Antenatal Care, Preconceptional Counseling and Care

Systematic supervision (examination and advice) of a woman during pregnancy is called antenatal (prenatal) care. The supervision should be regular and periodic in nature according to the need of the individual. Actually prenatal care is the care in continuum that starts before pregnancy and ends at delivery and the postpartum period. **Antenatal care comprises of**:

・Careful history taking and examinations (general and obstetrical)・Advice given to the pregnant woman.

AIMS AND OBJECTIVE

The aims are: (1) to screen the "high risk" cases (see p. 716), (2) to prevent or to detect and treat at the earliest any complication, (3) to ensure continued risk assessment and to provide ongoing primary preventive health care, (4) to educate the mother about the physiology of pregnancy and labor by demonstrations, charts and diagrams (mothercraft classes), so that fear is removed and psychology is improved, (5) to discuss with the couple about the place, time and mode of delivery, provisionally and care of the newborn, (6) to motivate the couple about the need of family planning and also appropriate advice to couple seeking medical termination of pregnancy.

The objective is to ensure a normal pregnancy with delivery of a healthy baby from a healthy mother.

The criteria of a normal pregnancy are delivery of a single baby in good condition at term (between 38 and 42), with fetal weight of 2.5 kg or more and with no maternal complication. As such, a normal pregnancy is a retrospective term.

PRoCEDURE at tHE FiRSt ViSit

The first visit should not be deferred beyond the second missed period. It may be earlier if the patient desires to terminate the pregnancy.

OBJECTIVES: (1) To assess the health status of the mother and fetus. (2) To assess the fetal gestational age and to obtain baseline investigations. (3) To organize continued obstetric care and risk assessment. Components of routine prenatal care are recorded in a standardized pro forma (antenatal record book).

. Detailed history .

Name: ……

Date of first examination: …… *Address:*
……

Age: A woman having her first pregnancy at the age of 30 or above (FIGO – 35 years) is called **elderly primigravida**. Extremes of age (teenage and elderly) are obstetric risk factors *Gravida and parity:* **Gravida** denotes a pregnant state both present and past, irrespective of the period of gestation. **Parity** denotes a state of previous pregnancy beyond the period of viability.

Gravida and para refer to pregnancies and not to babies. As such, a woman who delivers twins in first pregnancy is still a gravida one and para one. A pregnant woman with a previous history of two abortions and one term delivery can be expressed as fourth gravida but primipara.

Duration of marriage: This is relevant to note the fertility or fecundity. A pregnancy long after marriage without taking recourse to any method of contraception is called low fecundity and soon after marriage is called high fecundity. A woman with low fecundity is unlikely to conceive frequently.

Religion**: .....**

Occupation: It is helpful in interpreting symptoms of fatigue due to excess physical work or stress or occupational hazards. Such women should be informed to reduce such activities.

Occupation of the husband: A fair idea about the socioeconomic condition of the patient can be assessed. This knowledge is of value: (a) to anticipate the complications likely to be associated with low social status such as anemia, preeclampsia, prematurity, etc. (b) to give reasonable and realistic antenatal advice during family planning guidance.

Period of gestation: The duration of pregnancy is to be expressed in terms of completed weeks. A fraction of a week of more than 3 days is to be considered as completed week. In calculating the weeks of gestation in early part of pregnancy, counting is to be done from the first day of last normal menstrual period (LNMP) and in later months of pregnancy, counting is to be done from expected date of delivery (EDD).

Most reliable clinical parameter of gestational age assessment is an accurate LMP. In some cases, LMP may be inaccurate, unknown or following the use of oral contraceptives (OC). In the case of OC use, ovulation may not have occurred 2 weeks after the LMP. In such a situation, ultrasonography in first trimester of pregnancy is more reliable to estimate the gestational age.

Complaints: Categorically, the genesis of the complaints is to be noted. Even if there is no complaint‹ enquiry is to be made about the sleep, appetite, bowel habit and urination.

History of present illness: Elaboration of the chief complaints as regard their onset, duration, severity‹ use of medications and progress is to be made.

History of present pregnancy: The important complications in different trimesters of the present pregnancy are to be noted carefully. These are hyperemesis and threatened abortion in first trimester‹ features of pyelitis in second trimester and anemia, preeclampsia and antepartum hemorrhage in the last trimester. Number of previous antenatal visits (booking status), immunization status, has to be noted. Any medication or radiation exposure in early pregnancy or medical-surgical events during pregnancy should be enquired.

Obstetric history: This is only related with multigravidae. The previous obstetric events are to be recorded chronologically as per the pro forma given on the next page. To be relevant, enquiry is to be made whether she had antenatal and intranatal care before.

Menstrual history**:** Cycle, duration, amount of blood flow and **first day of the last normal menstrual period (LNMP) are to be noted** (spontaneous). From the LNMP, the expected date of

delivery (EDD) has to be calculated. The first day of the menstruation being the important event can be remembered precisely while the last day of the period is often tailed off and hence may be forgotten.

Calculation of the expected date of delivery (EDD): This is done according to **Naegele's formula** (1812) by adding 9 calendar months and 7 days *to the first day of the last normal (28 days cycle) period.* Alternatively, one can count back 3 calendar months from the first day of the last period and then add 7 days to get the expected date of delivery; the former method is commonly employed.

***Past medical history*:** Relevant history of past medical illnesses (urinary tract infections, tuberculosis) is to be elicited.

***Past surgical history*:** Previous surgery—general or gynecological, if any, is to be enquired.

***Family history*:** Family history of hypertension, diabetes, tuberculosis, blood dyscrasia, known hereditary disease, if any, or twinning is to be enquired.

***Personal history*:** Contraceptive practice prior to pregnancy, smoking or alcohol habits are to be enquired. LMP may be a withdrawal bleed following pill usage. The first ovulation may be delayed for 4–6 weeks (see p. 108). Smoking or alcohol abuse has got some relation with low birth weight of the baby. Previous history of blood transfusion, corticosteroid therapy, any drug allergy and immunization against tetanus or prophylactic administration of anti-D immunoglobulin are to be enquired.

