A Guide to Problems in Early Pregnancy and Their Management

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ACKNOWLEDGMENTS

I dedicate this book to my late, dear friend Dr. Adel Elkady (DGO, FRCOG, FICS), who worked as a Senior Consultant at the Armed Forces Hospital, Cairo.

This book would have never been completed without his continuing support, encouragement and confidence in me.

He himself had a great interest in teaching, training, mentoring and helping the trainees and junior doctors to achieve their career goals and ambitions.

He wrote books to help them and also taught trainees for the Member of the Royal College of Obstetricians and Gynecologists (MRCOG) exam. Dr. Elkady ran courses with great enthusiasm and dedication. His personal coaching and online courses enabled them to succeed.

I am very appreciative of my colleagues and friends Dr. S N Jha and Dr. Shabnam Sibtain DRCOG, DFFP, FRCOG, Assistant Professor OBGYN, Azra Naheed Medical College**,** Lahore, Pakistan.

They have been very supportive, spending time in reading the manuscript and making appropriate suggestions.

PREFACE

While most pregnancies and births are uneventful, all pregnancies are at risk of some kind of complication. Around 15 percent of all pregnant women will develop potentially life-threatening complications that call for skilled care, and some will require a major intervention to survive.

In every country and community in the world, pregnancy and childbirth are momentous events in the lives of every woman and their family. However, the pregnancy also represents a time of intense vulnerability and emotion for the women, and for the family and friends around them.

The concept of safe motherhood is usually restricted to physical safety (reducing morbidity and mortality), but childbearing is also an important rite of passage, which may have deep personal and cultural significance for a woman and her family.

This book focuses on the complications of the first trimester (up to 12–13 + 6 weeks) of pregnancy.

We have endeavored to offer comprehensive up-to-date knowledge and information on how to prevent, diagnose, investigate and treat common first-trimester complications.

The prevention of maternal morbidity and mortality should not be the only notion, but should include respect for women's basic human rights, autonomy, dignity, feelings, choices and preferences. This should also include the choice of companionship during labor and any unexpected event, wherever it is possible (Respectful Maternity Care: The Universal Rights of Childbearing Women).

Prabha Sinha

FOREWORD

The first trimester of pregnancy is a time when the pregnant woman first presents herself to a health professional. It is a time when a woman and her family will ask their first and, in many cases, their most important questions. The care afforded to women in the first trimester is shared between different members of the team from General Practitioners, specialist Obstetricians and Gynecologists, to specialty services such as the EPAU and midwives, as the woman accesses her desired care plan.

This book is essential for all those who provide care during this particular period of pregnancy. It is highly desirable that a consistent approach to a woman's questions, her problems and advice is up-to-date and evidence-based.

This book addresses common problems, complaints and questions easily with straightforward advice, in simple words. It also covers an approach to more difficult areas, such as vaccination, adnexal pathology and abdominal pain. Screening and counseling are also dealt with in an easy-to-follow way and can be used as a reference text when necessary. Of particular importance is the emphasis on counseling, communication skills and respect for patient dignity and autonomy.

Professor Prabha Sinha brings together her wealth of experience from specialist work across different continents, and she provides insight from different cultures and patient expectations.

This book is a necessity for all health professionals who deal with pregnant women, especially in early pregnancy (first trimester), and Prof. Sinha and her coauthors should be congratulated for their contribution to pregnancy care.

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INTRODUCTION

Pregnancy causes physical and psychological changes in a woman in many aspects of her life. Pregnancy is a "physiological load" which causes alterations in the uterus, ovaries, pelvic organs, and all over the body, including metabolic and physiological changes.

These normally occurring changes during pregnancy can be irritating or upsetting for most women and can affect even a fit and healthy woman.

Early pregnancy has its share of discomforts that can be minimal, such as mild nausea and fatigue, and that are almost universal. Other conditions, like nose bleeds and bladder infections, are less common.

Complications during pregnancy can involve the mother's health, the baby's health, or both to some degree. Some women have health problems that were present before pregnancy, or that arise during pregnancy.

Therefore, it is very important for women to receive health care advice before, and during, pregnancy to minimize the risk of complications.

