



Royal College of  
Obstetricians &  
Gynaecologists

# Operative Vaginal Delivery

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# Operative Vaginal Delivery

This is the third edition of this guideline, which was published under the same title in October 2005 and formerly as *Instrumental vaginal delivery*, which was published in October 2000.

## 1. Purpose and scope

The aim of this guideline is to provide up-to-date information on the use of forceps and vacuum extractor for both rotational and non-rotational operative vaginal deliveries. Obstetricians should be confident and competent in the use of both instruments for non-rotational delivery and in the use of a minimum of one technique for rotational delivery. An understanding of the anatomy of the birth canal and the fetal head is a prerequisite to becoming skilled in the safe use of forceps or vacuum extractor. It is strongly recommended that obstetricians achieve experience in spontaneous vaginal delivery prior to commencing training in operative vaginal delivery. The goal of operative vaginal delivery is to mimic spontaneous vaginal birth, thereby expediting delivery with a minimum of maternal or neonatal morbidity. The scope of this guideline will include indications for operative vaginal delivery, choice of instrument, aspects of safe clinical practice, risk of physical and psychological complications and a review of special circumstances. Concern was raised following publication of the second edition of the guideline that there had been insufficient attention paid to the safety of the instruments used and particularly the potential for neonatal morbidity following failed operative deliveries. These issues have been addressed in this edition.

## 2. Background

Operative vaginal delivery rates have remained stable at between 10% and 13% in the UK, yielding safe and satisfactory outcomes for the majority of mothers and babies.<sup>1,2</sup> There has been an increasing awareness of the potential for morbidity for both the mother and the baby. The increased risk of neonatal morbidity in relation to operative vaginal delivery is long established although with careful practice overall rates of morbidity are low.<sup>3</sup>

In 1998, the US Food and Drug Administration issued a warning about the potential dangers of delivery with vacuum extractor.<sup>4</sup> This followed several reports of infant fatality secondary to intracranial haemorrhage. In addition, there has been a growing awareness of the short-term and long-term morbidity of pelvic floor injury as well as neurodevelopmental outcomes for children following operative vaginal delivery.<sup>5-11</sup> Caesarean section in the second stage of labour is an alternative approach but also carries significant morbidity and implications for future births. The goal should be to minimise the risk of morbidity and, where morbidity occurs, to minimise the likelihood of serious harm while maximising maternal choice.

## 3. Identification and assessment of the evidence

A search of Medline and Embase from 2004 to 2009 and of the Cochrane Library Issue 2, 2009 was undertaken for relevant systematic reviews, meta-analyses, randomised controlled trials and other clinical trials. The date of the last search was May 2009. The main keywords used were 'extraction, obstetrical', 'vacuum extraction, obstetrical', 'vacuum extraction, instrumental delivery', 'obstetrical forceps', 'forceps delivery', 'forceps', 'ventouse', 'labour, obstetric', 'delivery, obstetric' and 'parturition'.

## 4. Preparation for operative vaginal delivery

### 4.1 Can operative vaginal delivery be avoided?

**All women should be encouraged to have continuous support during labour as this can reduce the need for operative vaginal delivery.**



**Use of upright or lateral positions and avoiding epidural analgesia can reduce the need for operative vaginal delivery.**

A

**Delayed pushing in primiparous women with an epidural can reduce the need for rotational and midcavity deliveries.**

A

As operative vaginal delivery can be associated with maternal and neonatal morbidity, strategies that reduce the need for operative vaginal delivery should be used. Continuous support for women during childbirth can reduce the incidence of operative vaginal delivery (15 trials; n=13 357; RR 0.82; 95% CI 0.82–0.96), particularly when the carer was not a member of staff.<sup>12</sup> Use of any upright or lateral position in the second stage of labour compared with supine or lithotomy positions was associated with a reduction in the number of assisted deliveries (20 trials; n=6135; RR 0.80; 95% CI 0.69–0.92).<sup>13</sup> Epidural analgesia compared with non-epidural methods is associated with an increased incidence of operative vaginal deliveries (17 trials; n=6162; OR 1.38; 95% CI 1.24–1.53), but provides better pain relief than non-epidural analgesia (one trial; n=105; weighted mean difference -2.60; 95% CI -3.82 to -1.3).<sup>14</sup>

Evidence level 1++

A recent Cochrane review concluded that using a partogram does not lead to a reduction in the incidence of operative births (RR 1.00; 95% CI 0.85–1.17).<sup>15</sup> One study showed that in primiparous women with an epidural, starting oxytocin in the second stage of labour can reduce the need for non-rotational forceps delivery.<sup>16</sup> The National Institute for Health and Clinical Excellence Clinical Guideline 55: *Intrapartum care* cites this study and concludes that oxytocin should not be used as a matter of routine in the second stage of labour, on the basis of one study.<sup>17</sup> In particular, oxytocin should be used with extreme caution in the second stage of labour in multiparous women. Therefore, we recommend that each woman should be assessed individually for the management of the second stage of labour.

