

Clinical Observations

Vacuum extraction: use in a small rural hospital

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The effectiveness of vacuum extraction with the Silastic Obstetrical Vacuum Cup (SOVC), which has a soft, malleable cup, was assessed by two family physicians in a small rural hospital. Vacuum extraction was attempted in 35 of 231 deliveries over an 18-month period, with an overall success rate of 66%. The main indications for vacuum extraction were fetal distress, followed by a prolonged second stage of labour and malrotation of the occiput. The efficiency of the technique improved with experience. The effects of vacuum extraction on the fetus and mother compared favourably with those reported in the literature. After introduction of the SOVC, the rate of primary cesarean section for cephalopelvic disproportion declined, as did the rate of forceps delivery. Despite careful antenatal screening and referral, and the availability of alternatives, delivery by vacuum extraction with the SOVC was found to be a useful and effective adjunct to obstetric practice.

L'efficacité de l'extraction sous vide à l'aide de la ventouse obstétricale Silastic (VOS), un instrument possédant une cupule molle et maléable, a été appréciée par deux médecins de famille dans un petit hôpital rural. Au cours d'une période de 18 mois l'extraction sous vide a été tentée dans 35 accouchements sur un total de 231, avec un taux de succès global de 66%. Les principales indications

de l'extraction par ventouse furent la souffrance foetale, suivie de la prolongation du deuxième stade du travail et de la malrotation de l'occiput. L'efficacité de la technique s'améliorait avec l'expérience. Les effets de l'extraction par ventouse sur le fœtus et sur la mère se sont comparés favorablement à ceux qui sont décrits dans la littérature. Avec l'utilisation de la VOS la fréquence des césariennes primaires dans les cas de disproportion céphalo-pelvienne s'est abaissée, de même que le nombre d'accouchements par application des forceps. En dépit d'un dépistage prénatal soigneux, de l'orientation de certains cas vers un établissement spécialisé et de la disponibilité d'autres moyens, l'accouchement par extraction sous vide à l'aide de la ventouse VOS s'est avérée un complément utile et efficace à la pratique de l'obstétrique.

Physicians in small rural hospitals must be prepared to deal expeditiously and safely with unexpected complications of labour and delivery.¹ However, restrictions in training and practice often make it difficult for them to maintain the necessary competence in operative techniques, particularly forceps deliveries.^{2,3} Therefore, vacuum extraction, when used to correct malrotation, promote descent or do both seems most appropriate in remote hospitals.^{4,7} The safety of vacuum extraction, originally proposed by Simpson⁸ in 1849, has been enhanced by the recent introduction of devices with a soft, malleable cup, such as the Silastic Obstetrical Vacuum Cup (SOVC) (Dow Corning Corpo-

ration, Midland, Michigan).⁹⁻¹¹ We assessed the use of vacuum extraction with the SOVC at the Baie Verte Peninsula Health Centre (BVPHC), the only source of primary care for 12 000 Newfoundlanders living in 21 remote coastal villages. The 40-bed hospital, staffed by six to eight family physicians, is equipped to do cesarean sections, but, whenever possible, high-risk patients are referred to the nearest centre with specialized facilities, which is 180 km from the BVPHC.

Methods

The SOVC is trumpet-shaped, 208 mm long and made of a soft, translucent silicone elastomer. The diameter of the cup-shaped end is 65 mm (Fig. 1). Either a wall or a mechanical vacuum can be used, with a pressure of -200 to -650 mm Hg.

The study period began July 1, 1980, when the SOVC was first used at BVPHC, and ended Dec. 31, 1981. During this time 231 infants were delivered at the hospital, and 35 women at moderate to high risk, according to the provincial guidelines,¹² were transferred for delivery at a regional centre.

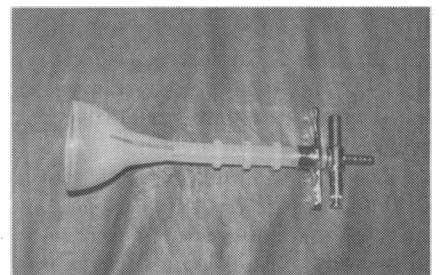


FIG. 1—Silastic Obstetrical Vacuum Cup.

