Caesarean Section

Caesarean section rates have been steadily increasing due to a higher number of sections for fetal distress, as diagnosed by cardiotocographic (CTG) monitoring in labour, and their increasing use for breech and multiple pregnancy. However, the greatest contribution to the current high caesarean rates, comes from elective repeat caesarean section (ERCS). The following is based on National Institute for Health and Care Excellence (NICE) latest guidance (November 2011)\(^\text{[1]}\).

Indications

Possible indications include:

- Cephalopelvic disproportion (use of pelvimetry is not advised).
- Malpresentation - eg, breech, transverse lie.
- Multiple pregnancy.
- Severe hypertensive disease in pregnancy.
- Fetal conditions: distress, iso-immunisation, very low birth weight.
- Failed induction of labour.
- Repeat caesarean section: see below.
- Pelvic cyst or fibroid.
- Maternal infection (eg, herpes, HIV) but see 'Mother-to-child transmission of maternal infections', below.

Maternal request for caesarean section is not on its own an indication and the reasons for the request should be explored, discussed and recorded. If the request is due to anxiety about childbirth, a referral should be offered to a healthcare professional with expertise in providing perinatal mental health support to help her address her anxiety in a supportive manner.

An individual clinician has the right to decline a request for caesarean section in the absence of an identifiable reason. However, the woman's decision should be respected and she should be offered referral for a second opinion.

Classification

Caesarean sections are classified by their urgency, dictated by the indication, into the following categories\(^\text{[2]}\):

1. Immediate threat to the life of the woman or fetus:
   - 'Emergency section'.
   - Performed as quickly as possible.
   - Decision-to-delivery time will usually be within 30 minutes. This is not critical in influencing baby outcome but has been an accepted audit standard for response to emergencies within maternity services.
   - Possible indications:
     - Cord prolapse.
     - Fetal distress in the first stage.
     - Antepartum haemorrhage.

2. Maternal or fetal compromise which is not immediately life-threatening:
   - Decision-to-delivery time will usually be within 75 minutes.
   - Possible indications:
     - Failure to progress.
     - Transverse lie in labour.

3. No maternal or fetal compromise but needs early delivery:
   - Timing dependent on indication.

4. Delivery times to suit woman or staff:
   - Not routinely before 39 weeks.

Perimortem caesarean\(^\text{[3]}\)

- Should be performed following collapse if there is no cardiac output after four minutes.
- Is performed primarily in the interests of maternal survival; confirming fetal well-being wastes time.
- Is done on the spot - the mother is not moved to theatre.
- No anaesthetic is necessary.
- A scalpel is the only essential equipment.
Method

- Ideally performed under spinal or epidural block. This has fewer risks and allows immediate contact between the baby and mother.
- There is evidence that prophylactic antibiotics result in fewer wound infections in non-elective and elective caesarean sections [4]. They should be offered routinely before the skin incision.
- Classical caesarean section (vertical incision) is now rarely used except in:
  - A very premature fetus with the lower segment poorly formed.
  - A transverse lying fetus with ruptured membranes and draining liquor.
  - Lower segment use made impossible by structural abnormality.
  - Constriction ring present.
  - Some fibroids.
  - Some cases of anterior placenta praevia with lower segment abnormally vascular.
  - Perimortem caesarean.
- Lower uterine segment incision is nearly always used now, as uterine rupture is much less common in subsequent pregnancies and it allows better healing, reduces infection and lowers postoperative complication rates:
  - The transverse incision of choice should be the Joel Cohen incision (a straight skin incision, 3 cm above the symphysis pubis; subsequent tissue layers are opened bluntly and, if necessary, extended with scissors and not a knife), because it is associated with shorter operating times and reduced postoperative febrile morbidity.
  - The use of separate surgical knives to incise the skin and the deeper tissues is not recommended because it does not decrease wound infection.
  - When there is a well-formed lower uterine segment, blunt rather than sharp extension of the uterine incision should be used because it reduces blood loss, incidence of postpartum haemorrhage and the need for transfusion.
  - Oxytocin 5 IU by slow intravenous injection should be used to encourage uterine contraction and to decrease blood loss.
  - The placenta should be removed using controlled cord traction, as this reduces the risk of endometritis.
  - The uterine incision should be closed in two layers.
  - Neither visceral nor parietal peritoneum should be sutured.
- Umbilical artery pH should be recorded after delivery.
- Appropriate thromboprophylaxis should be employed, according to guidelines and maternal risk factors [5].