Evidence level 1+

A meta-analysis demonstrated that primiparous women who received epidurals were likely to have fewer rotational or mid-cavity operative interventions when pushing was delayed for 1 to 2 hours or until they had a strong urge to push.<sup>18</sup>

There is insufficient evidence to support the hypothesis that discontinuing epidural analgesia reduces the incidence of operative vaginal delivery (23% versus 28%; RR 0.84; 95% CI 0.61–1.15), but there is evidence that it increases the woman's pain (22% versus 6%; RR 3.68; 95% CI 1.99–6.80).<sup>19</sup>

Evidence level 1++

There is no difference between the rates of operative vaginal delivery for combined spinal-epidural and standard epidural techniques (19 trials; n=2658; OR 0.82; 95% CI 0.67–1.00)<sup>20</sup> or patient-controlled epidural analgesia and standard epidural technique. A meta-analysis of nine studies, including 641 women, comparing patient-controlled epidural analgesia with continuous infusion showed that obstetric outcome was comparable in all included studies.<sup>21</sup> A randomised controlled trial of 126 women comparing patient-controlled epidural analgesia with continuous epidural infusion reported similar rates of normal delivery with a *P* value of 0.56.<sup>22</sup>

#### 4.2 How should operative vaginal delivery be classified?

**A standard classification of operative vaginal delivery should be used.**

D

To enable bench marking, audit and comparison between studies, a standard definition of the types of operative delivery should be used. The American College of Obstetricians and Gynecologists criteria are adapted in Table 1 and define the delivery by station and position.<sup>23</sup>

Evidence level 4

**Table 1. Classification for operative vaginal delivery**

<b>Outlet</b>	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</b>	Leading point of the skull (not caput) is at station plus 2 cm or more and not on the pelvic floor Two subdivisions: <ul style="list-style-type: none"> <li>• rotation of 45° or less from the occipito-anterior position</li> <li>• rotation of more than 45° including the occipito-posterior position</li> </ul>
<b>Mid</b>	Fetal head is no more than 1/5th palpable per abdomen Leading point of the skull is above station plus 2 cm but not above the ischial spines Two subdivisions: <ul style="list-style-type: none"> <li>• rotation of 45° or less from the occipito-anterior position</li> <li>• rotation of more than 45° including the occipito-posterior position</li> </ul>
<b>High</b>	Not included in the classification as operative vaginal delivery is not recommended in this situation where the head is 2/5th or more palpable abdominally and the presenting part is above the level of the ischial spines

Adapted from the American College of Obstetrics and Gynecology, 2000<sup>23</sup>

### 4.3 When should operative vaginal delivery be offered?

**Operators should be aware that no indication is absolute and should be able to distinguish ‘standard’ from ‘special’ indications.**

D

**A vacuum extractor should not be used at gestations of less than 34 weeks +0 days. The safety of vacuum extraction at between 34 weeks +0 days and 36 weeks +0 days of gestation is uncertain and should therefore be used with caution.**

D

Operative intervention is used to shorten the second stage of labour. It may be indicated for conditions of the fetus or of the mother (Table 2).<sup>24</sup> A retrospective cohort study of 15 759 nulliparous women demonstrated that maternal morbidity increased significantly after 3 hours of the second stage and further increased after 4 hours. The benefits of a shortened second stage for certain medical conditions should be discussed where possible in the antenatal period. There was no evidence of neonatal morbidity increasing in this retrospective study, where fetal surveillance and timely obstetric intervention were used.<sup>25</sup> The time constraints listed in Table 2 are therefore for guidance. The question of when to intervene should involve balancing the risks and benefits of continuing pushing versus an operative delivery. There is no evidence that elective operative delivery for inadvertent dural puncture is of benefit, unless the woman has a headache that worsens with pushing.<sup>26</sup>

Evidence level 2-

Fetal bleeding disorders (e.g. alloimmune thrombocytopenia) or a predisposition to fracture (e.g. osteogenesis imperfecta) are relative contraindications to operative vaginal delivery. However, there

Evidence level 4

**Table 2. Indications for operative vaginal delivery<sup>24</sup>**

Type	Indication
<b>Fetal</b>	Presumed fetal compromise (see text)
<b>Maternal</b>	To shorten and reduce the effects of the second stage of labour on medical conditions (e.g. cardiac disease Class III or IV*, hypertensive crises, myasthenia gravis, spinal cord injury patients at risk of autonomic dysreflexia, proliferative retinopathy)
<b>Inadequate progress</b>	Nulliparous women – lack of continuing progress for 3 hours (total of active and passive second-stage labour) <sup>17</sup> 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 labour) <sup>17</sup> with regional anaesthesia, or 1 hour without regional anaesthesia Maternal fatigue/exhaustion

\* New York Heart Association classification  
No indication is absolute and each case should be considered individually

may be considerable fetal risk if the head has to be delivered abdominally from deep in the pelvis.<sup>27,28</sup> Blood-borne viral infections of the mother are not a contraindication to operative vaginal delivery. However, it is sensible to avoid difficult operative delivery where there is an increased chance of fetal abrasion or scalp trauma and to avoid fetal scalp clips or blood sampling during labour.<sup>29</sup>

Vacuum extractors are contraindicated with a face presentation. It has been suggested that vacuum extractors should not be used at gestations of less than 36 weeks because of the risk of subgaleal and intracranial haemorrhage.<sup>30,31</sup> One case-control study suggests that this restriction may be unnecessary, but this study was small and undertaken outside the UK.<sup>32</sup> Below 34 weeks +0 days of gestation, the use of vacuum extraction is not recommended because of the susceptibility of the preterm infant to cephalohaematoma, intracranial haemorrhage, subgaleal haemorrhage and neonatal jaundice. There is insufficient evidence to establish the safety of vacuum extractors at gestations between 34 weeks +0 days and 36 weeks +0 days.

