INTRODUCTION AND EPIDEMIOLOGY

- Caesarean section has become one of the most performed surgical procedures worldwide and remains one oldest 'obstetrics and gynaecological' procedures
- By definition,
- Caesarean section is a surgical procedure in which one or more incisions are made through the mother's abdominal wall (laparotomy) and the uterine wall (hysterotomy) to deliver one or more babies.

INTRODUCTION AND EPIDEMIOLOGY

- Rates of caesarean delivery continue to increase –
- The rising trend in caesarean delivery from
  - 11.2% in the 80s to 27.9% in 1996 globally,
  - 24.6% in the UK in 2008/2009;
  - 38% in Italy in 2009;
  - 32.2% in the U.S. in 2014 (making it the most common surgical procedure performed on US women)

CAESAREAN SECTION: INDICATIONS AND CLASSIFICATIONS

INDICATIONS FOR A CAESAREAN SECTION

- A Caesarean section is often performed when a vaginal delivery would put the baby's or mother's life or health at risk.
- The WHO recommends that they should only be done based on medical need.
- Some are however performed upon request without a medical reason to do so.
- The leading indications for caesarean sections are :

  Previous caesarean delivery, Breech presentation, Dystocia, and Foetal distress.

INDICATIONS: COMPLICATIONS OF LABOUR (ETC)

- Complications of labour and factors impeding vaginal delivery.
  - Abnormal presentation (breech or transverse positions)
  - Prolonged labour or failure to progress (dystocia)
  - Foetal distress
  - Cord prolapse
  - Uterine rupture or an elevated risk thereof
  - Increased blood pressure in mother or baby after amniotic rupture

INDICATIONS: COMPLICATIONS OF LABOUR (ETC)

- Complications of labour and factors impeding vaginal delivery (cont.)
  - Tachycardia in mother or baby after amniotic rupture
  - Placental problems (placenta praevia, placental abruption)
  - Failed labour induction
  - Failed instrumental delivery
  - Large baby weighing >4000g (macrosomia)
  - Umbilical cord abnormalities

INDICATIONS: PRE-EXISTING CONDITIONS

- Other complications of pregnancy, pre-existing conditions and concomitant disease
  - Pre-eclampsia
  - Previous high risk foetus
  - HIV infection in mother
  - Previous longitudinal caesarean section
  - Previous uterine rupture
  - Uterine malformation – e.g. bicornuate uterus, pelvic abnormalities

INDICATIONS: PRE-EXISTING CONDITIONS

- Other complications of pregnancy, pre-existing conditions and concomitant disease
  - Prior problems with the healing of the perineum (e.g. from previous childbirth or Crohn's disease)
  - Obstructive lesions in the lower genital tract, including malignancies large vulvovaginal condylomas, obstructive vaginal septa, and leiomyomas of the lower uterine segment
  - Rare cases of posthumous birth after death of mother

INDICATIONS (CONT.)

- Please note that indications may be:
  - maternal
  - foetal
  - placental or
  - other conditions such as personnel problems:

  e.g. lack of obstetric skill – obstetrician not skilled in performing breech births, multiple births, etc)

CLASSIFICATION BY URGENCY

- **Emergency caesarean section**
- is performed in an obstetric emergency, where complications of pregnancy onset suddenly during the process of labour, and swift action is needed to prevent death of mother, child(ren), or both

- **Planned / Elective / Scheduled caesarean section**
- is arranged ahead of time, is most commonly arranged for medical reasons and ideally as close to due date as possible.

BY SURGICAL TECHNIQUE

- **The classical caesarean section**
- It involves a midline longitudinal incision which allows a larger space to deliver baby.
- It is rarely performed today, as it is more prone to complications.
- **The lower uterine segment caesarean section**
- This is most commonly used today
- It involves a transverse cut above the edge of the ladder
- It results in less blood loss and is easier to repair.

VAGINAL BIRTH AFTER CAESAREAN SECTION (VBAC)

- Mothers with previous caesarean section are more likely to have caesarean section for future pregnancies compared to mothers who never had caesarean section.
- VBAC is associated with decreased maternal morbidity and decreased risk of complications in future pregnancies.
- 60-80% of women opting for VBAC will successfully give birth vaginally.

