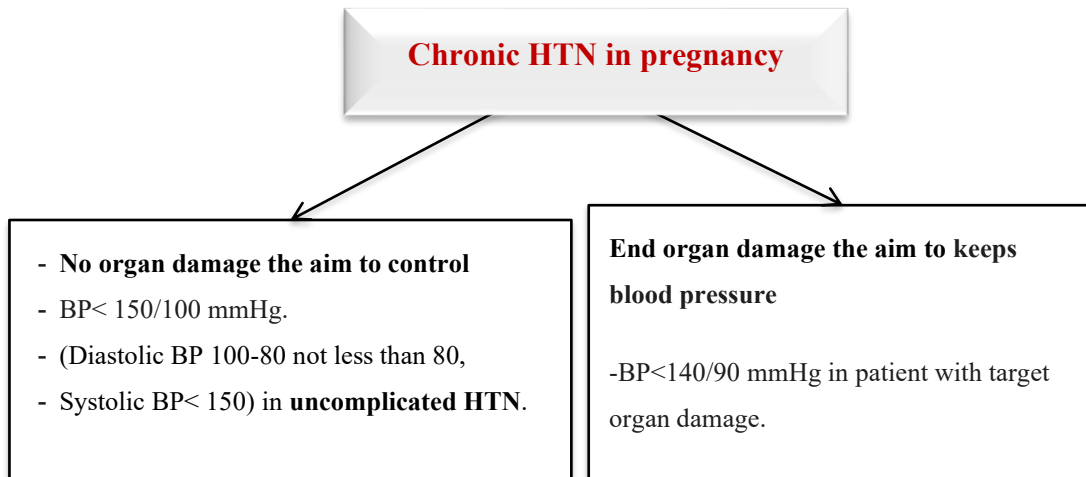
Hypertension in pregnancy

is a common complication affecting approximately 5–10% of pregnancies. It includes chronic hypertension, gestational hypertension, and preeclampsia. This condition poses significant risks to both maternal and fetal health, including preterm birth and placental abruption. Early diagnosis, close monitoring, and timely intervention are critical to optimizing outcomes.



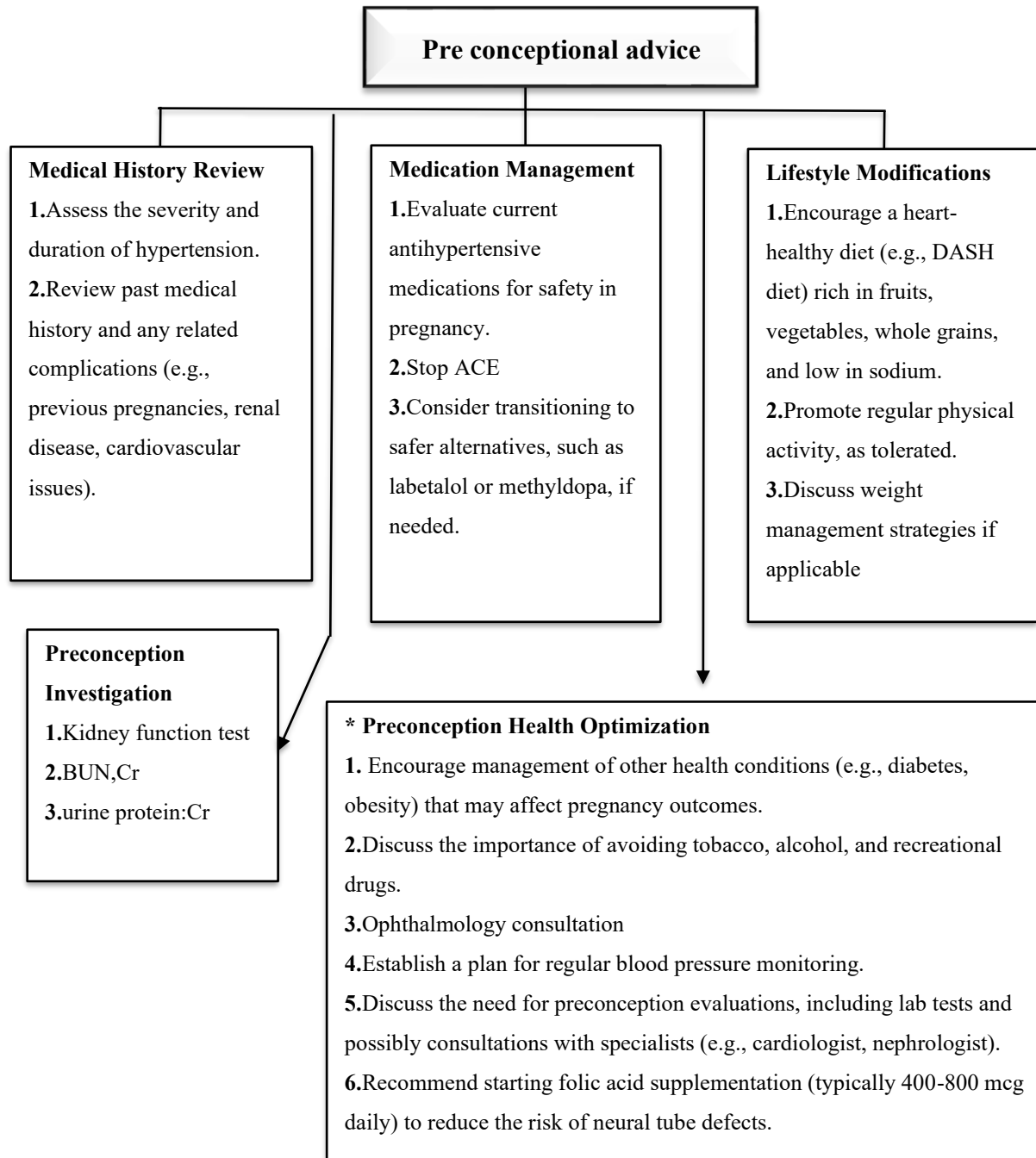
I.Chronic hypertension in pregnancy

Definition of chronic hypertension :consistently elevated blood pressure that persists over time. Specifically, it is diagnosed when a person's blood pressure readings are at or above 130/80 mmHg on two separate occasions.

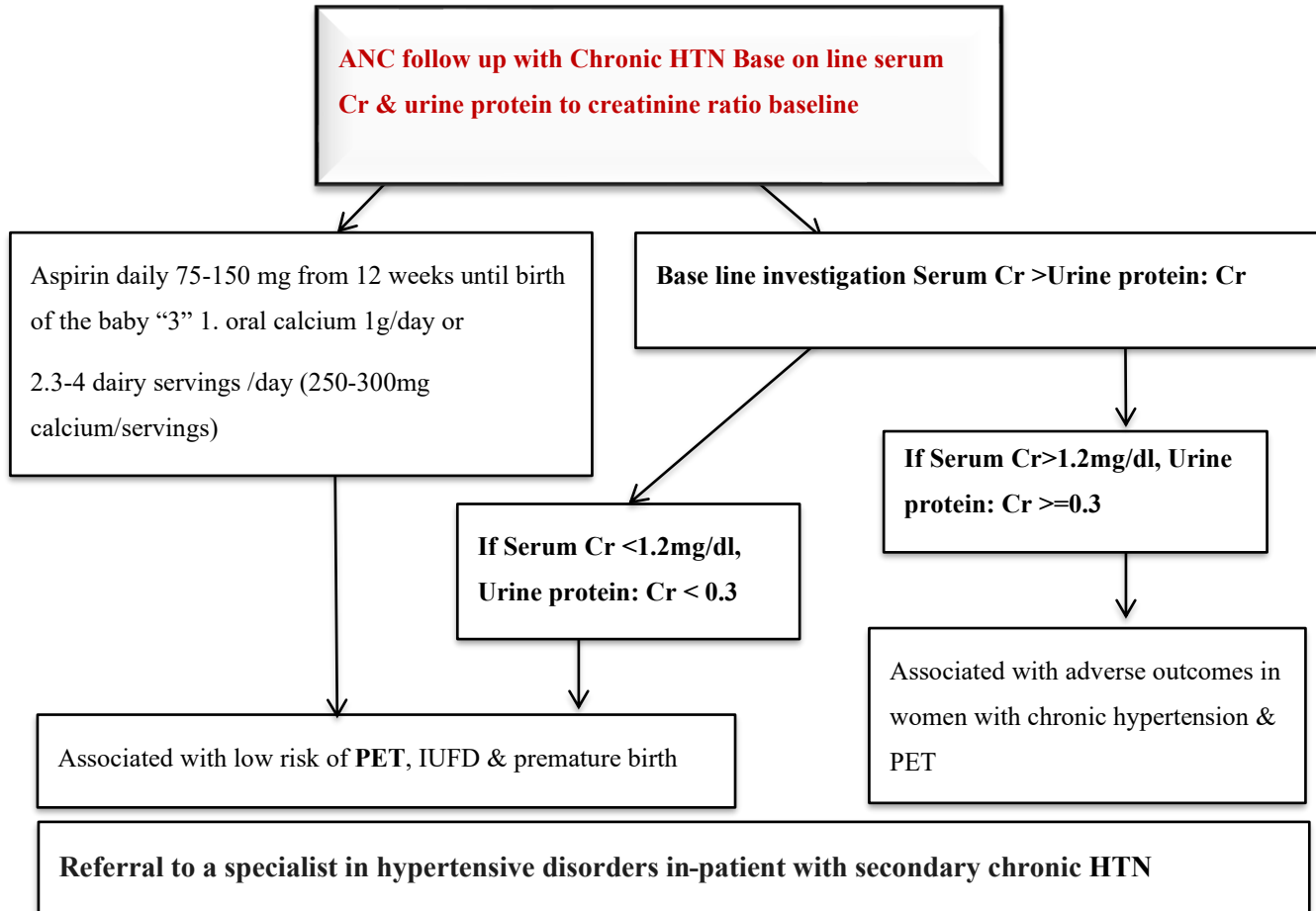


Prepreconceptional advice

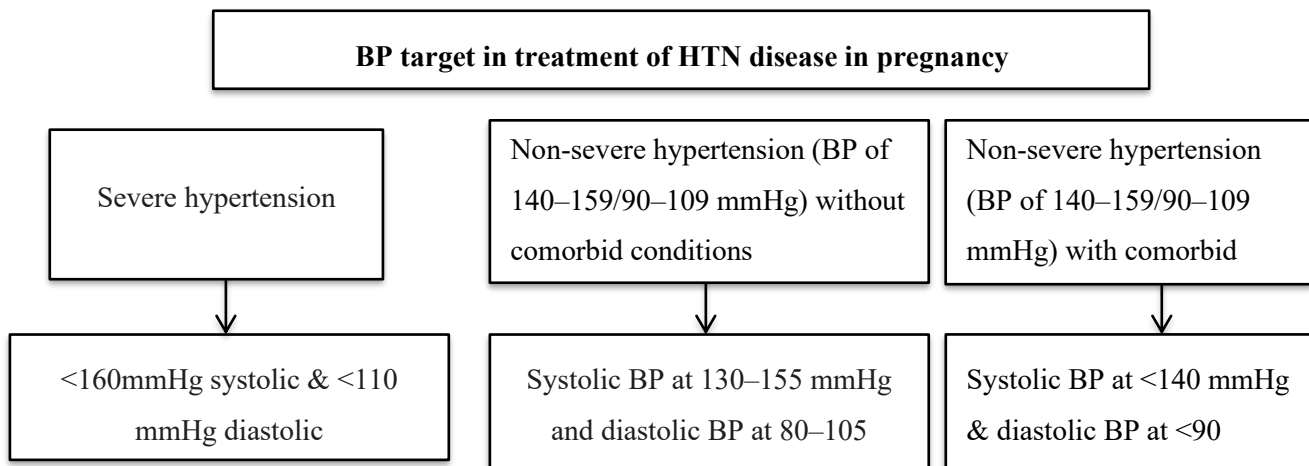
Preconceptionally counselling for patients with chronic hypertension is essential to optimize maternal and fetal health.



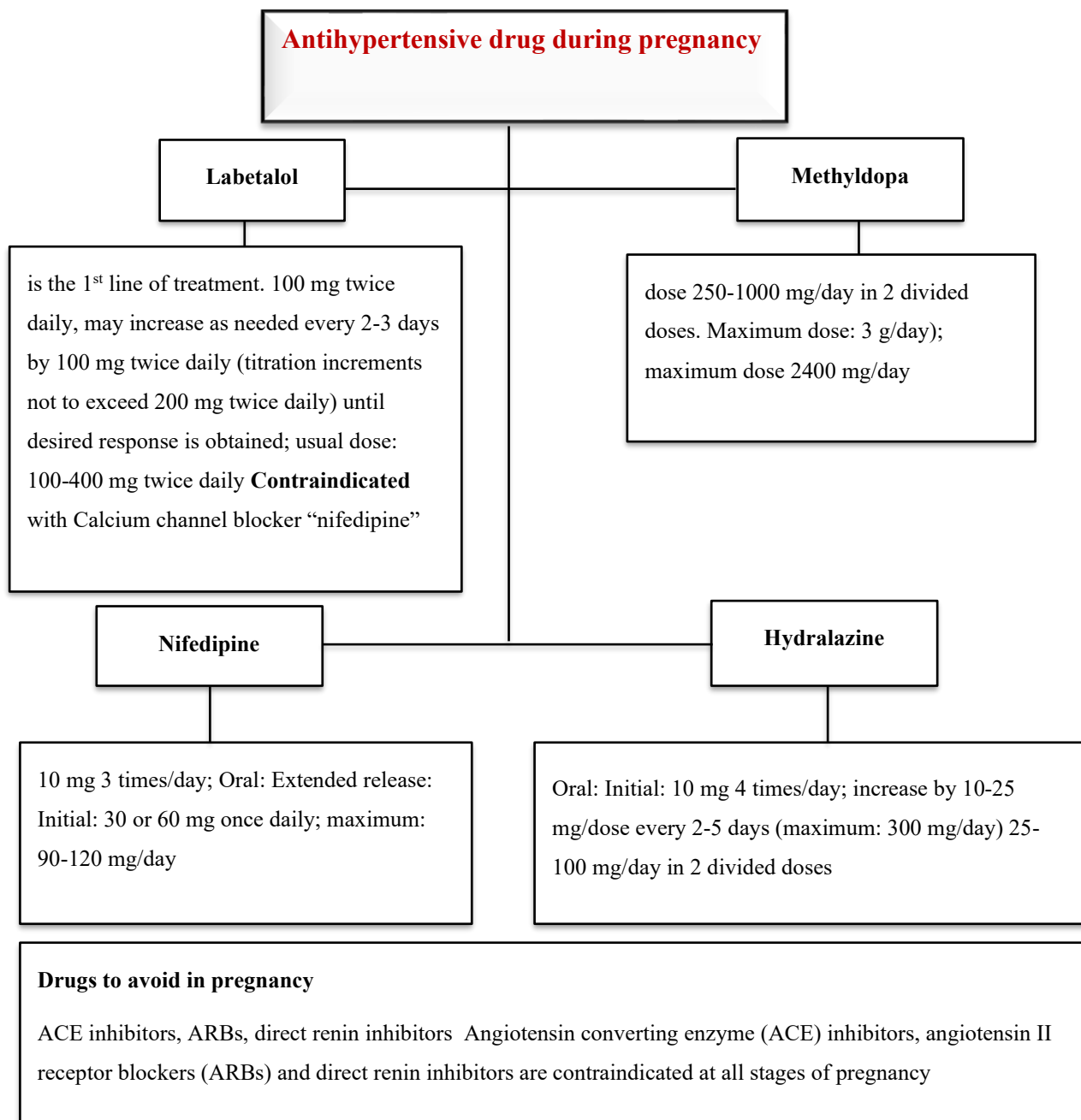
ANC follow up with chronic HTN



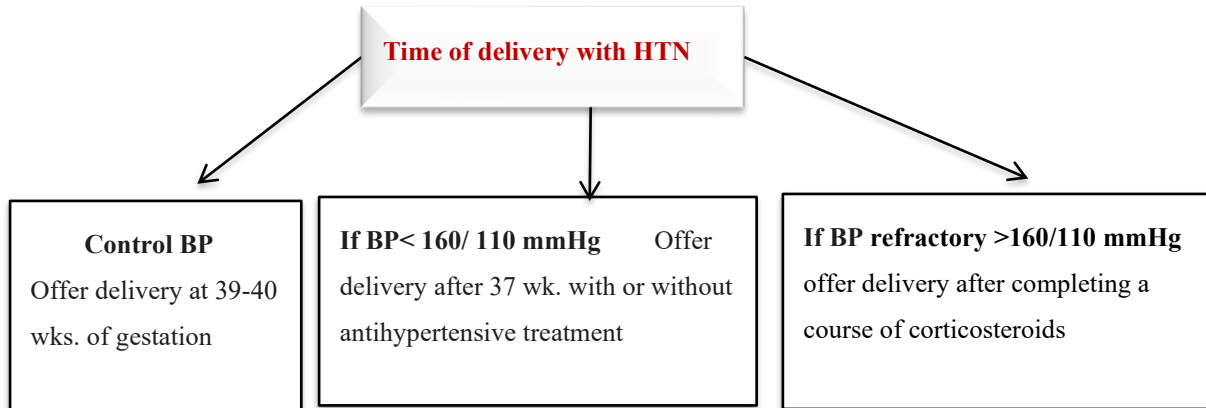
Target BP In Treatment of HTN Disease In Pregnancy



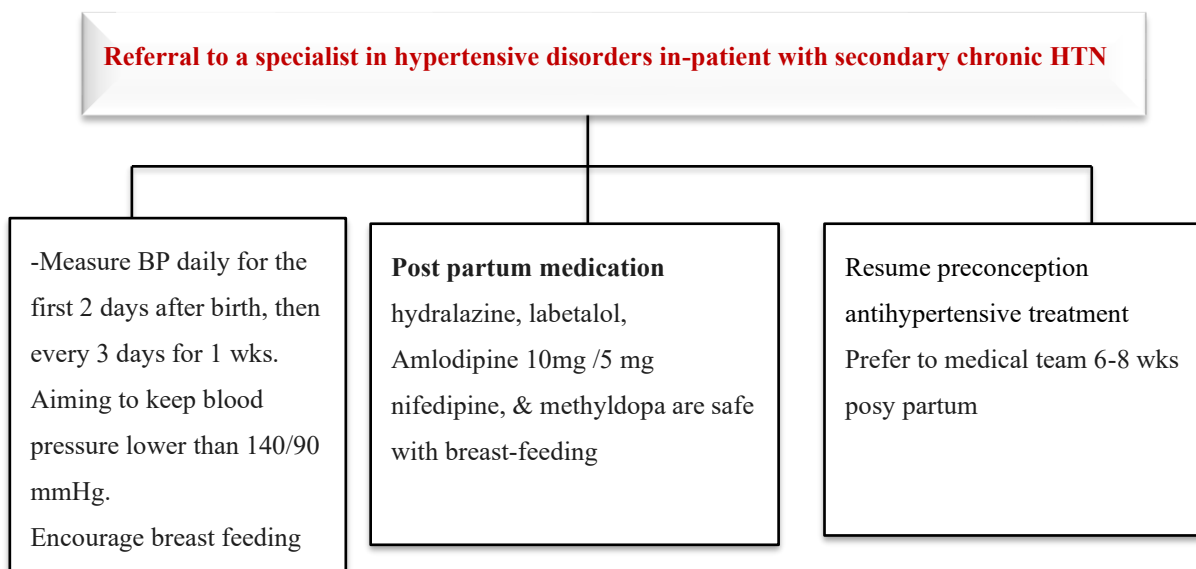
Antihypertensive drug during pregnancy



Time of delivery in chronic HTN patient



Post Partum Follow Up With Chronic HTN

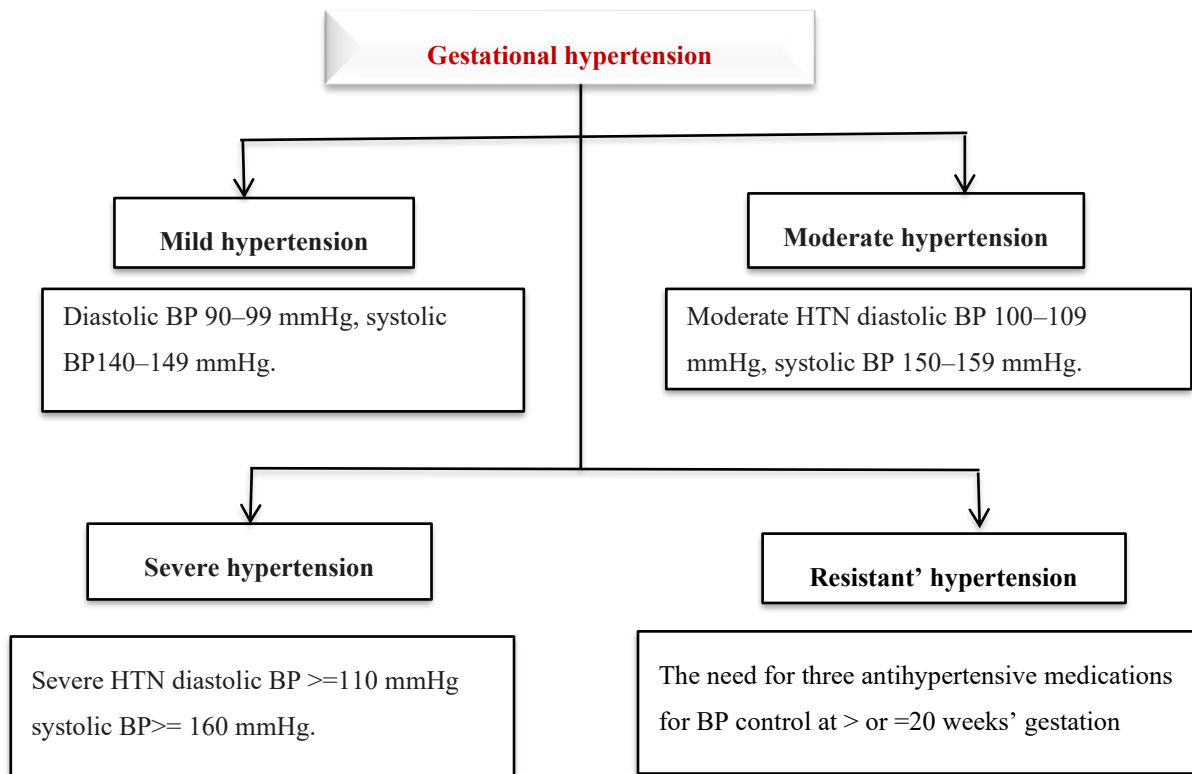


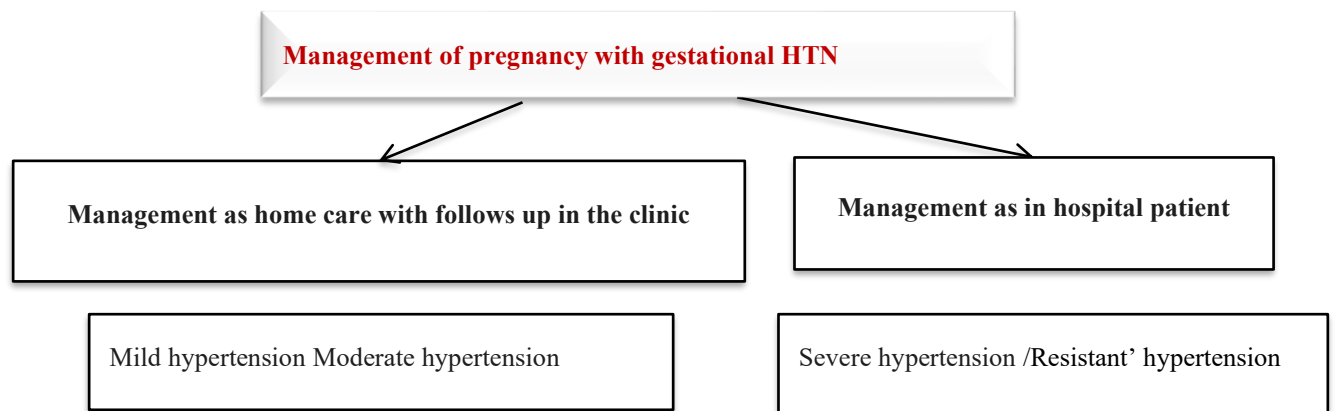
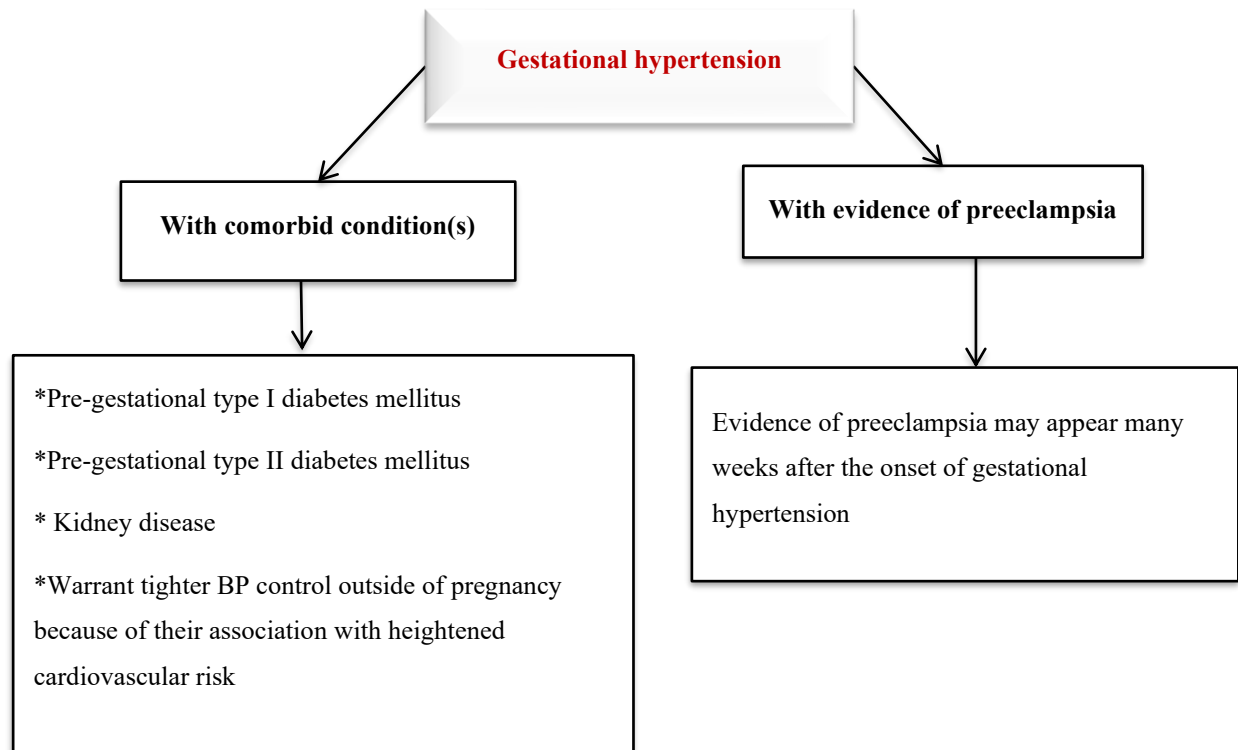
Summary of chronic HTN in pregnancy

Chronic hypertension in pregnancy is defined as high blood pressure diagnosed before pregnancy or before 20 weeks' gestation. It increases the risk of superimposed preeclampsia, fetal growth restriction, and placental abruption. Women with this condition require close monitoring and individualized management. Antihypertensive therapy is indicated if blood pressure exceeds 160/110 mmHg. Preconception counseling and early prenatal care are key to improving maternal and fetal outcomes.

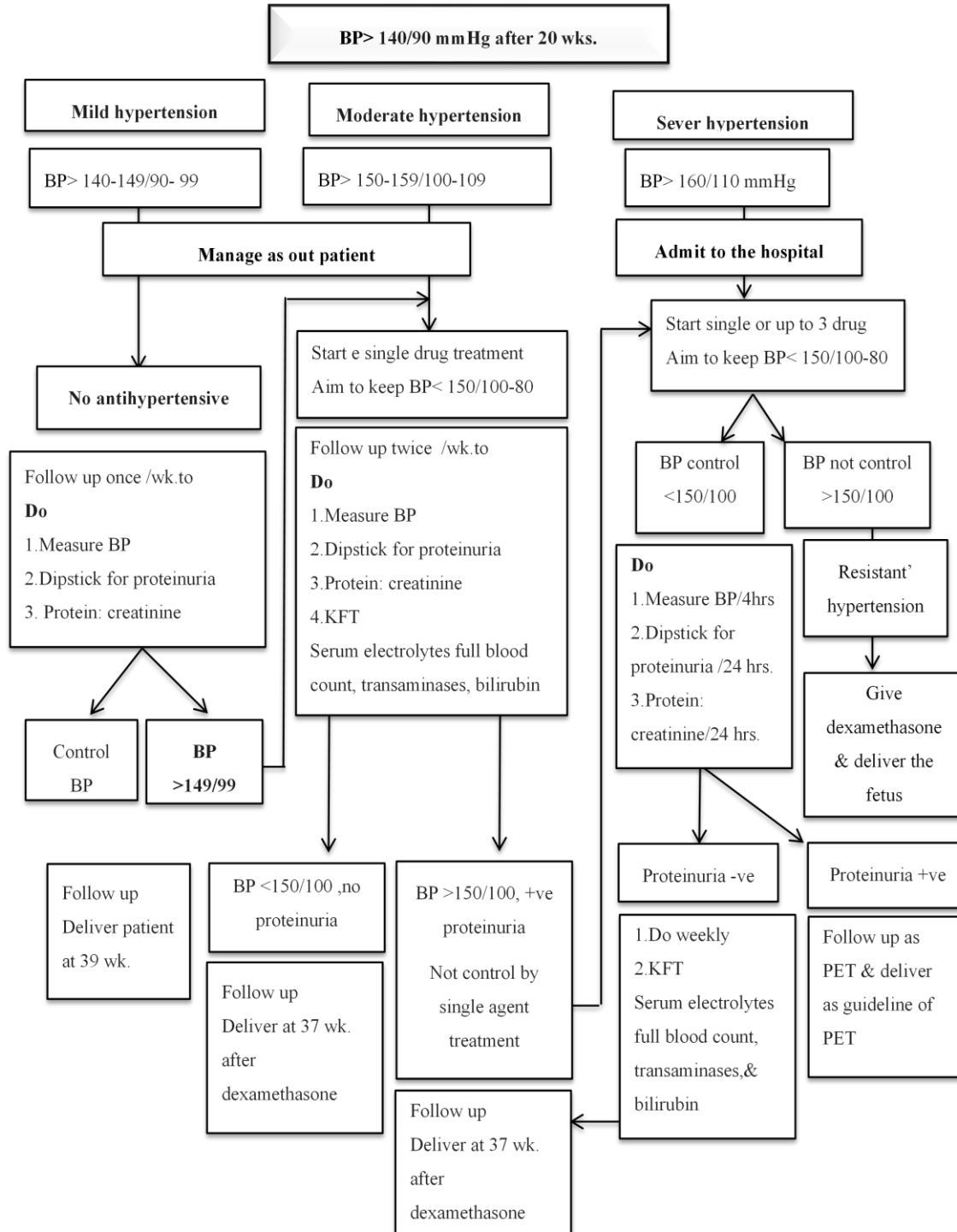
II. Gestational hypertension classification

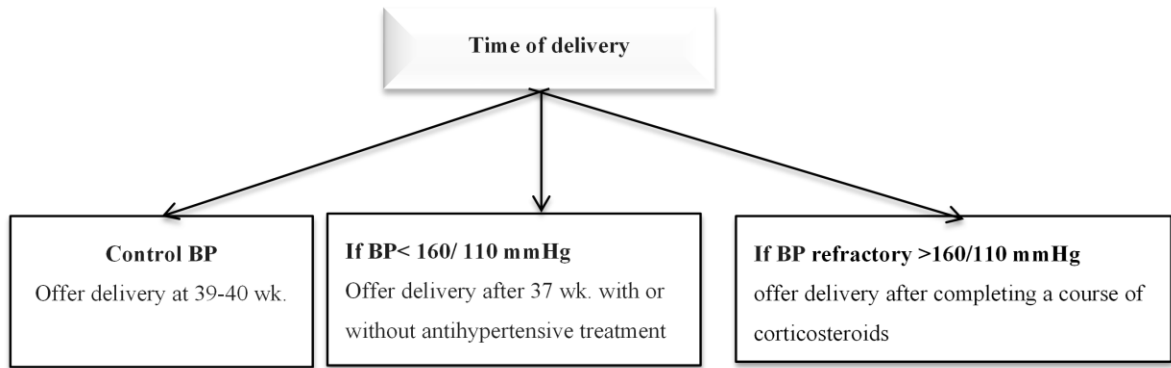
Gestational hypertension is defined as new-onset high blood pressure ($\geq 140/90$ mmHg) after 20 weeks of gestation without proteinuria or signs of end-organ damage. It typically resolves within 12 weeks postpartum. This condition may progress to preeclampsia, requiring close surveillance. Risk factors include first pregnancy, obesity, and a family history of hypertension. Early detection and regular monitoring are essential for maternal and fetal well-being.



