

REDUCING THE RISKS OF A VACUUM DELIVERY

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INTRODUCTION

Evidence-based reviews and practice guidelines have identified a number of risk factors associated with vacuum assisted delivery (VAD) that may result in adverse effects on the newborn infant, injuries to the mother's genital tract, and difficulty or failure of the procedure. In addition, clinical circumstances that predispose to increased risk, such as the use of the vacuum extractor for rotational and mid-cavity procedures, have been highlighted as possible avoidable factors^{1,2,3,4}. Although there is general agreement that success of vacuum delivery depends on the knowledge, experience and skill of the operator, system analyses of adverse outcomes often reveal inadequate training as a major contributing factor.^{1,5} It is beyond the scope of this review to present the detailed knowledge and technical skills required for correct use of the vacuum extractor. A variety of teaching resources is available for this purpose^{6,7,8,9} and practitioners who wish to obtain more information are referred to them.

This review will focus on a few selected issues that have been associated with suboptimal outcomes of vacuum delivery and explore strategies that may result in a reduction of the risks of this procedure.

KNOWLEDGE, TECHNICAL SKILLS AND EXPERIENCE

Between November 2005 and August 2006, the author conducted a series of training workshops on vacuum assisted delivery in the United Kingdom and Australia for obstetric trainees and specialist obstetricians. Participants completed an on line knowledge-based questionnaire derived mainly from recommended textbooks, systematic reviews and college guidelines and were followed by a hands-on practical component using feto-maternal manikins. One hundred and fifty-six participants completed the questionnaire, 81 in the United Kingdom and 75 in Australia. Incorrect or deficient knowledge was evident in a number of clinical and technical areas, a few examples of which are listed in Table 1. Furthermore, although the standard of

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Table 1 Incorrect or deficient knowledge in 156 VAD workshop participants

<i>Classification of VAD procedures</i>
<ul style="list-style-type: none">• 45% regarded VAD from station +2 cm as a mid-pelvic procedure• 69% stated that VAD from station 0 cm (at spines) was a high-pelvic procedure.
<i>Case selection</i>
<ul style="list-style-type: none">• 28% did not consider an incompletely dilated cervix (9 cm) a contraindication• 36% declared that they would deliver a second twin with a vacuum when the head was high (−1 cm) and the cervix not completely dilated.
<i>Technical issues</i>
<ul style="list-style-type: none">• 28% believed that the vacuum should be developed gradually over 8–10 minutes• 24% were not aware that a ‘posterior’ cup should be used for an OT delivery.
<i>Maternal injury</i>
<ul style="list-style-type: none">• 33% stated that VAD was just as likely to injure the anal sphincter as forceps• 53% believed that soft cups were less likely to injure the mother than rigid cups.
<i>Neonatal injury</i>
<ul style="list-style-type: none">• 50% responded that soft cups were likely to cause fewer subgaleal haemorrhages than rigid cups• 31% believed that ICH was more common after VAD than after forceps delivery.

VAD, vacuum assisted delivery; ICH, intracranial injury; OP, occipitoposterior; OT, occipitotransverse.

Table 2 Indications for vacuum assisted delivery (VAD)

Low-risk VAD – <i>caput is visible and station is low or outlet</i>
suspected non-reassuring fetal status (subacute fetal distress)
delay (failure to progress) in the second stage of labour
elective shortening of the second stage of labour
Moderate-risk VAD – <i>caput is not visible and station is low or mid</i>
suggestive evidence of fetal compromise (acute fetal distress)
delay in the second stage of labour where the fetal size is large
posterior and transverse positions of the occiput
maternal exhaustion or diminished expulsive powers

technical skills was not formally assessed during the hands-on training sessions, it was apparent that many of the participants were deficient in the essential skills required for vacuum assisted delivery.