RESUSCITATIVE HYSTEROTOMY

- It is also known as peri-mortem caesarean section
- It is an emergency c/s where maternal cardiac arrest occurred, to assist in resuscitation of mother by removing the aortocaval compression caused by the gravid uterus.
- Unlike other forms of caesarean section, the welfare of the foetus is a secondary priority

OTHERS

- **A caesarean hysterectomy**
- It consists of a caesarean section followed by removal of the uterus.
- This may be done in cases of intractable bleeding or when the placenta cannot be separated from the uterus.

- A repeat caesarean section
- This is done when a patient had a previous c/s.
- Performed through the old scar.

CAESAREAN SECTION: STEPS

PREOPERATIVE MANAGEMENT

- A minimum preoperative fasting time of at least 2 hours from clear liquids, 6 hours from a light meal, and 8 hours from a regular meal.
- Placement of an intravenous (IV) line
- Infusion of IV fluids (e.g. Lactated Ringer solution or Saline with 5% Dextrose)
- Placement of a Foley catheter (to drain the bladder and to monitor urine output)

PREOPERATIVE MANAGEMENT (CONT.)

- Placement of an external foetal monitor
- Placement of monitors for the patient's blood pressure, pulse, and oxygen saturation
- Preoperative antibiotic prophylaxis (decreases risk of endometritis after elective caesarean delivery by 76%, regardless of the type of caesarean delivery – whether emergent or elective
- Evaluation by the surgeon and the anaesthesiologist

LABORATORY TESTING

- The following laboratory studies may be obtained prior to caesarean delivery:
  - Complete blood count
  - Blood type and screen, cross-match
  - Screening tests for human immunodeficiency virus, hepatitis B, syphilis
  - Coagulation studies (e.g., prothrombin and activated partial thromboplastin times, fibrinogen level)

IMAGING STUDIES

- Check and document foetal position and estimated foetal weight – in labour and delivery.
- Ultrasonography is commonly used to estimate foetal weight.
- A Study reported the sensitivity of clinical and ultrasonographic prediction of macrosomia, respectively, as 68% and 58%.
- However, they are still being used

CAESAREAN SECTION TECHNIQUE

- The technique for caesarean delivery includes the following:
- Laparotomy via midline infra-umbilical, vertical, or transverse incision.
- Transverse incision include Pfannenstiel, Mayland, Joel Cohen
- Hysterotomy via a transverse (Monroe-Kerr) or vertical (e.g., Kronig, DeLee) incision
- Foetal delivery
- Uterine repair
- Closure

INTRAOPERATIVE CONTRACEPTION

- If patient has been counselled and consented prior to the procedure, contraception may be instituted; e.g.
- an IUD can be placed prior to the repair of the hysterotomy
- or a Levonorgestrel subdermal implant can be placed in the patient's arm at this time
- or a sterilization can be performed eg bilateral tubal ligation

POSTOPERATIVE MANAGEMENT

- Routine postoperative assessment
- Monitoring of vital signs, urine output, and amount of vaginal bleeding
- Palpation of the fundus
- IV fluids
- Advance to oral diet as appropriate, early feeding has been shown to shorten hospital stay
- IV or IM analgesia if patient did not receive a long-acting analgesic or had general anaesthesia
- Analgesia is usually not needed if patient received regional anaesthesia

POSTOPERATIVE MANAGEMENT (CONT.)

- Ambulation on postoperative day 1; advance as tolerated
- If patient plans to breastfeed, initiate within a few hours after delivery; if patient plans to bottle feed, she may use a tight bra or breast binder in the postoperative period
- Discharge on postoperative day 2 to 4, if no complications
- Discuss contraception as well as refraining from intercourse for 4-6 weeks postpartum, unless the patient had long-acting reversible contraceptives (LARC) placed at the time of the procedure

COMPLICATIONS

- Approximately 2-fold increase in maternal mortality and morbidity with caesarean section relative to a vaginal delivery :
- Partly related to the procedure itself, and
- partly related to conditions that may have led to needing to perform a caesarean delivery

