



## Cesarean Section in the Second Stage of Labour

**Mostafa Abbas Ibrahim, Hussein Mohamed Abdeldayem, Mabrouka Abdelmoula Mohamed, Reham Abdelhamid Elsayed**

Obstetrics and Gynecology Department, Faculty of Medicine, Zagazig university, Egypt

**Corresponding author:** Mabrouka Abdelmoula Mohamed

**Email:** Coca.deak31@gmail.com

---

**Article History:** Received: 26.06.2023

Revised:04.07.2023

Accepted: 22.07.2023

---

### Abstract:

The women delivered by cesarean in second stage have a higher risk of postpartum hemorrhage, operative morbidity with visceral injury, sepsis and prolonged hospital stays. Hence it is recommended that second stage cesarean should ideally perform and supervised by an experienced obstetrician. Timely decision for cesarean section should be taken especially when risk factors for failure to progress are present and there should be good neonatology support.

**Keywords:** Cesarean Section, Second Stage, Labour.

---

**DOI:** 10.53555/ecb/2023.12.1057

### Introduction:

Although determining whether labour is progressing normally is a key component of intrapartum care, determining the onset of labour, measuring its progress, and evaluating the factors (power, passenger, pelvis) that affect its course are an inexact science (1).

**Stages and phases:** Interpretation of labour progress depends on the stage and phase. The three stages and their phases are:

- **First stage:** Time from onset of labour to complete cervical dilation. The first stage consists of a latent phase and an active phase. The latent phase is characterized by gradual cervical change and the active phase is characterized by rapid cervical change (2).

- **Second stage:** Time from complete cervical dilation to fetal expulsion. When pushing is delayed, some clinicians divide the second stage into a passive phase (from complete cervical dilation to onset of active maternal expulsive efforts) and an active phase (from beginning of active maternal expulsive efforts to expulsion of the fetus) (3).
- **Third stage:** Time between fetal expulsion and placental expulsion (1).
- **Fourth stage:** A stage during labour and childbirth that starts with the delivery of the placenta and lasts about two hours after delivering the baby (1).

### Criteria for normal progress of labour:

Emanuel Friedman established criteria for the normal progress of labour in the 1950s, and these criteria were used for

assessment and management of labour for decades. He observed that normal labour should progress at a rate of at least 1 cm cervical dilation per hour, starting at 3 to 4 cm of dilation.

However, data derived from women in labour in the 21st century suggest that changes in obstetric and anesthesia practices and in women themselves in recent decades have resulted in changes in the average progress of labour (4).

#### **Prolonged second stage:**

The appropriate duration and maximum length of time allowed for the second stage of labour is not clearly defined. Parity, regional anesthesia, and delayed pushing in addition to other clinical considerations all significantly impact the length of the second stage (5).

We follow the 2014 Obstetric Care Consensus statement of recommendations for safe prevention of primary cesarean delivery by the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine (6).

These recommendations are used as a pragmatic approach for diagnosis of a prolonged second stage and are supported by the data from **Zhang et al., (7)** which we believe is the best guide for establishing the normal duration for the second stage of labour (median and 95<sup>th</sup> centile). The following is a summary of the statement/recommendations: (8):

- For nulliparous women, allow three hours of pushing, and for multiparous women, allow two hours of pushing prior to

diagnosing arrest of labour, when maternal and fetal conditions permit.

- Longer durations may be appropriate on an individual basis (eg, epidural anesthesia, fetal malposition) as long as progress is being documented.
- A specific absolute maximum length of time that should be allowed in the second stage of labour has not been identified.

#### **Management:**

##### **1. Candidates for oxytocin augmentation:**

After 60 to 90 minutes of pushing, we begin oxytocin augmentation if descent is minimal (ie, <1 cm) or absent and uterine contractions are less frequent than every 3 minutes. In the second stage, we are more concerned about a possible physical issue (eg, malposition or malpresentation, macrosomia, small maternal pelvis) slowing descent than hypo-contractile uterine activity, which is the prominent concern in the first stage (5).