INDICATIONS, CONTRAINDICATIONS AND CASE SELECTION

Indications for VAD will vary with each case but a practical, risk-based classification is presented in Table 2. Other variables that may influence the outcome of VAD are listed in Table 3. By carefully evaluating the information obtained from abdominal and vaginal examinations it is possible to select patients who are suitable for vacuum extraction and to grade the procedures into low-risk and moderate-risk categories. For example, if the indication for the intervention is delay in the second stage of labour and the size of the fetus is estimated to be large, the possibility of a difficult

Table 3 Factors that increase the risk of vacuum delivery

Prolonged second stage of labour
Non-reassuring fetal status
Caput not visible at the introitus
OP and OT positions (including OA > 45°)
Significant moulding of the head
Weak, infrequent contractions
Diminished expulsive effort
Epidural analgesia
Estimated large fetal size
Small maternal stature

extraction should be anticipated. Furthermore, the risk of shoulder dystocia is greater when this combination of factors is present. Moderate risk vacuum extractions may be acceptable when undertaken by experienced operators, but they are likely to be inappropriate when performed by lesser experienced practitioners. For this reason, operators should be capable of assessing the relative risk of a vacuum procedure *before* the delivery is attempted. Contraindications, like indications, are not necessarily constant and absolute but will depend to some extent also on the expertise of the operator. It is generally considered advisable, however, to avoid vacuum delivery in the following clinical situations:

- 1 cephalopelvic disproportion; brow, face or breech presentation; gestation <34 weeks; or high fetal station (head above the ischial spines)
- 2 uncertain fetal position where scalp is not visible at the introitus
- 3 the delivery of a severely compromised fetus as a rescue procedure. Such an infant may be depressed at birth and the operator may be blamed.
- 4 marked reduction of maternal expulsive powers – do not increase traction force to compensate for reduced powers.
- 5 excessive fetal head moulding; traction force may increase the risk of intracranial injury in such cases.
- 6 incomplete cervical dilatation – beware the ‘anterior lip’ of the cervix.

EFFECTS ON THE NEWBORN INFANT

The Cochrane Systematic Review of trials comparing soft and rigid vacuum cups concluded that soft cups are significantly more likely to fail to achieve vaginal delivery but that they are associated with less scalp injury.¹⁰ However, examination of the data in the systematic review show that soft cups cause fewer cosmetic effects, bruising and scalp lacerations but do not reduce the number of cephalhaematomas. All of these lesions are transient and none of them pose threats to the well-being of the infant. At the present time there are insufficient data to draw firm conclusions about the relative merits of different vacuum cups with regard to potentially life-threatening outcomes

Table 4 Classification of effects on the neonate

Cosmetic effects
Chignon or artificial caput succedaneum
Cup discolouration and bruising of the scalp
Clinically non-significant injuries
Blisters and superficial scalp abrasions
Cephalhaematoma
Retinal haemorrhage
Clinically significant injuries
Subgaleal (subaponeurotic) haemorrhage
Intracranial haemorrhage
Skull fracture
Indirect and coincidental injuries
Brachial plexus injury
Fracture of the clavicle or humerus

such as subgaleal haemorrhage and intracranial injuries but reports in the literature suggest that soft cups do not offer any benefits over rigid cups for the prevention of these injuries.^{11,12,13,14}

Meta-analysis of randomised trials comparing vacuum extraction with forceps delivery¹⁵ have demonstrated that the vacuum extractor is significantly more likely to fail to deliver the baby and is associated with more cephalhaematomas and retinal haemorrhages than forceps. Clinically significant neonatal morbidity in the studies was rare but the results should be interpreted with caution since the trials were statistically underpowered to allow any firm conclusions to be made. Observational data, however, suggest that subgaleal haemorrhages are more common with vacuum extraction than forceps delivery¹⁶ but that the occurrence of intracranial injury is not different between the two instruments.¹⁷ It is useful, therefore, for counselling and auditing purposes to classify neonatal outcomes according to their clinical rather than statistical significance since visible scalp effects are a source of considerable anxiety to parents and caregivers.¹⁸ A practical classification is suggested in Table 4.

