Operative Vaginal Delivery

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Operative vaginal delivery remains a valid option when problems arise in the second stage of labor. The most common indications are fetal compromise and failure to deliver spontaneously with maximum maternal effort. There is a clear trend to choose vacuum extraction over forceps to assist delivery, but the evidence supporting that trend is unconvincing. Recent literature confirms some advantages for forceps (eg, a lower failure rate) and some disadvantages for vacuum extraction (eg, increased neonatal injury), depending on the clinical circumstances. To preserve the option of forceps delivery, residency training programs must incorporate detailed instruction in forceps techniques and related skills into their curricula. Simulation training can enhance residents' understanding of mechanical principles and should logically precede clinical work.
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When either fetal compromise unresponsive to attempts at intrauterine resuscitation or failure to progress despite adequate uterine contractility complicates the first stage of labor, cesarean delivery is the only recourse. However, when maternal or fetal indications for delivery are encountered in the second stage of labor, there are no published randomized clinical trials on which to base a choice between cesarean and operative vaginal delivery. A MEDLINE search using the terms "extraction, obstetrical" and "forceps delivery" in English between 1965 and 2009 confirmed this statement. If operative vaginal delivery is undertaken, there is a body of level I evidence to aid clinicians in choosing between forceps and vacuum extraction, but rarely is that evidence the sole or even the most important factor in instrument selection. Instead, the choice depends heavily on clinical circumstances and operator preference. An individual's training, experience, and confidence provide the underpinning for his or her preference. The purpose of this communication is to examine, based predominantly on experience reported after the publication of the American College of Obstetricians and Gynecologists (the College) Practice Bulletin 17 in June 2000,[1] the current practice of operative vaginal delivery and to advocate for increased teaching of this important area of our specialty to physicians in training.

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INDICATIONS

The two most common indications for operative vaginal delivery are the ones cited above: fetal compromise and failure to progress in the second stage of labor. Typical scenarios that highlight the clinical circumstances commonly associated with these indications are presented below. Both indications require that certain prerequisites be satisfied (Box 1). Some of these requirements are obvious and unambiguous: the cervix must be fully dilated, membranes ruptured, and head engaged. Others are more qualitative and difficult to define precisely: an "experienced" operator, knowledge of fetopelvic relationships, and a "willingness" to abandon the procedure. The position of the fetal head must be accurately ascertained and the clinical features of the maternal pelvis assessed. Estimating the size of the fetus is difficult; the use of ultrasonography probably does not improve clinical assessment by much, if at all. Along with knowledge and skill, clinical judgment is an important factor that influences both maternal and neonatal outcomes.

Scenario 1

A 20-year-old primigravid woman at 37 weeks of gestation is undergoing induction of labor for mild

Box 1. Prerequisites for Operative Vaginal Delivery

- Complete cervical dilation
- Ruptured membranes
- Head engaged
- Position and station known*
- Clinically adequate pelvis*
- Assessment of fetopelvic relationship*
- Adequate anesthesia
- Patient properly positioned
- Perineal body evaluated (consider episiotomy and type)
- Empty bladder/rectum
- Cesarean delivery capability

* Item should be confirmed by most experienced person at the delivery.

preeclampsia. Her labor has been monitored electronically throughout. After 30 minutes of the second stage, the fetal heart rate tracing shows recurrent variable decelerations with increasing depth accompanied by minimal baseline variability. On vaginal examination, the cervix is dilated completely and the vertex is at +2 station (on a −5-cm to +5-cm scale), 45 degrees left occiput anterior. The pelvis is described as a gynecoid and the clinical estimate of fetal weight is 3,400 g.