Evidence level 4

Two case studies reported a minimal risk of fetal haemorrhage if the extractor is applied following fetal blood sampling or application of a spiral scalp electrode.<sup>33,34</sup> However, no bleeding was reported in two randomised trials comparing forceps and vacuum extraction.<sup>35-37</sup>

Evidence level 2+

Forceps and vacuum extractor deliveries before full dilatation of the cervix are contraindicated. Forceps can be used for the after-coming head of the breech and in situations where maternal effort is impossible or contraindicated.

Evidence level 4

#### 4.4 What are the essential conditions for safe operative vaginal delivery?

**Safe operative vaginal delivery requires a careful assessment of the clinical situation, clear communication with the mother and healthcare personnel and expertise in the chosen procedure.**

**D**

The role of ultrasound to assess fetal head position in the second stage of labour and prior to conducting an operative vaginal delivery has been investigated.<sup>38-40</sup> However, at present there is insufficient evidence to recommend routine use of ultrasound to determine fetal head position as part of assessment for operative vaginal delivery.


**Table 3. Prerequisites for operative vaginal delivery**


<b>Full abdominal and vaginal examination</b>	<ul style="list-style-type: none"> <li>Head is <math>\leq 1/5</math>th palpable per abdomen</li> <li>Vertex presentation.</li> <li>Cervix is fully dilated and the membranes ruptured.</li> <li>Exact position of the head can be determined so proper placement of the instrument can be achieved.</li> <li>Assessment of caput and moulding.</li> <li>Pelvis is deemed adequate. Irreducible moulding may indicate cephalo-pelvic disproportion.</li> </ul>
<b>Preparation of mother</b>	<ul style="list-style-type: none"> <li>Clear explanation should be given and informed consent obtained.</li> <li>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.</li> <li>Maternal bladder has been emptied recently. In-dwelling catheter should be removed or balloon deflated.</li> <li>Aseptic technique.</li> </ul>
<b>Preparation of staff</b>	<ul style="list-style-type: none"> <li>Operator must have the knowledge, experience and skill necessary.</li> <li>Adequate facilities are available (appropriate equipment, bed, lighting).</li> <li>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).</li> <li>A senior obstetrician competent in performing mid-cavity deliveries should be present if a junior trainee is performing the delivery.</li> <li>Anticipation of complications that may arise (e.g. shoulder dystocia, postpartum haemorrhage)</li> <li>Personnel present that are trained in neonatal resuscitation</li> </ul>

\* Adapted from the Society of Obstetricians and Gynaecologists of Canada 2004<sup>41</sup> and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists 2009<sup>27,28</sup>

Table 3 lists prerequisites for operative vaginal delivery. Like any operative intervention, adequate preparation and planning is important. Be cautious in the urgent situation and at handover periods when time pressures can limit the information given.

#### 4.5 *What type of consent is required?*

**Women should be informed in the antenatal period about operative vaginal delivery, especially during their first pregnancy.** 

**For deliveries in the delivery room, verbal consent should be obtained before an operative vaginal delivery and the discussion documented in the notes. If circumstances allow, written consent may also be obtained.** 

**Written consent should be obtained for trial of operative vaginal delivery in theatre.** 

Women should be informed about operative vaginal delivery as part of routine antenatal education, particularly women having their first baby when the risk of requiring a forceps or ventouse delivery is higher. This information should include the strategies known to be effective in reducing the need for operative vaginal birth.

The birth plan of the mother, including any preferences for or objections to a particular instrument, should be taken into account and discussed.<sup>17</sup>


By the very nature of the procedure, consent will need to be obtained at the end of labour in an emergency setting. Care needs to be taken as women may be exhausted, in pain or affected by narcotic drugs or Entonox. The principles of obtaining valid consent during labour should be followed.<sup>41</sup> Where possible, information should be given to women in labour between contractions.


Obstetricians must document the decision, the reasons for proceeding to an operative birth and consent. The RCOG provides consent advice on operative delivery.<sup>42</sup>


An accurate record of the operative vaginal delivery must be completed. This is aided by standardised documentation, an example of which can be found in Appendix 1.

## 5. Performing operative vaginal delivery


### 5.1 *Who should perform operative vaginal delivery?*

**An operative vaginal delivery should be performed by an operator who has the knowledge, experience and skills necessary to assess and to use the instruments and manage complications that may arise.** 

**Obstetricians should achieve experience in spontaneous vertex delivery before commencing training in operative vaginal delivery.** 

**Obstetric trainees should receive appropriate training in operative vaginal delivery. Competency should be achieved before conducting unsupervised deliveries and should be monitored regularly thereafter.** 

**An experienced operator, competent at mid-cavity deliveries, should be present from the outset for all attempts at rotational or mid-cavity operative vaginal delivery.** 

The goal of operative vaginal delivery is to mimic spontaneous vaginal birth, thereby expediting delivery with a minimum of maternal or neonatal morbidity. The complexity of the delivery is 

related to the type of delivery as classified in Table 1. Mid-cavity and rotational deliveries, independent of the type of instrument used, demand a high level of clinical and technical skill and the operator must have received adequate training.<sup>41</sup>

Evidence  
level 4

System analysis often reveals inadequate training as a key contributor to adverse outcomes, and training is central to patient safety initiatives.<sup>43</sup> Neonatal trauma is associated with initial unsuccessful attempts at operative vaginal delivery by inexperienced operators.<sup>44</sup>

