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ORIGINAL ARTICLE

Frequency of fetomaternal complications among instrumental vaginal deliveries

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ABSTRACT… Objective: To see the frequency of fetomaternal complications among women who have undergone instrumental vaginal deliveries. **Study Design:** Descriptive Cross-sectional study. **Setting:** Department of Gynaecology and Obstetrics Unit 2 in Civil Hospital Karachi. **Period:** 1st October 2020 to 30th March 2021. **Methods:** The sample size was calculated using OpenEpi version 3, which estimated a requirement of 94 participants with a 95% confidence interval and 5% confidence limit, based on a prevalence of 93.25%. Non-probability consecutive sampling was employed to recruit participants. **Results:** A total of 94 patients underwent instrumental vaginal deliveries. The average age of the patients was 25.98±4.52 years. The frequency of first-degree perineal tears was found to be 4.3% and second-degree perineal tears were also seen in 4.3% cases, while 3rd degree perineal tears were seen in 1.1% cases, and fourth degree tears were also found in 1.1% cases. The frequency of vaginal tears was 2.1% and cervical tears were seen in 3.2% cases. Retention of urine was observed in 2.1% of cases and postpartum haemorrhage was found in 4.3% cases. Paraurethral tears were observed in 1.1% cases, paravaginal hematoma and extension of episiotomy was observed in 0.3% and 10.6% respectively. As for the foetal complications, shoulder dystocia had occurred in 2.1%, cephalhematoma was seen in 3.2% babies and facial palsy in 1.1% however 17% babies were admitted to NICU. **Conclusion:** We conclude that Instrumental vaginal deliveries were found to be safer than caesarean section as they needed less expertise and had fewer chances of maternal morbidity. Forceps deliveries needed more skills and expertise to prevent maternal complications.

Key words: Cephalohematoma, Forceps Deliveries, Foetal Complications, Instrumental Vaginal Deliveries, Maternal Complication.

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INTRODUCTION

Instrumental vaginal delivery refers to vaginal births that are associated with the assistance of forceps or a vacuum extractor.[1] In the United Kingdom, the rates of assisted vaginal delivery are around 10% to 15% and in the United States 4.5% while in India and Istanbul rates of 2.8% and 1.4% were seen.[2] The lowest rates of instrumental vaginal delivery (<5%) are observed in the Northeast, while the highest rates (20%-25%) are found in the South of the United States.[3] The overall complication rate is 17.3% (neonatal = 13.2%, maternal = 4.1%). The most common maternal complication was excessive bleeding after delivery (postpartum hemorrhage) (3.3%), which may be attributed to perineal tears, accounting for 62.5% of post-partum hemorrhage cases.[4] A study conducted in Pakistan in 2016 found that the most of the instrumental vaginal deliveries were carried out with the use of vacuum extraction. The incidence of instrumental vaginal births was 4.73%, with forceps delivery occurring in 6.75% of cases, while 93.25% of cases were delivered via vacuum extraction.[5] Maternal soft tissue trauma was more prevalent with forceps delivery compared to vacuum delivery.

Perineal tears of the first and second degree were noted in 4.25% of cases, while third- and fourth-degree perineal tears were seen in 0.75% cases. Vaginal and cervical tears were seen in (0.75%) cases. 0.75% of cases were complicated by retention of urine, while postpartum hemorrhage was found in 0.5% of cases. Paraurethral tears were observed in (0.25%) cases.[5] Fetal complications are more commonly associated with poor Apgar score at one minute, compared to the scores at five minutes.[5] In 98.25% of babies, the Apgar score at one minute was between 6 and 9, while in 1.75% of babies, it was between 2 and 5.[5]

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The Apgar score at five minutes was between 8 and 9 in 93.25% of babies, and between 6 and 7 in 6.75% of babies.[5] Cephalhematoma was observed in 0.75% of babies, facial palsy in 1.5% babies, and 7.50% of babies were admitted to the neonatal unit.[5] A study done in Faisalabad in 2014 showed that shoulder dystocia occurs in 1.66% in forceps group 2.5% in vacuums group.[6] This finding correlates with results of research conducted by Caughey AB et al.[6,12,13]

The purpose of this study is to obtain insight into the scope of problem as there is very scanty data on this subject in our local population.[5] On extensive literature search only one study from Aga khan Hyderabad was done.[5] Moreover results of different studies have shown different results due to their different demographic features such as height, weight, so this is difficult to correlate our data with their data. So, to get further local evidence in this subject I have worked out to see the frequency of fetomaternal complications among instrumental vaginal deliveries. Results of this study will lead to reduction in maternal and fetal morbidity and mortality.