There is evidence that the use of electronic fetal monitoring increases the rate of cesarean deliveries and operative vaginal deliveries.[2] One system for classification of fetal heart rate (FHR) tracings recommends the use of a three-tiered approach.[2] According to that scheme, the FHR tracing in the above vignette would correctly be labeled category II (indeterminate). Appropriate management of a category II tracing may include the use of ancillary tests to ensure fetal well-being or an attempt, using some technique for intrauterine resuscitation, to improve fetal status. By common agreement, category II FHR tracings do not predict fetal acidosis. When such a tracing is encountered in the second stage of labor, as in the case described, expedited delivery is a valid option that might avoid deterioration to category III and the risk of exposure to asphyxia.

What delivery options are appropriate for this scenario? Many obstetricians practicing in the United States today would choose cesarean delivery without attempting or perhaps even considering operative vaginal delivery. Some would opt for vacuum extraction; others, for forceps delivery. An important factor would be the operator's confidence that instrumental delivery would be successful. Because there are few data directly comparing the alternative of cesarean delivery with some form of instrumental vaginal delivery, the option of cesarean delivery will not be addressed further.

In the scenario presented, once an attempt at vaginal delivery has been decided on, each operator must select an instrument, vacuum or forceps. Conceptually, this sounds like an "either/or" choice, but several options are available within each category. A number of randomized trials included in the Cochrane Library database have addressed the question of vacuum compared with forceps, but the application of this standard method of investigation to a complex clinical procedure has serious limitations. As emphasized in a recent re-

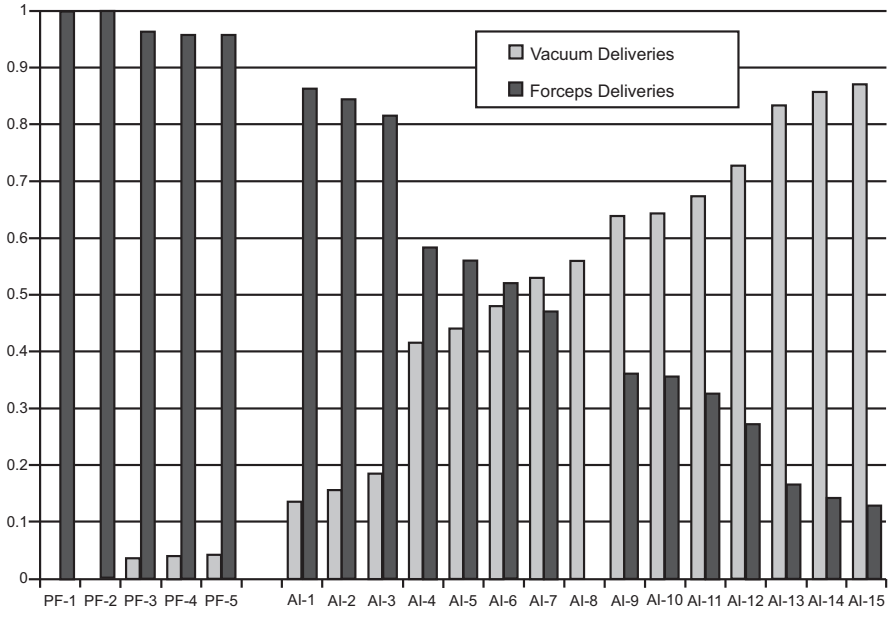

Fig. 1. Proportion of instrumental deliveries performed using forceps and vacuum between study obstetrician. PF, preferential forceps; AI, any instrument. (Reprinted from Abenhaim HA, Morin L, Benjamin A, Kinch RA. Effect of instrument preference for operative deliveries on obstetrical and neonatal outcomes. Eur J Obstet Gynecol Reprod Biol 2007; 134:164–8. Copyright 2007, with permission from Elsevier.)