Examination

General Physical Examination

***Build*:** Obese/average/thin. ***Nutrition*:** Good/average/poor ***Height*:** Short stature is likely to be associated with a small pelvis. Thus, in primigravidae, the height is to be measured to screen out the short stature. While an arbitrary measurement of 5 feet. is considered as short stature in western countries, it is 4' 7" in India considering the low average height.

***Weight*:** Weight should be taken in all cases in an accurate weighing machine. Repeated weight checking in subsequent visit should preferably be done in the same weighing machine. The importance of weight checking has already been discussed (see p. 57).

***Pallor*:** The sites to be noted are lower palpebral conjunctiva, dorsum of the tongue and nail beds.

***Jaundice*:** The sites to be noted are bulbar conjunctiva, under surface of the tongue, hard palate and skin.

***Tongue, teeth, gums and tonsils*:** Evidences of malnutrition are evident from glossitis and stomatitis. Evidence of any source of infection in the mouth is to be eradicated least there be a chance of autogenous infection in puerperium.

***Neck*:** Neck veins, thyroid gland or lymph glands are looked for any abnormality. Slight physiological enlargement of the thyroid gland occurs during pregnancy in 50% of cases.

***edema of legs*:** Both the legs are to be examined. The sites for evidence of edema are over the medial malleolus and anterior surface of the lower one-third of the tibia. The area is to be pressed with the thumb for at least 5 seconds. Varicosity in the legs, if any, is to be noted.

Causes of edema in pregnancy: (1) Physiological (2) Preeclampsia (3) Anemia and hypoproteinemia (4) Cardiac failure (5) Nephrotic syndrome. Dependent edema is physiological in pregnancy but generalized edema (anasarca) or facial edema can be a first sign of disease.

Physiological edema: The cause of physiological edema is due to increased venous pressure of the inferior extremities by the gravid uterus pressing on the common iliac veins. **The features of the**

physiological edema are: (1) slight degree (ankle edema), usually confined to one leg, more on the right, (2) unassociated with any other features of preeclampsia or proteinuria, (3) disappears on rest alone, (4) other pathologies of cardiac, renal and hematological are absent.

***Pulse*:**

Blood pressure: **Disappearance of sounds (Korotkoff 5) rather than muffling of sounds (Korotkoff 4) is the best representation of diastolic pressure during pregnancy**.

***Systemic examination*:**

Heart, Lungs, Liver and Spleen:

Breasts: **Examination of the breasts** helps to note the presence of pregnancy changes but also to note the nipples (cracked or depressed) and skin condition of the areola. The purpose is to correct the abnormality; if any, so that there will be no difficulty in breastfeeding immediately following delivery.

***Obstetrical examination* :**

Abdominal: Tone of the abdominal muscles, presence of any incisional scar or presence of herniation and skin condition of the abdomen are to be looked for. Fundus of the uterus is just palpable above the symphysis pubis at 12 weeks.

Vaginal: Examination is done in the antenatal clinic when the patient attends the clinic for the first time before 12 weeks. **It is done:** (1) to diagnose the pregnancy, (2) to corroborate the size of the uterus with the period of amenorrhea and (3) to exclude any pelvic pathology. Internal examination is, however, omitted in cases with previous history of miscarriage, occasional vaginal bleeding in present pregnancy.

Ultrasound examination has replaced routine internal examination. It is more informative and without any known adverse effect.

Steps of vaginal examination: Vaginal examination is done in the antenatal clinic. **The patient must empty her bladder prior to examination** and is placed in the dorsal position with the thighs flexed along with the buttocks placed on the foot-end of the table. Hands are washed with soap and a sterile glove is put on the examining hand (usually right).

Inspection: By separating the labia—using the left two fingers (thumb and index), the character of the vaginal discharge, if any, is noted. Presence of cystocele or uterine prolapse or rectocele is to be elicited.

Speculum examination: This should be done prior to bimanual examination, especially when the smear for exfoliative cytology or vaginal swab is to be taken. A bivalve speculum is used. The cervix and the vault of the vagina are inspected with the help of good light source placed behind. **Cervical smear for exfoliative cytology** or a vaginal swab from the upper vagina, in presence of discharge, may be taken.

Bimanual: Two fingers (index and middle) of the right hand are introduced deep into the vagina while separating the labia by left hand. **The left hand is now placed suprapubically.** Gentle and systematic examinations are to be done to note: (1) **Cervix**: consistency, direction and any pathology. (2) **Uterus**: size, shape, position and consistency. Early pregnancy is the best time to correlate accurately uterine size and duration of gestation. (3) **Adnexa**: any mass felt through the fornix. If the introitus is narrow, one finger may be introduced for examination. **No attempt should be made to assess the pelvis at this stage.**

Routine investigations:

- **Blood**: Hemoglobin, hematocrit, ABO, Rh grouping, blood glucose and VDRL are done. Serology (antibody) screening is done in selected cases (see p. 336).

- **Urine:** Protein, sugar and pus cells. If significant proteinuria is found, "clean catch" specimen of midstream urine is collected for culture and sensitivity test. **To collect the midstream urine**, the patient is advised to clean the vulva and to collect the urine in a clean container during the middle of the act of urination. Presence of nitrites and/or leukocyte esterase by **dipstick** indicates urinary tract infection.

- **Cervical cytology study** by Papanicolaou stain has become a routine in many clinics.

***Special investigations*:**

(a) **Serological tests for rubella, hepatitis B virus and HIV:** antibodies to detect rubella immunity and screening for hepatitis B virus and HIV (with consent) (see chapter 20). (b) **Genetic screen: Maternal serum alpha-fetoprotein** (MSAFP), triple test at 15–18 weeks for mother at risk of carrying a fetus with neural tube defects, Down's syndrome or other chromosomal anomaly. (c) **Ultrasound examination: First trimester scan** either transabdominal (TAS) or transvaginal (TVS) helps to detect: (i) early pregnancy, (ii) accurate dating, (iii) number of fetuses, (iv) gross fetal anomalies, (v) any uterine or adnexal pathology (see p. 734). Use of ultrasound should be selective rather than a routine.

Booking (18–20 weeks) scan has got advantages in addition to first trimester scan: (i) detailed fetal anatomy survey and to detect any structural abnormality including cardiac, (ii) placental localization.

