

Comparison of maternal and infant outcomes between vacuum extraction and forceps deliveries

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ABSTRACT

Objective: To analyze the instrumental deliveries carried out at the Armed Forces Hospital, Riyadh, Kingdom of Saudi Arabia during the year 2000 and compare the outcome of ventouse and forceps deliveries.

Methods: A retrospective case note review of all instrumental deliveries, carried out at the Armed Forces Hospital, Riyadh, during the year 2000.

Results: Three hundred and four vaginal deliveries, of whom 258 were ventouse and 46 were forceps deliveries, were assisted. Seventy percent of forceps deliveries were carried out in primigravida as compared to 49% of ventouse deliveries. Fetal distress was the indication in 81.4% of ventouse deliveries as compared to 76% of forceps deliveries. Prolonged 2nd stage of labor was an indication in 11% of forceps and 2.3% of ventouse deliveries. Consultants and Senior Registrars were more likely to use forceps while registrars use ventouse as their preferred instrument for delivery. Attempted ventouse delivery was successful in 91.4% as compared to 95.7% in

forceps. Extension of an episiotomy was more likely to occur with ventouse than forceps deliveries while 3rd degree perineal tear occurred more with forceps deliveries. Babies who had attempted ventouse deliveries have lower apgar score at one minute than attempted forceps. No babies required admission to neonatal intensive care unit. There was only one stillbirth in the ventouse delivery group due to intrapartum asphyxia and true knot in the umbilical cord.

Conclusion: Forceps is more likely to be used in the primigravida and prolonged 2nd stage of labor and less likely to fail. Ventouse is more likely to be used by registrars. Extension of an episiotomy and low apgar score at one minute is more likely to occur with ventouse deliveries.

Keywords: Ventouse, vacuum, forceps.

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Since the introduction of forceps into the art of midwifery in the 18th century, controversial views were expressed regarding its use. Some advocates explained that prophylactic forceps should be placed on every baby to shorten the 2nd stage of labor, thereby decreasing fetal trauma and protecting the perineum, while others believe that forceps is an anachronism and has no place in modern obstetrics.¹ Assisted deliveries using ventouse have never been as popular as using forceps in certain countries. This

has been put down to inadequate training, poorly maintained equipment, poor choice of patients and the innate conservatism of many doctors. There is a little doubt, however, that the right equipment in the right hands can achieve impressive and safe result.² In 1953, Malmstrom of Gothenburg, Sweden, presented vacuum extractor which further developed, and refined the method for modern practice.^{3,4}

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Methods. This was a retrospective study carried out at the Obstetric Unit of the Armed Forces Hospital, Riyadh, Kingdom of Saudi Arabia, of all instrumental deliveries during the year 2000. The data collected includes, age, parity, birthweight, apgar score, final method of delivery failed instrumental delivery, fetal and maternal morbidity or mortality. Regardless of the ultimate mode of delivery, for the purposes of analysis the women remained in the group to which they were allocated. The aim of this study was to compare the maternal and fetal outcome of forceps and vacuum extraction deliveries.

Statistics. The chi square (χ^2) test with Yates correction was used for statistical analysis. Differences were regarded as significant at $p < 0.05$.

Results. **Table 1** shows the characteristics of patients in the 2 study groups. Nulliparous were more likely to have forceps delivery while multiparous were more likely to be delivered by ventouse. These differences were statistically significant. Fetal distress was the most common indication for instrumental deliveries, 215/258 (83.3%) in ventouse versus 35/46 (76%) in forceps deliveries ($p > 0.1$). Prolonged 2nd stage of labor was indicated in 16 (6.2%) cases of ventouse and 6 (13%) cases of forceps ($p > 0.1$). In 25 (9.7%) cases of ventouse and 5 (11%) cases of forceps, poor maternal effort and maternal distress was the indication for instrumental delivery ($p > 0.5$). These differences were not statistically significant. Consultants and Senior Registrars were more likely to attempt a forceps delivery than a ventouse (10.9% versus 6.2%) ($p > 0.1$), (30.4% versus 23.3%) ($p > 0.1$). Residents carried out 10 (21.7%) forceps and 39 (15.1%) ventouse deliveries ($p > 0.1$). These differences were not statistically significant. Registrars use ventouse as their preferred instrument for delivery (55.4% versus 37%) ($p < 0.05$). Attempt at ventouse delivery was successful in 236 (91.4%) of cases as compared to 44 (95.7%) of attempted forceps delivery ($p > 0.1$).

Cesarean section (CS) had to be carried out in 19 (7.4%) cases of ventouse and 2 (4.3%) cases of forceps deliveries ($p > 0.1$). Normal delivery was achieved in 3 (1.2%) cases of attempted ventouse delivery. These differences were not statistically significant. Ventouse delivery failed in 22 (8.5%) cases. The reasons for failure were due to cephalopelvic disproportion 15, leaking machine 5, and cup detachment 2. The 2 cases of failed forceps were due to cephalopelvic disproportion. **Table 2** shows the maternal morbidity following instrumental delivery. Patients delivered by ventouse were more likely to have an intact perineum. Episiotomy was carried out in 87.2% of ventouse and 93.5% of forceps deliveries ($p > 0.1$). Ventouse deliveries were more likely to have an extension of their episiotomy ($p > 0.1$). Blood loss > 500 mls was more likely to be associated with ventouse deliveries ($p > 0.1$). These differences were not statistically significant. Forceps deliveries were more likely to sustain a 3rd degree perineal tear ($p < 0.01$). These differences were statistically significant. Babies delivered by ventouse have low apgar score at one minute (11.6 versus 2.2%) ($p < 0.05$). No babies were admitted to neonatal intensive care unit (NICU). Only one baby delivered by ventouse had an apgar score of < 7 at 5 minutes. There was only one stillbirth in the ventouse delivery groups due to intrapartum asphyxia and true knot in the umbilical cord.

