

The Malmström Vacuum Extractor in Obstetrics

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RECENTLY, the lay press has given a great deal of publicity to the use of the Malmström vacuum extractor as a new method of delivery. However, as early as 1706, J. Yonge used a form of vacuum extraction and, in 1849, Simpson described a suction tractor to be used as a substitute for forceps. As recently as 1955, Finderle described the results he achieved with his vacuum extractor. Castallo, in a discussion of Finderle's paper, informs us that he and Torpin also had devised such an instrument. He states that their results with vacuum extractors were not as successful as Finderle's, but he notes that they may not have been using it correctly.

In the past few years, the vacuum extractor has enjoyed more widespread use, especially in countries other than the United States. Barben has been so impressed with this mode of delivery that he suggests that modern obstetricians use, in vertex presentations, the following approaches, in this order of preference: spontaneous delivery, vacuum extraction, or an attempt at vacuum extraction delivery, or cesarean section. Similarly, Bruniquel and Israel reported the abolition of forceps deliveries in their series. Berggren and Voegeli each reported favorable results with the extractor with no deleterious maternal or fetal effects. Evelbauer has used the extractor synchronously with contractions in

cases of malposition and relative disproportion. Since he found no injury to mother or child he concludes that the method exposes both mother and child to less trauma than forceps.

One interesting feature in the literature on the vacuum extractor is the fact that the use of the instrument is reported always to have been successful and the complications minimal.

In January 1956, Shulman and Grossbard published their study on postpartum hemorrhage. They found that one third of the cases of early postpartum hemorrhage were due to vaginal lacerations, of which over 90 per cent occurred with the use of forceps.

We decided to use the improved vacuum extractor, as devised by Malmström, to see if we could eliminate the problems brought about by the use of forceps.

THE INSTRUMENT

This instrument consists of a metal suction cup, attached by a chain to a metal traction handle, and connected via a bottle to a vacuum pump and meter. The cup is made in different sizes, with openings ranging from 40 to 60 mm. in diameter. After the cup is inserted into the vagina and placed against the fetal scalp, a vacuum of 0.6 to 0.8 kg./sq. cm. is created.

TECHNIC

As with the use of forceps, several measures must be taken before the application of

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the suction cup. The bladder and rectum should be empty. The bag of waters must be ruptured. Cervical dilatation, station, and the position of the baby's head must be determined.

During the course of this study, we used 2 technics in the application of the instrument. In the first (Technic A), the suction cup is applied to the fetal scalp and the pressure raised immediately to the 0.6–0.8 kg. required. Traction is then applied to effect delivery. In the second technic (Technic B), the vacuum is created gradually by increasing the suction 0.2 kg. every 2 min., until the required vacuum is reached. This enables the soft tissues of the scalp to completely fill the suction cup. Two fingers of one hand are then inserted into the vagina and onto the baby's head. Synchronously with uterine contractions, traction is applied to the handle of the instrument with one hand, while the fingers of the other hand aid rotation of the baby's head to an occiput anterior position. As traction is applied in the direction of the birth canal, the tissues of the pelvic floor also aid in proper rotation of the baby's head. Episiotomy is performed in the usual manner.

When the occiput stems under the symphysis, traction is directed upwards, favoring extension until the entire head is delivered. At this point the vacuum is released, the cup removed, and the delivery completed. In many cases, with the head at the outlet, it was unnecessary to use synchronous traction (with uterine contractions). At this station, after proper vacuum is reached, simple traction will deliver the head easily. The vacuum cup causes a swelling or chignon to develop on the baby's scalp at the site of application. This resembles a caput succedaneum. The diameter of this will depend on the size of the cup used. In many instances an ecchymotic area remains when the swelling disappears. This area varies with the amount of traction used, and its size depends again on the size of the cup used.

INDICATIONS

This instrument was used in those cases where forceps would have been used: prolonged second stage, midpelvic arrest of the head, and for prophylactic reasons. However, to evaluate this instrument properly, we have used it electively several times when the head was at midposition, and could have descended to a low or outlet position spontaneously. Furthermore, its use was extended to one other complication: the arrest of the head in the midpelvis with the cervix dilated 3½ fingers or more, without further progress in spite of Pitocin stimulation. This complication is usually due to secondary uterine inertia which can stem from borderline cephalopelvic disproportion or from malposition of the head, or from cervical dystocia.