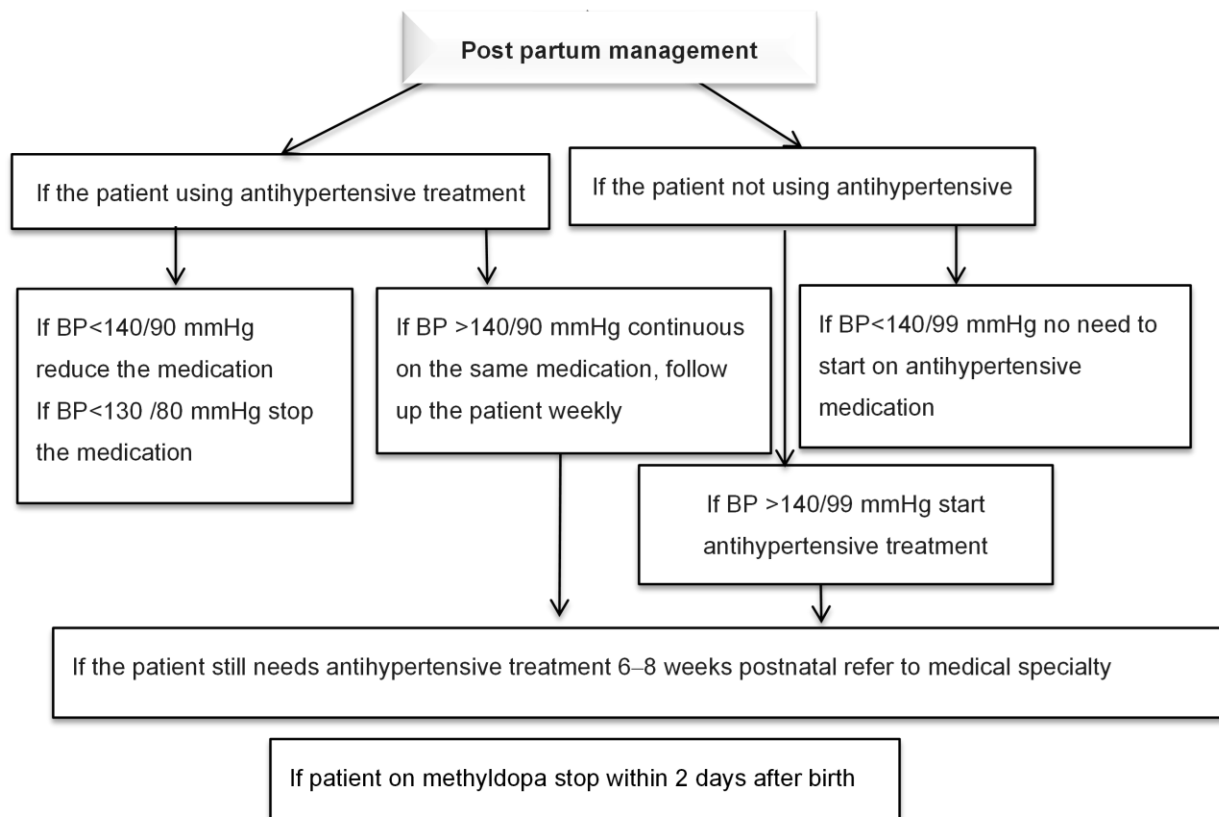


ANC follow up of patient with gestational hypertension





Postnatal investigation, monitoring and treatment



Summary of Management of gestational hypertension

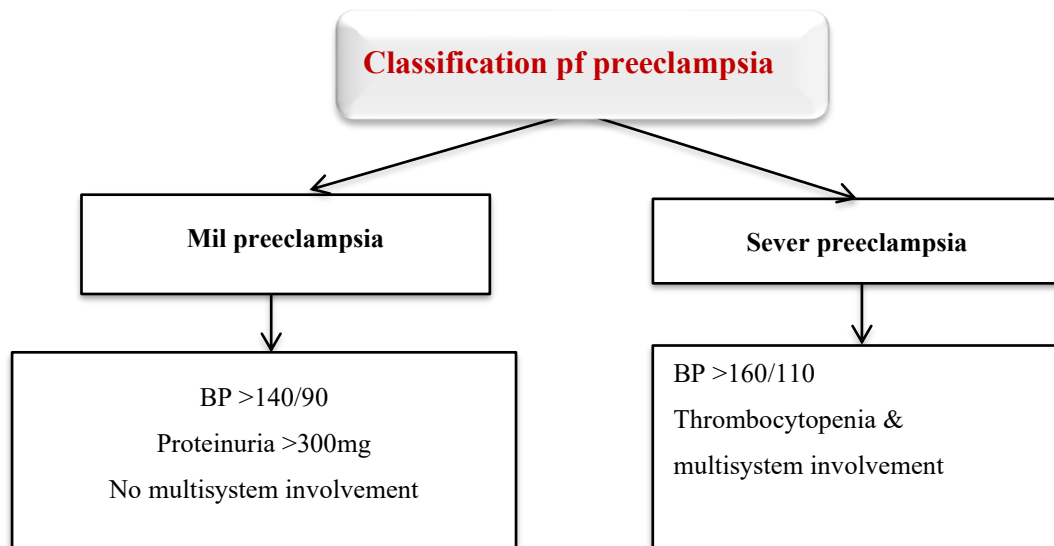
gestational hypertension focuses on monitoring and preventing progression to preeclampsia. Blood pressure should be regularly assessed, and antihypertensive therapy is considered if BP is $\geq 160/110$ mmHg. Fetal well-being is monitored with growth scans and non-stress tests. Delivery is usually planned at 37 weeks or earlier if complications arise. Patient education and close follow-up are key to ensuring safe outcomes.

III.Preeclampsia definition

Preeclampsia is a pregnancy-specific disorder characterized by new-onset hypertension after 20 weeks' gestation, accompanied by proteinuria or signs of organ dysfunction. It affects 2–8% of pregnancies and can range from mild to severe. The condition poses serious risks to both mother and fetus, including eclampsia, stroke, and fetal growth restriction. Its exact cause is not fully understood but is linked to abnormal placental development. Early diagnosis and management are essential to prevent complications.

Definitions of preeclampsia

New-onset hypertension (systolic blood pressure ≥ 140 mm Hg or diastolic blood pressure >90 mm Hg) and new-onset proteinuria after 20 weeks' gestation in a previously normotensive patient



Preeclampsia management by admission to the hospital for investigation and stabilization and delivery if indicated

Summary of the Management of preeclampsia

Management of preeclampsia involves close maternal and fetal monitoring to prevent complications. Blood pressure control with antihypertensives is essential, and magnesium sulfate is used to prevent seizures in severe cases. Delivery is the definitive treatment and is planned based on gestational age and disease severity. Frequent assessment of fetal growth and well-being guides timing of delivery. Supportive care and postpartum follow-up are critical for maternal recovery and long-term health.

References

1. Garovic, V. D., Dechend, R., Easterling, T., Karumanchi, S. A., McMurtry Baird, S., Magee, L. A., & Rana, S. (2022).
Hypertension in pregnancy: Diagnosis, blood pressure goals, and pharmacotherapy: A scientific statement from the American Heart Association. *Hypertension*, 79(2), e21–e41.
Comprehensive recommendations on diagnosing chronic hypertension in pregnancy, pharmacologic targets, and agent selection.
2. Society of Obstetric Medicine of Australia & New Zealand (SOMANZ). (2023).
Hypertension in pregnancy guideline. SOMANZ.
Includes updated strategies for screening, first-trimester risk prediction (e.g., PLGF-based testing), home BP monitoring, and international medication choices.
3. National Institute for Health and Care Excellence (NICE). (2023, April).
Hypertension in pregnancy: Diagnosis and management (NG133). NICE.
Outlines diagnostic criteria, labetalol/nifedipine/methyldopa use, timing of birth considerations, and postpartum monitoring.
4. BMJ Best Practice. (2024, December 6).
Gestational hypertension: Symptoms, diagnosis and treatment. BMJ Best Practice.
Defines gestational hypertension ($\geq 140/90$ mmHg after 20 weeks in previously normotensive women), management frameworks, and indications for induction.
5. ACOG. (2020, June).
Practice Bulletin No. 222: Gestational hypertension and preeclampsia. ACOG.
Includes classification, diagnostic criteria, maternal–fetal risks, prevention (aspirin), and treatment approaches.
6. NICE. (2023, April).
Hypertension in pregnancy: Diagnosis and management (NG133). NICE.
Provides updated guidance on use of PLGF-based testing, urgent care pathways, and postpartum follow-up specific to pre-eclampsia

Chapter 19

The Sweet Struggle

Diabetes in Pregnancy

I. Gestational diabetes

Gestational diabetes mellitus (GDM)

is glucose intolerance first recognized during pregnancy, usually developing in the second or third trimester. It affects about 7-10% of pregnancies and can increase risks for both mother and baby, including macrosomia and preeclampsia. GDM results from hormonal changes that impair insulin sensitivity. Early screening and diagnosis are important for effective management. Proper control of blood glucose levels helps improve pregnancy outcomes and reduce complications.

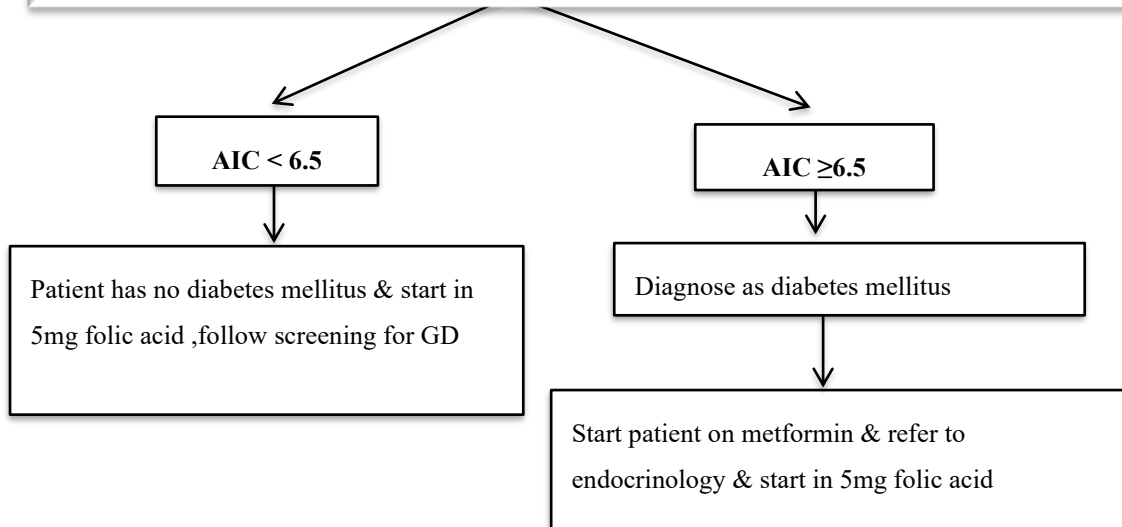
Risk factor for gestational diabetes

1. A family history of diabetes, especially in first degree relatives
2. Prepregnancy weight ≥ 110 percent of ideal body weight or body mass index >30 kg/m² or excessive gestational weight gain
3. Age >25 years
4. Previous delivery of a baby >9 pounds [4.1 kg]
5. Personal history of impaired glucose tolerance
6. Member of an ethnic group with higher than the background rate of type 2 diabetes (eg, Hispanic-American, African-American, Native American, South or East Asian, Pacific Islander).
7. Previous unexplained perinatal loss or birth of a malformed infant
8. Maternal birthweight >9 pounds [4.1 kg] or <6 pounds [2.7 kg]

- 9. Glycosuria at the first prenatal visit
 - 10. Polycystic ovary syndrome
 - 11. Current use of glucocorticoids
 - 12. Essential hypertension or pregnancy-related hypertension
 - 13. Metabolic syndrome
-

Screen for gestational diabetes

If the patient has one or more risk factor screen for gestational diabetes Do A1C



75g GTT normal value (one abnormal value will consider the patient gestational diabetes

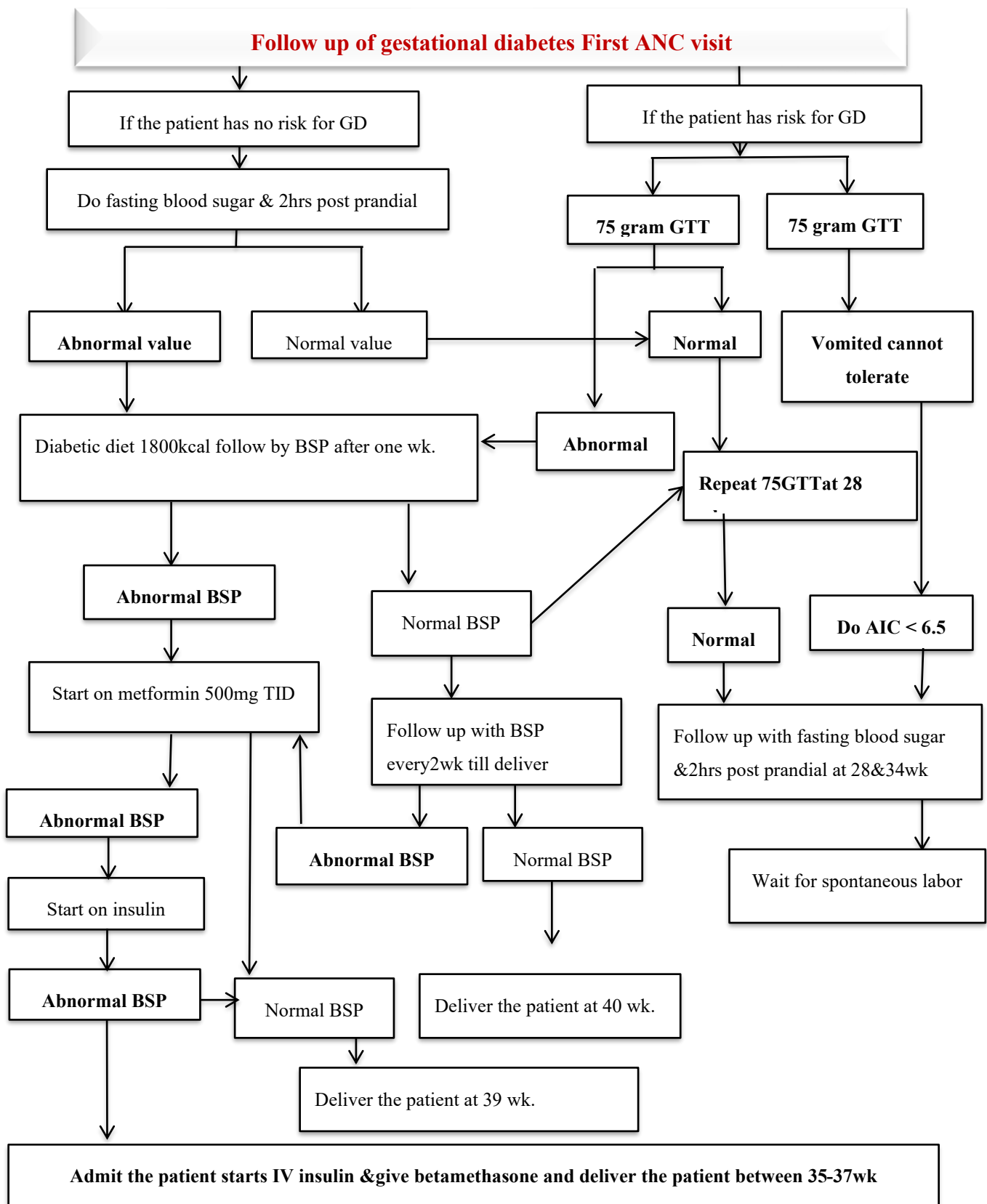
Fasting plasma glucose ≥ 92 mg/dL [5.1 mmol/L]

one hour ≥ 180 mg/dL (10.0 mmol/L)

two hour ≥ 153 mg/dL (8.5 mmol/L)

Normal value for BSP

FBS < 92 mg/dL (5.1 mmol/L) 2hrs postprandial 2-h < 140 mg/dl (7.7 mmol)



Summary of Management of gestational diabetes mellitus

Management of gestational diabetes mellitus (GDM) focuses on controlling blood glucose levels to prevent complications for both mother and baby. A healthy diet with controlled carbohydrate intake and regular physical activity is recommended as the first line of treatment. Blood glucose should be monitored regularly to maintain target levels for fasting and postprandial values. If blood sugar remains uncontrolled, insulin therapy or oral medications like metformin may be needed. Regular fetal monitoring, including ultrasounds, is essential to detect complications such as macrosomia or preterm birth. Close monitoring of blood pressure is important to prevent preeclampsia. Postpartum glucose testing is necessary to check for persistent diabetes or risk of developing type 2 diabetes.

II.pregnancy in type 1& 2 diabetes mellitus

Pregnancy in women with preexisting type 1 or type 2 diabetes mellitus carries increased risks for both mother and fetus. Poor glycemic control can lead to congenital anomalies, miscarriage, and stillbirth. These pregnancies require careful preconception counseling and tight blood sugar management throughout gestation. Close monitoring helps reduce complications such as preeclampsia, fetal macrosomia, and neonatal hypoglycemia. Multidisciplinary care is essential to optimize maternal and fetal outcomes.

ANC 1st visit for type 1&type 2 diabetes mellitus

Refer for retinal examination if not done within last 6 months

Confirm viability of pregnancy and gestational age at 7–9 wks. -Folic acid (5 mg/day) until 12 wks.

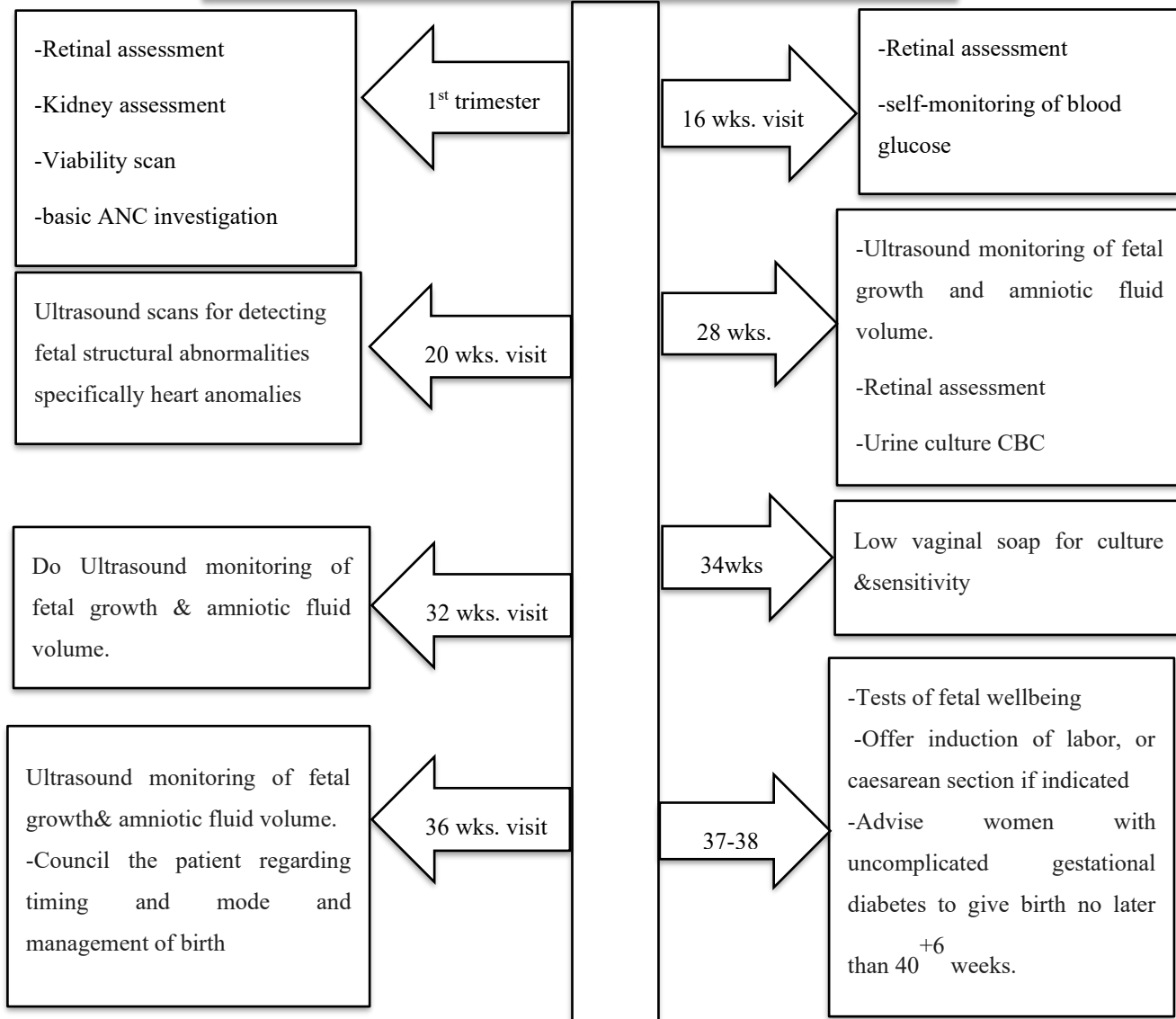
Offer renal assessment. If serum creatinine ≥ 120 micromole/liter or, the urinary albumin: creatinine ratio is ≥ 30 mg/mmol, referral to a nephrologist.

Control the blood sugar by

- 1.Refer to endocrinologist
- 2.Refer to Dietitian
3. Measure HbA1c levels target to be level $< 7\%$.
- 4.Statins should be discontinued before pregnancy
5. NPH insulin is the first choice for long-acting insulin

ANC follow up for type 1&type 2 diabetes mellitus

Combined endocrinology dietitian and obstetrician care



Post natal care with diabetes mellitus type1&2

initiate breast-feeding and advice women regarding hypoglycemia and the need for snacks

reduce the insulin to pre pregnancy dose or to 50% of the ANC dose and monitor it to reach to the appropriate dose, type 2 diabetes patient can resume medication safe during breast feeding (metformin& glibenclamide)

Oral contraception is not contraindicated for patient with diabetes type 1&2
Preferable to use progesterone hormonal bill

Summary

Management of type 1 diabetes mellitus (T1DM) in pregnancy requires strict blood glucose control to reduce risks to both mother and baby. Preconception counseling aims for an HbA1c of less than 6.5% to minimize complications. Blood glucose should be monitored 4-6 times daily, with insulin doses adjusted as pregnancy progresses. A balanced diet and regular physical activity are encouraged to help maintain glucose levels. Fetal monitoring through ultrasounds is essential to detect issues like macrosomia or preterm birth. Managing complications such as hypertension and diabetic retinopathy is crucial to prevent further risks. Postpartum care includes adjusting insulin requirements and monitoring for any persistent hyperglycemia.

References

1. Simmons, D., Immanuel, J., Hague, W. M., et al. (2023).

Treatment of Gestational Diabetes Mellitus Diagnosed Early in Pregnancy. New England Journal of Medicine, 388(23), 2275–2282.

This RCT supports early OGTT (first trimester) to improve maternal–fetal outcomes.

2. American Diabetes Association. (2023).

Standards of Medical Care in Diabetes—2023: Management of Diabetes in Pregnancy. Diabetes Care, 46(Supplement 1), S254–S266.

Provides detailed guidelines on screening strategies, glycemic targets, preference for insulin, and postpartum follow-up.

3. NICE. (2025, April).

Diabetes in Pregnancy: Management from Preconception to the Postnatal Period (NG3). National Institute for Health and Care Excellence.

Covers CGM use, ketone testing, retinal/renal assessments, and technology updates including hybrid closed-loop insulin systems.

4. de Bártolo, E., & et al. (2023).

Management of Type 1 Diabetes in Pregnancy: Update on Lifestyle, Pharmacological Treatment, and Novel Technologies. The Lancet Diabetes & Endocrinology, 11(10), e12.

Reviews targets for time in range, insulin technologies, and multidisciplinary care to reduce adverse outcomes.

Chapter 20

The Quiet Force

Thyroid Disease in Pregnancy

I. Hypothyroidism in pregnancy

Hypothyroidism in pregnancy

is a condition where thyroid hormone levels are insufficient to meet the increased demands of pregnancy. It can be overt or subclinical and is most commonly caused by autoimmune thyroiditis. Untreated hypothyroidism increases the risk of miscarriage, preeclampsia, and impaired fetal neurodevelopment. Early diagnosis and appropriate levothyroxine therapy are crucial. Regular monitoring of thyroid function throughout pregnancy ensures optimal maternal and fetal outcomes.

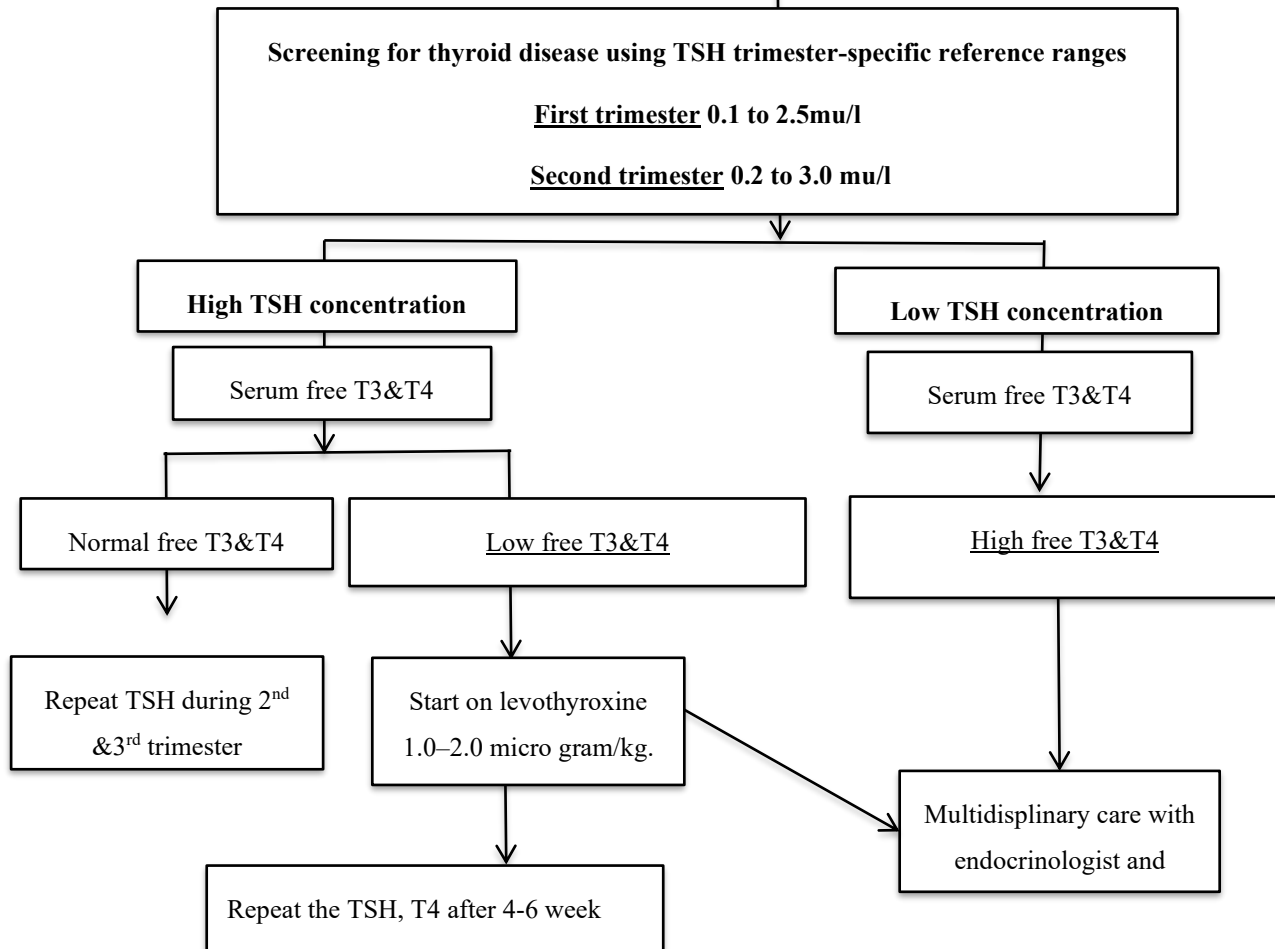
Uncontrolled hypothyroidism during pregnancy can lead to several serious risks for both the mother and the fetus. These include:

1. **Miscarriage and preterm birth** – especially in the first trimester.
2. **Preeclampsia** – increased risk of high blood pressure and related complications.
3. **Placental abruption** – premature separation of the placenta from the uterus.
4. **Low birth weight and stillbirth** – due to impaired fetal development.
5. **Impaired fetal brain development** – leading to intellectual and developmental delays.