Ultrasound examination is also very reassuring to the couple.

Ultrasound examination is performed as a routine at 18–20 weeks though doubt remains about its absolute benefit.

***Repetition of the investigations*:** (1) Hemoglobin estimation is repeated at 28th and 36th week. (2) Urine is tested (dipstick) for protein and sugar at every antenatal visit.

PRoCEDURE at tHE SUBSEQUEnt ViSitS

Generally, checkup is done at interval of 4 weeks up to 28 weeks; **at interval of 2 weeks up to 36 weeks and thereafter weekly till delivery**. Ideally, this should be more flexible depending on the need and the convenience of patient. In the developing countries, as per **WHO** recommendation, the visit may be curtailed to **at least 4**; first in second trimester **around 16 weeks**, second **between 24 and 28 weeks**, the third visit **at 32 weeks** and the fourth visit **at 36 weeks**.

***Objectives*:** (A) **To assess:** (1) fetal well-being, (2) lie, presentation, position and number of fetuses, (3) anemia, preeclampsia, amniotic fluid volume and fetal growth, (4) to organize specialist antenatal clinics for patients with problems like cardiac disease and diabetes. (B) **To select**, **time for** ultrasonography, amniocentesis or chorion villus biopsy when indicated .

***History*:** To note: (1) appearance of any new symptom (headache, dysuria), (2) date of quickening.

***Examination*:**

General: In each visit, the following are checked and recorded: (1) weight, (2) pallor, (3) edema legs, (4) blood pressure.

***Abdominal examination*:** *Inspection:* Abdominal enlargement, pregnancy marks—linea nigra, striae, surgical scars (midline or suprapubic). *Palpation:* (a) To note the height of the fundus above the symphysis pubis (see p. 88). (b) **In the second trimester**, to identify the fetus by external ballottement, fetal movements, palpation of fetal parts and auscultation of fetal heart sounds. (c) **In the third trimester,** abdominal palpation will help to identify fetal lie, presentation, position, growth pattern, volume of liquor and also any abnormality. Examination also helps to detect whether the presenting part is engaged or not. Girth of abdomen is measured at the level of umbilicus. The girth increases by about 2.5 cm per week beyond 30 weeks and at term, measures about 95–100 cm. (d) **Others**—any uterine mass (fibroid) or tenderness. Fetal activity (movements) is also recorded.

***Vaginal examination*: Vaginal examination in the later months of pregnancy (beyond 37 weeks)** with an idea to assess the pelvis is not informative. Pelvic assessment is best done with the onset of labor or just before induction of labor. Methods of vaginal examination for assessment of the pelvis and test for cephalopelvic disproportion are

. **Any history of vaginal bleeding contraindicates vaginal examination.**

Ongoing assessment and counseling is important as prenatal care has an **educational opportunity**. The woman should be informed about the list of **warning signs so** that she can contact the hospital or avail the nearby health-care facilities in time.

Warning Signs are:

・Leakage of fluid from vagina

・Vaginal bleeding

・Abdominal pain: distressing in nature.

. Headache, visual changes

・Decrease or loss in fetal movements

・Fever, rigor, excess vomiting, diarrhea

Antenatal advice

PRINCIPLES: (1) **To counsel the women** about the importance of regular checkup. (2) **To maintain or improve** the health status of the woman to the optimum till delivery by judicious advice regarding diet, drugs and hygiene. (3) **To improve** the psychology and to remove the fear of the unknown by counseling the woman.

DIET: **The diet during pregnancy should be adequate to provide:** (a) good maternal health, (b) optimum fetal growth, (c) the strength and vitality required during labor and (d) successful lactation. During pregnancy, there is increased calorie requirement due to increased growth of the maternal tissues, fetus, placenta and increased basal metabolic rate. **The increased calorie requirement is to the extent of 300 over the nonpregnancy state during second half of pregnancy**. Generally, the **diet in pregnancy** should be of woman's choice as regard the quantity and the type. Woman with normal BMI should eat adequately so as to gain the optimum weight (11 kg). Overweight women with BMI between 26 and 29 should limit weight gain to 7 kg and obese women (BMI > 29) should gain less weight. Excessive weight gain increases antepartum and intrapartum complications including fetal macrosomia.

The pregnancy diet ideally should be light, **nutritious**, **easily digestible and rich in protein**, **minerals and vitamins**. In terms of figures, the daily requirement during pregnancy and lactation is given in Table 10.1. It is not an absolute recommendation but simply a guide. The diet should consist in addition to the principal food at least half liter, if not, 1 liter of milk (1 liter of milk contains about 1 g of calcium), plenty of green vegetables and fruits. The amount of salt should be of sufficient amount to make the food tasty. At least, half of the total protein should be first class containing all the amino acids and majority of the fat should be animal type which contains vitamins A and D.

Dietetic advice should be given with due consideration to the socioeconomic condition, **food habits and taste of the individual**. **Woman with normal BMI** should eat as to maintain the schedule weight gain in pregnancy (see p. 57). **The instruction about diet should be reasonable and realistic to individual women**.

***Supplementary nutritional therapy*:** As previously mentioned, there is negative iron balance during pregnancy and the dietetic iron is not enough to meet the daily requirement especially in the second half of the pregnancy. Thus, **supplementary iron therapy is needed for all pregnant**

mothers from 16 weeks onwards. Above 10 g% of hemoglobin, 1 tablet of ferrous sulfate (Fersolate) containing 60 mg of elemental iron is enough. The dose should be proportionately increased with lower hemoglobin level to 2–3 tablets a day. **Three tablets provide 45 mg of absorbable iron**. As the essential vitamins are either lacking in the foods or are destroyed during cooking, supplementary vitamins are to be given daily from 20th week onwards.

ANTENATAL HYGIENE: In otherwise uncomplicated cases, the following advices are to be given:

***Rest and sleep*:** The patient may continue her usual activities throughout pregnancy. However, excessive and strenuous work should be avoided especially in the first trimester and the last 4 weeks. Recreational exercise (prenatal exercise class) is permitted as long as she feels comfortable. There is individual variation of the amount of sleep required. However, on an average, the patient should be in bed for about 10 hours (8 hours at night and 2 hours at noon), especially in the last 6 weeks. In late pregnancy, lateral posture is more comfortable.

