

Instrumental vaginal delivery in Usmanu Danfodiyo University Teaching Hospital, Sokoto: A ten-year review

JA GARBA, AT BURODO¹, AD SAIDU, B SULAIMAN, AG UMAR¹, R IBRAHIM, AM NASIR

Department of Obstetrics and Gynaecology, Usmanu Danfodiyo University Teaching Hospital, ¹Department of Obstetrics and Gynaecology, Usmanu Danfodiyo University, Sokoto, Nigeria

ABSTRACT

Background: Instrumental vaginal delivery is one of the key elements of essential obstetric care that mimics spontaneous vaginal delivery in order to expedite delivery with minimal maternal and neonatal morbidity. The objectives of the study were to determine the rate of instrumental deliveries, the common indications, and compare outcome and complications between forceps and vacuum deliveries.

Materials and Methods: This was a retrospective cross-sectional study on instrumental vaginal deliveries carried out in UDUTH over 10 years from January 2007 to December 2016. The list of cases was obtained, the case files were retrieved and relevant information was obtained. Data analysis was done using SPSS version 21. Level of significance was set at $P < 0.05$.

Results: The instrumental vaginal delivery rate was 2.06%. Vacuum deliveries accounted for 83.3% ($n = 524$) but forceps deliveries accounted for 16.7% ($n = 105$). The most common indication for both was delayed second stage of labor due to malposition. There was no statistical difference in the mean APGAR scores at 1st and 5th min between babies delivered by vacuum and those delivered by forceps. Majority had no complication and there was no statistical association between the type of procedure and maternal or fetal complications observed during the procedure ($\chi^2 = 3.18$, $P = 0.2$).

Conclusion: The rate of instrumental vaginal delivery is much lower than that reported in some centers in Nigeria and globally. Majority of the cases had no complication and there was no significant difference in complications observed between vacuum and forceps deliveries.

Key words: Complications; forceps delivery; rate; vacuum delivery.

Introduction

Instrumental vaginal delivery is one of the common obstetric interventions to aid delivery of the fetus. It is the use of the vacuum extractor or obstetric forceps in order to increase the forces along the pelvic curve and expedite delivery.^[1] The aim of instrumental vaginal delivery is to mimic spontaneous vaginal birth, in order to expedite delivery with a minimal maternal or neonatal morbidity.^[2]

The prevalence of instrumental vaginal delivery varies from one country to another and also from facility to facility. However,

the prevalence had remained fairly stable over the past three decades. Operative vaginal delivery rates have been between 10% and 13% in the United Kingdom^[2,3] and 5% in United States.^[4,5] A survey in nine Asian countries by the World Health Organization (WHO) found prevalence of 3.2%.^[6] In Nigeria, instrumental vaginal delivery rate was found to be 4.9% in Lagos, 0.69% in Bauchi, 3.6% in Zaria, and as high as 28.7% in Kano.^[7-10]

Address for correspondence: Dr. JA Garba,
Department of Obstetrics and Gynaecology, Usmanu Danfodiyo
University Teaching Hospital, Sokoto, Nigeria.
E-mail: jgarba80@gmail.com

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Forceps can be classified based on ability to rotate the fetal head in the birth canal into those that can exert traction only and those that can be used to exert both traction and rotation.^[11] Obstetric forceps can also be classified based on depth into which it can be applied into pelvic cavity as high, midcavity, or low/outlet forceps. Low cavity and outlet forceps are the most frequently performed in current obstetrics practice.^[12]

The different types of vacuum extractors can be based on the type of suction mechanism; which can be electrical or manual and the type of cup; which can either be rigid or soft (Malmstrom, OmniCup or Bird.^[12] The Malmstrom vacuum extractor with soft or rigid cups is the most common and widely available in resource poor settings.

Common indications for instrumental vaginal deliveries are delay in the second stage of labor due to poor maternal effort, inadequate uterine activity, malposition, and fetal distress. It is also indicated in women with medical conditions like cardiac disease, respiratory, or intracranial pathology where bearing down may increase the preload.^[13] Other indications include delivery of after coming head of a breech presentation, to deliver a “floating” fetal head during cesarean section using a Wrigley’s forceps and delivery of an impacted fetal head using single forceps blade. However, the indications are not absolute and decision is made based on the individual case on ground.^[12]

Instrumental vaginal delivery is one of the key elements of essential obstetric care. Advocating its use is likely to significantly reduce maternal and perinatal morbidity/mortality.^[12] It would also likely reduce the rise in rate of cesarean section. Some studies have revealed underutilization of instrumental vaginal delivery in resource poor countries.^[14,15] There is need to assess its utilization and outcome of the procedures in order to ascertain its safety or otherwise. There is limited published data on instrumental vaginal delivery in the study area; hence the need to carry out the study. It is also important that obstetric care providers are aware of the maternal and neonatal complications associated with instrumental vaginal deliveries and suggest options to minimize such complications. The objectives of the study were to determine the rate of instrumental deliveries, the common indications, and compare outcome and complications between forceps and vacuum deliveries.

