

## **1. Obstetrics Anesthesia**

Labour is an emotional experience and involves both physiological and psychological mechanisms. As a consistent finding, labour pain is ranked high on the pain rating scale when compared to other painful life experiences. The memory of this pain however is short lived and of parturients who experienced severe pain in labour, 90% found the experience satisfactory three months later. Labour pain has two components: visceral pain which occurs during the early first stage and the second stage of childbirth, and somatic pain which occurs during the late first stage and the second stage. The pain of labour in the first stage is mediated by T10 to L1 spinal segments, whereas that in the second stage is carried by T12 to L1, and S2 to S4 spinal segments.

### ***Visceral pain***

Visceral labour pain occurs during the early first stage and the second stage of childbirth. With each uterine contraction, pressure is transmitted to the cervix causing stretching and distension and activating excitatory nociceptive afferents. These afferents innervate the endocervix and lower segment from T10 – L1. Visceral pain is transmitted by small unmyelinated ‘C’ fibres which travel with sympathetic fibres and pass through the uterine, cervical and hypogastric nerve plexuses into the main sympathetic chain.

The pain fibres from the sympathetic chain enter the white rami communicantes associated with T10 to L1 spinal nerves and pass via their posterior nerve roots to synapse in the dorsal horn of the spinal cord. Some fibres cross over at the level of the dorsal horn with extensive rostral and caudal extension resulting in poorly localized pain. Chemical mediators involved include bradykinin, leukotrienes, prostaglandins, serotonin, substance P and lactic acid. The pain of early labour is referred to T10-T12 dermatomes such that pain is felt in the lower abdomen, sacrum and back. This pain is dull in character and is not always sensitive to opioid drugs; the response to opioids depends on the route of administration.

### ***Somatic pain***

This occurs in addition to the visceral pain described above, in the late first stage of labour and also in the second stage. It arises due to afferents that innervate the vaginal surface of the cervix, perineum and vagina and occurs as a result of stretching, distension, ischaemia and injury (tearing or iatrogenic) of the pelvic floor, perineum and vagina. It manifests during descent of the foetus and during this active stage, the uterus contracts more intensely in a rhythmic and regular manner.

Somatic pain is transmitted by fine, myelinated rapidly transmitting 'A delta' fibres. Transmission occurs via the pudendal nerves and perineal branches of the posterior cutaneous nerve of the thigh to S2 - S4 nerve roots.

Somatic fibres from the cutaneous branches of the ilioinguinal and genitofemoral nerves also carry afferent fibres to L1 and L2. Somatic pain occurs closer to delivery, is sharp in character and easily localised to the vagina, rectum and perineum. It radiates to the adjacent dermatomes T10 and L1 and compared to visceral pain, is more resistant to opioid drugs. All resulting nerve impulses (visceral and somatic) pass to dorsal horn cells where they are processed and transmitted to the brain via the spino-thalamic tract. Transmission to the hypothalamic and limbic systems accounts for the emotional and autonomic responses associated with pain.

Obstetric anesthesia is anesthesia used in obstetric care service including vaginal delivery and operative delivery. Three essentials of obstetric pain relief are simplicity, safety, and preservation of fetal homeostasis. Anesthesia is the total loss of sensory perception and may include loss of consciousness whereas analgesia is loss of sensory only. There are four components of full anesthesia including muscle relaxant, anxiolytics, analgesics and amnestic. Analgesia is the loss/modulation of pain perception. It can be:

Based on preparation or method anesthesia: can be pharmacologic or non-pharmacologic. And based of administration it can be given as local, regional or general.

### **Pharmacologic methods**

#### **Local Anesthesia**

- Administered before an episiotomy or after a delivery to repair a laceration.
- Nerve blocks that provide pain relief for women in labor and delivery without loss of consciousness.
- **Pudendal block:** Local infiltration of the pudendal nerve with a local anesthetic agent (eg, lidocaine). **Complications may be** Unintentional intravascular injection will cause systemic toxicity, hematoma, and infection.
- **Paracervical block:** Agent is injected at the 3 o'clock and 9 o'clock positions around the cervix. Complication may be fetal bradycardia (usually transient).

### **Regional Analgesia:**

- **Epidural analgesia:** Injection of local anesthetic into the epidural or peridural space:
- **Epidural anesthesia:** can be used to **relieve pain of labor and vaginal delivery**.
  - 1.0 mL of 1.0% lidocaine or 0.5 to 1.5 mL of 0.25% bupivacaine provides satisfactory analgesia for labor.
  - Analgesia can be maintained with intermittent injections of lidocaine or bupivacaine or with continuous infusion of 0.125% bupivacaine at a rate of 1.5 mL/hr.
  - Alternatively 0.05% bupivacaine plus Fentanyl 3 µg/mL at an initial rate of 3 mL/hour
- **Spinal(subarachnoid):-** Injection of local anesthetic into the epidural or spinal region:
  - ✓ This method is not used for vaginal delivery.
  - ✓ But can be used for instrumental deliveries such as forceps and vacuum extraction.

### **General anesthesia:-**

- Rarely indicated for labor and vaginal delivery.
- It is indicated in procedures where uterine relaxation is required and when there is limitation of time to institute an epidural catheter.
- Immediately after the procedure is completed and patient extubated after fully awake and airway reflexes have returned.

### **Common drugs used for labor pain analgesia**

#### **Pethidine**

- ✚ 50mg im stat in active 1<sup>st</sup> stage of labor, repeat 50mg im stat after 4 hrs if no adequate pain relief is gained.
- ✚ Avoid administering Pethidine late in labor as it may cause neonatal depression.

#### **Meperidine**

- The most commonly used during the first stage of labor.
- It is used IM 50 to 100mg and IV 25 to 50 mg

#### **Side effects:**

- Nausea and vomiting
- Depression of ventilation,
- Orthostatic hypotension

## **Fentanyl**

- It is a rapid-acting and short-lasting narcotic.
- 100mg of Fentanyl is equipotent to 10 mg of morphine and 100mg of meperidine.
- This agent used IM 50 to 100µg or IV 25 to 50µg

## ***Phenothiazines***

- Has been used extensively in obstetric cases.
- It effects **anxiolytic as well as antiemetic** properties
- Combination of **promethazine and pethidine** can also be used.

## ***Benzodiazepines***

- These agents are effective **anxiolytic, hypnotic, anticonvulsant**, as well as **amnesic** drugs.
- A popular anxiolytic drug, used in obstetric practice.
- In small doses (2.5 to 10 mg) diazepam did not affect Apgar scores or neonatal acid base values.
- Drug of choice to treat convulsions following local anesthetic toxicity or in eclamptic patients.

