No. 381-Assisted Vaginal Birth

This Clinical Practice Guideline has been prepared by the Society of Obstetricians and Gynaecologists of Canada (SOGC)’s Clinical Practice Obstetrics Committee, reviewed by the Guideline Management and Oversight Committee and approved by the Board of the SOGC.

Sebastian Hobson, MD, MPH, PHD, Toronto, ON
Krista Cassell, MD, Charlottetown, PE
Rory Windrim, MD, MSc, Toronto, ON
Yvonne Cargill, MD, Ottawa, ON

Clinical Practice Obstetrics Committee Members: Hussam Azzam (Co-Chair), MD, Thompson, MB; Jon Barrett, MD, Toronto, ON; Hayley Bos, MD, Victoria, BC; Kim Campbell, RM, Vancouver, BC; Krista Cassell, MD, Charlottetown, PE; Kirsten Duckitt, MD, Campbell River, BC; Jessica Dy, MD, Ottawa, ON; Ellen Giesbrecht (Co-Chair), MD, Vancouver, BC; Lisa Graves, MD, Toronto, ON; Michael Helewa, MD, Winnipeg, MB; Melanie Basso, RN, Vancouver, BC; Amy Metcalfe, PhD, Calgary, AB; Barbara Parish, MD, Halifax, NS; Yvonne Vasilie, MD, Pointe-Claire, QC; Jennifer Walsh, MD, Calgary, AB

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CHANGES IN PRACTICE

1. Encouraging safe and effective AVB by experienced and skilled care providers may be a useful strategy to reduce the rate of primary Caesarean delivery.
2. Optimizing the fetal head position prior to or during delivery can be encouraged.
3. Second stage Caesarean delivery is associated with short- and long-term complications, which may be taken into account when considering AVB.
4. An international consensus for the definition of assessment of fetal station is suggested.
5. There is modification to the classifications of AVB.

KEY MESSAGES

1. Encouraging safe and effective AVB by experienced and skilled care providers may be a useful strategy to reduce the rate of primary Caesarean delivery.
2. Safe and effective AVB requires a careful assessment of the clinical situation, clear communication with the patient, support people, and health care personnel, along with expertise in the chosen method.
3. Vacuum and forceps are associated with different short- and long-term benefits and risks.
4. Second stage Caesarean delivery is associated with short- and long-term complications, which may be taken into account when considering AVB.
5. Obstetrical trainees should receive appropriate comprehensive training in AVB and be deemed competent prior to independent practice.
Abstract

Objectives: To provide evidence-based guidelines for safe and effective assisted vaginal birth.

Outcomes: Prerequisites, indications, contraindications, along with maternal and neonatal morbidity associated with assisted vaginal birth.


Validation: These guidelines were approved by the Clinical Practice Obstetrics Committee and the Board of the Society of Obstetricians and Gynaecologists of Canada.

Recommendations:

1. The need for assisted vaginal birth can be reduced by: dedicated and continuous support during labour (I-A), oxytocin augmentation of inadequate labour (I-A), delayed pushing in women with an epidural (I-A), increased time pushing in nulliparous women with an epidural (I-B), as well as optimization of fetal head position through manual rotation (I-A).

2. Encouraging safe and effective assisted vaginal birth by experienced and skilled care providers may be a useful strategy to reduce the rate of primary Caesarean delivery (II-2B).

3. Safe and effective assisted vaginal birth requires expertise in the chosen method, comprehensive assessment of the clinical situation alongside clear communication with the patient, support people, and health care personnel (III-B).

4. Practitioners performing assisted vaginal birth should have the knowledge, skills, and experience necessary to assess the clinical situation, use the selected instrument, and manage complications that may arise from assisted vaginal birth (II-2B).

5. Obstetrical trainees should receive comprehensive training in assisted vaginal birth and be deemed competent prior to independent practice (III-B).

6. When assisted vaginal birth is deemed to have a higher risk of not being successful, it should be considered a trial of assisted vaginal birth and be conducted in a location where immediate recourse to Caesarean delivery is available (III-B).

7. The physician should determine the instrument most suitable to the clinical circumstances and their level of skill. Vacuum and forceps are associated with different short- and long-term benefits and risks. Unsuccessful delivery is more likely with vacuum than forceps (I-A).

8. Planned sequential use of instruments is not recommended as it may be associated with an increased risk of perinatal trauma. If an attempted vacuum is unsuccessful, the physician should consider the risks of proceeding to an attempted forceps delivery versus Caesarean section (II-2B).