***Bowel*:** Constipation is common. It may cause backache and abdominal discomfort. Regular bowel movement may be facilitated by regulation of diet taking plenty of fluids, vegetables and milk or prescribing stool softeners at bedtime. There may be rectal bleeding, painful fissures or hemorrhoids due to hard stool.

***Bathing*:** The patient should take daily bath but be careful against slipping in the bathroom due to imbalance.

***Clothing, shoes and belt*:** The patient should wear loose but comfortable garments. High heel shoes should better be avoided in advanced pregnancy when the center of balance alters. Constricting belt should be avoided.

***Dental care*:** Good dental and oral hygiene should be maintained. The dentist should be consulted, if necessary. This will facilitate extraction or filling of the caries tooth, if required, comfortably in the second trimester.

***Care of the breasts*:** Breast engorgement may cause discomfort during late pregnancy. A well-fitting brassiere can give relief.

***Coitus*:** Generally, coitus is not restricted during pregnancy. Release of prostaglandins and oxytocin with coitus may cause uterine contractions. Women with increased risk of miscarriage or preterm labor should avoid coitus if they feel such increased uterine activity.

***Travel*:** Travel by vehicles having jerks is better to be avoided, especially in first trimester and the last 6 weeks. The long journey is preferably to be limited to the second trimester. Rail route is preferable to bus route. Travel in pressurized aircraft is safe up to 36 weeks. **Air travel is contraindicated** in cases with placenta previa, preeclampsia, severe anemia and sickle cell disease. Prolonged sitting in a car or aeroplane should be avoided due to the risk of venous stasis and thromboembolism. Seat belt should be under the abdomen.

***Smoking and alcohol*:** In view of the fact that smoking is injurious to health, it is better to stop smoking not only during pregnancy but even thereafter. Heavy smokers have smaller babies and

there is also more chance of abortion. Similarly, alcohol consumption is to be drastically curtailed or avoided, so as to prevent fetal maldevelopment or growth restriction (see p. 537, 589).

IMMUNIZATION: Fortunately, most of life-threatening epidemics are rare. In the developing countries, immunization in pregnancy is a routine for tetanus; others are given when epidemic occurs or traveling to an endemic zone or for traveling overseas.

Live virus vaccines (rubella, **measles**, **mumps, varicella**, **yellow fever) are contraindicated**. **Rabies**, **hepatitis A and B vaccines**, **toxoids can be given as in nonpregnant state**. However in certain circumstances, risk or benefit assessment should be made before making decision.

***Tetanus*: Immunization against tetanus not only protects the mother but also the neonates**. In unprotected women, 0.5 mL tetanus toxoid is given intramuscularly at 6 weeks interval for 2 such, the first one to be given between 16 and 24 weeks. Women who are immunized in the past, a booster dose of 0.5 mL IM is given in the last trimester.

Prenatal classes are found to be helpful and valuable (see p. 155).

***Drugs*:** Almost all the drugs given to mother will cross the placenta to reach the fetus. Possibility of pregnancy should be kept in mind while prescribing drugs to any woman of reproductive age .

GENERAL ADVICE: **The patient should be persuaded** to attend for antenatal checkup positively on the schedule date of visit. **She is instructed** to report to the physician even at an early date if some untoward symptoms arise such as intense headache, disturbed sleep with restlessness, urinary troubles, epigastric pain, vomiting and scanty urination.

She is advised to come to hospital for consideration of admission in the following circumstances:

・Painful uterine contractions at interval of about 10 minutes or earlier and continued for at least 1 hour—suggestive of onset of labor.

・Sudden gush of watery fluid per vaginam—suggestive of premature rupture of the membranes.

・Active vaginal bleeding, however slight it may be.

MINOR AILMENTS IN PREGNANCY

***Nausea and vomiting*:** Nausea and vomiting especially in the morning, soon after getting out of bed, are usually common in primigravidae. They usually appear following the first or second missed period and subside by the end of first trimester. 50% women have both nausea and vomiting, 25% have nausea only and 25% are unaffected. Three main measures can reduce the problem. **Dietary changes:** To take dry toast, biscuits and protein rich meals. Frequent small foods are helpful. Fatty foods are avoided. **Behavior modification:** To avoid personal triggering factors. The woman can identify herself, this factor. Initial supplementation with vitamin B1 and B6 is started. **Medications** are discussed on page 587.

***Backache*:** It is a common problem (50%) in pregnancy. Physiological changes that contribute to backache are: joint ligament laxity (relaxin, estrogen), weight gain, hyperlordosis and anterior tilt

of the pelvis. Other factors may be faulty posture and high heel shoes, muscular spasm, urinary infection or constipation. Excessive weight gain should be avoided. Rest with elevation of the legs to flex the hips

may be helpful. Improvement of posture, well-fitted pelvic girdle belt which corrects the lumbar lordosis during walking and rest in hard bed often relieve the symptom. Massaging the back muscles, analgesics and rest relieve the pain due to muscle spasm.

***Constipation*:** Constipation is a quite common ailment during pregnancy. Atonicity of the gut due to the effect of progesterone, diminished physical activity and pressure of the gravid uterus on the pelvic colon are the possible explanations. Regular bowel habit may be restored with advice mentioned earlier.

***Leg cramps*:** It may be due to deficiency of diffusible serum calcium or elevation of serum phosphorus. Supplementary calcium therapy in tablet or syrup after the principal meals may be effective. Massaging the leg, application of local heat and intake of vitamin B1 (30 mg) daily may be effective.

***Acidity and heartburn*:** Heartburn is common in pregnancy due to relaxation of the esophageal sphincter. Patient is advised to avoid over eating and not to go to bed immediately after the meal. Liquid antacids may be helpful. Hiatus hernia which is common during the pregnancy can also produce heartburn, especially when the patient is in lying down position. Sleeping in semi-reclining position with high pillows relieves the symptoms of hiatus hernia.