Materials and Methods

This was a retrospective cross-sectional study on instrumental vaginal deliveries carried out in UDUTH over 10 years from January 2007 to December 2016. The list of cases of

instrumental vaginal deliveries during the study period was obtained from medical record office and labor room register and the case files were retrieved. The total number of deliveries during the study period was also obtained. Relevant information on sociodemographic characteristics, booking status, parity, type of procedure, complications, indication, and fetal and maternal outcome was obtained.

The information obtained was analyzed using SPSS version 21. The instrumental delivery rate was obtained in percentage. Tables and figures were used to display the results. Independent sample *t* test was used to test for association between mean Apgar scores. Chi square was used to test for any significant association between the type of procedure and fetal or maternal outcome.

Results

The total number of deliveries during the study period was 30,552. There were 629 instrumental vaginal deliveries and 518 files were retrieved, giving a retrieval rate of 82.4%. The mean age of the cases was 24 ± 5.6 and the range was 14–47 years. Majority of the cases (48.1%) were in the age group of 20–24 years and about 60% were primigravidae. Majority of the cases were Hausa and Muslims. The sociodemographic characteristics of the cases are shown in Table 1.

The overall instrumental vaginal delivery rate was 2.06%. Vacuum deliveries accounted for 83.3% ($n = 524$) whereas forceps delivery accounted for 16.7% ($n = 105$). The yearly incidence of instrumental vaginal delivery ranged from 1.36

Table 1: Sociodemographic characteristics of the cases ($n=518$)

Characteristics	<i>n</i> (%)
Age	
<20 years	97 (18.7)
20-24 years	211 (40.7)
25-29 years	114 (22.0)
30-34 years	62 (12.0)
Above 35 years	34 (6.6)
Ethnicity	
Hausa	336 (64.9)
Igbo	98 (18.9)
Yoruba	70 (13.5)
Others	14 (2.7)
Occupation	
House wife	236 (45.5)
Civil servant	190 (36.7)
Business	78 (15.1)
Others	14 (2.7)
Religion	
Islam	368 (71.0)
Christianity	150 (29.0)

to 3.01% during the 10 years study period. It was highest in 2007 and lowest in 2011 [Table 2].

The most common indication for both vacuum and forceps deliveries was delayed second stage of labor due to malposition, which was followed by eclampsia/severe preeclampsia. The distribution of the various indications for both vacuum and forceps is shown in Table 3. The mean gestational age at which instrumental vaginal deliveries were carried out in this study was 39 ± 1.5 weeks. The minimum gestational age was 34 weeks whereas the maximum was 41 weeks. However, majority were at gestational age of 40 weeks [Table 4].

The APGAR scores for vacuum and forceps deliveries are shown in Figures 1 and 2. The result showed that most of the babies (51.62%) had APGAR scores of 7 and above; which implied active and nonasphyxiated babies. Further analysis revealed that there was no statistical difference in the mean APGAR scores at 1 min between those babies delivered by vacuum (mean = 6.1 ± 2.3) and those delivered by forceps (mean = 5.3 ± 2.1) ($t = 2.4$, $df = 516$, $P = 0.07$). Similarly, there was no statistical difference in the mean APGAR scores at 5 min between those babies delivered by vacuum (mean = 7.4 ± 2.4) and those delivered by forceps (mean = 7.2 ± 2.2) ($t = 0.86$, $df = 516$, $P = 0.38$).

The maternal and fetal complications observed during vacuum and forceps deliveries are shown in Table 5. Both vacuum

and forceps deliveries were associated with neonatal and maternal complications but majority had no complication. The percentage of those that had genital laceration following vacuum and forceps deliveries was 5.8% and 4.9%, respectively. There was no statistical significant association between the type of procedure and maternal complications observed during the procedure ($\chi^2 = 3.18$, $P = 0.2$).