OTHER COMPLICATIONS

- Infection (e.g., postpartum endomyometritis, fascial dehiscence, wound urinary tract)
- Thromboembolic disease (e.g., deep venous thrombosis, septic pelvic thrombophlebitis)
- Anaesthetic complications
- Surgical injury (e.g., uterine lacerations; bladder, bowel, ureteral injuries
- Uterine atony
- Delayed return of bowel function

CONCERNS ABOUT CAESAREAN SECTION

CONCERNS ABOUT CAESAREAN SECTION

- The rapid increase in caesarean birth rates in the past two decades, with a less rapid concomitance decease in other indicators such as maternal and perinatal M&M raise concern that there's possibility caesarean delivery is overused.
- Women who undergo caesarean section often face substantially increased risks of maternal morbidity and mortality compared with women who deliver vaginally
- Safe reduction of the primary caesarean delivery rate thus needs to be explored using different approaches

CONCERNS ABOUT CAESAREAN SECTION (CONT.)

- Caesarean delivery remains one of the most common and oldest ob-gyn procedure, new evidence should change the way caesarean sections are performed.
- Evidence cannot replace expertise, but evidence-based medicine is recognition that data, and this should inform practice in important ways.

CONCERNS ABOUT CAESAREAN SECTION (CONT.)

- The consequences of different surgical techniques on longer term outcomes need to be assessed.
- Such outcomes include

i. those related to subsequent pregnancy: mode of delivery; abnormal placentation (e.g. accreta); postpartum hysterectomy,

ii. those related to longer term: pelvic problems; constipation, chronic pain; urinary problems, dyspareunia, adhesion formation; ,uterine rupture; infertility.

NEW EVIDENCE SHOULD CHANGE THE WAY C-SECTIONS ARE PERFORMED.

- It is imperative that all technical aspects in caesarean section continue to be challenged.
- Studies on operative technique in caesarean section have contributed significantly to our knowledge of
  - antibiotic prophylaxis,
  - bladder flap formation,
  - management of the uterine repair and
  - closure of the peritoneum and skin.

NEW EVIDENCE SHOULD CHANGE THE WAY C-SECTIONS ARE PERFORMED.

- Widely accepted aspects, including antibiotics administration at cord clamping and creation of a bladder flap, may not be best practice.
- There is compelling evidence that antibiotics should be given prior to skin incision rather than the traditional administration after cord clamping.
- Additionally, evidence suggesting benefit to multiagent, extended-coverage regimens is mounting.

NEW EVIDENCE SHOULD CHANGE THE WAY C-SECTIONS ARE PERFORMED.

- Recent studies challenge the accepted practice of creating a bladder flap in caesarean section.
- Uterine repair can be safely accomplished either intra or extra-abdominally but the debate over single versus double-layer closure continues.
- Non-closure of the visceral peritoneum confers significant benefit, but recent evidence suggests that closure of the parietal layer may be advantageous with respect to future adhesions.

NEW EVIDENCES FOR C-SECTION TECHNIQUES

- “This (Caesarean Section) is a procedure we all do everyday, For many aspects of the C-section, there are no right answers. But there are some good recommendations to follow.”

  - Dr. Eric Strand, MD, FACOG (2015)

ANAESTHESIA

- Both general and regional anaesthesia are acceptable for use during c/
- Regional anaesthesia (spinal, epidural, or combined spinal/epidural) is preferred as it allows the mother to be awake and interact immediately with her baby.
- Other advantages of regional anaesthesia include the absence of typica risks of general anaesthesia – such as pulmonary aspiration of gastric contents in late pregnancy.

ANAESTHESIA (CONTD.)