##### **2. Timing of operative delivery:**

In the absence of epidural anesthesia, we allow nulliparous women to push for at least three hours and multiparous women to push for at least two hours prior to considering operative intervention. We avoid operative delivery (vacuum, forceps, cesarean) in the second stage as long as the fetus continues to descend and/or rotate to a more favorable position for vaginal delivery, and the fetal heart rate pattern is not concerning. Prompt operative intervention is indicated for fetuses with abnormal fetal heart rate tracings, regardless of labour progress (6).

In women who have epidural anesthesia, we allow an additional hour of pushing on a case-by-case basis before considering operative intervention for a prolonged second stage. Extending the duration of the second stage to four hours in nulliparous women and three hours in multiparous women with epidural anesthesia may increase the chance of achieving a vaginal delivery, without significantly increasing maternal or neonatal morbidity, but evidence is limited to retrospective data and a small, randomized trial (9).

Whether to extend the duration of the second stage beyond four hours in nulliparous women and beyond three hours in multiparous women with epidural anesthesia (or beyond three hours in nulliparous women and beyond two hours in multiparous women without epidural anesthesia) is controversial, as a prolonged second stage has potential clinical challenges and consequences (10):

- If a cesarean delivery is necessary, a prolonged second stage may result in the fetal head trapped deep in the pelvis, which increases the difficulty of delivering the fetus. Reverse breech extraction may reduce the risk of a difficult delivery or injury to the uterine vessels.
- A prolonged second stage may also further thin the lower uterine segment, increasing the risk of extension of the hysterotomy into the uterine vessels at cesarean.

- Prolonging the second stage appears to increase the risk for postpartum hemorrhage and maternal infection.
- Prolonging the second stage may worsen neonatal outcome.

The importance of clinical experience and judgment regarding management of the second stage of labour must be emphasized, particularly when the duration of the second stage approaches or exceeds two to three hours. This can be a challenging clinical scenario where the risks of both maternal and neonatal morbidity are increased. We only allow labour to continue if our judgment suggests safe vaginal delivery is achievable. Numerous clinical factors need to be considered. Examples of these factors and how they may favor expectant management is (11):

- Obstetric history – A previous vaginal delivery.
- Medical/surgical history – No comorbidities likely to impact labour.
- Clinical pelvimetry – Pelvis deemed adequate for vaginal delivery based on physical examination.
- Maternal height and weight – Gravida is not short and/or obese.
- Fetal position – Occiput anterior, minimal caput and molding.
- Maternal temperature – Absence of temperature  $\geq 38.0^{\circ}\text{C}$  ( $102.2^{\circ}\text{F}$ ) (presumptive chorioamnionitis).
- Estimated fetal weight – Appropriate for gestational age.

- Effectiveness of maternal pushing – Effective pushing, mother is not exhausted.
- Fetal heart tracing – Category I tracing.
- Woman's desire to proceed with labour.

If the woman has not been pushing or not effectively pushing, then we factor that into consideration and are more likely to have her continue to push. If the fetal station is still high, the estimated fetal weight is >4000 to 4500 g, chorioamnionitis is suspected, or significant decelerations are present, we generally proceed with cesarean delivery. When the fetal heart rate tracing is reassuring and maternal pushing is resulting in progressive descent, we discuss with the patient the options of an operative vaginal (if she is an appropriate candidate or cesarean delivery versus continued pushing. In our experience, unless delivery occurs or appears to be imminent within the next 30 to 45 minutes, we proceed with an operative delivery (12).

### **Fetal monitoring:**

ACOG recommends FHR monitoring for high-risk pregnancies, such as those affected by preeclampsia, type 1 diabetes mellitus, and intrauterine growth restriction. Continuous fetal monitoring may also be performed prior to the onset of labour to evaluate fetal well-being when certain pathologic states are suspected. In cases of abdominal trauma after 20 weeks' gestation, for example, a 4 to 24 hour period of fetal monitoring is recommended to assess for placental abruption (13).

External fetal monitoring, which is most frequently used, involves the placement of

two transducers placed on the maternal abdominal wall: one overlying the fetal heart to record the FHR and one over the uterine fundus to record contractions. A fetal scalp electrode may be placed when there is concern regarding the reliability of the FHR tracing, such as in the setting of significant maternal heart rate artifact. Intrauterine pressure catheters may be used in settings where external tocodynamometry is not reliable, such as maternal obesity, or in settings where precise pressure measurement is warranted, such as in protracted or arrested labour (14).