Evidence  
level 2+

Dedicated consultant sessions on the labour ward should facilitate better training and supervision of trainees and a higher proportion of operative deliveries being performed by experienced obstetricians. Assessment of clinical competence is a key element of core training. Ideally, competence should be assessed using the Objective Structured Assessment of Technical Skills (OSATS) form designed for operative vaginal delivery by the RCOG.<sup>45</sup> For a trial of instrumental delivery in theatre, the consultant should attend in person or should be immediately available if the trainee on duty has not been assessed and signed off by OSATS as competent.<sup>46</sup> No data exist on the number of supervised procedures necessary before competence is gained. Individual centres should have a specified trainer responsible for coordinating training and assessment of the trainees. Local and specialist courses in labour ward management can contribute to the development and maintenance of operative delivery expertise. The operator should be aware of the peculiarities of different vacuum devices. Where available, the operator should also be aware of the manufacturer's recommendations for the chosen instrument.

Evidence  
level 4

Further work should be done to evaluate the merits of different methods of training in operative vaginal delivery. Once trained, practitioners will need to audit their performance. One study has demonstrated the potential for monitoring obstetricians' performance on vacuum extraction by the use of statistical process control charts.<sup>47</sup> Another study has looked at the position of chignon as a monitoring tool for cup application.<sup>48</sup> The RCOG report of a Working Party on Recertification in Obstetrics and Gynaecology identified third- and fourth-degree tears as a potential monitoring measure.<sup>49</sup> Further work needs to be done to develop the data collection tools with consideration of case complexity and how the results can be fed back to individuals in a sensitive and constructive way.

## 5.2 *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 recourse to caesarean section can be undertaken.**

C

Higher rates of failure are associated with:

- maternal body mass index over 30
- estimated fetal weight over 4000 g or clinically big baby
- occipito-posterior position
- mid-cavity delivery or when 1/5<sup>th</sup> of the head palpable per abdomen.

At mid-cavity the biparietal diameter is still above the level of the ischial spines. Failure rates are higher at this station. High maternal body mass index (over 30), neonatal birth weight over 4000 g and occipito-posterior positions are also indicators of increased failure.<sup>50</sup> Fetal injuries have been attributed to delay between a failed operative vaginal delivery and a caesarean section.<sup>51</sup> Therefore, operative deliveries that are anticipated to have a higher rate of failure should be considered a trial and conducted in a place where immediate recourse to caesarean section can be undertaken. There is little evidence of increased maternal or neonatal morbidity following failed operative vaginal delivery compared with immediate caesarean section where immediate recourse to caesarean section is available.<sup>52</sup>

The alternative view is that when an operative vaginal delivery is conducted in an operating theatre, there may be a delay associated with transfer that may have a negative impact on the

Evidence  
levels  
2- to 4

neonatal outcome. Two retrospective studies comparing operative vaginal delivery in the labour room with deliveries in an operating theatre reported a doubling in the decision-to-delivery interval when deliveries were carried out in theatre.<sup>53,54</sup> A study of 229 operative deliveries had a decision-to-delivery interval of 20 minutes for deliveries in the labour room and 59 minutes for deliveries in theatre.<sup>55</sup> Operative vaginal deliveries for all indications were included in the analysis. A study of 1021 singleton term operative deliveries for fetal distress showed that a decision-to-delivery interval of 15 minutes was an achievable target in the labour room whereas 30 minutes was the average decision-to-delivery interval in theatre.<sup>54</sup> There were no statistically significant differences in the neonatal outcomes in either study. Therefore, the risks of failed operative vaginal delivery in the labour room should be balanced with the risks associated with the transfer time when the delivery is conducted in an operating theatre.

Evidence levels 2- to 4

There has been one small study reviewing the use of midwifery ventouse practitioners in stand-alone units and consultant units. This showed a very low rate of obstetric intervention and prevented ambulance transfers. However, the study was small and retrospective.<sup>55</sup> There is insufficient evidence to assess the benefits and risks of conducting operative vaginal birth in midwifery-led units. There is a need for further studies in this area.

Evidence level 3

### 5.3 What instruments should be used for operative vaginal delivery?

**The operator should choose the instrument most appropriate to the clinical circumstances and their level of skill. Forceps and vacuum extraction are associated with different benefits and risks. Failed delivery with selected instrument is more likely with vacuum extraction.**



**The options available for rotational delivery include Kielland forceps, manual rotation followed by direct traction forceps or rotational vacuum extraction. Rotational deliveries should be performed by experienced operators, with the choice depending on the expertise of the individual operator.**



There are over 700 different models of forceps. There have been no randomised controlled trials comparing different forceps types and it is recognised that the choice is often subjective. Rotational delivery with the Kielland forceps carries additional risks and requires specific expertise and training. Alternatives to Kielland forceps include manual rotation followed by direct traction forceps or rotational vacuum extractor.<sup>41</sup> There have been no randomised controlled trials comparing these approaches and the operator should choose an appropriate approach within their expertise. Maintenance of skills in this area may reduce the need for second-stage caesarean section and training should be encouraged for trainees, particularly those embarking on the advanced labour ward and labour ward leadership Advanced Training Skills Modules.

