ORIGINAL ARTICLE

DIGITAL VAGINAL EXAMINATION VS TRANSABDOMINAL ULTRASOUND ASSESSMENT TO DIAGNOSE MALPOSITION BEFORE ATTEMPTING INSTRUMENTAL VAGINAL DELIVERY – WHICH IS A BETTER TOOL

Ghazala Huma✉, Asifa Siraj, Viqar Un Nisa, Ayesha Imran, Umairah Yaqub, Rabia Qasim Khichi

Pak Emirates Military Hospital, Rawalpindi-Pakistan

Background: Foetal malposition plays a vital role in the progress of labour and correct identification of the foetal position may impact the mode of delivery. The main purpose of this comparative cross-sectional study is to diagnose foetal malposition on vaginal versus ultrasound examination before attempting instrumental vaginal delivery at a tertiary care hospital setting in Pakistan. The study was conducted at Gynaecology and Obstetrics department Tertiary care hospital, Pakistan. August 2023 - January 2024. **Methods:** Pregnant females with singleton pregnancy of any age group without any previous history of systemic disease, booked cases with an indication of operative vaginal delivery were included in the study. Using non-probability consecutive sampling technique Group-V (*n*=72) patients underwent a digital vaginal exam however Group-U (*n*=72) underwent ultrasound trans-abdomen during the second stage of labour. The position of the foetus on a digital vaginal exam (DVE), and transabdominal ultrasound was recorded. Visual identification of the occiput position was recorded and considered the gold standard. **Results:** Median (IQR) age in years was 30.5(28-32). The recorded BMI of the participants was 28 (26–30) Kg/m2 and most of these pregnant patients had parity 2. The median time taken to perform the exam in seconds was 16 (15–18.5) in Group-V as compared to 35 (32–38) in Group-U (*p*-value<0.001). Occiput anterior including (OA, LOA, and ROA) were the most common foetal positions observed in both groups. The DVE was able to correctly identify the foetal position in 54 (75%) patients as compared to 67 (93.1%) correct findings after the ultrasound exam with a *p*-value of 0.003. **Conclusion:** Transabdominal ultrasound is a more reliable modality as compared to digital vaginal examination in identifying foetal malposition before instrumental vaginal delivery.

Keywords: Labor presentation; Gynaecological Examination; Ultrasonography

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INTRODUCTION

Instrumental vaginal delivery is a common procedure conducted in obstetric practice which refers to the use of instruments like forceps and vacuums to assist in the evacuation of the foetus.[1] Different foetal positions play a vital role in the progress of labour and delivery of foetus therefore correct identification before delivery is crucial for decreasing morbidity and mortality.[2]

Conventional techniques employed for the identification of foetal position include a digital vaginal exam (DVE) however they may lead to discrepancies and incorrect findings. The most common positions in which the digital vaginal examination failed to identify correct positions were the occiput posterior and the occiput transverse positions.[3] DVE has an accuracy ranging from 20 to 70% and training to improve the expertise in performing DVE for identification of foetal occiput position will still not increase the rate of success in experienced obstetricians.[4] Advances in the field of health care system has led to modern ultrasound machines which enable obstetricians to better visualize the foetus and correctly identify the position of the foetus before delivery.[5] Transabdominal, trans-perineal, and transvaginal ultrasound have been in use for identification of foetal position. Chou MR *et al* concluded that using ultrasound for identification of foetal head position reduced the chances of incorrect diagnosis as compared to the digital vaginal exam with a relative risk of 0.16.[6] In the modern world obstetricians prefer the use of ultrasound as compared to DVE however ultrasound itself may pose several shortcomings.

Transabdominal ultrasound may be unable to visualize the deeply embedded head of the foetus as

compared to transvaginal ultrasound which can directly visualize the head of the foetus and correctly identify the foetal position.[7] Similarly, the trans-perineal approach may hinder the ability to visualize the skull of the foetus due to a narrow visualized anatomic section.[8]

To date, there is a gap in research and the question of a reliable modality still exists. This research was done to evaluate the accuracy of vaginal exam versus transabdominal ultrasound for identification of foetal position before attempting instrumental vaginal delivery. The research will enable obstetricians to identify foetal malposition using a more reliable modality and early obstetric interventions if needed for a better fetomaternal outcome. In the future, the results of the study may pave the way for training of obstetricians in using a reliable modality for diagnosing foetal malposition.

MATERIAL AND METHODS

This comparative cross-sectional study was done at Pak Emirates Military Hospital (PEMH) RWP for a period of 06 months from Aug 2023 to Jan 2024. Ethical review board of the hospital approved the research work under ERB no EC/582/23.