***Varicose veins*:** Varicose veins in the legs and vulva (varicosities) or rectum (hemorrhoids) may appear for the first time or aggravate during pregnancy, usually in the later months. It is due to obstruction in the venous return by the pregnant uterus. For leg varicosities, elastic crepe bandage during movements and elevation of the limbs during rest can give symptomatic relief. **Specific therapy is better to be avoided**. Varicosities usually disappear following delivery.

Hemorrhoids: It may cause annoying complications like bleeding or may get prolapsed. Regular use of laxative to keep the bowel soft, local application of hydrocortisone ointment and replacement of the piles if prolapsed are essential. **Surgical treatment is better to be withheld** as the condition sharply improves following delivery.

***Carpal tunnel syndrome (10%)*:** Woman presents with pain and numbness in the thumb, index and the middle finger. There is weakness in the muscles for thumb movements. This is due to compression effect on the median nerve. Physiological changes in pregnancy with retention of excess fluid are the common cause. Treatment is mostly symptomatic. A splint is applied during sleep time to the slightly flexed wrist to give relief. Corticosteroid injection or surgical decompression is rarely needed. It resolves spontaneously following delivery.

***Round ligament pain*:** Stretching of the round ligaments during movements in pregnancy may cause sharp pain in the groins. This pain may be unilateral or bilateral. It is usually felt in second trimester onwards. This is more common in right side as a result of dextrorotation of uterus. Pain may be awakening at night time because of sudden roll over movements during sleep. Pain may be reduced by making movements gradual instead of sudden. Local heat application is helpful. Analgesics are rarely needed.

***Ptyalism*:** Increased secretion of saliva is observed during pregnancy. It may be associated with

increased intake of starch, though actual cause is not known. This problem is usually self-limiting and may be overcome by decreasing intake of carbohydrates. It is not associated with any adverse pregnancy outcome.

***Syncope*:** It is often seen in a woman following prolonged standing or standing upright abruptly. This is due to pooling of blood in the veins of the lower extremities. There is the effect of compression of the pelvic veins by the gravid uterus also. Other causes may be dehydration, hypoglycemia or overexertion. The woman presents with dizziness or light headedness on standing upright abruptly or following standing for a prolonged period. Syncope usually resolves rapidly on lying in left lateral position. Syncope in supine position is also managed by resting in lateral recumbent position. Recurrent syncope needs cardiological evaluation.

Ankle edema: Excessive fluid retention as evidenced by marked gain in weight or evidences of preeclampsia has to be excluded. No treatment is required for physiological edema or orthostatic edema. Edema subsides on rest with slight elevation of the limbs. **Diuretics should not be prescribed.**

Vaginal discharge: Assurance to the patient and advice for local cleanliness are all that are required. Presence of any infection (*Trichomonas, Candida, Bacterial vaginosis*) should be treated with vaginal application of metronidazole or miconazole (see p. 356).

EXERCISE IN PREGNANCY

A low impact exercise may be continued throughout the period of a normal pregnancy. However, physiologic changes of pregnancy may restrict certain types of exercises. Limits of moderate intensity physical activity in pregnancy:

- . Exercise should be regular (30 min/day), of low impact, and as a part of daily activites.
- . Exercise should avoid any symptoms of breathlessness, fatigue or dizziness.
- . Exercise should be done in a cool area without becoming uncomfortable and warm.
- . Prolonged supine position, any compression to the uterus or risk of injury (fall) should be avoided.

Contraindications of Exercise and to Limit Physical activity

- Fetal growth restriction (FGR)
- Cardiac or pulmonary disease
- Cervical insufficiency
- Vaginal bleeding (APH(
- Hypertension in pregnancy
- Risk for preterm labor

Values of antenatal care

The value of antenatal supervision is so much tested and recognized that it is needless to stress its importance. It should be borne in mind that a successful obstetric outcome depends on continued

careful supervision which starts in pregnancy and ends in puerperal period. **Inadequacy of one cannot be compensated by the other.** The chief values are:

・**To screen the high risk cases.** Medical disorders and obstetric complications are sorted out at the earliest

. **Risk assessment is a continued process and not once only.**

・**Detection of high risk factors** deserves no credit unless proper steps are taken to rectify it. Cases need to be admitted, investigated and treated.

・**Pregnancy should be regularly supervised.** Casual antenatal visit or inadequate care is worse than no care at all. Effi cacy of prenatal care depends on the **quality of care** given to the woman.

・**Antenatal care is said to be the strategy**; **the intranatal care is the tactic in obstetrics.** One is indispensible from the other to achieve a good result. Care should be **thorough** and based on **individual woman's need**.

・**Acceptance of advice:** During pregnancy, advice regarding diet, drugs, family planning guidance and immunization schedule are better followed than in the nonpregnant state.

・**It is an opportunity to make the patient realize** that childbirth is a physiological process and to boost up the psychology so that the patient fi nds herself confi dent during the ordeal of labor.

・**The net effect is marked reduction in maternal mortality** (about one-seventh) and morbidity. Similarly, there is significant **reduction in perinatal mortality (about one-fi fth) and morbidity.**

Preconceptional counseling and care

When a couple is seen and counseled about pregnancy, its course and outcome well before the time of actual conception is called **preconceptional counseling**. **Objective is to ensure that a woman enters pregnancy with an optimal state of health which would be safe both for herself and the fetus**. Organogenesis is completed by the first trimester. By the time the woman is seen first in the antenatal clinic, it is often too late to advice because all the adverse factors have already begun to exert their effects. Preconceptual phase is the time to identify any risk factor that could potentially affect the perinatal outcome adversely. The woman is informed about the risk factor and at the same time care is provided to reduce or to eliminate the risk factor in an attempt to improve the pregnancy outcome. **Virtually preconceptional counseling is a part of preventive medicine**.

PRECONCEPTIONAL VISIT, RISK ASSESSMENT AND EDUCATION

・**Identification of high risk factors** by detailed evaluation of obstetric, medical, family and personal history. Risk factors are assessed by laboratory tests, if required.

・**Base level health status** including blood pressure is recorded.

・**Rubella and hepatitis immunization** in a nonimmune woman is offered .

・**Folic acid supplementation** (4 mg a day) starting 4 weeks prior to conception up to 12 weeks of pregnancy , is advised. This can reduce the incidence of neural tube defects.