CHAPTER ONE

EARLY FETAL DEVELOPMENT IN THE FIRST TRIMESTER

PRABHA SINHA

Case History: A 24-year-old woman had an early pregnancy scan. She wants to know at what stage of gestation an embryo becomes a fetus. How much does it weigh, and what is its length at the end of the first trimester?

Answer at the end of the chapter

A woman's health is very important in early pregnancy for the normal development of the fetus. All the major body organs and systems are formed toward the end of the trimester (up to 13 weeks + 6 days).

After implantation, the embryo goes through several stages of development, which include the formation of several structures.

- **Embryo:** Soon after the fertilization, the zygote starts to rapidly divide and goes through the various stages of change, including blastocyst formation. Gradually, these cells replicate further and are displaced toward one side, giving rise to the amniotic sac which is gradually filled with amniotic fluid. This fluid surrounds the developing embryo and the fetus and has the ability to protect the fetus from any injury and regulates the temperature inside the amniotic cavity throughout the pregnancy. The amniotic fluid is made by the maternal plasma/blood (by osmosis and a hydrostatic mechanism), the amnion (fetal side of the placenta), and the fetal kidney when it starts functioning after the late first trimester.

- **Placenta:** It is attached to the uterine wall with chorionic villi. Fetal blood vessels (two umbilical arteries and one vein) grow from the umbilical cord into the intervillous space. These invasions of chorionic villi into the spiral arteries establish the uteroplacental and the fetoplacental circulation. These circulations help in exchanging nourishment and waste products with maternal blood.

- **Umbilical cord:** It connects the fetus to the placenta which is attached to the uterine wall. It has one vein and two arteries. The arteries carry the deoxygenated blood and waste products from the fetus to the placenta and a vein brings the oxygenated blood to the fetus with other nutrients.

The fetus is most susceptible in early pregnancy to toxic substances, certain medications, substance abuse and infectious illnesses (e.g., rubella).

Table 1. The sequence of development of most embryos and fetuses is the following:

Number of weeks after fertilization	Changes in the embryo/fetus
End of four weeks (embryo)	- Major organs start to develop. - The embryo measures around 6-7mm and starts looking like a tadpole. - The neural tube, digestive system, heart and circulatory system begin to form at this stage. - The development of eyes and ears begins. - Limb buds start to appear. - The fetal heart starts beating. - A primitive face takes form with large dark circles for eyes. The mouth, the lower jaw, and the lower throat start developing. - Blood cells take their shape and circulation begins.
End of eight weeks (embryo)	- The circulatory, nervous, digestive and urinary systems start to function. - The embryo develops a human shape, with a head that appears larger than the rest of the body. - The mouth, eyes, nose and ears become more defined.

	- All four limbs, with fingers and toes, can be clearly seen. - The main organs continue to develop and the fetal heartbeat can be heard with Doppler. - The nasal and jaw bones start developing quickly. - The embryo starts moving; however this is not appreciated by the mother. - At this stage, the embryo measures 2.54 cm in length and weighs approximately 9.45gms.
At the end of eight to nine weeks (embryo is called a fetus)	- The embryo is called a fetus/offspring after 8 weeks. - All the major organs and systems appear at this stage and measure approximately 1 to 1.5 inches long.
At nine to twelve weeks	- The external genitalia start to develop. - Finger and toe-nails appear. - Eyelids are present. - Measures 7.6-10 cm long and weighs 28g. - The arms and legs are fully formed. - The circulatory and urinary systems start working and the formation of bile starts forming from the liver. - The larynx and trachea start differentiating. - Fetal movement increases, but is still not felt by the mother.

