**Forceps Delivery, Vacuum Extraction & C-section - Dr. Rozhan**

**Introduction**

- The best outcome of pregnancy is a healthy mother and baby.
- Ideally, this outcome should follow a normal vaginal delivery with intact perineum.
- 40-50% of deliveries are associated with an episiotomy, or are effected by forceps, ventouse or caesarean section.
- The goal of operative delivery is to expedite delivery with minimum of maternal or neonatal morbidity.
- The risk of traumatic delivery in relation to forceps, particularly rotational procedures, has been long established.
- Caesarean section particularly in the second stage of labor, also carries significant morbidity and mortality.

**Operative vaginal delivery**

- Although the use of instruments to facilitate a birth was initially reserved for extraction of a dead infants via destructive techniques. From as early as 1500BC there exist reports of successful deliveries of live infants in obstructed labors.
- Definition: instrumental vaginal delivery: Delivery of a baby vaginally using an instrument for assistance.
- Prevalence:
  - Approximately 12% of deliveries are assisted with forceps/ventouse.
  - The incidence of instrumental intervention varies widely both within and between countries and may be performed as infrequently as 1.5%, or as often as 26%.

**Indication of instrumental vaginal delivery**

1. Commonest indications are delay in the second stage of labor.
2. Poor maternal effort.
3. Fetal distress including cord prolapse in the second stage of labor.
4. Maternal indications include severe cardiac, respiratory or hypertensive disease or intracranial pathology where bearing down effort may be detrimental for her health.

**Causes of prolonged 2nd stage**

- Prolonged second stage may be due to inadequate uterine contractions, poor expulsive efforts by the mother, minor disproportion or malposition.
- The incidence of IVD is slightly more with use of epidural analgesia and may be due to inadequate uterine activity secondary to abolition of Ferguson’s reflex due to absence of reflex release of oxytocin due to stretching of upper vagina.

**Prerequisites prior to performing an instrumental vaginal delivery**

1. The condition of the mother and the fetus and the clinical situation should be considered carefully.
2. The medical personal should introduce themselves to the woman and her partner and explain the reason for IVD.
3. The findings and the plan of action and the procedure that is to follow should be explained.
4. Verbal or written consent should be taken based on the protocol after explaining the indication, advantages and disadvantages.
5. **General examination** should include: condition of the mother, pain relief and hydration. **Analgesia** in the form of pudendal block and local perineal infiltration (20 ml of 1% plain lignocaine) may be adequate for low forceps or ventouse deliveries.
6. **Fetal condition** should be evaluated based on clinical information and auscultation or cardiotocographic findings.
7. Abdominal examination is important to assess size of fetus, the fifth of head palpable and the adequacy of uterine contractions. Oxytocin infusion should be considered.
8. Bladder should be empty.
9. **Vaginal examination** should confirm cervix to be fully dilated with absent membranes. Color and quantity of amniotic fluid should be noted, presentation should be vertex. Excess caput (soft tissue swelling) or moulding may suggest the possibility of some disproportion.
10. **Position and station** which is the leading bony part of the skull in relation to ischial spines should be identified.
Position of the mother

- IVD can be performed with mother in the dorsal position and the legs flexed and abducted or in the left lateral position, but it is much easier when the mother is placed in lithotomy with the buttocks just beyond the edge of the bed.
- It is preferable to deliver by CS if the head is above ischial spines.
- When vertex is below the spines IVD is possible and different types of forceps and vacuum could be used depending on the position and station of the vertex.

Classification of Forceps Application

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<th>Classification of Forceps Application</th>
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| Outlet forceps | Fetal scalp is visible without separating the vulva
Fetal skull has reached the pelvic floor
Sagittal suture is in the A.P. diameter (Wrigley's forceps). |
| Low forceps | The leading point of the skull is 2cm or more below the ischial spine but not on the pelvic floor
Sagittal suture is in the A.P. diameter (Neville Barnes or Simpson's forceps). |
| Mid forceps | The leading point of the skull is 2cm or less above spine but head is engaged (Keilland's forceps). |
| High forceps | EXCLUDED |

Choice of instruments – Forceps/ventouse

- Different forceps and vacuum devices are used for IVD. The choice of forceps or vacuum instrument should depend on:
  1. The operators experience,
  2. Station and position of the vertex.

Forceps delivery: What is forceps?