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The SOVC was used primarily by one of us (G.B.F.), usually as an alternative to Simpson's forceps, in expediting delivery. The indication for extraction was determined retrospectively from the physician's delivery record. The SOVC was applied to the vertex after rupture of the membranes; full cervical dilatation was not always a prerequisite. The application of the cup was considered to be high, mid, low-mid or low, according to Dennen's definition.¹³ A wall vacuum with a pressure of -450 mm Hg was used, and traction was applied simultaneously with the uterine contractions. The outcome was recorded as "complete" (successful extraction), "incomplete" (correction of malrotation, or promotion of descent or both, but unsuccessful extraction) or "failed" (no effect). Another method of delivery was used if complete extraction was not accomplished within 20 minutes or if the cup had become detached from the vertex three times.

Results

The SOVC was used for 35 (15%) of the 231 deliveries (Table I). The indications for vacuum extraction are given in Table II. Approximately one third of the extractions were performed for fetal distress. Fetal distress was usually indicated if the amniotic fluid contained meconium or if there was a deceleration in the fetal heart rate, or both (sampling of the pH of scalp blood and electronic monitoring of the fetal heart rate were not available). Of the 11 extractions indicated by fetal distress 10 were complete; in 1 an incomplete extraction resulted in spontaneous delivery.

The outcome of the 35 applications of the SOVC is shown in Table III. Of the 12 deliveries in which vacuum extraction was unsuccessful, 5 were accomplished by cesarean section and 3 by forceps delivery, and 4 were spontaneous. Only the primigravidas required operative delivery.

The rate of complete extraction was decreased in the presence of malrotation, failure of descent or both, and was 50% if the presentation was other than occiput anterior, 50% when the SOVC was applied

before full cervical dilatation and 33% when the SOVC was applied high or mid.

During the study period other staff physicians gradually became competent in using the SOVC. Of all the factors related to outcome, the experience of the operator was most consistently associated with complete extraction. The rate of incomplete or failed extraction was 53% (with spontaneous delivery occurring subsequently in four of nine cases) when the SOVC was applied by an inexperienced physician, compared with 17% (with delivery by cesarean section in all cases) when applied by an experienced physician.

Although epidural anesthesia was available, vacuum extraction was well tolerated with either a pudendal block or local infiltration. However,

episiotomy and laceration involving the external anal sphincter was more likely with vacuum extraction than with spontaneous vaginal delivery. Postpartum hemorrhage occurred in 7% of the women who underwent vacuum extraction. The incidence of disorders characterized by fever was

Table III—Outcome of attempted vacuum extraction

Outcome	No. (and %) of deliveries		
	Parity		
	0	≥ 1	Total
Complete	14 (40)	9 (26)	23 (66)
Incomplete	3 (8)	1 (3)	4 (11)
Failed	8 (23)	0 (0)	8 (23)
Total	25 (71)	10 (29)	35 (100)

Table I—Method of delivery according to parity

Method of delivery	No. (and %) of deliveries		
	Parity		
	0	≥ 1	Total
Spontaneous vaginal	53 (23)	97 (42)	150 (65)
Cesarean section			
Primary	22 (10)	5 (2)	27 (12)
Repeat	0 (0)	21 (9)	21 (9)
Vacuum extraction with SOVC*	14 (6)	9 (4)	23 (10)
Forceps	7 (3)	2 (< 1)	9 (4)
Assisted breech	1 (< 1)	0 (0)	1 (< 1)
Total	97 (42)	134 (58)	231 (100)

*SOVC = Silastic Obstetrical Vacuum Cup.