### **Non-pharmacological Methods of Pain Control:**

Women who are free from fear and who have confidence in their obstetrical staff require smaller amounts of pain medication: it includes an understanding of pregnancy and the birth process, appropriate antepartum training in breathing, appropriate psychological support (eg, by a friend or family member) and considerate midwives/nursing and labor assistants who assure confidence.

### **➤ Labor position**

- Allow freedom in position and movement throughout labor and childbirth and encourage any non-supine position:
  - Side lying
  - Squatting
  - Hands and knees
  - Semi-sitting
  - Sitting

- Use of upright or lateral position compared with supine or lithotomy position is associated with:
  - Shorter second stage of labor
  - Fewer assisted deliveries
  - Fewer episiotomies
  - Fewer reports of severe pain
  - Less abnormal heart rate patterns for fetus
  - More perineal tears
  - Blood loss > 500 mL
- **Massage:** Stimulating certain points on the lower back to relieve pain.
- **Breathing exercise:**
- **Soothing music:**
- **Acupressure and Acupuncture**

## 2. Labor Dystocia

Labor is a dynamic process characterized by regular uterine contractions which cause progressive dilatation and effacement of the cervix and descent of the fetus through the birth canal. The word **Etocia** is used to indicate normal labour and dystocia is the reversely used to show abnormal or combinations of the abnormalities to produce dysfunctional labor. Even though they are different, many expressions such as cephalopelvic disproportion and failure to progress often are used to describe abnormal labour progress. Dystocia is the most common current indication for primary cesarean delivery in most parts of the world. Lack of progress in labour is the reason for **68 %** of unplanned cesarean deliveries for cephalic-presenting fetuses.

The phrase cephalopelvic disproportion was started to use prior to the 20<sup>th</sup> century to describe **obstructed labor** resulting from disparity between the size of the fetal head and maternal pelvis. But the term originated at that time were due to when the main indication for cesarean delivery was overt pelvic contracture due to rickets. However, this word now does not indicate the same thing with obstructed labour. Failure to progress in either spontaneous labour or stimulated/assisted labour is also the description of ineffective labour. This term is used to include lack of progressive

cervical dilatation or lack of fetal descent but most precisely the specific terms and their definitions should be used to describe abnormal labor.

Labor dystocia can be caused by power, passage, and passenger, psychological and professional problems.

#### A. Power

Power indicates the adequacy of uterine contraction. In normal characteristics:

- **Frequency:** In the early stage of labor, the contractions come at intervals of 10–15 minutes. The intervals gradually shorten with advancement of labor until in the second stage, when it comes every 2–3 minutes which is about 3-5 per 10 minute
- **Duration:** In the first stage, the contractions last for about 30 seconds initially but gradually increase in duration with the progress of labor commonly 40-60 seconds and measures about 20-60mmHg pressure.
- **Intensity:** Intrauterine pressure is raised to **40–60 mm Hg during first stage and about 100–120 mm Hg in second stage of labor during contractions.** Any deviation from this characteristics causes dysfunctional uterine contraction. The power may be inefficient (including hypotonic and hypertonic) and over efficient that causes precipitated labor.
- **Tonus:** It is the intrauterine pressure in between contractions. During pregnancy, as the uterus is quiescent (inactive), the tonus is of 2–3 mm Hg. During the first stage of labor, it varies from 8 mm Hg to 10 mm Hg. It is inversely proportional to relaxation.

#### ❖ Hypotonic dysfunction

Hypotonic dysfunction reflects an inefficient generation and propagation of action potentials through the myometrium or lack of contractile response of myometrial cells to the contractile signal. Hypotonic uterine contractions are characterized by infrequent, low amplitude and accompanied by low or normal baseline intrauterine pressures. The maternal discomfort or pain is minimal. Oxytocin augmentation is usually applied in this clinical case if active labour has already begun. It occurs in 3 to 8% of parturient and has been defined as uterine contraction pressures less than 200 Montevideo units with infrequent. 95 % of women in active labor will have three to five contractions per 10 minutes.

### ❖ **Hypertonic dysfunction**

Hypertonic dysfunction is primarily a condition of primiparas and usually occurs in early labour. It is also known as uncoordinated uterine contraction meaning there is a strong contraction but it is not coordinated in the upper and lower uterine segment. It is characterized by the presence of a regular frequent uterine contractions, high amplitude accompanied by high baseline intrauterine pressures but that fail to effect cervical effacement and dilatation. Frequent contractions of low amplitude are often associated with an elevated basal intrauterine pressure. Maternal pain is usually significant. Therapeutic rest can be initiated in this clinical situation if the patient is in latent labour or expectant management can be applied. If the patient is in active labour and found to have hypertonic dysfunction, amniotomy can be performed with or without concomitant oxytocin administration.

### **B. Passage: -**

The passage indicates the adequacy of the pelvic canal for successful delivery of the fetus. A pelvis that is contracted is inadequate for delivery.

### **Bony obstruction**

Contracted pelvis can be defined anatomically as a pelvis in which one or more of its diameters are reduced below the normal by one or more centimeters. Or obstetrically it is a pelvis in which one or more of its diameters is reduced so that it interferes with the normal mechanism of labour. There are many factors influencing the size and shape of the pelvis including hereditary or congenital, Racial factor, malnutrition, Sexual factor: as excessive androgen may produce android pelvis, Metabolic factor: as rickets and osteomalacia and trauma, diseases or tumors of the bony pelvis, legs or spines.

The diagonal conjugate normally is 12.5 cm and cannot be reached. The ischial spines may be blunt (difficult to identify at all), prominent (easily felt but not large) or very prominent (large and encroaching on the mid-plane). The ischial spines can be located by following the sacrospinous ligament to its lateral end. By using the 2 examining fingers, if both spines can be touched simultaneously, the interspinous diameter is  $\leq 9.5$  cm i.e. inadequate for an average-sized baby. If the sacrospinous ligament is two and half fingers, the sacrosciatic notch is considered adequate.

Obstructed labour may be caused by bony obstruction including contracted pelvis and tumors of pelvic bones. Any contraction of the pelvis and any mass or tumor in the birth canal can also contribute to obstruction of labour. Contracted pelvis can be defined anatomically as a pelvis in which one or more of its diameters are reduced below the normal by one or more centimeters. Or obstetrically it is a pelvis in which one or more of its diameters is reduced so that it interferes with the normal mechanism of labour. There are many factors influencing the size and shape of the pelvis including hereditary or congenital, Racial factor, malnutrition, Sexual factor: as excessive androgen may produce android pelvis, Metabolic factor: as rickets and osteomalacia and trauma, diseases or tumors of the bony pelvis, legs or spines.