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port,[3] those trials fail to account for operator skill and, perhaps more importantly, operator preference. Shown in Figure 1 is a graphic assessment of operator preference taken from that report. The five operators at the left of the figure used forceps for more than 90% of their operative vaginal deliveries and were thus classified as preferring forceps. The remaining 15 operators were grouped as preferring any instrument; some preferred forceps over vacuum and some preferred vacuum over forceps. (My own preference would put me at the far left of the figure.) The authors of this report concluded that physician instrument preference is an important determinant of outcomes. One outcome of current interest that the investigators compared between the two groups is the incidence of third- and fourth-degree tears that complicated operative vaginal deliveries. For operators who preferred forceps, the incidence of such tears was 11.3%, whereas for those who used either instrument it was 13.9%. This experience contradicts the conclusions from several randomized trials of forceps compared with vacuum showing that perineal trauma was significantly greater for forceps delivery than for vacuum extraction delivery. The most recently available epidemiologic data indicate that the vacuum-to-forceps ratio in the United States stands at 4:1.[4] It is conceivable that the results of randomized trials affected the preference of contemporary practitioners. However, it is much more probable that other factors, especially training, exerted a stronger influence on preference than trial results.

A recent observational study also highlighted the importance of operator preference. Murphy and Koh reported on 1,021 operative deliveries for "fetal distress" in the second stage of labor, analogous to the scenario described above.[5] All women were at term with singleton cephalic neonates. In 998 of those women, operative vaginal delivery was attempted, and only 23 delivered by immediate cesarean delivery. Another 33 cesarean deliveries were performed after failed operative vaginal delivery, but surprisingly 965 of 998 attempted operative vaginal deliveries (96.7%) were completed successfully. The authors stated that "forceps were preferred to vacuum." Eight hundred deliveries (78.4%) were conducted in a labor room; there were only two failed forceps deliveries that were followed by cesarean delivery within 30 minutes. In contrast, there were 39 initial failed attempts at vacuum extraction in the labor room, but these 39 were all followed by successful forceps deliveries without moving to an operating room. Failures (31 of 198 [15.7%]) that occurred "in theater" were all followed by immediate cesarean delivery, but information as to whether forceps or vacuum extraction failed was not provided in the report. This remarkable study was reported from the United Kingdom and spanned only 5 years. There were only three serious adverse neonatal outcomes, and none were related directly to the method of delivery. The higher failure rate of vacuum extraction is a recurring theme in contemporary literature. The preference for forceps in this article would seem to be justified by the results.

The appropriate setting for attempted vaginal delivery, the labor room or the operating room (the latter referred to abroad as "in theater"), is a point of controversy and would depend on several factors. If the results from this large observational study[5] could be extrapolated to the United States, it would seem reasonable to attempt operative vaginal delivery in a labor room. With the fetal head at +2 station and 45 degrees left occiput anterior, the delivery would be classified as a low forceps or, more likely, a low vacuum given the 4:1 ratio of vacuum to forceps cited earlier. The classification scheme currently in use was adopted by the College in 1988 and reaffirmed in Practice Bulletin 17[1] on operative vaginal delivery and presented in Box 2. Of note, the Royal College of Obstetricians and Gynaecologists also uses a slightly modified version of the American classification system.

Box 2. Criteria for Types of Forceps Deliveries

Outlet Forceps

1. Scalp is visible at the introitus without separating labia.
2. Fetal skull has reached pelvic floor.
3. Sagittal suture is an anteroposterior diameter or right or left occiput anterior or posterior position.
4. Fetal head is at or on perineum.
5. Rotation does not exceed 45 degrees.

Low Forceps

Leading point of fetal skull is at station +2 cm or more (−5 cm to +5 cm scale) and not on the pelvic floor.

Rotation is 45 degrees or less (left or right occiput anterior to occiput anterior, or left or right occiput posterior to occiput posterior).

Rotation is greater than 45 degrees.

Midforceps

Station is above +2 cm but head is engaged.

High Forceps

Not included in classification.

