Multiple pregnancy

■ Definition: Any pregnancy in which two or more embryos or fetuses occupy the uterus simultaneously.

■ Simultaneous development of two fetuses in the uterus is the most common variety of multiple pregnancy.
VARIETIES:

- (1) Dizygotic (DZ) twins—It is most common (80%) and results from the fertilization of two ova.
- (2) Monozygotic (MZ) twins (20%) results from the fertilization of a single ovum.
- **Zygosity:** Refers to *genetic makeup of the twins* • Monozygous or Dizygous
- **Chorionicity:** Refers to *placentation* • Monochorionic or dichorionic
  - **Amnionicity:** Refers to the presence or absence of *amniotic membranes between the twins* • Monoamniotic or diamniotic
- Chorionicity is **determined by the timing of embryo division.**
- **Chorion** is the outermost membrane that encloses the *amnion*, embryo and other membranes.
Dizygotic twins

- Dizygotic twins 80% (Syn: fraternal, binovular) result from fertilization of **two ova**, most likely ruptured from **two distinct Graafian follicles** usually of the **same or one from each ovary**, by **two sperms** during a **single ovarian cycle**. Their subsequent implantation and development differ little from those of a single fertilized ovum.

- The babies bear only fraternal resemblance to each other (that of brothers and sisters from different births) and hence called fraternal twins.
Examination of placenta and membranes:

- Dizygotic twins:
  - (i) There are two placentae, either completely separated or more commonly fused at the margin appearing to be one (9 out of 10). There is no anastomosis between the two fetal vessels.
  - (ii) Each fetus is surrounded by a separate amnion and chorion.
  - (iii) As such, the intervening membranes consist of four layers—amnion, chorion, chorion and amnion.
In Monozygotic (MZ) twins 20% (Syn: identical, uniovular), the twinning may occur at different periods after fertilization and this markedly influences the process of implantation and the formation of the fetal membranes.
On rare occasion, the following possibilities may occur:

If the division takes place **within 72 hours after fertilization** the resulting embryos will have two separate placentia, chorions and amnions (diamniotic-dichorionic or D/D—30%).

If the division takes place between the **fourth and eighth day** after the formation of inner cell mass when chorion has already developed—diamniotic monochorionic twins develop (D/M—70–75%).

If the division occurs after **eighth day of fertilization**, when the amniotic cavity has already formed, a monoamniotic-monochorionic twin develops (M/M—1–2%).

On extremely rare occasions, division occurs **after 2 weeks** of the development of embryonic disc resulting in the formation of conjoined twin (<1%) called—**Siamese twin**.
What are the types of conjoined twins?

There are eight types of conjoined twins. They are classified according to the site of fusion. Attachment may be

- rostral: omphalopagus, thoracopagus, and cephalopagus;
- caudal: ischiopagus;
- lateral: parapagus, or
- dorsal: craniopagus, rachipagus, and pygopagus
Sex: While twins having opposite sex are almost always dizygotic and twins of the same sex are not always monozygotic but the uniovular twins are always of the same sex. If the fetuses are of the same sex and have the same genetic features (dominant blood group), monozygosity is likely. A test skin graft—Acceptance of reciprocal skin graft is almost a certain proof of monozygosity. **DNA microprobe technique is most definitive.** Follow-up study between 2 and 4 years—showing almost similar physical and behavioral features suggestive of monozygosity.

<table>
<thead>
<tr>
<th>Zygosity</th>
<th>Placenta</th>
<th>Communicating vessels</th>
<th>Intervening membranes</th>
<th>Sex</th>
<th>Genetic features (dominant blood group) DNA fingerprinting</th>
<th>Skin grafting (Reciprocal)</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monozygotic</td>
<td>One</td>
<td>Present</td>
<td>2 (amnions)</td>
<td>Always identical</td>
<td>Same</td>
<td>Acceptance</td>
<td>Usually identical</td>
</tr>
<tr>
<td>Dizygotic</td>
<td>Two (most often fused)</td>
<td>Absent</td>
<td>4 (2 amnions 2 chorions)</td>
<td>May differ</td>
<td>Differ</td>
<td>Rejection</td>
<td>Not identical</td>
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Diagnosis

- Diagnosis of zygosity can be made by:
  - examining fetal genders (different genders = dizygotic)
  - placenta (monochorionic → monozygotic)
  - by genetic testing.
INCIDENCE of multiple pregnancy:

- The incidence varies widely. It is highest in Nigeria being 1 in 20 and lowest in far Eastern countries being 1 in 200 pregnancies. In India, the incidence is about 1 in 80.