EFFECTS ON THE MOTHER

Systematic reviews of vacuum extraction and forceps delivery have consistently reported more anal sphincter damage and ano-rectal injury with the forceps.^{15,19} Furthermore the risk of damage to the sphincter is compounded if failure of vacuum extraction is followed by attempted forceps delivery.^{20,21}

Damage to the sphincter muscles of the anus during childbirth is regarded as a major predisposing factor for the subsequent development of bowel dysfunction²² leading some investigators to conclude that vacuum extraction may offer some protection against the development of faecal incontinence.^{19,23} However, a five-year follow up study of a cohort of women delivered by forceps or vacuum extractor reported no

significant differences between the instruments in terms of either bowel or urinary dysfunction.²⁴ Investigators in another study that examined women who sustained anal sphincter rupture during childbirth concluded that there was no greater incidence of anal incontinence 18 years after childbirth compared with controls.²⁵

Evidence has accumulated that liberal use of episiotomy in normal birth does not necessarily prevent severe vaginal or perineal trauma and as a result a restrictive policy for the use of episiotomy is now being advocated.²⁶ For operative vaginal delivery however it is not clear whether episiotomy is preferable to lacerations that may otherwise be incurred in terms of difficulty of repair.²⁷ Recent evidence has demonstrated that midline episiotomy has been significantly associated with higher rates of severe perineal trauma compared to mediolateral episiotomy.^{27,28,29} It would appear preferable, therefore, to perform mediolateral episiotomy as the method of choice when used in conjunction with instrumental delivery.^{27,30}

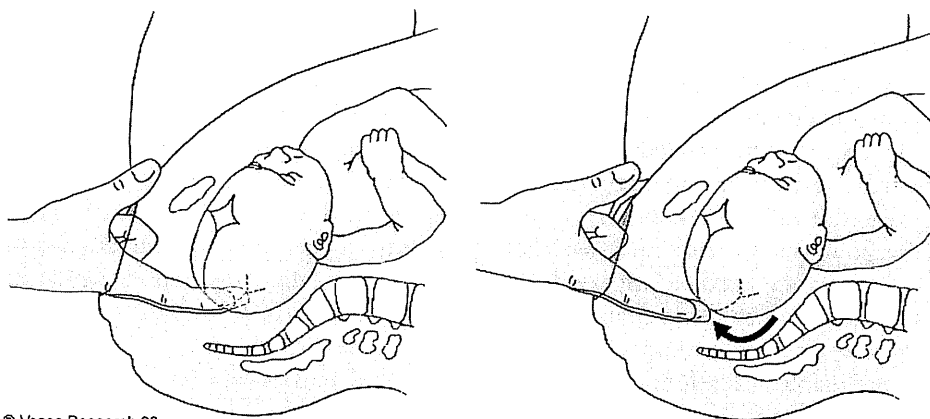
STANDARD VACUUM DELIVERY TECHNIQUE

When a valid indication for vacuum delivery exists, the relevant obstetrical factors should be identified and carefully evaluated to determine whether the procedure is appropriate for the clinical circumstances and falls within the capabilities and experience of the operator. The level of the fetal head should be assessed abdominally and at the same time, the site of the fetal back identified to help determine fetal position. Vaginal examination is performed to establish the dilatation of the cervix, station of the presenting part and degree of moulding of the fetal head. Position of the head should also be confirmed and the amount of deflexion and asynclitism noted. At this stage the precise location of the flexion point should be identified.

The flexion point

The fetal head is completely flexed when the mentovertical diameter points in the direction of descent. In the normally moulded head, the mentovertical diameter emerges on the sagittal suture approximately 3 cm anterior to the posterior fontanelle.³¹ This 'flexion point' is a critical landmark for vacuum assisted delivery. When the centre of the vacuum cup has been placed over the flexion point and axis traction is applied, fetal head diameters are optimal for delivery. Consistently good outcomes with vacuum extraction depend on achieving correct (flexing median) applications of the vacuum cup.⁶ Therefore, regardless of the position of the fetal head, the operator should be able to locate the flexion point and correctly position the cup over it.

