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Original Research Article

A study on feto-maternal outcome in instrument assisted vaginal deliveries

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ABSTRACT

Background: Operative Vaginal delivery (OVD) is performed with either forceps or vacuum used in second stage labour when there is maternal or fetal distress. A successful instrument assisted vaginal delivery can reduce the incidence the incidence of caesarean rates and its associated morbidity and mortality. It can be effective and safe when applied according to the individual patients indications.
Methods: A retrospective study was carried out in patients who has undergone instruments assisted vaginal delivery in SVMCH&RC during the year 2021-2023 and their data was obtained from medical record and delivery register at the hospital. The data obtained from Sri Venkateshwaraa Medical College Hospital and Research Centre Puducherry is compared with previously published studies.
Results: Out of 2022 deliveries 67 were instrument assisted vaginal deliveries in which majority of participants were primigravida aged between 21-30 years. The most common maternal indication was maternal exhaustion with inadequate expulsive efforts. Around 97% of newborn delivered by assisted vaginal delivery had an apgar score >6 at 1 minute. The complications have been reported in both vacuum and forceps assisted vaginal deliveries with slight increase in numbers on forceps assisted vaginal deliveries.
Conclusions: In this study after reviewing current various articles, it is proposed that surgeons prefer vacuum over forceps assisted vaginal delivery as it can provide better outcome in both mother and fetus in terms of both complications and its associated maternal and newborn morbidity and mortality. However, it should be applied according to individual patients indications, to reduce the caesarean section delivery rates.

Keywords: Maternal exhaustion, Operative vaginal delivery, Caesareans section delivery

INTRODUCTION

Operative deliveries are vaginal deliveries carried out using forceps or a vacuum device. Once one or the other is used on the fetal head, outward traction creates forces that support maternal pushing during vaginal delivery. Traction is the primary function of both vacuum and forceps. Forceps can also be utilized for rotation, especially from the posterior, occiput and transverse positions.[1]

Forceps or vacuum-assisted vaginal delivery was used for 3.6% of births in the USA in 2010, according to data from birth certificates from the National Vital Statistics Report, and it was used for approximately 11% and 17.3% of births at the Royal College of Obstetricians and Gynecologists in Australia and Tikur Anbessa Specialized hospital in Ethiopia, respectively.[2]

The proper indications for considering a forceps delivery or vacuum extraction, when the necessary conditions have been satisfied, are a prolonged second stage of labour, an

non-reassuring fetal heart rate tracing, or a need to shorten the second stage of labour for the benefit of the mother. Both vacuum and forceps have the potential to harm foetuses and newborns, however the incidence of maternal harm is lower with the vacuum than with forceps. The operator must understand the indications, contraindications, application, and use of the specific instrument in order to reduce risks to both the mother and the foetus. It is advised that operative vaginal delivery be carried out from a low or outlet station.[3]

Previously worldwide studies were carried out to compare the neonatal and maternal complications between forceps and vacuum deliveries. Vacuum extractor is not more likely to be related with APGAR score at 5 minutes as compared to forceps, according to a cochrane systemic review of nine randomized controlled trials (RCT), while some researches have suggested that forceps application increases the risk of maternal problems.[4-6]

The ACOG and the Society for Maternal Fetal Medicine recently held a workshop in February 2012 in Dallas, Texas, US to address the idea of preventing the primary cesarean delivery. This was done in response to the rising number of cesarean deliveries and the morbidities associated with the rising number of cesarean deliveries.[7]

Common indications for instrumental deliveries

The most common risk indication that leads to the use of instruments in vaginal delivery are prolonged second stage of labor, immediate fetal compromise,maternal heart disease, malposition of fetal head (such as occipito-posterior position), maternal exhaustion, and gestational diabetes.[8-12] Maternal and fetal outcomes in instrumental assisted vaginal deliveries is shown in Table 1.

Table 1: Maternal and fetal outcomes in instrument assisted vaginal delivery.

Outcomes in instrument assisted vaginal delivery			
Type of instrument	Good outcome	Bad outcome	
		Maternal	Fetal
Forceps	Reduces the rate of cesarean section[7]	1st & 2nd degree perineal tear[13]	Neonatal jaundice[8]
		Episiotomy extension[13]	NICU admissions[15]
		Traumatic PPH[12]	Cephalohematoma[15]
		Excessive blood loss requiring blood transfusion[12]	Neonatal sepsis[15]
Vacuum		Cervical tear[14]	
		Episiotomy extension[14]	
		Atonic PPH[12]	

The aim of the study was to analyze the maternal and fetal outcomes in patients undergoing instrument assisted vaginal deliveries in Sri Venkateshwaraa Medical College Hospital & Research Centre (SVMCH&RC). Also, to evaluate common indications for instrumental deliveries and to analyse the maternal and fetal outcome in forceps and vacuum assisted deliveries.

METHODS

Retrospective study was carried out in patients who have undergone instrument assisted vaginal delivery. This study conducted at Sri Venkateshwaraa Medical College and Research Institute for 2 years from January 2021 to December 2023.