### **Clinical Significance**

As explained in the Anatomy and Physiology section, fetal monitoring conveniently and noninvasively relays real-time information regarding the neurologic, autonomic, and cardiovascular status of the fetus. Baseline FHR, variability, accelerations, and decelerations are interpreted to gain this understanding (15).

The normal range for baseline FHR in the perinatal period is 110 to 160, and a baseline FHR consistently in this range is reassuring. The baseline FHR may be altered by intrinsic factors such as abnormal fetal cardiac pacemaking, abnormal conduction, and altered catecholamine levels. Extrinsic factors that alter the baseline FHR include maternal use of medications, fever, hypothermia, or abnormal thyroid function (16).

Variability is measured within a 10-minute window and is described as absent, minimal (<5 bpm), moderate (6 to 25 bpm), or marked (>25 bpm). Moderate variability

is thought to be a reassuring finding as it reliably excludes significant hypoxia and acidosis (17).

Decreased variability (absent or minimal) does not reliably indicate the presence of hypoxia or acidosis and does not reliably predict any poor perinatal outcome, although it may prompt the obstetric clinician to investigate further. The significance of marked variability is not clear.

Similarly, accelerations, which indicate fetal movement, are reassuring, but their absence is not necessarily concerning. Early decelerations indicate a benign vagal reflex. Their presence or absence have not reliably predicted any positive or negative perinatal outcomes (18).

The presence of variable and/or late decelerations are potentially concerning for increased risk of poor perinatal outcomes, particularly if the decelerations are recurrent and if they are associated with decreased variability (19).

FHR patterns are classified into three categories based on the above findings:

**Category I** patterns must have a normal baseline FHR, moderate variability, and no variable or late decelerations. These patterns are normal and reassure clinicians that labour may continue without intervention (20).

**Category II** patterns may involve tachycardia, bradycardia, reduced or marked variability, and/or occasional variable or late decelerations. These patterns may indicate a wide range of fetal and maternal disorders and prompt further investigation into the

underlying cause and may necessitate maternal or fetal resuscitation. If present, maternal disorders such as fever, hypothermia, dehydration, hyper- or hypothyroidism, sepsis, DKA, etc., should be identified and treated. Maternal medications should be reviewed. Maternal repositioning onto the right or left side may be attempted to improve placental perfusion. Opioids, magnesium, and beta-blockers may affect baseline FHR and/or variability, resulting in a category II pattern. Clinicians should consider the treatment of disorders such as intra-amniotic infections and oligohydramnios if suspected. The fetal sleep cycle is associated with decreased variability and may correct with fetal stimulation. Persistent abnormalities may indicate fetal arrhythmia, congenital heart defects, or antepartum neurologic injury(21).

There is no single algorithm to manage category II FHR patterns, as the clinician must rely on history, physical examination, and other diagnostic findings to determine and address the underlying etiology. Category II patterns may resolve spontaneously to become category I, at which point no intervention is necessarily warranted. However, closer observation is needed as the pattern may deteriorate to category III.

**Category III** patterns include at least one of the following findings: absent variability with bradycardia, absent variability with recurrent late and/or variable decelerations, or a sinusoidal pattern. These patterns are predictive of significant hypoxia or acidosis and predispose to neurologic

injury and other poor perinatal outcomes. Clinicians observing category III patterns should investigate, resuscitate, and prepare for operative delivery with urgency. Steps for resuscitation are similar to those that may be used for category II tracings and depend on the clinical scenario. Fetal stimulation and maternal repositioning may be attempted. Uterotonic medications should usually be discontinued, and tocolytics may be considered in the absence of any contraindication. Oxygen is often administered via a nonrebreather in the setting of category III tracings. However, the benefit of oxygen to a normoxic mother is unclear (22).

Delivery should be expedited to prevent the category III pattern from persisting for greater than ten minutes, and operational vaginal delivery or Cesarean section may be performed to accomplish this goal. Note that this guideline is primarily intended to prevent poor outcomes for the newborn. Delivery may be postponed greater than ten minutes if deemed necessary for further maternal resuscitation. As discussed above, the more ominous signs on fetal monitoring such as late decelerations, bradycardia, and decreased variability are often considered consequences of impaired fetal oxygenation and/or fetal acidosis. This also applies before the onset of labour. If a clinician is concerned about placental abruption, these findings on the fetal tracing would support the diagnosis and may warrant prompt intervention. In the setting of abdominal trauma, abnormally frequent uterine

contractions are a sensitive predictor of placental abruption (23).