9. Restrictive use of mediolateral episiotomy is supported in assisted vaginal birth (II-2B).

10. A debrief should be done with the patient and support people immediately following an attempted or successful assisted vaginal birth. If this is not possible, ideally this should be done prior to hospital discharge and include the indication for assisted vaginal birth, management of any complications, and the prognosis for future deliveries (III-B).

11. In a subsequent pregnancy, patients should be encouraged to consider spontaneous vaginal birth. However, care planning should be individualized and patient preference respected (II-3B).
INTRODUCTION

Assisted vaginal birth (AVB) attempts to mimic spontaneous vaginal birth (SVB). Delivery by AVB may benefit both mothers and neonates by decreasing risks of serious morbidity associated with prolonged delays in delivery, or a Caesarean delivery late in second stage. Various types of forceps or vacuum devices can be used to safely and successfully achieve vaginal delivery, provided the prerequisites for AVB are met.

Care providers are expected to have the appropriate training, skill, and experience with any instrument used. The choice of device will depend on the clinical situation; however, this choice is primarily determined by the clinical skill and scope of practice of the care provider. Not all providers are expected to achieve the same level of competence with all instruments, as this can be significantly influenced by training, local practices, and standards of care. Adequate patient counselling and involvement in decision making are also important aspects in the provision of AVB.

AVB should be undertaken when there is a reasonable chance of success, a high level of safety, and a suitable contingency plan in place. Informed consent is an essential component of AVB, as are documentation of the event and debriefing afterwards with the care team, patient, and family.

AVB has been widely studied and debated with a range of outcomes and safety profiles reported. Consideration must be given to both the maternal and neonatal risks of using either vacuum or forceps to achieve delivery. Observed variation in maternal and neonatal outcomes may be due to differences in underlying patient characteristics, multiple types of instruments being used under a variety of protocols, as well as the range of skill and experience of care providers.

Outcomes of randomized trials comparing vacuum with forceps should be critically appraised as there are often significant rates of protocol violations as providers can be allocated to an instrument with which they have less skill with or deliveries may be performed by junior trainees. Furthermore, both retrospective and prospective observational studies may have unmeasured confounders that can significantly skew results. For outcomes to be weighed meaningfully, comparison must be made not to spontaneous vaginal delivery, but to the actual clinical options of the alternate method of AVB or Caesarean delivery. Ideally, risk assessment would also consider the risk associated with any delay in delivery that may differ for AVB and Caesarean delivery.

The balance of risk of Caesarean delivery versus AVB continuously changes as the second stage of labour progresses and depends on the clinical scenario. There may also be increased risks associated with Caesarean delivery performed in the second stage of labour compared to the first stage of labour or AVB. This includes subsequent cervical insufficiency, particularly if the fetus was at a low station.1–4

Overall, in carefully selected circumstances, both vacuum and forceps are associated with relatively low rates of serious morbidity and mortality in both mother and baby.

Interventions that have been Shown to Promote Spontaneous Vaginal Birth

1. Dedicated maternal support person. One-to-one support in labour has been shown to decrease the rate of AVB.5,6 These results are consistent throughout a variety of obstetrical settings, hospital conditions, pregnancy risk factors, and differing levels of professional training in the persons who provided support. This practice should be encouraged in all maternity care sites.

2. Use of intermittent auscultation for low risk labour. A 2017 Cochrane review suggests use of continuous electronic fetal monitoring in low-risk women in labour is associated with an increase in both Caesarean delivery and AVB when compared with intermittent auscultation.7

3. Delayed pushing with epidural. Epidural use is associated with an increased rate of AVB. The 2017 Cochrane review on this subject has shown that delaying pushing with an epidural when there is no urge to push reduces the total duration of pushing and increases the rates of

ABBREVIATIONS

- AVB: assisted vaginal birth
- CI: confidence interval
- CPD: cephalopelvic disproportion
- NICU: neonatal intensive care unit
- OA: occiput anterior
- OASIS: obstetrical anal sphincter injury
- OP: occiput posterior
- OR: odds ratio
- OT: occiput transverse
- PPH: postpartum hemorrhage
- PTSD: post-traumatic stress disorder
- RR: relative risk
- SVB: spontaneous vaginal birth

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successful vaginal birth but may increase the incidence of low Apgar scores.13 In nulliparous patients, a 2018 randomized clinical trial of 2404 patients demonstrated that immediate compared to delayed pushing was associated with similar rates of SVB, lower rates of chorioamnionitis, PPH, and neonatal acidemia.8 There were, however, higher rates of OASIS in the immediate pushing group. Currently, the evidence is conflicting in this area.