Research done by Chou MR et al revealed 92% accuracy of Ultrasound as compared to 71% accuracy of digital exam in identifying correct foetal position in pregnant patients when the position identified at birth by attending obstetrician was considered as gold standard.[9] Using a power of 95% with 5% level of significance sample size calculated using WHO sample size calculator was *n*=72. Using non-probability consecutive sampling technique 144 pregnant patients were divided into two Groups with 72 patients in each group. Group-V patients underwent digital vaginal exam however Group-U underwent ultrasound trans-abdomen during the second stage of labor. Position of the foetus as evident on DVE, ultrasound and at the time of delivery was also recorded. Occiput position identified at the time of delivery was considered as gold standard.

Pregnant females with singleton pregnancy of any age group without any previous history of systemic disease, booked cases with an indication of operative vaginal delivery were included in the study. The selection was done on admission or at the second stage of labour where the decision for assisted vaginal delivery was taken.Patients with age less than 18 years, twin pregnancies or foetal malformations were excluded.

Patients were received in the gynaecology and obstetrics department of our hospital and written informed consent was obtained. As per the hospital protocol baseline vitals including baseline blood pressure, heart rate, temperature, and respiratory rate were recorded and an intravenous line was established.

Demographic characteristics of the patients were recorded and each patient was examined. After the confirmation of the second stage of labour patients from Group-V underwent digital vaginal examination however patients from Group-U underwent abdominal ultrasound using an aseptic technique. A classified gynaecologist performed the ultrasound using a curvilinear probe of 5 mega Hz (ultrasound machine Chison – model ECHO-5, 1508213, China).

By visualizing the structure of the foetus such as the foetal head, cerebellum, foetal chest, and spine, the position of the foetus was determined in a clockwise fashion as an analog of the wall clock and the identified position of the foetus was recorded.

Time taken to perform ultrasound and DVE was recorded on a stopwatch and endorsed on the Performa. As per the institutional protocol patients were delivered and the final position at the time of delivery was recorded by the attending obstetrician.

DVE and transabdominal ultrasound findings were considered correct if they were within 60 degrees of the position as identified at the time of delivery. Discrepancies of 60 degrees or more, 90 degrees or more, and 180 degrees were noted by the attending classified gynaecologist with at least 3 years of post-fellowship experience huma.

Data feeding and analysis was performed using SPSS version 23. For categorical variables frequencies and percentages were calculated while chi square test was used to find significance. For continuous data following non-normal distribution median (IQR) values were calculated and non-parametric tests of significance were applied keeping a *p*-value of ≤0.05 as significant.

RESULTS

With 144 participants in the study median (IQR) age was 30 (28–32) years in Group-V as compared to 31 (28–33) years in Group-U. Recorded BMI of the participants was 28 (26–30) Kg/m2 and majority of these pregnant patients had parity 2. Presence of caput succedaneum and foetal head station were comparable between the Groups. Characteristics of patients are shown in Table-1. Occiput anterior including (OA, LOA and ROA) were the most common foetal positions observed in both the groups as shown in Table-2.

Median time taken to perform exam in seconds was 16 (15–18.5) in Group-V as compared to 35 (32-38) in Group-U (*p*-value<0.001). Vaginal exam was able to correctly identify foetal position in 54(75%) patients as compared to 67 (93.1%) correct findings after ultrasound exam with a *p*-value of 0.003. Comparison of Vaginal versus Ultrasound Exam is shown in Table-3.

Table-1: Characteristics of patients (*n*=144)

Variables		Group-V (*n*=72)	Group-U (*n*=72)	*p*-value
Age in years Median (IQR)		30 (28–32)		0.617
BMI kg/m^2 Median (IQR)		28 (26–31)	31 (28–33)	0.616
Parity *n* (%)	1	28 (26–30)		0.089
	2	39 (54.2%)		
	3	32 (44.4%)		
Foetal Head Station *n* (%)	+2	01 (1.4%)		0.243
	+3	41 (56.9%)		
Caput Succedaneum *n*(%)	Yes	31 (43.1%)	12 (16.7%)	0.820
	No	61 (84.7%)	60 (83.3%)	

Table-2: Foetal Positions Observed at the time of Delivery (*n*=144)

Foetal Position	Group-V (*n*=72)	Group-U (*n*=72)
Occiput Anterior *n* (%)	24 (33.3%)	25 (34.7%)
Left Occiput Anterior *n* (%)	33 (45.8%)	14 (19.4%)
Left Occiput Transverse *n* (%)	02 (2.8%)	07 (9.7%)
Left Occiput Posterior *n* (%)	01 (1.4%)	07 (9.7%)
Occiput Posterior *n* (%)	03 (4.2%)	03 (4.2%)
Right Occiput Posterior *n* (%)	04 (5.6%)	03 (4.2%)
Right Occiput Transverse *n* (%)	0	04 (5.6%)
Right Occiput Anterior *n* (%)	05 (6.9%)	09 (12.5%)

Table-3: Comparison of Vaginal versus Ultrasound Exam (*n*=144)