The diagonal conjugate normally is 12.5 cm and cannot be reached. If it is felt the pelvis is considered contracted and the true conjugate can be calculated by subtracting 1.5 cm from the diagonal conjugate but this assessment is not done if the head is engaged. The ischial spines may be blunt (difficult to identify at all), prominent (easily felt but not large) or very prominent (large and encroaching on the mid-plane). The ischial spines can be located by following the sacrospinous ligament to its lateral end. By using the 2 examining fingers, if both spines can be touched simultaneously, the interspinous diameter is  $\leq 9.5$  cm i.e. inadequate for an average-sized baby. If the sacrospinous ligament is two and half fingers, the sacrosciatic notch is considered adequate.

#### **Soft tissue obstruction:**

- **Uterus:** - in the uterus any impacted sub-serous pedunculated fibroid and constriction ring opposite the neck of the fetus.
- **Cervix:** obstructed labor may also occur during cervical dystocia.
- **Vagina:** when there are transverse and longitudinal vaginal septum.

#### **Stenosis and Tumors**

**Septa:** - Vaginal septum may be two types. Transverse vaginal septa result from faulty fusion or canalization of the urogenital sinus and müllerian ducts. Approximately 46% occur in the upper vagina, 40% in the mid-portion, and 14% in the lower vagina. When the septum is located in the upper vagina, it is likely to be patent, whereas those located in the lower part of the vagina are more often complete. A complete septum results in signs and symptoms similar to those of an imperforate hymen. Vaginal septa may also be longitudinal vaginal Septum. Duplication of the vagina is an extremely rare condition, often associated with duplication of the vulva, bladder, and

uterus. More commonly, a longitudinal vaginal septum forms when the distal ends of the müllerian ducts fail to fuse properly. Both parts of the vagina are encircled by one muscular layer, and a fibrous septum lined with epithelium divides the vagina. The uterus may be bicornuate, with 1 or 2 cervices.

- **Ovaries:** Impacted ovarian tumors.

### **C. Passenger**

The passenger indicates factors that are related to the fetus which may affect the labor and delivery outcome by the following conditions.

- ✓ **Mal-presentations and mal-positions:** - Any mal-presentation and mal-position cause obstructed labour like persistent occiput- posterior, deep transverse arrest, persistent mento-posterior, and transverse arrest of the face presentation, brow, shoulder and impacted frank breech.
- ✓ **Large sized fetus** (macrosomia) where fetal weight is greater than 4.5kg.
- ✓ **Congenital anomalies:** hydrocephalus, fetal ascites, omphalocele/gastrochisis and fetal tumors.
- ✓ **Locked and conjoined twins.**

### **D. Professional/physician**

The role of the professionals/midwives in the outcome of the labor and delivery is as equal as the influence of the power and passenger. Midwives/obstetricians must be able to correctly assess, diagnose, manage labor and effective clinical decision making skills otherwise the progress and outcome of the labor will not be good. In addition to their skill and knowledge midwives attitude highly affect the progress of labor. If the midwife does not approach the woman in a friendly manner, the labor progress will be slowed.

### **E. Psyche/psychology**

The secretion of endogenous oxytocin is directly related to the psychological condition of the women. If the woman gets stressed, the production of oxytocin will be reduced. Thus the woman should be in a relaxed mood so as the labor progress in a good manner.

### 3. Abnormal Patterns of Labor

The progress of labour is evaluated primarily through estimation of cervical dilatation and descent of the fetal presenting part. The major labour abnormalities which mostly indicate for cesarean delivery are **protraction and arrest disorders**. Abnormal labour pattern can occur at any stage of labour but about **20%** of all labours ending in a live birth involve a protraction and/or arrest disorder.

#### Prolongation Disorder

Prolongation disorder may occur in the latent first stage, in the second stage of labour or third stage of labour.

1. **Prolonged Latent first stage of labor:** - The only disorder that occurs in latent first stage of labour is prolonged latent first stage of labour. The latent phase of labour begins with the onset of regular uterine contractions and extends to the beginning of the active phase of cervical dilatation. The duration of the latent phase averages **6.4 hours** in nulliparas and **4.8 hours** in multiparas. The latent phase is said to be abnormally prolonged if it lasts more than **20** hours in nulliparas or **14** hours in multiparas. However, in all women it is diagnosed after 8 hours of duration according to the national protocol/2018 BEmoNC Guideline/

#### Causes

Causes of prolonged latent phase include excessive sedation or sedation given before the end of the latent phase, use of conduction or general anesthesia before labour enters the active phase, labor beginning with an unfavorable cervix, uterine dysfunction characterized by weak, irregular, uncoordinated and ineffective uterine contractions and feto-pelvic disproportion.

#### Management

Treatment option in prolonged latent first phase primarily consists of therapeutic rest regimens or active management of labour. After 6–12 hours of rest with sedation and hydration, **85%** of patients spontaneously enter the active phase of labour and further progression in dilatation and effacement may be expected. **10%** of patients will be in false labour and can be allowed to return home to await the onset of true labor if there are no other indications for delivery. In the remaining **5%** of mothers, uterine contractions remain ineffective in producing dilation in this case if there is no contraindication, augmentation with oxytocin infusion may be effective in progression to the

active phase of labour. There is no need of urgent intervention in prolonged latent stage unless there are no other conditions.

2. **Prolonged second stage of labor:** - The second time when prolongation occurs is the second stage of labour. Second stage of labour normally stays on averages **20** minutes in parous women and **50** minutes in nulliparous women. Prolonged second stage of labor was diagnosed when the stage exceeds 2 hours in nulliparas or **1** hour in multiparas or **3** and 2 hours, respectively in the presence of anesthesia. However, in current obstetrics, as long as the fetomaternal condition is assuring, there is no emergency for intervention for second stage of labor.

### **Causes**

The causes prolonged of second stage of labor may be malpresentation, malposition, poor uterine contraction, poor maternal effort and sedatives.

### **Management**

The management of prolonged second stage of labour may be depend on the presence of fetopelvic disproportion, abnormal position and presentation and the condition of the mother and her fetus. If everything is ok the labour may be augmented, shortened by instrumental delivery. But if not corrected by augmentation and unsuccessful instrumental delivery cesarean section may be done. Still even in the prolonged second stage of labour till the maternal and fetal conditions are well no need of urgency with unnecessary interventions.

3. **Prolonged third stage of labor (Retained placenta):**- third stage of labor is the most critical period when rapid physiological change occurs as shifting of from labor stage of recovery stage. The 3<sup>rd</sup> stage is said to be prolonged when the placenta is not delivered within 30 minute while applying CCT and 1 hour expectantly. This section will be discussed in the postpartum complication in detail.