A practical method for locating the flexion point is described in the following technique. The middle finger of the examining hand is used to identify the posterior fontanelle and the finger is then moved forward along the sagittal suture approximately 3 cm to the flexion point (Figure 1). With the tip of the finger on the flexion point and by supinating the hand so that the palmar surface of the fingers face upwards the operator notes where the back of the middle finger makes contact with the fourchette. Keeping



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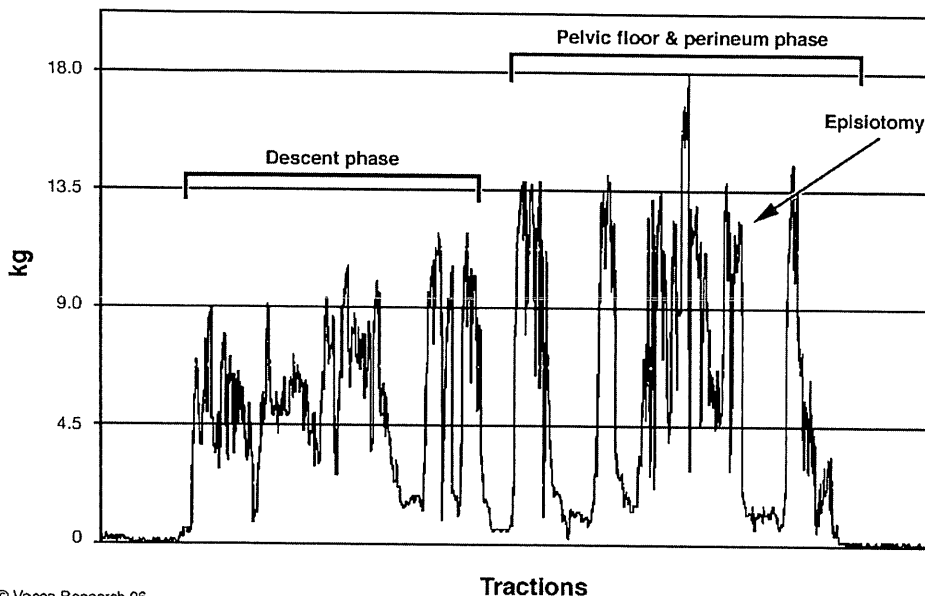
Figure 1 Locating the flexion point.**Table 5** Classification of vacuum cups

Soft 'anterior' cups
Silc and Silastic cups
Standard soft plastic Mityvac cup
Kiwi ProCup
Rigid 'anterior' cups (plastic or metal)
Malmstrom, Bird, and O'Neil anterior cup
Kiwi OmniCup
M-Style Mystic Mityvac cup
Rigid 'posterior' cups (plastic or metal)
Bird and O'Neil posterior cups
Kiwi OmniCup
M-Select Mityvac cup

in mind that the distance from the tip of the middle finger to the proximal interphalangeal joint is 5 to 6 cm and to the knuckle, is 10 to 11 cm it is possible to calculate the distance from the flexion point to the posterior fourchette of the perineum and thus determine how far the vacuum cup must be inserted to achieve a correct application. To facilitate this insertion, the suction tubes of some vacuum extractor cups have been stamped with distance markers to indicate how far the cup has been inserted.³²

Cup selection

A representative list of vacuum extractor cups that are available commercially is presented in Table 5. The use of soft cups and rigid *anterior* cups, because of their limited manoeuvrability, should be restricted to outlet and low non-rotational vacuum extractions.³³ For rotational and mid-pelvic procedures one of the posterior cups should be selected, provided the operator has been trained in its use.^{6,8}



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Figure 2 Traction force recorded during the descent and perineal phases.

