

## ORIGINAL ARTICLE

## Instrumental vaginal delivery - an assessment of use in a tertiary care centre

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### ABSTRACT

**Background:** Majority of women in sub-Saharan Africa expect to achieve spontaneous vaginal delivery at the end of pregnancy. This is usually possible, but, a few women will receive one form of assistance or another (forceps or vacuum) to avert maternal or foetal morbidity or mortality. Training and research in instrumental vaginal delivery will improve the benefit for mothers and their babies and also, maintain and improve the skills for these procedures.

**Objectives:** To determine the incidence, indications, cadre of birth attendant and outcome of instrumental vaginal delivery in Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria.

**Methodology:** This was a 5-year retrospective study. Records of patients, who had vacuum or forceps delivery from 1<sup>st</sup> January, 2008 to 31<sup>st</sup> December, 2012 were retrieved and relevant data extracted and analyzed using the SPSS for windows version 20.0.

**Results:** The incidence of instrumental vaginal delivery was 1.06% of all deliveries (0.08% for forceps and 0.98% for vacuum). Vacuum-assisted delivery accounted for 92.1%. Forceps-assisted delivery showed a decline over the years while vacuum use remained constantly higher. Delayed second stage of labour (68.6%) and eclampsia (24.8%) were the common indications. Resident trainees (93.4%) applied the instruments and the most common maternal complication was post-partum haemorrhage (11.1%) followed by perineal laceration (5.9%). Few neonates (4.6%) suffered complications.

**Conclusion:** The incidence of instrumental vaginal delivery is low. There is an obvious shift from the use of forceps to vacuum-assisted delivery and this may explain the good maternal and perinatal outcomes.

**Keywords:** Forceps, vacuum, training, residents, outcome, Sokoto

### INTRODUCTION

Instrumental vaginal delivery (IVD), a key element of essential obstetric care, refers to the application of either forceps or a vacuum device to assist the mother in effecting vaginal delivery of a foetus. According to the

WHO and other UN agencies, assisted vaginal delivery is one of the six critical functions of basic emergency obstetric and new born care (EmONC).<sup>1</sup> Primarily, its use was aimed at saving the mother's life which took precedence over possible harm to the

foetus. However, with the development of safer techniques for vaginal extraction, the focus of these procedures has changed such that in modern obstetric practice, the goal is to shorten the second stage of labour for conditions of the foetus or of the mother.<sup>2</sup>

The incidence of instrumental vaginal delivery has large geographic differences. In the developed countries it ranges 10-15% in the UK and 4.5% in the United States, while in low resource countries like Niger, Burkina Faso, Mali and Mauritania, lower rates of 1-3% were reported.<sup>3,4</sup> In Nigeria, most studies were done on forceps delivery with rates ranging from 0.9% to 6%.<sup>5</sup> In Zaria and Ibadan forceps delivery rates of 3.6% and 1.57% were reported while vacuum delivery rates of 1.5%, 1.6%, 1.7% and 0.9% were reported from Enugu, Ile-Ife, Ilorin and Kano, respectively.<sup>6,7,8,9,10,11</sup>

Indications for instrumental vaginal delivery include delayed second stage of labour, inadequate progress from poor maternal expulsive efforts due to fatigue or exhaustion and fetal distress or non-reassuring foetal heart rate tracing in the 2<sup>nd</sup> stage of labour.<sup>2</sup> Maternal indications aim to shorten and reduce the effect of Valsalva manoeuvre of second stage of labour on maternal medical conditions such as cardiac disease especially New York Heart Association (NYHA) class III/IV, or neurologic diseases including uncorrected intra-cerebral vascular malformations as well as hypertensive crisis, myasthenia gravis, spinal cord injury patients at risk of autonomic dysreflexia and proliferative retinopathy.<sup>2</sup>

Essentially, all vacuum extraction devices consist of a cup made of soft or rigid material which can be attached to the foetal scalp, a vacuum pump that provides suction for the cup's attachment and a traction system that allows the operator to assist the mother with the birth. Soft or flexible vacuum cups have a higher incidence of failure than rigid vacuum cups primarily due to their higher frequency of spontaneous detachment pop-offs.<sup>12</sup> However, they also result in less foetal cosmetic injury than rigid cups.