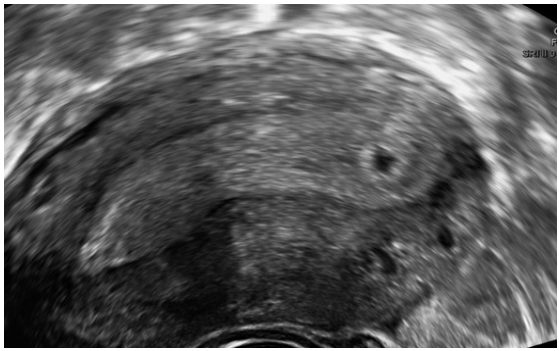


Image 1: Early IUP – regular gestation sac at 4 + 4 days

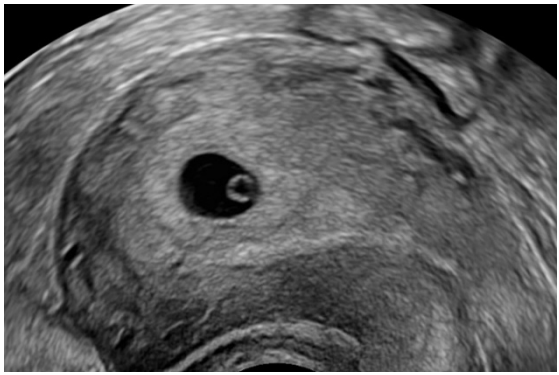


Image 2: Early IUP – regular gestation sac and yolk sac

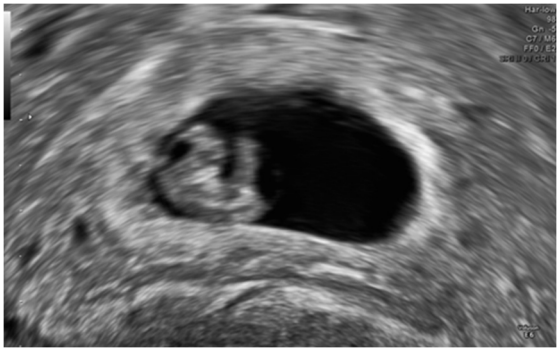


Image 3: 7 weeks embryo

Image 4: 9 weeks embryo

Image 5: 9 + 3 days

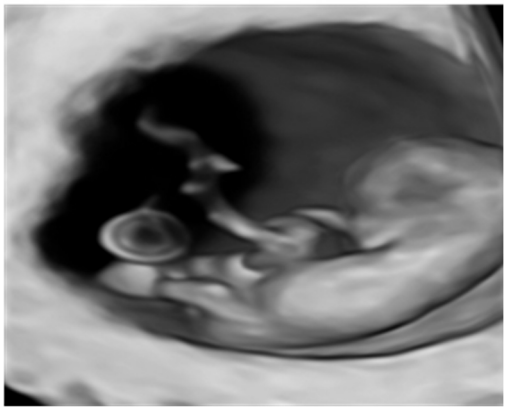


Image 6: 10 weeks embryo in 3D

Image 7: 13-week-old fetus

Answer to the case scenario

Most changes and development of a baby occur during the early part of the first trimester. Soon after the fertilization has taken place, the embryo develops very rapidly and is called a fetus after eight weeks of gestation.

The fetus is fully formed at the end of the first trimester and measures three to four inches in length, and weighs approximately 0.5 to 1 ounce.

CHAPTER TWO

THE ROLE OF EARLY PREGNANCY ASSESSMENT UNITS

PRABHA SINHA AND YASMIN SANA

Case History: A 32-year-old G4 P2 woman came to the EPAU with left-sided abdominal pain and vaginal spotting. Her previous pregnancy was a left-sided ectopic pregnancy treated by laparoscopic left salpingostomy.

A. What investigations and findings will suggest the diagnosis of ectopic pregnancy?

Answer at the end of the chapter

The early pregnancy, known as the first trimester (up to 13 weeks + 6 days of gestation), can be an extremely stressful and emotional time. Bleeding, pain, or both, is not an uncommon phenomenon in early pregnancy, however, it is not a normal feature. These symptoms do not necessarily indicate a problem or are harmful to the developing embryo/fetus most of the time. However, they should always be investigated for maternal reassurance and to detect any developing untoward complications. The aim is to identify the cause of pain or bleeding, or both, so that proper advice is given.

Management of early pregnancy complications is often undertaken in EPAUs in developed countries. In the UK, EPAUs were established in early 1990. Comparisons of the different models of care were made to establish the clinical and cost-effectiveness of the units.

In most hospitals, EPAUs are staffed by dedicated service professionals (a team of nurses, sonographers and gynecologists) who specialize in this area.