4. **Increasing the time pushing with epidural.** Although there are geographic variations within centres across Canada, contemporary obstetrical practice has generally defined a prolonged second stage as pushing in labour with an epidural as >3 hours for nulliparous women and >2 hours for parous women.4,9 One randomized trial in 2016 showed that for nulliparous women, if the duration of active pushing is extended by 1 hour beyond this convention that there is a reduced risk of Caesarean delivery without increases in adverse maternal or perinatal outcomes.10 Regardless of definitions and limits applied, a pragmatic approach to prolonged second stage and management is advised.

5. **Manual rotation.** Manual rotation from an OT or OP position to a more optimal position has been correlated with decreased use of vacuum or forceps in second stage and may be up to 90% effective in achieving rotation to OA.11,12 In most cases, manual rotation is attempted after reaching full dilation; however, in certain clinical scenarios it may be required prior to full dilation to facilitate the progress of labour. Manual rotation to optimize the fetal head position may also aid subsequent AVB if required.

### Recommendation

1. The need for assisted vaginal birth can be reduced by: dedicated and continuous support during labour (I-A), oxytocin augmentation of inadequate labour (I-A), delayed pushing in women with an epidural (I-A), increased time pushing in nulliparous women with an epidural (I-B), as well as optimization of fetal head position through manual rotation (I-A).

### Assisted Vaginal Birth Over Time

AVB rates in Canada have declined from 2002-2003 (15.7%), 2005-2006 (14.3%), and 2011-2012 (rural areas 8.6%, urban areas 10.6%). This downward trend was observed for both vacuum and forceps deliveries, and data available from 2010-2011 suggest the rate of vacuum-assisted deliveries was three-times the rate of forceps-assisted deliveries (9.6% vs 3.2%).13 Concurrently, the rates of primary Caesarean delivery have been climbing and many authorities have raised concerns over these trends. International data would suggest that these changes are being seen on a global scale.14

As one approach, in order to ameliorate increasing rates of Caesarean delivery, the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine have recently begun advocating for the increased use of AVB to achieve delivery.15 Strategies and evaluations of approaches to achieve this end-goal are underway,16,17 and the current primary challenge of AVB hinges on opportunities to promote adequate skills and training.18,19 It is now widely accepted that obstetrical trainees should receive appropriate comprehensive training in AVB and be deemed competent prior to independent practice.16,20,21 This not only maintains a high standard of patient care and improves outcomes, it also serves to maintain the highly skilled Art of Obstetrics in the next generation of care providers.22

### Recommendations

2. Encouraging safe and effective assisted vaginal birth by experienced and skilled care providers may be a useful strategy to reduce the rate of primary Caesarean delivery (II-2B).

3. Safe and effective assisted vaginal birth requires expertise in the chosen method, comprehensive assessment of the clinical situation alongside clear communication with the patient, support people, and health care personnel (III-B).

4. Practitioners performing assisted vaginal birth should have the knowledge, skills, and experience necessary to assess the clinical situation, use the selected instrument, and manage complications that may arise from assisted vaginal birth (II-2B).

5. Obstetrical trainees should receive comprehensive training in assisted vaginal birth and be deemed competent prior to independent practice (III-B).

### Indications for Assisted Vaginal Birth

- Maternal conditions precluding repetitive Valsalva manoeuvres including, but not limited to, maternal cardiac disease (New York Heart Association class III or IV), severe respiratory disease, cerebral arteriovenous malformation or proliferative retinopathy, as well as neurologic diseases such as myasthenia gravis or spinal cord injury at risk of autonomic dysreflexia.
• Delayed progress in the second stage of labour due to malposition or inadequate fetal descent despite maximal maternal effort and effective uterine contractions.
• Abnormal fetal heart rate tracing.

**Contraindications to Assisted Vaginal Birth**

**Absolute**
- Non-vertex presentation, unless forceps are used for face presentation or the after-coming head in vaginal breech delivery.
- Unengaged head, with more than one-fifth of the fetal head palpable abdominally above the pubic brim.
- Incomplete cervical dilation.
- Uncertainty of the fetal head position.
- Suspected CPD.
- Fetal coagulopathy, thrombocytopenia, or brittle skeletal dysplasia.
- Inability to progress to timely Caesarean delivery should the AVB be unsuccessful.

**Relative**
- Vacuum delivery for fetal prematurity, particularly <34+0 weeks gestation.

**Classification of Assisted Vaginal Birth**

**Outlet**
- Fetal scalp is visible at the introitus without separating the labia.
- Fetal skull has reached the pelvic floor.
- Sagittal suture is in the anterior-posterior position or rotation to this position does not exceed 45 degrees.