Table II—Indications for vacuum extraction

Indication	No. (and %) of deliveries			No. (and %) of complete extractions
	Parity			
	0	≥ 1	Total	
Fetal distress	5 (14)	6 (17)	11 (32)	10 (91)
During first stage of labour	1 (3)	1 (3)	2 (6)	2 (100)
During second stage of labour	4 (11)	5 (14)	9 (26)	8 (89)
Prolonged second stage of labour	5 (14)	0 (0)	5 (14)	1 (20)
Deep transverse arrest	3 (8)	2 (6)	5 (14)	4 (80)
Maternal fatigue	5 (14)	0 (0)	5 (14)	3 (60)
Persistent occiput posterior presentation	4 (11)	0 (0)	4 (11)	1 (25)
Outlet obstruction	1 (3)	1 (3)	2 (6)	2 (100)
Elective	1 (3)	0 (0)	1 (3)	1 (100)
Failed forceps delivery	0 (0)	1 (3)	1 (3)	1 (100)
Unknown	1 (3)	0 (0)	1 (3)	-
Total	25 (71)	10 (29)	35 (100)	23 (66)

increased after application of the SOVC in four (11%) of the women, but three of the four cases of infection of the genitourinary tract occurred following cesarean section.

Of the 35 infants 12 (34%) had macrosomia¹⁴ and 5 (14%) had shoulder dystocia. Cephalohematoma developed in eight (23%), 75% of whom also had neonatal jaundice; in six of the eight infants the cephalohematoma resolved within the first 6 weeks.

The Apgar score was depressed in nine (26%) of the 35 infants at 1 minute but in only one (3%) at 5 minutes. The 11 infants with fetal distress demonstrated a similar pattern in their Apgar scores; however, 54% had neonatal jaundice. When they were assessed at 6 weeks of age, 10 of the 11 infants (1 was lost to follow-up) were developing normally.

Severe asphyxia at the time of birth occurred in 1 of the 35 infants. There had been spontaneous onset of labour in the 16-year-old primigravid mother at 42 weeks' gestation. After application of the SOVC because of a prolonged second stage of labour, vacuum extraction failed. Delivery with Simpson's forceps also failed. Fetal distress was not diagnosed until the time of delivery by cesarean section. The male infant, who had an Apgar score of 2 at 1 minute and 3 at 5 minutes, required tracheal intubation and was subsequently transferred to the regional neonatal care facility. Follow-up at 24 weeks, by a pediatrician from the Provincial Perinatal Program of Newfoundland, showed the child to be developing normally.

Of all 231 infants born during the study period 2 (0.9%) were stillborn; however, neither death was associated with the use of the SOVC. The perinatal mortality for all of Newfoundland at this time was 9.8%, compared with the national perinatal mortality of 10.8%.¹⁵

Discussion

Despite careful antenatal screening and referral, 26% of the women followed through labour at the BVPHC during the study period unexpectedly required operative delivery.

Vacuum extraction with the

SOVC was a useful adjunct to our obstetric practice, especially in the presence of fetal distress. However, as others have reported,¹⁶⁻¹⁸ its effectiveness in correcting malrotation and promoting descent was enhanced by operator experience. When an experienced physician attributed failure of vacuum extraction to cephalopelvic disproportion, a "trial of forceps"¹⁹ would not be done, and cesarean section would be expedited. This practice is accepted in other centres.¹¹

The incidence of cephalohematoma in our study (23%) is comparable to that reported in studies of vacuum extraction with a device having a rigid cup.²⁰ Except for neonatal jaundice, we found no significant sequelae in our infants. Although shoulder dystocia developed frequently after delivery with the SOVC, there was no subsequent abnormality. Midpelvic delivery is known to be associated with shoulder dystocia, and several authors have reported an increased incidence of this disorder following vacuum extraction.^{21,22} We did not determine the incidence of retinal hemorrhage; although this condition has been associated with vacuum extraction with the Malmström device, its clinical significance is uncertain.²³

As we expected, instrumental delivery seemed to increase the maternal morbidity. However, the rate of cesarean section appeared to decrease after the introduction of the SOVC to our centre. Although the rate of primary cesarean section fell by only 2% from 14% in the 18 months before the study period, the incidence of cephalopelvic disproportion or failure of labour to progress as an indication for cesarean section dropped from 65% to 52%. The use of Simpson's forceps declined in the same period, from 7% to 4%, and the SOVC replaced Kieland's forceps. Although these three instruments have not been compared in controlled studies, vacuum extraction with the Malmström device (introduced in 1954) has been shown to be as safe as or safer than forceps delivery.^{5,24-27}

After developing competence in vacuum extraction, physicians may need to reassess the need for the use of forceps and surgical intervention in certain cases. Training in the use

of vacuum extraction with an instrument such as the SOVC should be encouraged for the many family physicians practising obstetrics in small rural hospitals.