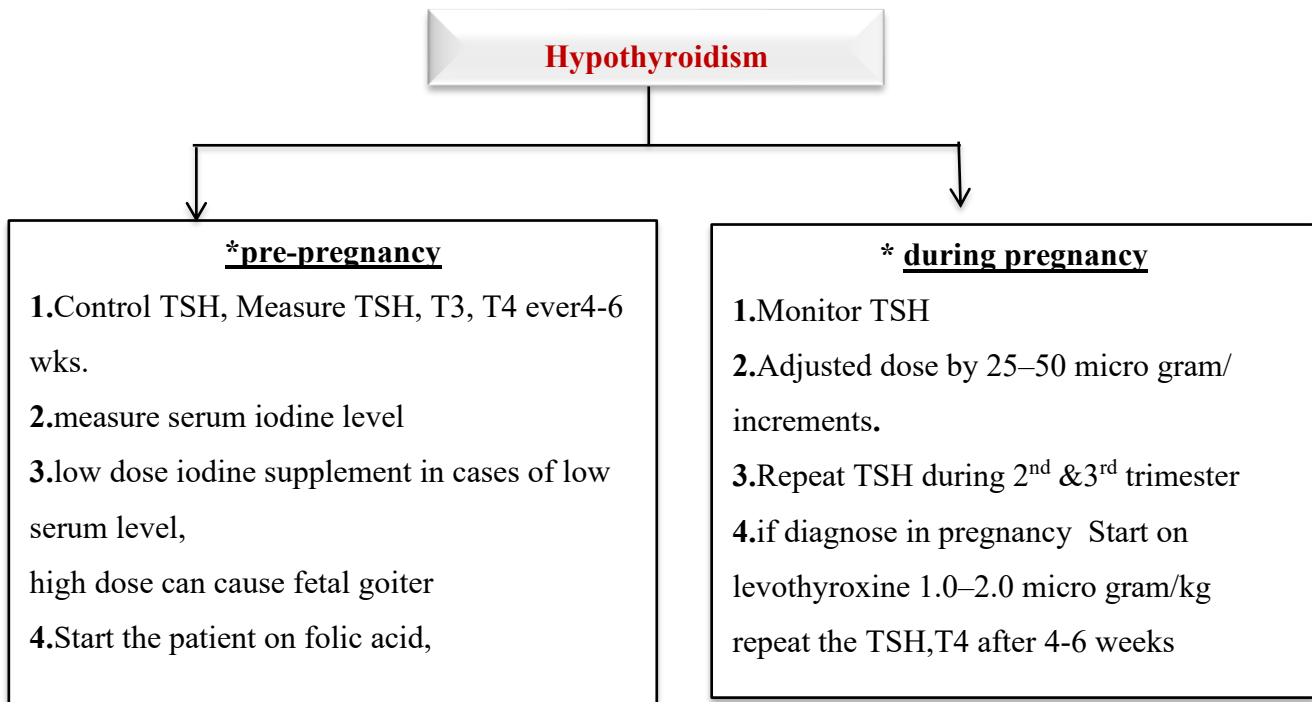
Timely diagnosis and proper levothyroxine management are essential to minimize these risks.

Screening Thyroid disease in pregnancy

Thyroid disease in pregnancy



Management of Hypothyroidism women pre-pregnancy & during pregnancy



Timing of delivery for women with hypothyroidism

For pregnant patients with **well-controlled hypothyroidism**, there is **no need for early delivery solely due to the thyroid condition**. Delivery should be planned based on standard obstetric indications, typically around **39–40 weeks of gestation**.

However, early delivery **may be considered** in the following cases:

1. **Uncontrolled or severe hypothyroidism** with complications (e.g., preeclampsia, fetal growth restriction).
2. **Associated medical or obstetric conditions** requiring early intervention.
3. **Non-reassuring fetal status** or evidence of placental insufficiency

II. Hyperthyroidism in pregnancy

Hyperthyroidism in pregnancy

is a condition characterized by excessive thyroid hormone levels, most commonly caused by Graves' disease. It occurs in about 0.1–0.4% of pregnancies and can lead to complications if not well-controlled. Symptoms may overlap with normal pregnancy changes, making diagnosis challenging. Uncontrolled hyperthyroidism increases the risk of miscarriage, preeclampsia, preterm birth, and fetal growth restriction. Early diagnosis and careful management are essential for maternal and fetal health.

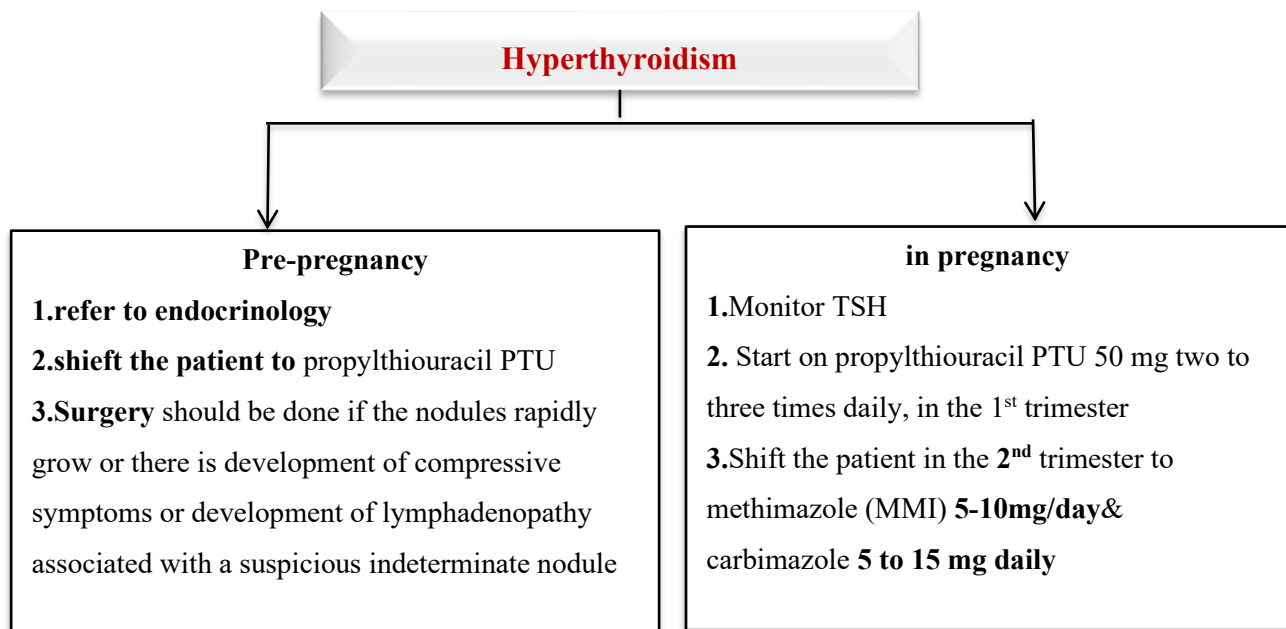
Uncontrolled hyperthyroidism during pregnancy poses significant risks to both mother and fetus.

These risks include:

1. **Miscarriage and preterm labor** – due to hormonal imbalance and poor placental function.
2. **Preeclampsia** – increased risk of high blood pressure and related complications.
3. **Fetal growth restriction and low birth weight** – from impaired uteroplacental blood flow.
4. **Heart failure and thyroid storm** – life-threatening conditions in the mother if severely uncontrolled.
5. **Neonatal thyrotoxicosis** – caused by transplacental passage of stimulating antibodies.

Careful monitoring and treatment are crucial to minimize these complications.

Management of prepregnancy & in pregnancy for women with Hyperthyroidism



Timing of delivery for women with hyperthyroidism

The **timing of delivery in patients with hyperthyroidism** depends on the control of the disease and presence of any complications:

1. **Well-controlled hyperthyroidism** (with antithyroid medications and stable thyroid levels):
 - Delivery is typically planned at **39–40 weeks** of gestation, following standard obstetric practice.
2. **Poorly controlled or severe hyperthyroidism**, or if complications arise (e.g., preeclampsia, fetal growth restriction, or risk of thyroid storm):
 - **Early delivery (before 39 weeks)** may be indicated based on maternal or fetal status.
3. **Thyroid storm or maternal cardiac issues**:
 - These are emergencies and may require urgent delivery, regardless of gestational age.

Conclusion: The goal is to achieve and maintain good thyroid control during pregnancy; delivery timing is individualized based on disease severity and overall maternal-fetal health.

Post partum care for women with thyroid disease

1. monitor thyroid function

Testing TSH & free T4 levels.

Thyroid function should be monitored within the first 6 weeks Postpartum, consider lowering the dose to the pre-pregnancy dose .

2. breast feeding

Encourage breast feeding the medication not excreted in breast milk

Summary of thyroid disease in pregnancy

The management of hypothyroidism and hyperthyroidism during pregnancy requires careful medication choices to ensure both maternal and fetal safety. For **hypothyroidism**, **levothyroxine** is the treatment of choice, and it is considered safe during pregnancy, though dosage adjustments may be required to meet the increased demand. For **hyperthyroidism**, **propylthiouracil (PTU)** is preferred in the first trimester, while **methimazole**

References

1. Royal College of Obstetricians and Gynaecologists. (2025, April 17).

Management of thyroid disorders in pregnancy (Green-top Guideline No. 76). RCOG.

This UK guideline provides comprehensive recommendations on diagnosing and managing both overt and subclinical hypothyroidism during pregnancy, including trimester-specific TSH targets and levothyroxine dosing strategies

2. Korevaar, T. I. M., Medici, M., Visser, T. J., & Peeters, R. P. (2023).

Screening and management of major endocrinopathies during pregnancy: An update. European Journal of Endocrinology, 188(5), 123–135.

Defines overt hypothyroidism and reviews levothyroxine dosing ($\approx 1.1 \mu\text{g/kg/day}$), monitoring frequency (every 4–6 weeks), and implications of subclinical disease .

3. Sorah, K., & Alderson, T. L. (2023, May 23).

Hyperthyroidism in pregnancy. StatPearls [Internet].

Summarises epidemiology (0.1%–0.4% of pregnancies), differentiation between Graves' disease vs gestational thyrotoxicosis, and emphasizes safe use of PTU in the first trimester.

4. BMC Maternal Health Journal. (2025).

Overview of thyroid disorders in pregnancy. Maternal Health, Neonatology and Perinatology, 11, 25.

Provides a detailed review of gestational transient thyrotoxicosis vs Graves, diagnostic criteria (TSH, FT4/T3, TRAb), and maternal–fetal risks including pre-eclampsia and fetal growth restriction

Chapter 21

The Quiet Thunder

Epilepsy in pregnancy

Management of epilepsy in pregnancy focuses on balancing seizure control with minimizing risks to the developing fetus. Pregnancy can alter seizure frequency and affect antiepileptic drug (AED) levels, requiring close monitoring. Some AEDs carry teratogenic risks, so careful selection and dose adjustment are essential. Preconception counseling and early prenatal care play a critical role in optimizing outcomes. A multidisciplinary approach ensures both maternal safety and fetal development are well managed.

Management of epileptic patient during pregnancy

Monitoring During Pregnancy

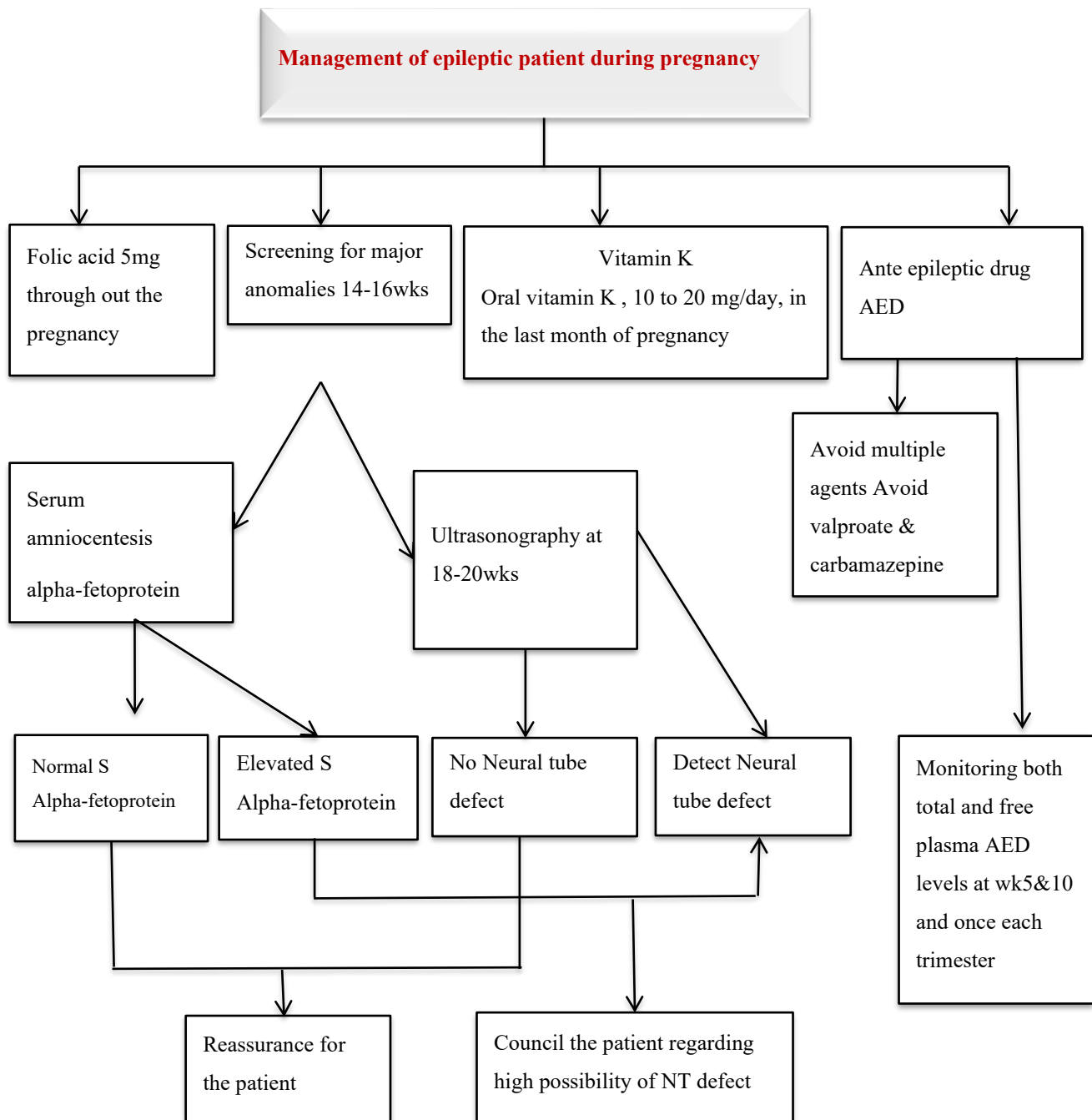
Frequent checkups

- Once pregnant, women with epilepsy should be closely monitored for seizure control, as pregnancy can affect AED metabolism, leading to changes in drug levels.

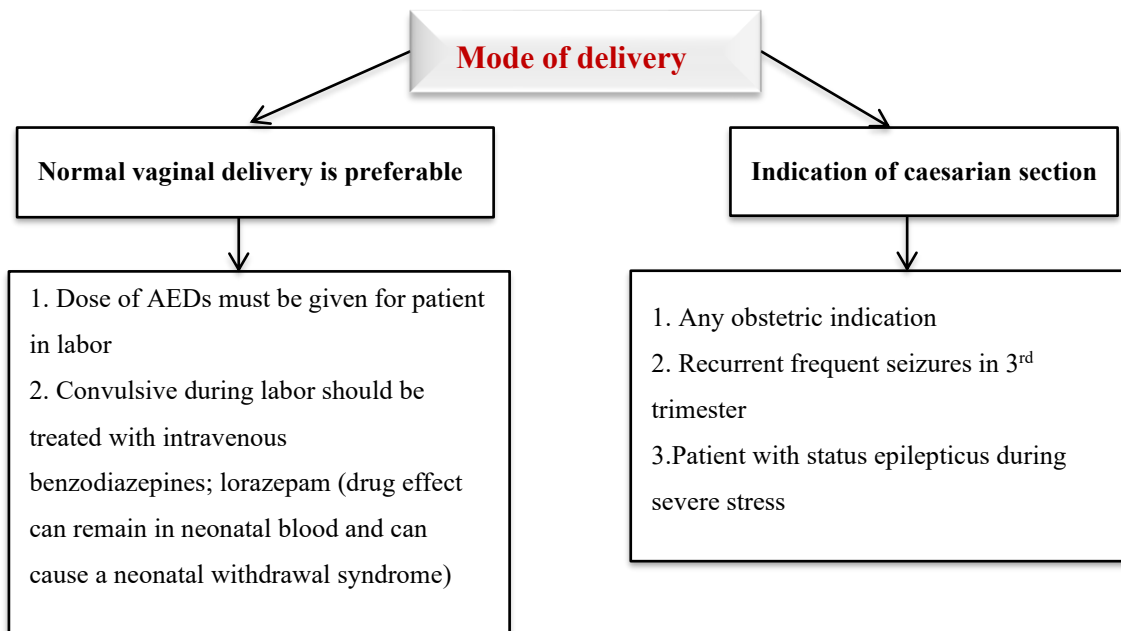
Ultrasound screening

- Conduct detailed ultrasounds and prenatal screening for congenital malformations, especially when women are on higher-risk AEDs.

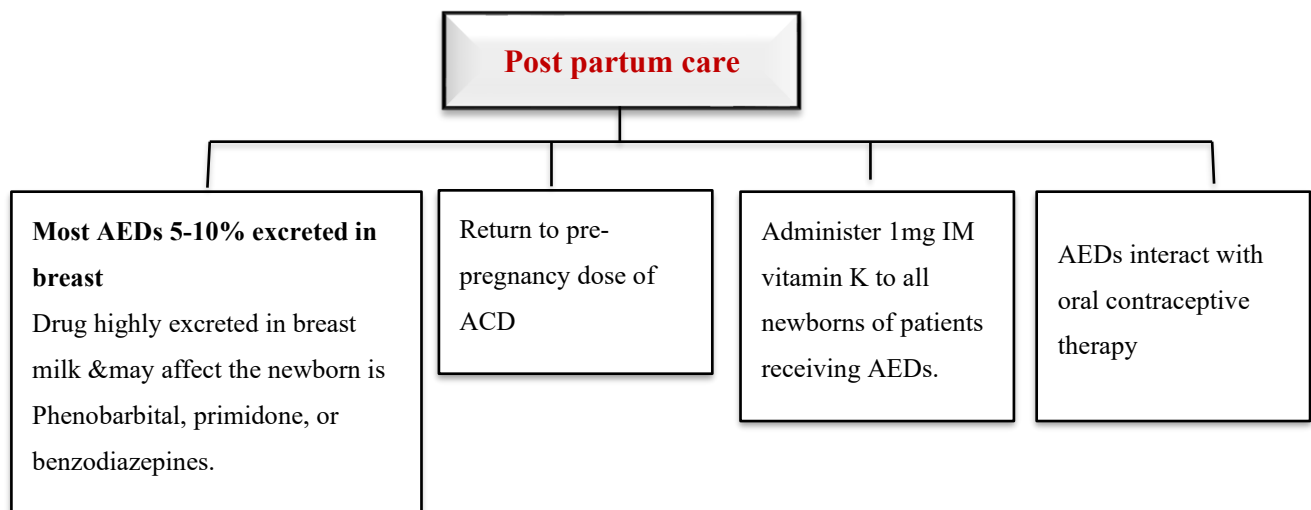
Management of epileptic patient during pregnancy



Mode of delivery in epileptic patient



Post partum care for patient with epilepsy



Summary

Managing epilepsy during pregnancy involves balancing seizure control with minimizing risks to both the mother and fetus. Antiepileptic drugs (AEDs) should be carefully chosen, with preference for monotherapy at the lowest effective dose. Valproate is avoided due to its teratogenic effects. Folic acid supplementation (4-5 mg/day) is recommended to reduce the risk of neural tube defects. Regular monitoring of drug levels, liver function, and fetal growth is necessary. Multidisciplinary care, including obstetricians, neurologists, and anesthesiologists, ensures optimal management. Vaginal delivery is usually preferred unless contraindicated by other factors. Seizure frequency may increase during pregnancy, requiring prompt adjustments in treatment.

References

1. American Academy of Neurology Practice Guideline Subcommittee. (2023).

Teratogenesis, perinatal, and neurodevelopmental outcomes after in utero exposure to antiseizure medication. Neurology, advance publication.

This guideline synthesizes evidence on congenital malformations and neurodevelopmental outcomes linked to antiseizure medications (ASMs), and recommends optimizing ASM selection and dosing prior to conception

2. Pennell, P. B., French, J. A., May, R. C., et al. (2022).

Antiseizure medication concentrations during pregnancy: Results from the MONEAD study. JAMA Neurology, 79(4), 370–379.

Provides key insights into pregnancy-related pharmacokinetic changes of ASMs and the importance of regular serum level monitoring to maintain seizure control .

3. Royal College of Obstetricians and Gynaecologists. (2024).

Epilepsy in pregnancy (Green-top Guideline No. 68, 2nd ed.). RCOG.

Offers evidence-based guidance on pre-conception counselling, ASM adjustments (especially regarding valproate), folic acid use, delivery planning, and postpartum management

4. Tomson, T., Battino, D., & Marson, A. (2023).

Cochrane review: Monotherapy treatment of epilepsy in pregnancy—congenital malformation outcomes in the child. Cochrane Database of Systematic Reviews, (8), CD013300.

A systematic review comparing teratogenic risks across ASM monotherapies—highlighting relatively lower risks with lamotrigine and levetiracetam versus valproate and topiramate

Chapter 22

Multiple sclerosis in pregnancy

Pregnancy in women with multiple sclerosis (MS) is generally well tolerated and does not negatively impact long-term disease progression. MS is an autoimmune disorder affecting the central nervous system, often diagnosed in women of childbearing age. During pregnancy, especially in the second and third trimesters, relapse rates tend to decrease due to immunological changes. However, there is an increased risk of relapse in the postpartum period. Careful planning, medication management, and coordinated care are essential for a healthy pregnancy and postpartum recovery.

Antenatal management for women with MS

1. Antenatal care for women with multiple sclerosis (MS) requires careful coordination between obstetricians, neurologists & maternal fetal specialist

2. patient should be managed as high risk pregnancy with risk of preterm birth, gestational hypertension, or preeclampsia

3. Assessing Pregnancy Progress: The obstetrician will monitor fetal growth, amniotic fluid levels, and other pregnancy milestones to ensure the baby's development is progressing normally.

4. Managing MS Symptoms During Pregnancy

- **Fatigue Management:** Doctors will discuss strategies for managing fatigue, such as pacing, optimizing sleep, and adjusting daily activities.
- **Spasticity and Muscle Weakness:** The obstetrician and neurologist may work together to develop a plan to manage any spasticity or muscle weakness, possibly including physical therapy, stretching exercises, or medications that are safe for use during pregnancy.

- **Bladder and Bowel Dysfunction:** should be monitored and managed to reduce discomfort and prevent complications.
- **Pain Management:** Non-pharmacological methods, such as physical therapy, massage, or acupuncture, may be suggested for pain management. If necessary, safe pain medications can be prescribed.

prenatal Tests and Imaging

- **Routine Prenatal Tests:** These will include blood tests, urine tests, ultrasound scans, and screenings for conditions like gestational diabetes and preeclampsia, just as with any other pregnancy.
- **Fetal Monitoring:** Fetal growth and development will be closely monitored, including ultrasounds to check fetal size and position and to assess amniotic fluid levels.
- **Magnetic Resonance Imaging (MRI):** **MRI can generally be done safely during pregnancy, when necessary.**

Complication of pregnancy with MS

Women with **multiple sclerosis (MS)** generally have favorable pregnancy outcomes, but certain **complications and challenges** may occur:

1. **Increased risk of postpartum relapses** – especially within the first 3–6 months after delivery.
2. **Fatigue and mobility issues** – may worsen as pregnancy progresses, especially in the third trimester.
3. **Urinary tract infections (UTIs)** – more common due to bladder dysfunction associated with MS.
4. **Medication-related concerns** – some disease-modifying therapies (DMTs) may need to be stopped or adjusted due to potential fetal risks.
5. **Delivery and anaesthesia considerations** – some women may require tailored plans depending on neurological status, keep in mind that both spinal and epidural anesthesia are generally considered safe **for** patients with multiple sclerosis (MS),

Overall, with proper planning and monitoring, most women with MS can have safe and successful pregnancies.

Labor and Delivery Planning

- **Labor Management:** Depending on the severity of MS symptoms, some women may require assistance with mobility during labor or may be at higher risk for complications such as impaired bladder control.
- Caesarean section will be done for obstetric complication
- Epidural and spinal anesthesia (neuraxial anesthesia) are **not strictly contraindicated** in women with multiple sclerosis (MS), should explore the risk of damage to the spinal cord which might lead to exacerbate of existing symptoms like weakness, spasticity, or bladder dysfunction
- **Breastfeeding and MS Medications:** If the woman plans to breastfeed, the doctor should discuss which MS medications are compatible with breastfeeding. Some treatments may pass into breast milk, so alternative medications or management strategies might be needed.

Medication safe during lactation safe option for breastfeeding mothers with MS	Medication safe during lactation Short-term use is usually considered safe, but it's important to use the lowest effective dose.	Medications to Avoid or Use with Caution During Lactation
Interferon beta (e.g., Avonex, Rebif, Betaseron) Glatiramer acetate (Copaxone)	Corticosteroids (e.g., Prednisone)	Teriflunomide (Aubagio) Fingolimod (Gilenya) Natalizumab (Tysabri) Alemtuzumab (Lemtrada)

Summery

Management of pregnancy in women with multiple sclerosis (MS) involves multidisciplinary care to optimize maternal and fetal outcomes. Preconception counseling is essential to discuss disease stability and medication adjustments, as some disease-modifying therapies may need to be paused. During pregnancy, monitoring focuses on controlling symptoms and preventing infections like UTIs. Relapse rates typically decrease in pregnancy but may increase postpartum, so planning for close follow-up after delivery is important. Labor and delivery usually proceed normally, with regional anesthesia considered safe. Overall, individualized care and communication between neurologists, obstetricians, and anesthesiologists ensure the best outcomes.

References

1. Vukusic, S., Carra-Dallière, C., Ciron, J., Maillart, E., Michel, L., Leray, E., ... Lebrun-Frenay, C. (2023).

Multiple sclerosis and pregnancy: Pathogenesis, influencing factors, and treatment options. Autoimmunity Reviews, 22(11), 103449.

A comprehensive review covering immunological mechanisms during pregnancy, impact on relapse rates, and management of disease-modifying therapies (DMTs) across conception, pregnancy, and postpartum

2. Graham, E. L., Bove, R., Costello, K., Crayton, H., Jacobs, D. A., Shah, S., ... Stoll, S. S. (2024).

Practical considerations for managing pregnancy in patients with multiple sclerosis. Neurology Clinical Practice, 14(2), 87–99.

Provides practical guidance on preconception counselling, DMT adjustment, MRI safety, delivery options, postpartum relapse management, and reinitiation of therapy .

***3. Mulkerrin, G., Seery, M., Tubridy, N., & McGuigan, C. (2025, April).**

The evolving management of multiple sclerosis during pregnancy: Experience from an Irish multiple sclerosis centre.* *Neurology, 104(7_Suppl_1), P9-1.003.*

Real-world data from 2018–2024: highlights on DMT continuation before conception, timing of discontinuation (natalizumab, ocrelizumab, DMF, fingolimod), relapse rates during and after pregnancy, and MRI findings

***4. Neurology UK. (2022; updated 2023).**

Recommendations | Multiple sclerosis in adults: management.* NICE Guideline NG220.