・**Maternal health is optimized preconceptionally**. Problems of overweight, underweight, anemia, abnormal papanicolaou smears are evaluated and treated appropriately.

・**Fear of the incoming pregnancy** is removed by preconceptional education.

・**Patient with medical complications** should be educated about the effects of the disease on pregnancy and also the effects of pregnancy on the disease. In extreme situation, the pregnancy is discouraged. Preexisting chronic diseases (hypertension, diabetes, epilepsy) are stabilized in an optimal state by intervention.

・**Drugs used before pregnancy** are verified and changed if required so as to avoid any adverse effect on the fetus during the period of organogenesis (see p. 587). For example, anticonvulsant drugs are checked (see p. 584), warfarin is replaced with heparin and oral antidiabetic drugs are replaced with insulin.

・**Woman should be urged to stop** smoking, taking alcohol and abusing drugs. Addicted woman is given specialized care.

・**Inheritable genetic diseases** (sickle cell disease, cystic fibrosis) are screened before conception and risk of passing on the condition to the offspring is discussed (see p. 316).

・**Importance of prenatal diagnosis** for chromosomal or genetic diseases is discussed .

・**Inheritable genetic diseases** could be managed either by **primary prevention** (eliminating the causal factor) or **by secondary prevention** (terminating the affected fetus).

・**Couples with history of recurrent fetal loss** (see p. 195) or with family history of congenital abnormalities (genetic, chromosomal or structural) are investigated and counseled appropriately. There may be some **untreatable factors** . **Educational classes** include discussion as regard delivery, timing, method and possible interventions (ventouse/forceps or cesarean delivery). Such prenatal classes are found helpful and valuable. The counseling should be done by primary health-care providers. The help of an obstetrician, physician and geneticist may be required and should be extended.

Diagnosis of Pregnancy

The reproductive period of a woman begins at menarche and ends in menopause. It usually extends from 13–45 years. While biological variations may occur in different geographical areas, pregnancy is rare below 12 years and beyond 50 years. **Lina Medina** in Lima, Peru was the

youngest one, delivery by cesarean section when she was only 5 years and 7 months old and **the oldest one** at 57 years and 4 months old.

DURATION OF PREGNANCY: The duration of pregnancy has traditionally been calculated by the clinicians in terms of 10 lunar months or 9 calendar months and 7 days or 280 days or 40 weeks, **calculated from the first day of the last menstrual period**. **This is called menstrual or gestational age**.

But, fertilization usually occurs 14 days prior to the expected missed period and in a previously normal cycle of 28 days duration, it is about 14 days after the first day of the period. Thus, the true gestation period is to be **calculated by subtracting 14 days from 280 days, i.e. 266 days**. **This is called fertilization or ovulatory age** and is widely used by the embryologist.

FIRST TRIMESTER (FIRST 12 WEEKS)

SUBJECTIVE SYMPTOMS The following are the presumptive symptoms of early months of pregnancy:

Amenorrhea during the reproductive period in an otherwise healthy individual having previous normal periods, is likely due to pregnancy unless proved otherwise. However, cyclic bleeding may occur up to 12 weeks of pregnancy, until the decidual space is obliterated by the fusion of decidua vera with decidua capsularis. Such bleeding is usually scanty, lasting for a shorter duration than her usual and roughly corresponds with the date of the expected period. **This is termed as placental sign**. This type of bleeding should not be confused with the commonly met pathological bleeding, i.e. threatened abortion. Pregnancy, however, may occur in women who are previously amenorrheic — during lactation and puberty.

Morning sickness (Nausea and vomiting) is inconsistently present in about 70% cases, more often in the first pregnancy than in the subsequent one. **It usually appears soon following the missed period and rarely lasts beyond 16 weeks**. Its intensity varies from nausea on rising from the bed to loss of appetite or even vomiting. But it usually does not affect the health status of the mother.

Frequency of micturition is quite troublesome symptom during 8–12th week of pregnancy. It is due to (1) resting of the bulky uterus on the fundus of the bladder because of exaggerated anteverted position of the uterus, (2) congestion of the bladder mucosa and (3) change in **maternal osmoregulation** causing increased thirst and polyuria (see p. 58). As the uterus straightens up after 12th week, the symptom disappears.

Breast discomfort in the form of feeling of fullness and 'pricking sensation' is evident as early as 6–8th week specially in primigravidae.

Fatigue is a frequent symptom which may occur early in pregnancy.

OBJECTIVE SIGNS:

· ***Breast changes*** are valuable only in primigravidae, as in multiparae, the breasts are enlarged and often contain milk for years. The breast changes are evident between 6 and 8 weeks. There is enlargement with vascular engorgement evidenced by the delicate veins visible under the skin .

The nipple and the areola (primary) become more pigmented specially in dark women. Montgomery's tubercles are prominent. Thick yellowish secretion (colostrum) can be expressed as early as 12th week・***Per abdomen*** — Uterus remains a pelvic organ until 12th week, it may be just felt per abdomen as a suprapubic bulge.

・***Pelvic changes*** — The pelvic changes are diverse and appear at different periods. Collectively, these may be informative in arriving at a diagnosis of pregnancy.

・**Jacquemier's or Chadwick's sign:** It is the dusky hue of the vestibule and anterior vaginal wall visible at about 8th week of pregnancy. Th e discoloration is due to local vascular congestion.

・**Vaginal sign:** (a) Apart from the bluish discoloration of the anterior vaginal wall (b) Th e walls become softened and (c) Copious non-irritating mucoid discharge appears at 6th week (d) Th ere is increased pulsation, felt through the lateral fornices at 8th week called **Osiander's sign.**

・**Cervical signs:** (a) Cervix becomes soft as early as 6th week **(Goodell's sign)**, a little earlier in multiparae. Th e pregnant cervix feels like the lips of the mouth, while in the non-pregnant state, like that of tip of the nose. (b) On speculum examination, the bluish discoloration of the cervix is visible. It is due to increased vascularity.

