Indications and Risks of Vacuum Assisted Deliveries.

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***Abstract**: The aim of the study was to find out the percentage of vacuum assisted deliveries, indications of its application and related complications.It was a prospective observational study. The study was carried out in department of obstetrics and gynaecology at sharif medical city hospital, from 1st November 2010 to 30th October 2011. During study period the total number of deliveries was 1149, in sixty seven (5.83%) patients vacuum assisted delivery was conducted. Amongst these, sixty five (97.01%) were successful vacuum deliveries while in two patients (2.9%) there was a failure of vacuum application. The mother's age group ranged from 18-40 years with the mean of 27.7 ± 6.26 years. Among them, twenty four (35.8%) women were primigravida whereas forty three (64.17%) were multigravida. Gestational age varied from 37-43 weeks with the mean of 39.7±1.17 weeks. Major indication for vacuum application was fetal distress, which was seen in thirty (44.7%) patients. The other prominent indication was prolong second stage of labour, observed in 17 women (25.37%) ; mainly due to poor maternal effort in 11(16.4%) and deep transverse arrest in 5 (7.4%) patients. Vacuum assisted delivery was conducted in two patients with cord prolapse (2.98%), persistent occipito-posterior in one (1.49%) and one patient was eclamptic (1.49%). Average neonatal weight was 3.11±0.38kg. Neonatal complications observed were cephal hematoma in 7 babies (10.44 %), jaundice in 5 (7.4%), birth asphyxia in 2 (2.98%) whereas skull fracture in one (1.49%) newborn. Maternal complications seen were 4th degree perineal tear in 1 (1.49%) woman and extension of episiotomy in 3 (4.4%) patient. **Conclusion:** Vacuum delivery has a high success rate in suitable cases with acceptably low rate of neonatal and maternal complications.*

INTRODUCTION

Assisted vaginal delivery offers safe and quick delivery in difficult situation of fetal or maternal compromise at full dilatation of cervix. The only other option available is caesarean section, which at full dilatation is not only technically challenging but is also associated with higher maternal morbidity and its consequences on future pregnancy. In selected cases of either cord prolapse or severe fetal distress, time taken for caesarean section preparation may augment the risk of birth asphyxia to the baby.

The operative vaginal delivery rate has remained stable between 10% and 13% [1]. Both the instruments, forceps and vacuum were equally applied for assisted deliveries. However since 1970 the rate of vacuum delivery has increased against the forceps delivery as vacuum became the instrument of choice in current obstetric practice [2,3]. For majority of obstetricians both the instruments have same efficacy and safety, while few obstetricians are more comfortable with one than the other. There has been an increasing awareness and litigation regarding potential fetal and maternal complications associated with instrumental delivery. At the same time abdominal delivery (caesarean section) became safer with availability of blood transfusion and anaesthesia. All these factors have led to an increase in caesarean section and reduction in instrumental delivery rate.

Vacuum delivery although safe, needs expertise; do have some risk of failure of application and a substantial risk of fetal and maternal complications. Hence young obstetricians prefer to perform abdominal delivery than an assisted vaginal delivery. Purpose of this study was to assess the prevalence, success rate, indications and complications (maternal and fetal) associated with vacuum assisted vaginal delivery.

MATERIAL AND METHOD

It was a prospective observational study. It was carried out at department of Obstetrics & Gynaecology, Sharif Medical City Hospital, over a period of one year, from 1st November 2010 to 30th October 2011.

Sixty seven cases of vacuum assisted delivery were included during study time. There was failure in two cases. All singletons, term, cephalic pregnancies, with some indication for vacuum delivery were included in the study. Maternal demographic data as age, parity, gestational age were documented. Multiple pregnancies, intrauterine death, preterm pregnancies (<37 weeks), pregnancies with fetal anomalies and non cephalic presentation were excluded from the study. All the vacuum assisted deliveries were carried out after verbal consent in Labour Room, using silastic cup vacuum extractor by an experienced obstetrician or by a resident under supervision of a consultant. All mothers were given analgesia in the form of epidural or local infiltration of xylocaine.