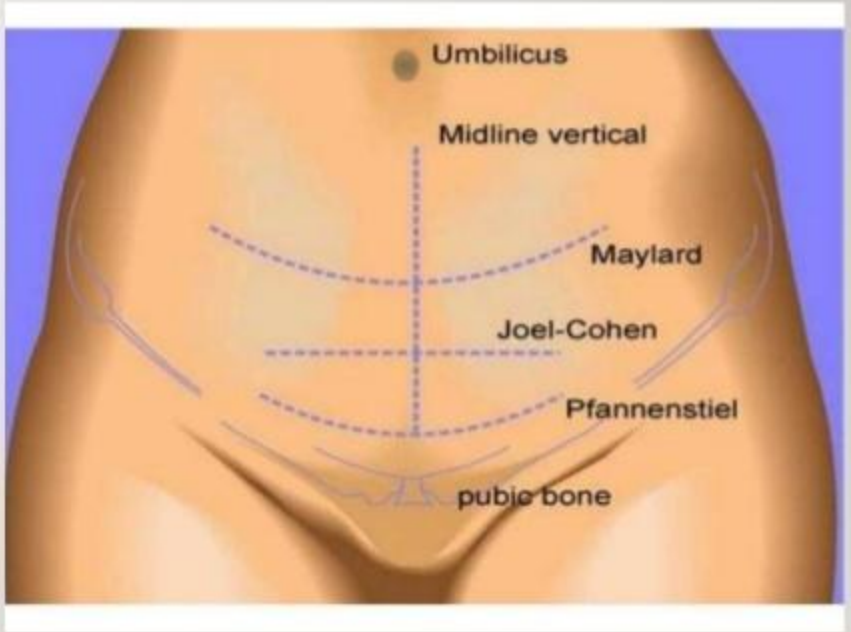
- General anaesthesia may be necessary because of specific risks to mother or child.
- Patients with heavy, uncontrolled bleeding may not tolerate the haemodynamic effects of regional anaesthesia.
- General anaesthesia is also preferred in very urgent cases, such as severe foetal distress, when there is no time to perform regional anaesthesia .

SKIN INCISION

- Incision choices are less current.
- Most practitioners use the traditional Pfannenstiel incision.
- Recent data suggests lower rates of complication with the Joel-Cohen incision, a straight lateral incision about two centimetres above the Pfannenstiel location.

SKIN INCISION (CONT.)

- **Pfannenstiel skin incision**
- is slightly curved, 2-3 cm or 2 fingers above the symphysis pubis, with the midportion of the incision within the shaved area of the pubic hair;
- **Joel-Cohen incision**
- is straight, 3 cm below the line that joins the anterior superior iliac spines, slightly more cephalad than Pfannenstiel.



SKIN INCISION (CONT.)

- There are good data suggesting that there are benefits from using the Joel-Cohen, including
  - shorter length of maternal stay,
  - less febrile morbidity, less pain medication use,
  - shorter time to delivery and
  - less operating room time overall.
  - It is designed for less tissue dissection and disruption.

SKIN PREPARATION

- All obstetrician-gynaecologists recognize the need for skin preparation.
- There are multiple options available, including aqueous or alcohol-based iodine and alcohol-based chlorhexidine solutions.
- Efficacy data are conflicting.
- We all know that the skin should be prepped, but how you prep is up to you.

PATIENT POSITIONING

- There are few recommendations on patient positioning
- Women are typically positioned to the left to avoid vena cava compression and improve blood flow to the uterus and the placenta,
- A Cochrane Review in 2013 found no apparent benefit to a 20 degree left lateral table tilt compared to a supine position – the data were too weak to produce any recommendations.

BLADDER FLAP

- The bladder flap helped minimize infection before antibiotics but no longer serves a useful purpose.
- Caesarean delivery without a bladder flap appears not to add addition risks, but significantly shortens operative time.
- The flap is made by superficially incising and dissecting the peritoneal lining to separate the urinary bladder from the lower uterine segment.
- It is reapproximated with sutures during closure to cover the uterine incision.
- No Bladder flap means quicker procedure and less bleeding

DISSECTION OF FASCIA OFF THE RECTUS MUSCLES

- Data strongly supports the use of blunt dissection using the fingers instead of scissors or other sharp instruments.