The staff should have skills and training in transvaginal and abdominal ultrasound scans, breaking bad news, and in sensitive communication.

The unit must have facilities and be equipped with adequate and up-to-date abdominal and transvaginal ultrasound scans. The unit should also have a separate area to perform urine testing, facilities to perform a blood test, a dedicated waiting area and a quiet area for breaking bad news/bereavement counseling.

Ideally, the unit should be supported by a team of gynecologists and have facilities for the surgical management of miscarriage and ectopic pregnancy.

A standard unit will accept referrals from the community midwife, the GP (General Practitioner) and from within the hospital, such as the Emergency Department.

Direct/self-referrals or a walk-in service is a preferable setup, which is offered by some EPAUs depending on the available resources.

The recent COVID-19 pandemic has changed the method of service provision in EPAUs, particularly in referral and follow-up pathways. This is the result of the rapid evolution and further modernization of care provided. Telephone consultations and triaging have become an essential part of early pregnancy services. A dedicated telephone service allows triaging patients to be seen physically or can reassure those who have minor issues/simple questions and who are merely seeking reassurance. Similarly, telephone follow-ups allow safe outpatient management of many conditions, such as those undergoing medical treatment of a possible miscarriage.

The gestational age up to which an EPAU accepts patients for assessment is variable (between 16 and 20 weeks) which depends on the local level of staffing in different units. There is almost always an overlap of services between early pregnancy and obstetric services for certain patients, such as those who are unsure of their dates.

The patients attending the unit should be informed that their visit will probably last for up to an hour depending on the symptoms and further evaluation. The process involves:

1- The attending health care professional (who may be a specialist nurse or a doctor) should take a brief and focused history regarding general health, the current pregnancy and any previous pregnancies, if any.

2- An ultrasound scan, abdominal or transvaginal (TVS) scan, or internal, depending on gestation, should be the first-line of investigation for further assessment. The woman should be informed that TVS is not usually painful, but that slight discomfort may be likely and does not harm the pregnancy.

3- A clinical examination should be performed depending on presenting symptoms (vital signs, abdominal and pelvic examination).

4- Some women will require further investigations, such as urine tests, blood tests for blood groups, hemoglobin checks, and serum β-human chorionic gonadotrophin (β-hCG). The blood test is also carried out for progesterone levels. This might help in some cases of ectopic pregnancy where non-surgical management options are being considered or, in cases of pregnancy of an unknown location.

- If the scan confirms a live intrauterine pregnancy, the woman is discharged and followed-up by the community midwife, or her GP, for ongoing routine antenatal care.

- If the scan shows a miscarriage, the nurse or a doctor will discuss the management options available.

- If it is a complete miscarriage, there will be no need for any further clinical care and the woman will be discharged, with a follow-up appointment with her GP for further advice if required.

- If it is an incomplete miscarriage, then the options are either conservative, medical or surgical management. This is explained and offered according to the choice of the woman.

- If the scan suggests an ectopic pregnancy (a pregnancy implanted outside the uterine cavity) the woman may need to have further tests and the management options are discussed accordingly.

- Sometimes scans are inconclusive and it may not be possible to give a definitive answer on the initial visit. It may be that the pregnancy is too early to see a fetal heartbeat on the scan. In this situation, arrangements

are made for a further scan, blood tests, or both, to review the β-hCG level.

- Written information should be given to women where possible about their clinical diagnosis. All women who suffer pregnancy loss should be offered counseling, where possible, to reduce the psychological impact.

Opening hours

The opening hours are usually from 9 a.m. to 5 p.m. in most units**.** However**,** the ideal is a 24/7 service, where women can access the care at any time.

Advantages of the EPAU[1]

1- Most women with early pregnancy problems can access the care directly without needing to attend the Emergency Department. The duration of these visits is shorter compared to when attending through the Emergency Department.

2- EPAUs are an example of a women-centered service where it is possible to reach a fast and conclusive diagnosis and give urgent advice. Most patients are discharged in a single comprehensive review, reducing the need for repeated visits and attendance to the Emergency Department.

3- A short duration of hospital stay for women requiring surgical management of a miscarriage, such as the evacuation of the uterus.