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In the absence of an indication-specific series of large size from the United States and mindful of the steady decline in operative vaginal delivery in this country, one might surmise that the frequency of

immediate cesarean delivery would be higher than in the report by Murphy and Koh.[5] Guidelines in the Practice Bulletin 17[1] caution against the performance of combined vacuum-forceps delivery because of an increased incidence of neonatal intracranial hemorrhage. Therefore, when the inevitable failed vacuum extraction occurs, cesarean delivery would be chosen more often. Although the case presented is relatively straightforward, there are data suggesting that recent graduates might not have the confidence to attempt vaginal delivery, especially by forceps.[6] All of these factors, plus the ever-present threat of litigation, would result in a much higher cesarean rate for fetal compromise compared with the series by Murphy and Koh.[5]

Scenario 2

A 17-year-old primigravid woman at 40 weeks of gestation has been pushing in the second stage for 3 hours. Vaginal examination reveals that the vertex is at +3 station. There is anterior asynclitism and moderate caput, and the position is felt to be 60 degrees right occiput anterior. A continuous lumbar epidural anesthetic is providing good relief of pain but the patient is exhausted. The pelvis is clinically adequate and the estimated fetal weight is 3,800 g.

The second major indication for operative vaginal delivery is failure to progress in the second stage of labor. Such failure may be attributable to maternal exhaustion, relative cephalopelvic disproportion manifesting as arrest of descent, or simply prolongation of the second stage. Definition of prolonged second stage varies by parity and use of epidural anesthesia[1] and is most often a judgment call on the part of the operator. As the duration of the second stage extends beyond 3 hours, maternal morbidity may increase and the likelihood of successful vaginal delivery diminishes. The literature contains few data on operative vaginal delivery specifically for this indication. Intuitively, the degree of difficulty in this situation is greater and the probability of success less than in the first scenario where delivery was indicated for possible fetal compromise. In the first scenario, the indication for delivery arose before the woman accomplished all that she could with her voluntary effort. In the second scenario, the woman could not physically deliver her neonate without some form of operative assistance.

For operators that prefer the vacuum extractor, the patient in scenario 2 presents some technical challenges. A correct median-flexing application of the vacuum cup is more difficult to obtain when caput and asynclitism are both present. The patient's ability to push and augment the force applied by the operator using the vacuum device may be diminished by fatigue, increasing the chance of cup detachment. In a series of 1,000 consecutive vacuum-assisted deliveries, many of which were significantly less challenging than this hypothetical one, the failure-to-deliver by vacuum rate for nulliparous women was 15.3%.[7] In that series, as well as in the large series cited earlier by Murphy and Koh,[5] initial vacuum failure was frequently followed by forceps delivery. In the United States, cesarean delivery would probably be the next step instead, without attempting forceps delivery.

A strong case can be made for attempting forceps delivery initially in scenario 2, provided that the operator has sufficient skill and confidence. An instrument with a pelvic curve and a sliding lock like that of Luikart may be chosen because it allows for correction of asynclitism. Alternatively, the more commonly used Simpson forceps may be used if careful attention is paid to achieving a symmetric and accurate cephalic application before applying traction. Even at station +3, this delivery involves more than 45 degrees of rotation and poses a greater challenge than a simple outlet forceps or a low forceps delivery without rotation. To avoid a failed forceps delivery in the labor room, some might choose to attempt delivery in an operating room with immediate capability for cesarean delivery in case of failure. This procedure would be termed a "trial of forceps" (in theater in the United Kingdom, as noted above). Selecting the most appropriate site for delivery is one aspect of clinical judgment that must be exercised in every operative vaginal delivery. Guidance from the College cautions against a trial of forceps unless there is a high probability of success,[1] whereas the Royal College of Obstetricians and Gynaecologists has liberalized the criteria for delivery in theater.[8] However, some investigators believe that too many deliveries, including some relatively easy ones, are being performed in theater.[9,10] Murphy and colleagues[11] performed a prospective cohort study of 393 women with arrested progress in the second stage of labor. They used delivery in theater as a surrogate to define difficult instrumental vaginal delivery (n=184) and compared the outcomes with those of 209 women delivered by cesarean delivery. Women delivered in theater if rotation was required, borderline cephalopelvic disproportion was suspected, or recourse to cesarean delivery was a possibility. The overall rate of serious neonatal morbidity was low for both groups, with no perinatal deaths and only two cases of encephalopathy. These authors concluded that their data lend

support to an aim to deliver women vaginally unless there are clear signs of cephalopelvic disproportion.