EXPANSION OF UTERINE INCISION

- Blunt expansion remains preferred to sharp expansion of the uterine incision
- It is associated with decreased maternal morbidity as measured by estimated blood loss and decrease in haemoglobin

PLACENTAL DRAINAGE

- The act of allowing foetal blood to egress both passively and actively by milking the umbilical cord after the cord is clamped and cut, has been evaluated
- Placental drainage was associated with a significant decrease in fetomaternal transfusion as measured by a postpartum positive

EXTRACTION OF THE PLACENTA

- Manual extraction of the placenta is indicated
- It is another traditional technique that's changing.
- Studies / trials show lower rates of endometritis with manual extraction compared to spontaneous extraction.

EXTERIORIZING THE UTERUS

- The data are less clear for exteriorizing the uterus.
- There are advantages both ways.
- Thus, the decision to exteriorize the uterus should be guided by the Surgeon preference.
- Technical issues such as adhesions are also part of the deciding factors.

UTERINE INCISION REPAIR

- Closure of the uterine incision with single- vs double-layer closure
- The data on uterine incision repair and subsequent uterine rupture are unclear.
- Some data suggest that single layer repair is associated with a greater risk of rupture.
- Other studies suggest that a locked stitch is more likely to result in future uterine rupture than an unlocked stitch.

PERITONEAL CLOSURE

- Peritoneal closure is similarly mixed.
- Closing the parietal peritoneum is associated with fewer adhesions of fascia to the uterus, omentum to uterus, and omentum to fascia.
- There are also benefits to not closing the visceral peritoneum, including decreased inflammation, urge incontinence, and urinary frequency.

INTRAABDOMINAL IRRIGATION

- Intraabdominal irrigation with normal saline before abdominal closure has been evaluated
- The rate of intraoperative nausea was significantly increased with intraabdominal irrigation
- However it confers no added benefits in terms of estimated blood loss, operating time, intrapartum complications, hospital stay, return of gastrointestinal function, or infectious complications

SUBCUTANEOUS TISSUE MANAGEMENT

- Subcutaneous tissue management:
  - It changes with depth.
  - There are no advantages to closing subcutaneous tissues less than two centimetres deep and
  - There are advantages to closing tissues deeper than two centimetres.
- Adhesion barriers generally provide no benefit

SKIN CLOSURE

- The data are clear when it comes to sk
  closure.
- Sutures have fewer complications than
  staples,
- Subcuticular sutures have the lowest ra
  of wound separation.

RECOMMENDATIONS

RECOMMENDATIONS: THE US PREVENTIVE SERVICES TASK FORCE

- As defined by the US Preventive Services Task Force, the following recommendations have been made:
  - pre-skin incision prophylactic antibiotics
  - cephalad-caudad blunt uterine extension
  - spontaneous placental removal
  - surgeon preference on uterine exteriorization
  - single-layer uterine closure when future fertility is undesired, and
  - suture closure of the subcutaneous tissue when thickness is 2 cm or greater

RECOMMENDATIONS: THE US PREVENTIVE SERVICES TASK FORCE

- It does not favour:
  - manual cervical dilation,
  - subcutaneous drains, or
  - Supplemental oxygen for the reduction of morbidity from infection.

- The technical aspect of caesarean delivery, with high-quality, evidence-based recommendations should be adopted

RECOMMENDATIONS CONT.

Recommendations By Dahlke In Evidence-based Caesarean Delivery.