Findings	Group-V (*n*=72)	Group-U (*n*=72)	*p*-value
Correct Findings *n*(%)	54(75%)	67(93.1%)	0.003
Incorrect findings *n*(%)	18(25%)	05(6.9%)	
Time taken to complete exam in seconds Median (IQR)	16 (15-18.5)	35 (32-38)	0.000

DISCUSSION

This comparative cross-sectional study was conducted to compare the utility of vaginal examination versus ultrasound examination in pregnant females before instrumental vaginal delivery. Significant results were concluded with a superior ability of ultrasound examination to correctly identify foetal position in 67 (93.1%) as compared to 54(75%) in patients who underwent vaginal exam. Similar to the results of our study another study revealed that ultrasound was able to detect correct foetal position in 97% of the cases as compared to 51% correct identification after vaginal exam.[10] Another cross-sectional study revealed that identification of correct foetal occiput position was observed in 81% versus 93% of the patient after vaginal and ultrasound exam. The agreement between the two modalities was found to be weak (kappa-0.416).[11]

We recorded the Median age of the participants in our study which was 30.5 (28–32) year's comparable to the mean age of 29.33±3.04 years in the study done by Wang JG *et al.*[12] In our study the cesarean section rate was 8.3% versus 4.2% in Group-V as compared to Group-U (*p*-0.302). The rate of caesarean section in our study was comparable with another study conducted by Nouri *et al* with a percentage of 8.6% in the vaginal exam group as compared to 6.3% in patients who underwent ultrasound.[13] We concluded that 18 out of 72 findings after vaginal exam were incorrect out of which 15 (20.83%) had a discrepancy of 60 degrees or more as compared to the actual position identified at the time of delivery of foetus. A discrepancy of 90 degrees or more was apparent in only 07 (9.7%) cases while 02 (2.7%) cases had a discrepancy of 180 degrees as compared to the actual position of the foetus.

In comparison, transabdominal ultrasound failed to correctly identify foetal malposition in 05(6.9%) cases out of which 03(4.1%) had a discrepancy of 60 degrees or more, 01(1.38%) with a discrepancy of 90 degrees or more and only 01 (1.38%) with a 180 degrees discrepancy. Similar to our findings another study revealed that the disagreement between the findings between DVE and USG was 85.7% when the position of the foetus was occiput posterior as compared to a disagreement of 27.3% between the two modalities when the foetal position was occiput anterior.[14]

Our results showed median time interval to perform digital vaginal exam was significantly shorter 16 (15-18.5) seconds versus 35 (32–38) seconds in performing transabdominal ultrasound. These findings were supported by Zahalka N *et al* with mean time of 8.7±5.[8] seconds in performing vaginal exam as compared to 22.7±14.[6] seconds in performing ultrasound.[15] We could not use Cohen kappa statistical evaluation in our study to measure the agreement between the two techniques however a recent trial revealed low level of agreement between transabdominal ultrasound and vaginal examination revealing that DVE results may not be as reliable as USG.[16]

Correct identification of the occiput position of the foetus before operative vaginal delivery was previously thought to affect the incidence of operative vaginal deliveries however a recent meta-analysis revealed that despite correct identification of the foetal position using sonography as compared to digital vaginal exam did not increase the incidence of operative vaginal deliveries.[17] In our study we conducted vaginal and sonographic examination in the 2nd stage of labor before Instrumental

delivery and the results were in favor of transabdominal ultrasound for accurate identification of the foetal position in active labor.[18] This will pave the way for future research on the combination of both techniques in pregnant patients for more reliable results.

CONCLUSION

Transabdominal ultrasound is a more reliable modality as compared to vaginal examination in identifying foetal malposition before instrumental vaginal delivery.

Limitations of the Study: All patients recruited in the study were from the same ethnicity and the study was conducted at a single center. The study was not a randomized controlled trial, and perinatal outcomes were not recorded. Although the study highlights the use of USG for determining foetal position before assisted vaginal delivery, but it cannot surpass the need for improving clinical skills for the precision of clinical findings.

Machines replacing the hands are not making better clinicians and they are then handicapped where these facilities are not present. Secondly, a training period is required to develop the USG skills for determining the correct foetal position in the second stage of labor. Use of USG would be helpful in situations where caput or moulding or asynclitism makes clinical examination confusing.

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Conflict of Interest: None

AUTHORS' CONTRIBUTION

Ghazala Huma conceived and supervised the study and critically reviewed the manuscript. Asifa Siraj contributed to study design and methodology. Viqar un Nisa assisted with data collection and clinical assessment. Ayesha Imran was involved in data entry and analysis. Umairah Yaqub drafted sections of the manuscript and contributed to the literature review. Rabia Qasim Khichi assisted in editing, formatting and final proofreading. All authors approved the final version of manuscript.

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Address for Correspondence:
Ghazala Huma, Obs and Gynae Department, Pak Emirates Military Hospital, Rawalpindi-Pakistan
Cell: +92 333 988 7999
Email: huma.gynae@yahoo.com