**Low**
- The leading bony point of the fetal head is at station equal to or greater than +2 cm below the ischial spines.
- Two subdivisions:
  - Rotation of 45 degrees or less from the OA position.
  - Rotation of more than 45 degrees from the OA position (including the OP position).

**Mid**
- Fetal head is no more than one-fifth palpable above the public brim per abdomen.
- Leading bony point of the skull is above +2 cm but not above the ischial spines.
- Two subdivisions:
  - Rotation of 45 degrees or less from the OA position.
  - Rotation of more than 45 degrees from the OA position (including the OP position).

**High**
- The fetal head is not engaged with station above the ischial spines. Contemporary practice does not support the use of vacuum or forceps delivery at high station.

**Accurate Examination and Measurement of Station**

An important concept in AVB is the accurate and standardized examination of the maternal bony pelvis, soft tissues, and fetus, along with their spatial relationship and temporal changes during labour and delivery. In order to safely and effectively perform AVB, all practitioners should be skilled in this comprehensive mandatory assessment including:

1. **Abdominal examination**: Palpation of the uterus, fetal lie, presenting part, descent of the head into the maternal pelvis (measured in fifths above the pubic brim), and assessment of the maternal bladder size requiring voiding/emptying. Ultrasound examination may be used as an adjunct to physical examination, particularly in the preparation for rotational AVB.

2. **Vaginal examination**:
   a. **Assessment of the maternal pelvis**: Assessment of the pelvis, with particular reference to the pubic angle, ischial spines, and coccyx to determine pelvic adequacy.
   b. **Cervical dilation**: The cervix should be assessed for full dilation both during and in the absence of uterine activity.
   c. **Fetal head position**: This assessment includes accurate knowledge of the relative position of the occiput (OA, OT, OP), flexion or deflexion, and asynclitism. Examining which fontanelle or suture is most posterior in the maternal pelvis can assist in determining position as this may be less affected by caput and moulding of the fetal head. Adequate analgesia may assist in achieving the most information from this component of the examination. Palpation of the fetal ears or intrapartum ultrasound can also be useful adjuncts to digital exam.
   d. **Moulding and caput**: Fetal skull bones, sutures, and soft tissues are assessed for the moulding (overlapping of fetal skull bones) and caput (swelling) in order to select the appropriate mode of delivery.
   e. **Station**: Fetal station assessment is a bony measurement not affected by maternal or fetal soft tissues. While there are a number of different techniques of measuring station concurrently in use, modern consensus describes fetal head station based on the location of its lowermost bony
portion in relation to a theoretical midline point between the maternal ischial spines.\textsuperscript{25} By convention, this reference line is called “0 station.” The stations above the ischial spines are 1 cm apart and are expressed with negative numbers, reaching a value of $-5$ cm at the pelvic inlet. Below this, stations are also 1 cm apart and are numbered from $+1$ to $+5$ cm, the latter number corresponding to the perineum.\textsuperscript{25} Fetal head station must take into account moulding and caput as these may falsely indicate a lower station.

**Prerequisites for Assisted Vaginal Birth**

1. **Consent:** In the setting of labour, consent for AVB may necessarily be brief. It should address the alternative options for delivery available and an assessment of the chance of success, as well as the risks and benefits of each management option. Written consent, particularly for a trial of AVB with possibility of Caesarean delivery, should ideally be completed if the situation permits.

2. **Examination:** Thorough abdominal and vaginal examinations should be performed as previously described.

3. **Preparation of staff:** A skilled operator should be present and actively involved in the delivery. Safe and successful AVB requires effective teamwork and communication among team members. Staff proficient in neonatal resuscitation should be present. Anesthesia staff should be notified and available should the need for timely Caesarean delivery occur. AVB should be conducted in accordance with other operative procedures such that a succinct team briefing occurs prior to the procedure in order to define the clinical context and prepare a contingency plan in case of unsuccessful AVB.

4. **Location of delivery:** An appropriate delivery bed with adequate lighting and monitoring is needed. Access to Caesarean delivery in case of unsuccessful AVB should be planned. AVB at increased risk of not being successful should be considered a trial of AVB and conducted in a location where immediate recourse to Caesarean delivery is available (III-B).

5. **Analgesia:** Regional anesthesia with spinal, epidural, or pudendal block may be suitable options.

6. **Maternal bladder:** The bladder should be empty or emptied prior to attempting AVB, with consideration of deflating or removing the Foley catheter, if used, to avoid potential urethral trauma.