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Vacuum was applied on vertex at zero or below zero station. The procedure was abandoned after three unsuccessful attempts. The newborn was immediately assessed by pediatrician for Apgar score at one and five minutes. They were also examined for birth trauma, cephalhematoma, intracranial hemorrhage, retinal hemorrhage, skull fracture and need for admission in NICU (Neonatal Intensive Care Unit). Ultrsonography and x-ray skull were perform in suspected cases of cranial trauma. Prevalence of shoulder dystocia and neonatal jaundice was also recorded. The patients were examined for perineal injuries and postpartum hemorrhage. Babies were monitored for seven days for any complication.

Maternal and neonatal data was entered and analyzed by software SPSS v.17.0. The quantitative data was presented as mean and standard deviation. Qualitative data including all nominal and ordinal variables were described as frequency and percentages. Independent t test was applied for quantitative data

RESULTS

During the study time there were 1149 vaginal births at Sharif medical city. Amongst them 67 (5.83%) women had vacuum deliveries. Sixty five had successful vacuum deliveries and failure occured in two patients, while 246 (21.41%) ladies underwent caesarean sections.

The main maternal and obstetrical characteristics of the group studied are presented by charts and graphs. The mean maternal age of study group was 27.53±6.26 years (range 18 – 40 years). The mean estimated gestational age was 39.78±1.17 weeks (range 37 – 43 weeks). Twenty four (35.82%) were primigravida while 43 (64.14) were multigravida (Graph 1).

***Graph 1:** n=67*

The vacuum was applied for different indications. The most frequent indication for intervention was fetal distress, followed by prolong second stage and poor maternal effort.

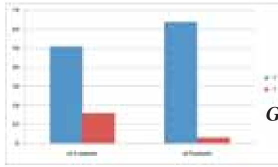
Indications for vacuum application are given in Table 1.

***Table 1:** Indications for vacuum application. n = 67*

Sr. No.	Indication	No of Cases	Percentage
1.	Fetal distress	30	44.7%
2.	Prolong second stage	17	25.37%
3.	Poor maternal effort	11	16.4%
4.	Deep transverse arrest	5	7.4%
5.	Persistent occipito posterior	1	1.49%
6.	Cord prolapsed	2	2.98%
7.	Eclampsia	1	1.49%

Neonatal outcome in term of newborn weight, Apgar score at 1 minute and at 5 minutes were recorded. Apgar score at 1 minute was >7 in 51 newborn, and

<7 in 16 babies. Apgar score at 5 min was >7 in 64 and <7 in only 3 newborns (Graph 2). The mean new born weight was 3.11±0.38kg.



Graph 2: *Apgar score at 1 & 5 minute*

All the newborns with morbidity and complication were admitted in NICU and further assessed by cranial ultrasonography and radiography. Cephal haematoma was found in 7 newborns, among them 5 developed jaundice needed phototherapy later on. However all newborns recovered completely and were discharged from the hospital.

Two babies delivered with severe birth asphyxia with cord blood PH < 6.9. In one neonate the vacuum was applied for cord prolapse and other was for severe fetal bradycardia . Both babies needed ventilator support for couple of days. One of them later developed convulsions.

Linear skull fracture was reported in one baby which was confirmed by x-ray skull. The mother was primigravida who underwent low vacuum extraction for prolong 2nd stage of labour. Newborn was with good Apgar score of 7 and 9 at one minute and 5 minutes respectively and was managed conservatively. There was no case of intracranial and subglial hemorrhage or retinal hemorrhage.

We found no relationship of maternal age and neonatal complications. However more cephal haematomas were reported in primigravida than multigravida. No relationship was found between frequency of complication and gestational age, fetal sex and neonatal birth weight.

Caesarean delivery was performed in two cases after an attempted vacuum extraction. One extraction was done for deep transverse arrest and the other was for prolong 2nd stage of labour.

A summary of fetal and maternal complications encountered is presented in table 2.