#### **Indications of cesarean section in 2nd stage of labour:**

##### **I. Non descent of head:**

- a. With fetal distress
  - i. Non reassuring fetal heart rate
  - ii. Thick meconium-stained liquor
- b. With caput succedaneum

##### **II. Unsuccessful ventouse/forceps**

##### **III. Deep transverse arrest**

##### **IV. Retained second twin**

#### **Technique of delivering a deeply engaged head:**

Impaction of the fetal head occurs when the station of head is below the level of ischial spines, and then onwards the delivery of the head becomes difficult. A deeply engaged head is hard to deliver and can cause difficulty. A careful vaginal examination should be done before Cesarean section to ascertain the findings (24).

The incision that preferred for second stage cesarean section is Joel-Cohen incision. This is an incision 3 cm above the pubic symphysis. It is associated with lesser operating time. When performing cesarean section in the second stage, a higher incision is preferred on the Uterus. Blunt dissection of Uterus with fingers is associated with lesser blood loss than sharp dissection using scissors (25).

An incision lower in the Uterus may be associated with more chances of injury and extension of the uterine incision. Chances of bladder injury are more likely if the incision is lower. With a lower incision, sometimes

inadvertent delivery through the vagina may also occur. Hence, it is always better to put an incision higher in the lower segment during the second stage sections. The fetal head is deeply impacted in the second stage of labour and delivering poses a challenge. The Uterus is a state of contraction, and Oxytocin infusion should be stopped before taking the patient for cesarean section. There is no evidence that Nitroglycerin relaxes the Uterus (26). Moreover, the use of uterine relaxants may be associated with more chances of postpartum bleeding. There is no evidence that the use of tocolytics ease the delivery at second stage cesarean section (26). Sometimes if constriction ring dystocia is suspected a low vertical incision may be used in the lower segment. A vertical lower segment incision has a risk of extension on to the bladder or upper uterine segment. It may be associated with higher chances of rupture in subsequent pregnancies. The only advantage of a vertical lower segment incision is that there are lesser chances of extension laterally into the broad ligament area (27).

Deepening the plane of anesthesia may help to disengage the fetal head. Upward pull of fetal shoulder may help to disengage the fetal head. The operating hand should be placed in a cup-shaped fashion and delivered to the fetal head. This conventional method of delivering the head as cephalic without assistance may result in the uterine wound's extension and is dangerous when the head is deeply engaged in the pelvis (22). Hence, it would be advisable to resort to one of the two commonly used "pull" or "push"

method techniques. In the "push" method head is pushed from below. In the "pull" the baby is delivered as breech using a reverse breech extraction. A head low position may help the delivery of the deeply engaged head.

C-snorkel is a soft, malleable tube with holes and can be placed between the vagina and the fetal head. Aeration through the tube can help to disengage the fetal head. There are no adequate trials with this equipment(11).

### **Maternal complications:**

Maternal morbidity may be higher when a caesarean section is done during the second stage of labour, as it is more difficult, especially in cases of malposition (such as in the occipito-posterior position), cephalopelvic disproportion (CPD) or after attempted instrumental delivery. The major maternal risks that lead to increased maternal morbidity and mortality during second stage caesarean sections are major hemorrhage, trauma to the surrounding structures (such as the bladder, bowel and urethra), lacerations of the lower segment and involvement of the broad ligament (28).

The second stage caesareans increase the maternal risks such as extension tears of the uterine angle leading to broad ligament hematoma, major obstetric hemorrhage, longer hospital stay and greater risk of bladder trauma. An increase in neonatal mortality and morbidity is mainly due to hypoxia and fetal trauma (29).

A study reported that blood-stained urine was the major complication observed in 60% (n=15) of patients followed by

difficulty in extraction of the baby in 48% (n=12) of deliveries. The lower uterine segment tear and angle extension were observed in 12% (n=3) of patients. Second stage cesareans are associated with increased risk of PPH but only one patient had PPH in our study. Broad ligament hematoma was also observed only in 1 patient. Mean duration of hospital stay is 2.28 days. Longer duration of 5 days was documented as a case underwent total abdominal hysterectomy due to uterine tears during the surgery (28).