### **Protraction Disorder**

One of the disorders of active first stage of labour is protraction disorder which can be protracted cervical dilatation and protracted descent. The underlying pathogenesis of protracted labour is not exactly known and it is multifactorial. Fetopelvic disproportion is encountered in approximately

**one-third** of labouring mothers. Other factors include minor malposition, improperly administered anesthesia, excessive sedation and pelvic tumors obstructing the birth canal.

### **Protraction of cervical dilation**

Protraction disorder is diagnosed when the progress of labour is sluggish or slower than the expected rate of progress. Protracted cervical dilatation in the active phase of labour is diagnosed when the cervix fails to dilate 1cm per hour. And protracted descent (can occur in 1<sup>st</sup> or 2<sup>nd</sup> stage of labour) of the fetus is characterized by a rate of fetal descent less than **1 cm/h** in nulliparas or less than **2 cm/h** in multiparas.

### **Management**

Treatment of protraction disorders depends on the presence or absence of fetopelvic disproportion, the adequacy of uterine contractions and the fetal condition. Cesarean section is indicated in the presence of confirmed CPD unless labour may be augmented by oxytocin depending on the protocol. The main purpose of augmentation is to rule out poor uterine contraction and once the contraction is ruled out the protraction may be due to CPD secondary to malposition, malpresentation or big baby.

### **Arrest Disorders**

As the name indicates arrest disorder occurs when labour has no progress or stopped to progress at some time and station. There are two patterns of arrest disorder in labour: Arrest of cervical dilation also known as secondary arrest of dilatation. Arrest of cervical dilation expresses no progressive cervical dilatation in the active phase of labor. The threshold for the active phase of labor is now cervical dilation of 6 cm. The diagnosis of arrest in the first stage of labor should be reserved for women at or beyond 6 cm cervical dilation with membrane rupture and one of the following: 4 hours or more of adequate contractions (e.g., more than 200 Montevideo units) or 6 hours or more oxytocin administration in inadequate contractions.

**Secondary arrest** is defined when the active phase of labor (cervical dilatation) commences normally but stops or slows significantly for 2 hours or more prior to full dilatation of the cervix.

**Arrest of descent in second stage:** The second arrest disorder is arrest of descent in 2<sup>nd</sup> stage of labour which occurs when no progress in descent (no change in station) is observed. A nullipara to push for

at least 3 hours and a multipara to push for at least 2 hours before second-stage labor arrest is diagnosed.

### **Cause and management**

Regarding the cause of arrest disorder, approximately **50%** of mothers with arrest disorders demonstrate fetopelvic disproportion when inadequate uterine contractions have been treated. Other causative factors include various fetal mal-positions, inappropriately administered anesthesia and excessive sedation. When an arrest disorder is diagnosed evaluation of fetopelvic relationships before initiation of treatment is crucial. Evaluation should include a careful clinical pelvic examination for pelvic adequacy and estimation of fetal weight. If fetopelvic disproportion is established in the context of an arrest disorder, cesarean section is clearly warranted. If fetopelvic disproportion is not present and uterine activity is less than optimal, oxytocin stimulation is generally effective in producing further progress.

### **Precipitate Labor Disorders**

Precipitate is defined as fast or very fast speed of labour. Precipitate labour is defined as delivery of giving birth in less than **3** hours starting from onset of contractions. Precipitate dilatation is can be seen in relation with precipitate labour defined as cervical dilatation occurring at a rate of **5 cm** or more per hour in a primipara or **10 cm** or more per hour in a multipara. Precipitate labor may result from either extremely strong uterine contractions or low birth canal resistance. Although the initiating mechanism for extraordinarily forceful uterine contractions usually is not known, abnormal contractions may be associated with administration of oxytocin. Strong uterine contractions (both in force and increased basal tone) may accompany placental abruption.

There is no specific management except preventing complications like tear, PPH, fetal distress and fetal dropping. But some sources have mentioned using tocolytics is advantageous. If oxytocin administration is the cause of abnormal contractions, it may be simply stopped. The patient should be placed in the lateral position to prevent compression of the inferior vena cava and the problem typically resolves in less than 5 minutes.

#### **4. Induction of Labor**

Induction of labor is artificial initiation (stimulation) of uterine contraction for the purpose of delivering of the fetus vaginally after the fetus has reached viability (after the 28wks of gestation). It can be Elective (planned) - if there is unfavorable cervix, use cervical ripening drugs the day before. Or induction can be also Emergency- started at any time of the day due to emergency conditions.

##### **Indication for Induction**

Labour is induced when it is considered that the health or wellbeing of mother & fetus would be adversely affected if the pregnancy continued. The decision to induce labor is largely governed by the assessment of obstetric balance. The three factors that should be considered are: - The risk if the pregnancy continues, the risk if the pregnancy is interrupted and the hazards of induced labor.

##### **❖ Some of These indications are:**

- Post term pregnancy
- Medical condition
- Elderly primigravida
- Bad obstetric history
- Chorioamnionitis
- PROM
- Previous large baby
- ABO/Rhesus iso-immunization
- Previous precipitate labour
- Placenta abruption, & some PP
- Placenta insufficiency
- Polyhydramnios /oligohydramnios
- Gross congenital malformations

##### **Factors which affect induction of labour**

Factors that affect the outcome and effectiveness of induction may be fetal maturity and favorability of cervix. Fetal maturity and viability is necessary to know the maturity of the fetal lung in order to induce the pregnancy. This is done by amniocentesis. The other factor is favorability of cervix which assessed by “Bishop” score which has to be done before induction.

Score of 6 and above from total of 13 is considered as favorable. If the cervix is favorable, it means we can induce a woman otherwise cervical ripening will be needed.

### **Bishops Score System**

No	Factors	Rating			
		0	1	2	3
1	Dilatation of cervix in cm	Closed	1 – 2cm	3 – 4cm	More than 5cm
2	Consistency of cervix	Firm	Medium	Soft	-
3	Position of cervix	Posterior	Medline	Anterior	-
4	Effacement of cervix %	0 – 30	40 – 50	60 – 70	80
5	Descent by station of the head( cm from ischial spine)	-3	-2	-1	+1

### **Preparation for induction**

Psychological- the decision to induce labour should only be made with the informed concept of the woman. Great care should be taken to ensure that she fully understand the reason & the procedures to be followed.

### **Contraindication**

#### **Absolute contraindication:**

- ✓ CPD more than border line
- ✓ Malpresentation
- ✓ Major placenta previa
- ✓ Cord presentation and prolapse
- ✓ Abnormal fetal heart rate pattern
- ✓ Absence of cesarean section facility
- ✓ Classical c/s,
- ✓ > Lower segment c/s, myomectomy.
- ✓ Repaired fistulas or pelvic tumors.