Epidemiology

Caesarean section accounts for 25% of all deliveries in England, with a similar rate throughout the UK [6]. There is significant regional variation and an association between caesarean sections and both local deprivation and individual social class [7].

Factors affecting caesarean section rate

Factors affecting the likelihood of caesarean section during intrapartum care include:

- Place of birth: planned delivery at home or in a midwifery-led unit reduces the likelihood of caesarean section.
- Continuous support during labour reduces the likelihood of caesarean section.
- Induction of labour beyond 41 weeks in women with an uncomplicated pregnancy, because this reduces the risk of perinatal mortality and the likelihood of caesarean section.
- A partogram with a four-hour action line used to monitor progress of labour of women in spontaneous labour with an uncomplicated singleton pregnancy at term reduces the likelihood of caesarean section.
- Consultant obstetricians should be involved in the decision making for caesarean section, because this reduces the likelihood of caesarean section.
- Electronic fetal monitoring is associated with an increased likelihood of caesarean section [8]. When caesarean section is contemplated because of an abnormal fetal heart rate pattern, in cases of suspected fetal acidosis, fetal blood sampling should be offered if it is technically possible and there are no contra-indications.
- Active management of labour and early amniotomy have not been shown to influence the likelihood of caesarean section for failure to progress and should not be offered routinely.

There is no influence on the likelihood of caesarean section with walking in labour, non-supine position during the second stage of labour, immersion in water during labour, epidural analgesia during labour or the use of raspberry leaves.

The effects on the likelihood of caesarean section of complementary therapies used during labour (such as acupuncture, aromatherapy, hypnosis, herbal products, nutritional supplements, homeopathic medicines and Chinese medicines) have not been properly evaluated.

Planned caesarean section

The risk of respiratory morbidity is increased in babies born by caesarean section before labour but this risk decreases significantly after 39 weeks. Therefore, planned caesarean section should not routinely be carried out before 39 weeks.

Breech presentation

Women who have an uncomplicated singleton breech pregnancy at 36 weeks of gestation should be offered external cephalic version. Exceptions include women in labour and women with a uterine scar or abnormality, fetal compromise, ruptured membranes, vaginal bleeding or medical conditions. If external cephalic version is contra-indicated or has been unsuccessful, caesarean section should be offered because it reduces perinatal mortality and neonatal morbidity.
**Multiple pregnancy**

If the first twin is cephalic, perinatal morbidity and mortality are increased for the second twin. However, the effect of planned caesarean section in improving outcome for the second twin remains uncertain and therefore caesarean section should not routinely be offered. If the first twin is not cephalic, the effect of caesarean section in improving outcome is uncertain; however, current practice is to offer a planned caesarean section. Planned caesarean section for uncomplicated twin pregnancy should not be carried out before 38 weeks because this increases the risk of respiratory problems in these babies.

**Preterm birth**

Is associated with higher neonatal morbidity and mortality. However, the effect of planned caesarean section in improving these outcomes remains uncertain and therefore caesarean section should not routinely be offered.

**Small for gestational age babies**

The risk of neonatal morbidity and mortality is higher with small for gestational age babies. However, the effect of planned caesarean section in improving these outcomes remains uncertain and therefore caesarean section should not routinely be offered.