・**Uterine signs:** (a) *Size, shape and consistency* — Th e uterus is enlarged to the size of hen's egg at 6th week, size of a cricket ball at 8th week and size of a fetal head by 12th week. The pyriform shape of the non-pregnant uterus becomes globular by 12 weeks. Th ere may be asymmetrical enlargement of the uterus if there is lateral implantation. Th is is called **Piskacek's sign** where one half is more fi rm than the other half. As pregnancy advances, symmetry is restored. **The pregnant uterus feels soft and elastic**.

(b) *Hegar's sign:* It is present in two-thirds of cases. **It can be demonstrated between 6 and 10 weeks**, a little earlier in multiparae. **Th is sign is based on the fact that**: (1) upper part of the body of the uterus is enlarged by the growing fetus (2) lower part of the body is empty and extremely soft and (3) the cervix is comparatively fi rm. Because of variation in consistency, on bimanual examination (two fingers in the anterior fornix and the abdominal fi ngers behind the uterus), the abdominal and vaginal fingers seem to appose below the body of the uterus . Examination must be gentle to avoid the risk of abortion.

(c) *Palmer's sign:* Regular and rhythmic uterine contraction can be elicited during bimanual examination as early as 4–8 weeks. Palmer in 1949, fi rst described it and it is a valuable sign when elicited.

To elicit the test, the uterus is cupped between the internal fingers and the external fingers for about 2–3 minutes. During contraction, the uterus becomes firm and well defined but during relaxation, becomes soft and ill defined. While the contraction phase lasts for about 30 seconds, with increasing duration of pregnancy, the relaxation phase increases (Fig. 7.3). **After 10th week**, **the relaxation phase is so much increased that the test is difficult to perform.**

IMMUNOLOGICAL TESTS FOR DIAGNOSIS OF PREGNANCY

Principle: Pregnancy tests depend on detection of the antigen (hCG) present in the maternal urine or serum with antibody either polyclonal or monoclonal available commercially.

Other uses of pregnancy tests: Apart from diagnosis of uterine pregnancy, the tests are employed in the diagnosis of ectopic pregnancy (see p. 213), **to monitor pregnancy following in vitro fertilization and embryo transfer and to follow up cases of hydatidiform mole and choriocarcinoma**. Test accuracy ranges from 98.6 – 99%. Non-pregnant level is below 1 mIU/mL.

Limitations: Test accuracy is affected due to presence of (i) hemoglobin (ii) albumin (iii) LH and (iv) immunological diseases.

ULTRASONOGRAPHY: Intradecidual gestational sac (GS) is identified as early as 29 to 35 days of gestation.

Fetal viability and gestational age is determined by detecting the following structures by**transvaginal ultrasonography**. *Gestational sac and yolk sac* by 5 menstrual weeks ; *Fetal pole and cardiac activity* — 6 weeks; *Embryonic movements* by 7 weeks. Fetal gestational age is best determined by measuring the CRL between 7 and 12 weeks (variation ± 5 days). **Doppler effect of ultrasound can pick up the fetal heart rate reliably by 10th week.** The instrument is small, handy and cheap . The gestational sac (true) must be differentiated from pseudogestational sac.

SECOND TRIMESTER (13–28 WEEKS)

SYMPTOMS: The subjective symptoms — such as nausea, vomiting and frequency of micturition usually subside, while amenorrhea continues. **The new features that appear are**:

・"***Quickening***" **(feeling of life) denotes the perception of active fetal movements by the women**. It is usually felt about the 18th week, about 2 weeks earlier in multiparae. Its appearance is an useful guide to calculate the expected date of delivery with reasonable accuracy .

・***Progressive enlargement*** of the lower abdomen by the growing uterus.

GENERAL EXAMINATION

・***Chloasma:*** Pigmentation over the forehead and cheek may appear at about 24th week.

・***Breast changes:*** (a) Breasts are more enlarged with prominent veins under the skin (b) Secondary areola specially demarcated in primigravidae, usually appears at about 20th week (c) Montgomery's tubercles are prominent and extend to the secondary areola (d) Colostrum becomes thick and yellowish by 16th week (e) Variable degree of striae may be visible with advancing weeks.

ABDOMINAL EXAMINATION

Inspection: (1) Linear pigmented zone **(linea nigra)** extending from the symphysis pubis to ensiform cartilage may be visible as early as 20th week (2) **Striae** (both pink and white) of varying degree are visible in the lower abdomen, more towards the flanks

Palpation: **Fundal height** is increased with progressive enlargement of the uterus. Approximate duration of pregnancy can be ascertained by noting the height of the uterus in relation to different levels in the abdomen. **The following formula is an useful guide for the purpose**.

The height of the uterus is midway between the symphysis pubis and umbilicus at 16th week; at the level of umbilicus at 24th week and at the junction of the lower third and upper two-thirds of the distance between the umbilicus and ensiform cartilage at 28th week.

・**The uterus feels soft and elastic** and becomes ovoid in shape.

・**Braxton-Hicks contractions** are evident.

・**Palpation of fetal parts** can be felt distinctly by 20th week. The findings are of value not only to diagnose pregnancy but also to identify the presentation and position of the fetus in later weeks.

・**Active fetal movements** can be felt at intervals by placing the hand over the uterus as early as 20th week. **It not only gives positive evidence of pregnancy but of a live fetus**. Th e intensity varies from a faint fl utter in early months to stronger movements in later months.

・**External ballottement** is usually elicited as early as 20th week when the fetus is relatively smaller than the volume of the amniotic fl uid (Fig. 7.6A). It is diffi cult to elicit in obese patients and in case with scanty liquor amnii. It is best elicited in breech presentation with the head at the fundus.

Auscultation

・**Fetal heart sound (FHS) is the most conclusive clinical sign of pregnancy**. With an ordinary stethoscope, it can be detected between 18–20 weeks. Th e sounds resemble the tick of a watch under a pillow. Its location varies with the position of the fetus. Th e rate varies from 110–160 beats per minute. **Two other sounds are confused with fetal heart sounds**. **Th ose are**:

・***Uterine souffl e*** is a soft blowing and systolic murmur heard low down at the sides of the uterus, best on the left side. **Th e sound is synchronous with the maternal pulse and is due to increase in blood flow through the dilated uterine vessels**. It can be heard in big uterine fibroid.

・***Funic or fetal souffl e*** is due to rush of blood through the umbilical arteries. **It is a soft, blowing murmur**

synchronous with the fetal heart sounds.