**SAFETY AND RISKS OF ASSISTED VAGINAL BIRTH**

Complications to both mother and baby can occur with any type of birth, including SVB. Maternal morbidity increases with the complexity of the delivery method, with SVB being the least morbid, followed in turn by any AVB and Caesarean delivery in labour.\textsuperscript{6} During the second stage of labour, the fetal head can become deeply impacted into the maternal pelvis, thereby increasing the technical difficulty of a Caesarean section as well as maternal and fetal morbidity.\textsuperscript{26} This includes an increased risk of major obstetrical hemorrhage, prolonged hospital stay, and NICU admission compared to AVB.\textsuperscript{27}

**Maternal Risks**

Maternal risks of AVB include all manners of soft tissue injury and both the short- and long-term sequelae of these injuries, as well as the psychological impact of the delivery on the mother and family.

Maternal soft tissue injuries associated with AVB include lower genital tract laceration, vulvar and vaginal hematomas, OASIS, and urinary tract damage.\textsuperscript{28–31} These injuries can be associated with increased blood loss and anemia, as well as increased pain at delivery and in the postpartum period, requiring more maternal analgesia. There may also be short- and long-term psychological sequelae of these injuries.

Maternal soft tissue trauma may be limited by avoiding traumatic insertion of the device, checking frequently for maternal soft tissue entrapment, avoiding slippage or pop-offs of the vacuum, and controlling the rate of descent and delivery of the head.\textsuperscript{32–34} Unless clinically indicated, routine use of episiotomy is no longer recommended to facilitate AVB.\textsuperscript{35}

In regard to AVB for malposition, a birth cohort study of over 1000 deliveries in New Zealand suggested that in
experienced hands, rotational forceps successfully delivered over 95% of infants with maternal trauma rates that are both low and similar to vacuum delivery. This was also supported by a retrospective study in the United Kingdom of 1291 consecutive births with malposition in the second stage of labour. The authors demonstrated that Kieland’s rotational delivery was more successful than autorotational vacuum (96% vs. 78%) with no significant differences in PPH, OASIS, or admission to the NICU. A 2013 prospective study suggested simple manual rotation of posterior or transverse fetuses at full dilation results in decreased operative delivery rate.

OASIS includes both partial and complete third- and fourth-degree tears of the perineum. The overall incidence of OASIS reported in the literature also varies across sources due to differences in the definition and accurate recognition of the condition, as well as the impact of episiotomy. It is generally accepted, however, that OASIS rates are higher with AVB than with SVB and are higher with forceps than with vacuum delivery. A recent review suggests an OASIS incidence of between 4% and 6.6% of all vaginal births, including those by AVB.

OASIS can cause significant perineal pain, which can lead to urinary retention or defecation problems in the early postpartum period and dyspareunia and sexual dysfunction in the long term. Damage to the anal sphincter complex or pudendal nerve can also lead to the many manifestations of anal incontinence. Women having any type of vaginal birth compared with a Caesarean delivery have an increased risk of developing anal incontinence. A large meta-analysis suggested that the risk of symptoms in the first postpartum year ranged from a one third increased risk for SVB (OR 1.32; 95% CI 1.04–1.68) to a doubling of risk with forceps (OR 2.01; 95% CI 1.47–2.74). However, when compared to SVB, instrumental deliveries resulted in more symptoms of anal incontinence (OR 1.47; 95% CI 1.22–1.78), which was statistically significant for forceps deliveries (OR 1.5; 95% CI 1.19–1.89) but not for vacuum deliveries (OR 1.31; 95% CI 0.97–1.77).

Urinary tract symptoms can occur secondary to nerve injury and pelvic floor weakness in the form of urinary incontinence or pelvic organ prolapse. Urinary stress incontinence is common in women during the early postpartum period. A Canadian study suggested urinary incontinence rates at 6 months postpartum of 26%, irrespective of mode of delivery. Spontaneous vaginal delivery was associated with a higher incidence of urinary incontinence (RR 2.1; 95% CI 1.1–3.7) compared with Caesarean delivery. There was no significant difference in rates of incontinence between women who had Caesarean births performed either before or during labour. Forceps delivery did not significantly increase the risk of urinary incontinence (RR 1.5; 95% CI 1.0–2.3) compared with spontaneous vaginal delivery. A 5-year follow-up study of a randomized controlled trial in the United Kingdom comparing vacuum versus forceps did not find any major differences in outcomes. Urinary incontinence was reported by 47%, bowel habit urgency was reported by 44%, and loss of bowel control “sometimes” or “frequently” by 20% of women. No significant differences were found in terms of either bowel or urinary dysfunction between the vacuum and forceps delivery groups.

