Chapter 39

ASSISTED VAGINAL BIRTH: VACUUM AND FORCEPS

Assisted or operative vaginal birth refers to the use of vacuum or forceps ~~in~~ **to achieve** vaginal birth **in the second stage of labour**. Both methods are safe and reliable for assisting childbirth, provided that appropriate attention is paid to the indications and contraindications for the procedures. The benefits and risks, both maternal and fetal, of using either instrument, and the risks associated with proceeding vs. the alternative choice of Caesarean section must be considered in every case.

The choice of instrument should suit both the clinical circumstances and the preference of the patient and health care provider. Assessment of pelvic adequacy is mandatory.

Informed consent is essential.

VACUUM EXTRACTOR

The vacuum extractor should not be regarded as an easier alternative to forceps, or for use by less skilled operators.

The vacuum extractor is designed to produce traction upon the fetal scalp, in order to assist the maternal expulsive effort. It is not a device by which to apply rotation forces, nor is it likely to succeed in the absence of maternal expulsive effort. The vacuum may be used judiciously to correct attitude (deflexion), if it is properly applied and if traction is correctly applied.

INDICATIONS

1. Fetal
   - Evidence of atypical or abnormal fetal heart rate
2. Maternal
   - Medical indications to avoid Valsalva manoeuvre (cerebral vascular disease, cardiac condition)
3. Inadequate Progress
   - Adequate uterine activity documented

- No evidence of cephalopelvic disproportion
- Lack of maternal effort

CONTRAINDICATIONS

Contraindications - Absolute

- Non-cephalic presentation, face or brow
- Fetal conditions (eg bleeding or demineralization disorders)

Contraindications – Relative

- <34 weeks gestation
- need for operator applied rotation
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Previous fetal scalp sampling is not a contraindication to vacuum assisted birth.

PREREQUISITES

- Informed consent
- Appropriate analgesia
- Maternal bladder empty
- Vertex engaged
- Cervix fully dilated
- Membranes ruptured
- Adequate maternal pelvis by clinical assessment
- Experienced operator, adequate facilities
- Reasonable chance of success
- Back-up plan
- On-going fetal and maternal assessment

TECHNIQUE FOR VACUUM EXTRACTION (Appendix 1)

A useful mnemonic, which was initially developed for forceps births, has been adapted for vacuum extraction. (Bachman, Journal of American Academy of Family Practice, 1989) (See page 39-8).
The vacuum should be applied with rigorous adherence to the mnemonic provided. It is important that the indication is clear, well understood by the parents and fully documented. Traction is usually applied at settings between 500-600 mmHg (0.6-0.8 kg/cm^2), to resting pressure settings of between 100-200 mmHg (0.1-0.3 kg/cm^2).

Rule of Threes

The procedure is deemed to have failed when there has been failure to accomplish descent / birth according to the following:

- 3 pulls, over 3 contractions, no progress
- 3 pop-offs, without obvious cause
- 30 minutes elapsed time and delivery is still not imminent

The procedure should be abandoned at this point, and an alternate method of birth selected.

DISADVANTAGES OF VACUUM EXTRACTION

- Cephalohematoma
  - Subaponeurotic (subgaleal) haemorrhage
- Neonatal retinal haemorrhages
  - Uncertain clinical significance
- More likely to fail to delivery, requiring alternative
- Potential for other complications ie shoulder dystocia and postpartum hemorrhage

FORCEPS

The use of obstetrical forceps has decreased significantly during the past decade and has primarily been replaced by the increased use of Caesarean section. Birth trends have been observed showing that, for most countries, rates of Caesarean section have risen as operative vaginal birth rates have fallen. This trend has not been shown to confer benefit to the mother or baby.

Function of Forceps

- Traction
- Rotation
- Flexion
- Extension

INDICATIONS

The indications for forceps use are similar to those for the use of vacuum, but also include situations where the suboptimal attitude of the fetal head may be corrected provided that the appropriate prerequisites are met.

The prerequisites for forceps birth are:

- Informed consent
- Absence of fetal condition (eg bleeding or demineralization disorder)
- Appropriate analgesia in effect
- Bladder empty
- Head must be engaged
- Cervix fully dilated and retracted
- Membranes ruptured
- Exact position of the head determined
- Clinically adequate pelvis
- Adequate facilities and backup available
- Operator must have knowledge of the instruments, their use, and the complications that can arise
- Ongoing fetal and maternal assessment

CLASSIFICATION

Outlet Forceps

- Fetal head is at or on the perineum
- Fetal skull has reached the pelvic floor
- Scalp visible at the introitus without separating the labia
- The sagittal suture is in:
  AP diameter
  Right/left occiput anterior or posterior position (ie: rotation $\leq 45°$)

Low Forceps

- Skull is at station spines +2 or lower
- Two sub-divisions:
- Rotation of $\leq 45°$
- Rotation $\geq 45°$

Mid Forceps

- Head is engaged (bony skull not caput at station of spines 0 or lower)
- Leading position of the skull is above station +2

There remains a role for mid-forceps operations. The risk of a mid-forceps birth must be compared with that of its alternative, which is an intrapartum Caesarean section. When a mid-forceps birth is planned, there should be preparations made for prompt access to Caesarean birth in case vaginal birth is not easily accomplished (trial of forceps).

TECHNIQUE FOR FORCEPS BIRTH (Appendix 2)

- Mnemonic (See page 39-8,9)

FORCEPS SHOULD NEVER BE APPLIED THROUGH A CERVIX THAT IS NOT FULLY DILATED OR WITH AN UNENGAGED PRESENTING PART.