Successful vacuum extraction depends on achieving correct applications of the cup on the foetal scalp. A proper cup application occurs when the edge of a standard 60-mm cup lies approximately 3 cm or 2 finger breadths behind the centre of the anterior fontanelle in the midline over the sagittal suture.<sup>13</sup> A sufficient vacuum (100-150mmHg) to fix the cup to the foetal head is applied and a check of cup placement follows, to rule out entrapment of maternal tissues within the cup. Full vacuum is subsequently applied (450-600 mm Hg) and traction follows, paralleling the uterine contractions. In the relaxation phase between contractions, the vacuum can either be maintained or reduced to less than 200 mm Hg.<sup>14</sup> When the fetal head is malpositioned, particularly when deflexion and asynclitism are present, the Kiwi OmniCup Vacuum Delivery System™ may be applied instead.<sup>15</sup>

The general trend in the use of operative vaginal delivery is that of a decline, with a gradual shift away from the use of forceps in favour of the vacuum extractor which now accounts for about four times the rate of forceps-assisted vaginal births.<sup>4</sup> African obstetricians and those of USA prefer vacuum extraction over forceps while the reverse is the case with their counterparts in Eastern Europe and South America.<sup>16</sup> This decline may be due to concerns about both instruments' potentials for poor neonatal outcomes (especially neuro-developmental) and maternal morbidity (particularly, the short-term and long-term pelvic floor injury).<sup>17, 18</sup>

The objective of this study was to determine the incidence, indications, cadre of the birth attendant, complications and neonatal and maternal outcome of IVD in Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria.

#### METHODOLOGY

This was a 5-year retrospective descriptive study. Case notes of patients who had forceps or vacuum delivery from 1<sup>st</sup> January, 2008 to 31<sup>st</sup> December, 2012 at Usmanu Danfodiyo University Teaching Hospital, Sokoto, were retrieved manually from the health records

department. Data relating to age, parity, indication/type of procedure, cadre of the birth attendant and both neonatal and maternal complications were extracted and analyzed using the SPSS for Windows version 20.0. Ethical approval for the study was from the Hospital Ethics Committee.

## RESULTS

There were 168 instrumental vaginal deliveries out of 15,892 deliveries within the five years under review, giving an overall incidence of 1.06% or 10.6 per 1000 deliveries. The incidence for vacuum-assisted delivery was 0.98%, while that for forceps was 0.08%. However, 152 case notes were available for analysis giving a retrieval rate of 90.5%.

The ages of the patients ranged between 14 to 40 years with a mean of  $23.4 \pm 5.8$  years. The socio-demographic characteristics of the patients are shown in Table 1.

Table 1. Socio-demographic characteristics of the patients

	No.	%
<b>Ethnic group</b>		
Hausa	119	78.3
Igbo	10	6.6
Yoruba	9	5.9
Fulani	6	3.9
Others	8	5.3
<b>Total</b>	<b>152</b>	<b>100</b>
<b>Religion</b>		
Islam	134	88.2
Christianity	18	11.8
<b>Total</b>	<b>152</b>	<b>100</b>
<b>Occupation</b>		
Housewife	143	94.1
Civil Servant	5	3.3
Trader	3	1.9
Farmer	1	0.7
<b>Total</b>	<b>152</b>	<b>100</b>

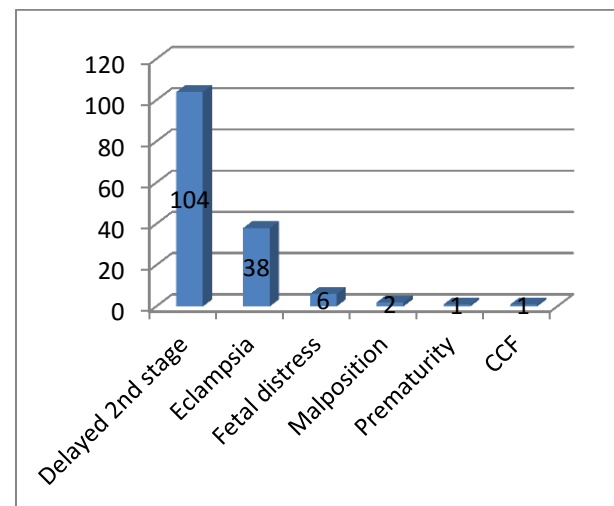
The obstetric characteristics of the patients are shown in Table 2. Vacuum-assisted delivery accounted for more, 140 (92.1%), than forceps, 12 (7.9%) (Table 2).