Traction, number of pulls and duration

Safety measures recommended for vacuum assisted delivery include limiting the number of pulls, restricting the duration of the procedure and avoiding excessive traction. The traction force and number of pulls required for vacuum delivery will be determined by the following clinical variables: quality of the uterine contractions, maternal voluntary expulsive powers, effects of epidural analgesia, station and position of the fetal head, size of the fetus and presenting head diameters, type of vacuum cup application, parity of the mother, and, in a nulliparous woman, the resistance of the perineal muscles. Completion of delivery in three pulls has been viewed as a criterion for safe vacuum assisted delivery^{34,35}. However, a review of the number of acceptable pulls for a normal vacuum delivery is warranted by several recent changes in obstetrical practice, namely, increasing use of epidural analgesia, extension of the 'normal' duration of the second stage, and decreasing use of episiotomy to facilitate delivery across the perineum. The first two may interfere with the maternal expulsive effort, especially if the mother is exhausted, and an intact perineum in a nulliparous woman may provide a greater degree of resistance to the passage of the head through the outlet. In a recent prospective study of vacuum delivery in nulliparous mothers³⁶ higher levels of traction force and a greater number of pulls were recorded during the outlet phase of the vacuum delivery than during the descent phase in the majority of cases (Figure 2). The explanation may be that, at this stage, resistance is greater because the widest part of the fetal head is crossing the narrowest section of the maternal birth canal. Only 27% of the mothers in the study

had their vacuum deliveries completed in three or fewer pulls. However, 84% of the deliveries were accomplished without increase in significant adverse outcome if three pulls were allowed for the descent phase and three pulls for the outlet phase, provided that some progress was observed with each pull. For this reason it would seem to be logical to allow additional time and pulls for the perineum to stretch over the head as is practised with normal delivery especially if the birth is managed without episiotomy.

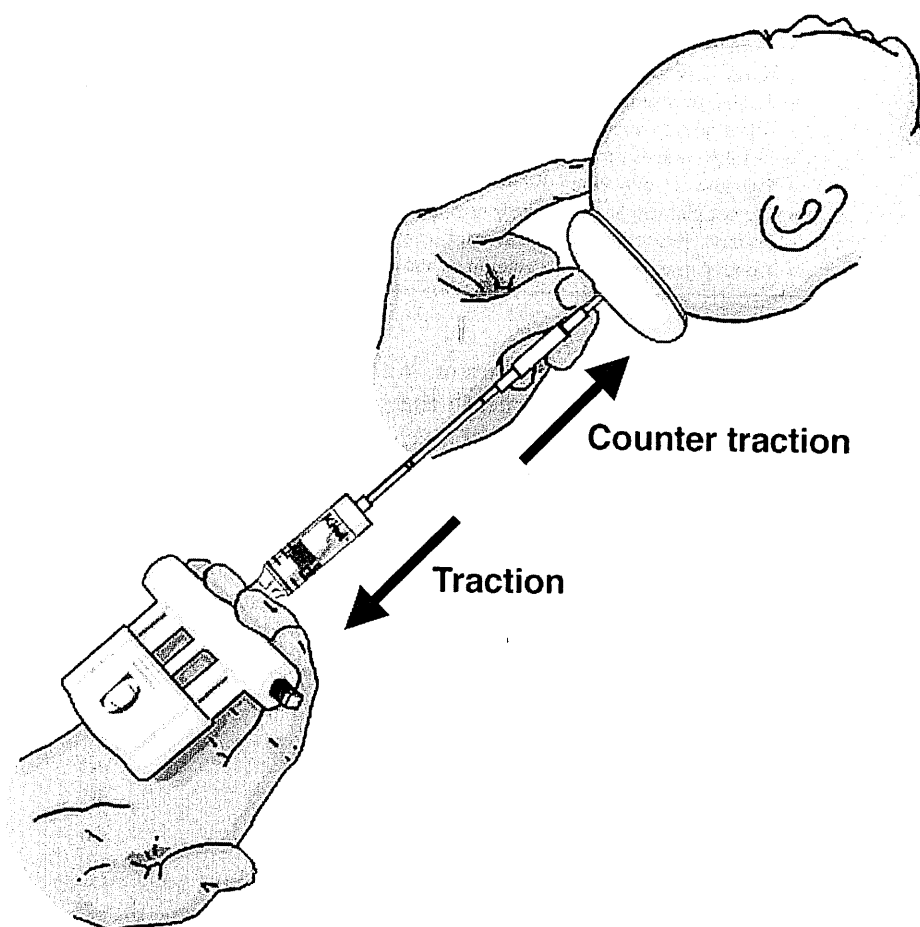
Arbitrary time limits for vacuum delivery have been suggested as protection against the effects of prolonged or excessive traction.⁶ Extensive observational data have demonstrated that, with efficient uterine contractions and good maternal expulsive effort, most vacuum deliveries can be completed in 15 minutes and almost all within 20 minutes.³⁶