Emphasizes family planning support, counseling on pregnancy timing, DMT implications, vitamin D/folic acid supplementation, and reassurance that MS does not increase pregnancy risks

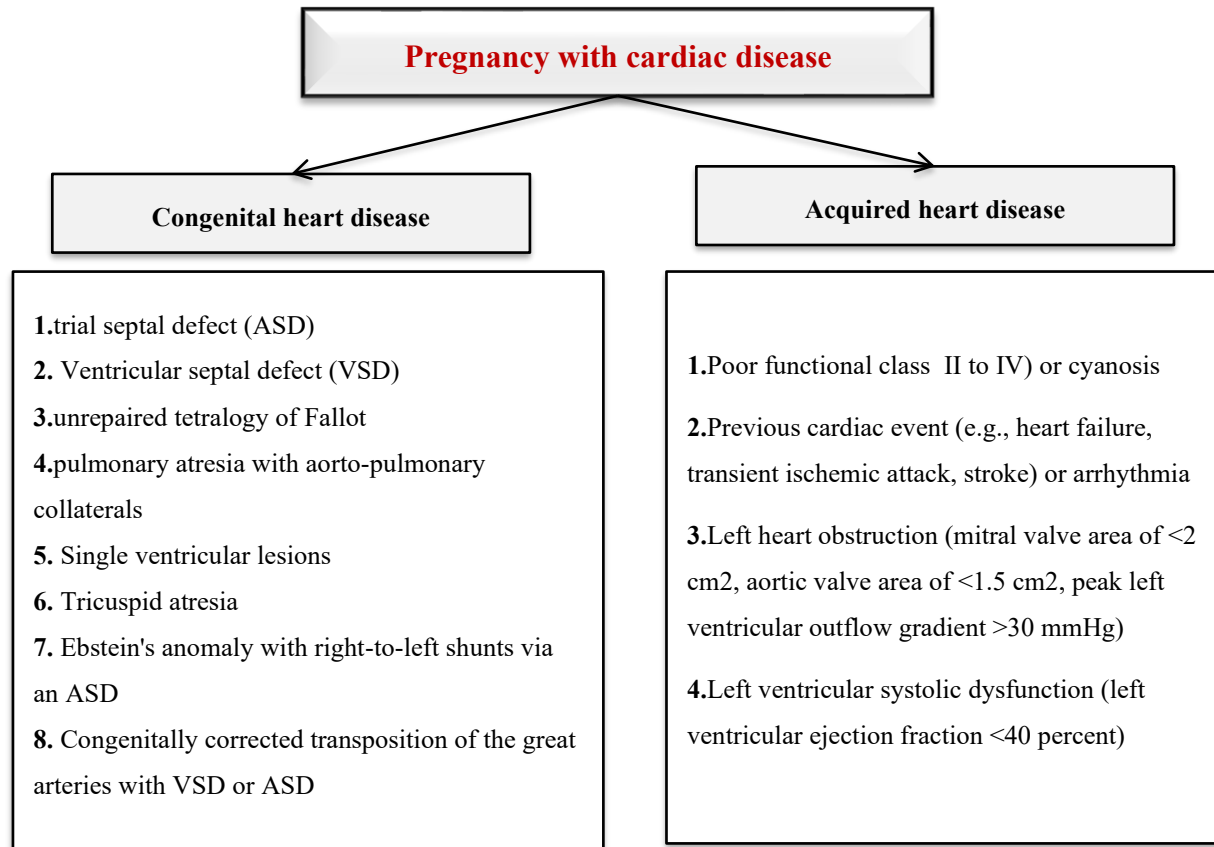
Chapter 23

A Fragile Beat

Cardiac disease in pregnancy

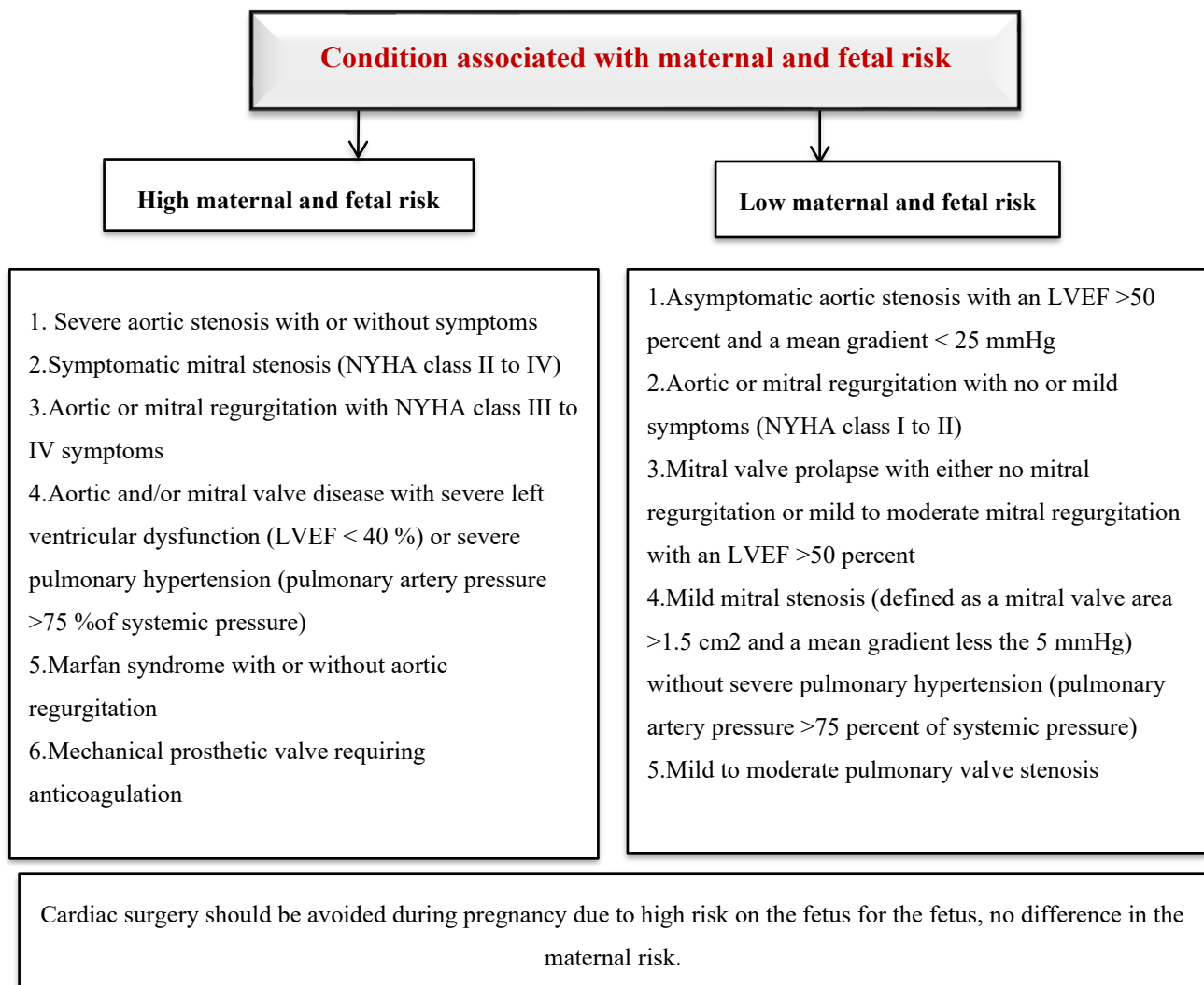
Cardiac disease in pregnancy

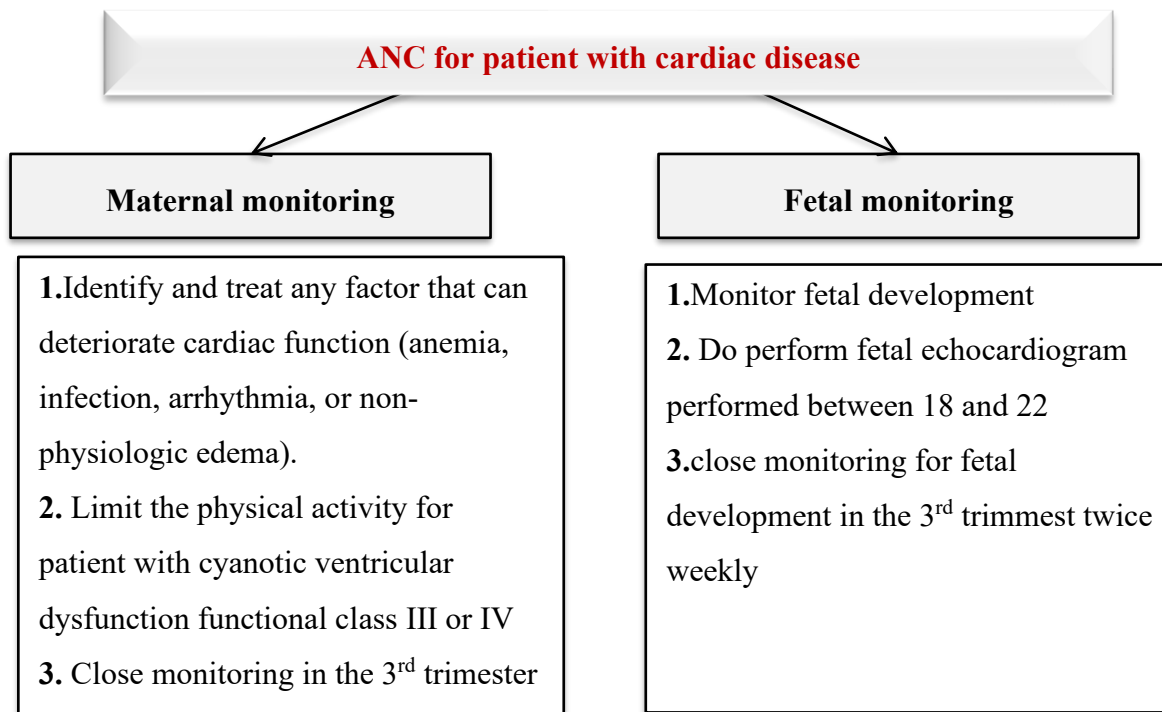
poses significant challenges due to the increased hemodynamic demands on the maternal cardiovascular system. It is a leading cause of maternal morbidity and mortality worldwide. Pregnancy can exacerbate preexisting heart conditions or reveal previously undiagnosed cardiac issues. Careful assessment and management are essential to balance maternal cardiac health with fetal well-being. A multidisciplinary team approach is critical for optimizing outcomes throughout pregnancy, labor, and postpartum.



Type of cardiac diseases in pregnancy

Condition associated with maternal and fetal risk





Complication of cardiac disease in pregnancy

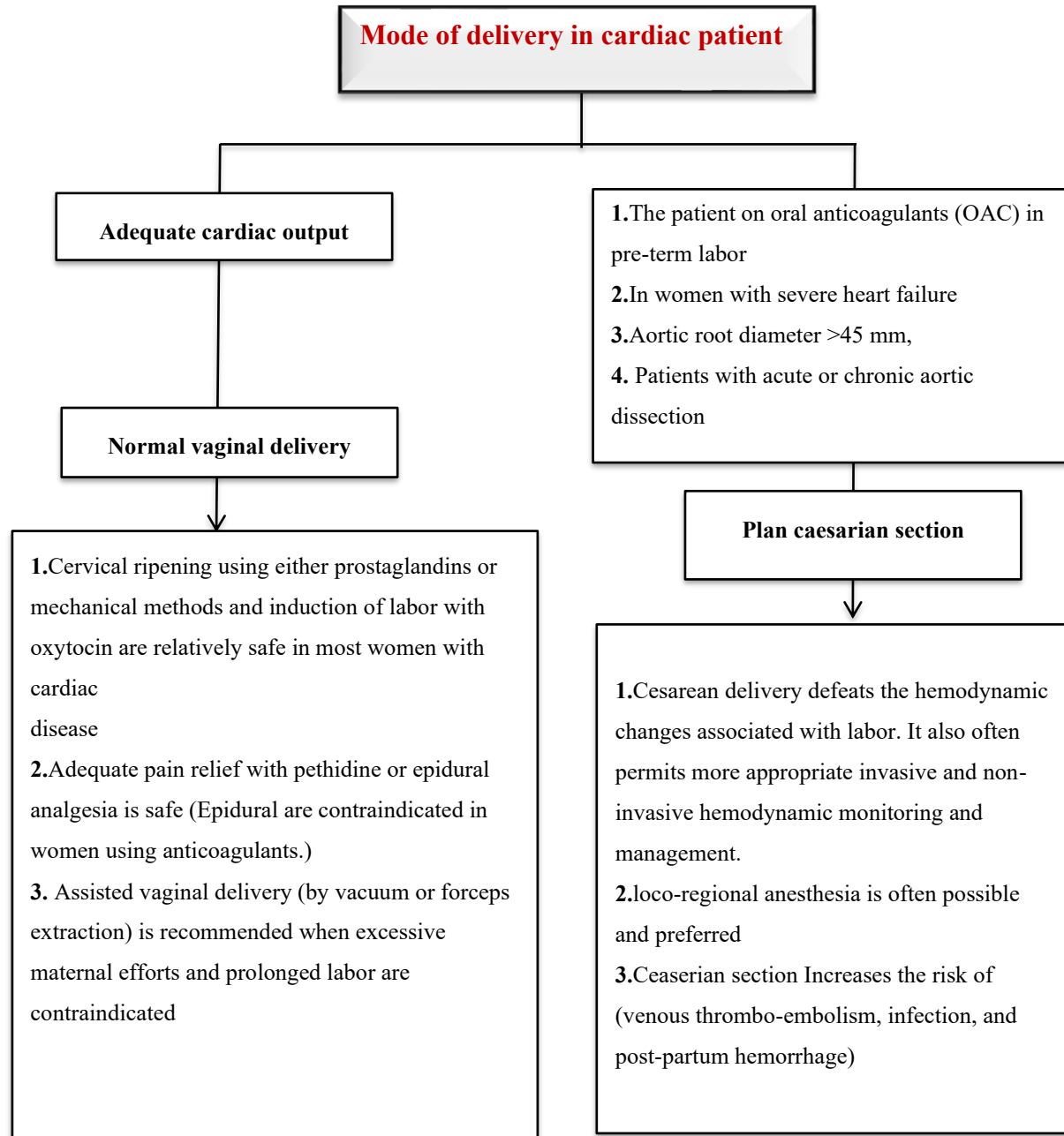
Maternal complications of cardiac disease in pregnancy include:

1. Heart failure due to increased cardiac workload.
2. Arrhythmias and thromboembolic events.
3. Pulmonary edema and cardiogenic shock.
4. Increased risk of maternal mortality.

Fetal complications include:

1. Intrauterine growth restriction (IUGR) due to poor placental perfusion.
2. Preterm birth and low birth weight.
3. Stillbirth and fetal demise.
4. Neonatal complications from maternal hypoxia or medication effects.

Close monitoring and management are essential to minimize these risks. Mode of delivery in cardiac patient



Summary

Management of cardiac disease in pregnancy involves a multidisciplinary approach to minimize risks to both mother and fetus. Preconception counseling is essential to optimize maternal health and assess pregnancy risks. Anticoagulation therapy is carefully managed, balancing the need for thrombosis prevention with risks of bleeding. Drug choices are limited to those safe for pregnancy, such as beta-blockers or heparin. Close monitoring through regular ultrasounds and fetal assessments is crucial to detect complications. Delivery plans are individualized, often involving a team of specialists for labor and delivery. Postpartum care includes continued monitoring, as pregnancy-related cardiac complications may persist.

References

- 1. DeFilippis, E. M., Bhagra, C., Casale, J., Ging, P., Macera, F., Punnoose, L., ... Kittleson, M. M. (2023, September).**

Cardio-Obstetrics and Heart Failure: State-of-the-Art Review. JACC: Heart Failure, 11(9), 1165–1180.

Provides a detailed overview of heart failure and cardiomyopathy in pregnancy, including preconception counseling, risk stratification, safe medication use, and team-based care models

- 2. Mehta, L. S., Warnes, C. A., Bradley, E., Burton, T., Economy, K., Mehran, R., ... Wood, M. (2020; reaffirmed 2023).**

Cardiovascular Considerations in Caring for Pregnant Patients: A Scientific Statement From the American Heart Association. Circulation.

Outlines diagnostics, management of heart failure, arrhythmias, valve disease, and mechanical valves in pregnancy—providing multidisciplinary, evidence-based recommendations tailored for pregnant patients .

- 3. Rakisheva, A., Sliwa, K., Bauersachs, J., Van Linthout, S., Chopra, V. K., Bayes-Genis, A., Rosano, G. M. C. (2024, April 28).**

Multidisciplinary Care of Peripartum Heart Failure: A Scientific Statement of the Heart Failure Association of the ESC. European Journal of Heart Failure, 26(4), 742–753.

Emphasises structured multidisciplinary care for peripartum cardiomyopathy and heart failure, informing diagnostic pathways, clinical management, and delivery planning

- 4. Afari, H., Sheehan, M., & Reza, N. (2024, February 10).**

Contemporary Management of Cardiomyopathy and Heart Failure in Pregnancy. Cardiology and Therapy, 13, 17–37.

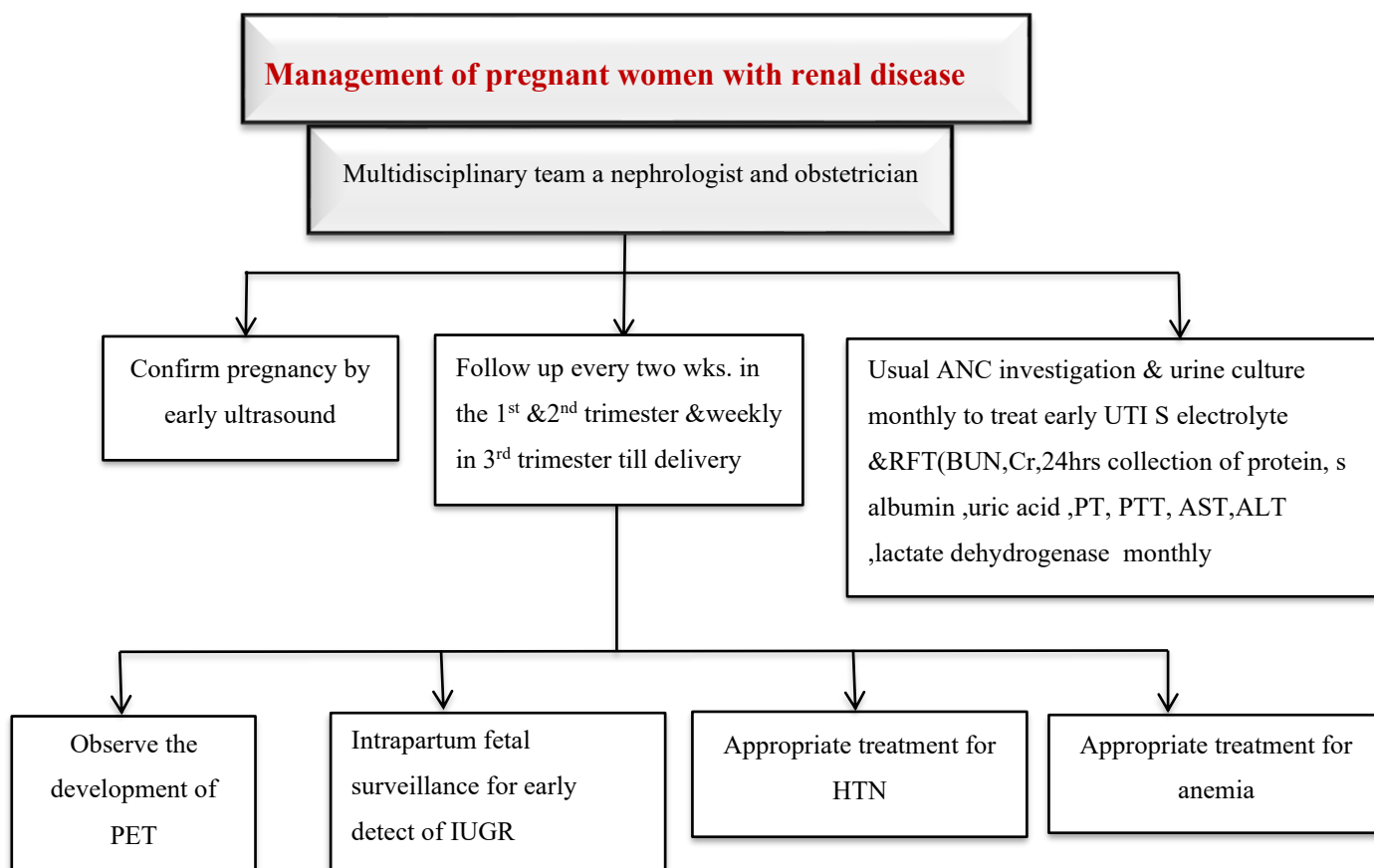
Presents a clinical guide to diagnosing heart failure, pharmacologic adjustments (e.g., avoiding ACE inhibitors), and tailored strategies across pregnancy and postpartum

Chapter 24

The Clouded Waters

kidney Disease in Pregnancy

Pregnancy in women with kidney disease is considered high-risk due to potential complications affecting both maternal and fetal health. The severity of renal impairment, presence of hypertension, and proteinuria greatly influence pregnancy outcomes. Kidney disease can increase the risk of preeclampsia, preterm birth, and fetal growth restriction. Pregnancy may also accelerate the progression of underlying renal dysfunction. Multidisciplinary care and close monitoring are essential to optimize outcomes for both mother and baby.



Pregnancy in women with renal disease is associated with several maternal and fetal complications, which vary depending on the severity of kidney impairment. Key complications include:

Maternal Complications:

1. **Worsening renal function** – pregnancy can accelerate progression of kidney disease.
2. **Hypertension and preeclampsia** – significantly more common in women with kidney disease.
3. **Proteinuria** – often worsens during pregnancy and can signal complications.
4. **Increased risk of infections** – especially urinary tract infections.
5. **Higher risk of cesarean delivery** – due to maternal or fetal indications.

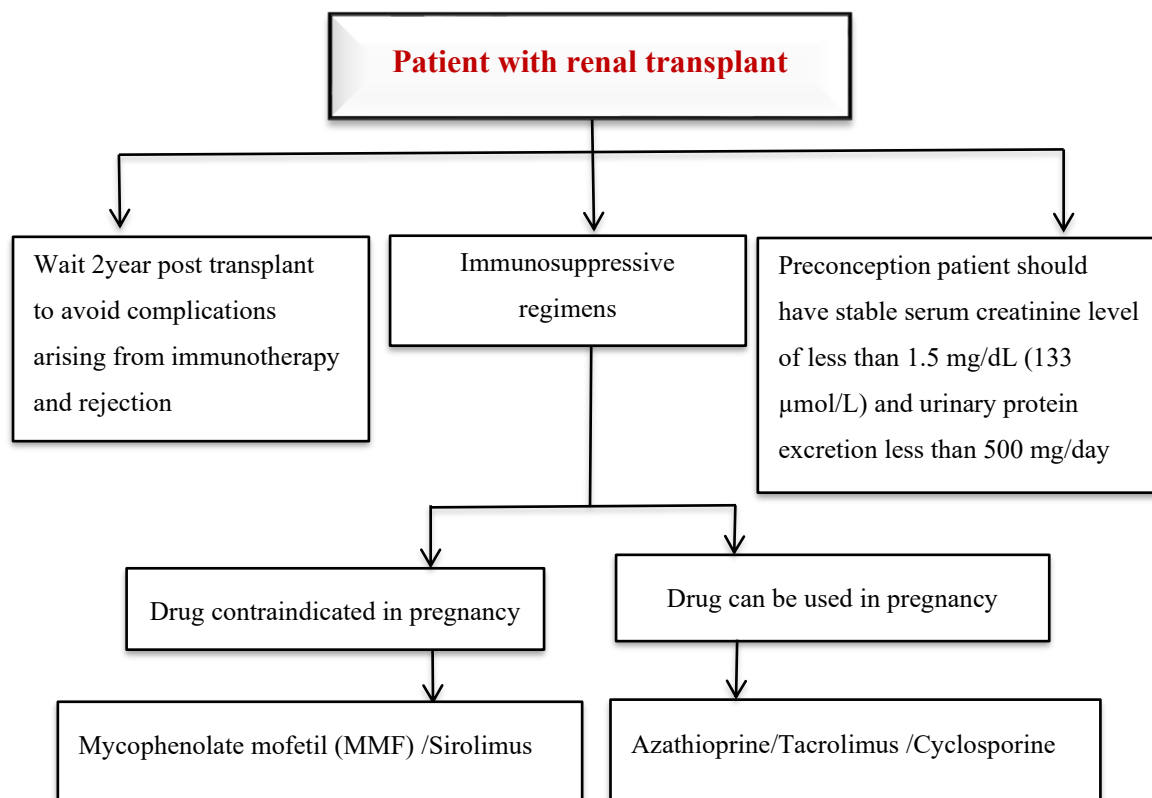
Fetal Complications:

1. **Preterm birth** – often due to maternal complications or early delivery for safety.
2. **Intrauterine growth restriction (IUGR)** – from poor placental perfusion.
3. **Low birth weight** – related to preterm birth and IUGR.
4. **Stillbirth** – increased risk, especially in advanced renal disease.
5. **Neonatal complications** – such as respiratory distress or metabolic issues.

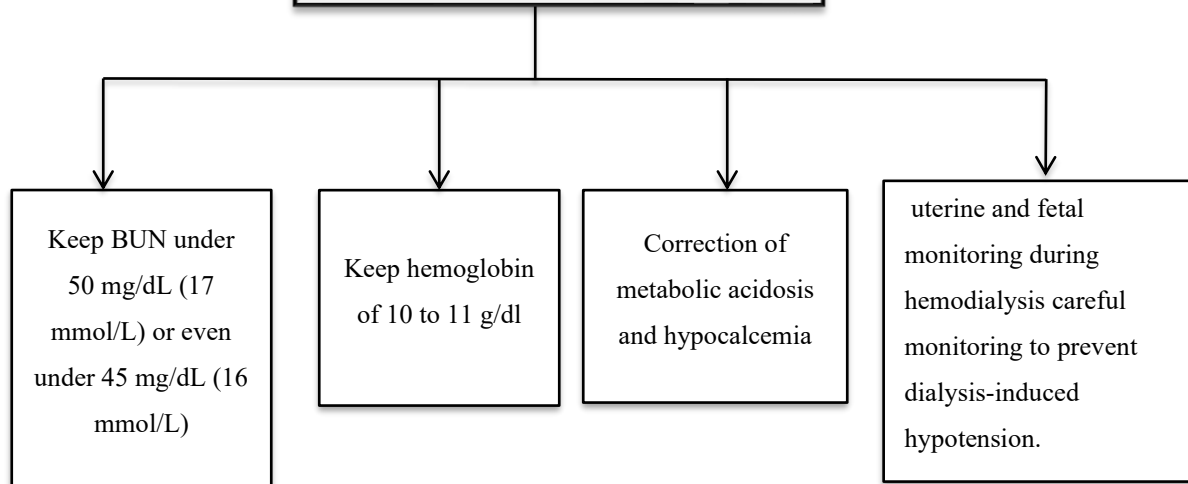
Close monitoring by a multidisciplinary team is crucial to manage these risks and ensure the best possible outcomes for both mother and baby.

Special situation in pregnancy with renal disease

Patient with renal transplant

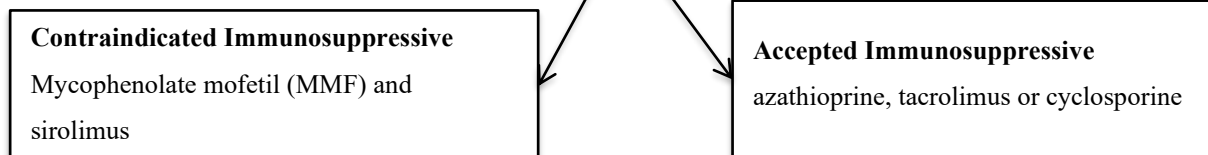


Patient with Intensive dialysis



Pregnancy following renal transplantation

Immunosuppressive regimens



Social consideration for vitamin supplement for women with kidney disease

1. Avoid fat-soluble vitamin excess (especially A and D):

- CKD patients have impaired excretion, increasing the risk of **vitamin A toxicity**, which can cause **birth defects**.
- **Vitamin D** should be given carefully and usually in its **active form (calcitriol)** under nephrology guidance, as CKD reduces conversion to the active form.

2. Folic acid supplementation:

- Required to prevent neural tube defects.
- Standard dose is **400–800 mcg/day**, but women with CKD (especially on dialysis) may need **higher doses** (up to 1–5 mg/day), especially if they have elevated homocysteine.

3. Limit or avoid vitamin C in high doses:

- High doses can lead to **oxalate accumulation** in CKD, which may worsen renal function.
- Keep within **recommended dietary intake (60–100 mg/day)**.

4. Water-soluble vitamins (B-complex):

- May be lost during dialysis, so **supplementation is often needed**, especially **vitamin B6 and B12**.
- Avoid high doses unless deficiency is proven.

5. Iron and erythropoietin support:

- CKD often causes anemia. Iron supplementation (oral or IV) should be monitored, and erythropoiesis-stimulating agents may be needed under medical supervision.

Summary

Managing renal disease in pregnancy requires careful monitoring of both maternal kidney function and fetal well-being. Preconception counseling helps assess the risks and optimize kidney health. Antihypertensive medications, like labetalol, may be prescribed to manage blood pressure, while avoiding ACE inhibitors and ARBs. Regular monitoring of renal function, electrolytes, and proteinuria is necessary throughout pregnancy. Adequate hydration and proper nutrition are essential, with adjustments based on renal function. Delivery is planned according to maternal and fetal status, with consideration for early delivery in cases of severe disease. Postpartum monitoring is vital, as renal function may deteriorate or improve.

References

1. Shehaj, L., & Kazancioğlu, R. (2023).

Pregnancy in Chronic Kidney Disease. Kidney and Dialysis, 3(2), 152–162.

Comprehensive overview of pregnancy outcomes, maternal risk stratification, and CKD management strategies, including blood pressure and proteinuria control.

2. Fang, L., Shen, B., Zhang, H., et al. (2023, August 29).

Clinical features and prognosis of pregnancy-related renal damage and pregnancy after chronic kidney disease. BMC Pregnancy and Childbirth, 23, 619.

A cohort study delineating diagnostic features and prognosis in CKD-complicated pregnancies. [u](#)

3. American College of Obstetricians and Gynecologists. (2023, August).

Urinary tract infections in pregnant individuals: Clinical consensus. Obstetrics & Gynecology, 142(3), 435–445.

This ACOG consensus recommends a single urine culture early in prenatal care to screen for asymptomatic bacteriuria; if positive ($\geq 10^5$ CFU/mL), a 5–7-day course of pathogen-directed antibiotics is advised. Symptomatic UTI requires similar treatment, with inpatient management and parenteral therapy for pyelonephritis

4. Christoph, D., et al. (2024).

Evidence-based clinical practice guideline for chronic kidney disease: pregnancy recommendations. Clinical and Experimental Nephrology, 2024.

Includes trimester-safe antihypertensive options (methyldopa, labetalol, hydralazine, nifedipine), and strategies for drug dose adjustment and sick day rules.

Chapter 25

A Fragile Cascade

Systemic lupus erythematosus

Systemic lupus erythematosus (SLE)

in pregnancy requires careful multidisciplinary management due to increased risks for both mother and fetus. Disease activity should ideally be quiescent for at least six months before conception. Close monitoring, medication adjustments, and regular antenatal care are crucial. Tailored treatment balances maternal disease control with fetal safety.

Pregnancy in women with SLE requires careful management due to the potential for disease

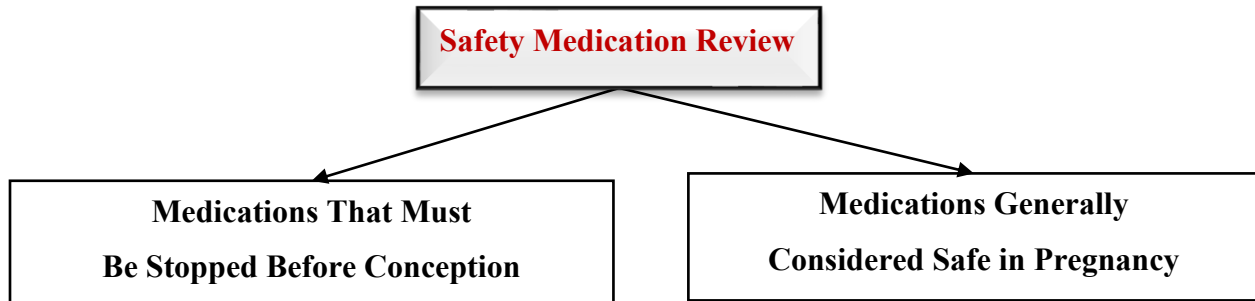
Disease situation Before attempting pregnancy, it is essential that the patient's SLE be well-controlled. A patient should be in **remission or low disease activity** for at least 6 months prior to conception to minimize the risk of disease flare during pregnancy and its complication.

The disease evaluation should include clinical assessment, laboratory assessment, disease Activity indices and medication Review.