**Placenta praevia**

- Risk of placenta praevia is increased after previous caesarean section.
- If partly or completely covering the internal cervical os (major placenta praevia), delivery should be by caesarean section.
- Risk of the placenta being morbidly adherent (placenta accreta) is high in women who have had a previous caesarean and should be suspected if the placenta is under the previous caesarean scar at 32 weeks of gestation in a woman who has had a previous caesarean section, a colour-flow or 3-D power Doppler ultrasound should be offered.
  - If the Doppler scan is equivocal, magnetic resonance imaging (MRI) may help to diagnose placenta accreta; however, definitive diagnosis can only be made at surgery.
- If placenta accreta is suspected, the recommended 'care bundle' should be followed. See the separate Placenta Praevia article.

**Cephalopelvic disproportion**

Pelvimetry is not useful in predicting failure to progress in labour and should not be used in decision making about mode of birth. Shoe size, maternal height and estimations of fetal size (ultrasound or clinical examination) do not accurately predict cephalopelvic disproportion and should also not be used.

**Risks versus benefits**

Planned caesarean section may reduce the risk of:

- Perineal and abdominal pain during birth and three days postpartum.
- Injury to vagina.
- Early postpartum haemorrhage.
- Obstetric shock.

Planned caesarean section may increase the risk of:

- Neonatal intensive care unit admission for the baby.
- For the mother, a longer hospital stay, hysterectomy (necessitated to stem postpartum haemorrhage) and cardiac arrest.

**Mother-to-child transmission of maternal infections**

**HIV-positive women**

The risk of HIV transmission from mother to child is the same for a caesarean section and a vaginal birth if the woman is on highly active antiretroviral therapy with a viral load of fewer than 400 copies per ml, or the woman is on any antiretroviral therapy with a viral load of fewer than 50 copies per ml. Viral load is measured at 36 weeks. Caesarean section should not be advised in order to reduce risk of transmission in these circumstances.

**Hepatitis B**

Mother-to-child transmission of hepatitis B is about 90% but can be reduced by 90% if the baby receives vaccination, usually in combination with immunoglobulin, at birth. There is no evidence that a planned caesarean section reduces vertical transmission of hepatitis B virus and it is not indicated.

**Hepatitis C**

There is currently no known way of reducing vertical transmission of hepatitis C which is about 5% (up to 40% if the woman is also HIV positive). Women with hepatitis C should not be offered a planned caesarean section. However, caesarean section at 38 weeks is recommended to women with hepatitis C and HIV co-infection.
Genital herpes simplex virus (HSV) infection[1]

- Primary genital HSV occurring at the time of delivery or within six weeks of the due date is an indication for caesarean delivery, in order to decrease the risk of neonatal HSV infection, which is otherwise estimated to be 41%.
- Recurrent genital HSV at the time of delivery is associated with a low risk of neonatal HSV (0-3% for vaginal delivery). A caesarean section can be considered for other reasons but should not routinely be offered in this situation.

Vaginal birth after caesarean

- In the UK the rates of vaginal birth after caesarean (VBAC) dropped from 45.9% in 1988 to 36% between 2001 and 2011, due to concerns about maternal safety[12].
- Subsequent evidence has emerged of the relative safety of VBAC but the rates have not recovered.
- In a national cohort of women, over half of those who had had one previous caesarean, attempted a VBAC and almost two thirds successfully achieved a vaginal birth[13].
- A systematic review of qualitative research suggests that women who had been very keen for a vaginal birth prior to their caesarean, were more likely to attempt VBAC, whereas women who had had a distressing birth experience were more likely to request a repeat caesarean[12]. Those women with an open mind, are more strongly influenced by written information and personalised expert advice. This confirms the importance of addressing a woman's ideas, concerns and expectations as well as imparting information and, as first trimester preferences for either VBAC or ERCS persist in over 70% of women, this should be done as early as possible, starting at the time of the first caesarean.