Evidence level 4

A Cochrane systematic review of nine randomised controlled studies involving 1368 primiparous and multiparous women showed that soft vacuum extractor cups compared with rigid cups were associated with a significant increase in the rate of failure (OR 1.6; 95% CI 1.2–2.3) but a significant reduction in puerperal scalp trauma (OR 0.4; 95% CI 0.3–0.6).<sup>56</sup>

Evidence level 1++

There are several types of disposable vacuum extractor now available. The Kiwi™ OmniCup (Clinical Innovations Europe Ltd, Abingdon, UK) is a vacuum device that has been reported to be both safe and effective for rotational and non-rotational operative vaginal delivery in non-trial settings.<sup>57,58</sup> However, two UK-based randomised controlled trials comparing the use of the Kiwi OmniCup with the conventional cup (soft and metal) concluded that the Kiwi OmniCup was less successful in achieving a vaginal delivery. In one trial including 194 women who underwent vacuum delivery, the failure rate with Kiwi OmniCup was 34% compared with 21% with the standard cup (adjusted OR 2.3; 95% CI 1.01–5.0), thereby increasing the sequential use of instruments (vacuum and forceps) (22% versus 10%; adjusted OR 2.7; 95% CI 1.1–6.4).<sup>59</sup> In the

Evidence level 1+



second trial including 404 women, the failure rate for occipito-anterior deliveries was 25.9% compared with 16.8% with the conventional cup (RR 1.55; 95% CI 1.00–2.40). Neither study reported any differences in morbidity.<sup>60</sup> A recent prospective observational study of 1000 vacuum-assisted deliveries with the Kiwi OmniCup reported a failure rate of 12.9%.<sup>61</sup>

Evidence level 1+

The relative merits of vacuum extraction and forceps have been evaluated in a Cochrane systematic review of ten randomised controlled trials, involving 2923 primiparous and multiparous women.<sup>37</sup>

Evidence level 1++

Vacuum extraction compared with forceps is:

- more likely to fail delivery with the selected instrument (OR 1.7; 95% CI 1.3–2.2)
- more likely to be associated with cephalhaematoma (OR 2.4; 95% CI 1.7–3.4)
- more likely to be associated with retinal haemorrhage (OR 2.0; 95% CI 1.3–3.0)
- more likely to be associated with maternal worries about baby (OR 2.2; 95% CI 1.2–3.9)
- less likely to be associated with significant maternal perineal and vaginal trauma (OR 0.4; 95% CI 0.3–0.5)
- no more likely to be associated with delivery by caesarean section (OR 0.6; 95% CI 0.3–1.0)
- no more likely to be associated with low 5-minute Apgar scores (OR 1.7; 95% CI 1.0–2.8)
- no more likely to be associated with the need for phototherapy (OR 1.1; 95% CI 0.7–1.8).

In view of the reduction of maternal pelvic floor injuries, the vacuum was advocated as the instrument of first choice in 1989.<sup>62</sup> The downside of this approach has been the increased risk of failed operative delivery and of sequential use of instruments (vacuum followed by forceps) with inherent additional risks to the mother and infant. Therefore, a careful, well-trained operator will select the instrument best suited to the individual circumstances.

A randomised controlled trial has reported that symptoms of altered faecal continence are significantly more common following forceps delivery compared with vacuum extraction.<sup>9</sup> However, a 5-year follow-up of women enrolled in one of the randomised controlled trials above did not show any significant differences in long-term outcome between the two instruments for either the mother or the child.<sup>63</sup> The data available from the published controlled trials cannot be analysed separately to compare vacuum and forceps in their use for rotational deliveries.

Evidence level 1+

**There is insufficient evidence to favour either a rapid (over 2 minutes) or a stepwise increment in negative pressure with vacuum extraction.**



A recent Cochrane review including one small randomised controlled trial of 94 women found no significant difference in detachment rate, degree of perineal tear, Apgar score, umbilical artery pH less than 7.2, scalp laceration greater than one-quarter of the scalp surface involved, cephalhaematoma and number of tractions comparing rapid with stepwise (0–2 kg/2 minutes until 0–8 kg) increments in pressure using a Malmstrom metal 50 mm cup.<sup>64</sup>

Evidence level 1-

The size of the trial was small. Further research is needed to establish the relative advantages and disadvantages of either policy.

#### 5.4 *When should operative vaginal delivery be abandoned?*

Operative vaginal delivery should not be attempted unless the criteria for safe delivery have been met (see Table 3).

**Operative vaginal delivery should be abandoned where there is no evidence of progressive descent with moderate traction during each contraction or where delivery is not imminent following three contractions of a correctly applied instrument by an experienced operator.**



**Adverse outcomes, including unsuccessful forceps or vacuum delivery, should trigger an incident report as part of effective risk management processes.**



**Paired cord blood samples should be processed and recorded following all attempts at operative vaginal delivery.**



Vacuum and forceps delivery can be associated with significant complications, both maternal and fetal. Two maternal deaths have been described in association with tearing of the cervix at vacuum delivery and a further maternal death has been described following uterine rupture in association with forceps delivery.<sup>65,66</sup> Neonatal intracranial and subgaleal haemorrhage are life-threatening complications of particular concern.<sup>67,68</sup> In a review of 583 340 liveborn singleton infants born to nulliparous women, the rate of subdural or cerebral haemorrhage in vacuum deliveries (one in 860) did not differ significantly from that associated with forceps use (one in 664) or caesarean section during labour (one in 954). However, risks increased significantly among babies exposed to attempts at both vacuum and forceps delivery (one in 256).<sup>68</sup>