Another study reported that the incidence of intra-operative complications showed that out of 54 patients, 7 (13.0%) had atonic postpartum hemorrhage (PPH), 11 cases (20.4%) had an extension of uterine angle, 3 cases (5.6%) had an injury to uterine vessels, nine cases (16.7%) required blood transfusion, 1 case (1.9%) had bladder injury, and 6 cases (11.1%) had blood stained urine in the study group. All complications were non-exclusive, meaning a few cases had multiple intra-operative complications. The incidence of post-operative complications demonstrated that out of 54 cases studied, 3 cases (5.6%) had febrile illness, 3 cases (5.6%) had wound infection, and four cases (7.4%) had PPH in the study group. All complications were non-exclusive, meaning a few cases had multiple post-operative complications (30).

#### **Fetal complications:**

Birth-related problems in neonates like asphyxia, injuries, fetal acidemia, hypoxic-ischemic encephalopathy, prolonged NICU stay, and even stillbirths are common (31).

A study reported that the majority of the babies' weights were within the normal range (2500g-3500). Number of babies with birth weight >3.5 kg is 4 (16%); among those 5 (20%) babies had neonatal complications following caesarian section in second stage labour. Meconium-stained amniotic fluid was present in 28% of the cases (n=7). All the babies had APGAR score of more than 7 at 5 minutes. 20% (n=5) of babies were admitted to PBU, among them one required neonatal resuscitation at birth and two received IV antibiotics. There was no neonatal mortality reported in this study (28).

Also, a study reported that the incidence of neonatal complications demonstrated that out of 54 babies delivered, 6 babies (11.1%) had 1 min APGAR score below 5, 8 babies (13.0%) had 5 min APGAR score below 5, 9 babies (16.7%) had respiratory distress, 3 babies (3.7%) had birth injuries, 17 babies (29.6%) required NICU admission, 1 baby (1.9%) had a stillbirth, and none of the babies had neonatal death in the study group. All complications were non-exclusive, meaning a few babies had multiple complications (30).

#### **Managing complications associated with second stage sections**

Second stage sections may be associated with many complications. Extension of uterine incision and bleeding is one of the most typical difficulties in the second stage section. The deeply engaged head, lack of amniotic fluid and the thinned out lower segment predispose uterine wound extension during delivery. It is important to



make an adequate incision on the abdominal wall. The loose fold of peritoneum should be picked up incised, and upper limit of the bladder should be identified to avoid injury to the bladder (32).

The incision on the Uterus may be placed relatively at a higher level to prevent uterine incision extension. A careful delivery of head using a “push” or “pull” technique should be used. Extension of the lower segment uterine incision is one of the most typical injuries during a section. The chances extension of the uterine incision is directly proportional to the length of the second stage of labour. The uterine wound extension as 25% if the second stage of labour was 1–3 hours and increasing to 32% if the duration of the second stage of labour was 4–5 hours. Uterine wound extension commonly occurred into the lower segment, followed by the cervix (33).

If the incision has extended the edges of the incision should be identified and sutured. If there is excess bleeding Uterine artery ligation or internal iliac artery ligation may need to be done. Uterine artery ligation is done by passing an absorbable suture material like No 1 Polygalactin suture through the myometrium medial to the Uterine artery (34).

The suture is brought forward through an avascular area through the anterior and posterior wall of the broad ligament and sutured. Internal iliac artery ligation may be needed in cases where there is severe bleeding. When all measures have failed, sometimes Hysterectomy may be required in the extreme extension of Uterine

incision. In rare instances of lateral extension of uterine incision, sometimes ureters may be injured and wise to help a Urologist repair these injuries (35).

Bladder injuries can sometimes occur during the second stage cesarean section due to extension. The torn bladder edges should be identified and sutured in 2 continuous layers by 3.0 or 4.0 delayed absorbable sutures. The bladder should be drained continuously for 2 to 3 weeks with continuous bladder drainage. If there is suspicion of injury to ureteric orifices, help should be taken from urologist to repair the defect (36).