- Most forceps have a pair of fenestrated blades with a cephalic and pelvic curve between the heel and toes (at the distal end) of the blades.
- The heel continues as a shank which ends in the handle.
- The handles of two blades sit together so that they could be held by one hand and are kept in place by a lock on shank.
- The cephalic curve is constructed to grasp the fetal head – with the toes of the blades over the maxilla or malar eminences, while the length of the blade grasps the sides of the head from the malar area along the side of the head in front of the ear and the parietal bones in front of the occiput.
- The pelvic curve fits the pelvis and is minimal in those forceps used for rotation as in cases with malposition, for example, Kielland’s forceps.
- Prior to application of forceps the blades should be assembled to check whether they fit together as a pair.

Application of forceps

1. The handle which lies on the left hand is the left blade and it is inserted first negotiating the pelvic and cephalic curve with a curved movement of the blade between the fetal head and the operator’s hand kept along the left vaginal wall.
2. The right blade is held by the right hand and is applied between the left hand that protects the vagina and the head by negotiating the cephalic and pelvic curve. If the blades were applied correctly, the handles should lie horizontally and lock easily.

Biparietal-bimalar application offers uniform grip on the two sides. The sagittal suture bisects the shank which is over the flexion point – about 3 cm anterior to the occiput.
The three ESSENTIAL points of applying forceps

1. Sagittal suture in the midline (i.e. no asynclitism).
2. Occiput 3 to 4 cm above the shank (i.e. traction will be along the flexion point).
3. Not more than one finger space between the head and the heel of the blade.
   • Traction is in the direction of the pelvic curve and is synchronized with contractions and maternal bearing-down efforts.
   • An episiotomy is usually needed when the head is crowning at the vulva.
   • The direction of traction is upwards as the head is born by extension.

COMPLICATIONS OF FORCEPS DELIVERY

Maternal Complication:

1. Greater incidence of maternal vaginal and perineal lacerations including 3rd and 4th degree tears compared with vacuum deliveries.
2. Perineal pain during delivery.
3. Hematomas.
4. Postpartum hemorrhage.
5. Urinary retention.
6. Urinary and fecal incontinence.

Fetal complications:

1. Paralysis of VII nerve is rare and resolves within days or weeks.
2. Transient facial and scalp abrasions are not uncommon but clears in a few days.
3. Cephalhaematomas and fracture of skull are rare and depressed fracture may need elevation by surgery.

Ventouse delivery

• Ventouse or vacuum delivery is an alternative for forceps delivery for similar indications in the second stage of labor. Ventouse (vacuum) : have three type:
  o Silica silk cup.
  o Metallic cup.
  o Omni cup.

How to Apply Ventouse

1. The conditions that need to be satisfied for any instrumental delivery need to be checked prior to application.
2. The cups come in different sizes and are usually 4, 5 or 6 cm in diameter.
3. The cup is applied over the flexion Point which is 3–4 cm in front of the occiput on the midline indicated by sagittal suture. It is halfway between the two parietal eminences and hence promotes flexion to permit the minimal diameters for the vertex to descend through the pelvis.
4. It is important for the accoucheur to identify the position of the head.
5. Once the cup is placed firmly on the fetal scalp vacuum is created by a hand-held pump up to 0.2 kg/cm2 negative pressure.
6. The positioning in relation to the sagittal suture and the posterior fontanelle should be checked and inclusion of the vaginal or cervical tissue excluded.
7. The vacuum is increased to 08. Kg/cm2 prior to commencement of traction with uterine contractions and bearing down effort.
8. The traction needs to be applied in a direction to cause flexion of the head and for it to descend along the axis of the pelvis.
Ventouse deliveries in proportion to forceps deliveries

1. Have increased over the last decade due to evidence suggesting less perineal trauma including third degree tears.
2. The soft tissue sucked into the cup remains as an elevated circular ‘bump’ called ‘chignon’. This soft tissue swelling settles in the next 2–3 days.
3. Neonatal injuries are: scalp abrasions, retinal hemorrhages, hematoma confined to one of the skull bones.
4. Rarely subgaleal hemorrhage which could cause severe morbidity and mortality

Contraindication of Ventouse

1. It is not used in very preterm (<34 weeks) babies.
2. Those fetuses with possible hemorrhagic tendencies for fear of causing subgaleal hemorrhage and morbidity or mortality.
3. Face presentation.