Discussion. The vacuum extractor has advantages over forceps for certain types of delivery. Birth trauma was significantly more likely to occur with the vacuum extractor than forceps.⁵ Vaginal and cervical tears which are usually caused by accidental inclusion of these tissues into the cup are prevented if the cup was checked all around to ensure that no vaginal skin is included into the cup and soft tissues are not sucked in when vacuum has been established. The more obvious fetal injury is the formation of the chignon, abrasions and lacerations of the fetal scalp. These are usually minor and self limiting.

Table 1 - Characteristics of patients in the 2 study groups.

Variable	Ventouse	Forceps	p-value
Age (M \pm SD) (years)	25.6 \pm 6	24.6 \pm 6	
Nulliparous (%)	126 (49)	32 (49)	<0.02
Multiparous (%)	132 (51)	14 (30)	<0.02
Birthweight (M \pm SD) (gms)	3330 \pm 440 M - mean, SD - standard deviation	3270 \pm 490	

Table 2 - Maternal morbidity following instrumental delivery.

Trauma	Ventous N=258 (%)	Forceps N=46 (%)	p-value
Intact perineum (%)	17 (6.6)	-	NS
Episiotomy	225 (87.2)	43 (93.5)	NS
Episiotomy + extension	15 (5.8)	-	NS
Third degree perineal tear	1 (0.4)	3 (6.5)	<0.01
Blood loss > 500	22 (8.5)	2 (4.3)	NS

N - number, NS - not significant.

Cephalhematoma, apart from causing neonatal jaundice is rarely of clinical significance.³ The one perinatal death in this study was related to the indication for the procedure "severe fetal distress", and not to the instrument used. Early resort to CS may have saved the baby. Ventouse delivery failed in 22 (8.5%) cases. The most common cause of failure is a presumptive diagnosis of cephalopelvic disproportion on the basis of failure of the presenting part to descend. Problems with the apparatus, the rubber tubing and washers or the chain as leaking machine was the leading 2nd cause. Failure to time traction efforts carefully with contractions or performance of oblique pulls outside of the pelvic curve leading to cup detachment are common causes for vacuum extraction failure and predispose to injury.⁶ The sudden detachment of the vacuum extractor is especially dangerous.⁷ The long term outcome of infants delivered by vacuum extractor had been studied, and these infants had normal neurological development at 5-6 years of age.⁴ There is no data on the theoretical remote complication of genital prolapse later in life.³ Failed forceps occurs when an attempt to deliver a baby by forceps is unsuccessful and the operator encounters difficulties in the use of forceps and resorts to CS. Attempt at forceps delivery failed in only 2 cases in which the diagnosis of cephalopelvic disproportion was made due to failure of presenting part to descend despite proper application. The procedure had to be abandoned with resort to CS. If a failed forceps should occur, it is wise to ask for help. Resort to CS early is better and safer than attempting another instrumental delivery. Meta-analysis of the randomized controlled trials indicate that use of forceps was significantly less likely to fail, more likely to be associated with maternal perineal or vaginal trauma, and less likely to be associated with cephalhematoma. Intracranial hemorrhage, skull fracture, retinal hemorrhage and rarely, subgaleal hemorrhage, do occur with vacuum extraction. With the exception of cephalhematoma, there are no clear differences in neonatal morbidity.^{6,8,9} There was no significant differences in neurological status on the first and 5th day between the forceps and ventouse extraction groups. Thus in low extraction with no signs of fetal asphyxia, either method can be used with safety if the obstetrician is familiar with both methods of operative vaginal delivery.¹⁰ Vacuum extraction have replaced forceps for many institutions in which assistance is required to achieve vaginal delivery.¹¹ Increasingly registrars go through obstetric training with insufficient training in obstetric forceps delivery. This was associated with a steady increase in the CS rate throughout the world.¹² The Armed Forces Hospital is no exception. There was a dramatic increase in the total number of deliveries from 1377 in 1979 to 7404 in the year 2000. Forceps deliveries showed a steady decline

from 12.8% in 1979 to 0.6% in 2000, while ventouse deliveries increased from 0.1% in 1979 to 3.4% in 2000. The decline in forceps deliveries from 12.8% in 1979 to <1% in year 2000 was associated with steady increase in CS from 6.7% in 1979 to 14.6% in year 2000. Vacuum extractor is a relatively easy instrument to use, and for this reason is at some risk of being misused.⁹ This may explain the higher failure rate of ventouse when compared to forceps. There was a significant increase in the frequency of neonatal resuscitation and increase in base deficit for the umbilical artery, increased rate of admission to NICU and increase in the risk of birth trauma in midpelvic deliveries.¹³ Admission to NICU was not required in any baby of the 2 groups. There was no significant increase in short-term neonatal morbidity in the forceps groups, while maternal morbidity was higher in the cesarean delivery group.¹⁴

In conclusion, the key for successful attempt at instrumental delivery are skill, experience and awareness that application of forceps or vacuum extractor is not a commitment to vaginal delivery. The true success is the outcome of the healthiest child and mother by whatever route. Only outlet forceps have a place in modern obstetrics today.

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