Safety Medication Review

Some SLE meds are safe where other medication need to **be stopped well in advance**

Folic acid supplementation All women planning a pregnancy should take **high-dose folic acid (4-5 mg/day)** before conception and during the first trimester to prevent neural tube defects.



Medications That Must Be Stopped Before Conception

Medication	Reason to Avoid During Pregnancy	When to Stop Before Conception
Mycophenolate mofetil (MMF)	High risk of congenital malformations and miscarriage	At least 6 weeks before conception
Methotrexate (MTX)	Teratogenic – neural tube defects, miscarriage	At least 3 months before conception
Cyclophosphamide	Teratogenic, especially in first trimester	At least 3 months before conception
Leflunomide	Severe birth defects; requires drug elimination with cholestyramine	At least 2 years , or shorter with washout
Warfarin	Teratogenic (especially between weeks 6–12); fetal warfarin syndrome	Switch to low molecular weight heparin (LMWH)
ACE inhibitors / ARBs	Renal damage, oligohydramnios, skull defects in fetus	Switch to safer antihypertensives before conception

Medications Generally Considered Safe in Pregnancy

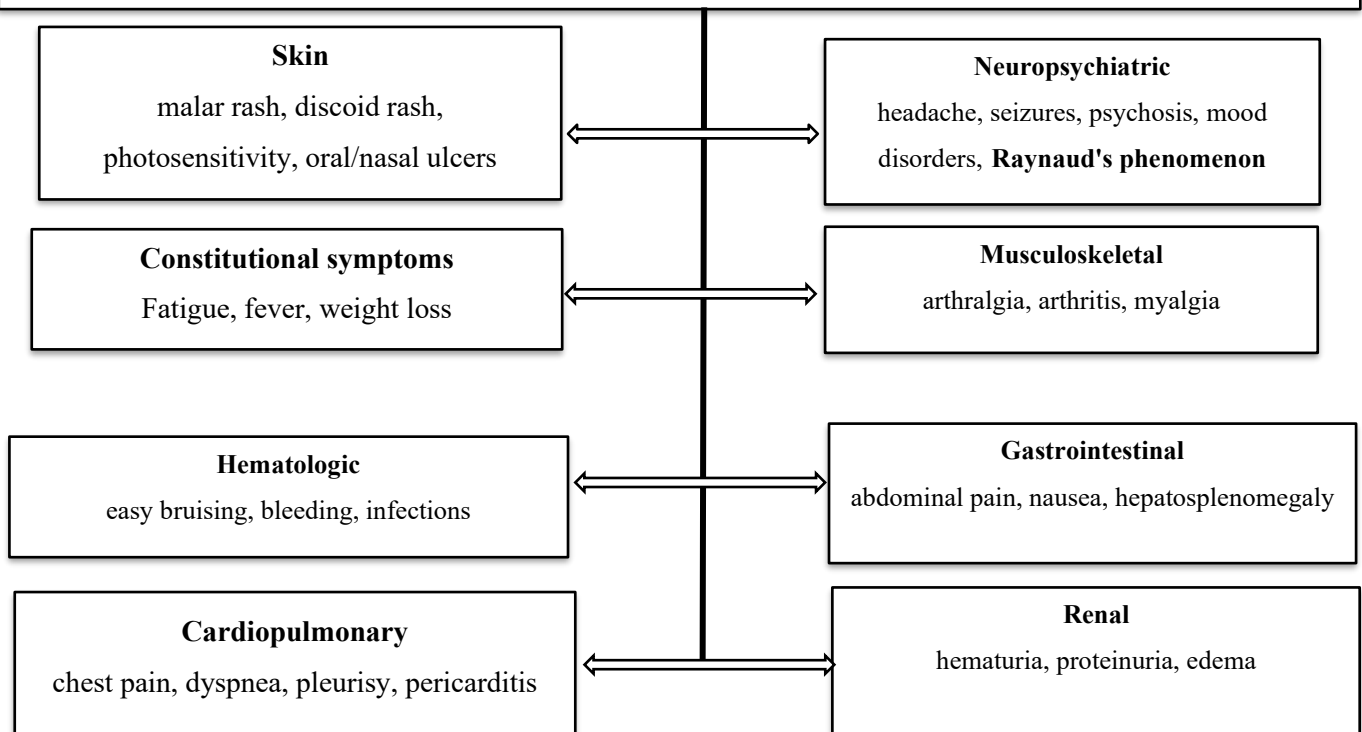
Medication	Comments
Hydroxychloroquine (HCQ)	Strongly recommended to continue; reduces flares and improves pregnancy outcomes
Azathioprine	Safe at doses ≤ 2 mg/kg/day
Low-dose corticosteroids (prednisone)	Safe; use lowest effective dose Steroids (Prednisone): Low-dose prednisone may be used during pregnancy, but high doses should be avoided due to risks like gestational diabetes, hypertension, and preeclampsia.
NSAIDs (e.g., ibuprofen)	Safe in 1st and 2nd trimesters , avoid in 3rd trimester
Low molecular weight heparin (LMWH)	For antiphospholipid syndrome or thrombosis prophylaxis
Aspirin (81 mg/day)	Recommended in high-risk pregnancies (e.g., antiphospholipid antibodies) to reduce preeclampsia risk

Clinical management of SLE in pregnancy

A detailed clinical assessment of the patient should include

history review for any recent flare in the past 6–12 months which include the following symptom & manifestation

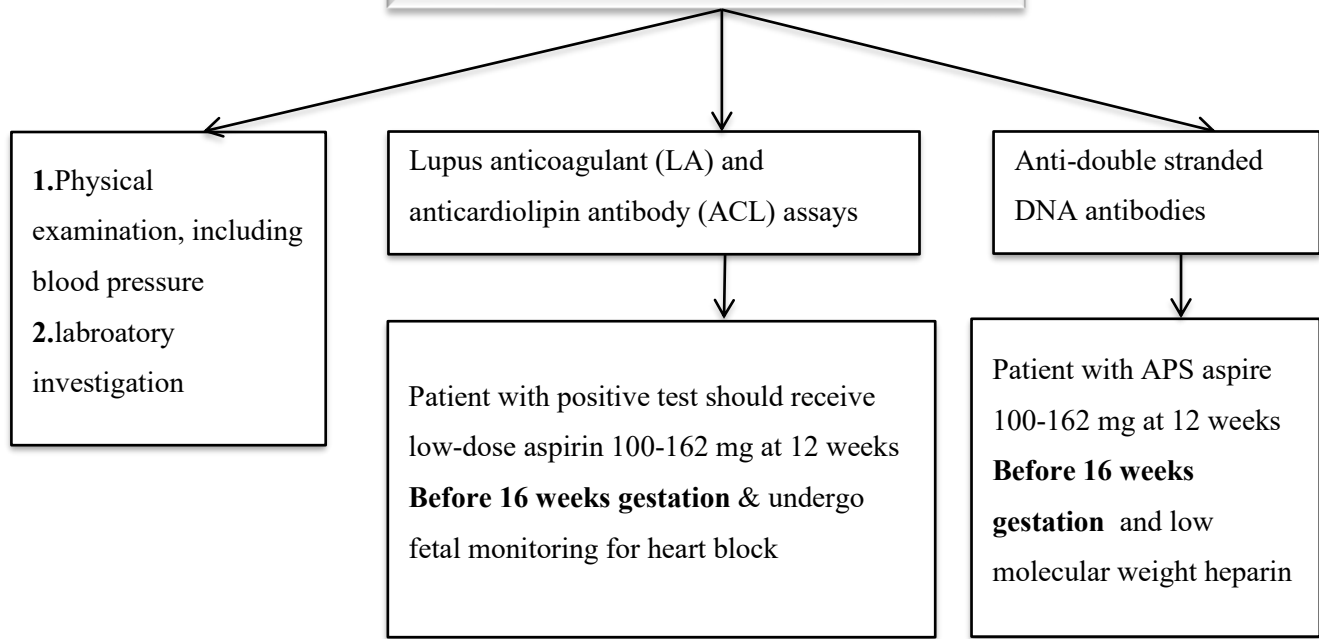
Key goal: Disease should ideally be **quiescent for at least 6 months** before conception.



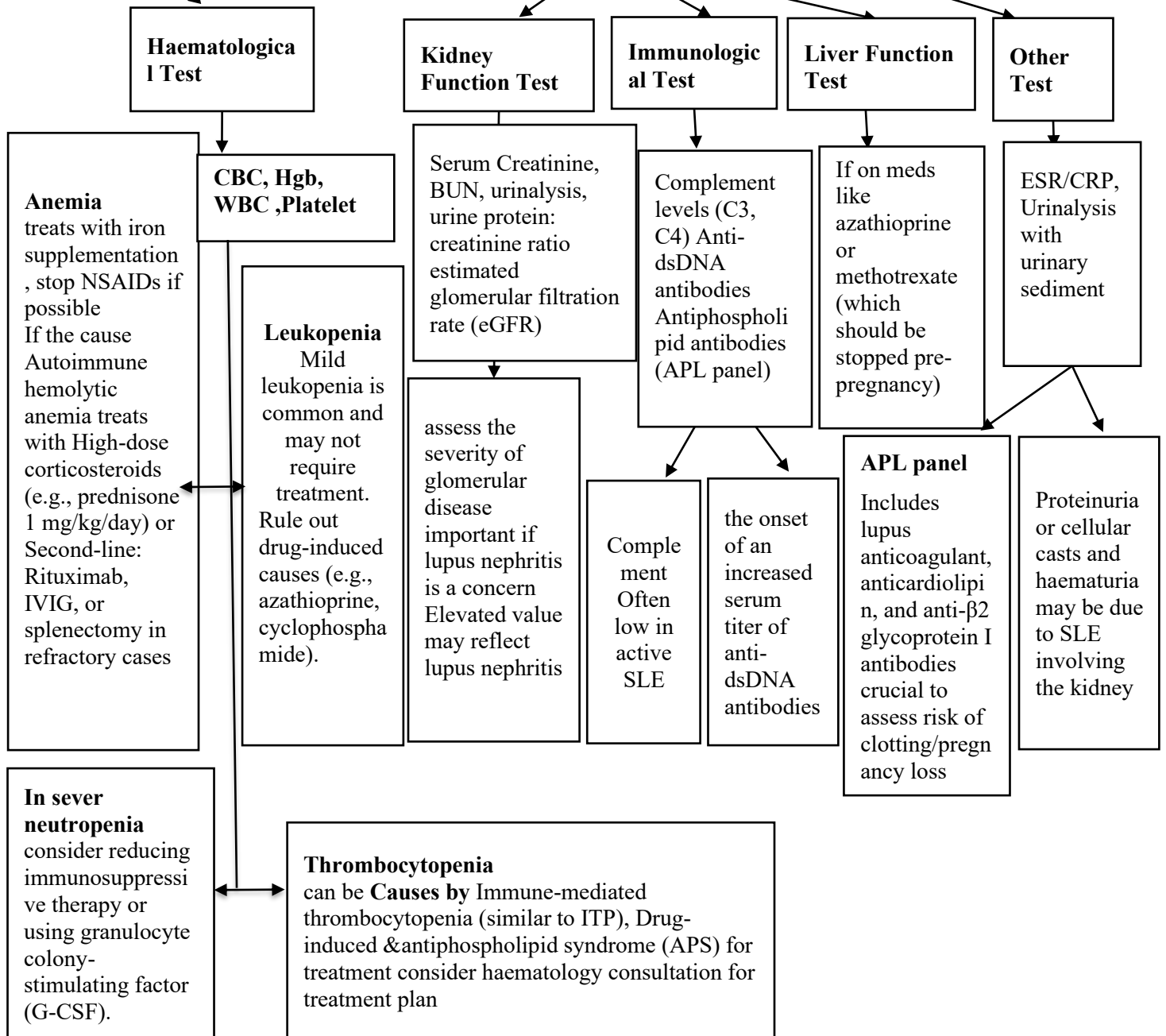
an active SLE must be distinguished from chronic damage especially involving the **kidneys, heart, lungs, and nervous system**, as these can significantly impact pregnancy outcomes.

ANC follow up for patient with SLE

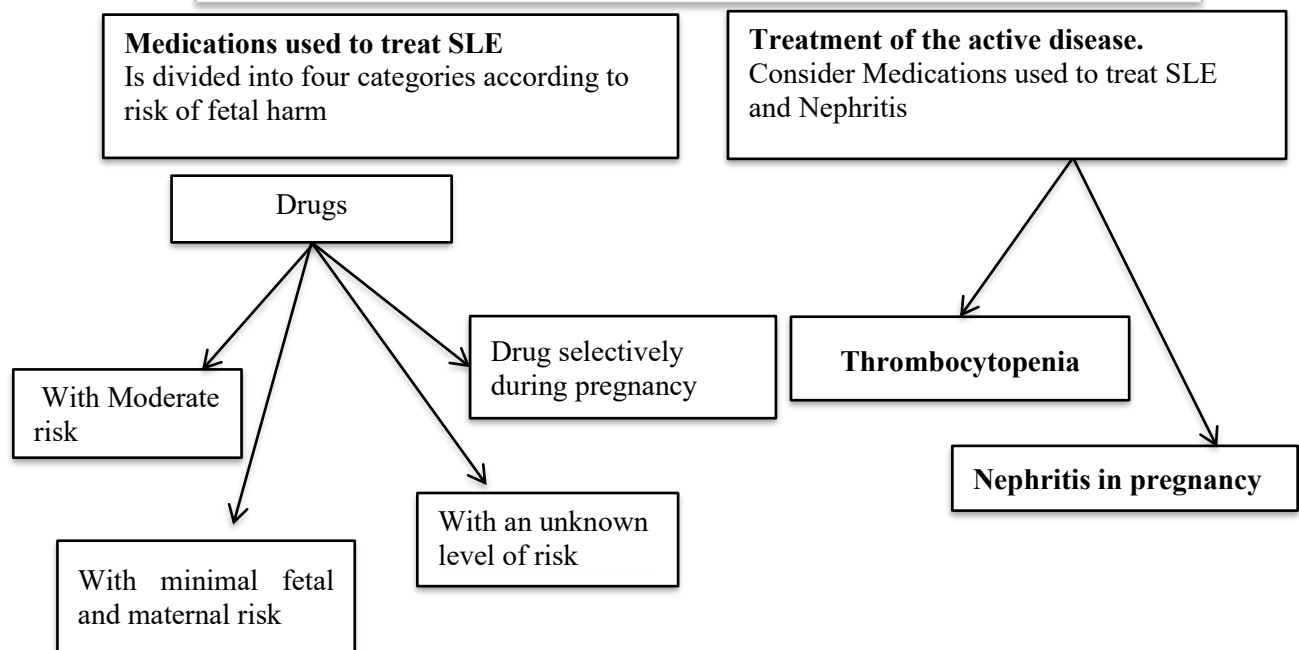
1st visit base line ANC follow up plan



laboratory assessment



Treatment of active disease in pregnancy
Consider Medications used to treat SLE & Nephritis in pregnancy



Monitoring of SLE patient in the second and third trimester

Monitoring in the last trimester of pregnancy for complication like
Preeclampsia, hypertension, fetal growth restriction, fetal heart block



Weekly follow up with
In the third trimester Biophysical profile, nonstress test, amniotic fluid assessment, and umbilical artery Doppler ultrasonography

The exacerbation of renal disease in SLE patient

Treatment of patient with SLE Recommendation

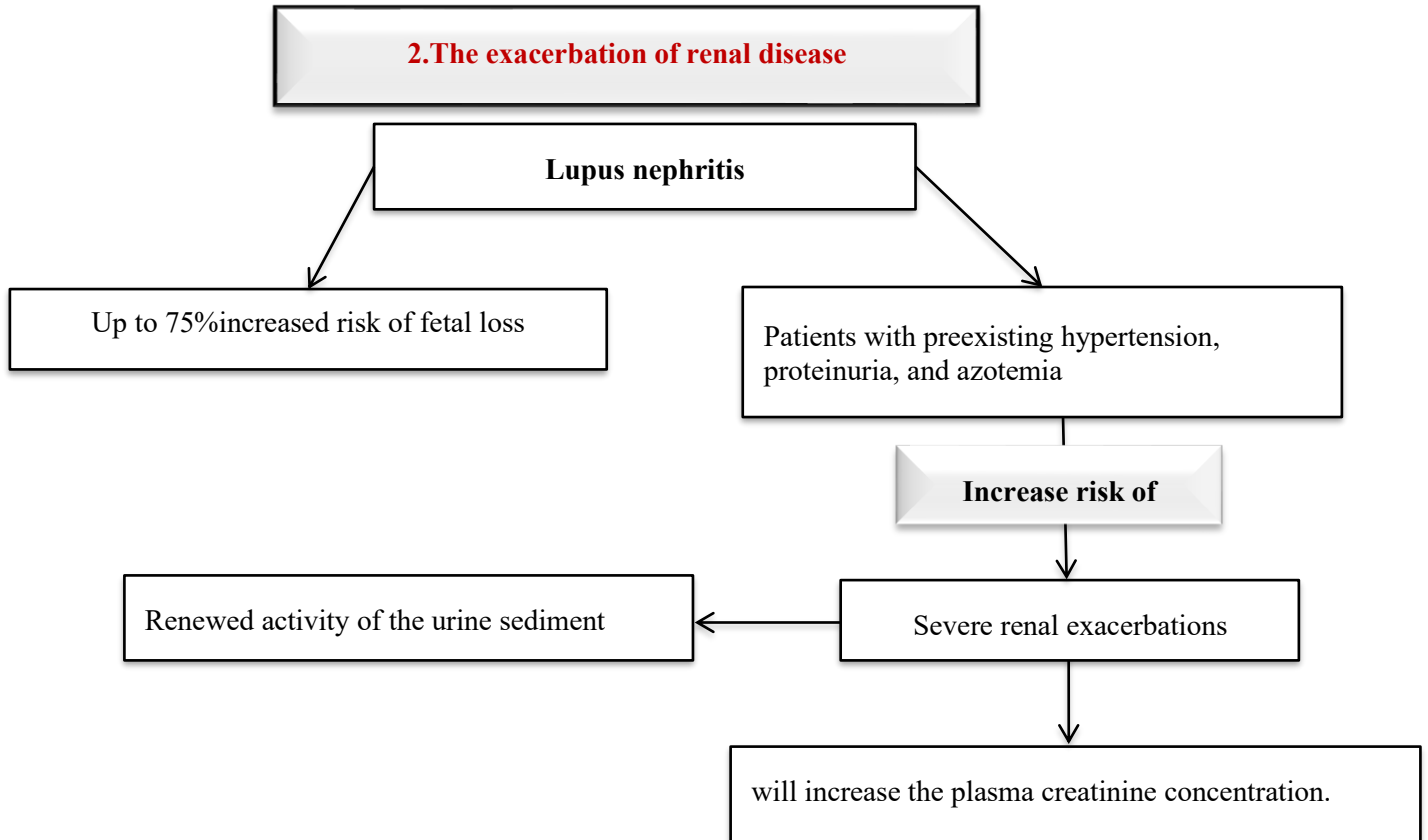


Monitoring
Assessed for disease activity at least once each trimester

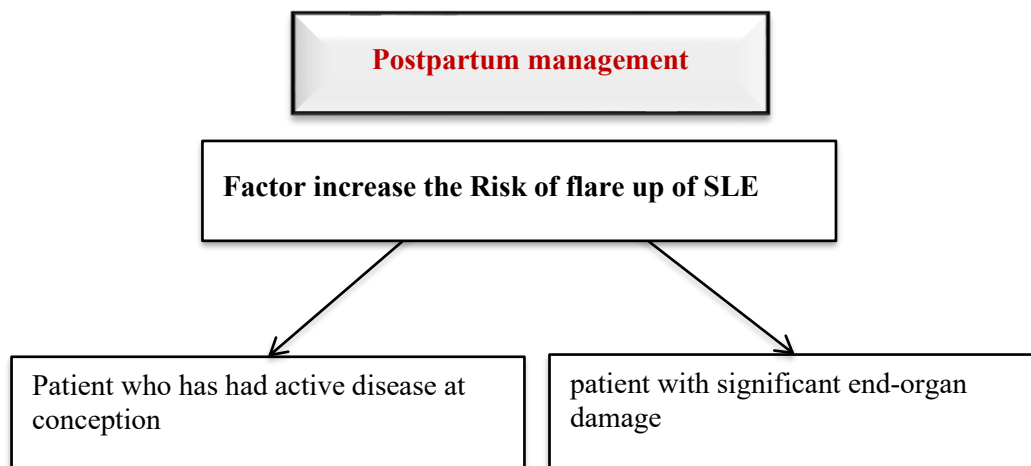


Treatment of the active disease.
Consider Medications used to treat SLE and Nephritis in pregnancy

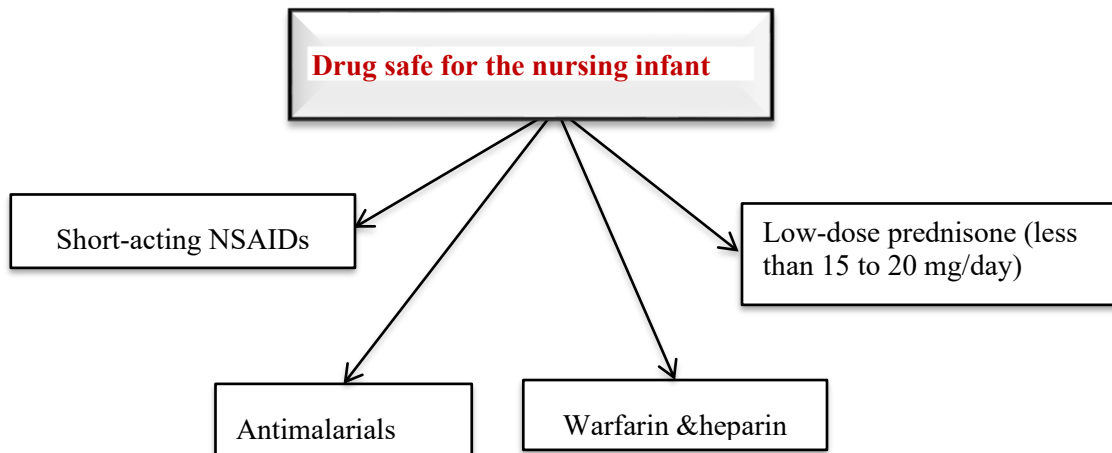
2.The exacerbation of renal disease



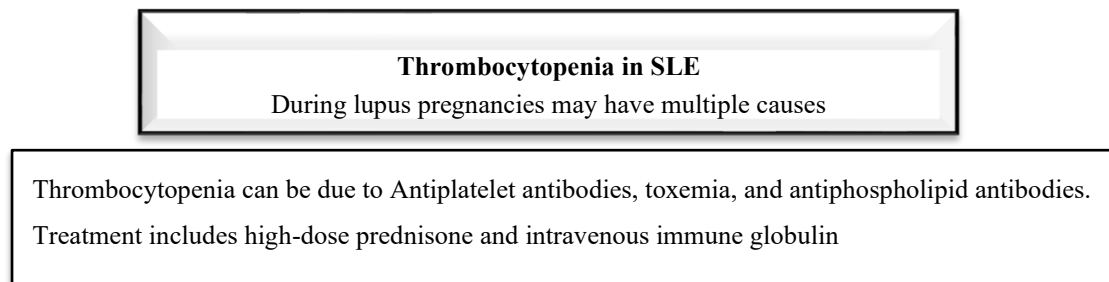
Management of patient with SLE in the postpartum period



Drug safe for breast feeding



Thrombocytopenia in SLE



Post partum care for SLE patient

1. Monitoring Disease Activity and close observation

- a. Increased risk of flare-ups** particularly in the first 6 months.
- b. Close monitoring:** Regular follow-up appointments with a rheumatologist are essential.
- c. Treatment adjustments:** If a flare is detected, treatment may include increasing or adjusting medications.

2. Management of Postpartum Complications

a. Postpartum preeclampsia Monitoring for sign of preeclampsia and treat

- **Antiphospholipid syndrome (APS):** Women with SLE and APS are at higher risk of **thromboembolic events** so prophylactic **low-molecular-weight heparin (LMWH)** is indicated .
- **Infections** monitoring for signs of infection in the post partum period and treat

3. Medications and Medication Adjustments

1.Continuing safe medications: Medications that were safe during pregnancy, such as **hydroxychloroquine, low-dose steroids, and antihypertensives** (e.g., labetalol, methyldopa), can usually continue postpartum to control SLE symptoms.

2.Avoid contraindicated medication during breast feeding (e.g., methotrexate, mycophenolate mofetil)

3. Steroid tapering: Corticosteroid use during pregnancy should be monitored, and the dose may need to be **tapered down** after delivery to minimize side effects

4.Anticoagulation: Women with a history of **antiphospholipid syndrome (APS)** or **thrombosis** may require postpartum anticoagulation therapy, such as **heparin or warfarin** for several weeks to reduce the risk of clotting.

5.Breastfeeding considerations: Hydroxychloroquine and most other common lupus medications are compatible with breastfeeding, but certain medications, such as methotrexate and mycophenolate mofetil, should be avoided due to potential risks to the infant.

Summary

Managing systemic lupus erythematosus (SLE) in pregnancy involves close monitoring to minimize maternal and fetal risks. Disease activity should be well-controlled before conception, with medications like hydroxychloroquine and low-dose corticosteroids being preferred. Nonsteroidal anti-inflammatory drugs (NSAIDs) and oral contraceptives are avoided due to potential risks. Regular fetal monitoring for growth and signs of lupus-related complications, such as preeclampsia or neonatal lupus, is essential. Anticoagulation therapy may be indicated for antiphospholipid syndrome. The timing of delivery is based on maternal health, with preterm birth considered in cases of complications. Postpartum care includes careful monitoring for disease flare-ups.

References

1. Silver, R., Craigo, S., Porter, F., Osmundson, S. S., Kuller, J. A., & Norton, M. E.; Society for Maternal–Fetal Medicine. (2023).

SMFM Consult Series #64: Systemic lupus erythematosus in pregnancy. American Journal of Obstetrics and Gynecology, 228(3), B41–B60.

Key recommendations include the **continuation of hydroxychloroquine**, initiation of **low-dose aspirin from 12 weeks**, strategies to manage SLE flares (e.g., steroids, azathioprine, tacrolimus), and distinguishing **lupus nephritis from preeclampsia**, with tailored anticoagulation for antiphospholipid syndrome.

2. Gamba, A., Zen, M., Depascale, R., Calligaro, A., Gatto, M., Iaccarino, L., & Doria, A. (2024).

Modern management of pregnancy in systemic lupus erythematosus: From prenatal counseling to postpartum support. Journal of Clinical Medicine, 13(12), 3454.

This review outlines **preconception risk stratification**, fetal surveillance including **anti-Ro/SSA-related congenital heart block**, medication management (e.g., hydroxychloroquine, steroids, azathioprine, tacrolimus), and postpartum care.

3. van der Bijl, M., & EULAR Task Force. (2024).

EULAR recommendations for women's health and management of pregnancy in patients with SLE and/or antiphospholipid syndrome. Annals of the Rheumatic Diseases.

Emphasises **continuation of hydroxychloroquine**, early initiation of **low-dose aspirin**, use of pregnancy-compatible immunosuppressants (e.g., azathioprine, calcineurin inhibitors), and guidelines for managing moderate to severe flares (e.g., glucocorticoids, IVIG, plasmapheresis), while avoiding contraindicated agents like cyclophosphamide in early pregnancy.

Chapter 26

fighting the invader

Infectious Diseases in Pregnancy

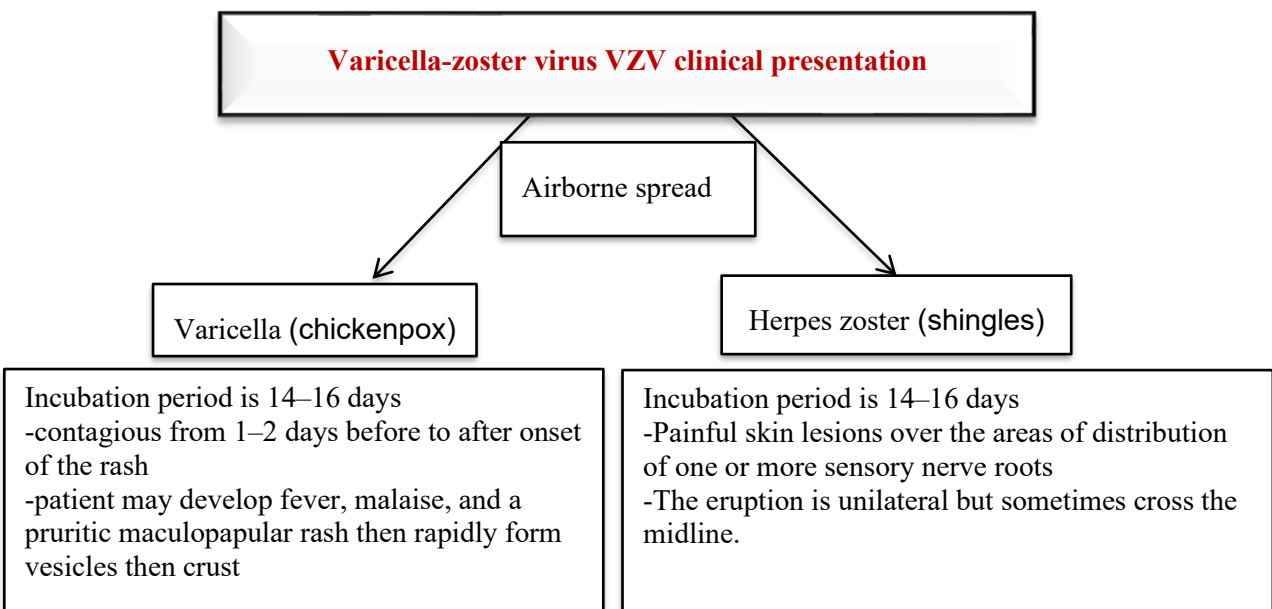
Infectious diseases during pregnancy can pose significant risks to both the mother and the developing fetus. Which might be potentially leading to complications such as premature birth, birth defects, or even fetal death.

