

Appropriateness of Obstetric Ultrasound Indications in a Tertiary Care Hospital in Quetta, Pakistan: Compliance with ACOG Guidelines

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ABSTRACT

Background: Ultrasound plays a crucial role in managing pregnancy, obstetrical complications, and clinical outcomes. Specific indications and clinical clues determine the need for ultrasound. The full benefits of ultrasound are realized when it is used correctly. In resource-starved regions like Balochistan, the proper indication of ultrasound is crucial to prevent the loss of resources and time. This underscores the importance of reviewing to ensure its appropriate application in obstetrics.

Objective: This study aim to review appropriateness of indications for obstetric ultrasound in a tertiary care facility in Pakistan.

Methods: A retrospective review was conducted on all request forms for obstetric scans from 1 January 2023 to 31 December 2023 to evaluate the appropriateness of ultrasound requests at Bolan Medical Complex Hospital, