Operative vaginal delivery

Operative vaginal delivery (OVD) refers to a vaginal birth with the use of any type of forceps or vacuum extractor (ventouse). The terms instrumental delivery, assisted vaginal delivery and OVD are used interchangeably.

The goal of OVD is to expedite delivery with a minimum of maternal or neonatal morbidity.

OVD should only be performed when the safety criteria have been met and when the benefits outweigh the risks.

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- obstetricians should achieve experience in spontaneous vaginal delivery prior to commencing training in OVDs.
- OVDs should be conducted by obstetricians with competency in the chosen procedure or by trainees under direct supervision of an experienced trainer. When these conditions are adhered to, the outcomes of OVD are good

Incidence

In the UK, between 10% and 15% of deliveries are assisted with forceps or ventouse. The rate in nulliparous women is as high as 30%.

The incidence of OVD varies widely both within and between countries, and this impacts on rates of second-stage caesarean section.

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strategies have been employed to lower rates of OVD include:

1. provision of one-to-one midwifery care in labour.
2. the presence of a birth partner.
3. delayed pushing in the second stage of labour, especially with epidural analgesia.
4. use of oxytocin to enhance expulsive contractions in the second stage of labour.
5. maternal repositioning to enhance the effects of gravity and the maternal urge to push

Indications for OVD

❖Fetal Suspected fetal compromise (CTG pathological, abnormal pH or lactate on fetal blood sampling, thick meconium

❖Maternal

•Nulliparous women – lack of continuing progress for 3 hours (total of active and passive second stage of labour) with regional anaesthesia or 2 hours without regional anaesthesia

•Multiparous women – lack of continuing progress for 2 hours (total of active and passive second stage of labour) with regional anaesthesia or 1 hour without regional anaesthesia

•Maternal exhaustion/vomiting/distress

•Medical indications to avoid prolonged pushing or valsalva (e.g. cardiac disease, hypertensive crisis, cerebral vascular disease, particularly uncorrected cerebral vascular malformations, myasthenia gravis, spinal cord injury)

❖Combined Fetal and maternal indications for assisted vaginal delivery often coexist. The threshold to intervene may be lower where several factors coexist)

Classification of operative vaginal delivery

A- Outlet

Fetal scalp visible without separating the labia*

Fetal skull has reached the pelvic floor

Sagittal suture is in the antero-posterior diameter or right or left occiput anterior or posterior position (rotation does not exceed 45°)

Fetal head is at or on the perineum

B- Low

Leading point of the skull (not caput) is at station plus 2 cm or more but not on the pelvic floor

Two subdivisions:

(a) rotation of 45° or less; (b) rotation more than 45°

C- Mid

Fetal head is no more than 1/5 palpable per abdomen, usually 0/5

Leading point of the skull is above station plus 2 cm but not above the ischial spines (station 0 to +1)

Two subdivisions: (a) rotation of 45° or less;

(b) rotation of more than 45°

D-High Not appropriate, therefore not included in classification (station –1 or above)

Contraindications

1. *When the safety criteria are not met,* for example, a high fetal head two-fifths palpable abdominally with station above the ischial spines.
2. before full dilatation of the cervix ,although possible exceptions occur (e.g. with the vacuum delivery of a second twin where the cervix has contracted somewhat in the interval between delivery of the first and second twins).
3. Fetal bleeding disorders (alloimmune thrombocytopenia) or a predisposition to fracture (osteogenesis imperfecta) are relative contraindications to OVD.

4-The ventouse should not be used in gestations of less than 34 completed weeks because of the risk of cephalhaematoma and intracranial haemorrhage. It is relatively contraindicated at gestational ages 35–36 weeks.

5-the ventouse should not be used for a face or breech presentation.

6- There is minimal risk of fetal haemorrhage if the vacuum extractor is employed following fetal blood sampling (FBS) or application of a fetal scalp electrode (FSE).

Safety criteria for operative vaginal delivery

A- Full abdominal and vaginal examination

- Head is ≤1/5 palpable per abdomen (in most cases 0/5 palpable)
- Cervix is fully dilated and the membranes ruptured
- Station at level of ischial spines or below (0/+1/+2/+3)
- Exact position of the head has been determined so correct placement of the instrument can be achieved
- Caput and moulding is no more than moderate
- Pelvis is deemed adequate

B- Preparation of mother

- Clear explanation given and informed consent obtained
- Trust has been established and woman offers full cooperation
- Appropriate anaesthesia is in place; for midpelvic rotational delivery this will usually be a regional block; a pudendal block may be appropriate in the context of urgency; a perineal block may be sufficient for low-pelvic or outlet delivery
- Maternal bladder has been emptied recently
- In-dwelling catheter has been removed or balloon deflated
- Aseptic technique

C--Preparation of Staff

- Operator has the knowledge, experience and skill necessary
- Adequate facilities are available (appropriate equipment, bed, lighting) and access to an operating theatre
- Back-up plan in place in case of failure to deliver: For midpelvic deliveries, theatre staff should be available immediately to allow a caesarean section to be performed without delay (<30 minutes); senior obstetrician should be present if a junior obstetrician is conducting the delivery
- Anticipation of complications that may arise (e.g. shoulder dystocia, perineal trauma, postpartum haemorrhage)
- Personnel present that are trained in neonatal resuscitation

Table 3. Prerequisites for operative vaginal delivery

Full abdominal and vaginal examination	Head is ≤1/5th palpable per abdomen
	Vertex presentation.
	Cervix is fully dilated and the membranes ruptured.
	Exact position of the head can be determined so proper placement of the instrument can be achieved.
	Assessment of caput and moulding.
	Pelvis is deemed adequate. Irreducible moulding may indicate cephalo–pelvic disproportion.
Preparation of mother	Clear explanation should be given and informed consent obtained.
	Appropriate analgesia is in place for mid-cavity rotational deliveries. This will usually be a regional block. A pudendal block may be appropriate, particularly in the context of urgent delivery.
	Maternal bladder has been emptied recently. In-dwelling catheter should be removed or balloon deflated.
	Aseptic technique.
Preparation of staff	Operator must have the knowledge, experience and skill necessary.
	Adequate facilities are available (appropriate equipment, bed, lighting).
	Back-up plan in place in case of failure to deliver. When conducting mid-cavity deliveries, theatre staff should be immediately available to allow a caesarean section to be performed without delay (less than 30 minutes). A senior obstetrician competent in performing mid-cavity deliveries should be present if a junior trainee is performing the delivery.
	Anticipation of complications that may arise (e.g. shoulder dystocia, postpartum haemorrhage)
	Personnel present that are trained in neonatal resuscitation

What type of consent is required?

❖ Women especially during their first pregnancy should be informed in the antenatal period about operative vaginal delivery including:

•strategies effective in reducing the need for operative vaginal birth.

•preferences for or objections to a particular instrument.

1-In delivery room, verbal consent should be obtained and discussion documented in the notes

❖ Information should be given to women in labour between contractions.

❖ If circumstances allow, written consent may also be obtained.

2-For trial of operative vaginal delivery in theatre written consent should be obtained.

Where should operative vaginal delivery take place?

➢Operative vaginal births that have a higher risk of failure should be considered a trial and conducted in a place where immediate caesarean section can be undertaken.

Higher rates of failure are associated with:

❖maternal BMI over 30

❖ estimated fetal weight over 4000 g or clinically big baby

❖ occipito-posterior position

❖mid-cavity delivery or when 1/5th of the head palpable per abdomen.

Choice of instrument

The guidelines of the RCOG in the UK recommend that obstetricians should be competent and confident in the use of both forceps and the ventouse and that practitioners should choose the most appropriate instrument for the individual circumstances.

The choice of instrument should be based on a combination of indication, experience and training.

The aim should be to complete the delivery successfully with the lowest possible morbidity and, where appropriate, the preferences of the mother should be taken into account.

Ventouse and forceps have been **compared**

The ventouse compared to forceps is significantly **more likely to be associated with:**

Failure to achieve a vaginal delivery.

Cephalohaematoma (subperiosteal bleed).

Retinal haemorrhage.

Maternal worries about the baby.

The ventouse compared to forceps is significantly **less likely to be associated with:**

Use of maternal regional/general anaesthesia.

Significant maternal perineal and vaginal trauma.

Severe perineal pain at 24 hours.

The ventouse compared to forceps is **similar in terms of:**

Delivery by caesarean section (where failed vacuum is completed by forceps).

Low 5 minute Apgar scores

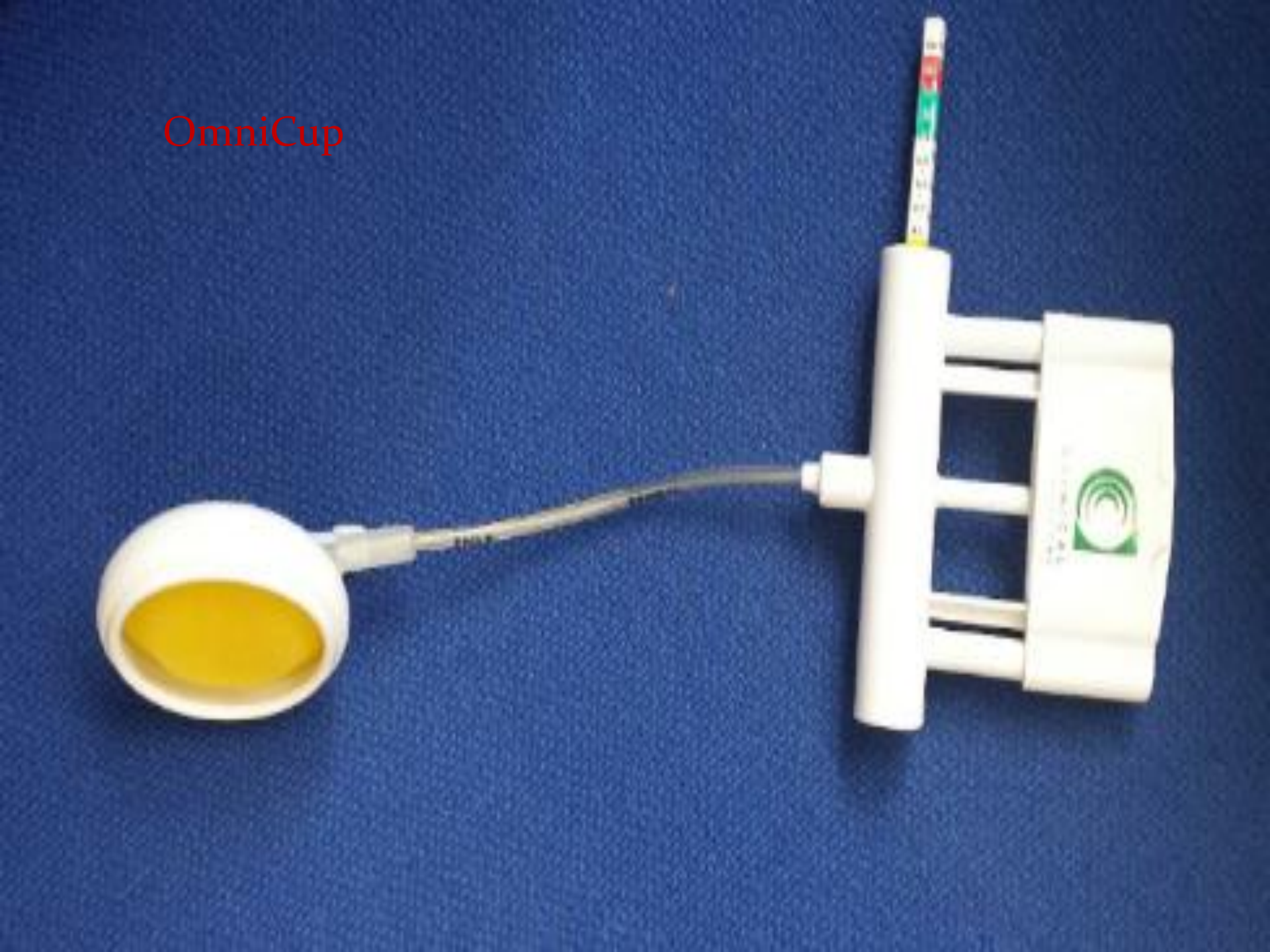
Instrument types

Ventouse/vacuum extractors

The basic premise of vacuum extraction is that a suction cup, of a silastic or rigid construction, is connected, via tubing, to a vacuum source .**Either** directly through the tubing or via a connecting 'chain', direct traction can then be applied to the presenting part coordinated with maternal pushing to expedite delivery. Recent developments have removed the need for cumbersome external suction generators and have incorporated the vacuum mechanism into 'hand-held' pumps (e.g. OmniCup™).

rigid metalic cups

Silastic soft cup


OmniCup

Initial clinical trials suggested that the failure rate is higher with hand-held disposable devices, but this may have been related to the learning curve of adapting to new instruments. More recent large case series have reported success rates similar to that of standard vacuum devices.

SOFT OR RIGID CUPS

Soft vacuum cups are significantly more likely to fail to achieve vaginal delivery than rigid cups; however, they are associated with less scalp injury.

There appears to be no difference in terms of maternal trauma. The soft cups are appropriate for uncomplicated deliveries with an occipito-anterior position (OA);

metal cups appear to be more suitable for

1. occipito-posterior (OP),
2. occipitotransverse
3. potentially difficult OA position deliveries where the infant is larger or there is marked caput.

For successful use of the ventouse, (TECHNIQUE)

1-determination of the flexion point is vital.