#### **Relative contraindications:**

- ❖ Elderly primigravida
- ❖ Grand multiparity
- ❖ Uterine over distension
- ❖ One lower segment cesarean section

- ❖ Frank breech
- ❖ Unfavorable cervix
- ❖ Psychological distress

### **Types of induction and Augmentation**

#### **Based on timing of induction**

1. **Elective induction of labor:** refers to the initiation of labor for convenience in an individual with a term pregnancy who is free of medical or obstetric indications.
2. **Emergency Induction:**

#### **Based on the method of Induction**

3. **Medical** – using drugs alone (oxytocin & Prostaglandin E<sub>2</sub>).
4. **Surgical and Mechanical**-Amniotomy, membranes sweep, extraamniotic saline infusion, transcervical balloons, and hygroscopic cervical dilators.
5. **Combined** – medical & surgical.

#### **Medical method**

1. **Prostaglandin E<sub>2</sub>**:- prostaglandin is used to ripen unfavorable cervix prior to amniotomy. Vaginal prostaglandin can be used in the form of pessaries (2.5-5mg), vaginal tablets (3-6mg) or in gel (2.5-5mg). The dose varies according to parity, bishop's score of cervix & differences in maternity unit policies. It is administered when the membranes are intact b/c of risk of infection & increase sensitivity of Cx.
  - ✓ **Endocervical prostaglandin**- 0.5mg in a viscous gel into cervical canal.
  - ✓ **Oral prostaglandin**- tablets each containing 0.5 mg may be given following rupture of membrane. One tablet is swallowed at hourly intervals up to a maximum of ten, but it occasionally causes diarrhea, so stop to use.
  - ✓ **Misoprostol**- to ripen the cervix only in highly selected situations such as:
    - ↳ Place 25mcg in the posterior fornix of the vagina, repeat after six hrs, if required.
    - ↳ If there is no response after two doses of 25mcg, increase to 50mcg every six hrs
    - ↳ Do not use for more than 50mcg at a time & do not exceed four doses(200mcg)
    - ↳ Discontinue use of prostaglandins & begin oxytocin infusion if conditions are met.

**Foley catheter:** - it is effective alternative to prostaglandins for cervical ripen& labour induction

2. **Intravenous oxytocin (pitocin):**- An IV infusion of oxytocin in fluid used to stimulated uterine contraction, following ARM. The aim is to achieve 3 contractions per 10 minutes lasting 40 – 60secon.

**Protocol of induction**

Dose	For multi	For primi	Time	Drop rate
1 <sup>st</sup> dose	2.5IU	5Iu	0.00	20D/min
	-	-	0.30	40 D/min
	-	-	1.00	60 D/min
	-	-	1.30	80 D/min
2 <sup>nd</sup> dose	2.5IU	5Iu	2.00	40 D/min
			2.30	60 D/min
			3.00	80 D/min
3 <sup>rd</sup> dose	2.5IU	5Iu	3.30	80 D/min

- Maintain the drop rate that brought adequate contractions till delivery & continue for one hour after delivery. But if not labor starts within 6 hours consult or deliver with C/s.

## 5. Cervical Ripening

The condition of the cervix described as cervical “ripeness” or “favorability” is important for successful labor induction. Pharmacological and mechanical methods can enhance cervical favorability also termed preinduction cervical ripening.

### 1. Pharmacological

- **Prostaglandin E2(Dinoprostone):**

It is a synthetic analogue of prostaglandin E2 (PGE2). It is commercially available in three forms: a gel, a time-release vaginal insert, and a 20-mg suppository. The gel and time-release vaginal insert formulations are indicated only for cervical ripening before labor induction. However, the 20-mg suppository is not indicated for cervical ripening. It instead is used for pregnancy termination between 12 and 20 weeks’ gestation and for evacuation of the uterus after fetal demise up to 28 weeks. A 10-mg dinoprostone vaginal insert is approved for cervical ripening.

- **Prostaglandin E1(Misoprostone):**

When compared with dinoprostone, misoprostol lowered the need for oxytocin induction, but it increased the frequency of meconium-stained amniotic fluid. Higher doses of misoprostol are

associated with a decreased need for oxytocin but with more uterine tachysystole, with and without fetal heart rate changes. The American College of Obstetricians and Gynecologists (2016) recommends a 25-µg vaginal dose vaginal polymer insert containing 200 µg of PGE1. They compared its efficacy with 10-mg dinoprostone inserts, and preliminary observations are favorable.

## **2. Mechanical methods**

### **➤ Transcervical Catheter**

Generally, these techniques are only used when the cervix is unfavorable because the catheter tends to come out as the cervix opens. It is suitable for women with intact or ruptured membranes. In most cases, a Foley catheter is placed through the internal cervical os, and downward tension is created by taping the catheter to the thigh. A modification of this—extraamniotic saline infusion (EASI)—adds a constant saline infusion through the catheter into the space between the internal os and placental membranes.

### **➤ Hygroscopic Cervical Dilators**

Cervical dilation can be accomplished using hygroscopic osmotic cervical dilators, as described for early pregnancy termination

#### **Observation of mother and fetus**

- The fetal heart rate every 20-30 minutes
- Uterine contractions, length, strength, frequency every 15-30minute
- Fluid balance chart
- Urine test for ketoses
- Progress in labour
- vital sign every one hour
- Abdominal & cervical examination every 2 – 4 hours
- Use partograph
- Never be left alone the woman with oxytocin

## **Complications of medical induction**

### **For the mother:**

- Over stimulation of the uterus-stop infusion & use tocolytics like Sulbutamol 10mg in 1L IV fluid N/S at 10drops/minute or Terbutaline 250mcg IV slowly over 5mintue
- Precipitate labour
- Uterine rupture ,especially for multi
- Amniotic fluid embolism
- Premature separation of the placenta
- Laceration of the cervix
- Intrauterine infection
- Postpartum hemorrhage.
- Fetal distress
- Prolapse of the cord may follow amniotomy.

## **6. Augmentation of Labor**

Augmentation of labour refers to the process of promoting more effective uterine contractions when labour has already begun spontaneously but then becomes weak, irregular or ineffective (hypotonic) that assistance is needed to strengthen them. The most commonly used methods of labour augmentation are also methods for induction of labor including amniotomy, Intravenous oxytocin infusion. Amniotomy is not as predictable or effective stimulator of labor as oxytocin induction. Breast stimulation to increase endogenous oxytocin secretion may be also used. The protocol is to use half of induction dose otherwise the drop rate and other part of protocol is similar with induction protocol.