Evidence level 2++

A prospective cohort study of 393 women experiencing operative delivery in the second stage of labour reported an increased risk of neonatal trauma and admission to the special care baby unit following excessive pulls (more than three) and sequential use of instruments. The risk was further increased where delivery was completed by caesarean section following a protracted attempt at operative vaginal delivery.<sup>44</sup> At 5 years of follow-up, there was no difference in neurodevelopmental outcomes of babies born by operative vaginal delivery compared with babies born by caesarean section. The two cases of cerebral palsy did not have a causal relationship to the mode of delivery and were delivered by caesarean section.<sup>11</sup>

Evidence level 2+

The bulk of malpractice litigation results from failure to abandon the procedure at the appropriate time, particularly the failure to eschew prolonged, repeated or excessive traction efforts in the presence of poor progress. Adverse events, including unsuccessful forceps or vacuum, birth trauma, term baby admitted to the neonatal unit, low Apgar scores (Apgar less than 7 at 5 minutes) and cord arterial pH under 7.1, should trigger an incident report and review if necessary as part of effective risk management processes.<sup>69</sup>

### 5.5 *Is there a place for sequential use of instruments?*

**The use of sequential instruments is associated with an increased risk of trauma to the infant; however, the operator must balance the risks of a caesarean section following failed vacuum extraction with the risks of forceps delivery following failed vacuum extraction.**



**Obstetricians should be aware of increased neonatal morbidity with failed operative vaginal delivery and/or sequential use of instruments and should inform the neonatologist when this occurs to ensure appropriate management of the baby.**



The use of outlet/low-cavity forceps following failed vacuum extraction may be judicious in avoiding a potentially complex caesarean section. Caesarean section in the second stage of labour is associated with an increased risk of major obstetric haemorrhage, prolonged hospital stay and admission of the baby to the special care baby unit compared with completed instrumental delivery.<sup>50</sup>

Evidence level 2++

This must be balanced with the increased risk of neonatal trauma associated with sequential use of instruments (risk of intracranial haemorrhage one in 256 deliveries for two instruments versus one in 334 for failed forceps proceeding to caesarean section).<sup>68,70-72</sup>

Evidence levels 2+ to 3

A population-based retrospective analysis of 12 014 739 live births in the USA reported that sequential use of vacuum and forceps compared with forceps alone was associated with an increased risk of need for mechanical ventilation with an adjusted OR of 2.22 (1.24-3.97). The risk of intracranial haemorrhage, retinal haemorrhage and feeding difficulty was also greater with sequential use of instruments.<sup>72</sup>

Evidence level 2+

The sequential use of instruments should not be attempted by an inexperienced operator without direct supervision and should be avoided if possible.

### 5.6 *What is the role of episiotomy for operative vaginal delivery?*

**In the absence of robust evidence to support routine use of episiotomy in operative vaginal delivery, restrictive use of episiotomy, using the operator's individual judgement, is supported.**

**B**

A multicentre pilot randomised controlled study including 200 nulliparous women to evaluate the role of episiotomy at operative vaginal deliveries failed to provide conclusive evidence that a policy of routine episiotomy was better or worse than a restrictive policy. The incidence of obstetric anal sphincter injury was similar in both groups (8.1% in 99 women randomised to the routine use of episiotomy and 10.9% in 101 women randomised to restrictive use; OR 0.72; 95% CI 0.28–1.87).<sup>73</sup> In this study, routine compared with restrictive use of episiotomy was not associated with a statistically significant difference in anal sphincter tears for forceps delivery (OR 0.56; 95% CI 0.19–1.61) and the anal sphincter tears rate was low overall for vacuum deliveries. A review of 323 consecutive operative vaginal deliveries in a US setting evaluated the relationship between episiotomy and significant perineal trauma (third- and fourth-degree tears).<sup>74</sup> The use of episiotomy did not influence the risk of significant perineal trauma for forceps delivery but was associated with an increased risk of significant perineal trauma when vacuum delivery was performed. These data are difficult to interpret in the UK context as midline episiotomy is preferred in the USA and mediolateral episiotomy in the UK. A further study reported a lower frequency and severity of perineal tears in forceps delivery when an episiotomy was performed, particularly for medio-lateral episiotomy.<sup>75</sup> A large observational study from the Netherlands of 28 732 operative vaginal deliveries concluded that mediolateral episiotomy is protective against obstetric anal sphincter injury in both vacuum extraction (9.40% versus 1.36%, OR 0.11, 95% CI 0.09–0.13) and forceps delivery (22.73% versus 2.6%, OR 0.28, 95% CI 0.13–0.63).<sup>76</sup> However, this is a retrospective study and the incidence of obstetric anal sphincter injury is not comparable to that seen in a UK-based prospective cohort study of 1360 operative vaginal deliveries.<sup>77</sup> In the UK study episiotomy did not appear to protect against obstetric anal sphincter injury in vacuum extraction (4.3% with episiotomy versus 5.5% without episiotomy) and forceps delivery (11.7% versus 10.6%). However, episiotomy was associated with a greater incidence of postpartum haemorrhage (28.4% versus 18.4%, OR 1.72, 95% CI 1.21–2.45). This conflict in findings between the two studies may be due to variations in practice of the threshold for episiotomy and use of different instruments.