- While the incidence of monozygotic twins remains fairly constant throughout the globe being 1 in 250, it is the dizygotic twins which are responsible for the wide variation of the incidence.

- According to Hellin’s (1895) rules, the mathematical frequency of multiple birth is, Hellin’s Law is the principle that one in about 89 natural pregnancies ends in the birth of twins, triplets once in $89^2$ births, and quadruplets once in $89^3$ births-probability; namely n’lets once in $89^{n-1}$.

- The actual incidence of multiple pregnancy has increased significantly at present. This is due to early detection by ultrasound as well as increasing use of induction of ovulation and assisted reproductive techniques (ARTs).
ETIOLOGY:

- The cause of twinning is not known. The frequency of monozygotic twins remains constant throughout the globe and is probably related to maternal environmental factors.

- It is the wide variation in the prevalence of binovular twins which is responsible for the fluctuation in the overall incidence of twins in different populations. Prevalence of dizygotic twins is related to:
  - **Race**: The frequency is highest amongst Negroes, lowest amongst Mongols and intermediate amongst Caucasians.
  - **Hereditary**: There is a hereditary predisposition likely to be more transmitted through the female (maternal side).
  - **Advancing age of the mother**: Increased incidence of twinning is observed with the advancing age of the mother, the maximum being between the age of 30 and 35 years. The incidence of twins is markedly reduced thereafter.
  - **Influence of parity**: The incidence is increased with increasing parity, especially from fifth gravida onward.
  - **Iatrogenic**: Drugs used for induction of ovulation may produce multiple fetuses to the extent of 20–40% following gonadotrophin therapy, although to a lesser extent (5–6%) following clomiphene citrate.
- Superfecundation is the fertilization of two different ova released in the same cycle, by separate acts of coitus within a short period of time usually less than 24 hours from same father or different fathers.

- Superfetation is the fertilization of two ova released in different menstrual cycles. The nidation and development of one fetus over another fetus is theoretically possible until the decidual space is obliterated by 12 weeks of pregnancy. (not observed in humans).

- Fetus papyraceous or compressus is a state which occurs if one of the fetuses dies early. The dead fetus is flattened, mummified and compressed between the membranes of the living fetus and the uterine wall. It may occur in both varieties of twins, but is more common in monozygotic twins and is discovered at delivery or earlier by sonography.
- **Fetus acardiacus** occurs only in monozygotic twins. Part of one fetus remains amorphous and becomes parasitic without a heart.

- Vanishing twin: Serial ultrasound imaging in multiple pregnancy since early gestation has revealed occasional death of one fetus and continuation of pregnancy with the surviving one. The dead fetus (if within 14 weeks) simply “vanishes” by resorption. The rate of disappearance could be to the extent of 40%.
MATERNAL PHYSIOLOGICAL CHANGES:

- Multiple pregnancy imposes physical changes on the mother in excess of those seen in singleton pregnancy.
- (1) There is increase in weight gain and cardiac output.
- (2) Plasma volume is increased by an addition of 500 mL. There is no corresponding increase in red cell volume resulting in exaggerated hemodilution and anemia.
- (3) There is increased a-fetoprotein level, tidal volume and glomerular filtration rate.
LIE AND PRESENTATION

- The most common lie of the fetuses is longitudinal (90%) but malpresentations are quite common.
- The combination of presentation of the fetuses are—
  - (1) both vertex (50%)
  - (2) first vertex and second breech (30%)
  - (3) first breech and second vertex (10%)
  - (4) both breech (10%),
  - (5) first vertex and second transverse and so on,
- but rarest one, being both transverse when the possibility of conjoined twins should be ruled out.
Diagnosis

- **HISTORY:** ask about factors that increase incidence of multiple pregnancy (i) History of ovulation inducing drugs specially gonadotrophins, for infertility or use of ART. (ii) Family history of twinning (more often present in the maternal side).