OBJECTIVE

To see the frequency of fetomaternal complications among instrumental vaginal delivery

METHODS

This descriptive cross-sectional study was conducted in the Department of Gynecology and Obstetrics, Unit 2, Civil Hospital Karachi, over a six-month period from 1st October 2020 to 30th March 2021. The sample size was calculated using OpenEpi version 3, which estimated a requirement of 94 participants with a 95% confidence interval and 5% confidence limit, based on a prevalence of 93.25%.[5] Non-probability consecutive sampling was employed to recruit participants.

Women aged 19–39 years who underwent instrumental vaginal deliveries, including vacuum or forceps-assisted deliveries, at a gestational age of over 34 weeks with a singleton pregnancy in cephalic presentation and longitudinal lie, and with parity one to three, were included in the study. Antenatal women with multiple pregnancies or preterm labor below 34 weeks of gestation were excluded, as these conditions are associated with higher fetomaternal complications.

The study was conducted following formal approval from the College of Physicians and Surgeons of Pakistan (Letter reference number: CPSP/REU/OBG-2018-183-8756) dated March 17, 2022. Data were collected from women meeting the inclusion criteria after obtaining informed consent. A pre-designed proforma was used to record maternal and fetal complications.

Maternal complications included perineal tears, defined as trauma to the perineal skin, muscles, and/or mucosa during vaginal childbirth, classified as first degree (skin and mucosa only), second degree (involving perineal muscles), third degree (involving the anal sphincter, assessed by digital rectal examination, and further subclassified as 3a <50% external sphincter, 3b >50% external sphincter, 3c internal sphincter involvement), and fourth degree (involving both sphincters and rectal mucosa). Cervical tears were diagnosed on speculum examination. Postpartum hemorrhage was defined as blood loss greater than 500 ml within 24 hours of delivery, measured by kidney tray and pad soakage. Paravaginal hematomas were diagnosed on vaginal, speculum, and rectal examination, supplemented by ultrasound, and categorized as supralevator (above levator ani, associated with cervical or fornix tears) or infralevator (below the broad ligament, around the vulva, perineum, or lower vagina).

Fetal complications included cephalohematoma (subperiosteal bleeding between skull and periosteum, assessed on scalp examination), scalp bruising (contusion due to rupture of subcutaneous vessels without breach of skin integrity), and shoulder dystocia, defined as failure to deliver the shoulders after head delivery despite gentle downward traction.

Data were processed and analyzed using IBM-SPSS (Version 22). Quantitative variables, including age, parity, and gestational age, were expressed as mean ± standard deviation (SD), while qualitative variables, including fetomaternal outcomes and types of instrumental vaginal deliveries, were presented

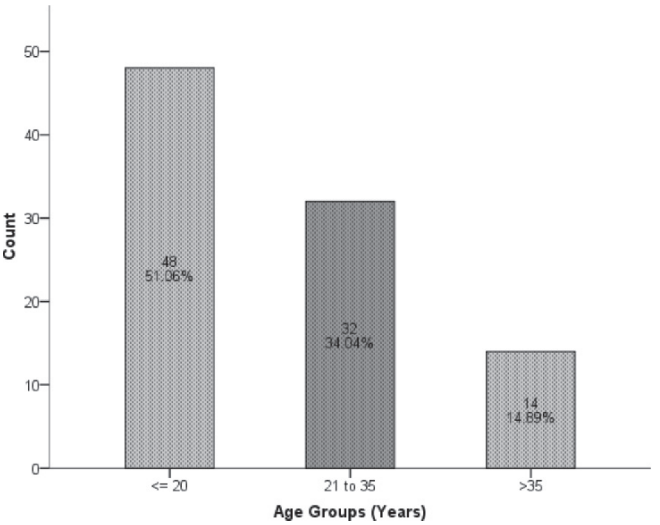
as frequencies and percentages. Potential effect modifiers such as age, parity, gestational age, and birth weight were managed through stratification. Post-stratification, the chi-square test and Fisher's exact test (for expected counts <5) were applied, with p-values <0.05 considered statistically significant.