Infectious diseases during pregnancy can be caused by a wide range of pathogens

This chapter will explore the impact of infectious diseases during pregnancy, focusing on their pathophysiology, risk factors, prevention strategies, and management approaches

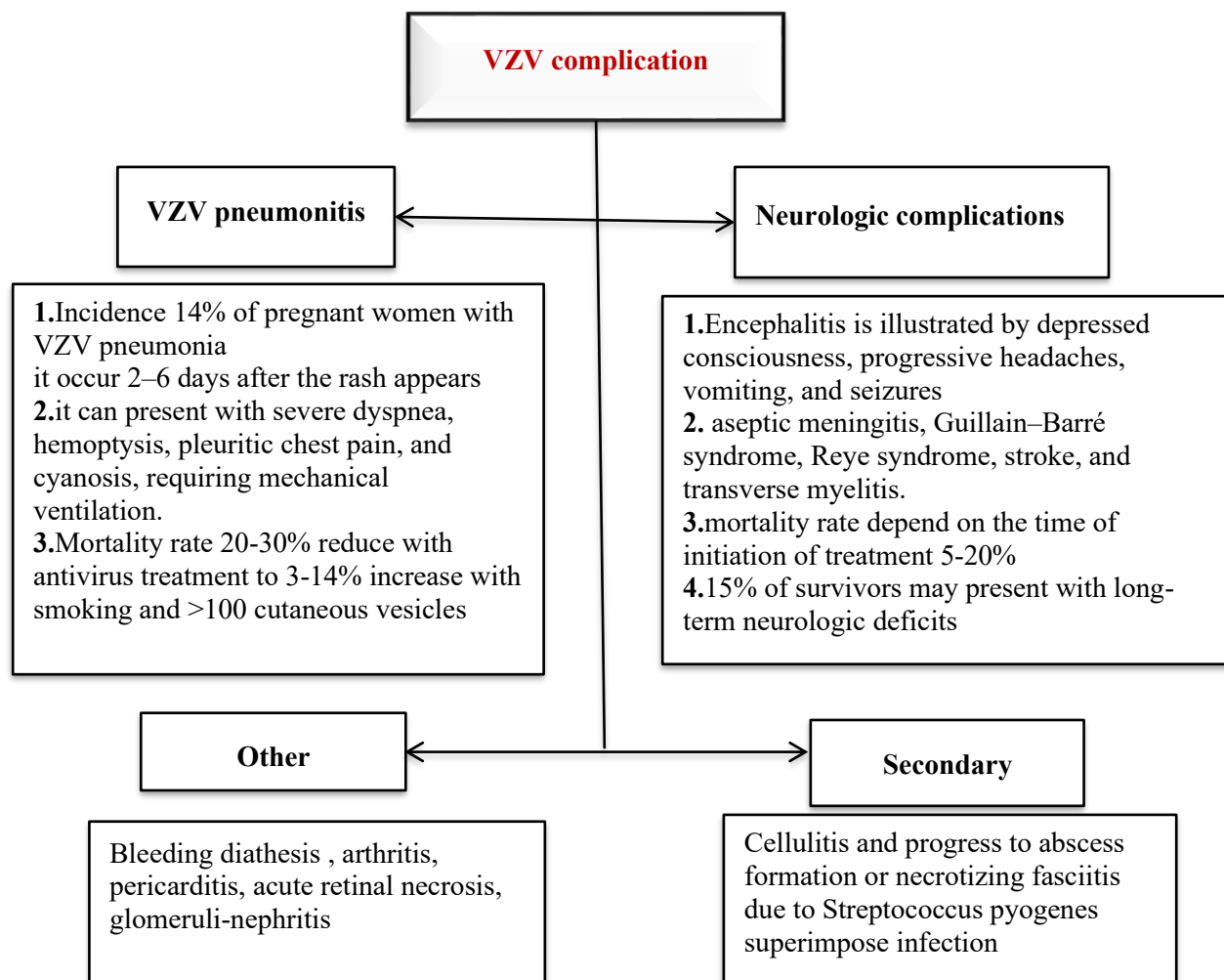
Varicella-zoster virus in pregnancy

Varicella-zoster virus (VZV), the cause of chickenpox and shingles, poses significant risks during pregnancy. Primary VZV infection in a pregnant woman can lead to serious maternal complications like pneumonia and may cause fetal varicella syndrome if contracted in early pregnancy. Reactivation as herpes zoster is less risky but still requires careful management. Prevention through screening and vaccination pre-pregnancy is crucial to reduce adverse outcomes.

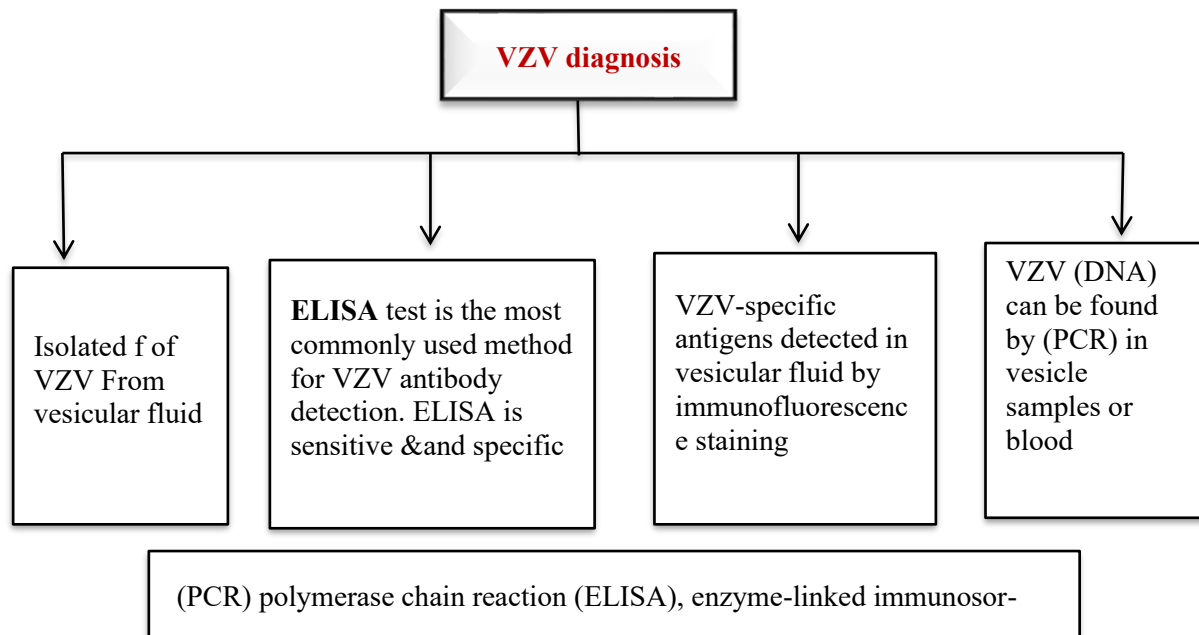


VZV complication

Varicella infection in pregnancy can lead to severe **maternal complications** such as varicella pneumonia, which may be life-threatening. **Fetal complications** include congenital varicella syndrome (CVS), especially if infection occurs before 20 weeks, causing limb hypoplasia, skin scarring, and neurological defects. **Neonatal varicella** can occur if maternal infection happens close to delivery, carrying high morbidity and mortality



VZV diagnosis

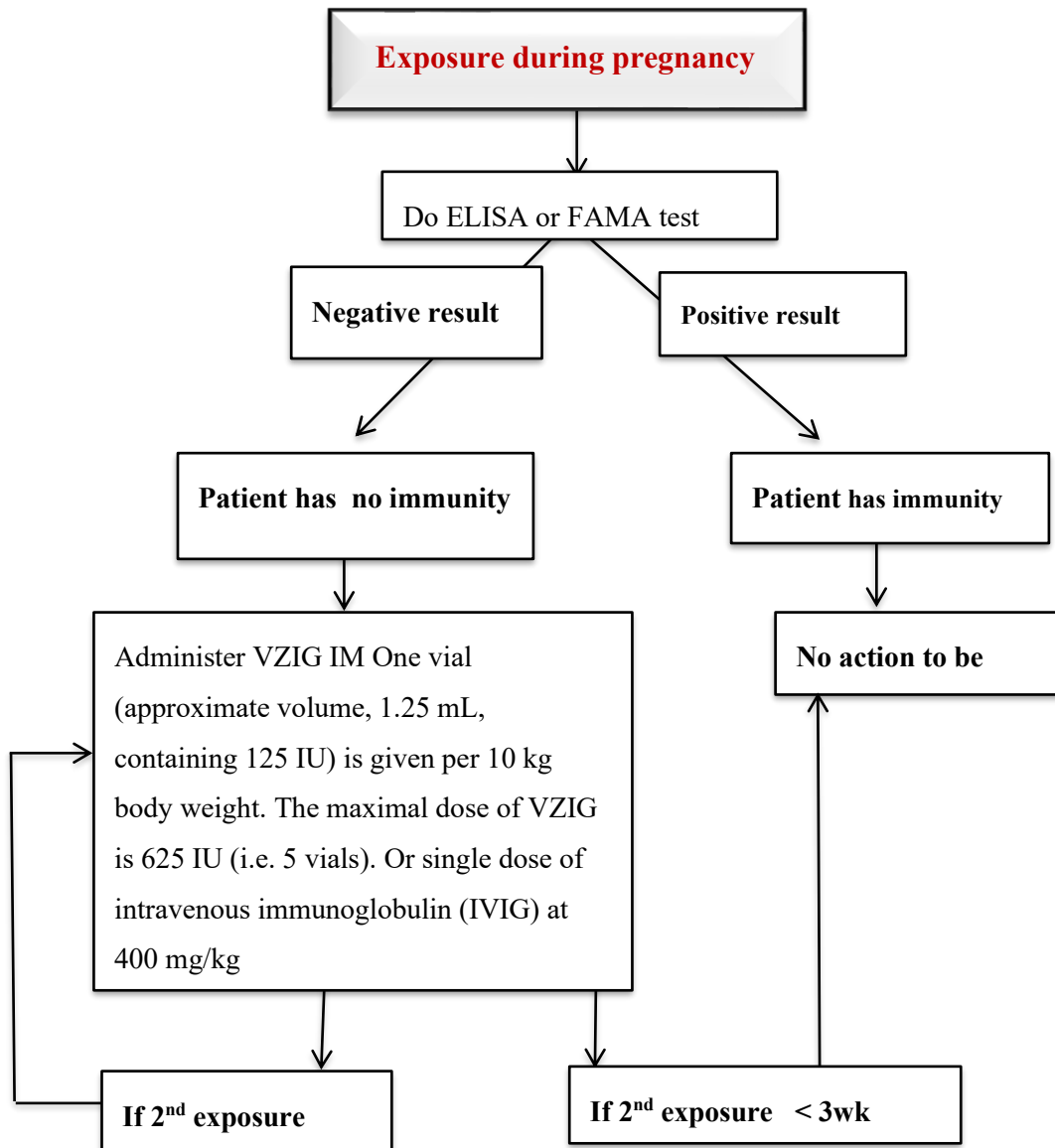


Safety of chickenpox during breast feeding

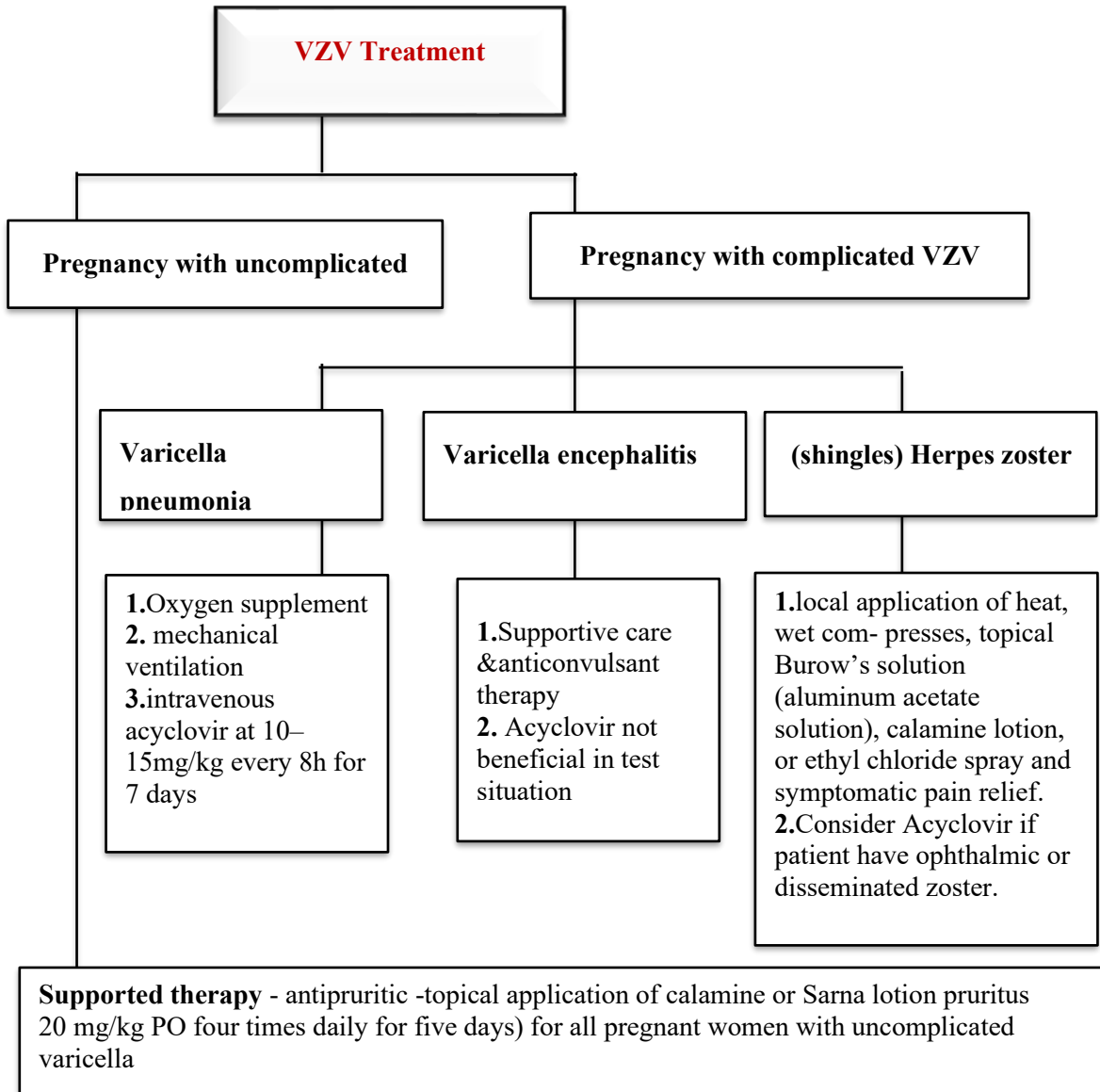
Safety of chickenpox during breast feeding

a mother with chickenpox can generally continue to breastfeed her baby. Breastfeeding may actually provide some protection to the infant, as the mother can pass on antibodies through her milk. However, it's important for the mother to take precautions to avoid direct contact with the baby's skin lesions, if any, and to practice good hygiene, such as washing hands frequently.

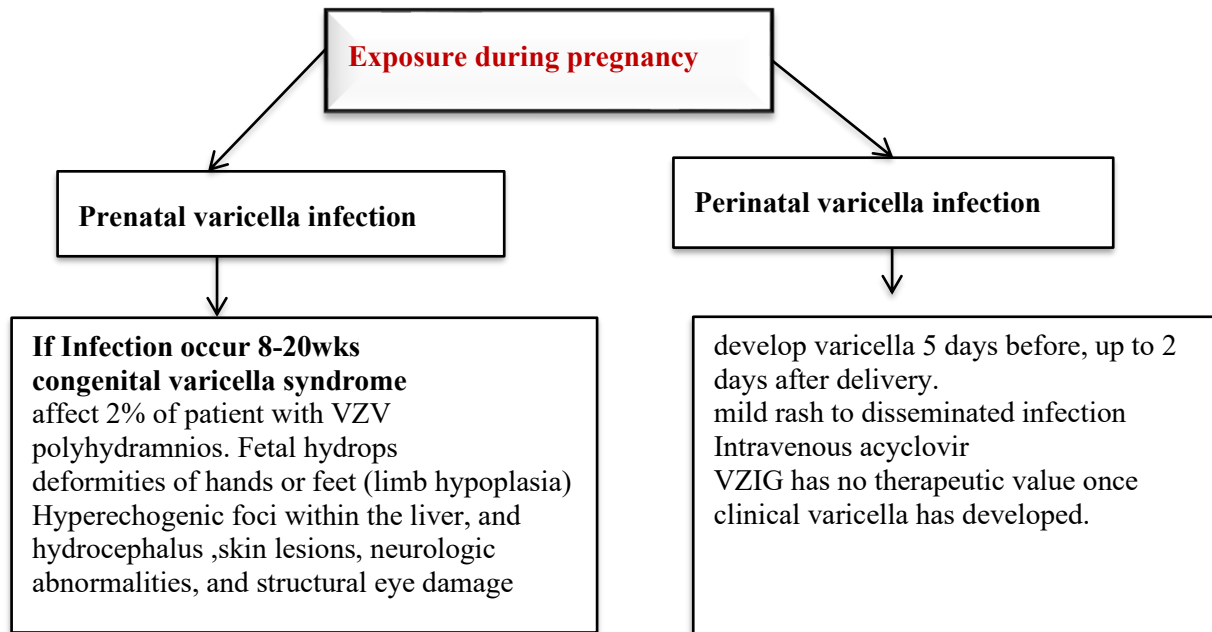
Management of exposure to VZV during pregnancy



VZV Treatment



Management of VZV Exposure during pregnancy



Summery

Managing varicella-zoster virus (VZV) in pregnancy involves timely diagnosis and treatment to reduce risks to both the mother and fetus. Pregnant women who have not had chickenpox or been vaccinated should receive varicella-zoster immunoglobulin (VZIG) if exposed. Antiviral therapy with acyclovir is recommended for active infections, especially in severe cases. If VZV infection occurs close to delivery, neonates should receive VZIG within 72 hours of birth. Monitoring for complications such as pneumonia or congenital varicella syndrome is essential. Pregnant women should be advised to avoid contact with infected individuals. Vaccination is recommended pre-pregnancy for susceptible women.

II. Toxoplasmosis and pregnancy

Toxoplasmosis is a parasitic infection caused by *Toxoplasma gondii*, which can have serious implications during pregnancy. While often asymptomatic in the mother, primary infection during pregnancy can lead to transplacental transmission. This may result in congenital toxoplasmosis, causing neurological and ocular damage in the fetus. Early diagnosis and treatment are essential to reduce fetal risk.

Toxoplasma infection clinical presentation during pregnancy

Toxoplasma infection during pregnancy can present in various ways, ranging from asymptomatic cases to those showing symptoms, which may include:

1. **Flu-like Symptoms:** Such as fever, muscle aches, and fatigue.
2. **Swollen Lymph Nodes:** Particularly in the neck and head.
3. **Headaches:** Some women may experience persistent headaches.
4. **Rash:** Occasionally, a mild rash may occur.

The most concerning aspect is the potential transmission to the fetus, which can lead to serious complications, including:

- **Congenital Toxoplasmosis:** This may result in eye problems, hearing loss, neurological issues, and developmental delays.
- **Miscarriage or Stillbirth:** Though less common, severe cases can result in pregnancy loss.

Toxoplasma infection presentation during

The incidence: 1 to 8 per 1000 susceptible pregnancies
the risk of congenital infection increases with gestational age

Secondary toxoplasmosis
Congenital toxoplasmosis is rare

Primary toxoplasmosis infection
Fatigue, fever, headache, malaise, and myalgia.
Lymphadenopathy, Congenital toxoplasmosis

Fetal effect
Congenital toxoplasmosis

Maternal effect
Fatigue, fever, headache, malaise, and
myalgia. Lymphadenopathy

Impact on Fetal Transmission

The primary goal of treating *Toxoplasma* infection in pregnancy is to reduce the risk of the parasite being transmitted from the mother to the fetus. The likelihood of fetal transmission varies based on the timing of maternal infection:

Early Pregnancy (First Trimester)

The risk of fetal transmission is lower in early pregnancy, but if transmission occurs, it can lead to severe outcomes such as miscarriage, hydrocephalus, and cerebral calcifications. Treatment in the first trimester can reduce fetal transmission, but it may not completely prevent severe complications in the fetus.

Second and Third Trimester

The risk of fetal transmission increases as pregnancy progresses, but the severity of fetal effects generally decreases. In these stages, treatment can significantly reduce the severity of the infection in the fetus, preventing neurological and ocular damage that can occur without intervention.

Toxoplasma screening

Routine screening for Toxoplasma infection in pregnant women is not typically recommended testing may be considered in specific situations, such as:

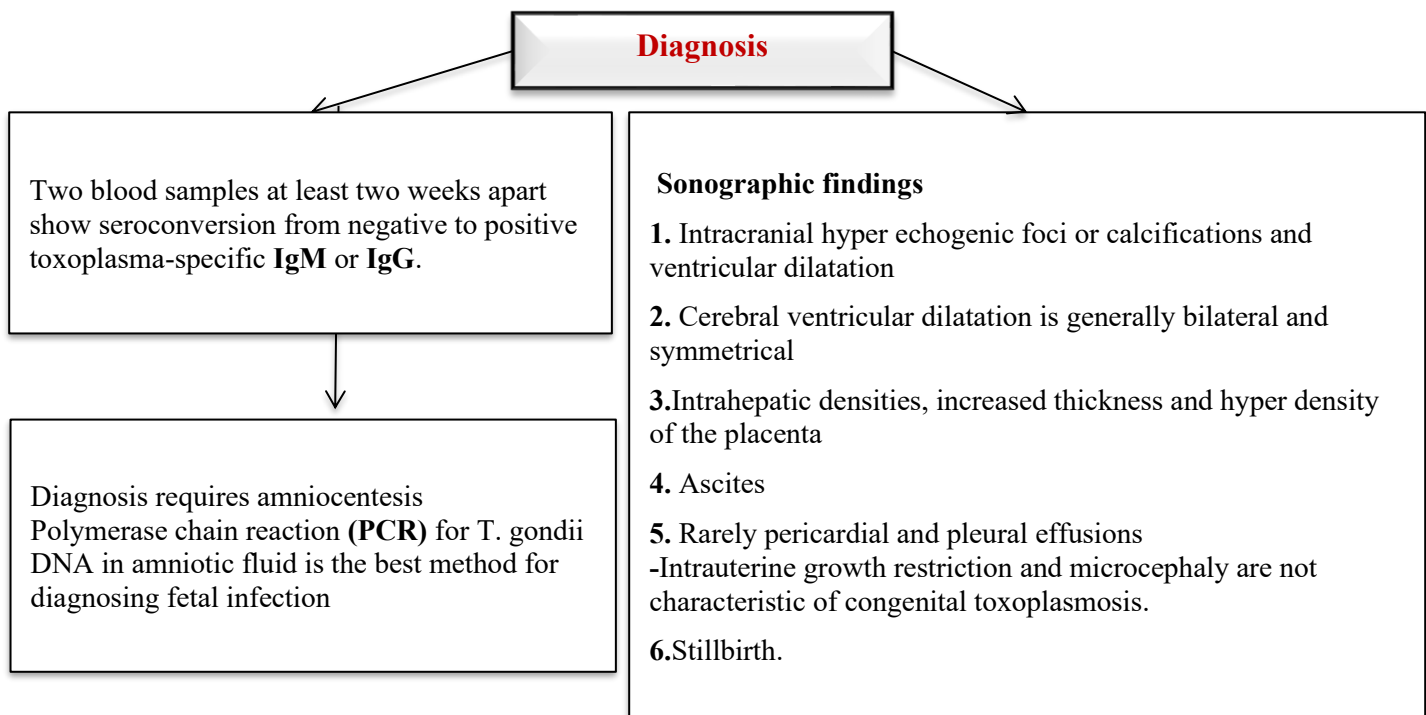
High-Risk Individuals for Toxoplasma

Women who have high-risk factors, such as exposure to cats or consumption of undercooked meat, may benefit from testing.

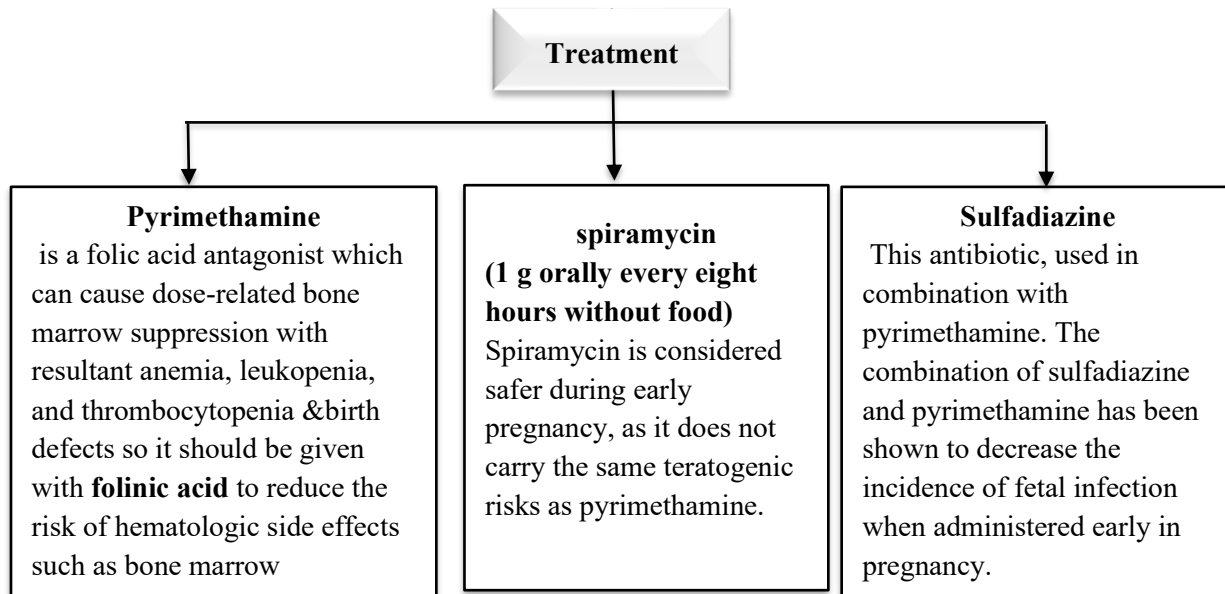
Symptoms of Toxoplasma

If a pregnant woman shows symptoms suggestive of Toxoplasma infection, testing may be warranted.

Toxoplasma infection diagnosis



Treatment of Toxoplasma infection during pregnancy



Summary

Toxoplasmosis in pregnancy is caused by *Toxoplasma gondii* and can lead to severe fetal complications, including congenital defects or stillbirth. The risk of transmission to the fetus increases with gestational age, but early infection may result in more severe outcomes. Pregnant women should avoid handling cat litter, consuming undercooked meat, or exposure to contaminated soil. If infection occurs, treatment with pyrimethamine and sulfadiazine is recommended to reduce fetal risks. Diagnosis is confirmed through serological testing. Infected pregnancies require close monitoring through ultrasound and possible amniocentesis. Early detection and treatment can help minimize adverse outcomes for the baby.

III. Gonorrhoea infection in pregnancy

Gonorrheal infection, caused by *Neisseria gonorrhoeae*, is a sexually transmitted infection that can adversely affect pregnancy. If left untreated, it increases the risk of preterm labor, premature rupture of membranes, and chorioamnionitis. Vertical transmission during delivery can lead to neonatal conjunctivitis or systemic infection. Early screening and appropriate antibiotic treatment are crucial for maternal and neonatal health.

Gonorrhea clinical presentation

In pregnancy, gonorrhea presents unique challenges as it can have adverse effects on maternal health and fetal development if left untreated. While gonorrhea can often be asymptomatic, particularly in women, its potential to cause serious complications makes early diagnosis and treatment crucial.

Common Symptoms:

1. Abnormal vaginal discharge can appear yellow or green.
2. A burning sensation during urination.
3. Pelvic or Abdominal Pain: This can indicate severe complications like PID.
4. Pain during Intercourse
5. can pass without any symptom

Complications

1. **Pelvic Inflammatory Disease (PID)**: which may present with severe abdominal pain, fever.
2. **Disseminated Gonococcal Infection (DGI)**: A rare condition that can cause joint pain, skin rashes, and systemic symptoms

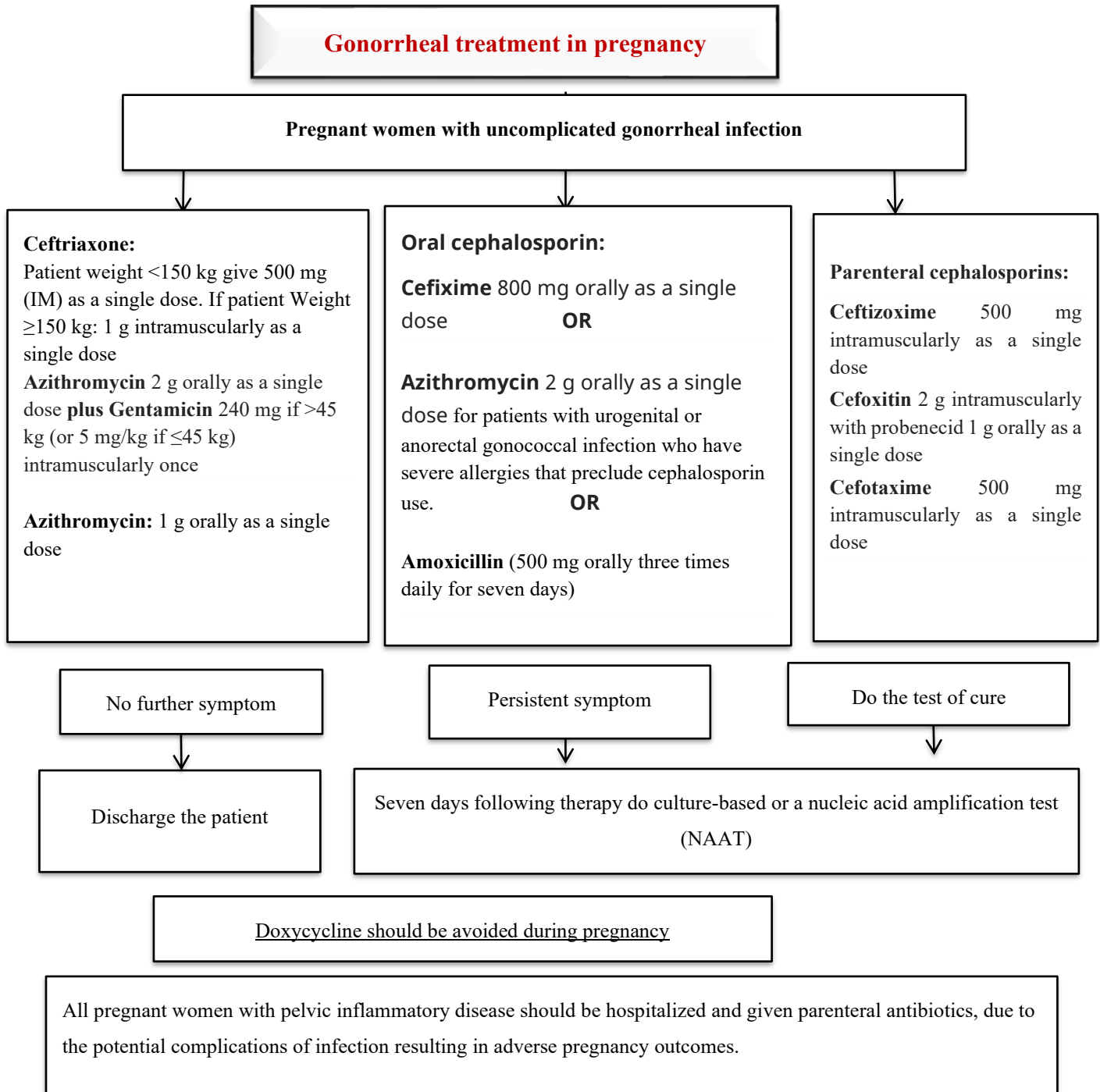
Asymptomatic Cases:

1st trimester screening is important

The treatment of gonorrhoea typically involves antibiotic therapy.