4- A short length of stay as an inpatient.

5- Potential cost savings from reduced admissions, and length of stay, in comparison to unnecessary hospital inpatient admission.

6- The availability of a dedicated service minimizes the risk of misdiagnosis and helps to reduce the anxiety that women may experience with problems in early pregnancy.

7- In comparison with other models of care, staff in a dedicated service are specialized in early pregnancy issues. They can provide women with appropriate information and psychological support, which may help to mitigate some of their anxieties and concerns.

8. Improved patient satisfaction.

The COVID-19 pandemic in 2020 has further highlighted the significance of these units, where women can be seen directly by the specialist service without needing to attend other parts of the hospital, allowing them to focus on the general patient workload.

National Institute of Clinical Excellence (NICE) guidance – Woman-centered care.[2]

- Women in the first trimester of pregnancy should be cared for in a dedicated EPAU, where services are available seven days a week with the availability of an ultrasound scanning service. A 24-hour contact telephone service number should be available.

- Women's choices and preferences should be taken into account when the treatment option is discussed with them. The choice of treatment modalities will depend on the individual circumstances as well as the compliance. The treatment/management options should be in partnership with the woman and the clinician.

- If the patient is under 16 years of age, or cannot give consent for her treatment (due to her mental status), the guidelines for consent for these individuals should be followed (Department of Health (DoH) Seeking consent: working with children) by the caring clinicians and healthcare professionals.

- Adequate information and support for the family and carers should be provided. They may be able to help the underage girl in making decisions about her treatment.

Answer to the case history.

An ectopic pregnancy is most accurately diagnosed by using a combination of TVS and beta-hCG.[3]

The urine pregnancy test is a quick and easy test with a sensitivity of 99 percent (greater than 25 International Units (IU)/l). A negative test almost invariably excludes an ectopic pregnancy. TVS is the first gold standard investigation with a sensitivity of 87–93 percent, specificity of 94–99 percent and a positive predictive value of 92.5–98 percent. A TVS finding

of an adnexal mass combined with serum beta-hCG increases the sensitivity to 97 percent.

The usual TVS findings suggestive of ectopic pregnancy (EP) are the following:

- An empty gestational sac associated with a tubal ring
- Presence of a fetal pole/embryo and fetal heartbeat in the gestational sac
- An adnexal mass other than a simple cyst

Adnexal Findings [4]

- An extrauterine gestational sac with a yolk sac/embryo, with or without the presence of a fetal heartbeat, can be diagnostic of an EP. This has 100 percent PPV.

- The presence of a bagel or doughnut sign appears as a round anechoic fluid collection with a thick echogenic rim within the fallopian tube. It appears like a tubal ring or an adnexal mass with an empty gestational sac. The finding of a bagel sign is detected in approximately 50 percent of cases. If the tubal ring is seen separate from the ovary it can have more than 95 percent PPV.

- Color Doppler sonographic imaging may be of value. Some of the adnexal masses can show limited blood flow, or no flow at all.

- The presence of a nonspecific adnexal mass representing a hemorrhage with a blood clot (homogeneous, heterogeneous, or complex) may appear as either cystic or solid with variable echogenicity (hypo- to hyperechoic).

- A hemorrhage within the fallopian tube (hematosalpinx) appears as tubular or ovoid in shape on an ultrasound scan (USS).

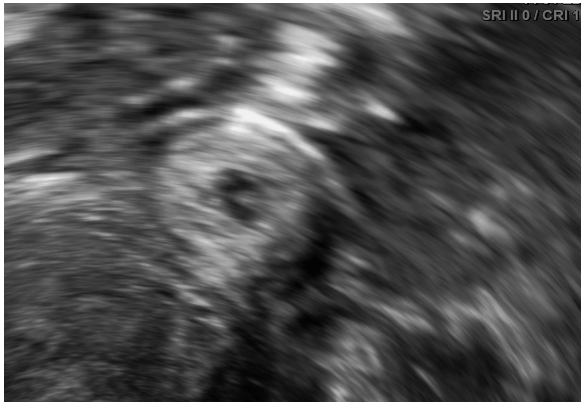
- Internal vascularity in the mass increases the likelihood of an EP rather than a hemorrhage from a ruptured corpus luteum.