Occasionally when the section is done in the second stage of labour, the baby may be delivered accidentally through an incision on the vagina. Hence it is essential to identify the lower segment and correct incision to deliver the baby through the lower uterine segment. Patients who underwent Cesarean section in the second stage may be at increased risk of preterm labour in subsequent pregnancies (37).

**References:**

1. **Housseine, N., Punt, M. C., Mohamed, A. G., et al. 2020.** Quality of intrapartum care: direct observations in a low-resource tertiary hospital. *Reproductive health, 17*(1), 1-11.
2. **Inde, Y., Nakai, A., Sekiguchi, A., Hayashi, M., & Takeshita, T. 2018.** Cervical dilatation curves of spontaneous deliveries in pregnant Japanese females. *International journal of medical sciences, 15*(6), 549.

3. Sandström, A., Altman, M., Cnattingius, S., et al. 2017. Durations of second stage of labor and pushing, and adverse neonatal outcomes: a population-based cohort study. *Journal of Perinatology*, 37(3), 236-242.
4. Caughey, A. B. (2020). Is Zhang the new Friedman: How should we evaluate the first stage of labor?. In *Seminars in perinatology* (Vol. 44, No. 2, p. 151215).
5. Gimovsky, A. C. & Berghella, V. 2016. Prolonged Second Stage: What Is the Optimal Length? *Obstet Gynecol Surv*, 71, 667-74.
6. Leveno, K.J., Nelson, D.B. and McIntire, D.D., 2016. Second-stage labor: how long is too long?. *American journal of obstetrics and gynecology*, 214(4), pp.484-489.
7. Zhang, J., Landy, H.J., Branch, D.W., et al., 2010. Contemporary patterns of spontaneous labor with normal neonatal outcomes. *Obstetrics & Gynecology*, 116(6), pp.1281-1287.
8. ACOG & SMFM, 2014. American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine. Obstetric care consensus no. 1: safe prevention of the primary cesarean delivery. *Obstet Gynecol*; 123:693.
9. Grantz, K.L., Sundaram, R., Ma, L., et al., 2018. Reassessing the duration of the second stage of labor in relation to maternal and neonatal morbidity. *Obstetrics and gynecology*, 131(2), p.345.
10. Myles, T.D. and Santolaya, J., 2003. Maternal and neonatal outcomes in patients with a prolonged second stage of labor. *Obstetrics & Gynecology*, 102(1), pp.52-58.
11. Sung, J.F., Daniels, K.I., Brodzinsky, L., et al., 2007. Cesarean delivery outcomes after a prolonged second stage of labor. *American journal of obstetrics and gynecology*, 197(3), pp.306-e1.
12. Cheng, Y.W., Hopkins, L.M. & Caughey, A.B., 2004. How long is too long: does a prolonged second stage of labor in nulliparous women affect maternal and neonatal outcomes?. *American journal of obstetrics and gynecology*, 191(3), pp.933-938.
13. Mohan, M., Ramawat, J., La Monica, G., et al., 2021. Electronic intrapartum fetal monitoring: a systematic review of international clinical practice guidelines. *AJOG Global Reports*, 1(2), p.100008.
14. Galli, A., Peri, E., Zhang, Y., et al., 2021. Dedicated algorithm for unobtrusive fetal heart rate monitoring using multiple dry electrodes. *Sensors*, 21(13), p.4298.
15. Bhide, A., Ganguly, A., Parupudi, T., et al., 2021. Next-generation continuous metabolite sensing toward emerging sensor needs. *ACS omega*, 6(9), pp.6031-6040.
16. Hurtado-Sánchez, M.F., Pérez-Melero, D., Pinto-Ibáñez, A., et al., 2021. Characteristics of heart rate tracings in preterm fetus. *Medicina*, 57(6), p.528.
17. Dore, S. & Ehman, W., 2020. No. 396-fetal health surveillance: intrapartum consensus guideline. *Journal of Obstetrics and Gynaecology Canada*, 42(3), pp.316-348.