Pelvic floor morbidity 3 years after instrumental versus Caesarean delivery in the second stage of labour was assessed in a prospective cohort of 393 women. Long-term urinary incontinence was greater in the instrumental delivery group as compared to the Caesarean delivery group (10.5% vs 2.0%; OR 5.37; 95% CI, 1.7–27.9). There were no significant differences in anorectal or sexual symptoms between the two groups. A subsequent delivery did not increase the risk of pelvic floor symptoms at 3 years in either group. Another longitudinal cohort of 1011 U.K. women 5–10 years after vaginal or Caesarean birth compared pelvic floor symptoms between groups. Compared with Caesarean without labour, SVB was associated with a significantly greater odds of stress incontinence (OR 2.9; 95% CI 1.5–5.5) and prolapse to or beyond the hymen (OR 5.6; 95% CI 2.2–14.7). AVB significantly increased the odds for all pelvic floor disorders, especially prolapse (OR 7.5; 95% CI 2.7–20.9). Their results suggested that 6.8 additional AVBs or 8.9 SVBs, relative to Caesarean births, would lead to 1 additional case of prolapse.

Postpartum PTSD has steadily gained recognition as a clinical entity. A recent Canadian study suggested an incidence of clinically diagnosed PTSD in up to 7.6% within the first 4 weeks postpartum, with another 16.6% of women reporting partial symptoms. While some studies suggest a delivery that is perceived by the woman to be traumatic, including an AVB or unplanned Caesarean delivery, may lead to PTSD and may even deter future child-bearing, a recent large population-based Norwegian study does not suggest that mode of delivery is a key factor in the development of postpartum PTSD. More research is required in this area.

Importantly, it is now emerging that compared to alternative modes of delivery, second stage Caesarean delivery is associated with increased risk of subsequent preterm birth both <37 weeks (RR 1.57; 95% CI 1.43–1.73) and <32
weeks (RR 2.12; 95% CI 1.67–2.68), along with increased rates of recurrent preterm birth <30 weeks (RR 3.06; 95% CI 1.22–7.71) and perinatal death due to prematurity (RR 1.44; 95% CI 1.05–1.96). Caesarean delivery is also significantly associated with increased risks of placenta accreta spectrum disorders and uterine rupture in subsequent pregnancies. These aspects should be kept in mind when counselling patients regarding the long-term risks of second stage Caesarean delivery.

Neonatal Risks

Large cohort studies suggest that overall, the rates of serious neonatal complications are low and are similar to rates noted when compared with Caesarean delivery at full dilation. This suggests that the common risk factor for certain neonatal complications may in fact be the presence of abnormal labour. However, both vacuum and forceps delivery may be associated with neonatal risks, depending on the technique or device used.

Application of vacuum to the fetal scalp causes the exaggeration of subcutaneous caput in the form of a chignon, which often resolves within hours of birth. Bruising is usually benign, as are fetal scalp lacerations. A cephalhematoma refers to a deeper collection of blood between the skull bone and periosteum that occurs in approximately 5% of vacuum deliveries. The associated swelling is typically benign and resolves over weeks to months; however, resorption of hemoglobin can result in hyperbilirubinemia, sometimes necessitating neonatal treatment.

A more serious complication of fetal scalp trauma secondary to vacuum delivery is a subgaleal hemorrhage. This is caused by tearing of the large emissary veins that lie beneath the aponeurosis of the scalp. Blood flow in this space is not limited by suture lines as in the case of cephalhematoma, and significant loss of volume can occur quickly, resulting in neonatal hypovolemia and shock. Early recognition and prompt replacement with blood and/or plasma are the key to limiting neonatal morbidity and mortality. A Canadian study suggests subgaleal hemorrhage is rare, reported 1 in 1000 deliveries with a rigid plastic vacuum cup.

Studies examining methods to reduce fetal scalp trauma with vacuum suggest this can best be prevented by avoiding excessive, incorrect, prolonged application (>15 minutes), pop-offs, and by avoiding rotational forces applied by the accoucher to the vacuum cup. If one considers the type of vacuum cup used, a meta-analysis suggests cephalhematoma and scalp injury were less likely with a soft versus rigid or metal cup but there appear to be no other differences in neonatal outcome. A recent Cochrane review suggests rapidly applying negative pressure results in no difference in neonatal complications, yet results in a significant decrease in time to delivery.

Shoulder dystocia is more common in AVB compared to SVB. Two population-based retrospective cohort studies have shown that the rates of shoulder dystocia are one half to two thirds lower with forceps birth compared to vacuum. Patients should be informed of this potential risk and maternal and neonatal teams should be prepared to act promptly if shoulder dystocia does occur.