PERFORMANCE OF OPERATIVE VAGINAL DELIVERY: POINTERS AND PITFALLS

The discussion that follows presumes that an appropriate indication has been identified and that the basic prerequisites have been met. Forceps delivery is considered first, followed by vacuum extraction.

Forceps Delivery: Scenario 1

The delivery in this case would be classified as a low forceps without rotation. Clinical assessment confirms an average-size fetus and an adequate pelvis, so the delivery can be undertaken in the labor room. Either Simpson or Simpson-Luikart forceps would be common choices of instrument. The operator should ensure that the woman is positioned properly in the labor bed, with her buttocks slightly overhanging the edge of the bed and the legs supported by stirrups. Excessive abduction and elevation of the legs should be avoided. The legs should not be strapped down. A "ghost" application is performed by holding the articulated forceps in front of the perineum in the position that they will ultimately occupy inside the pelvis. The left (posterior) blade should be applied first. The right blade will need to be wandered into the right upper quadrant of the pelvis. Words alone cannot adequately convey the technique of forceps placement to those who do not already understand it. Therefore, this discussion of application of forceps serves only to illustrate one of the steps involved in approaching the problem posed in scenario 1. Articulation of the branches should not be difficult. Rotation of the fetal head to occiput anterior should precede the initiation of traction. Whether to cut an episiotomy, what type, and when are all important decisions that affect the incidence of third- or fourth-degree extensions or lacerations. Traction is then applied in the axis of the pelvis using a Pajot-Saxtorph bimanual technique, or a Bill axis traction device can be used. The fetal head should descend with each pull. Once it has reached the pelvic floor, the handles of the forceps should be elevated to an angle of approximately 45 degrees as the head comes under the pubic arch. One hand of the operator grasps the shanks of the forceps while the thumb of the other hand rests on the fetal head to prevent it from popping out as the fingers reach behind the anus to secure the fetal chin. Once the chin is secured, the forceps should be removed before delivery of the fetal head. This simple maneuver may reduce the incidence of deep perineal lacerations. One pitfall is to pull in a downward direction for too long; doing so puts the external anal sphincter at risk of tearing. One of the most commonly cited disadvantages of forceps compared with vacuum extraction is the increased incidence of maternal perineal damage. Such damage should be attributed more to the operator than to the instrument itself.

Forceps Delivery: Scenario 2

Delivery of the woman described in this scenario is likely to be more difficult than in the one above. In scenario 1, the woman had not accomplished all that she was capable of, whereas in scenario 2, three hours of expulsive effort has not brought the fetal head to the pelvic floor. There is caput, molding, and asynclitism, which complicate position diagnosis. The head will have to be rotated more than 45 degrees, which means it would be classified as a low forceps with rotation. It may be prudent to move the woman to the operating room for a trial of forceps delivery. At +3 station, success is highly likely. It is important to achieve a symmetric and accurate bimalar biparietal application to minimize the risk of fetal injury. Luikart forceps have pseudofenestrated blades that decrease forceps marks and overlapping shanks that distend the perineum less than forceps with parallel shanks would. They also have a sliding lock for correction of asynclitism; unfortunately, they are not widely available. The delivery can be performed with Simpson forceps, possibly with manual correction of asynclitism and manual rotation before application. Caution is indicated because the parallel shanks of the Simpson forceps stretch the perineum and increase the risk of maternal injury. Another pitfall is that an unfavorable brow-mastoid application may be obtained, and this increases the risk of fetal injury. Once a good application is achieved, rotation should be performed by swinging the handles through a wide arc of 60 degrees. The advice contained in Practice Bulletin 17[1] was that rotational forceps should be undertaken only by those with appropriate skill and training; the references cited in the Bulletin preceded the adoption of the current classification of low and midforceps, which makes it difficult to use them to guide contemporary practice. There have been no new articles published since the Bulletin that address rotational forceps delivery. Traction should produce descent with each pull and, as above, the forceps should be removed before delivery of the head. With forceps as well as with the vacuum extractor (see below), when descent does not occur after appropriately directed traction, the procedure should be abandoned in favor of cesarean delivery. A midline episiotomy increases the probability of third- or fourth-degree extension.