18. **Sholapurkar, S.L., 2017.** Critical imperative for the reform of British interpretation of fetal heart rate decelerations: analysis of FIGO and NICE guidelines, post-truth foundations, cognitive fallacies, myths and Occam's razor. *Journal of Clinical Medicine Research*, 9(4), p.253.
19. **Melamed, N., Baschat, A., Yinon, Y., et al., 2021.** FIGO (international Federation of Gynecology and obstetrics) initiative on fetal growth: best practice advice for screening, diagnosis, and management of fetal growth restriction. *International Journal of Gynaecology and Obstetrics*, 152(Suppl 1), p.3.
20. **Tarvonen, M.J., Lear, C.A., Andersson, S., et al., 2022.** Increased variability of fetal heart rate during labour: a review of preclinical and clinical studies. *BJOG: An International Journal of Obstetrics & Gynaecology*, 129(12), pp.2070-2081.
21. **Stampalija, T., Casati, D., Montico, M., et al., 2015.** Parameters influence on acceleration and deceleration capacity based on trans-abdominal ECG in early fetal growth restriction at different gestational age epochs. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 188, pp.104-112.
22. **Garite, T.J., Nageotte, M.P. & Parer, J.T., 2015.** Should we really avoid giving oxygen to mothers with concerning fetal heart rate patterns?. *American Journal of Obstetrics and Gynecology*, 212(4), pp.459-e1.
23. **Gyamfi-Bannerman, C. and Society for Maternal-Fetal Medicine (SMFM), 2018.** Management of bleeding in the late preterm period. *American journal of obstetrics and gynecology*, 218(1), B2-B8.
24. **Kadhun, T.J. 2009.** Head pushing versus reverse breech extraction for delivery of impacted head during cesarean section *Kuf Med J* 2009;12:200-205.
25. **Sandars, J., Beattie, B., Chaudry, S., et al. (2011).** National Institute for Health and Clinical Excellence: Caesarean Section Clinical Guidance. London: NICE; 2011 [<http://www.nice.org.uk/nicemedia/live/13620/57162/57162.pdf>].
26. **Waterfall, H., Grivell, R. M. & Dodd, J. M. 2016.** Techniques for assisting difficult delivery at caesarean section. *Cochrane Database Syst Rev*, 2016, 49-54.
27. **Simm, A., & Mathew, D. 2008.** Caesarean section: techniques and complications. *Obstetrics, Gynaecology & Reproductive Medicine*, 18(4), 93-98.
28. **Thirukumar, M. 2020.** Feto-Maternal Outcome in Caesarean Sections Performed in Second Stage of Labour. *Jaffna Med J*, 32, 18-22.
29. **Gurung, P., Malla, S., Lama, S., et al. 2017.** Caesarean Section During Second Stage of Labor in a Tertiary Centre. *J Nepal Health Res Counc*, 15, 178-81.
30. **Vashi, C. A., Vijay, N., Bhalerao, A., et al. 2023.** Obstetrics Outcomes in Women Undergoing Second-Stage Cesarean Section: A Cross-Sectional Study. *Cureus*, 15, 399-401.
31. **Anusha, S. 2020.** Our experience of maternal and foetal outcomes in 2nd

- stage caesarean deliveries-tertiary care centre study. *Blood Transfus*, 29, 58-62.
- 32. Bloch, C., Dore, S. & Hobson, S. 2021.** Committee Opinion No. 415: Impacted Fetal Head, Second-Stage Cesarean Delivery. *J Obstet Gynaecol Can*, 43, 406-13.
- 33. Bhargava, S., Hooja, N., Kala, M., et al. 2019.** Caesarean Delivery in the Second Stage of Labour at a Tertiary Care Hospital. *J Obstet Gynaecol India*, 69, 558-60.
- 34. Berghella, V., Gimovsky, A. C., Levine, L. D., et al. 2017.** Cesarean in the second stage: a possible risk factor for subsequent spontaneous preterm birth. *Am J Obstet Gynecol*, 217, 1-3.
- 35. Cubo, A. M., Villalba Yarza, A., Gastaca, I., et al. 2021.** Cesarean Hysterectomy in Abnormally Invasive Placenta: The Role of Prenatal Diagnosis. *Diseases*, 9, 4-9.
- 36. Manidip, P. & Soma, B. 2020.** Cesarean bladder injury - obstetrician's nightmare. *J Family Med Prim Care*, 9, 4526-9.
- 37. Wood, S., Tang, S. & Crawford, S. 2018.** Cesarean Delivery in the Second Stage of Labor and the Risk of Subsequent Premature Birth. *Obstetric Anesthesia Digest*, 38, 44-9.