Method of traction

Traction should only be applied when the uterus is contracting and the mother is pushing. It should be an adjunct to the maternal expulsive efforts, not the primary force to overcome resistance to descent. Traction should be a two-handed exercise, with one hand providing the traction and direction of pull, the other hand performing counter-traction with the thumb on the cup and monitoring descent of the head with the index finger on the fetal scalp (Figure 3). The crossbar of the traction device should be held in the fingertips of the pulling hand to limit the traction force. Traction should be maintained smoothly for the duration of a contraction as long as the mother is pushing. As soon as the contraction passes or the mother stops pushing, traction should cease. It should not be continued between contractions to prevent retraction of the head because the lowest station reached at the end of one contraction will be regained quickly at the start of the next. There is no evidence to support the recommendation that the vacuum should be released or reduced between contractions, nor is there evidence to show that maintaining the vacuum is harmful for the fetus.^{3,37}

Vacuum assisted delivery for occipitoposterior and transverse positions

The method of rotational vacuum delivery is identical to the standard technique. However, the procedure may carry a greater risk because a high level of operator experience is required to assess relevant clinical factors that may influence the outcome and to select candidates for whom the procedure is appropriate. Furthermore, the operator must be trained in the use of the posterior cup, especially in the method of manoeuvring the cup to achieve correct (flexing median) applications.^{8,9} An important but little appreciated fact in vacuum delivery technique is the relationship between correct cup placement and auto-rotation of the fetal head. Bird demonstrated that anterior rotation rates of about 90% can be achieved with vacuum extractions undertaken when the position of the head is posterior or transverse, provided the



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Figure 3 The two-hand traction technique.

application of the cup causes flexion. On the other hand, auto-rotation rates will drop to about 30% if the cup application is deflexing.^{38,39} Anterior rotation of the malpositioned fetal head during vacuum extraction occurs automatically as a passive event similar to the internal rotation that is integral to the normal mechanism of labour. Hence the term 'auto-rotation' is used to describe it. No attempt should be made to manually rotate the head either by manipulating the cup or by grasping the handle and physically rotating the device in the way that rotational forceps delivery is accomplished. The lack of appreciation by many clinicians that the fetal head will rotate automatically with correct technique has placed the vacuum extractor at a disadvantage since restrictions imposed on rotational forceps delivery have also been applied to rotational vacuum extraction.³

Table 6 Practical suggestions for rotational vacuum delivery

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- Know how to locate the flexion point
 - Be able to estimate the cup insertion distance
 - Know how to manoeuvre a posterior cup to achieve correct applications
 - Pull downwards for axis traction then horizontally
 - Pull upwards only when the head has crowned
 - Do not pull too hard especially during the perineal phase
 - Perform episiotomy if perineal resistance delays progress
 - Control descent on the perineum to allow completion of autorotation
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If a large caput succedaneum is present, rotation will often not be completed until the caput has emerged from beneath the pubic arch.⁴⁰ For this reason, as the cup becomes visible at the introitus, the operator should resist the temptation to pull upwards before the caput has emerged. Another reason for not pulling upwards prematurely is the fact that the mid-point of the fetal head is situated at the level of the bi-parietal plane, some 6 cm behind the cup. To achieve axis traction, therefore, the operator should direct the pull horizontally or even slightly downwards until the head begins to crown. Failure to do so may impede auto-rotation or may result in detachment of the cup. A few practical suggestions for improving performance of rotational vacuum delivery are listed in Table 6. More detailed accounts may be obtained from other resources that are available.^{8,9}