- The presence of an empty uterus with a positive pregnancy test and adnexal mass (that is clearly not an intraovarian corpus luteum, para-ovarian cyst, or pedunculated fibroid) has a 92 percent PPV.

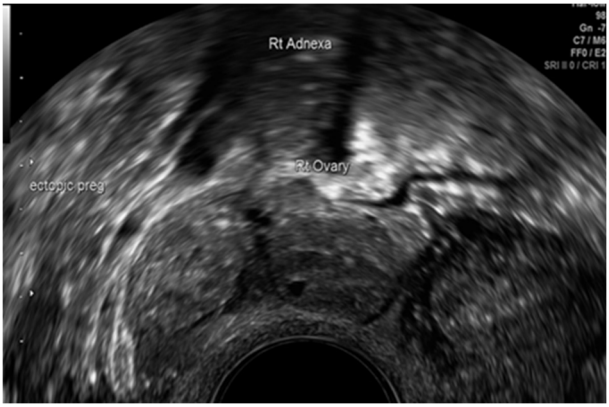
- EPs are most commonly located between the uterus and the ovary, or in the pouch of Douglas.

- The diagnosis of EP may be based on other ultrasound features (hemoperitoneum, hematosalpinx, free fluid in the peritoneum or in the pouch of Douglas) in the absence of conclusive adnexal findings.

- It should be diagnosed on the positive findings of an adnexal mass rather than the findings of the "empty uterus" (absence of an intrauterine gestational sac).[5]



Left-sided EP containing GS and a small YS



Right-sided adnexal mass EP

Cul-de-Sac Findings

- Hemoperitoneum can be found in up to 25 percent and may be the only finding in the initial presentation of the EP. The blood can appear as an echogenic free fluid in the POD (pouch of Douglas).

- An empty uterus has a 90 percent probability of EP along with a finding of a moderate/large amount of echogenic free peritoneal fluid.

β-hCG level

Once the positive diagnosis of ectopic pregnancy has been made on a transvaginal ultrasound scan, β-hCG can be used for follow-up where expectant or non-surgical management options are being considered. EPAUs should have locally agreed on protocols to allow safe follow-up for these women. A declining β-hCG is consistent with pregnancy resolution and follow-up should continue until a negative pregnancy test. Women should be informed about a small risk of rupture even in these cases.

- In 8 percent of spontaneously resolving EPs, the serum β-hCG level falls, as occurs in cases of a spontaneous miscarriage. Because of this reason and the similarity to a spontaneous miscarriage, serum β-hCG levels alone, are not very reliable for follow-up. Therefore, this should not be used for the diagnosis and management of EP.

- The use of a TVS alone is not reliable for follow-up either, as some EPs are too small to be visualized and cannot be detected.

- The diagnosis of miscarriage made on the ultrasound examination findings may have an underlying EP in 6 percent of cases.

- A diagnosis of complete miscarriage made on the TVS findings (empty uterus) should be treated as a PUL (pregnancy of unknown location) until an embryonic pregnancy/blighted ovum/miscarriage is confirmed with serial β-hCG levels and further follow-up with the TVS.

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CHAPTER THREE

PRE-PREGNANCY COUNSELING

PRABHA SINHA

Case History: A 26-year-old woman came to the preconception counseling clinic to ask for advice. She is taking warfarin because of a cardiac valve prosthesis.

Justify your advice regarding:

a) Continue warfarin and consult with a hematologist when she is pregnant

b) Continue with warfarin and change to low molecular weight heparin when she is six weeks pregnant

c) Continue with warfarin and change to unfractionated heparin before 6 weeks (4-6 weeks) pregnant

d) Continue warfarin through the whole of the pregnancy

e) Change to low molecular weight heparin in the third trimester.

Answer at the end of the chapter

Pre-pregnancy counseling (also called pre-conceptual counseling) refers to a meeting between a woman (who wishes to become pregnant) with a healthcare professional (generally a physician or midwife). The appointment is for the advice of a preconception risk assessment for any potential complications in pregnancy in order to modify these risk factors.