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Acute nonlymphocytic leukemia following bladder instillations with thiotepa

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A case of therapy-related leukemia is described. Other cases of acute nonlymphocytic leukemia have been associated with the intramuscular administration of thiotepa (an alkylating agent), but this patient received only intravesical instillations of the drug. The interval between the start of chemotherapy and the onset of leukemia was 56 months.

Un cas de leucémie consécutif à une chimiothérapie est décrit. D'autres cas de leucémie non-lymphocytaire aiguë ont été rattachés à l'administration de thiotépa (un agent alkylant) par voie intramusculaire, mais dans le cas qui nous occupe le patient n'avait reçu le médicament que par instillation intravésicale. L'intervalle écoulé entre le début de la chimiothérapie et l'apparition de la leucémie était de 56 mois.

The association between treatment with cytotoxic drugs and the subsequent development of acute leukemia is now well recognized. Like other alkylating agents, thiotepa has been implicated, though usually after intramuscular administration. Transient cytopenia occurs commonly as a result of intravesical

instillation of thiotepa, but we report a case in which this form of thiotepa administration was followed by acute nonlymphocytic leukemia.

Case report

In 1955, at the age of 56 years, the patient first presented with hematuria. He was found to have a moderately large papillary tumour of the bladder. A transitional cell papilloma (grade 1) was resected.

He was seen regularly for follow-up assessment and required further resection or cautery for small recurrences on 10 occasions between 1960 and 1977. The histologic character of these tumours was the same as that of the original neoplasm. In 1976 transurethral prostatectomy was performed. Histologic examination of the prostatic tissue showed nodular hyperplasia.

In 1978 the patient was found to have many small, benign-looking papillary lesions in the bladder. Because of their multifocal nature thiotepa, 60 mg in 60 ml of normal saline solution, was instilled each month from March 1978 until May 1981.

Routine peripheral blood counts remained essentially normal until June 1980, when the platelet count was $111 \times 10^9/l$, the leukocyte count $3.3 \times 10^9/l$ (42% polymorphonuclear leukocytes, 42% lymphocytes, 9% monocytes, 4% eosinophils and 3% band forms) and the hemoglobin

concentration 118 g/l. During the rest of the period when thiotepa was being administered the platelet count fluctuated between 100 and $136 \times 10^9/l$ except for one occasion, when treatment had been deferred for 1 month, and the count reached $150 \times 10^9/l$. The leukocyte count varied between 2.8 and $4.8 \times 10^9/l$ during this time.

Almost a year after thiotepa had been discontinued the patient was admitted to hospital with an apparent viral illness; he was found to be pancytopenic. The hemoglobin level was 80 g/l, the leukocyte count $2.8 \times 10^9/l$ (with 50% neutrophils) and the platelet count $34 \times 10^9/l$. Occasional blast cells were seen in smears of the peripheral blood. A bone marrow aspirate showed a normocellular marrow with erythroid hyperplasia. There was some evidence of dyserythropoiesis, and 5% of the cells were blast cells.

The patient was readmitted after another 6 months because of epistaxis and weakness. He was free of urinary symptoms. His hemoglobin level was 65 g/l, leukocyte count $1.6 \times 10^9/l$ (52% lymphocytes, 32% polymorphonuclear cells, 9% blast cells, 5% monocytes and 2% basophils) and platelet count $10 \times 10^9/l$. Occasional nucleated erythrocytes were seen. The marrow aspirate was hypocellular but showed dysplastic erythropoiesis; 10% of the cells were blast cells. A trephine biopsy specimen was markedly hypocellular,

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