RESULTS

A sum of 94 women who delivered via instrumental vaginal deliveries were included in the study. Most of the women 48 (51.06%) age were below and equal to 20 years, 32(34.04%) were 21-35 years old and 14(14.89%) were above 35 years old as shown in Figure-1.

FIGURE-1

The women age distribution (n=94)



The patients average age was 25.98±4.52 years. Mean gestational age was 36.83±1.31, and birth weight of the baby was 2.45±0.42 kg of baby as reported in Table-I.

Out of 94 instrument delivery, vacuum delivery was performed in 43(45.74%) cases and 51(54.26%) forceps as shown in Figure-2.

Extension of episiotomy was the most common maternal complication, occurring in ten patients (10.6%) among the 94 who underwent instrumental vaginal delivery. Para-vaginal hematoma was observed in five patients (5.3%), postpartum hemorrhage in four patients (4.3%), and cervical tears in three patients (3.2%). Vaginal tears and retention of urine were seen in two patients each (2.1%), while third- and fourth-degree tears and para-urethral tears occurred in one patient each (1.1%). First- and second-degree perineal tears were reported in four patients each (4.3%). Among the 94 neonates delivered via instrumental vaginal delivery, 16 infants (17%) required admission to the NICU. Cephalohematoma was observed in three neonates (3.2%), shoulder dystocia in two (2.1%), and both scalp bruising and facial palsy occurred in one neonate each (1.1%). The frequencies of fetal and maternal outcome complications among instrumental vaginal delivery are presented in figure 3 and 4 respectively.

TABLE-I

Patients demographic characteristics (n=94)

Variable	Mean 25.7	95% Confidence Interval		Standard Deviation
		Lower Bound	Upper Bound	
Age (years)	25.98	25.05	26.90	4.52
Gestational Age (weeks)	36.83	36.56	37.10	1.31
Parity	1.27	1.15	1.38	0.55
Fetal Weight (kg)	2.45	2.36	2.54	0.42

FIGURE-2

Instrumental vaginal delivery (n=94)

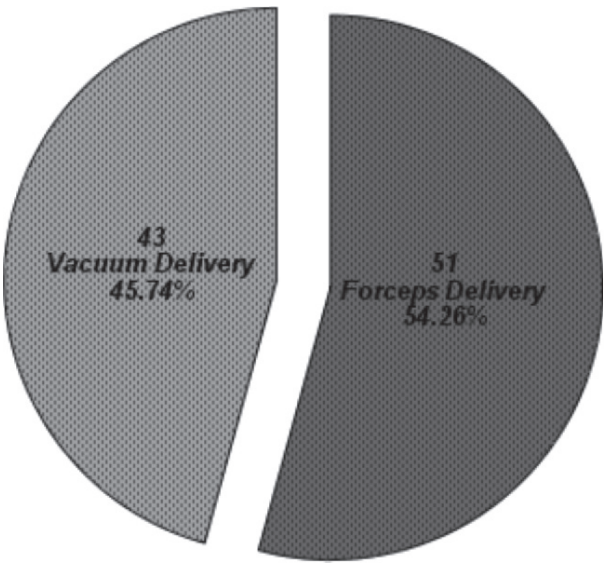


FIGURE-3

Frequency of maternal complications among instrumental vaginal delivery (n=94)