DIFFICULTY, CUP DETACHMENT AND FAILED VACUUM DELIVERY

Studies comparing vacuum extraction and forceps delivery have consistently shown that the vacuum extractor is less likely than forceps to complete the delivery.^{8,15} However, of the mothers who had failed vacuum extractions about 80% subsequently had vaginal deliveries completed with forceps suggesting that incorrect technique may have been a factor in a number of the cases.³⁵ Failure of vacuum extraction and the sequential use of forceps to complete the delivery have been associated with increased risk of injury to the fetus^{12,17} and to the maternal genital tract.^{20,21} For these reasons, attempted forceps delivery following a failed vacuum extraction is not recommended and should be avoided unless the failure occurs with the fetal head visible at the outlet of the pelvis.¹ A number of predisposing factors have been linked to failed vacuum extractions with or without cup detachment. They include occipitoposterior and transverse positions of the head,^{33,35} mid-cavity procedures,^{1,3} deflexing and paramedian applications of the cup,^{8,38} use of soft cups in preference to rigid cups,¹⁰ extractions attempted before full dilatation of the cervix,⁴¹ and cephalopelvic disproportion.⁴²

Sudden cup detachment should not be regarded as a built-in safety feature of vacuum extraction devices. Scalp abrasion or underlying blood vessel damage may result

if “pop-off” occurs during strong traction. Complete detachment may be avoided by applying counterpressure on the cup with the thumb of the non-pulling hand during traction (Figure 3) and by timing the pulls with contractions and the mother’s expulsive efforts.⁸ Since most detachments occur at the pelvic outlet when the fetal head is passing through the resistant introitus,³⁶ it is important that counterpressure by the non-pulling hand is maintained throughout traction until the head has delivered. If support of the perineum with a hand is practised during delivery of the head, an assistant should be instructed to perform this task.

TRAINING AND CREDENTIALLING

There is no doubt that the operator is a major determinant of the success or failure of instrumental delivery and that unfavourable results associated with vacuum extraction are often caused by the user’s unfamiliarity with either the instrument or the basic rules governing its use. Nevertheless, reports repeatedly raise concerns about the level of experience and training of individuals involved in maternity decision-making⁵ and system analysis often identifies inadequate training as a key factor contributing to adverse outcomes with operative vaginal delivery.¹ Fellows of the American College of Obstetricians and Gynecologists (ACOG) reported that, although 75% of them employed the vacuum extractor in their practice, only 57% had received any training in the use of the device.⁴³ For this reason the justification for mid pelvic and rotational instrumental delivery has been challenged on many sides and their use has progressively declined. Despite this, ACOG’s Practice Bulletin concludes that there still appears to be a role for this procedure provided the operator has been appropriately trained.³ However, adequate competence may be difficult to acquire since training programmes are not common. Similarly, for the UK, the Royal College of Obstetricians and Gynaecologists (RCOG) suggests that maintenance of skills in this area may reduce the need for second-stage caesarean section with the attendant risks for the mother from this procedure but this must be balanced with the increased risks for the fetus.¹ Fortunately it is possible to grade vacuum deliveries according to the level of technical skill that is required to perform them and operators should discipline themselves to master all aspects of the technique beginning with straightforward deliveries before proceeding to the more complex extractions.⁸ A suggested operator classification and training programme is presented in Table 7 as a guide for achieving proficiency in vacuum delivery. This graduated approach should not only make the procedure safer for the mother and infant but, equally important, will help the operator to develop a sense of confidence in the method.

Although training under the supervision of skilled users of the vacuum extractor should be the preferred method of achieving competence in the technique, many obstetricians acquire their experience through self instruction. It should not be surprising, therefore, that standards of practice and reported outcomes are sometimes

Table 7 Training programme for vacuum assisted delivery

Level C (Beginner grade):

- Trainee has experience in managing normal labour and its common problems.
- The trainee receives instruction in at least 5 low-risk VADs (scalp visible at the introitus, OA position) under supervision of a qualified trainer.
- Trainee monitors progress with a detailed log of all procedures

Level B (Trainee grade)

- Trainee has achieved Level C competence
- Trainee receives instruction in at least 5 moderate-risk VADs (scalp not visible the introitus, OP/OT positions) under supervision of a qualified trainer.
- The trainee monitors progress with a detailed log of all procedures.