VAGINAL EXAMINATION

・***Th e bluish discoloration*** of the vulva, vagina and cervix is much more evident, so also softening of the cervix.

・***Internal ballottement*** can be elicited between 16–28th week (Figs 7.6B and C). Th e fetus is too small before 16th week and too large to displace after 28th week. However, the test may not be elicited in cases with scanty liquor amnii, or when the fetus is transversely placed.

INVESTIGATIONS (Imaging Studies)

Sonography: Routine sonography at 18–20 weeks permits a detailed survey of fetal anatomy, placental localization and the integrity of the cervical canal. **Gestational age** is determined by measuring the biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC) and femur length (FL). It is most accurate when done between 12 and 20 weeks (variation ± 8 days). BPD is measured at the level of the thalami and cavum septum pellucidum. BPD is measured from outer edge of the skull to the inner edge of the opposite side.

Fetal organ anatomy is surveyed to detect any malformation. ***Fetal viability*** is determined by realtime ultrasound. Absence of fetal cardiac motion confirms fetal death.

Magnetic Resonance Imaging (MRI): MRI can be used for fetal anatomy survey, biometry and evaluation of complex malformations.

Radiologic evidence of fetal skeletal shadow may be visible **as early as 16th week.**

LAST TRIMESTER (29-40 WEEKS)

SYMPTOMS: (1) **Amenorrhea** persists (2) **Enlargement of the abdomen** is progressive which produces some mechanical discomfort to the patient such as palpitation or dyspnea following exertion (3) **Lightening** — At about 38th week, specially in primigravidae, a sense of relief of the pressure symptoms is obtained due to engagement of the presenting part (4) **Frequency of micturition** reappears (5) **Fetal movements** are more pronounced.

SIGNS:

・**Cutaneous changes** are more prominent with increased pigmentation and striae.

・**Uterine shape** is changed from cylindrical to spherical beyond 36th week.

・**Fundal height:** The distance between the umbilicus and the ensiform cartilage is divided into three equal parts. The fundal height corresponds to the junction of the upper and middle third at 32 weeks, up to the level of ensiform cartilage at 36th week and it comes down to 32 week level at 40th week because of engagement of the presenting part. To determine whether the height of the uterus corresponds to 32 weeks or 40 weeks, engagement of the head should be tested. **If the head is fl oating, it is of 32 weeks pregnancy and if the head *is engaged*, *it is of 40 weeks pregnancy.***

Symphysis fundal height (SFH). Th e upper border of the fundus is located by the ulnar border of the left hand and this point is marked. Th e distance between the upper border of the symphysis pubis up to the marked point is measured by a tape in centimeter. After 24 weeks, the SFH measured in cm corresponds to the number of weeks up to 36 weeks. A variation of ± 2 cm is accepted as normal. Variation beyond the normal range needs further evaluation.

・**Braxton-Hicks** contractions are more evident.

・**Fetal movements** are easily felt.

・**Palpation of the fetal parts** and their identification become much easier. Lie, presentation and position of the fetus are determined.

・**FHS** is heard distinctly in areas corresponding to the presentation and position of the fetus. **FHS may not be audible in cases** of maternal obesity, polyhydramnios, occipitoposterior position and certainly in IUD.

・**Sonography** — gestational age estimation by BPD, HC, AC and FL is less accurate (variation ± 3 weeks). Fetal growth assessment can be made provided accurate dating scan has been done in first or second trimester.

Fetal AC at the level of the umbilical vein is used to assess gestational age and fetal growth profile (IUGR or macrosomia) . Fetal weight estimation can be done using tables. **Amniotic fluid volume** assessment is done to detect oligohydramnios (AFI < 5) or polyhydramnios (AFI > 25).

Placental anatomy: Location (fundus or previa), thickness (placentomegaly in diabetes) or other abnormalities are noted.

Other information: Fetal life, number, presentation and organ anatomy as done in the first and second trimester are surveyed again.

DIFFERENTIAL DIAGNOSIS OF PREGNANCY

While the clinical diagnosis of pregnancy at times becomes easy but there are occasions where the diagnosis poses a problem. The enlargement of the uterus caused by pregnancy may have to be differentiated from abdominopelvic swellings, such as **uterine fibroid**, **cystic ovarian tumor**, **encysted tubercular peritonitis**, **hematometra or even distended urinary bladder.** The confusion is accentuated by the presence of amenorrhea for some other reasons. Pregnancy may also coexist with the swellings.

Pseudocyesis (Syn: Phantom, spurious, false pregnancy): **It is a psychological disorder where the woman has the false but firm belief that she is pregnant although no pregnancy exists.** The woman often is infertile who has an intense desire to have a baby. The conspicuous feature is cessation of menstruation. Other confusing manifestations are gradual enlargement of the abdomen because of deposition of fat, secretion from the breasts and intestinal movement, imagining it to be fetal movement. In some cases, the condition continues until eventually

spurious labor sets in. Obstetric examination reveals absence of positive signs of pregnancy. Examination with ultrasound and/or immunological tests for pregnancy may be required to negate the diagnosis.

Cystic ovarian tumor: **The diagnostic points are**: (1) The swelling is slow growing, usually takes months to grow (2) Amenorrhea is usually absent (3) It feels cystic or tense cystic (4) Absence of Braxton-Hicks contraction (5) Absence of positive signs of pregnancy (6) Ultrasonography shows absence of fetus.

Fibroid: (1) The tumor is slow growing, often takes years (2) Amenorrhea is absent (3) The feel is firm, more towards hard but may be cystic in cystic degeneration (4) Positive signs of pregnancy are absent (5) Ultrasonography or immunological test for pregnancy gives negative result.

Encysted peritonitis: (1) History of Koch's infection (2) Amenorrhea of longer duration may be present (3) Swelling is ill defined (4) Absence of positive signs of pregnancy (5) Internal examination reveals normal uterus separated from the swelling (6) Ultrasonography — absence of fetus.

Distended urinary bladder: In chronic retention of urine due to retroverted gravid uterus, the distended bladder may be mistaken as ovarian cyst or acute hydramnios. Catheterization of the bladder solves the problem