Source: Am J Obstet Gynecol 2013

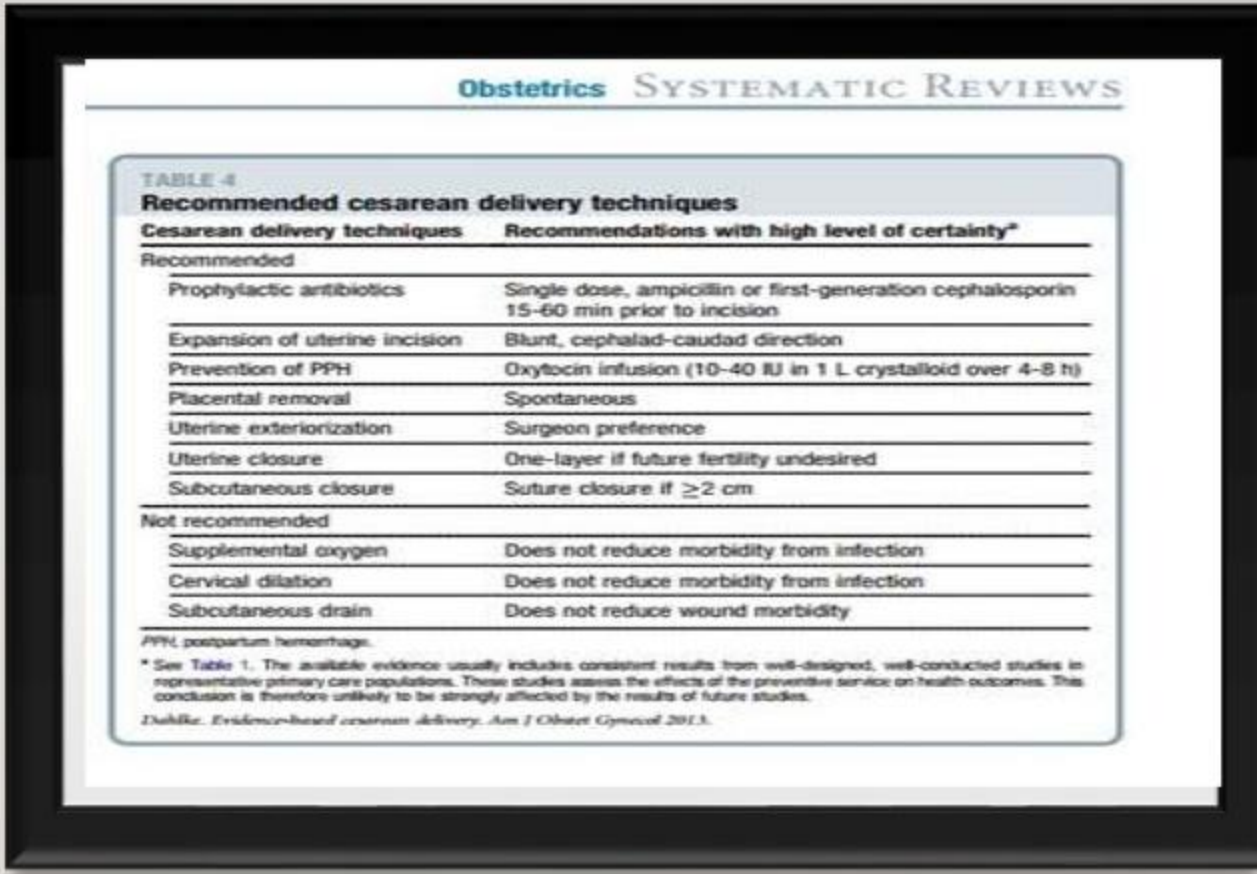


TABLE 4
Recommended cesarean delivery techniques

Cesarean delivery techniques	Recommendations with high level of certainty*
Recommended	
Prophylactic antibiotics	Single dose, ampicillin or first-generation cephalosporin 15-60 min prior to incision
Expansion of uterine incision	Blunt, cephalad-caudad direction
Prevention of PPH	Oxytocin infusion (10-40 IU in 1 L crystalloid over 4-8 h)
Placental removal	Spontaneous
Uterine exteriorization	Surgeon preference
Uterine closure	One-layer if future fertility undesired
Subcutaneous closure	Suture closure if ≥2 cm
Not recommended	
Supplemental oxygen	Does not reduce morbidity from infection
Cervical dilation	Does not reduce morbidity from infection
Subcutaneous drain	Does not reduce wound morbidity

PPH, postpartum hemorrhage.

* See Table 1. The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.

Dahlke. Evidence-based cesarean delivery. Am J Obstet Gynecol 2013.

REFERENCES

- Joshua D. Dahlke; Hector Mendez-Figueroa; Dwight J. Rouse; Vincenzo Berghella; Jason K. Baxter; Suneet P. Chauhan (2013). Evidence-based surgery for caesarean delivery: an updated systematic review. *American Journal of Obstetrics & Gynecology*
- Hedwige Saint Louis, (2016). Cesarean Delivery. Morehouse School of Medicine, Alabama

THANK YOU FOR LISTENING