- **SYMPTOMS:** Minor ailments of normal pregnancy are often exaggerated. Some of the symptoms are related to the undue enlargement of the uterus:
  - (i) increased nausea and vomiting in early months,
  - (ii) cardiorespiratory embarrassment which is evident in the later months—such as palpitation or shortness of breath,
  - (iii) tendency of swelling of the legs, varicose veins and hemorrhoids is greater,
  - (iv) unusual rate of abdominal enlargement and excessive fetal movements may be noticed by an experienced parous mother.
Continue,

- GENERAL EXAMINATION: (i) Prevalence of anemia is more than in singleton pregnancy. (ii) Unusual weight gain, not explained by preeclampsia or obesity, is an important feature. (iii) Evidence of preeclampsia (25%) is a common association.

- ABDOMINAL EXAMINATION:

  - Inspection: The elongated shape of a normal pregnant uterus is changed to a more “barrel shape” and the abdomen is unduly enlarged.

  - Palpation: (i) The height of the uterus is more than the period of amenorrhea. This discrepancy may only become evident from mid-pregnancy onward. (ii) Fetal bulk seems disproportionately larger in relation to the size of the fetal head. (iv) Palpation of too many fetal parts. (v) Finding of two fetal heads or three fetal poles makes the clinical diagnosis almost certain.
Continue,

- **Auscultation**: Simultaneous hearing of two distinct fetal heart sounds (FHS) located at separate spots with a silent area in between by two observers, gives a certain clue in the diagnosis of twins, provided the difference in heart rates is at least 10 beats per minute. The abdominal palpation and auscultation may not be carried out so easily, as described, because of the presence of hydramnios.

- **INTERNAL EXAMINATION**: In some cases, one head is felt deep in the pelvis, while the other one is located by abdominal examination. On occasions, the clinical methods fail to detect twins prior to the delivery of the first baby.
INVESTIGATIONS

Sonography: In multifetal pregnancy it is done to obtain the following information:

(i) confirmation of diagnosis as early as tenth week of pregnancy,
(ii) viability of fetuses, vanishing twin in the second trimester,
(iii) chorionicity (lambda or twin peak sign,
(iv) pregnancy dating,
(v) fetal anomalies
(vi) fetal growth monitoring (at every 3–4 weeks interval) for IUGR,
(vii) presentation and lie of the fetuses,
(viii) twin transfusion (Doppler studies),
(ix) placental localization,
(x) amniotic fluid volume
Questions

■ When is the most appropriate time (trimester) to assess chorioamnionicity? Why is this assessment important?

■ • First trimester, especially after 7 weeks of pregnancy is the most appropriate period to consider chorioamnionicity. >> Earliest time: 6 - 8 weeks • Most accurate & reliable time: 10–13 weeks

■ Assessing chorioamnionicity is important, since monochorionic fetuses share the same fetoplacental circulation, serious complications could be observed. Such as;– TTTS (twin-twin transfusion syndrome). – TRAP (twin reversed arterial perfusion). TAPS (twin anemia polycythemia sequence).

■ What is the absolute intrauterine proof of dizygotic twin pregnancy? • Two different sex twins (male/female fetus)

■ What is the absolute intrauterine proof of monozygotic twin pregnancy? • Single chorion visualized by ultrasound
- Chorionicity of the placenta is best diagnosed by ultrasound at 10–13 weeks of gestation.

- In dichorionic twins there is a thick septum between the two gestational sacs. It is best identified at the base of the membrane, where a triangular projection is seen. This is known as lambda or twin peak sign. Presence of lambda or twin peak sign indicates dichorionic placenta.