Malmström's chief indication for the use of the extractor is uterine inertia. He claims that mild traction on the head, which presses it against the cervix, can stimulate or increase uterine contractions, and thus facilitate delivery. He further advocated the use of the extractor to expedite delivery at 3 fingers dilatation. We believe this to be a form of accouchement force, and do not recommend its use at this point of dilatation.

CONTRAINDICATIONS

We do not believe the instrument should be used when rapid delivery is indicated, because the time required to effect delivery is much too long. Accordingly, we do not recommend its use for fetal distress regardless of cause. Furthermore, we do not believe it should be used on abnormal presentations, such as face, breech, or transverse. It is also contra-indicated in absolute cephalopelvic disproportion.

RESULTS

The vacuum extractor was used on 91 mothers whose ages ranged from 16 to 34. In this series, there was one twin pregnancy in which the extractor was used on each child; hence, there were 92 deliveries with

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this instrument. Since the technic was changed after the first 35 cases, results are presented in two sections, one for cases in which Technic A was used, and one for which the present Technic B was used. In the first group, the extractor was used on 18 primiparas and 17 multiparas. In the group of primiparas, of 13 at a low or outlet station, 9 were successfully delivered. In the group of 17 multiparas, of 14 at an outlet or low station, 13 were successfully delivered. Of the remaining three, which were at the mid-pelvis, only 1 was successfully delivered.

Technic B was used in a series of 57 cases, of which 28 were primiparas and 29, multiparas. In both groups, with the head at the outlet or low station, we had a 100 per cent success rate. With the head at the midposition, it was successful in 5 of the 9 primiparas and 12 of the 14 multiparas. These results are depicted in Table 1.

Babies

A total of 93 infants was delivered in this series, with weights ranging from 4 lb. 12 oz. to 9 lb. 13 oz. Seventy-five per cent of the babies delivered weighed over 7 lb.

Complications—Mother

There were a total of 6 vaginal wall lacerations in this series. Five were either small first-degree lacerations or short extensions of the episiotomy wound. None caused undue bleeding and each was simple to repair. One laceration, however, produced a blood loss of

300–400 cc. This was in a unipara in whom the cup was applied to a vertex at plus-one station with synchronous traction; a baby weighing 8 lb. 2 oz. was delivered. A first-degree vaginal laceration, 5.0 cm. in length, was sustained. It was located in the right anterolateral wall, adjacent to the inferior pubic ramus and effective hemostasis was, at first, difficult to obtain. There were no sulcus tears nor extensions to the vault or into the rectum. One patient developed a hematoma of the episiotomy wound postpartum, which required evacuation. There were 2 cervical lacerations.

Complications—Baby

Four infants were anoxic at birth. This was attributed to general anesthesia given over a prolonged period. Three infants had an avulsion of the superficial layers of the scalp, and 3 developed blistering at the circumference of the ecchymotic area. There were no cases of alopecia seen, although this complication has been reported. All infants were carefully evaluated; there was no evidence of brain damage in any.

Failures

A failed vacuum extraction simply means that as traction is being applied to the scalp, the suction cup slips off and delivery cannot be effected. There are two reasons for failures in this instrument. One is the use of improper technic, and the other, the fact that the instrument is still not perfected to

TABLE 1. RESULTS IN DELIVERY USING MALMSTRÖM VACUUM EXTRACTOR

<i>Parity</i>	<i>No. infants delivered</i>	<i>Technic</i>	<i>Delivery</i>					
			<i>Low or outlet</i>			<i>Mid or low-mid</i>		
			<i>Success</i>			<i>Success</i>		
			<i>No.</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>No.</i>	<i>%</i>
Primiparas	46	A	13	9	69	5	1	20
		B	19	19	100	9	5	55
Multiparas	46	A	14	13	93	3	1	33
		B	15	15	100	14	12	86

the point where all babies can be delivered with it regardless of technic. With Technic A the instrument failed in 5 of 27 infants in the outlet or low position. Where we were dealing with a midposition, the instrument failed in 6 of 8 cases. However, using Technic B there were no failures at the low or outlet position. From the midposition we or the instrument failed in 6 of 23 cases. In 5 of these 6 failures, one of the following conditions was present: deep transverse arrest, occiput posterior, a large baby (over 8 lb.). However, with either technic, in spite of failure, we were able to bring the head down from a mid- to a low position, making the subsequent forceps delivery easier.