Forceps deliveries are more likely to lead to facial lacerations in 1% of deliveries and mild corneal abrasions or external ocular trauma (2.3%). Facial nerve palsies are thought to occur in <1% of forceps deliveries and are likely to resolve spontaneously. Neonatal skull fractures have been noted with all types of delivery but may be more common with forceps as suggested by a small retrospective case control study noting 18 fractures following SVB while 50 fractures were noted after AVB. Brachial plexus injuries occur 5 in every 10 000 forceps deliveries. Prolonged or dysfunctional labour may be an important risk factor.

Retinal hemorrhage is recognized to occur in one quarter of normal deliveries but is far more common after instrumental deliveries. The hemorrhages, however, resolved rapidly and rarely persisted beyond 6 weeks. Follow-up studies suggest that vision in childhood is usually completely normal in affected infants. A large Californian database study suggested that intracranial hemorrhage occurs with 1 in 860 vacuum deliveries, a rate similar to that noted with both forceps delivery and Caesarean delivery in labour. Similarly, there appear to be no significant differences in neonatal encephalopathy or neonatal death when comparing vacuum and forceps.

When delivery by vacuum is compared to Caesarean delivery, lower rates of neurologic complications are seen, and when delivery by forceps is compared to both vacuum and Caesarean delivery, lower rates of neurologic complications including seizures, intraventricular hemorrhage, and subdural hemorrhage are reported. There is little evidence around long-term consequences of AVB, but there are no data to suggest any differences in cognitive development, learning, speech or neurologic abnormality in infants delivered by vacuum or forceps.

CHOICE OF INSTRUMENTS

A Cochrane review of randomized trials suggested vaginal delivery is unsuccessful in about 9% of attempted forceps.
deliveries and 14% of attempted vacuum deliveries. The possibility of CPD should always be considered if an appropriately executed attempt at instrumental delivery is not successful and the planned sequential use of instruments to achieve delivery is not recommended due to the potential for increased neonatal complications.

Large U.S. population-based studies suggested sequential use of instruments compared to forceps delivery alone was associated with an increased need for mechanical ventilation, intracranial hemorrhage, retinal hemorrhage, NICU admission, and feeding difficulty. However, if an instrument was felt to not be optimally applied, or its use limited by technical issues, it may be appropriate to consider a change in instruments as this is unlikely to compound risk and may avoid a difficult Caesarean delivery. Under such circumstances, a small Canadian cohort study of 288 unsuccessful vacuum deliveries suggested a successful forceps delivery rate of greater than 80% with no subgaleal or intracranial hemorrhages or skull fractures noted.

**Recommendations**

7. The physician should determine the instrument most suitable to the clinical circumstances and their level of skill. Vacuum and forceps are associated with different short- and long-term benefits and risks. Unsuccessful delivery is more likely with vacuum than forceps (I-A).

8. Planned sequential use of instruments is not recommended as it may be associated with an increased risk of perinatal trauma. If an attempted vacuum is unsuccessful, the physician should consider the risks of proceeding to an attempted forceps delivery versus Caesarean section (II-2B).

**Episiotomy**

Contemporary guidelines advise against the routine use of episiotomy for both assisted and unassisted vaginal delivery. A multicentre randomized controlled trial including 200 nulliparous women evaluating the role of routine versus restrictive episiotomy at AVB failed to show conclusive evidence regarding which practice is best. Subtle non-significant differences were seen in the rates of anal sphincter tears (8.1% routine vs. 10.9% restrictive; OR 0.72; 95% CI 0.28–1.87) and primary PPH (36.4% routine vs. 26.7% restrictive; OR 1.57; 95% CI 0.86–2.86). There were also no clinically significant differences in results separating forceps versus vacuum delivery.

A recent large observational study involving over 40,000 deliveries suggested that good communication, applied perineal stretching, and a mediolateral episiotomy for forceps delivery reduced the OASIS rate by half. Another centre in the United States was able to reduce the incidence of serious tears from 41% to 26% (P = 0.02) using a policy of mediolateral episiotomy rather than midline if episiotomy was deemed necessary, increased utilization of vacuum over forceps, conversion of OP to OA positions before delivery, flexion of the fetal head maintenance of axis traction, and early disarticulation of forceps if used.

These findings suggest that certain clinical factors such as nulliparity, forceps use, requirements for rapid delivery without adequate time for stretching of the perineum, and previous OASIS may be indications for an appropriately placed mediolateral episiotomy. To be protective, mediolateral episiotomies should be performed at an angle of 60–70 degrees from the midline (20–30 degrees from the horizontal) when the perineum is distended. Initiating the episiotomy 1 cm lateral to the midline on the fourchette may also be protective. The decision whether to perform this adjunct procedure must be made by the treating clinician, with a view to avoiding OASIS or expediting delivery within the unique context of each particular case.