- Presence of one gestational sac with a thin dividing membrane, and two fetuses, ("T" sign) suggests monochorionic diamniotic pregnancy.
Biochemical tests:
* Maternal serum chorionic gonadotrophin,
  • a-fetoprotein and
  • Unconjugated estriol are approximately double than those of singleton pregnancies. But their values cannot diagnose clearly a twin from a single fetus.

DIFFERENTIAL DIAGNOSIS includes:
(1) hydramnios,
(2) big baby,
(3) fibroid or ovarian tumor with pregnancy,
(4) ascites with pregnancy.
ANTENATAL MANAGEMENT

The essence of successful outcome of a twin pregnancy is to make an early diagnosis. High index of clinical suspicion and thorough ultrasound examination are the keys to the diagnosis. It is useful to make early diagnosis and to detect chorionicity, amniocity, fetal growth pattern and congenital malformations.
ADVICE

- **Diet**: Increased dietary supplement is needed for increased energy supply to the extent of 300 K cal per day, over and above that is needed in a singleton pregnancy. The increased protein demand is to be met with.

- Increased rest at home and early cessation of work from 24 weeks onward is advised to prevent preterm labor and other complications.

- **Supplement therapy**: (i) Iron therapy is to be increased to the extent of 100–200 mg per day. (ii) Additional vitamins, calcium and folic acid (5 mg) are to be given, over and above those prescribed for a singleton pregnancy.

- **Interval of antenatal visit should be more frequent** to detect at the earliest, the evidences of anemia, preterm labor or preeclampsia.

- **Fetal surveillance is maintained** by serial sonography at every 3–4 weeks interval or earlier if needed. Assessment of fetal growth, amniotic fluid volume and AFI, non-stress test and Doppler velocimetry are carried out.
More frequent Antenatal visits

DC: ANC Q 2 wks from 24 wks onwards (Fetal growth, liquor volume, umbilical artery Doppler’s) • Umbilical artery Doppler studies indicated especially in MC when there are signs of growth discordancy

MC: ANC every 2 wk from 16 wks
HOSPITALIZATION

- Routine hospital admission only for bed rest is not essential. However, bed rest even at home from 24 weeks onward, not only ensures physical and mental rest but also **improves uteroplacental circulation**. + must move because of risk of DVT and those things.

- Use of corticosteroids to accelerate fetal lung maturation is given (single dose) to women with preterm labor less than 34 weeks. **Twins develop pulmonary maturity 3–4 weeks earlier than singletons.**

- Emergency: Development of complicating factors necessitates urgent admission irrespective of the period of gestation.
What is the timing of delivery for normal uncomplicated twin pregnancies?

- 37w-38w → Dichorionic Diamniotic
- 36w → Diamniotic Monochorionic
  - only CS at 32-34w → Monochorionic
  - 8 Corticosteroid before 1w of CS.

Delivery:
- In triplet → 35w
- By CS
- In quad → Mostly 33w (31-32w)
Mode of delivery

- Most important factor in deciding mode of delivery is Fetal presentation at time of labour.
- Fetal presentation: best determined by USS.
MANAGEMENT DURING LABOR

- Place of delivery: As the twin pregnancy is considered a “high risk”, the patient should be confined in an equipped hospital preferably having an intensive neonatal care unit. Vaginal delivery is allowed when both the twins are/or at least the first twin is with vertex presentation.

- FIRST STAGE: Usual conduction of the first stage as outlined for a singleton fetus, is to be followed with additional precautions:
  - A skilled obstetrician should be present. An experienced anesthetist should be made available.
  - Neonatologists (two) should be present.
  - Presence of ultrasound in the labor ward is helpful. It makes both the external and internal versions less difficult by visualizing the fetal parts.
  - The patient should be in bed to prevent early rupture of the membranes.
  - Use of analgesic drugs is to be limited as the babies are small and rapid delivery may occur. **Epidural analgesia is preferred as it facilitates manipulation of second fetus, should it prove necessary.**
  - Careful fetal monitoring (preferably electronic) is to be done.
  - Internal examination should be done soon after the rupture of the membranes to exclude cord prolapse.
One unit of compatible and cross matched blood should be made readily available.