ANESTHESIA

Malmström recommends the use of pudendal block anesthesia with this instrument. Finderle recommends either no anesthesia, light anesthesia, or local anesthesia with his vacuum extractor. However these types of anesthesia do not have patient acceptance. We have used both general (gas, oxygen, Trilene, and cyclopropane) and saddle block. General anesthesia was used 50 times, and saddle block, 41. Among 50 patients who had general anesthesia there were 10 failures, while among the 41 who had saddle block, there were only 6 failures. Since saddle block decreases resistance of the pelvic floor, we have found extraction to be much easier with this method than with general anesthesia. Furthermore, patients are more cooperative under saddle block, and can bear down with contractions as traction is made on the scalp, thus facilitating delivery. In addition, in general anesthesia the child should be delivered within 5 min. of maternal anesthesia. In regional anesthesia there is no time limit.

DISCUSSION

The primary objective of the use of the vacuum extractor—namely, to reduce the incidence of vaginal lacerations and subsequent postpartum hemorrhage of forceps delivery

was achieved. There was only one case in which more than average blood loss was seen. The few lacerations sustained in other cases were of no significance. It is our impression that the successful use of this instrument in cases of deep transverse arrest may have obviated need for cesarean section in 4 or 5 patients. This was especially true for those patients who progressed to 3½ to 4 fingers dilatation, and made no further progress in spite of Pitocin stimulation. We were pleased when delivery was successfully terminated by the use of the extractor in these particular patients without maternal or fetal damage. Berggren reported a similar observation. With the use of the Malmström extractor there was a concurrent decrease in his cesarean section rate from 2.4 to 1.4 per cent. When the instrument is unsuccessful, as it has been several times in this series, one may resort to the use of forceps. We have found that the previous application of the extractor had no deleterious effect either on mother or baby.

There was one neonatal death, this due to congenital heart disease in this series. There was no evidence of brain damage in any of the infants delivered. These infants have been carefully observed by the pediatric staff and the nursery staff. The swelling or chignon disappears 3–24 hours after delivery. The superficial abrasions of the scalp and blistering described earlier disappear in 10–14 days. In the latter instances we have used antibiotic dusting powders. The ecchymotic area usually disappears in 10–12 days. Rossboth and Roloff advise that the cup should not be applied for more than 30–40 min. to avoid severe damage to the fetal scalp. We have not found it necessary to maintain the vacuum cup in position for that length of time, yet their admonition is valid.

There were several instances of anoxia which we believe were related to general anesthesia. Since it takes 6–8 min. to apply the cup properly, and another 10–20 min. to complete delivery, some babies received too

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much anesthesia. However, there was no problem in resuscitation and no residual effects. This is one of the reasons we prefer saddle or caudal block.

Fulst reported autopsy findings on 2 infants delivered by extraction. Both had died of asphyxia shortly after birth. In neither was there any cerebral or meningeal damage. In the same article he reported on the condition of the ocular fundus 2-3 days after birth. In both spontaneous deliveries and extractor deliveries, there was no significant difference in the frequency of retinal hemorrhage.

CONCLUSIONS

The Malmström vacuum extractor practically eliminated the early postpartum hemorrhage due to vaginal lacerations when forceps are used. The instrument was successfully used in midpelvic arrest. However, forceps must still be used when it fails mechanically. There was no fetal mortality caused by the extractor. None of the babies showed any evidence of brain damage. However, future evaluation over a prolonged period will be necessary to judge fully the remote results of this instrument on these infants. The outstanding effect of this instrument is the development of a chignon or swelling, and in some instances an ecchymotic area on the baby's scalp. Several cases of complications

to the baby's scalp were also described.

Since this study was not conducted under controlled conditions, and it encompasses only a small series, much more experience will be necessary to evaluate properly the role of this instrument in obstetrics. A much more detailed and controlled study is now being conducted, and will be reported.

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