In terms of neonatal complications, 9.7% of the neonates that had vacuum delivery were asphyxiated whereas 7.0% of those that had forceps delivery were asphyxiated. Among those that had forceps delivery, 7.0% died during early neonatal period whereas 5.1% of those that had vacuum delivery died during the neonatal period. However, there was no statistical association between the type of procedure and neonatal complication encountered during the procedure ($\chi^2 = 2.9$, $P = 0.56$).

Discussion

The prevalence of instrumental vaginal delivery found in this study is much lower than that reported in some developed countries in United Kingdom and United States.^[2-5] It is also lower than that reported in some states in Nigeria like Lagos, Zaria, and Kano.^[7,9,10] This may be because of underutilization of the procedures by the doctors or underutilization of hospital services by the pregnant women in the study area.

Table 2: Instrumental vaginal delivery rates during the study period (n=629)

Year	Total deliveries	Instrumental deliveries n (%)
2007	2,588	78 (3.01)
2008	3,191	80 (2.51)
2009	3,032	60 (1.99)
2010	2,978	78 (2.62)
2011	3,311	45 (1.36)
2012	3,267	65 (1.99)
2013	3,391	52 (1.53)
2014	2,186	62 (2.84)
2015	3,334	73 (2.19)
2016	3,274	55 (1.68)

Table 3: Indications for vacuum and forceps deliveries

Indication	Vacuum		Forceps	
	n	%	n	%
Abruptio placentae	15	3.5	0	0
Eclampsia/severe PET	151	35.0	29	33.7
Fetal distress	32	7.4	5	5.8
Delayed 2 nd stage due to malposition	158	36.6	43	50.0
Poor maternal effort	68	15.7	9	10.5
Medical conditions	8	1.9	0	0

Table 4: Gestational ages for the instrumental vaginal deliveries

Gestational age (weeks)	Number	Percentage
34	5	1
35	7	1.3
36	30	5.8
37	35	6.8
38	125	24.1
39	59	11.4
40	233	45
41	24	4.6
Total	518	100

Table 5: Complications of vacuum and forceps deliveries

Complication	Vacuum		Forceps		χ^2 /fisher	P
	n	%	n	%		
Maternal						
Nil	393	91	74	80.9	3.18	0.2
Genital laceration	21	4.9	5	5.8		
Postpartum hemorrhage	18	4.2	7	8.1		
Neonatal						
Nil	350	81.2	56	73.77.0	2.9	0.56
Birth asphyxia	42	9.7	6			
Early neonatal death	22	5.1	6	7.0		
Fresh stillbirth	15	3.5	7	8.2		
Macerated stillbirth	2	0.5	11	12.7		