The indication of augmentation is weak uterine contraction and prolonged labor whereas the contraindications are similar with induction. In addition, the fetomaternal follow up and complications are similar with induction of labor.

The protocol for augmentation of labour is the same with protocol of the induction however it is use with a half dose.

### **Amniotomy (Surgical induction)**

Amniotomy is artificial rupturing of amniotic bag or membranes. Rupturing these if they do not rupture spontaneously allows the fetal head to contact the cervix more directly and may increase the efficiency of contractions. The membranes are torn and amniotic fluid is allowed to escape.

### **Contraindications:**

- ✓ High head
- ✓ Unripe cervix
- ✓ Malpresentations
- ✓ cord presentation
- ✓ Unidentified APH
- ✓ Intrauterine fetal death
- ✓ HIV/hepatitis, active genital herpes

### **Complications:**

- Cord prolapse & compression
- Chorioamnionitis
- Abruptio placenta
- Intrauterine infection
- Rare amniotic fluid embolism & rupture of vasa previa.

## **7. Obstructed labour**

Obstructed labour is failure of descent of the fetus in the birth canal for mechanical reasons despite adequate uterine contraction. Or it can be defined as arrest of vaginal delivery of the fetus due to mechanical obstruction but if the failure of descent is due to poor uterine contraction it is said to be protraction of labour.

The phrase obstructed labour is different from cephalopelvic disproportion (CPD) which is one cause of obstructed labour. Cephalopelvic disproportion is when there is misfit between the fetal head and the pelvis which mean it is impossible for the fetus to pass through the birth canal. It may be due to small pelvis with normal sized head, normal pelvis with large fetus or combination of large baby and small pelvis. Cephalopelvic disproportion may be marginal or definitive. In case of marginal CPD the problem may be overcome during labour process. Strong contraction, relaxation of the pelvic joints and moulding of fetal head may enable the fetus to pass through the pelvis. But in case of definite CPD the fetus has no option to pass and cesarean delivery is needed.

### **Prevalence**

Obstructed labour is one of the common preventable causes of maternal and perinatal mortality and morbidity especially in developing countries. The prevalence of obstructed labor varies from one country to another, but it is more common in developing countries. In developing countries, the incidence of obstructed labor is difficult to estimate, primarily because of poor data collection procedures and secondarily because most of the reported studies are based on data from large, tertiary hospitals. In Africa and Asia obstructed labor effects between 2 and 5 % of deliveries. In 2013 it resulted in 19,000 deaths (about 8% of all deaths related to pregnancy). Most deaths due to this condition occur in the developing world.

The prevalence in Ethiopia is about **22%** but differs from region to region and in different hospitals. In a study conducted in Miza Tepi Ehtiopia in 2015, the Prevalence of obstructed labor was 7.95% and the main causes were cephalopelvic disproportion (66.67%), malpresentation or malposition (25%). In a study conducted in jimma hospital Ethiopia in 2010, the incidence of obstructed labor was 12.2%. The causes of obstructed labor were cephalo-pelvic disproportion (67.6%) and malpresentation (27.9%).

### **Etiology:**

The most common causes of obstructed labour are CPD, malpresentation and position, abnormalities in the genital tract and tight perineum particularly in primigravida. The cause of obstructed labour can be explained by two categories as maternal and fetal or generally can be classified as power, passenger and the passage causes.

#### **I. Maternal causes:**

- 1. Bony obstruction:** obstructed labour may be caused by bony obstruction including contracted pelvis and **tumors of pelvic bones**. Any contraction of the pelvis and any mass or tumor in the birth canal can also contribute to obstruction of labour.
- 2. Soft tissue obstruction:**
  - **Uterus:** - in the uterus any impacted sub-serous pedunculated fibroid and constriction ring opposite the neck of the fetus.
  - **Cervix:** obstructed labour may also occur during cervical dystocia.
  - **Vagina: Stenosis and Tumors**
    - **Ovaries:** Impacted ovarian tumors.

## **II. Fetal causes:**

- ✓ **Mal-presentations and mal-positions:** - Any mal-presentation and mal-position cause obstructed labour like persistent occiput- posterior, deep transverse arrest, persistent mento-posterior, and transverse arrest of the face presentation, brow, shoulder and impacted frank breech.
- ✓ **Large sized fetus** (macrosomia) where fetal weight is greater than 4.5kg.
- ✓ **Congenital anomalies:** hydrocephalus, fetal ascites, omphalocele/gastrochisis and fetal tumors.
- ✓ **Locked and conjoined twins.**

### **Diagnosis:**

Obstructed labour is characterized by three tumor abdomen, caput, molding and sign of CPD. It is the clinical picture of obstructed labour with impending rupture uterus (excessive uterine contraction and retraction).

#### **(A) History:**

In the history the mother may complain as the labour is prolonged, frequent and strong uterine contractions and rupture membranes.

**(B) General examination:** shows signs of maternal distress as:

- ✓ Maternal and fetal distress,
- ✓ Dehydration and ketoacidosis,
- ✓ Exhaustion and rapid respiratory rate,
- ✓ High temperature ( $\geq 38^{\circ}\text{C}$ ),
- ✓ Shock, rapid and weak pulse,

#### **(C) Abdominal examination:**

##### **Uterus:**

The uterus becomes hard and tender, there will be frequent strong uterine contractions with no relaxation in between (tetanic contractions) and rising retraction ring is seen and felt as an oblique groove across the abdomen. **Bandl's ring:** it is the name given to the area between the above and lower uterine segment when it is visible during labour. The upper uterine segment becomes retracted and the lower becomes distended. In normal pregnancy and labour this area is called

retraction ring and normally not visible. Bandl's ring is late sign of obstructed labour. The lower uterine segment further divided into two by full bladder and forms three tumor abdomens.

### **Fetus:**

The fetal parts cannot be felt easily and FHB may be absent or show none reassuring due to interference with the utero-placental blood flow. Widest diameter of fetal part felt above pelvic brim.

### **(D) Vaginal examination:**

- Vulva: is edematous.
- Foul smelling,
- Catheter contains meconium or blood,
- Vagina: is dry and hot.
- Cervix: is fully or partially dilated, edematous and hanging.
- The membranes: are ruptured.
- The presenting part: is high and not engaged or impacted in the pelvis. If it is the head it shows excessive molding and large caput.
- The cause of obstruction can be detected.

### **(E) Differential diagnosis:**

The differential diagnosis for obstructed labour may be constriction ring, full bladder and fundal myoma. Because by one or other way they affect progress of labour and finally cause obstruction.