**DELIVERY OF THE FIRST BABY:** The delivery should be conducted in the same guidelines as mentioned in normal labor. As the baby is usually small, the delivery does not usually pose any problem.

(i) Liberal episiotomy under local infiltration with 1% lignocaine.

(ii) Forceps delivery, if needed, should be done preferably under pudendal block anesthesia. General anesthesia is better avoided, as the second baby may be subjected to the effects of prolonged anesthesia.

(iii) Not to give intravenous **ergometrine** with the delivery of the first baby.

(iv) Clamp the cord at two places and cut in between, to prevent exsanguination of the second baby through communicating placental circulation in monozygotic twins (of course, it is an usual procedure even in singleton birth).

(v) At least, 8–10 cm of cord is left behind for administration of any drug or transfusion, required.

(vi) The baby is handed over to the nurse after labeling it as number 1.
SCHEME OF MANAGEMENT OF TWINS DURING LABOR

- Both twin vertex (50%)
- Twin A-vertex
- Twin B-nonvertex (40%)

Deliver the first baby vaginally
- Cord is divided in between two clamps
- No methergine is given

To note the lie of the second baby clinically and/or by USG

Transverse lie
- External version
  - Cephalic-preferable or Podalic
    - Fails
      - Internal podalic version and Breech extraction under general anesthesia

Longitudinal lie
- ARM + Oxytocin if necessary
- If delay
  - Vertex
    - Low down
      - Forceps
  - Breech
    - High up
      - Ventouse or Internal version

DELIVERY: To guard against PPH

The indication of cesarean section for the second twin:
(i) Larger second twin with noncephalic presentation
(ii) Prompt closure of the cervix after the delivery of the first baby
(iii) Fetal distress of the second twin.
CONDUCTION OF LABOR AFTER THE DELIVERY OF THE FIRST BABY (DELIVERY OF SECOND TWIN) Principles:

- The principle is to expedite the delivery of the second baby. The second baby is put under strain due to placental insufficiency caused by uterine retraction following the birth of the first baby.

Steps of management:

- Step 1: Following the birth of the first baby, the lie, presentation, size and FHS of the second baby should be ascertained by abdominal examination or if required by real time ultrasound. A vaginal examination is also to be made not only to confirm the abdominal findings but to note the status of the membranes and to exclude cord prolapse, if any.

Lie longitudinal:

- Step 1: Low rupture of the membranes is done after fixing the presenting part on the brim. Syntocinon may be added to the infusion bottle to achieve this. Internal examination is once more to be done to exclude cord prolapse. More vigilance is employed to watch the fetal condition.
Step 2: If the uterine contraction is poor, 5 units of oxytocin is added to the infusion bottle. The interval between deliveries should ideally be less than 30 minutes.

Step 3: If there is still a delay (say 30 minutes), interference is to be done.

- Vertex:
  - Low down — Forceps are applied
  - High up — If the first baby is too small and the second one seems bigger, cephalopelvic disproportion should be ruled out. The possibility of hydrocephalic head should be excluded by ultrasonography. If these are excluded, internal version followed by breech extraction is performed under general anesthesia. Ventouse may be an effective alternative.
Breech: The delivery should be completed by breech extraction.

Lie transverse: If the lie is transverse, it should be corrected by external version into a longitudinal lie preferably cephalic, if fails, podalic. If the external version fails, internal version under general anesthesia should be done forthwith. As the fetus is small there is no difficulty in performing internal version and it is the only accepted indication of internal version in present day obstetric practice.)
Indications of urgent delivery of the second baby:

- (1) Severe (intrapartum) vaginal bleeding,
- (2) Cord prolapse of the second baby,
- (3) Inadvertent use of intravenous ergometrine (oxytocics) with the delivery of the first baby,
- (4) First baby delivered under general anesthesia,
- (5) Appearance of fetal distress.

