CHAPTER 41

Instrumental vaginal delivery

1 Introduction
When there is a valid indication for expediting the birth of the baby, instrumental vaginal delivery rather than cesarean section may be selected on the basis of a number of factors. These include the condition of the fetus and mother, progress in labor, dilatation of the cervix, the station of the presenting part, position and moulding of the fetal head, comfort, morale and co-operation of the mother, experience and attitudes of the operator, and the availability of the necessary equipment.

Few indications for instrumental delivery are absolute, and there are considerable regional and international differences in the rate of instrumental deliveries. Various care practices may help to achieve lower rates of assisted delivery. Among these are encouraging companionship in labor, active management of delay in the second stage of labor with oxytocin, and the use of upright posture for birth. When epidural analgesia is used, allowing time for the analgesic effect to wear off, and having a more liberal approach to the length of the second stage, will also reduce the need for assisted delivery.

There is considerable disagreement concerning the preferred method. In the English-speaking world, in general, forceps are the...
preferred instruments, although the use of vacuum extraction when instrumental delivery is required is increasing. The situation is the reverse in many European countries, where forceps are used less frequently than vacuum extraction.

2 Conditions for instrumental delivery

The operator is a major determinant of the success or failure of instrumental delivery. Unfavorable results are almost always caused by the user’s unfamiliarity with either the instrument or the basic rules governing its use.

A fully dilated cervix is a prerequisite for instrumental vaginal delivery. The station and degree of moulding of the head must be carefully assessed and its position accurately known. The use of oxytocin may be better than too early instrumental delivery for dealing with a delay in second stage labor before the baby’s head reaches the pelvic floor.

The common indications for instrumental delivery, such as fetal distress or delay in the second stage of labor, are likely to create anxiety in the mother and her partner. Some of this anxiety can be relieved by keeping them fully informed of the reasons for, and the nature of, the procedures that are undertaken.

Proper and effective analgesia should be provided before instrumental delivery is commenced. Less pain relief is needed, as a rule, for vacuum extraction than for forceps delivery. Vacuum extraction or outlet forceps delivery can usually be accomplished comfortably with local infiltration of the perineum or pudendal nerve block. Rotational forceps deliveries will often require a more profound form of anesthesia, such as epidural or spinal block.

The total force exerted on the fetal head during instrumental birth will depend on the type of instrument, the duration of the procedure, and on the number and strength of pulls. Some descent of the head should occur with each pull. Absence of descent with traction on a correctly positioned instrument should be regarded as a reason to abandon the procedure in favor of cesarean section.

Elective instrumental vaginal delivery has been compared with spontaneous vaginal birth in only a few small trials. Instrumental delivery results in significantly more perineal trauma (both episiotomy and laceration) than spontaneous birth. The alleged benefits of an elective ‘lift out’ forceps in terms of slightly fewer babies with low cord blood
pH values have to be weighed against the more frequent problem of maternal vaginal and perineal trauma.

3 Equipment and techniques

3.1 Forceps
Since the introduction of forceps, numerous modifications have been made in attempts to improve their efficiency and safety. Forceps can be grouped on a functional basis into those whose primary function is to exert traction and those whose primary function is to correct malposition. No controlled trials of the use of different types of forceps have been reported. One trial evaluated the use of a forceps pad designed to reduce infant trauma; the use of the pad resulted in fewer babies having craniofacial markings.

3.2 Vacuum extraction
Various cup designs have been used to perform vacuum extraction. The metal cups most widely used are the Bird-modification ones. The posterior cup is designed to be inserted higher up in the vagina than the anterior cups. This is to allow correct placement over the occiput when the head is deflexed.

More recently, a number of soft cups have been developed, which follow the contour of the baby's head during application. They are less likely than metal cups to be associated with scalp trauma, though serious complications, such as subgaleal hemorrhage, have been reported. Being soft, they are easy to apply and unlikely to injure the mother. As they are cleaned and sterilized as one item, they present no problems with assembly or leakage. In addition, the opinions of both women and midwives about the instruments appear to be favorable.