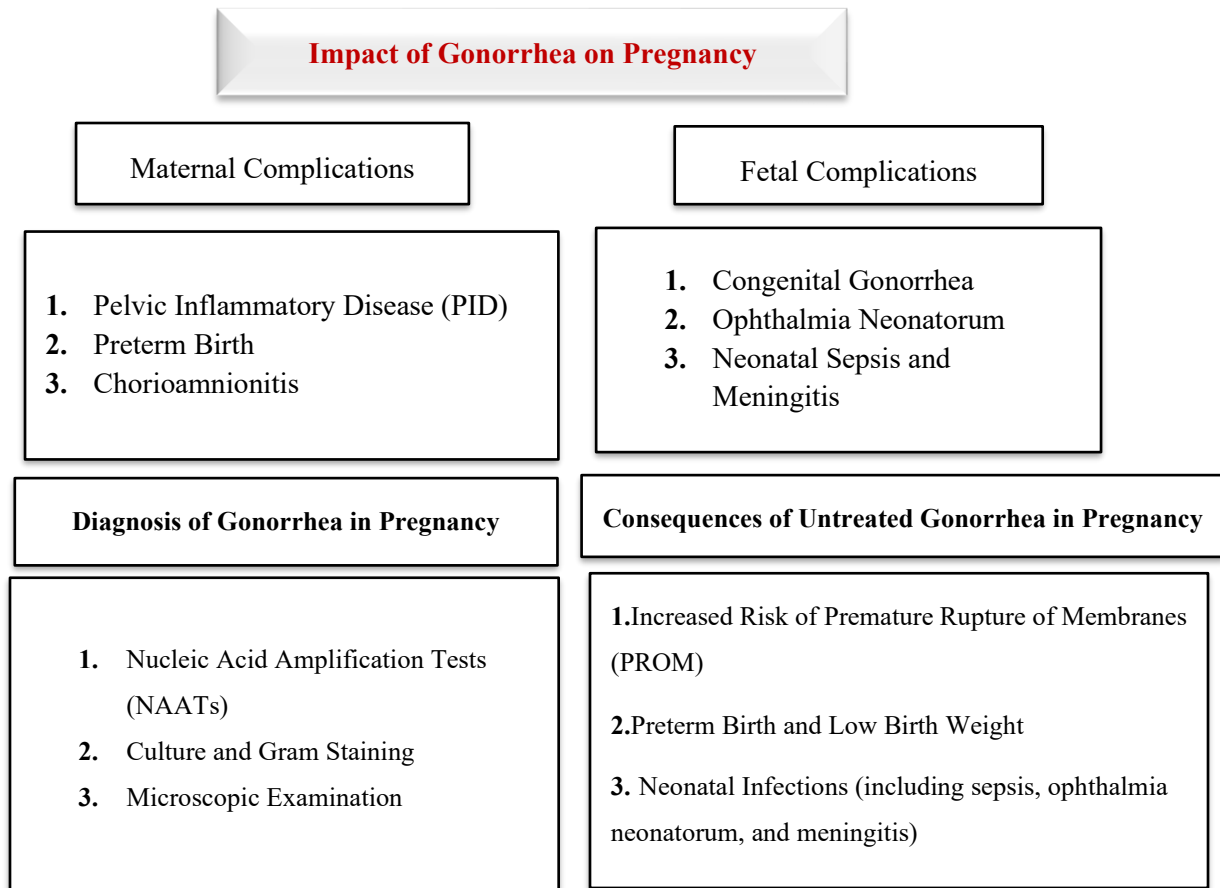
Follow-Up of pregnancy with gonorrhea

Retesting is recommended within three months after treatment to ensure the infection has been cleared, especially for those at high risk for rein.



Post partum care for patient infected with gonorrhea during pregnancy

Neonatologist should be informed about the current pregnancy history

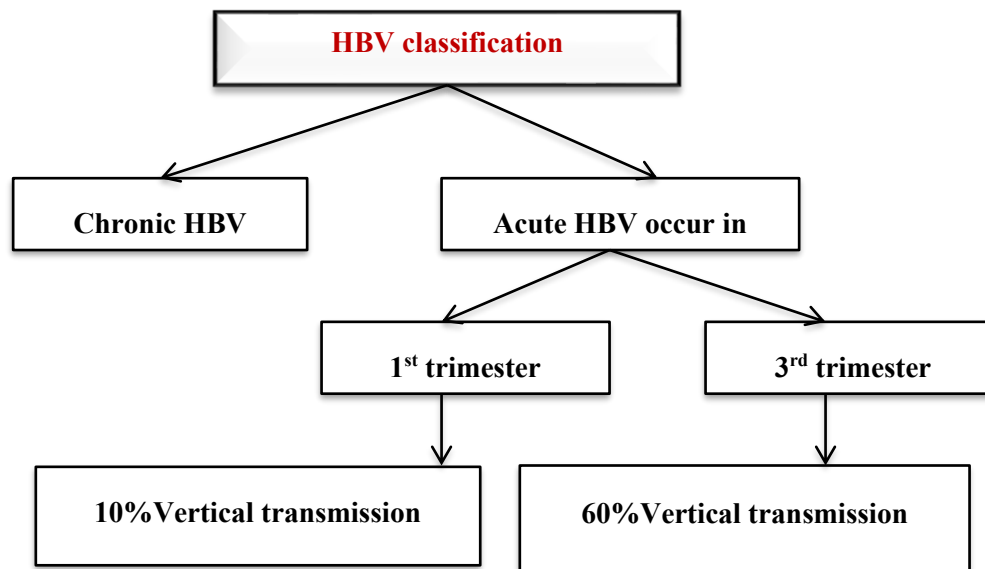


Summary

Gonorrheal infection during pregnancy can lead to complications such as preterm labor, chorioamnionitis, and neonatal infections. Screening for gonorrhea is recommended during pregnancy, especially for high-risk women. If diagnosed, treatment with appropriate antibiotics, such as ceftriaxone, is essential to prevent complications. Gonorrhea can be transmitted to the baby during delivery, potentially causing conjunctivitis or systemic infections. Infected women should be retested after treatment to ensure cure. Pregnant women with gonorrhea should avoid sexual contact until the infection is fully treated. Timely management helps reduce risks to both the mother and infant.

IV. Hepatitis B during pregnancy

Hepatitis B infection during pregnancy presents specific challenges due to the potential for maternal and neonatal complications, including the risk of vertical transmission from mother to child. Understanding the impact of Hepatitis B on pregnancy, its diagnosis, management, and preventive measures is essential to optimize both maternal and fetal health



Clinical presentation of HBV

Hepatitis B virus (HBV) infection during pregnancy can have various clinical presentations which can be chronic or acute, and implications for both the mother and the fetus.

Maternal Presentation of HBV

1. **Asymptomatic Carrier:** Many women may be asymptomatic, having chronic HBV infection without noticeable symptoms.
2. **Acute Hepatitis:** Some women may experience acute hepatitis, which can present with:
*Fatigue *Nausea and vomiting *Abdominal pain (especially in the right upper quadrant) *Jaundice
3. **Chronic Hepatitis:** For women with chronic HBV, there may be periods of flares or exacerbations, which can be monitored through liver function tests.
4. **Liver Complications:** In rare cases, pregnant women with severe chronic HBV may experience liver-related complications, such as liver failure.

Fetal Presentation

Vertical Transmission: The main concern during pregnancy is the risk of transmitting HBV to the fetus, which can occur:

- During delivery (especially if the mother is HBeAg positive).
- Rarely, in utero.

Risk Factors for Transmission:

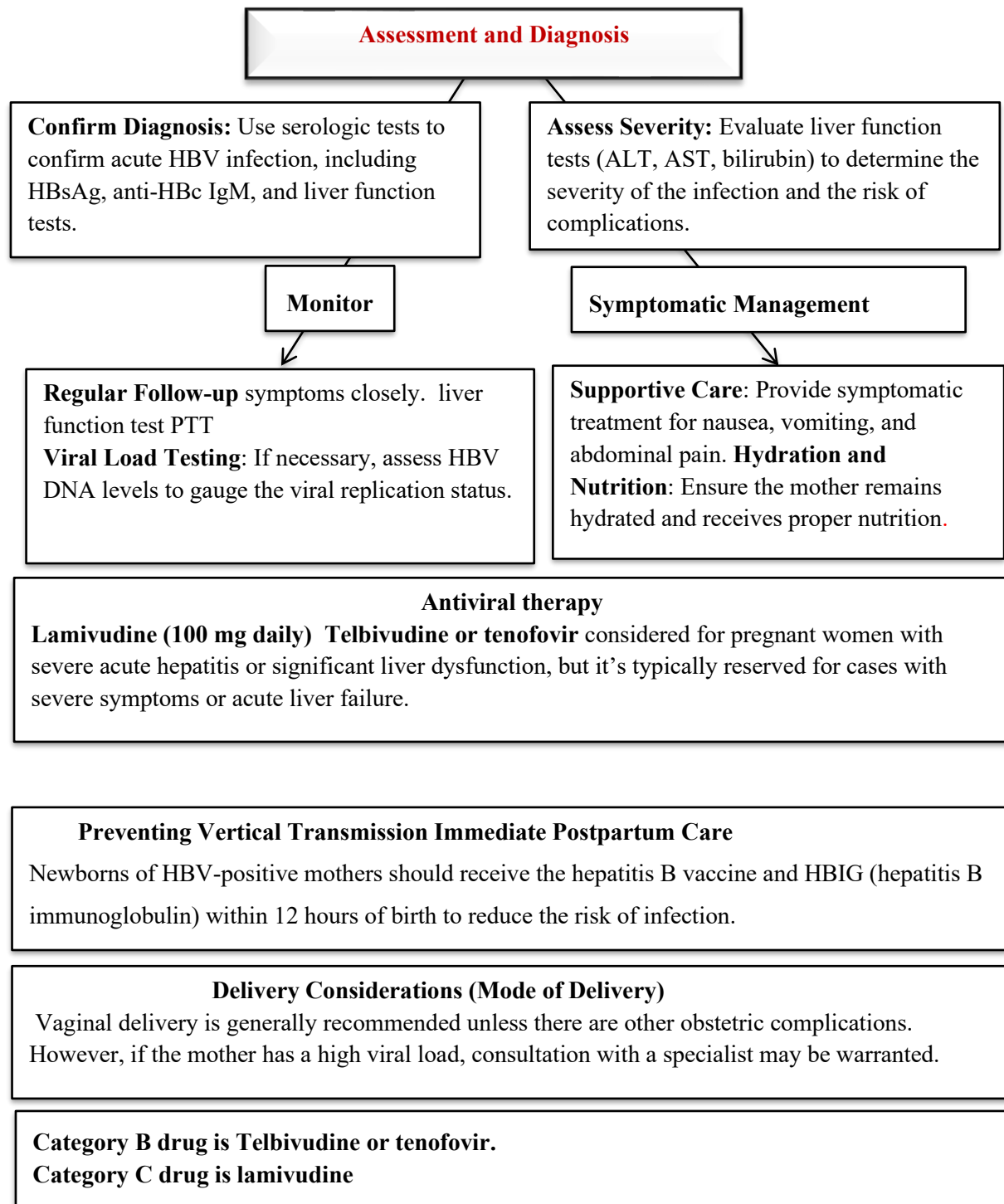
- Higher viral load in the mother (measured by HBV DNA).
- HBeAg positivity increases the risk of transmission.

Outcomes: If transmission occurs, the newborn is at risk of developing chronic hepatitis B infection, which can lead to long-term liver issues.

Postpartum Considerations

1. Vaccination and Immunoglobulin
2. Monitoring

Management of acute hepatitis B virus (HBV) infection during pregnancy



Postpartum Follow-up for patient affected with acute HBV

1. Monitor Liver Function: Continue monitoring liver function tests after delivery.

2. Vaccination: Ensure that the newborn receives appropriate vaccination and follow-up care.

3. Counseling and Support

Patient Education: Provide information about HBV, the importance of follow-up care, and potential impacts on the child.

4. Psychosocial Support: Address any anxiety or stress related to the diagnosis.

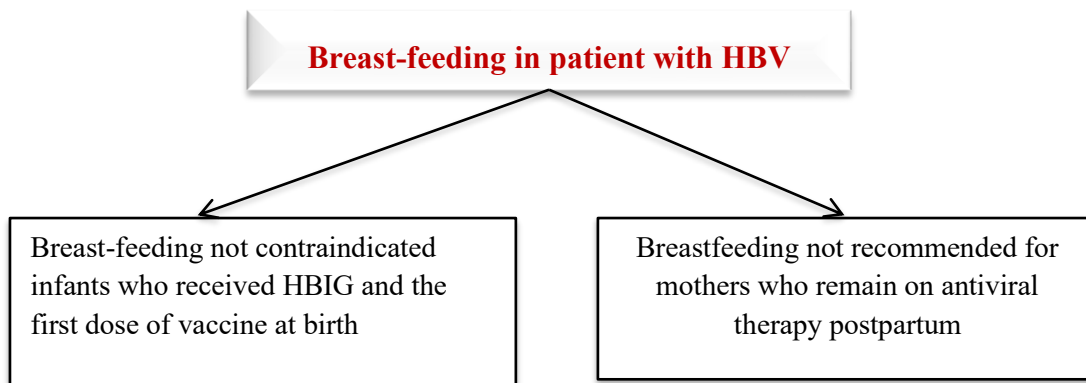
5. Breastfeeding for mothers affected by acute hepatitis B virus (HBV)

infection is generally considered safe

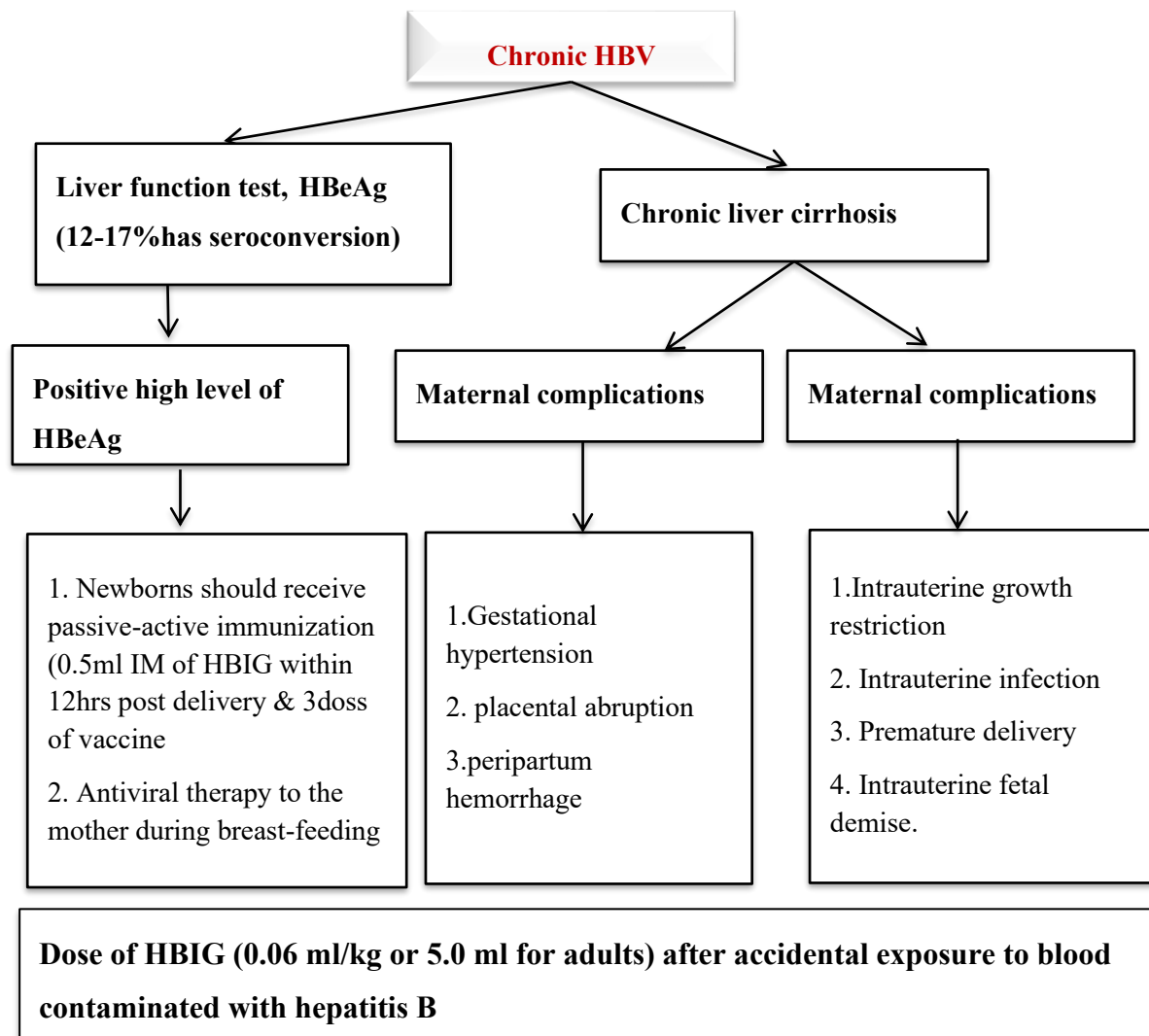
6. Newborn Immunization:

It is crucial that the newborn receives the hepatitis B vaccine and hepatitis B immunoglobulin (HBIG) within 12 hours of birth. This significantly reduces the risk of HBV transmission.

Breast-feeding in patient with HBV



Chronic HBV during pregnancy



Summary

Hepatitis B during pregnancy can lead to vertical transmission, risking neonatal infection, chronic hepatitis, and liver complications. Screening for hepatitis B is recommended for all pregnant women, especially in high-risk groups. Antiviral treatment with tenofovir may be given to women with high viral loads to reduce the risk of mother-to-child transmission. Newborns should receive hepatitis B immune globulin (HBIG) and the first dose of the hepatitis B vaccine within 12 hours of birth. Caesarean delivery is not typically required unless there are other obstetric indications. Maternal liver function and viral load should be monitored throughout pregnancy. Postpartum follow-up ensures that both mother and baby are managed appropriately.

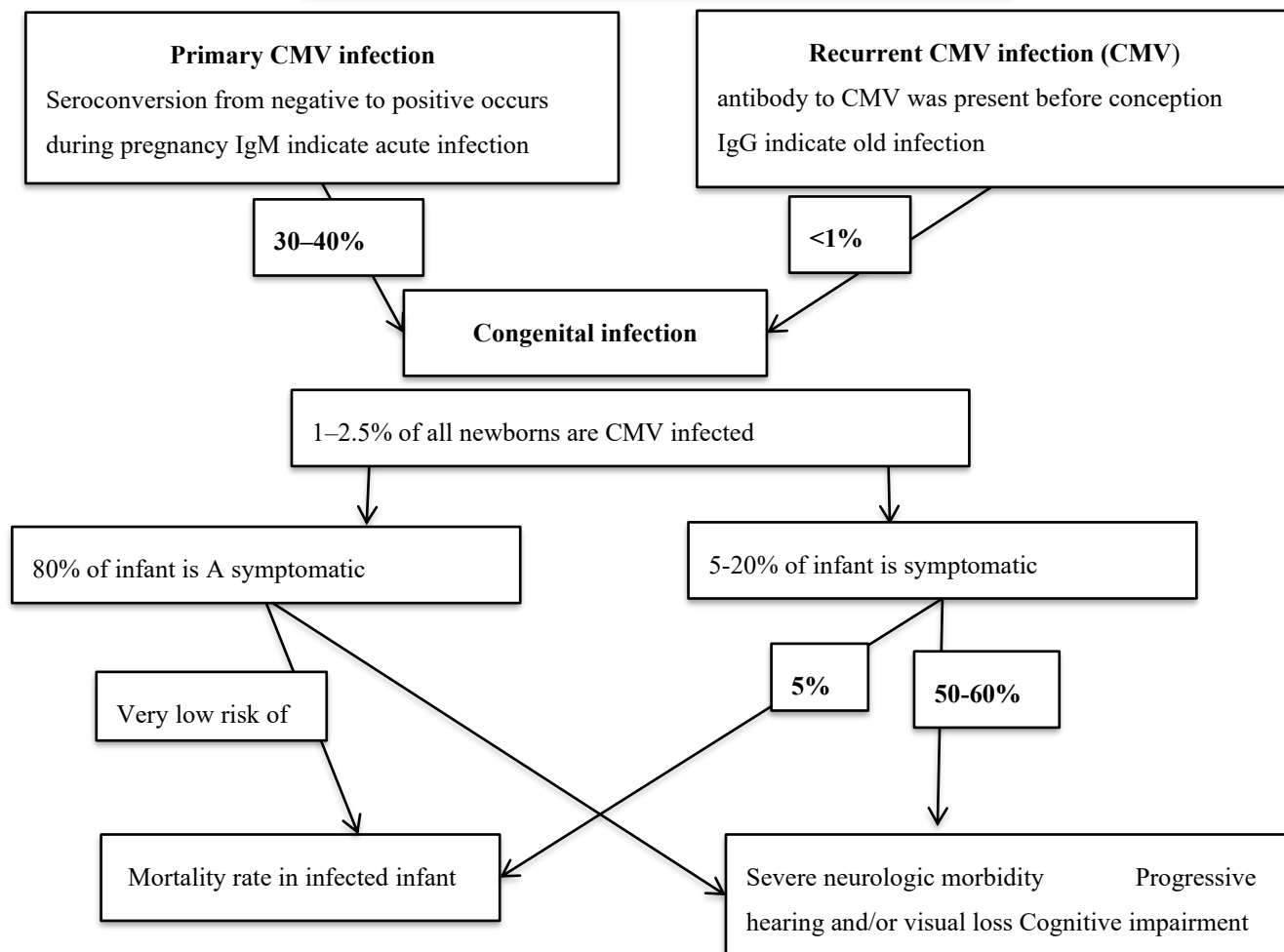
V. Cytomegalovirus infection in pregnancy

Cytomegalovirus (CMV)

is a common herpesvirus that can cause serious complications if a primary infection occurs during pregnancy. It is the most frequent congenital viral infection, with potential to cause hearing loss, vision impairment, and neurodevelopmental delays in the fetus. Many infections are asymptomatic in the mother, making early diagnosis and monitoring vital. Preventive measures and counseling are

Cytomegalovirus (CMV) infection during pregnancy can present in various ways, and many women may remain asymptomatic. Here are key clinical presentations to be aware of:

Maternal presentation of Cytomegalovirus



Cytomegalovirus infection (CMV)

Fetal presentation

Congenital CMV Infection

The primary concern during pregnancy is the risk of transmitting CMV to the fetus, which can lead to congenital CMV infection. Clinical manifestations in the fetus may include: **Microcephaly**, **Intracranial Calcifications**, **Hearing Loss**, **Vision Problems**, **Growth Restriction**

Symptoms at Birth

Infants born with congenital CMV may present with, Petechiae or purpura
Jaundice Hepatosplenomegaly,
Neurological issues

Maternal presentation

Asymptomatic

Mild Symptoms

Some may experience mild, flu-like symptoms, which can include, Fatigue
Fever, Sore throat, Muscle aches, Swollen lymph nodes

Severe Illness

In rare cases, CMV can cause more severe symptoms, particularly in immunocompromised individuals. This may include: Pneumonia, Hepatitis, Thrombocytopenia (low platelet count)

Monitoring: If CMV is suspected or diagnosed, refers for fetomaternal unit for close monitoring of the pregnancy and fetal development is essential.

Postnatal Follow-Up: Infants born to mothers with CMV should be monitored for potential developmental delays, hearing loss, and other complications.

Fetal transmission of CMV Prenatal diagnosis

Refer for feto-maternal subspeciality

Ultrasound finding suggestive of infection

- Periventricular calcifications
- Cerebral ventriculomegaly
- Microcephaly
- Hyperechogenic fetal bowel
- Hepatosplenomegaly
- Polymicrogyria
- Cerebellar hypoplasia
- Periventricular (pseudo) cysts
- Periventricular echogenicity
- Large cisterna magna
- Fetal growth restriction
- Amniotic fluid abnormalities
- Ascites and/or pleural effusion
- Hydrops
- Placental enlargement

Amniocentesis

Perform PCR for CMV DNA in amniotic fluid to identify an infected fetus, sensitivity of PCR ranges from 70 -100%, sensitivity higher at 21wks, allowing 6wks lag time between maternal infection and amniocentesis

During pregnancy, there is no effective treatment for prevention of fetal disease or reduction in risk of sequelae of CMV

Summary

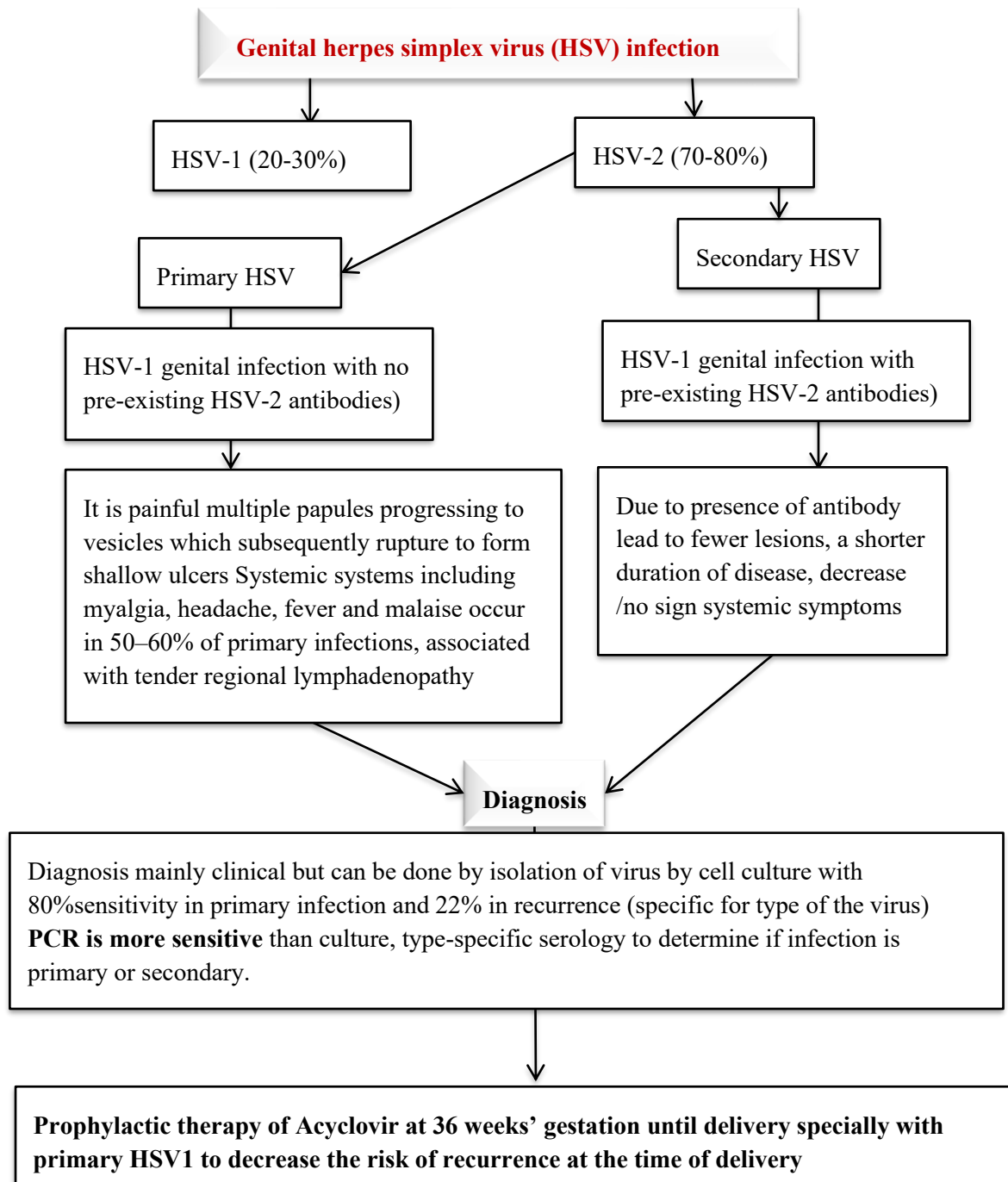
Management of cytomegalovirus (CMV) infection in pregnancy focuses on early detection and monitoring. Maternal serologic testing helps confirm primary infection, and amniocentesis may be used to assess fetal involvement. Regular ultrasounds are performed to monitor fetal growth and signs of CMV-related damage. There is no approved antiviral treatment during pregnancy, but investigational therapies like CMV hyperimmune globulin may be considered. Counseling and supportive care remain essential components of management.