Note:

- Application of the ventouse prior to full dilatation but after 7–8 cm dilated in multiparous women has been practiced by experienced personal but should be treated with caution.
- In those with cardiac, respiratory or neurological disease where maternal expulsive efforts may cause compromise, forceps may be better than vacuum delivery.

Caesarean Section

- Definition: Delivery of the baby by an abdominal and uterine incision known as Caesarean section (CS).
- Cesarean Section is removal of a fetus from the uterus by abdominal and uterine incisions, after 28 weeks of pregnancy.
- It is called hysterotomy, if removal is done before 28 weeks of pregnancy.

Prevalence: It account for 15-25% of all deliveries

- Is increasingly used for safe delivery for fetal or maternal reasons either electively or as an emergency.
- A small proportion is contributed by maternal request for non-medical reasons.
- Advent of blood transfusion with minimal incidence of cross reactions,
- Improved anesthesia, aseptic and antiseptic techniques and the invention of antibiotics have made it a safe procedure.

- A large number of techniques and materials for cesarean section have been proposed to reduce the operating time, the hospital costs and to make the procedure easier for the surgeon.
Factors contribute to an increase in the rate of caesarean section

1. Inaccurate dating of the pregnancy.
2. Fetal monitoring.
3. Macrosomia (large size baby).
4. Maternal request.
5. Advancing maternal age.
6. Socioeconomic factors.
7. Reduced parity.
8. Improvements in surgical techniques - Decreased morbidity and mortality.
9. Type of health insurance, whether the hospital is private or public.
10. Choose the time and day of delivery.
11. Procedures as high forceps and difficult mid forceps are abandoned in favor of Caesarean Section (C.S.)
12. Destructive operations are abandoned in favor of C.S
13. The introduction of epidural anesthesia

The five Most Common Indication of Cesarean Section (CS)

1. CS on Request
2. Routine repeat cesareans.
3. Dystocia(non-progressive labor)
4. Abnormal fetal presentation, e.g. breech, transverse, cord presentation.
5. Fetal distress.
6. Other indications: such as multifetal pregnancy, abruptio placenta, placenta previa, active genital herpes virus.

Based on the timing of CS at the time of decision making, the indications are grouped under one of four categories:

1. **Category 1 or emergency CS** – There is an immediate threat to the mother or the fetus. Ideally the CS should be done within the next 30 min. Some examples are; abruption, cord prolapse, scar rupture, scalp blood pH < 7.20 and prolonged FHR deceleration < 80 beats/min.
2. **Category 2 or urgent CS** – There is maternal or fetal compromise but was not immediately life threatening. Here the delivery should be completed within 60–75 min and cases with FHR abnormalities are those of concern.
3. **Category 3 or scheduled CS** – The mother needed early delivery but there was no maternal or fetal compromise. There may be concern that continuation of pregnancy is likely to affect the mother or fetus in hours or days to come. E.g.: case of iatrogenic preterm delivery where need to give a course of steroid for lung maturity.
4. **Category 4 or elective CS** – The delivery is timed to suit the mother and staff. These are cases where there is an indication for CS but there is no urgency and examples include:
   a) Placenta praevia with no active bleeding;
   b) Malpresentations, (e.g. brow, breech).
   c) History of previous hysterotomy or vertical incision CS.
   d) Past history of repair of vesico-vaginal or recto-vaginal fistulae or stress incontinence.
   e) HIV infection.
   f) Previous more than two CS.

Elective CS

- Is generally done around 39 wks as the incidence of tachypnea of the newborn is much less after this gestation.
- However, the medical or obstetric condition determines the gestation at which the elective CS is planned – the main principle being to carry out the CS as late as possible in gestation without compromising the maternal or fetal health.

Consent for CS

- Consent for CS should be requested after providing pregnant women with evidence based information and in a manner that respects: The woman’s privacy, Views and culture whilst taking into consideration the clinical situation.
Preoperative testing and preparation for CS

1. Pregnant women should be offered a hemoglobin assessment before CS to identify those who have anemia. Although blood loss of more than 1000ml is infrequent after CS. Investigation: CBC, viral screen, RBS, GUE, Renal function.
2. Prescribe antibiotics (one dose of first-generation cephalosporin or ampicillin)
3. Assess risk for thromboembolic disease: (offer graduated stockings, hydration, early mobilization and low molecular weight heparin).
4. To reduce the risk of aspiration pneumonitis: Empty stomach, Give an antacid + Cimetidine IV 1 hr before CS.
5. Women having CS with regional anesthesia require an indwelling urinary catheter to prevent over-distension of the bladder.