Table 2: *Fetal and maternal complication* *n = 67*

Serial number	Complication	Number of cases	Percentage %
	Fetal		
1	Cephalhematoma	7	10.44
2	Jaundice	5	7.4
3	Birth asphyxia	2	2.9
4	Skull fracture	1	1.4
5	Subgalial hemorrhage	0	0
6	Intracranial hemorrhage	0	0
	Maternal		
1.	Extension of episiotomy	3	4.4%
2.	4th degree perineal tear	1	1.4%

DISCUSSION

Operative vaginal delivery refers to application of a device either forceps or vacuum to assist mother in effecting vaginal delivery with a minimum maternal and neonatal morbidity. Both these instruments have comparable efficacy rate, with comparatively less maternal morbidity than caesarean section[4]. According to recent RCOG green top guidelines, indication for operative vaginal delivery include fetal distress; prolong second stage of labour, maternal exhaustion, malpositioning of fetal head and to shorten the second stage of labour in certain maternal medical disorder. In our study the commonest indication was fetal distress, including two cases of cord prolapse with severe fetal bradycardia. In such a situation the time taken between decision to incision can be a factor for worsening asphyxia of new born, here vacuum delivery provides a safe route to escape. Moreover caesarean section at full dilatation of cervix is associated with high maternal morbidity in term of uterine tear and hemorrhage[5]. Despite this fact, for the past few decades, overall rate of operative vaginal delivery is in decline[6]. This decline is because of fear of failure and litigation in case of fetal and maternal complication.

A few studies documented a high failure rate of vacuum deliveries attributed to insufficient training of junior staff [7]. However we encountered a very low failure rate, probably because of appropriate selection criteria and involvement of senior staff for procedure. Other factors contributing to failure of vacuum delivery include higher maternal body mass index (>30), neonatal birth rate greater than 4000gm and occipito posterior position of fetal head.

Vacuum extraction is associated with substantial risk of neonatal trauma. Cephal haematoma and scalp edema are usually not considered of clinical significance because they resolved spontaneously without treatment. The reported incidence of cephal haematoma in a large cohort study is 12% which is comparable to our study[8]. Neonatal intracranial and sub glial hemorrhage are considered to be the most severe neonatal and life threatening complication of vacuum delivery; however, we did not encounter such complications. This might be incidental or proper selection of cases and involvement of senior staff in procedure.

Two babies were with severe birth asphyxia. Probably this complication was because of already compromised fetus on which vacuum was applied. Skull fracture is an uncommon complication of vacuum delivery. Unfortunately one baby (1.4%) had a linear skull fracture. In one cohort study incidence of skull fracture was found 5.04%. This high incidence was related to more aggressive traction at instrument[8]. Other neonatal complications associated with vacuum are retinal hemorrhage, sub glial hemorrhage and shoulder dystocia, however we did not encounter any of these complication.

Vacuum delivery although considered to be relatively safe but still associated with maternal genital tract injuries including 3th and 4th degree perineal tear, anal sphinctor injuries, spiral tear of vagina and post partum haemorrhage. Many studies has been conducted to compare the frequency of maternal trauma with different tyes of instruments applied, all had concluded that the risk of materanal injuries were less with vacuum extraction.

In our study only one woman had 4th degree perineal tear and three (4.4%) had extension of episiotomy. Singh Abha and Rathor reported even less maternal complication in their study[9].

It has been comprehended that neonatal and maternal trauma is associated with initial unsuccessful attempts and this risk is further amplified if the delivery is completed by caesarean section following a protracted attempt at operative vaginal delivery[10]. It is mostly seen in cases where decision taken and procedure was conducted by junior staff. It has been found that inadequate training is a key contributor to adverse fetal and maternal outcome. However, this deficiency can be overcome by involving seniors in patient's selection , and conducting regular skill workshops for junior obstetrician, so as to train young obstetrician in the art of instrumental delivery. The increased litigation awareness in our society has rendered a bad outcome as substantial risk for the operator and hospital regardless of the cause for injury. In such a situation, careful documentation regarding clinical circumstances and detailed operative notes are the key stones in operator's defense. However fear of litigation should not dictate the protocol of medical practice.

CONCLUSION

Maternal and fetal mortality and morbidity with abdominal delivery is markedly reduced with availability of blood transfusion and anaesthesia however Instrumental delivery either vacuum or forceps helps in decreasing the caesarean section rate. Different studies have proved vacuum safer method then forceps. Expertise is essential in both the instrumental application; however it has been observed that obstetricians feel more comfortable with vacuum extraction.

Vacuum is safer for both fetus and mother when used properly. Factors as appropriate patient selection, correct placement of cup on fetal head and knowing when to abandon the procedure are the key component to conduct a safe and successful vacuum delivery. To reduce the complication rate, there is a need to train young obstetricians in the skill of vacuum delivery.

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