### **Complications:**

#### **(I) Maternal:**

- Maternal distress and ketoacidosis.
- Uterine rupture.
- Obstetric Fistula: vesico -vaginal or recto-vaginal fistula.
- Infections as chorioamnionitis and puerperal sepsis.
- Postpartum hemorrhage due to injuries or uterine atony.
- Slow return of uterus to its place
- Paralytic illues(small intestine stops movement)

**(II) Fetal:** The fetal complication may also occur as asphyxia, intracranial hemorrhage from excessive molding, birth injuries and infections.

### **Management:**

- (A) Good nutrition starting from childhood** so that their height and pelvis will be adequate for childbirth. The most common cause of obstructed labour in Ethiopia is malnutrition.
- (B) Delay early marriage**
- (C) Universal antenatal care and risk screening:** so that it can be early diagnosed.
- (D) Birth preparedness and complication readiness.**
- (E) Skilled health personnel and proper utilization of partograph.**
- (F) Preventive measures:** Careful observation, proper assessment, early detection and management of the causes of obstruction.
- (G) Curative measures:** Caesarean section is the safest method even if the baby is dead as labour must be immediately terminated and any manipulations may lead to rupture uterus.

## **8. Uterine Rupture**

Uterine rupture occurs when a full-thickness disruption of the uterine wall that involves the overlying visceral peritoneum (uterine serosa). Rupture of the pregnant uterus is the most life threatening event for the mother and fetus due to previous uterine surgery (common in developed countries), neglected obstructed labor in Ethiopia and other developing world. Rupture of the unscarred uterus is rare but appears to account for an increasing proportion of all uterine ruptures. It can either occur in women with unscarred uterus or a uterus with a surgical scar from previous surgery. Uterine scar dehiscence is a more common event than uterine rupture and seldom results in major maternal or fetal complications.

The pathogenesis of rupture of the unscarred uterus is not exactly known but mostly it is related to inherent or acquired weakness of the myometrium, disorders of the collagen matrix, and abnormal architecture of the uterine cavity. Over-distension of the uterine cavity whether absolute or relative to the size of the cavity may be the major physical factor and it has been reported as a cause of rupture of the non-gravid uterus. Abnormal labor which leads to obstructed labor and prolonged stress on the uterine wall with eventual loss of uterine integrity is also causes of uterine rupture.

### **Incidence and risk factors**

The prevalence was found significantly higher in under developed countries of Asia and Africa in comparison to high income countries. The incidence of uterine rupture has dropped significantly in developed countries and is most often encountered while attempting vaginal birth after

caesarean section. The risk of experiencing ruptured uterus during child birth is 50 times higher if the mother already had a caesarean section. Neglected labour is common in developing countries, especially in semi urban and rural areas.

The etiologies for rupture of the unscarred uterus are difficult to determine but the risk factors include grand multi-parity, advancing maternal age, dystocia resulting in protracted labor, uterine wall thinner than 2 millimeters, macrosomia, multiple gestation and abnormal placentation, trauma and obstetric maneuvers (eg, internal version and breech extraction, instrumental delivery, manual removal of the placenta). Medical induction or augmentation of labor is an iatrogenic risk factor for uterine rupture. The overall safety of uterotonic drugs has improved with development of reliable drug delivery processes, timely recognition, appropriate treatment of excessive uterine activity and better understanding of the indications for beginning and discontinuing these drugs.

The incidence of uterine rupture is;

- 0.013% of Spontaneous Uterine Rupture.
- 0.2-1.5% after lower transverse cesarean section
- Around 4% in two previous C/s.
- 2-7% after low vertical cesarean delivery
- 32% after uterine repair
- 4-9% after classical cesarean section

### **Clinical manifestations and diagnosis**

**Fetal:** - Fetal bradycardia is the most common and characteristic clinical manifestation of uterine rupture which may be preceded by variable or late decelerations fetal heart rate pattern. But fetal heart rate changes alone have low sensitivity and specificity for diagnosing uterine rupture. History of malpresentation and malposition may be there.

**Maternal:** - Maternal manifestations are variable including constant abdominal pain; signs of intra-abdominal hemorrhage are present. Vaginal bleeding is not a cardinal symptom, as it may be modest, despite major intra-abdominal hemorrhage. Other potential clinical manifestations include maternal tachycardia, hypotension ranging from subtle to severe, cessation of uterine contractions, loss of station of the fetal presenting part, uterine tenderness and change in uterine shape. Differentially abdominal pain, bleeding and fetal heart rate changes can be associated with

placental abruption or intra-amniotic infection. Maternal markers of hemodynamic instability occur with intra-abdominal bleeding from any source. History of prolonged labor and previous uterine scar may be also present.

### **Types of uterine rupture**

**9. Based on degree of separation:** - based on degree of rupture it may be complete or incomplete type.

- **Complete:** During a complete uterine rupture, the peritoneum tears and the contents of the mother's uterus can spill into her peritoneal cavity. The fetal morbidity rate increases dramatically after this period.
- **Incomplete:** In an incomplete uterine rupture, the mother's peritoneum remains intact. An incomplete uterine rupture is significantly less dangerous with fewer complications to the delivery process.

**10. Based on the site of rupture:** - Uterine rupture may occur on the Anterior, Posterior, Lateral and mixed.

**11. Based on the anatomical integrity uterine rupture** can be classified as transverse and vertical uterine rupture.

**12. Uterine Dehiscence:** - Uterine dehiscence is a similar condition to uterine rupture. It occurs when a previous uterine scar separates. It involves less bleeding, fewer layers, and less risk. The fetus, umbilical cord, and placenta remain in the uterus. Due to the less intense nature of uterine dehiscence, it typically does not require medical treatment to heal.

### **Management**

Hemodynamically unstable patients should be stabilized with fluids and blood transfusion, as appropriate and prepared for cesarean delivery. The choice of abdominal incision is based on the leading diagnoses in differential diagnosis. A uterine rupture in the lower anterior uterine segment is usually immediately recognized upon opening the abdomen. With rupture of the fundal area or posterior or lateral wall the anterior uterus may appear intact and hemoperitoneum may be present. Upon entry into the uterine cavity the fetal presenting part may be floating and may be difficult to deliver if fetal parts have extruded through the site of rupture. Extension of the abdominal wall incision and uterine incision may be necessary to facilitate delivery. After delivery, the two options

are repair of the rupture site and hysterectomy. The decision to perform definitive surgery should be based on a combination of factors.