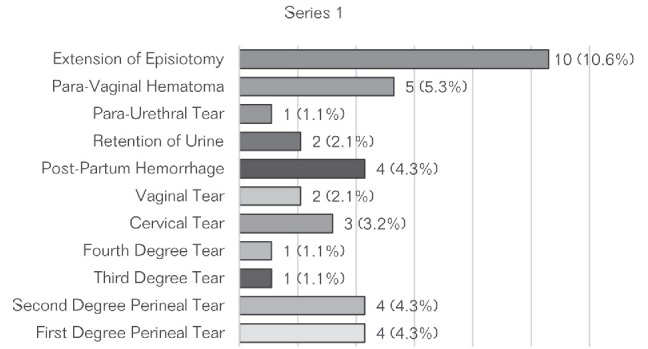
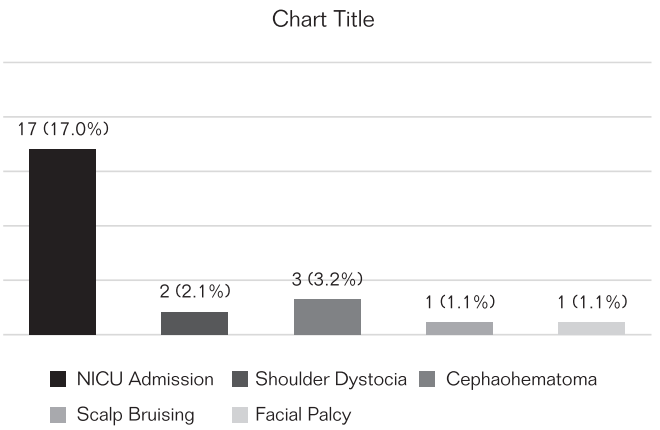


FIGURE-4

Frequency of fetal complications among instrumental vaginal delivery (n=94)



First- and second-degree perineal tears occurred in 4.3% of cases, while third- and fourth-degree perineal tears were observed in 1.1% cases. Vaginal and cervical tears seen in 2.1% and 3.2% cases. Urinary retention was observed in 2.1% cases and postpartum hemorrhage was found in 4.3% cases. Paraurethral tears were observed in 1.1% cases, paravaginal hematoma and extension of episiotomy was observed in 5.3% and 10.6% respectively (Figure-4). Fetal complications, shoulder dystocia occurred in 2.1% cephalhematoma was found in 3.2% babies and facial palsy in 1.1% however 17% babies were admitted to NICU. Stratification analysis was conducted and observed the rate of fetomaternal complications among age groups, gestational age, parity and birth weight as presented in 6 to 13 respectively. Rate of complications were not statistically significant among age groups, gestational age, parity and birth weight except NICU admission which was significantly high in low gestational age and low birth weight (<2.5kg) (p=0.0005).

DISCUSSION

Instrumental vaginal delivery involves the use of obstetric forceps or a vacuum extractor device to assist in the vaginal delivery of the fetus. Assisted vaginal deliveries are performed in cases of maternal or fetal conditions, or any event that may harm the mother or fetus, but can potentially be alleviated through intervention during the second stage of labor.[12,13] In developed countries, complications associated with assisted vaginal delivery are not very common, due to advancements in skills related to the administration of these procedures and the availability of adequate facilities and resources. However, in developing countries like Pakistan, both the mother and her newborn may experience varying degrees of morbidity and mortality as a result of instrumental delivery. Researchers reported that most of these problems can be avoided if early interventions are implemented.[14] While assisted vaginal delivery accounts for 1.5% of deliveries in some countries, the rate can be as high as 15% in others. The rates of instrumental vaginal delivery in the United Kingdom, range between 10% and 15%. The rates have remained relatively stable, although there has been a shift in the choice of instruments used.[15]

Few reported that forceps related fetal problems are seldom observed.[16] Fetal damage from vacuum-assisted delivery can range from minor to occasionally severe scalp injuries, including bruising, intracranial hemorrhage and subgaleal hematoma.[17] Maternal complications due to instrumental delivery can range from mild issues, such as vaginal and perineal lacerations, to more significant complications, including traumatic hemorrhage, bladder injury, and pelvic muscle damage.[18] To see the frequency of fetomaternal complications among instrumental vaginal delivery, total of 94 women, aged between19 to 39 years, delivered by instrumental vaginal deliveries were included in this study. In our study, most of the women 48(51.06%) age were below and equal to 20 years, 32(34.04%) were 21 to 35 years of age and 14(14.89%) were

above 35 years of age and the average patients age was 25.98±4.52 years. In a research study conducted in Chhattisgarh, India, the overall mean age was 23.81±3.6 years.[15] We found that out of 94 women, vacuum delivery was performed in 43 (45.74%) cases, while forceps was carried out in 51 (54.26%) cases, indicating that the most of the instrumental vaginal deliveries were conducted using obstetric forceps.