This is located at the vertex, which, in an average term infant, is on the saggital suture 3 cm anterior to the posterior fontanelle and thus 6 cm posterior to the anterior fontanelle. The centre of the cup should be positioned directly over this, as failure to do so will lead to a progressive deflexion of the fetal head during traction, and an inability to deliver the baby safely.

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2-The operating vacuum pressure for nearly all types of device is between 0.6 and 0.8 kg/cm2. It is prudent to increase the suction to 0.2 kg/cm2 first and then to recheck that no maternal tissue is caught under the cup edge. When this is confirmed the suction can then be increased

Traction must occur in the plane of least resistance along the axis of the pelvis

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– the traction plane. This will usually be at exactly 90º to the cup and the operator should keep a thumb and forefinger on the cup and fetal scalp to ensure that the traction direction is correct and to feel for slippage. Safe and gentle traction is then applied coordinated with uterine contractions and voluntary maternal expulsive efforts. There is a descent phase bringing the head onto the perineum usually achieved in at most three pulls. The crowning phase should occur shortly afterwards, and depending on the resistance of the perineum, may occur with one further pull or some operators prefer to use up to three very small pulls to minimize perineal trauma.

With any ventouse, the operator should allow no more than two episodes of breaking the suction 'pop-offs' in a vacuum delivery, and the maximum time from application to delivery should ideally be less than 15 minutes. Rotation is achieved by the natural progression of the head through the pelvis.

It is not acceptable to use a ventouse when:

A. The position of the fetal head is unknown.
B. There is a significant degree of caput that may either preclude correct placement of the cup or, more sinisterly, indicate a substantial degree of CPD.
C. The operator is inexperienced in the use of the instrument.