Management: In all these conditions, the baby should be delivered quickly. A rational scheme is given below which depends on the lie, presentation and station of the head.

A. Head
   - If low down, delivery by forceps
   - If high up, delivery by internal version under general anesthesia

B. Breech should be delivered by breech extraction

C. Transverse lie—internal version followed by breech extraction under general anesthesia.

If, however, the patient bleeds heavily following the birth of the first baby, immediate low rupture of the membranes usually succeeds in controlling the blood loss.
MANAGEMENT OF THE THIRD STAGE:

The risk of postpartum hemorrhage can be minimized by

1) routine administration of 0.2 mg methergine IV or oxytocin 10 IU IM following the delivery of the second baby.

2) The placenta is to be delivered by controlled cord traction. It is a sound practice to continue the oxytocin drip for at least 1 hour, following the delivery of the second baby.

A blood loss of more than average should be immediately replaced by blood transfusion, already kept at hand. The patient is to be carefully watched for about 2 hours after delivery.

Multiple births put an additional stress and strain on the mother as well as on the family members. Mother should be given additional support at home to look after both the babies.
INDICATIONS OF CESAREAN SECTION: The indications are broadly divided into:

- Obstetric causes
- For twins

Obstetric indication: (1) Placenta previa (2) Severe preeclampsia (3) Previous cesarean section (4) Cord prolapse of the first baby (5) Abnormal uterine contractions (6) Contracted pelvis.

For twins: (i) Both the fetuses or even the first fetus with noncephalic (breech or transverse) presentation (ii) Twins with complications: IUGR, conjoined twins (iii) Monoamniotic twins (iv) Monochorionic twins with TTTS (v) Collision of both the heads at brim preventing engagement of either head.

MANAGEMENT OF DIFFICULT CASES OF TWINS

Fortunately, abnormal conditions leading to difficult delivery are extremely rare.

Interlocking: The most common one being the after-coming head of the first baby getting locked with the fore-coming head of the second baby. Vaginal manipulation to separate the chins of the fetuses is done, failing which cesarean section is necessary.
Occasionally, two heads of both vertex twins get locked at the pelvic brim preventing engagement of either of the head. The possibility should be kept in mind and the diagnosis is confirmed by intranatal sonography/radiography. Disengagement of the higher head can be possible under general anesthesia. If fails, cesarean section is the alternative, for fetal interest.
CONJOINED TWINS (see p. 473): It is extremely rare. Incidence varies from 1:100,000 to 1:50,000 live births.

>> A marked female predominance with 72%.

>> Diagnosis: Unfortunately conjoined twins are often diagnosed during delivery when there is obstruction in the second stage, Failure of traction to deliver the first twin in the second stage or inability to move one twin without moving the other suggests conjoined twins. Presence of a bridge of tissue between the fetuses on vaginal examination confirms the diagnosis. Antenatal diagnosis.

Management: depends on (i) Extent and site of union (ii) Possibility of surgical separation and (iii) Size of the fetuses and possibility of survival.
- TRIPLETs, QUADRUPLETs, ETC. Triplets may develop from fertilization of a single ovum or two or even three ova; similarly with quadruplets and quintuplets. Female fetus usually outnumber the male one.

- The diagnosis is accidental following sonography, or during births.

- Clinical course and complications are intensified compared to twins.

- Perinatal loss is markedly increased due to prematurity.

- Preterm delivery is common (50%) and usually delivery occurs by 32–34 weeks (mean 33.5 weeks) time.

- Discordance of fetal growth is more common than twins. Perinatal loss is inversely related to birth weight.
The average duration of pregnancy
- 33 weeks for triplets
- 29 weeks for quadruplets
- delivery: Cs
- 7-8 / 1000 live births for singleton
- 37 / 1000 live and stillbirths for twins
- 52 / 1000 live for triplets
- 231 / 1000 live for higher order multiples births
Thank you