Mediolateral episiotomy may reduce this risk but it is not widely practiced in the United States. Again, perineal trauma may be attributable to the type of episiotomy, not to the instrument itself.

Vacuum Extraction: Scenario 1

As previously mentioned, vacuum extraction is preferred 4:1 in the United States today, but this fact is not based on compelling evidence. Compared with forceps, the risk of failure is higher with vacuum extraction, particularly in a nulliparous woman. However, it makes more sense to use it for fetal compromise than it does for arrest of descent when pop-offs may occur more frequently. In scenario 1, it should be relatively easy to properly place the center of the cup directly over the sagittal suture at the median flexing point, defined as 3 cm anterior to the posterior fontanel. A soft cup is preferable to a metal cup because the incidence of scalp trauma is less. Any of several soft cups on the market should be suitable. Traction after the pelvic curve should produce visible descent with each pull. Releasing the vacuum between pulls is not necessary.

Vacuum Extraction: Scenario 2

Cup placement will be difficult with caput and asynclitism. The woman may be too exhausted to push, and pop-offs are predictable. Instrument failure is expected in more than 15% of cases, and failure may necessitate cesarean delivery. Two major complications of vacuum extraction, shoulder dystocia and subaponeurotic hemorrhage, are discussed subsequently. Three pop-offs, duration of use more than 20 minutes, or failure of descent with traction should signal the need to abandon the procedure. If vacuum extraction fails to effect delivery, especially at a level above the pelvic floor, switching to forceps incurs additional risk.[1,12]

Episiotomy

The use of episiotomy as an adjunct to operative vaginal delivery has historically been left to the discretion of the operator. Only recently has there been an attempt to examine the practice scientifically. A small randomized controlled trial of routine compared with restrictive use of episiotomy at operative vaginal delivery failed to provide conclusive evidence favoring one approach over the other.[13] This was a pilot study that determined that a definitive trial was feasible but would require large numbers of women (more than 8,000) to be enrolled to inform clinical practice. There is a prevalent concern that clinical judgment may affect outcomes of this surgical procedure (eg, the actual angle of a mediolateral episiotomy). Whereas only 200 women were randomly assigned in this pilot study, a contemporaneous study of more than 1,300 women from the same institutions revealed that the use of episiotomy neither reduced nor greatly increased the frequency of anal sphincter tears.[14] Both of these reports came from the United Kingdom and therefore involved mediolateral episiotomies. Another report from The Netherlands concluded that mediolateral episiotomy protected significantly against anal sphincter damage compared with no episiotomy for operative vaginal delivery.[15] In this large series of 21,254 vacuum deliveries and 7,478 forceps deliveries, anal sphincter tears occurred in 3.0% of the former and 4.7% of the latter. Finally, as part of a multiple-intervention study in the United States, Hirsch and colleagues[16] recommended performance of mediolateral episiotomy at operative vaginal delivery if episiotomy was deemed necessary. They compared the frequency of high-order perineal lacerations before implementing a number of interventions (41%) to the frequency after implementation (26%). Although the reduction was statistically significant, the series was small and the outcome may have been attributable to one of several interventions besides the increase in the number of mediolateral episiotomies. Of interest, comparing the United Kingdom reports (where midline episiotomy is rarely practiced) to this small American study (where the majority of episiotomies even after implementation of the recommended interventions were still midline), the difference in the frequency of high-order lacerations is striking. The issue of episiotomy takes on additional significance regarding choice of instrument because the primary adverse consequence of using forceps is injury to the anal sphincter and rectum. If it can be shown conclusively that cutting an appropriate size episiotomy of whatever type reduces that risk when forceps are used, the demonstrated advantages of a lower failure rate and a lower risk of neonatal trauma with forceps compared with vacuum extraction may increase the preference for forceps to accomplish operative vaginal delivery.