Forceps

Types of forceps

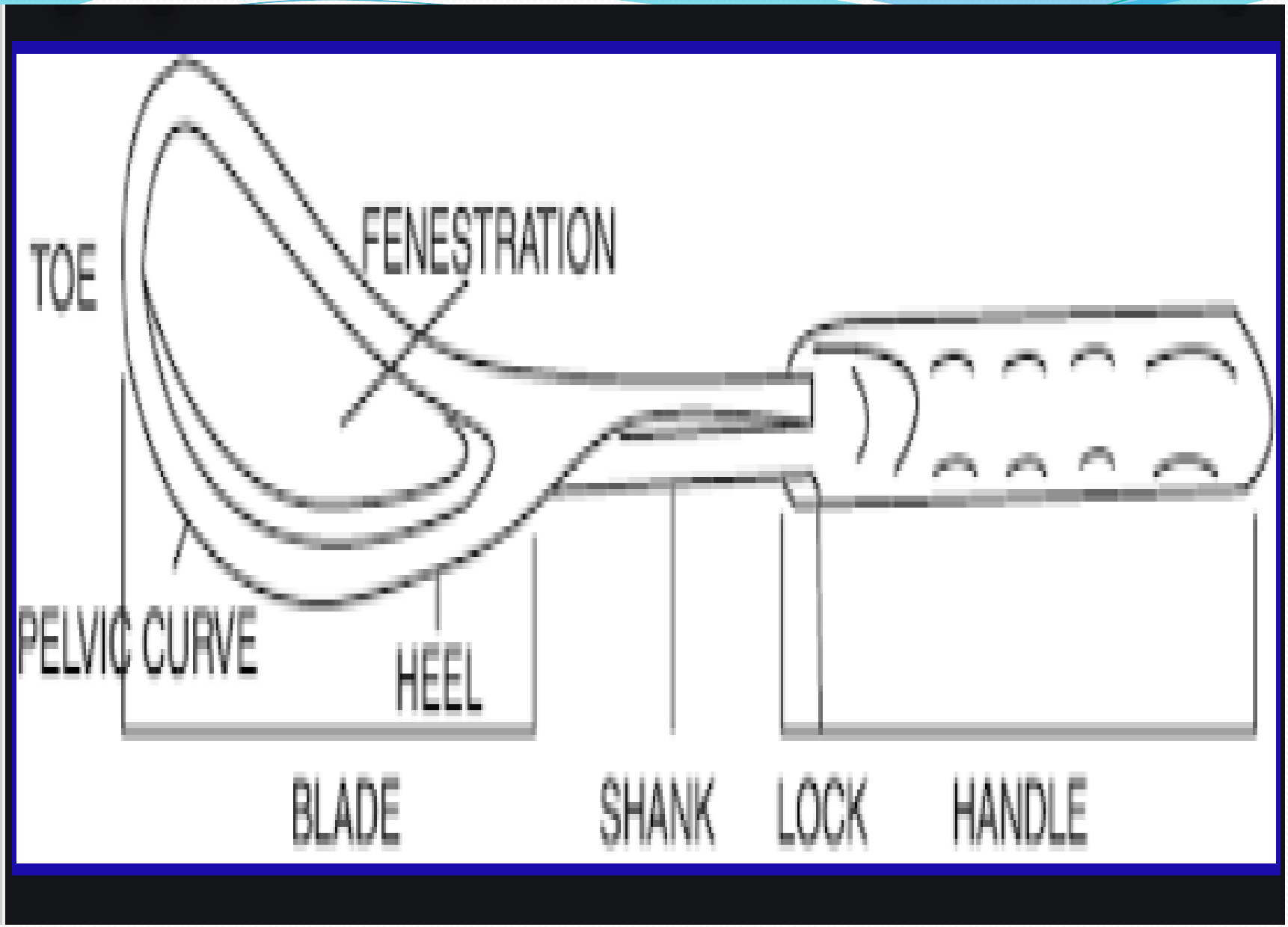
The basic forceps design has not changed radically over many years; all types in use today consist of two blades with shanks, joined together at a lock, with handles to provide a point for traction.

The specific details of construction vary between instruments. The blades may be fenestrated (open), pseudofenestrated (open with a protruding ridge) or solid. Likewise, the length of the shanks, the design of the lock (convergent, divergent or sliding) and the fashioning of the handles are instrument specific.

Non-rotational forceps are used when the head is OA with no more than 45ºdeviation to the left or right (LOA, ROA). Examples such as Neville Barnes or Simpson forceps **have a pelvic curve and an English or non-sliding** lock.

If the head is positioned more than 45º from the vertical, rotation must be accomplished before traction. Forceps designed for rotation, such as Kielland forceps, have minimal pelvic curve to allow rotation around a fixed axis; the sliding lock of the Kielland forceps **facilitates correction of** asynclitism.