### 1. General Resuscitation measures

- Intravenous Fluid Resuscitation
- Type and cross match for Blood Products
- Stop Oxytocin if there is
- Maternal position change
- Subcutaneous intervention to stop any contractions

### 2. Repairing of the uterus: Criteria to repair ruptured uterus:-

- ✓ Lower uterine segment
- ✓ Anterior rupture
- ✓ No necrotized edges
- ✓ Anatomically not disfigured.
- ✓ Not involving round ligament
- ✓ Further fertility needed
- ✓ Less contamination / no gross infection
- ✓ Unstable hemodynamic state

### 3. Hysterectomy: hysterectomy is the removal of uterus. Hysterectomy is classified into three types;

- **Subtotal hysterectomy:** it is done when there the surgeon want to remove the uterus by leaving te cervix. This type of hysterectomy may be preferred if the cervix is intact.
- **Total hysterectomy:** this is the removal of all parts of the uterus including te cervix and mostly done when there is extension of rupture to cervix.
- **Radical hysterectomy:** this is done by removing the uterus including all uterus, ligaments, vessels and muscles. It can be done mostly when there are malignant cells like in uterine cancer and GTD.

### 13. Non-reassuring Fetal Heart Rate Pattern

Non-reassuring fetal status is a term used to describe suspected fetal hypoxia and is meant to replace the more ubiquitous term “fetal distress.” Fetal distress, defined as progressive fetal hypoxia and/or acidemia secondary to inadequate fetal oxygenation, is a term that is used to indicate changes in fetal heart patterns, reduced fetal movement, fetal growth restriction, and presence of meconium stained fluid. Non-reassuring fetal status is a term used to describe suspected fetal hypoxia and is meant to replace the more ubiquitous term “fetal distress.” Fetal distress, defined as progressive fetal hypoxia and/or acidemia secondary to inadequate fetal oxygenation, is a term that is used to indicate changes in fetal heart patterns, reduced fetal movement, fetal growth restriction, and presence of meconium stained fluid blood supply, placental transfer or fetal gas transport may lead to fetal hypoxia and non-reassuring fetal status.

The fetus experiences three stages of deterioration when oxygen levels are depleted: transient hypoxia without metabolic acidosis, tissue hypoxia with a risk of metabolic acidosis, and hypoxia with metabolic acidosis. Fetal response to oxygen deprivation is regulated by the autonomous nervous system, mediated by parasympathetic and sympathetic mechanisms. The fetus is equipped with compensatory mechanisms for transient hypoxia during labor, but prolonged, uninterrupted fetal hypoxia may lead progressively to acidosis with cell death, tissue damage, organ failure and potentially death. In response to hypoxia, fetal compensatory mechanisms include

- 1) A decrease in heart rate;
- 2) A reduction in oxygen consumption secondary to cessation of nonessential functions such as gross body movements;
- 3) A redistribution of cardiac output to preferentially perfuse organs, such as the heart, brain, and adrenal glands; and
- 4) A switch to anaerobic cellular metabolism.

Prolonged fetal hypoxia is associated with significant perinatal morbidity and mortality with particular concern for short- and long-term complications including encephalopathy, seizures, cerebral palsy, and neurodevelopmental delay. The fetal heart rate changes markedly in response to prolonged oxygen deprivation, making fetal heart rate monitoring a potentially valuable and

commonly used tool for assessing fetal oxygenation status in real time. Non-reassuring fetal heart rate patterns are observed in approximately 15% of labors.

➤ **Fetal heart beat can be monitored**

- ✓ Fetoscope/pinard stethoscope
- ✓ Doppler fetoscope/Doppler ultrasound
- ✓ Electronic fetal monitoring:- belt in the abdomen
- ✓ Internal monitoring

➤ **Causes of abnormal FHB pattern**

- ✓ Maternal Pyrexia
- ✓ Maternal exhaustion
- ✓ Administration of drugs
- ✓ Hemorrhage and anemia

➤ **Feature of fetal heart beat pattern**

✚ **Normal range:**

Some sources say 110-120 during term and labor and others say 120-160 is normal. FHR increases progressively over the subsequent 2-3 weeks becoming: ~110 bpm (mean) by 5-6 weeks and ~170 bpm by 9-10 weeks. This is followed by a decrease in FHR becoming on average: ~150 bpm by 14 weeks, ~140 bpm by 20 weeks and ~130 bpm by term.

✚ **Baseline Tachycardia**

- ✓ Mild/moderate=A FHB of 160-180Bpm
- ✓ Severe = FHB of >180Bpm

✚ **Baseline Bradycardia**

- ✓ Mild/moderate=A FHB of 110-120Bpm
- ✓ Severe =a FHB of <100Bpm

✚ **Variability**

- ✓ The FHB should be vary in over time between the lowest and highest level otherwise it is considered as nomal.

✚ **Accelerations:** - Accelerations are normal rises in baby's heart rate – of at least 15 bpm, and lasting 15 seconds. These rises in heart rate usually happen at different stages during labor and birth. They indicate the baby has plenty of oxygen and is coping well.

✚ **Decelerations:** - When baby's heart rate drops temporarily, these are referred to decelerations. There are three types of deceleration:

- ✓ **Early decelerations:** these commonly happen **when the baby's head is compressed**, usually just before birth, when the baby is descending through the vagina. They can also occur if the baby is in a breech position, as the head is being squeezed during contractions. It occurs starting the uterine contraction and return to normal at the end of the contraction. Early decelerations do not indicate the presence of fetal distress. However they may indicate very strong contractions. Therefore, these fetuses must be carefully monitored as they are at an increased risk of fetal distress.
- ✓ **Late decelerations:** these begin **at the peak of a contraction or just after a contraction** has finished. They are smooth, shallow dips which mirror the contraction. If the baby's heart rate doesn't recover in 30 seconds after the contraction then it is possible the baby isn't handling labor well. Repeated late decelerations are a sign of fetal distress and are caused by fetal hypoxia. The level of late deceleration is due to Uterine hypertonus or tachysystole, Conduction anesthesia, Maternal hypotension, Placental abruption and Medication effects
- ✓ **Variable decelerations:** these are **irregular dips in the fetal heart rate** that usually occur when the baby's **umbilical cord is being compressed**. This happens during most labors and can be of concern if the pattern occurs repeatedly. The baby's oxygen and other important nutrients might be compromised.

## **Management**

**Mild/Moderate:** in the mild/moderate bradycardia and tachycardia corrective/resuscitative measures are taken including;

- Frequent follow up
- Lateral position
- Hydration with Normal saline/ringer lactate
- Oxygen therapy
- Psychological support

**Severe:** immediate delivery is needed in the presence of severe tachycardia and bradycardia either cesarean delivery in 1<sup>st</sup> stage or instrumental delivery in 2<sup>nd</sup> stage of labor if the conditions are favorable.

## 14.Reference

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