Maternal Position during CS

- All obstetric patients undergoing CS should be positioned with left lateral tilt to avoid aorto-caval compression
- By tilting the operating table to the left or place a pillow or folded linen under her right lower back

Anesthesia

1. General anesthetic.
2. Regional anesthesia (Epidural block-Spinal block).
   - Regional anesthesia is regarded as considerably safer than general anesthesia with respect to maternal mortality
   - Regional anesthesia is generally preferred because it allows the mother to remain awake, experience the birth, and have immediate contact with her infant.

TYPES OF CAESAREAN SECTION

The CS is described based on the type of incision on the uterus: **Lower uterine** segment incision, **Midline** vertical incision.

1. **Lower uterine segment incision**
   - Lower segment CS involves a horizontal incision on the lower segment after reflecting the visceral peritoneum.
   - This is the *commonest* CS procedure.

CS Procedures:

a) The abdomen is opened by a low midline, paramedian and more commonly by a Pfannenstiel (suprapubic horizontal) incision and the peritoneal cavity opened.
b) The bladder is reflected from the lower segment and a transverse incision is made on the lower uterine segment care being taken not to injure the fetus.
c) The presenting part is delivered through the lower segment
d) Traditionally the lower uterine segment muscle is closed in two layers. The placenta was manually removed or spontaneously delivered: Spontaneous delivery of the placenta may reduce blood loss and decrease the chance of postoperative endometritis. By keeping gentle traction on cord and massage (rub) the uterus through abdomen. Deliver the placenta and membranes
e) The uterine cavity should be cleaned not to leave any retained tissue.
f) Closure of the uterine wound is followed by peritoneal toilet when any blood or liquor in the abdomen and pelvis is removed using suction or gauze swabs on a sponge holder.
g) The opportunity is taken at this stage to inspect the ovaries and tubes.

Presence of pediatrician at CS

- An appropriately trained practitioner skilled in the resuscitation of the newborn should be present at CS performed under general anesthesia or where there is evidence of fetal compromise.
2. Midline vertical incision

- The midline vertical incision could be in the lower or upper segment of the uterus.
- Commonly it starts in the lower segment as a small buttonhole incision till the uterine cavity is reached and is extended upwards.
- Because of:
  a) The difficulty in making the incision,
  b) Increased blood loss,
  c) Inadequate approximation at closure,
  d) Increased post-operative morbidity and inability to offer a trial of vaginal delivery in the next pregnancy due to possible higher incidence of scar rupture, the midline incision is reserved for specific indications.

Classical midline vertical incision

A midline approach is used when:

1. The lower segment approach is difficult because of fibroids or anterior placenta previa with large vessels in the lower segment.
2. Preterm breech with poorly formed lower segment, impacted transverse lie with ruptured membranes or transverse lie with a congenital anomaly of the uterus.
3. An extreme example is a perimortem CS. In special circumstances a lower or upper segment both segments) vertical or an inverted T incision is made.

Immediate Post-operative Care

1. After surgery is completed, the woman will be monitored in a recovery area to ensure that the uterus remains contracted.
2. There is no excessive vaginal bleeding or bleeding at the incision site.
3. That there is adequate urine output.
4. Monitor routine vital signs (blood pressure, temperature, and breathing).
5. Pain medication is also given.

COMPLICATIONS ASSOCIATED WITH CS

Early complication:

1. Hemorrhage.
2. Anesthesia-related complication.
3. Infection (prophylactic antibiotic given).
4. Occasionally there is injury to bowel, bladder, ureters or the fetus.
5. Thromboembolism is rare but could be fatal.
6. Aspiration of gastric contents leads to Mendelson’s syndrome.
7. Post-operative lung atelectasis.

Late complications:

1. Wound infection.
2. Secondary hemorrhage are not that uncommon.
3. Vesico- or ureterovaginal fistulae due to visceral injury are extremely rare.
4. Placenta accreta.

Maternal mortality

- Is extremely low and is usually related to the reason for which a CS is done or due to anesthetic or hemorrhagic complications and is estimated to be less than 0.33 per 1000.