Evidence levels  
1+ to 2-

### 5.7 *Should prophylactic antibiotics be given?*

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

**A**

**Good standards of hygiene and aseptic techniques are recommended.**



A Cochrane review included only one randomised trial of 393 participants. There were seven women with endometritis in the group given no antibiotics and none in the prophylactic antibiotic group. This difference did not reach statistical significance, but the relative risk reduction was 93% (RR 0.07; 95% CI 0.00–1.21).<sup>78,79</sup>

Evidence level 1++

## 6. Aftercare following operative vaginal delivery

### 6.1 *Should thromboprophylaxis be given?*

**Women should be reassessed after an operative vaginal delivery for risk factors for venous thromboembolism and, if appropriate, thromboprophylaxis should be prescribed.**

**D**

Mid-cavity delivery, prolonged labour and immobility are risk factors for thromboembolism. Women should be reassessed after delivery for risk factors for venous thromboembolism and considered for thromboprophylaxis if necessary.<sup>80</sup> The obstetrician should refer to the RCOG Green-top Guideline No. 37: *Reducing the risk of thrombosis and embolism during pregnancy and the puerperium*.<sup>80</sup>

### 6.2 What analgesia should be given after delivery?

**Regular paracetamol and diclofenac should be offered after an operative vaginal delivery in the absence of contraindications.**



Regular paracetamol and diclofenac have been shown to be beneficial after caesarean section and for perineal pain.<sup>81</sup> They should be considered (in the absence of contraindications) after an operative vaginal delivery.

### 6.3 What precautions should be taken for 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 who have had a spinal anaesthetic or an epidural that has been topped up for a trial may be at increased risk of retention and should be recommended to have an indwelling catheter in place for at least 12 hours post-delivery to prevent asymptomatic bladder overfilling.

**Women should be offered physiotherapy-directed strategies to prevent urinary incontinence.**



Urine retention with bladder overdistension should be avoided, particularly in women who have had spinal or dense epidural blocks. Operative delivery, prolonged labour and epidural analgesia may predispose to postpartum urinary retention, which can be associated with long-term bladder dysfunction.<sup>82-84</sup> There is considerable variation in practice in postpartum bladder management in the UK.<sup>85</sup> Further research is needed to develop evidence-based guidelines. However, at a minimum the first void should be measured, and if retention is a possibility a post-void residual should be measured to ensure that retention does not go unrecognised. Women who have had a spinal anaesthetic or an epidural that has been topped up for a trial should be offered an indwelling catheter for at least 12 hours post-delivery to prevent asymptomatic bladder overfilling followed by fluid balance charts to ensure good voiding volumes.

Evidence level 2+

Urinary incontinence is common after operative vaginal delivery. A physiotherapist-delivered intervention designed to prevent urinary incontinence reduced incontinence from 38.4% to 31% in a group of women who had had an operative vaginal birth and/or a baby over 4000 g.<sup>86</sup>

Evidence level 1+

### 6.4 How can we reduce psychological morbidity for the mother?

**There is no evidence to support the use of midwife-led debriefing in reducing maternal depression following operative vaginal delivery.**



**The woman should be reviewed prior to hospital discharge to discuss the indication for operative delivery, management of any complications and the prognosis for future deliveries. Best practice would be for the woman to be reviewed by the obstetrician who conducted the delivery.**



Operative vaginal delivery can be associated with fear of subsequent childbirth and in a severe form may manifest as a post-traumatic stress-type syndrome termed tocophobia.<sup>87-91</sup> Follow-up of a cohort at 3 years following operative delivery reported that 50% of women did not plan on having

Evidence level 2+

a further child and almost half of these women reported fear of childbirth as the main reason for avoiding pregnancy.<sup>92</sup>

Evidence level 2+

Several studies have looked at debriefing approaches to reducing psychological morbidity following childbirth.<sup>93,94</sup> There is no evidence to support the use of formal debriefing in reducing the risk of subsequent postnatal depression for women who have experienced operative vaginal delivery.

Evidence level 2-

Nonetheless, women report the need for a review following delivery to discuss the indication for delivery, the management of any complications and the implications for future deliveries.<sup>87</sup>

Evidence qualitative

The optimal timing, setting and healthcare professional for post-delivery review require further evaluation.

### 6.5 How should we advise women for future deliveries?

**Women should be encouraged to aim for a spontaneous vaginal delivery in a subsequent pregnancy as there is a high probability of success.**

B

**Care should be individualised for women who have sustained a third- or fourth-degree perineal tear.**



Women who have experienced an operative vaginal delivery should be encouraged to aim for spontaneous vaginal delivery in a subsequent pregnancy. The likelihood of achieving a spontaneous vaginal delivery is approximately 80% even for women who have required more complex operative vaginal deliveries in theatre.<sup>92,95,96</sup>

Evidence level 2++ to 3

This discussion should take place at the earliest opportunity as there is evidence to suggest that women decide on the future mode of delivery soon after delivery.<sup>97</sup> The future plan of care should be reviewed carefully with women who have experienced a third- or fourth-degree tear, particularly if they are symptomatic, as they may be at increased risk of further anorectal damage with a subsequent delivery.<sup>98</sup>

Evidence level 2++

Women who sustain a third- or fourth-degree perineal tear should be counselled regarding the risk of recurrence and implications for future childbirth.<sup>99</sup>

## 7. Auditable standards

The following should be reviewed on a regular basis.

Maternity unit:

- rate of operative vaginal delivery.