Kielland rotational forceps (left) and Simpson non-rotational forceps


TOE
FENESTRATION
PELVIC CURVE
HEEL
BLADE
SHANK
LOCK
HANDLE

Technique

For forceps, all the usual prerequisites for safe delivery apply, but in addition it is essential that the operator checks the pair of forceps to ensure that a matching pair has been provided and that the blades lock with ease (both before and after application). By convention, the left blade is inserted before the right with the operator's hand protecting the vaginal wall from the blades. With proper placement of the forceps blades, they come to lie parallel to the axis of the fetal head and between the fetal head and the pelvic wall. The operator then articulates and locks the blades, checking their application before applying traction.

Traction should be applied intermittently coordinated with uterine contractions and maternal expulsive efforts. The axis of traction changes during the delivery and is guided along the 'J'-shaped curve of the pelvis. As the head begins to crown, the blades are directed to the vertical and the head is delivered. The majority of forceps deliveries will be completed in no more than three pulls.

Specific techniques are required for rotational forceps deliveries and only those who have been properly trained in their use should employ them. Rotation occurs between contractions and the descent phase is similar to non-rotational forceps.

The role of episiotomy at vacuum and forceps delivery is controversial with conflicting studies reported. A RCT reported that a routine approach to episiotomy was neither protective nor associated with an increased risk of severe perineal tearing. In practice, most obstetricians cut an episiotomy routinely for forceps delivery, especially in nulliparous deliveries where anal sphincter damage is more likely. In parous women, particularly those requiring ventouse delivery, an episiotomy may not be necessary.

When should operative vaginal delivery be abandoned?

1. where there is no evidence of progressive descent with moderate traction during each contraction

2. where delivery is not imminent following three contractions of a correctly applied instrument.

Paired cord blood samples should be processed and recorded following operative vaginal delivery

sequential use of instruments

- The use of sequential instruments is associated with an increased risk of trauma to the infant.
- The operator must balance the risks of a CS following failed vacuum extraction with the risks of forceps delivery following failed vacuum extraction.
- Second stage CS is associated with an increased risk of major obstetric haemorrhage, prolonged hospital stay and admission of the baby to NICU compared with completed instrumental delivery.
- sequential use of instruments compared with forceps alone was associated with an increased risk of:
- need for mechanical ventilation.
- intracranial haemorrhage.
- retinal haemorrhage.
- feeding difficulty.

The neonatologist should be informed to ensure appropriate management of the baby.

Should prophylactic antibiotics be given?

There are insufficient data to justify the use of prophylactic antibiotics in operative vaginal delivery.

Good standards of hygiene and aseptic techniques are recommended.

Aftercare following operative vaginal delivery

A--Thromboprophylaxis

Women should be reassessed after an operative vaginal delivery for risk of thromboembolism.

risk factors for thromboembolism:

1. Mid-cavity delivery.
2. prolonged labour.
3. immobility.

B--Analgesia after delivery

Paracetamol and diclofenac should be offered after an operative vaginal delivery.

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C--Care of the bladder after delivery

 The timing and volume of the first void urine should be monitored and documented.

 A post-void residual should be measured if retention is suspected.

 Women with Operative delivery, prolonged labour a spinal anaesthetic or an epidural are at increased risk of retention and should have an indwelling catheter in place for at least 12 hours.

 Women should be offered physiotherapy to prevent urinary incontinence

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D--advise for future deliveries

Aim is spontaneous vaginal delivery in a subsequent pregnancy as there is a high success 80%.

Care should be individualized for women who have sustained a 3rd or 4th degree perineal tear

Serious Complication of OVD

	Complication	Instrument
Maternal	3rd and 4th degree perineal tears	> Forceps
	Extensive or significant vaginal / vulval tear	> Forceps
	PPH	> Forceps
Neonatal	Subaponeurotic (subgaleal haemorrhage)	> Vacuum
	Intracranial haemorrhage	> Vacuum
	Injury of sixth and seventh cranial nerves, Erb palsy	Mixed
	Cervical spine injury	> Forceps (rotational)