Checking the Application - Three Ways

- The posterior fontanelle should be located midway between the sides of the blades, with the Lambdoid sutures equal distance from the forceps blades and one finger breadth above the plane of the shanks.

- The fenestration of the blades should be barely felt and the amount of fenestration felt on each side should be equal (with a solid blade no more than a fingertip should be able to be inserted between the blade and the fetal head).

- The sagittal suture must be perpendicular to the plane of the shanks throughout its length.

Potential Complications

- Maternal lacerations
- Retinal hemorrhage
- Facial nerve palsies
- Subaponeurotic hemorrhages
- Minor external ocular trauma
- Fetal skull fractures
- Cephalohematomas
- Scalp lacerations

COMPARISON OF VACUUM EXTRACTION TO FORCEPS

Episiotomy is not obligatory with forceps or vacuum, but is more common with forceps.

One serious potential complication of vacuum extractions is subgaleal or subaponeurotic haemorrhage. Failure to recognize high pelvic station and/or CPD, and exceeding the recommended limits for the attempted extraction are the two common operator errors associated with subgaleal haemorrhage.
After every vacuum birth, there should be surveillance of the neonate to ensure that the

expected swelling on the head does not thereafter enlarge significantly and that there is no evidence of developing hypovolemia. Newborn assessment q1h x 2, then q2 x 1 then q4h x 24 hours involving measurement of newborn head circumference and heart rate. Notify physician of head circumference increase of 1 cm or more, heart rate greater than 170 beats per min.

PATIENTS SHOULD BE INFORMED OF THE POTENTIAL RISKS AND BENEFITS OF THE USES OF BOTH VACUUM EXTRACTION AND FORCEPS BIRTH.

DOCUMENTATION

The indication, definition and method of operative technique employed must be clearly and completely documented in all operative births. The position and station of the fetal head at the commencement of the intervention must be stated. A contemporaneous written note and a dictated operative record should be prepared.

This is the suggested format for a chart note documenting an assisted vaginal birth and may also serve as a template to dictate a birth summary.

- Date / Time
- Physician
- Indication
- Record of discussion with the woman of the risks, benefits, and options
- Position and station of the fetal head
- Amount of moulding and caput present
- Assessment of maternal pelvis
- Assessment of fetal heart rate and contractions
- Number of attempts and ease of application of vacuum or forceps
- Duration of traction for both forceps and vacuum (start and stop time for vacuum) and force used
- Description of maternal and neonatal injuries

REFERENCES

1. Managing Obstetrical Risk Efficiently Program, Salus Corporation. www.moreob.com

2. Society of Obstetricians and Gynaecologists of Canada (SOGC), ALARM Course

Syllabus, 22nd Edition, 2015-2016.

Vacuum Mnemonic		
A	ADDRESS ANAESTHESIA ASSISTANCE ABSENCE	– Consent – Adequate pain relief – Neonatal support – Of contraindication
B	BLADDER	– Bladder empty
C	CERVIX CONTRACTIONS	– Fully dilated, membranes ruptured – adequate
D	DETERMINE	– Position, station and pelvic adequacy – Think possible shoulder dystocia – Most appropriate location for birth
E	EQUIPMENT	– Inspect vacuum cup, pump, tubing and check pressure
F	FONTANELLE	– Position the cup just anterior to or over the posterior fontanelle – Sweep the finger around cup to clear maternal tissue

G	GENTLE TRACTION	– 100 mm Hg initially
		– pull with contractions only
		– as contraction begins:
		  – increase pressure to 600 mm Hg
		  – prompt mother for good expulsive effort
		  – traction in axis of birth canal

H	HALT	– IF – No progress after 2 pulls – no progress with three traction aided contractions – vacuum pops-off three times – no more than 20 minutes total application
I	INCISION	– consider episiotomy (not routinely required)
J	JAW	– remove vacuum when jaw is reachable or delivery assured

Adapted from Bachman J. *A Vacuum Operation Needs to be Documented in the Same Manner as any Other Operative Procedure.* Forceps Delivery Correspondence. J Am Acad Fam Practi 1989;29:4.

Forceps Mnemonic		
A	ADDRESS ANAESTHESIA ASSISTANCE ABSENCE	– Consent – Adequate pain relief – Neonatal support – Of contraindications
B	BLADDER	– Bladder empty
C	CERVIX CONTRACTIONS	– Fully dilated, membranes ruptured – Adequate
D	DETERMINE	– Position, station and pelvic adequacy – Think possible shoulder dystocia – Most appropriate location for birth
E	EQUIPMENT	– Check the equipment
F	FORCEPS	– Phantom application – Left blade, left hand, maternal left side, pencil grip and vertical insertion, with right thumb directing blade – Right blade, right hand, maternal right side, pencil grip and vertical insertion with left thumb directing blade – Lock blade and support – check application – Posterior fontanelle 1 cm above plane of shanks – Fenestration not > 1 fingerbreadth between it and scalp – Sagittal suture perpendicular to plane or shanks with occipital sutures 1 cm above respective blades
G	GENTLE TRACTION	– Applied with contraction/expulsive effort
H	HANDLE ELEVATED HALT	– Traction in axis of birth canal – Do not elevate handle too early – Difficulty or failure of application – Inadequate descent with traction – If no progress observable in 3 traction attempts
I	INCISION	– consider episiotomy (not routinely required)
J	JAW	– when jaw is reachable, remove forceps

Adapted from Bachman J. *A Vacuum Operation Needs to be Documented in the Same Manner as any Other Operative Procedure.* Forceps Delivery Correspondence. J Am Acad Fam Practi 1989;29:4.