Level A (Qualified grade):

- Trainee has achieved Level B competence.
 - Trainee may undertake all types of clinically appropriate VADs at the discretion of a qualified trainer
 - The qualified trainee maintains competence with a log of all procedures.
-

suboptimal.^{44,45,46} To address this issue, self-directed teaching materials have recently been published^{8,9} and a number of structured training programmes have become available. Such programmes as Management of Obstetric Emergency and Trauma (MOET) and Advanced Life Support in Obstetrics (ALSO) include a component of basic vacuum extraction training. More recently, obstetric manikins have been developed that simulate the conditions of a vacuum delivery to a high degree of clinical reality. Simulation training with constant feedback and recurrent practice under qualified trainers should improve the standard of practice but the demonstration of better outcomes will be difficult to confirm over the short term and may not become apparent unless the training is available to all individuals.

CONCLUSION

The practice of vacuum-assisted delivery and the attitudes of clinicians towards this method of assisting a woman to give birth are determined to a large extent by the outcomes for the newborn infant and for the mother. Clinically significant injuries are often preceded by difficult vacuum extraction associated with detachment of the cup and failure of the procedure or with the use of forceps to complete the birth after vacuum extraction has failed. Clinical audit and system analysis often identify inadequate operator knowledge and training as an important contributor to adverse maternal and neonatal outcomes. With careful selection of patients, correct technique and strict adherence to safety rules the majority of serious injuries associated with vacuum extraction should be preventable (Table 8). Training programmes that teach basic vacuum extraction are becoming increasingly available and should be offered to all trainees. Ultimately, every obstetric hospital must take responsibility for the standard of instrumental delivery practice within the institution and effective risk

Table 8 Safety measures instituted prior to, during and after vacuum delivery*Before vacuum delivery*

- Availability of experienced operator who is skilled in vacuum delivery
- Classification of indications into lower and higher risk groups
- Classification of vacuum procedures according to station: outlet, low, mid
- Classification according to rotation: OA < 45°, OA > 45°, OT or OP
- Classification according to expected difficulty: standard or 'trial' vacuum delivery
- Recognition of cephalopelvic disproportion
- Consider whether caesarean section might be a safer option for delivery
- Forewarn parents of the transient cosmetic scalp effects
- Inform the neonatal paediatric staff of the intended vacuum delivery

During vacuum delivery

- Effective uterine contractions – consider use of oxytocin
- Maternal cooperation and effective maternal pushing
- Allow additional gentle tractions to compensate for effects of epidural analgesia
- Appropriate choice of cup: soft or anterior for OA; posterior cup for OP and OT
- Achieve a flexing median application of the cup
- Correct method of traction – avoid cup detachment
- Allow three pulls for the descent phase and three pulls for the perineal phase
- Observe descent with each contraction – cease if no descent or if difficulty occurs
- Reassess progress after each traction – if in doubt, stop and do caesarean section
- Presence of neonatal paediatric attendant

After vacuum delivery

- Examination of fetal scalp soon after delivery and at regular intervals
- Early recognition and prompt treatment of subgaleal haemorrhage
- Anticipate parental anxiety of the effects of vacuum delivery
- Consult neonatologist if there are concerns about the infant's condition
- Record details of the procedure on a suitable vacuum delivery data form

Post-vacuum delivery review

- Review the delivery with the mother within 24 hours and answer her questions
- Check site of the cup application for scalp effects and for educational purposes
- Arrange follow-up appointment for all infants with scalp lesions

OA, occipitoanterior; OT, occipitotransverse; OP, occipitoposterior

management will depend on regular audit of relevant clinical indicators and a review of all adverse outcomes.

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