Inclusion criteria

The below mentioned data were obtained from the medical records and the delivery register maintained at the hospital of the patients who delivered alive early and late preterm and term fetus during the above-mentioned time period. The data obtained includes: Maternal age, Gravida score, gestational age, indication, instruments used, delivery outcome, maternal outcome, fetal outcome.

Exclusion criteria

Stillborn, intrauterine death, extremely preterm fetus, instrument assisted caesarean deliveries, multiple pregnancy and malpresentation (other than cephalic).

Statistical analysis

The data obtained from SVMCH&RC was compared with previously published studies.[8,10]

RESULTS

There was a total of 67 instrument assisted vaginal deliveries out of the 2022 deliveries done in SVMCH&RC during the year 2021-2023. Majority of the participants were primigravida aged 21-30 years (Table 2). Maternal exhaustion with inadequate expulsive effort was the major indication for vacuum or forceps assisted vaginal deliveries in this study (Table 3). Around 65 (97%) children delivered had an APGAR score of >6 at 1 minute and only 2 child delivered with vacuum assisted delivery had an APGAR score of <6 at 1 minute. The complications in both mother and child were recorded and presented as

Table 4. Overall, 80% of the children birth weight ranged over 2.5 kgs (Table 5).

Table 2: Maternal characteristics of the participants by the type of vaginal deliveries.

	Forceps n=17	Vacuum n=50	Total n=67 (%)
Maternal age (years)			
<20	1	3	4 (5.97)
21-25 years	12	28	40 (59.70)
26-30 years	4	19	23 (34.30)
Gravida			
Primigravida	14	32	46 (68.65)
Multigravida	3	18	21 (29.85)
Gestational age			
35-37 weeks	4	11	15 (22.38)
38-40 weeks	13	37	50 (74.62)
>40 weeks	0	2	2 (2.98)

Table 3: Indications for forceps and vacuum assisted vaginal deliveries.

	Forceps	Vacuum	Total n=67 (%)
Maternal exhaustion with inadequate expulsive effort	10	34	44 (65.67)
Fetal distress	5	10	15 (22.38)
Maternal heart disease	1	3	4 (5.97)
Malposition of fetal head (occipito-posterior position)	1	3	4 (5.97)
Total	17	50	67 (100)

Table 4: Complications in forceps and vacuum assisted vaginal deliveries.

Complications	Forcep	Vacuum	Total (%)
Maternal complications			
Failed instrumenttal deliveries	10	6	16 (23.88)
Perineal tear/ cervical tear	10	6	16 (23.88)
PPH	16	4	20 (29.88)
Any other	14	1	15 (22.38)
Neonatal complications			
Cephalohematoma	1	14	15 (22.38)
Neonatal jaundice	4	12	16 (23.88)
Neonatal sepsis	10	6	16 (23.88)
Other injuries	5	0	5 (7.46)
NICU admissions	8	7	15 (22.38)

Table 5: Distribution of birth weight by the type of vaginal deliveries.

Birth weight	No of children	Vaccum	Forceps
2-2.5kg	14	10	4
2.5-3kg	20	16	4
>3kg	33	28	5
Total	67	54	13

DISCUSSION

In this study, a retrospective analysis was done for a total of 2022 vaginal deliveries which were conducted in SVMCH&RC out of which 67 (3.31%) of them were instrument assisted vaginal deliveries. Of the 67 instrument assisted vaginal deliveries that were done 17 of them were forceps assisted (25.37%), 49 of them were vacuum assisted (73.13%) and 1 was a vacuum assisted outlet forceps vaginal delivery (1.49%). On comparison with the other studies, there is a higher usage of vacuum rather than forceps in this study (see Tables 2-5). [8,10] The most common indication were inadequate maternal efforts or exhaustion (65.67%) and fetal distress (22.38%) when compared with other studies poor maternal efforts leading to prolonged second stage is the most common cause.[8] Instrument assisted deliveries carries increased number of per vaginum examination which can increase the incidence of sepsis to newborn and puerperal infection to mother which may lead to endometritis in later life.[16] NICU admissions for forceps assisted deliveries (53.3%) are comparitively more with vacuum assisted deliveries (46.6%).[17] The reason for the preference of vacuum assistance over forceps assistance lies in the fact that, vacuum assisted vaginal deliveries reduces the risk of maternal and fetal infections when compared to forceps assisted vaginal delivery. As such, the outcomes have all been successful in all the instrument assisted vaginal deliveries done and post-partum complications are minimal to none. But in current practice many practising gynaecologist prefer caserean delivery to reduce the incidence of severe maternal morbidity (perineal injuries) and mortality, perinatal morbidity (low apgar, sepsis, birth injuries) and mortality when compared to instrumental deliveries.

This study has few limitations. There are many risk factors reported related to instrument assisted vaginal delivery. However sufficient data was not available in the present study in order to draw comparisons and to analyze the risk factors.

CONCLUSION

In this present study and after studying various review articles, it is concluded that surgeons prefer using vacuum more than forceps as it can provide a better outcome to both mother and fetus. However, considering benefits and complications of both forceps and vacuum deliveries, it must be applied only according to the indications of individual patients. Therefore, in modern Obstetrics and

Gynecology, its important to continue the practice of instrumental deliveries, whose rate is reducing at present practice so that it can reduce the rate of cesarean section.

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