**Recommendation**

9. Restrictive use of mediolateral episiotomy is supported in assisted vaginal birth (II-2B).

**Aftercare**

**Maternal**

Following an AVB, active management of the third stage of labour should be undertaken to limit the possibility of PPH as risk factors leading to AVB may increase chances of PPH.

Intrapartum antibiotic prophylaxis is not routinely recommended for AVB based on a retrospective review of just under 400 women, suggesting similar rates of endometritis in women undergoing AVB regardless of antibiotic administration. After OASIS repair, however, prophylactic single-dose intravenous antibiotics are recommended.

The lower genital tract, perineum, and anus should be examined after delivery for lacerations and trauma. It is important also to rule out pelvic injury in women who undergo Caesarean delivery following an unsuccessful AVB.
Careful documentation of the delivery should be undertaken in a timely fashion. The indication and method of AVB technique employed must be clearly and completely documented in all assisted deliveries. A contemporaneous written note and a dictated operative record are recommended.

**Documentation May Include but is Not Limited To:**

- Date/time
- Physician(s) involved/present
- Indication
- Anaesthesia type
- Record of discussion with the patient of the risks, benefits, and options
- Position and station of the fetal head (abdominally and vaginally)
- Amount of moulding and caput present
- Assessment of maternal pelvis adequacy
- Assessment of fetal heart rate and contractions
- Type of vacuum or forceps used
- Number of attempts and ease of application of vacuum or forceps
- Duration of traction for forceps and duration of application for vacuum (start and stop time noted), along with an estimation of force used
- Any rotation applied with forceps or autorotation that occurs with vacuum
- For vacuum, number of pop-offs
- Condition of newborn at delivery, with personnel present for potential resuscitation
- Position of chignon on fetal scalp (vacuum): flexing versus de flexing; median versus paramedian application
- Description of any maternal and neonatal injuries
- Initiation of monitoring for subgaleal hemorrhage (vacuum)

Appropriate analgesia should be offered post AVB. Non-steroidal anti-inflammatories and acetaminophen are preferred over narcotics, and care should be taken to avoid constipation.

Attention should be paid to voiding post AVB to ensure that urinary retention does not develop. At minimum, documentation of the timing and amount of first void and measurement of post-void residual volumes if retention is suspected should be considered. Women with either urinary incontinence or fecal incontinence post AVB are appropriate candidates for referral for pelvic physiotherapy.

Postpartum thromboprophylaxis following AVB should be considered in the presence of multiple clinical or pregnancy-related risk factors as for any other delivery.

Patients welcome the opportunity to debrief after delivery to specifically discuss the indications for interventions, management of any complications, along with short- and long-term implications for the future. Ideally, this should be performed by the practitioner who conducted the delivery and be adequately documented.

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**Recommendation**

10. A debrief should be done with the patient and support people immediately following an attempted or successful assisted vaginal birth. If this is not possible, ideally this should be done prior to hospital discharge and include the indication for assisted vaginal birth, management of any complications, and the prognosis for future deliveries (III-B).

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**Neonatal**

AVB is a safe delivery option with low rates of neonatal injury; however, neonatal care providers should be informed of the mode of delivery to be alert to any potential sequelae.

Neonates should be examined for any signs of facial injury, scalp trauma, or swelling, including cephalhematoma. Signs of neurologic irritation or subgaleal hemorrhage should also be observed. Serial hemoglobin measurements and head imaging may be appropriate if clinical concern is present.

Umbilical cord blood gas sampling of both arterial and venous samples is strongly recommended following AVB. Although there are no current recommendations based on evidence specific to AVB, delayed cord clamping should be considered depending on the clinical situation.

**NEXT PREGNANCY AND BEYOND**

Women who have had an AVB should be encouraged to aim for an SVB in subsequent pregnancies. The chances of successful SVB are around 80% to 90%, regardless of the previous mode of vaginal delivery.

It is important to note, however, that for those women who have experienced third- or fourth-degree OASIS, the future plan of care should be carefully reviewed with adequate counselling. Future vaginal delivery may impart increased risk of repeat OASIS injury and worsening morbidity, particularly for those with ongoing continence symptoms. At all times care planning should be individualized and flexible in accordance with patient preferences.
**Recommendation**

11. In a subsequent pregnancy, patients should be encouraged to consider spontaneous vaginal birth. However, care planning should be individualized and patient preference respected (II-3B).

**REFERENCES**


44. Mawdsley SD, Baskett TF. Outcome of the next labour in women who had a vaginal delivery in their first pregnancy. BJOG 2000;107:932–4.


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