All the vacuum cups are satisfactory for outlet and non-rotational midpelvic operations. Operators would be well advised to develop confidence in outlet and non-rotational midpelvic procedures before embarking on assisted deliveries where the head is malrotated. The basic technique is similar in all positions of the occiput, and experience gained with non-rotational procedures will prove invaluable when the more difficult rotational operations are attempted. In one small study, no advantage of graded over rapid creation of a vacuum was shown. The few trials that have been carried out comparing the various rigid cup designs to one another have not demonstrated any differences in outcome. Comparisons of soft with
rigid vacuum extraction cups suggest that soft cups are less likely to achieve vaginal delivery, but result in significantly fewer fetal scalp injuries than metal cups.

The success rate with a metal cup is better than with a soft cup, especially for delivering a baby in an occiput-posterior position, where the ‘OP’ cup is very useful. Because soft cups are also more likely to fail with a large baby, a high head, or a large amount of caput, it is reasonable to limit their use to more straightforward deliveries. Despite these disadvantages, it is worth continuing to use soft cups when feasible because they are associated with less neonatal trauma.

The risk of injury to the infant is directly related to the number of pulls with the vacuum extractor. Sudden cup detachments may cause injury to the scalp of the infant. In one study, increasing asynclitism (oblique presentation of the fetal head) and increasing application to delivery time correlated significantly with cephalhematoma. No advantage has been shown with reduced vacuum pressure between contractions.

4 Comparison of vacuum extraction and forceps

4.1 Efficiency

With adequate experience and proper placement of the vacuum cup, most deliveries that require instrumental rotation of the head can be accomplished by vacuum extraction, thus avoiding the need for painful and potentially traumatic forceps rotations. This experience should not be difficult to obtain and should form part of all specialty training programs in obstetrics. Although the vacuum extractor is less likely than forceps to achieve a vaginal delivery with the chosen instrument, with backup of forceps when required, vacuum extraction is associated with a lower overall cesarean-section rate.

The mean time between the decision to deliver and delivery itself is similar for forceps and vacuum extraction, although the range of the decision-to-delivery interval is greater for forceps. This is at least in part due to the time required to institute the more complex forms of analgesia used for forceps delivery. The widely held belief that vacuum extraction is too slow to be useful when rapid delivery is required for fetal distress can firmly be laid to rest.

On balance, for most instrumental vaginal deliveries, vacuum extraction is to be preferred over forceps. Reserving one instrument for routine applications and the other for especially difficult situations
would be ill-advised. Even moderately difficult extractions, whether by forceps or by vacuum extraction, should not be undertaken unless the operator has considerable expertise with the instrument chosen. In the absence of such expertise, delivery by cesarean section should be considered.

4.2 Effects on the mother
The vacuum extractor is significantly less likely to cause serious maternal injury than the forceps. Its use is associated with a lower usage of regional and general anesthesia, and with significantly less pain to the mother, both at delivery and in the puerperium.

4.3 Effects on the infant
Vacuum extraction is more likely to cause cephalhematoma than forceps, but forceps are more likely to cause other kinds of scalp and facial injuries. No significant differences between the instruments have been found in the number of babies requiring phototherapy. Perhaps because of the chignon caused by the rigid vacuum cup, mothers tend to be more worried by the immediate appearance of the baby delivered by vacuum extraction than with forceps.

The vacuum extractor appears to be associated with an increased incidence of retinal hemorrhages (although this latter result is largely influenced by a single study that was methodologically less sound than all other trials reviewed).

There is not enough information available to judge the relative effects of the two instruments on the risk of perinatal death or the long-term condition of the infants. In the only follow-up study of cohorts randomized to the two instruments, the incidence of problems was similar in the vacuum and forceps groups, but the numbers of infants studied was too small to exclude anything other than very dramatic differences in outcome.

Follow-up studies showed no significant differences in mothers’ attitudes to the instruments or in infant readmissions to hospital.

5 Conclusions
Both a valid indication and the necessary conditions must be met before instrumental delivery is undertaken. The cervix must be fully dilated; effective analgesia must be in place; and the operator must be familiar with the chosen instrument. There is no justification for a
‘difficult instrumental delivery.’ Cesarean section would almost always be preferable.

Shortening of the second stage with elective instrumental delivery can result in a clinically unimportant gain in umbilical cord blood pH, but may lead to a considerable increase in maternal vaginal and perineal trauma.

Forceps delivery and vacuum extraction are to a large extent interchangeable procedures. The available evidence indicates that the use of forceps is more likely to result in maternal injury, and is more dependent on extensive analgesia or anesthesia than is vacuum extraction.

Sources

Effective care in pregnancy and childbirth

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