Table 2. Obstetric characteristics and type of IVD

Obstetric characteristic	No.	%
<b>Parity</b>		
Primigravida	117	77
Multigravida	26	17.1
Grandmultipara	9	5.9
<b>Total</b>	<b>152</b>	<b>100</b>
<b>Booking status</b>		
Unbooked	80	52.6
Booked	72	47.4
<b>Total</b>	<b>152</b>	<b>100</b>
<b>Type of IVD</b>		
Vacuum-assisted delivery	140	92.1
Forceps-assisted delivery	12	7.9
<b>Total</b>	<b>152</b>	<b>100</b>

Majority, 150 (98.7%) of the instrumental deliveries were emergency procedures. Only 2 (1.3%) were elective/planned. Delayed second stage of labour, 104 (68.4%) was the most common indication for IVD. Majority 151 (99.3%) of the procedures were successful (Figure 1). There was 1 (0.7%) failed procedure (vacuum) for which caesarean section was performed.

Figure 1. Indications for the procedure



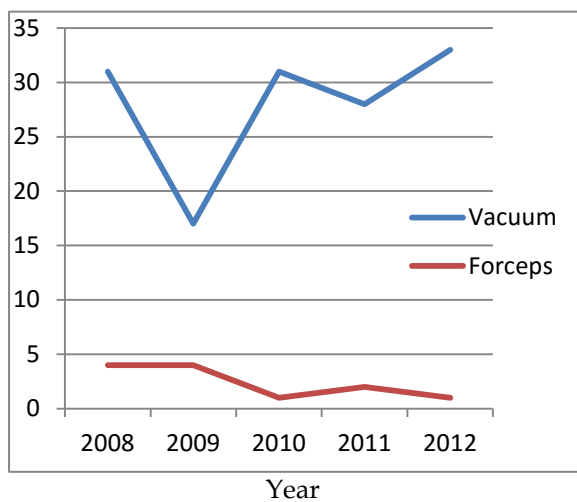
## Indications

The gestational age at which IVD was performed ranged from 32 to 42 weeks with a mean of  $38.07 \pm 1.7$  weeks. Most, 124 (81.6%), of the procedures were performed on term neonates ( $GA \geq 37$  weeks) and only 1 (0.7%) was delivered by forceps at 32 weeks. There

were 10, (6.6%) intra uterine fetal deaths (IUFD) who were macerated stillbirths and 142 (93.4%) live births. The birth weights of the neonates ranged from 2 to 4.9 kg with a mean birth weight of  $3.17 \pm 0.51$  kg.

The average rate of instrumental delivery per annum was 30.4 procedures. The rate was fairly constant over the years studied (33 per annum except for 2009) with forceps-assisted delivery declining while the use of vacuum was consistently higher (Figure 2).

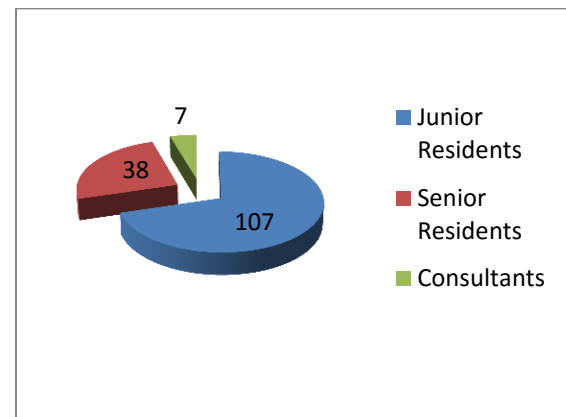
Figure 2. Yearly trend in the use of forceps / vacuum



Junior Resident doctors applied the instruments in 108 (71.4%) procedures, while Senior Residents and Consultant Obstetricians conducted 38 (25%) and 7 (4.6%) procedures, respectively (Figure 3).

The overall complication rate for the procedures was 18.4% in the mothers and 4.6% in the neonates. The most common maternal complication was postpartum haemorrhage 18 (11.8 %) followed by perineal laceration 9 (5.9%) and cervical laceration 1 (0.7%). Few, 7 (4.6%), neonates had mild-to-moderate asphyxia. Majority, 126 (82.9%), of the neonates were discharged home with their mothers within 10 hours of the procedure. There was one (0.7%) maternal and 1 (0.7%) perinatal mortality among the group.