Maternity unit and individual operator:

- percentage of women with failed operative vaginal delivery
- rate of sequential instrument use
- case notes review to audit appropriate management of women with failed operative vaginal delivery or sequential instrument use, i.e. when to use a sequential instrument and when to abandon
- percentage of women with third- and fourth-degree perineal tears
- rate of neonatal morbidity, composite trauma (subgaleal haemorrhage/brachial plexus injury/fracture/facial nerve palsy/cerebral haemorrhage), low Apgar <7 at 5 minutes and cord arterial pH <7.1
- documentation of written or verbal consent for operative vaginal delivery
- documentation of written consent for trial of operative vaginal delivery in operating theatre
- accuracy of documentation.

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**APPENDIX 1**

**OPERATIVE VAGINAL DELIVERY RECORD**

Patient Details
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Date.....  
 Operator Name ..... Grade .....  
 Supervisor Name ..... Grade .....

Indication(s) for delivery: .....

Classification of OVD: outlet / low / midcavity                      Rotation > 45°: yes / no  
 Fetal wellbeing: CTG: normal / suspicious / pathological              Liquor: clear / meconium

<b>Prerequisites:</b>	<b>Examination</b>
Place of delivery: room / theatre	1/5th per abdomen: .....
Analgesia: local / pudendal / regional	Dilatation:.....
Consent: verbal / written	Position: .....
Catheterised: yes / no	Station: .....
	Moulding:.....
	Caput:.....

**Procedure**  
 Instrument used:  
 Vacuum extractor : silastic / Kiwi / metal anterior / metal posterior  
 Forceps: rotational / non-rotational / outlet  
 Number of pulls: .....  
 Traction: easy / moderate / strong  
 Maternal effort: minimal / moderate / good  
 Placenta: CCT/ manual  
 Episiotomy: yes / no  
 Perineal tear:    1st degree          
                       2nd degree          
                       3rd / 4th degree     (complete pro forma)  
                       Other                     (complete suturing pro forma if necessary)

Multiple instrument use: yes / no
Examination before second instrument
1/5th per abdomen:.....
Position: .....
Station: .....
Moulding: .....
Caput:.....
<b>Reasons for second instrument:</b>
.....
.....
.....

EBL: .....


Baby: M / F    Birth weight: ..... (kg)    Apgar: 1..... 5..... 10.....    Cord pH: Arterial..... Venous.....  
**Post-delivery care:**  
 Level of care: routine / high dependency  
 Syntocinon infusion: yes / no  
 Catheter: yes / no        Remove .....

Signature: .....                      Date: .....

## APPENDIX II

Clinical guidelines are: 'systematically developed statements which assist clinicians and patients in making decisions about appropriate treatment for specific conditions'. Each guideline is systematically developed using a standardised methodology. Exact details of this process can be found in Clinical Governance Advice No.1: *Development of RCOG Green-Top Guidelines* (available on the RCOG website at <http://www.rcog.org.uk/womens-health/clinical-guidance/development-rcog-green-top-guidelines-policies-and-processes>). These recommendations are not intended to dictate an exclusive course of management or treatment. They must be evaluated with reference to individual patient needs, resources and limitations unique to the institution and variations in local populations. It is hoped that this process of local ownership will help to incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty where further research may be indicated.

The evidence used in this guideline was graded using the scheme below and the recommendations formulated in a similar fashion with a standardised grading scheme.

Classification of evidence levels	Grades of recommendations
1++ High-quality meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a very low risk of bias	<b>A</b> At least one meta-analysis, systematic review or randomised controlled trial rated as 1++ and directly applicable to the target population; or  A systematic review of randomised controlled trials or a body of evidence consisting principally of studies rated as 1+ directly applicable to the target population and demonstrating overall consistency of results
1+ Well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias	<b>B</b> A body of evidence including studies rated as 2++ directly applicable to the target population, and demonstrating overall consistency of results; or  Extrapolated evidence from studies rated as 1++ or 1+
1- Meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a high risk of bias	<b>C</b> A body of evidence including studies rated as 2+ directly applicable to the target population and demonstrating overall consistency of results; or  Extrapolated evidence from studies rated as 2++
2++ High-quality systematic reviews of case-control or cohort studies or high-quality case-control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal	<b>D</b> Evidence level 3 or 4; or  Extrapolated evidence from studies rated as 2+
2+ Well-conducted case-control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal	
2- Case-control or cohort studies with a high risk of confounding, bias or chance and a significant risk that the relationship is not causal	
3 Non-analytical studies, e.g. case reports, case series	
4 Expert opinion	
	<b>Good practice point</b>   Recommended best practice based on the clinical experience of the guideline development group

This guideline has been produced on behalf of the Guidelines Committee of the Royal College of Obstetricians and Gynaecologists by:

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The final version is the responsibility of the Guidelines Committee of the RCOG.

The guidelines review process will commence in 2014 unless evidence requires earlier review.

#### DISCLAIMER

The Royal College of Obstetricians and Gynaecologists produces guidelines as an educational aid to good clinical practice. They present recognised methods and techniques of clinical practice, based on published evidence, for consideration by obstetricians and gynaecologists and other relevant health professionals. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor or other attendant in the light of clinical data presented by the patient and the diagnostic and treatment options available within the appropriate health services.

This means that RCOG Guidelines are unlike protocols or guidelines issued by employers, as they are not intended to be prescriptive directions defining a single course of management. Departure from the local prescriptive protocols or guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.