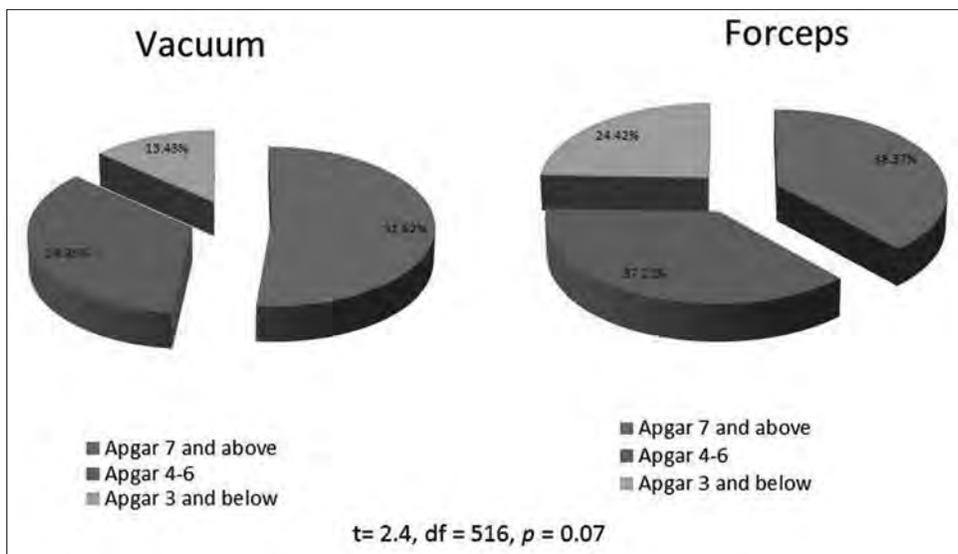


Figure 1: Apgar at 1st min for babies delivered by vacuum and forceps

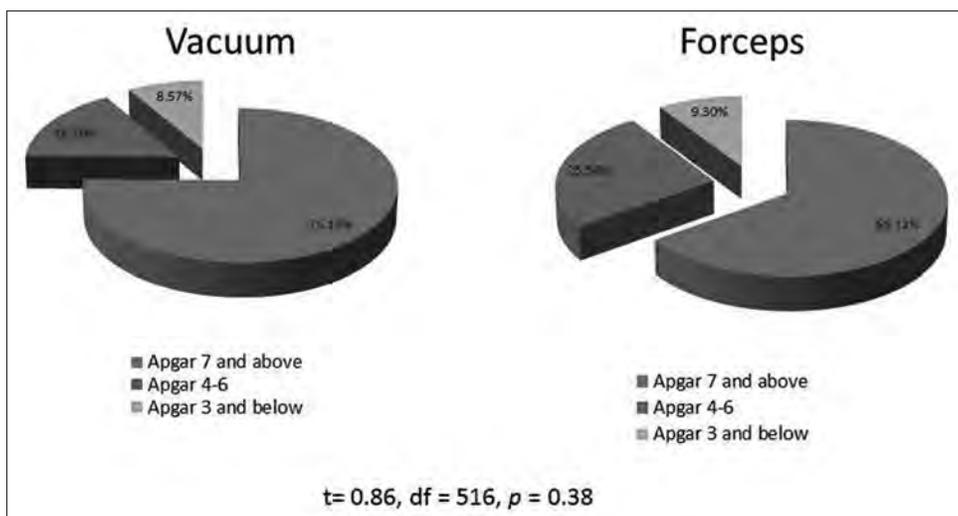


Figure 2: Apgar at 5th min for babies delivered by vacuum and forceps

Underutilization of instrumental vaginal deliveries has been reported in some resource poor countries.^[14,15] Lower prevalence of 0.69% was reported in Bauchi, Nigeria.^[8]

The result showed that vacuum delivery was carried out more than forceps delivery which may be due to lack of expertise to conduct forceps delivery by young residents and the fear that it is more associated with complications and fear of litigation. This finding contradicts previous study in northern part of Nigeria that revealed forceps delivery was carried out more than vacuum.^[9]

Primigravidae are more likely to have delayed second stage that explains why instrumental vaginal deliveries were carried out more on them. This may also explain why it was more in the younger age group who were mostly primigravidae.

Similar finding was also reported in some centers in northern Nigeria.^[9] The predominant population in the study area is Hausa/Muslim that may explain why most of the cases of instrumental vaginal deliveries were Hausa and Muslims.

The finding that most of the instrumental vaginal deliveries had no complication indicates that the goal of performing the procedure has been achieved. It has been well documented that instrumental vaginal delivery is indicated both for fetal and maternal conditions with the aim of shortening the second stage of labor.^[2] The indications for instrumental vaginal deliveries in this study do not differ from those documented in previous studies.^[2,7,9,10] Prolonged second stage was found to be the most common indication for both vacuum and forceps deliveries and this may be because it has been demonstrated that there is increased maternal

morbidity after 3 h of the second stage of labor which is further increased after 4 h.^[16]

Cases of abruptio placentae in the second stage of labor benefitted from instrumental vaginal delivery in order to shorten the second stage and avoid fetal compromise. Cases of fetal distress that occurred in second stage of labor also had instrumental vaginal delivery. Instrumental vaginal deliveries were carried out in cases with medical comorbidities in order to shorten second stage of labor. Some of these medical conditions were sickle cell disease and cardiac diseases in pregnancy. Women with some medical conditions may benefit from instrumental vaginal delivery to avoid bearing down that may not be conducive to their health.^[13]

This study did not find any significant difference in complications observed in either vacuum or forceps. Similar finding was also reported in a 5-year follow-up of women enrolled in a randomized controlled trial where there was no significant difference in the long-term outcome between vacuum and forceps deliveries for both the mother and the child.^[2] It has also been documented that vacuum is not significantly associated with low 5-min Apgar scores.^[2] The two cases of macerated stillbirth have occurred even before the procedures.

Conclusion

This study has identified that rate of instrumental vaginal delivery was 2.06% that is much lower than that reported in some centers in Nigeria and globally. The most common indication for both vacuum and forceps deliveries were delayed second stage of labor due to malposition. Majority of the cases had no complication and there was no statistical significant difference in complications observed between vacuum and forceps deliveries. The finding suggests that either of the two types of instrumental vaginal deliveries can be safely carried out when indicated.

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Conflicts of interest

There are no conflicts of interest.

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