ADVERSE OUTCOMES: A BALANCED VIEW

Practice Bulletin 17[1] addressed some of the complications of operative vaginal delivery. The Bulletin cites studies indicating that maternal morbidity is increased for forceps compared to vacuum delivery. This morbidity refers mainly to deep perineal lacerations or episiotomy extensions (third-degree, fourth-degree, or both). As mentioned in the discussion of episiotomy in the preceding section, the frequency of

such injuries may be modifiable. The type of episiotomy (midline compared with mediolateral) and the approach to episiotomy (routine compared with restrictive) are factors that so far have been inadequately investigated. Unquestionably, there are aspects of improper delivery technique that definitely can impact on the frequency of these complications. Examples include pulling in a downward direction too long or not removing the forceps before delivery of the head. Nevertheless, it was this concern for increased maternal morbidity with forceps compared with vacuum that contributed significantly to the belief that the vacuum was the instrument of "first choice." A 5-year follow-up of maternal health in women enrolled in a randomized trial of forceps delivery compared with vacuum extraction found no significant difference in bowel or urinary dysfunction when forceps deliveries were compared with vacuum extraction.[17] The fact that the vacuum fails more often, and that such failure resulted in combined vacuum and forceps delivery (proven to be more morbid than either technique alone), received relatively little attention.

Of even greater significance in the final choice of instrument are neonatal complications. The Bulletin[1] cites an incidence of subgaleal hematomas associated with vacuum extraction at 26–45 per 1,000. This is an impressively frequent occurrence and one that may have dire consequence for the newborn. In contrast to cephalohematomas (subperiosteal bleeds, also increased with vacuum extraction), subgaleal hematomas can be associated with much higher blood loss, leading to shock and even exsanguination. Such severe complications are fortunately not common, but when they occur they are strongly associated with vacuum extraction. Boo and colleagues[18] found 71 cases of clinically confirmed subgaleal hemorrhages in a series of 338 neonates exposed to vacuum extraction, for an incidence of 21%. They included neonates who were either actually delivered by vacuum extraction or who had an attempted vacuum extraction followed by some other method of delivery. Hypovolemic shock developed in 7 (10%) of 71 of these neonates. Uchil and Arulkumaran[19] cautioned that traction which does not produce descent creates more force on the scalp compared with traction that is associated with descent. Proponents of vacuum extraction should be acutely aware of this observation, especially in cases such as the one in scenario 2 above. The randomized trials included in the Cochrane Library database may have preferentially excluded difficult cases and therefore found a low incidence of subgaleal bleeding. An estimate of the frequency of this complication for forceps delivery is difficult to find but, based on many years of personal experience, undoubtedly is much lower.

An important report by Towner and colleagues[12] emphasized that the incidence of neonatal intracranial hemorrhage, as opposed to extracranial hemorrhage such as the subgaleal bleeding described above, was very low and not statistically different for vacuum extraction, forceps delivery, and cesarean delivery after labor. The highest incidence of intracranial bleeding was noted with combined use of vacuum extraction and forceps delivery. The authors raised the question of whether abnormal labor was etiologic as opposed to the method used to terminate the labor. With regard to long-term neurodevelopmental outcome, a recent small study confirmed low overall rates of morbidity irrespective of mode of delivery.[20]

Shoulder dystocia is another serious complication encountered more frequently with vacuum extraction than with forceps delivery. Caughey et al[21] have advanced a theory as to why this occurs. They postulate that the axis of traction may contribute to impaction of the anterior shoulder behind the symphysis, whereas the axis of traction for forceps delivery is more posterior.