A similar rate of vacuum deliveries was observed in a study conducted at the Federal Teaching Hospital Abakaliki (FETHA)[19], but lower rates (1.7%) were reported in studies from Maiduguri and Lagos. The rate was reported as 3.1% in Benin City and 3.5% in Emug.[16,20] In developed countries, the preference for lower segment caesarean sections has resulted in a substantially lower rate of instrumental deliveries compared to developing countries. In our study, we found that primiparous mothers were approximately 3.5 times more likely to experience complications from instrumental deliveries compared to multiparous mothers. A possible explanation is that primigravid mothers are more likely to experience delays during the second stage of labor. Although the exact mechanism is not fully understood, primiparous women were found to have a higher risk for perineal injuries.[21] We observed in our study population, that the perineal tears were of same frequency in forceps and vacuum extraction i.e. 4.3% this observation is supported by other studies which showed that perineal damage had no difference between the two methods.[22,23]

Maternal morbidity associated with instrumental vaginal delivery included vaginal tears in 2.1%, cervical tears in 3.2%, and post-partum hemorrhage in 4.3% of cases. Para urethral tears were observed in 1.1% cases, paravaginal hematoma and extension of episiotomy was observed in 5.3% and 10.6% respectively. Weerasekera DS et al[24] also found that both vacuum and forceps deliveries are equally associated with cervical tears, perineal tears, and post-partum hemorrhage. Randomized clinical trials comparing forceps and vacuum, conducted by Fitzpatrick M, et al[25] found that extension of episiotomy and paravaginal hematoma were more common following forceps-assisted vaginal delivery. The study also identified vacuum as the preferred choice for assisted vaginal delivery. The Royal College of Obstetricians and Gynecologist (RCOG)[26] also recommends ventouse as the preferred instrument of choice for assisted vaginal delivery. Regarding rate of neonatal injuries related to instrumental vaginal deliveries we found, cephalohematoma has been more commonly associated with vacuum-assisted vaginal delivery compared to forceps delivery.[27,28]

In our cohort, the incidence of cephalhematoma was lower than previously reported (3.2% vs 15%)[29,30], which could be attributed to reporting bias. In majority of cases, cephalohematoma typically does not require treatment, although its reabsorption can lead to jaundice.[32,32] In our study, the incidence of shoulder dystocia was 2.1%, which is similar to the range reported in the literature (0.38-5.8 per 1000).[33] Some studies suggest that a birth weight greater than 4000g is independently associated with poor neonatal outcomes following instrumental vaginal deliveries.[31] However, in our study, the incidence of shoulder dystocia in instrumental vaginal deliveries was not influenced by birth weight. We found a significantly higher proportion of NICU admissions in instrumental deliveries, with a rate of 17%. The evidence on this matter is conflicting. Some studies conclude that neonates delivered via any surgical approach are at a higher risk of NICU admission[34], while others found that that forceps use was associated with higher rates of admissions of the newborns to the NICU compared to vacuum vaginal delivery.[35] Additionally, some studies argue that NICU admission should not be considered a predictor of newborn morbidity.[36]

However, we included NICU admission as a key variable in our study, as it leads to separation from the mother, which has been linked to challenges in breastfeeding. Murphy DG, et al[37] examined the effects of operative delivery in the second stage of labor on fetal morbidity and found that it was more commonly linked with the use of multiple instruments, increased manipulation, and greater operative experience.

CONCLUSION

In summary, instrumental deliveries appear safer than caesarean sections in terms of maternal

morbidity, though they require expertise to minimize risks, especially with forceps. While cesarean sections were linked to more maternal complications, instrumental deliveries carried higher risks of neonatal injury. Careful practice, timely interventions, and improved antenatal care can reduce these complications. Findings should be interpreted with caution due to the study's small sample size.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Falak Baloch:** Manuscript writing, Data collection.
2	**Payal Davee:** Final editing.
3	**Zakir Ali:** Data analysis.
4	**Pooja Seetlani:** Data analysis.