Figure 3. Level of birth attendant



## DISCUSSION

This was a retrospective descriptive study of case files of women who had IVD between 1<sup>st</sup> January, 2008 and 31<sup>st</sup> December, 2012 at the Usmanu Danfodiyo University Teaching Hospital, Sokoto, in North-West Nigeria. Of the 168 cases recorded, 152 case files were available for analysis. This was one of the limitations of retrospective reviews especially in developing countries where record keeping is yet to be optimal.

The overall incidence of 1.06% or 10.6 per 1000 deliveries found in this study is comparable to studies from Ibadan, Enugu, Ile-Ife and Ilorin which reported rates of 1.57%, 1.5%, 1.6% and 1.7%, respectively.<sup>5,8,9,10</sup> It is, however, much lower than that reported from Zaria in North-West Nigeria (3.6%) and the rate of 8.5% recommended by RCOG.<sup>2,6</sup>

The low rate may be attributed to our centre being a tertiary institution where emergency obstetric surgeries may be carried out through a loan scheme thereby making it easily accessible and affordable.<sup>19</sup>

The incidence of vacuum-assisted delivery was 0.98%, while that of forceps was 0.08%. The preference for vacuum over forceps found in this review is similar to findings elsewhere, particularly in the United States where it is the instrument of choice for IVD.<sup>5,8,20,21</sup> This agrees with trends all over the world suggesting that there is a gradual shift from the use of forceps to vacuum-assisted deliveries, which may be because the skill for vacuum is more easily acquired compared to

the forceps, and is considered safer.<sup>11,22</sup> The average rate of IVD was 31 per annum with a dip in the number of procedures in 2008 due to the breakdown of the vacuum machine. The rate was fairly constant over the years under study and it is similar to that observed in Scotland and Australia unlike in USA where it is declining: most probably due to litigations.<sup>23</sup>

Primigravidae 77%, adolescents and young adults (mean age 23.4 years) made up the bulk of the parturients. This is not surprising as they are prone to delays in the second stage of labour from rigid untested pelvis, undue anxiety, uterine inertia and inexperience in labour.<sup>24</sup> Unbooked patients (52.6%) were slightly more than booked patients (47.4%). This is the expected trend because booked patients benefit from counseling on birth preparedness and complication readiness during the antenatal visits, which in turn make them more psychologically prepared for labour, unlike their unbooked counterparts.

Majority of the procedures were carried out at term. This is the accepted practice as vacuum-assisted delivery, which was more favoured in this study, is contraindicated in preterm deliveries less than 34 weeks of gestation.

The most common indication for IVD was delayed second stage from poor maternal effort and exhaustion. This was the finding in most other studies.<sup>3,4,5,6,7,8,9,10,11,25</sup> The other main indication for IVD, eclampsia, has also been reported in Zaria where women have demographic and obstetric characteristics which are similar to those of Sokoto.<sup>6</sup> Most (99.3%) of the procedures were successful, and this was probably due to proper patient selection.

Resident doctors undergoing training applied 93.4% of the instruments. This may be because most of the procedures were undertaken as emergencies and these are the group of doctors usually at hand for most emergencies. This may also explain the dwindling rate of forceps delivery which needs requisite skills for its use.

The maternal complication rate for the procedures was 18.4%, with postpartum haemorrhage of 18 (11.8 %) topping the list, followed by perineal laceration, 9 (5.9%). This was similar to the findings elsewhere.<sup>11,25</sup> The post-partum haemorrhage was probably secondary to the delay in second stage which was the most common indication for IVD in this study. Thus, active management of the third stage of labour and prompt suturing of lacerations should be strictly adhered to for women who undergo IVD. There was 1 maternal death recorded from eclampsia which could not be directly related to the procedure.

Neonatal complications were few with only 7 (4.6%) neonates born with mild-to-moderate asphyxia. However, most 126 (82.9%) of the neonates were discharged home with their mothers within 10 hours of the procedure, thus, preventing adequate monitoring of these babies for other complications.

#### CONCLUSION

Instrumental vaginal delivery rate is low in our centre in Sokoto. The rate of its application has been fairly constant over the years under study but use of forceps was declining while vacuum use remained constant. Many neonates had no form of follow-up after the procedure. It is, therefore, difficult to ascertain both immediate and long term effects of these procedures on the new born child. A well designed prospective study may be needed to ascertain this.

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