Repeat caesarean section[1]

Women who have had up to and including four caesarean sections should be advised that the risk of fever, bladder injuries and surgical injuries does not vary with planned mode of birth. The risk of uterine rupture, although higher for planned vaginal birth, is rare. Therefore, the decision about mode of birth after a previous caesarean section should take into consideration:

- Maternal preferences and priorities.
- Risk of uterine rupture: a rare complication. One systematic review found an additional risk of 2.7 symptomatic ruptures per 1,000 when comparing trial of labour with EPRC[14]. In the 2009-2012 Confidential Enquiry into Maternal Deaths in the UK and Ireland, four women died due to uterine rupture; none had previously had a caesarean.
- Risk of perinatal mortality and morbidity: the risk of an intrapartum infant death is small for women who have a planned vaginal birth (about 10 per 10,000) but higher than for a planned repeat caesarean section (about 1 per 10,000). The effect of planned vaginal birth or planned repeat caesarean section on cerebral palsy is uncertain.

Women who have had a previous caesarean section should be offered electronic fetal monitoring during labour and care during labour, in a unit where there is immediate access to caesarean section and on-site blood transfusion services.

Women who have had a previous caesarean section can be offered induction of labour but both women and healthcare professionals should be aware that the likelihood of uterine rupture in these circumstances is increased to:

- 80 per 10,000 when labour is induced with non-prostaglandin agents.
- 240 per 10,000 when labour is induced using prostaglandins.

Women who have had five or more caesarean sections have greater maternal morbidity, largely due to placenta praevia and accreta. They also have higher rates of preterm delivery, most likely due to antepartum haemorrhage[15].

Management

- A low-residue diet during labour (toast, crackers, low-fat cheese) results in larger gastric volumes but the effect on the risk of aspiration if anaesthesia is required is uncertain.
- Isotonic drinks during labour prevent ketosis without a concomitant increase in gastric volume.
- Timing will depend on the reason for the caesarean (see 'Classification', above).
- Intraoperative blood cell salvage:
  - Blood shed during an operation is collected, filtered and washed to produce autologous red blood cells for transfusion to the patient.
  - Intraoperative blood cell salvage is an effective technique for blood replacement but there are theoretical safety concerns when it is used in obstetric practice.
  - This procedure should only be performed by multidisciplinary teams who develop regular experience of intraoperative blood cell salvage.

- Women who have needed an emergency caesarean section should have the reasons explained to them before they are discharged from hospital. Printed information should also be given as to their options for delivery in future pregnancies.

Complications

- Lung aspiration.
- Pulmonary embolus.
- Postpartum haemorrhage.
- Infection: overweight and obesity are significant risk factors for infection post-caesarean[16].
Longer stay in hospital may lead to difficulties in bonding and adjustment difficulties for the mother and the rest of the family.

**Prognosis**

The balance of maternal and fetal risks between caesarean section and vaginal delivery is difficult; in an emergency scenario it is almost impossible to differentiate the consequences of caesarean section from the indication for the operation. In the 2009-2012 Confidential Enquiry into Maternal Deaths in the UK and Ireland, there were no deaths following a caesarean section performed at maternal request. The women who died had serious prenatal or intrapartum complications or illness that required a caesarean section to try to save either their or their baby’s life.[1]

**Further reading & references**

- Quality standard for caesarean section; NICE, Jun 2013
- Placenta Praevia and Placenta Accreta: Diagnosis and Management; Royal College of Obstetricians and Gynaecologists (September 2018)
- Intrapartum care for healthy women and babies; NICE Guideline (Dec 2014, updated Feb 2017)

1. Caesarean section; NICE Clinical Guideline (November 2011)
2. Caesarean overview; NICE Pathway, Nov 2015
5. Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium; Royal College of Obstetricians and Gynaecologists (April 2015)
6. Patterns of Maternity Care in English NHS Hospitals 2011/12; Royal College of Obstetricians and Gynaecologists
9. Guidelines for the management of HIV in pregnant women (2014 interim review); British HIV Association
10. Management of HIV in Pregnancy; Royal College of Obstetricians and Gynaecologists (June 2010)
11. Management of Genital Herpes in Pregnancy; British Association of Sexual Health and HIV and Royal College of Obstetricians and Gynaecologists (Oct 2014)

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