Facial nerve palsy is seen more often with forceps delivery than with vacuum extraction. The incidence is reported to be just less than 1% of all forceps deliveries. However, a recent series[22] of 28 cases of facial nerve palsy in neonates secondary to forceps use provides reassurance that such injuries are relatively mild. Only one case required any treatment, and all 21 neonates with adequate long-term follow-up recovered fully after an average period of just over 3 weeks.

Failure to progress in the second stage of labor is a frequent clinical problem that necessitates a choice between cesarean and operative vaginal delivery. As noted previously, there is a dearth of published evidence to guide this choice. Obstetricians must consider their ability to safely perform operative vaginal delivery, the patient's preference, fetal status, and a number of other variables. Counseling should include not only immediate outcome, but long-term consequences as well. Studies have shown that the prognosis for normal neurologic development after operative vaginal delivery is quite good.[20] After operative vaginal delivery of a first neonate, subsequent deliveries are likely to be vaginal, as opposed to primary cesarean for the first delivery, which is highly likely to be followed by repeat cesarean deliveries with their potential for morbidity. The dramatic in-

crease in placenta accreta along with its associated risk of massive hemorrhage, hysterectomy, and even death that has accompanied the high cesarean delivery rate should be explained during counseling. The incidence of uterine rupture is increased in a subsequent pregnancy once there is a uterine scar. Women rarely die after vaginal delivery, operative or nonoperative. The same cannot be said for cesarean delivery, even after underlying complications have been excluded; Deneux-Tharaux and colleagues reported that the risk of postpartum death was 3.6 times higher after cesarean delivery than after vaginal delivery.[23] These considerations were not specifically cited in Practice Bulletin 17[1] but were alluded to with the statement that "the risks associated with alternative procedures also must be considered." For all these reasons, those responsible for counseling patients should present a balanced view of risks, benefits and alternatives, and should not simply advise immediate cesarean delivery when problems arise in the second stage of labor.

TRAINING

All surgical skills require training, and operative vaginal delivery is a surgical skill that simultaneously affects the outcome for two patients, the mother and her neonate. To optimize outcome, a simple, straightforward approach to training is proposed. First, residents must be given a series of lectures on the topic of operative vaginal delivery to provide a firm foundation in areas that are essential to competent performance: maternal pelvic assessment, accurate diagnosis of fetal position, indications, prerequisites, advantages and disadvantages of various instruments, and detailed information about the instruments themselves. The resident's assimilation of this knowledge should then be assessed by both written examination and formal simulation exercises before allowing them to be primary operators on real patients. Once the resident has demonstrated readiness to be the primary operator, he or she must be supervised by a faculty member who has experience in the chosen method of delivery. The supervisor must put on gloves, confirm the resident's findings, check the application of the instrument before traction, and closely monitor the direction and magnitude of the force applied, providing instantaneous feedback and correction throughout the procedure. The resident should then be given a written evaluation of performance, termed a Focused Assessment of Competency. These Focused Assessments of Competency should be placed in the resident's training folder and reviewed by the program director. One goal of such a regimented approach is to ensure that graduates of our training programs are capable of independent practice of operative vaginal delivery. A second goal is to reduce preventable morbidity during training to an absolute minimum.

CONCLUSION

A review of selected literature from the past decade confirms that operative vaginal delivery remains an acceptable method of delivering babies. The trend to prefer vacuum extraction over forceps delivery, which was identified in Practice Bulletin 17[1] a decade ago, has continued unabated. The evidence for such a preference is not compelling. Preserving forceps as a choice for operative vaginal delivery mandates training in forceps techniques during residency. This message, echoed by several authors recently,[21,24] must be embraced by trainees and heeded by program directors everywhere.

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