VI. Genital herpes simplex virus (HSV) infection in pregnancy

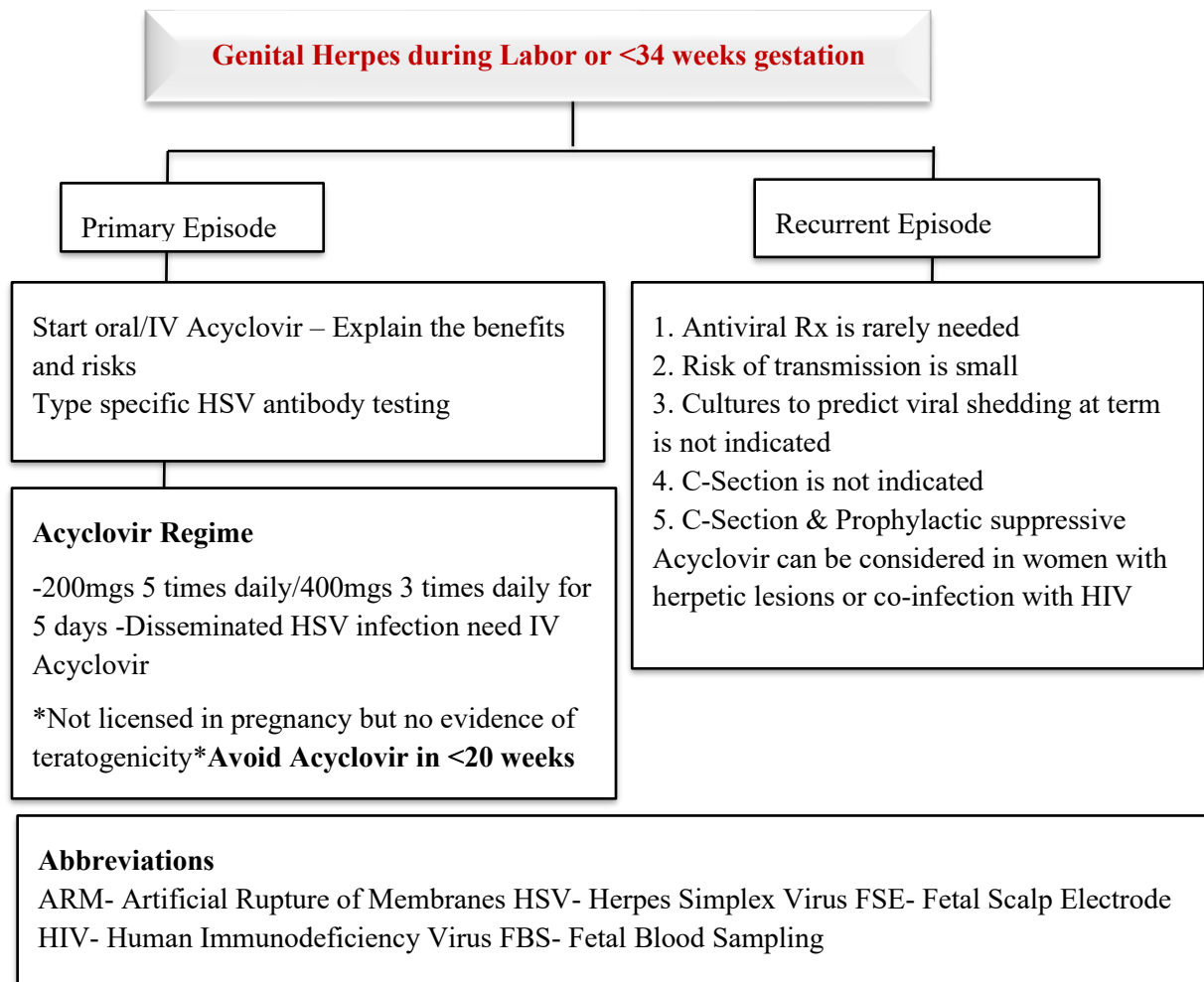
Genital herpes simplex virus (HSV), primarily caused by HSV-2 and occasionally HSV-1, is a common sexually transmitted infection affecting the genital area. During pregnancy, HSV poses a risk of vertical transmission, especially if primary infection occurs in the third trimester. Neonatal herpes can lead to severe complications, including neurological damage and even death. Early diagnosis and careful management are vital to reduce maternal and neonatal risks.

Genital herpes is a common sexually transmitted infection (STI) caused by the herpes simplex virus (HSV). It primarily affects the genital area but can also impact other regions, including the anal area and thighs.

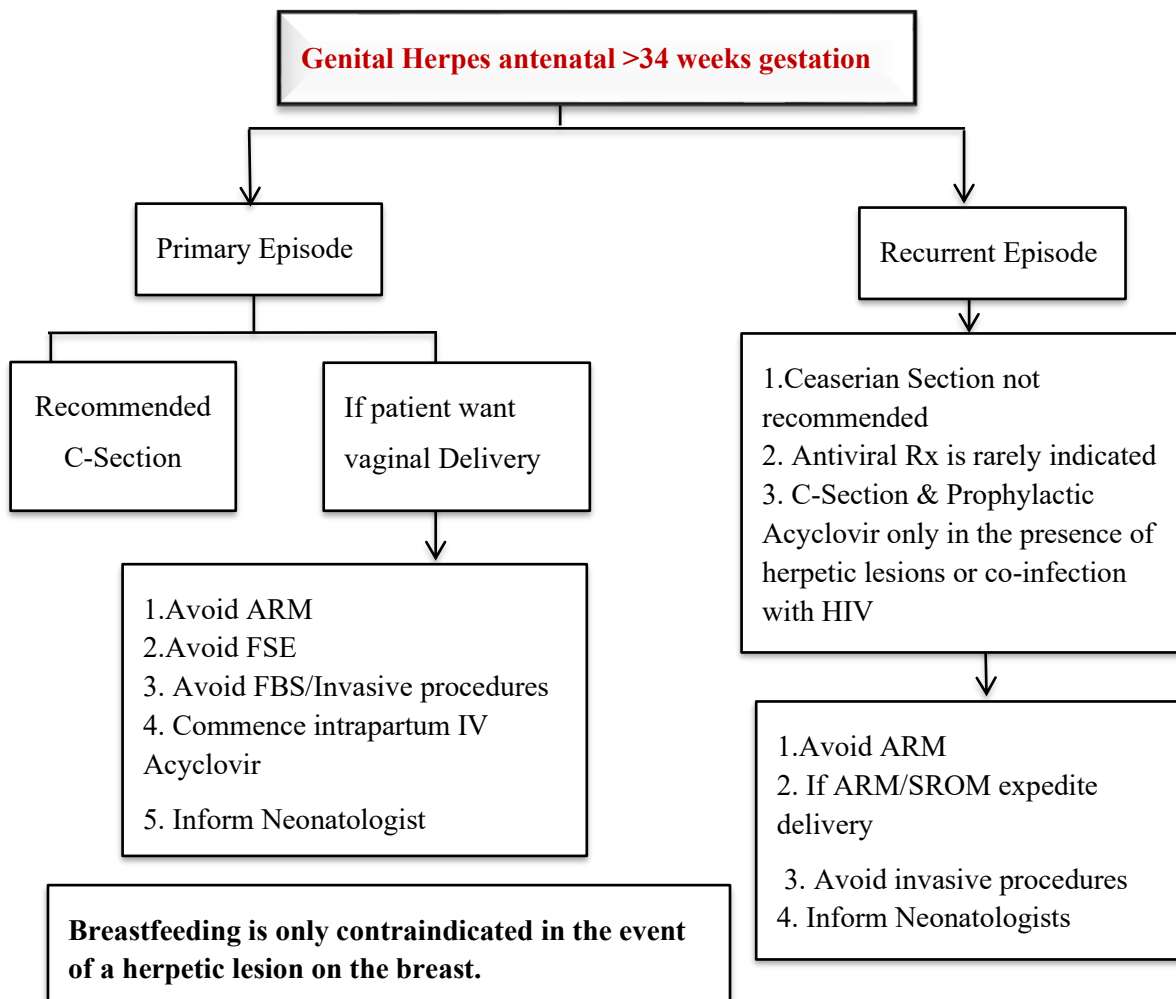
Genital herpes simplex virus (HSV) infection



Genital Herpes during Labour or <34 weeks gestation



Genital Herpes at >34 weeks

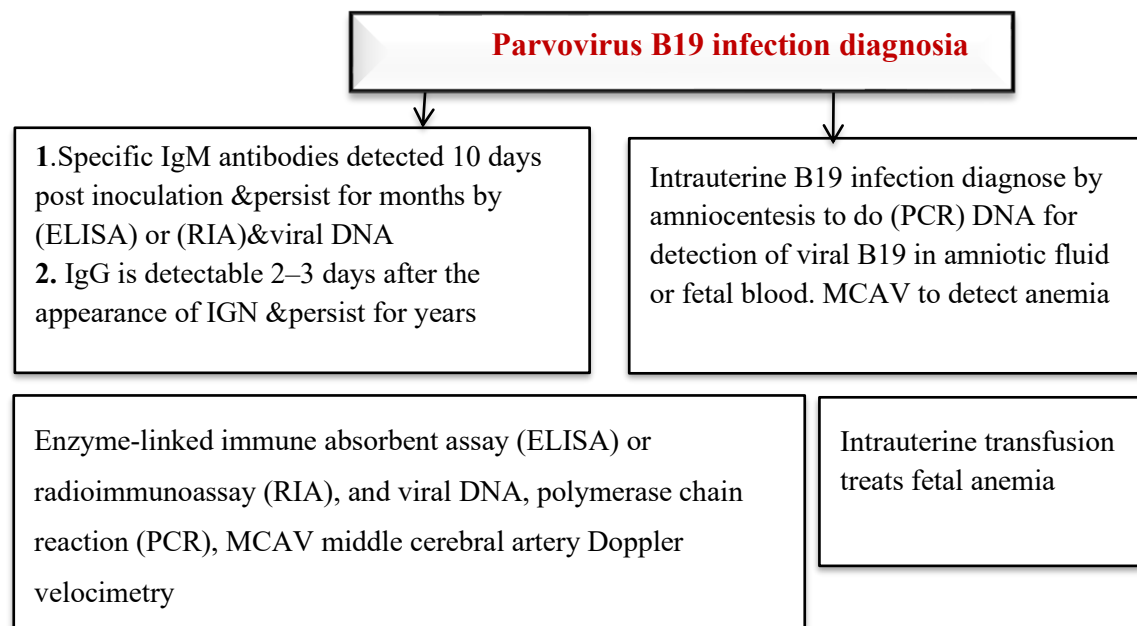


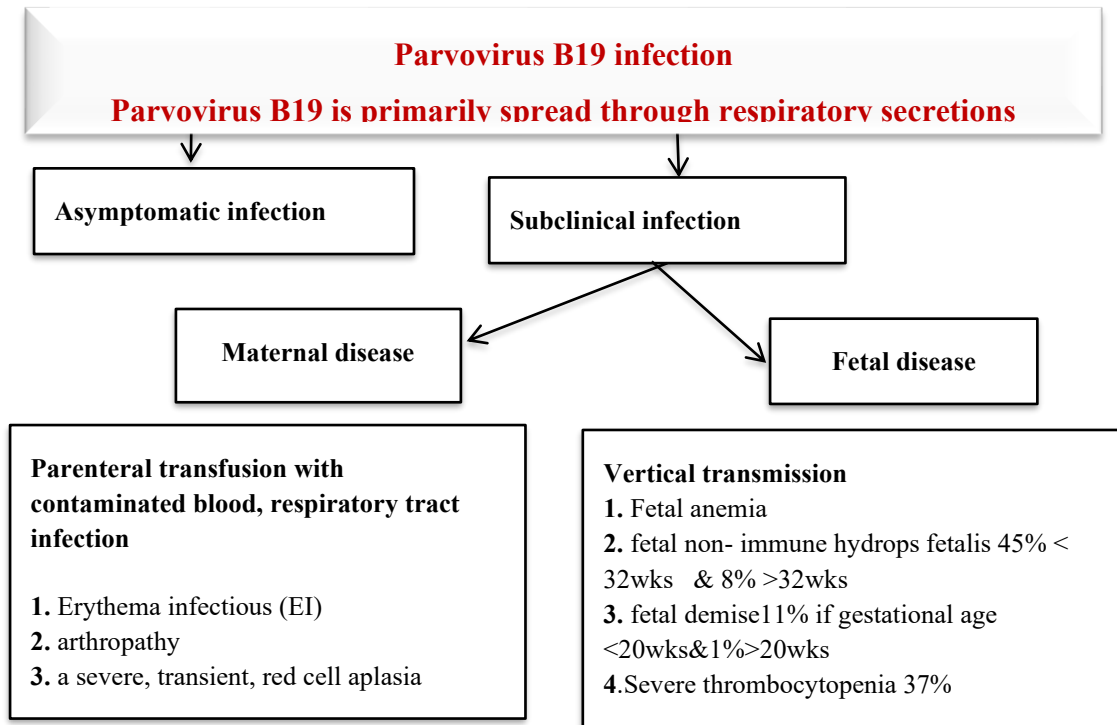
Genital herpes simplex virus (HSV) in pregnancy can lead to serious neonatal infections, especially if primary infection occurs late in pregnancy. Risk of transmission is highest during vaginal delivery with active lesions. Antiviral therapy, typically acyclovir, is recommended in the third trimester to reduce recurrence and viral shedding. Cesarean delivery is advised if active lesions or prodromal symptoms are present at labor. Early diagnosis, treatment, and delivery planning are key to preventing neonatal herpes.

VII. Parvovirus B19 infection

Parvovirus B19 is a common viral infection that can have significant implications during pregnancy. While often mild or asymptomatic in the mother, infection can cross the placenta and affect the fetus. The virus targets red blood cell precursors, potentially causing fetal anemia, hydrops fetalis, or even miscarriage, particularly if infection occurs in the first half of pregnancy. Early detection and close fetal monitoring are essential for managing affected pregnancies

Parvovirus B19 infection



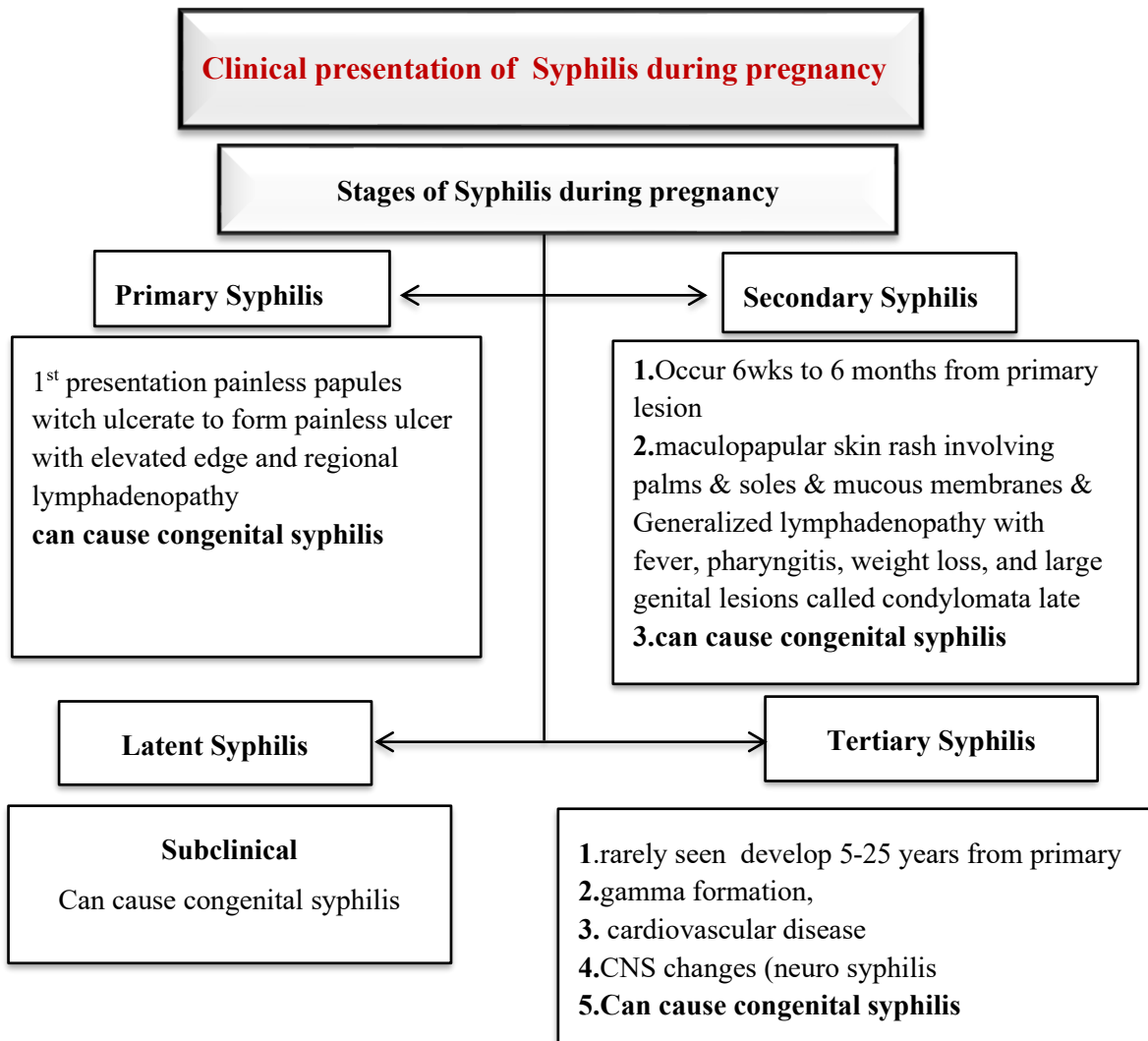


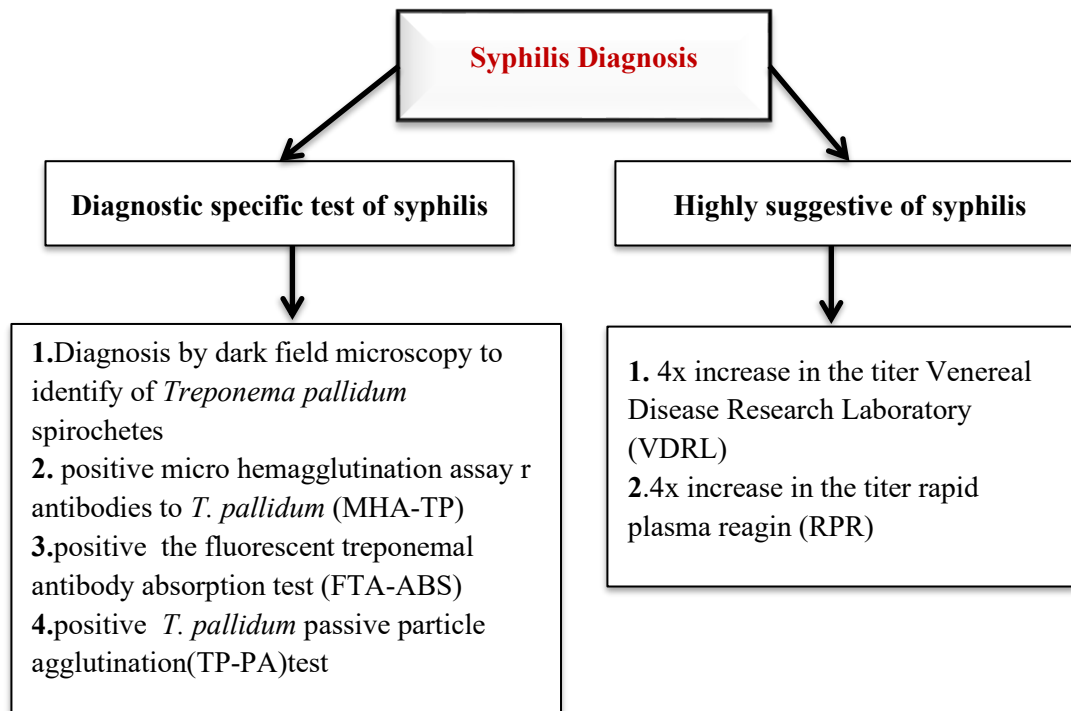
Summary

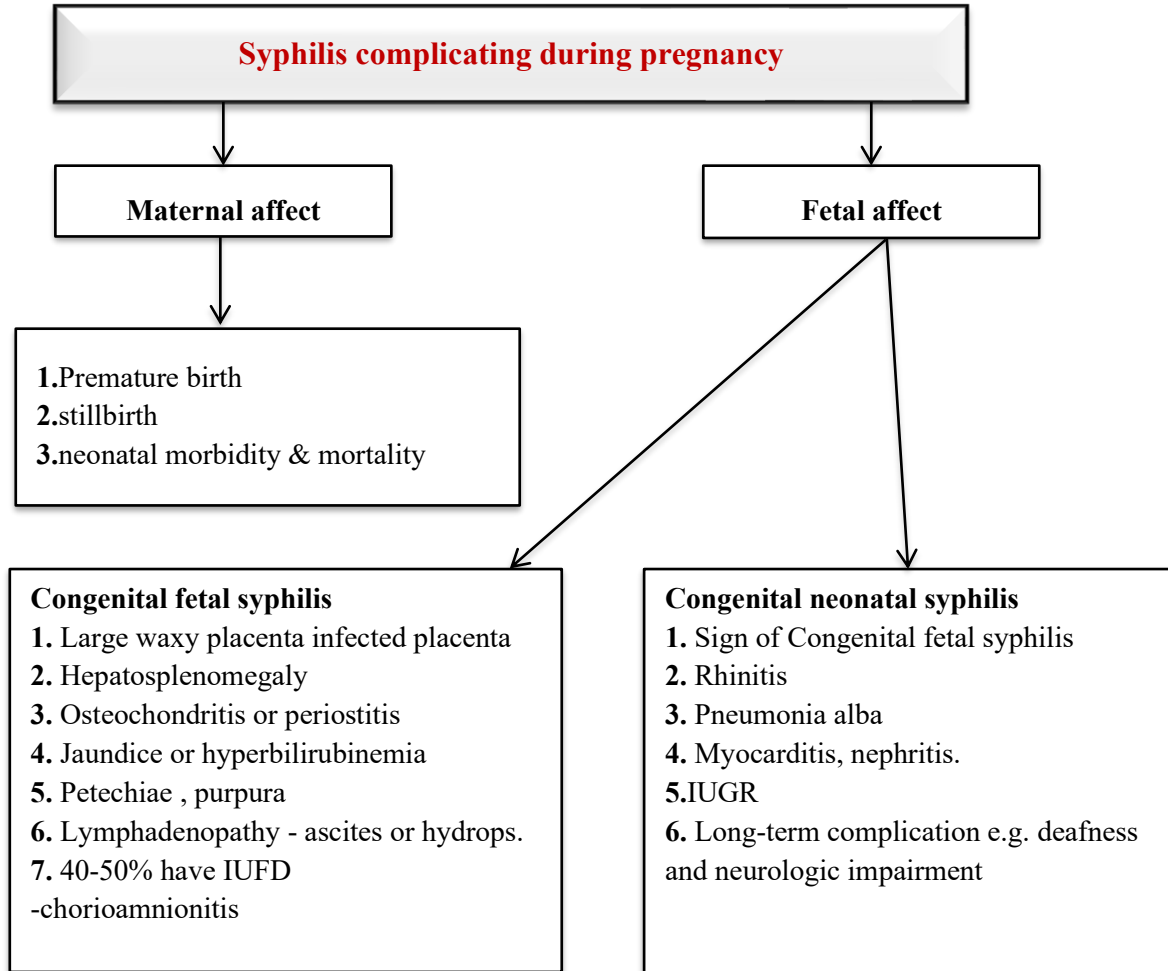
Parvovirus B19 infection during pregnancy can lead to complications like fetal anemia, hydrops fetalis, or stillbirth, especially when contracted in the first half of pregnancy. The infection is usually mild in the mother, with symptoms like a rash, fever, and joint pain. If exposure occurs, fetal monitoring through ultrasound is essential to detect signs of anemia or hydrops. In some cases, intrauterine blood transfusions may be needed for the fetus. Parvovirus B19 is typically diagnosed through serology. Most pregnancies with maternal infection result in healthy outcomes, but close monitoring is necessary. Preventive measures include avoiding contact with infected individuals, especially in outbreaks.

VIII. Syphilis in pregnancy

Syphilis is a sexually transmitted infection caused by *Treponema pallidum* that can have serious consequences during pregnancy. If untreated, it can lead to miscarriage, stillbirth, or congenital syphilis, causing severe neonatal complications. Routine screening and early treatment with penicillin are critical to prevent maternal and fetal morbidity. Close follow-up ensures effective management and reduces transmission risk.







Management of syphilis in pregnancy

Who should receive treatment

1. Have a history of sexual contact with a person with documented syphilis
2. Display evidence of spirochetes on dark field microscopy
3. Show serologic evidence of syphilis with confirmation by a specific treponemal test
4. Have been treated previously for syphilis, but have persistently elevated ($\geq 1:4$) or rising titers by VDRL or RPR

For patient allergic to penicillin

do penicillin desensitization either orally or intravenously (tetracycline, erythromycin are contraindicated in pregnancy), (azithromycin is unsatisfactory), (ceftriaxone is promising)

a single intramuscular dose of 2.4 million units of benzathine penicillin G can be repeated after one wk.

RPR titer

Expected to drop be a fourfold drop in serologic titers over a 6-month period and become nonreactive by 12 to 24 months

If titer increase by 4-fold indicate either treatment failure or reinfection

Summary

Management of syphilis in pregnancy involves early screening and diagnosis to prevent adverse outcomes like stillbirth, preterm birth, and congenital syphilis. Pregnant women should be screened for syphilis at the first prenatal visit, with retesting for high-risk individuals during pregnancy. Penicillin is the treatment of choice, as it is safe and effective for both the mother and fetus. If the mother is allergic to penicillin, desensitization is recommended. Sexual partners should also be treated to prevent reinfection. Neonates born to infected mothers should receive appropriate evaluation and treatment, including penicillin. Timely diagnosis and treatment significantly reduce the risk of congenital syphilis.

References

1. Royal College of Obstetricians and Gynaecologists. (2024).

Chickenpox in pregnancy (Green-top Guideline No. 13) (4th ed.; updated Jan 2024).

Provides comprehensive recommendations on:

- Assessment of maternal immunity at booking
- Post-exposure prophylaxis (VZIG or antivirals depending on gestation and exposure timing)
- Antiviral therapy (aciclovir or valacyclovir) for established maternal infection or pneumonia
- Fetal ultrasound surveillance for congenital varicella syndrome (CVS) after first/early second-trimester infection

2. Centers for Disease Control and Prevention. (2024, April 24).

Clinical guidance for people at risk for severe varicella (including pregnant women).

Highlights that:

- Pregnant women with active varicella pneumonia or severe infection should receive **IV aciclovir** promptly
- For post-exposure prophylaxis, **oral antivirals** are now preferred over VZIG in most pregnant cases; VZIG reserved for neonates peripartum or when antivirals contraindicated

3. Montoya JG, Liesenfeld O. Toxoplasmosis. *Lancet*. 2004;363(9425):1965–1976. doi:10.1016/S0140-6736(04)16412-X
4. Dunn D, Wallon M, Peyron F, et al. Mother-to-child transmission of toxoplasmosis: risk estimates for clinical counselling. *Lancet*. 1999;353(9167):1829–1833. doi:10.1016/S0140-6736(98)08220-8
5. McLeod R, Boyer K, Karrison T, et al. Outcome of treatment for congenital toxoplasmosis, 1981–2004: the National Collaborative Chicago-based, Congenital Toxoplasmosis Study. *Clin Infect Dis*. 2006;42(10):1383–1394. doi:10.1086/503421
6. U.S. Preventive Services Task Force. Screening for gonorrhea: recommendation statement. *Ann Intern Med*. 2005;143(12):899–903. doi:10.7326/0003-4819-143-12-200512200-00012
7. Ross J, Cole M, Evans C, et al. Genital gonorrhoea: a clinical update. *Br J Gen Pract*. 2019;69(681):604–605. doi:10.3399/bjgp19X706853
8. Centers for Disease Control and Prevention (CDC). Gonorrhea treatment guidelines, 2021. In: *Sexually Transmitted Infections Treatment Guidelines*. *MMWR Recomm Rep*. 2021;70(4):1–187.
9. Schillie S, Murphy TV, Sawyer M, et al. CDC guidance for evaluating health-care personnel for hepatitis B virus protection and for administering postexposure management. *MMWR Recomm Rep*. 2013;62(RR-10):1–19.

10. Wiseman E, Fraser MA, Holden S, et al. Perinatal transmission of hepatitis B virus: an Australian experience. *Med J Aust.* 2009;190(9):489–492. doi:10.5694/j.1326-5377.2009.tb02528.x
11. Terrault NA, Bzowej NH, Chang KM, et al. AASLD guidelines for treatment of chronic hepatitis B. *Hepatology.* 2016;63(1):261–283. doi:10.1002/hep.28156
12. Kenneson A, Cannon MJ. Review and meta-analysis of the epidemiology of congenital cytomegalovirus (CMV) infection. *Rev Med Virol.* 2007;17(4):253–276. doi:10.1002/rmv.535
13. Fowler KB, Stagno S, Pass RF. Maternal immunity and prevention of congenital cytomegalovirus infection. *JAMA.* 2003;289(8):1008–1011. doi:10.1001/jama.289.8.1008
14. Rawlinson WD, Boppana SB, Fowler KB, et al. Congenital cytomegalovirus infection in pregnancy and the neonate: consensus recommendations for prevention, diagnosis, and therapy. *Lancet Infect Dis.* 2017;17(6):e177–e188. doi:10.1016/S1473-3099(17)30143-3
15. Brown ZA, Wald A, Morrow RA, et al. Effect of serologic status and cesarean delivery on transmission rates of herpes simplex virus from mother to infant. *JAMA.* 2003;289(2):203–209. doi:10.1001/jama.289.2.203
16. Kimberlin DW, Rouse DJ. Clinical practice. Genital herpes. *N Engl J Med.* 2004;350(19):1970–1977. doi:10.1056/NEJMcp035143
17. American College of Obstetricians and Gynecologists (ACOG). ACOG Practice Bulletin No. 220: Prevention of neonatal herpes simplex virus. *Obstet Gynecol.* 2020;135(1):e193–e202. doi:10.1097/AOG.0000000000003600
18. Rodis JF, Borgida AF, Wilson M, et al. Management of parvovirus infection in pregnancy and outcomes of hydrops: a survey of members of the Society of Perinatal Obstetricians. *Am J Obstet Gynecol.* 1998;179(4):985–988. doi:10.1016/S0002-9378(98)70190-4
19. Bonvicini F, Bua G, Gallinella G. Parvovirus B19 infection in pregnancy—awareness and opportunities. *Curr Opin Virol.* 2017;27:8–14. doi:10.1016/j.coviro.2017.11.007
20. Enders M, Weidner A, Zoellner I, et al. Fetal morbidity and mortality after acute human parvovirus B19 infection in pregnancy: prospective evaluation of 1018 cases. *Prenat Diagn.* 2004;24(7):513–518. doi:10.1002/pd.898
21. Gomez GB, Kamb ML, Newman LM, et al. Untreated maternal syphilis and adverse outcomes of pregnancy: a systematic review and meta-analysis. *Bull World Health Organ.* 2013;91(3):217–226. doi:10.2471/BLT.12.107623
22. Peeling RW, Mabey D, Kamb ML, et al. Syphilis. *Nat Rev Dis Primers.* 2017;3:17073. doi:10.1038/nrdp.2017.73
23. American College of Obstetricians and Gynecologists (ACOG). ACOG Practice Bulletin No. 211: Syphilis in pregnancy. *Obstet Gynecol.* 2019;133(1):e33–e38. doi:10.1097/AOG.0000000000003031

About This Book

This book is a **practical, concise clinical guide** covering the most important medical disorders and obstetric complications encountered during pregnancy.

It presents **evidence-based clinical management** in **simple, easy-to-follow flowcharts** to support timely and effective decision-making.

Designed for **obstetricians, gynecologists, family physicians, and general practitioners** working in outpatient settings, it aims to improve the **quality and safety of maternal care.**

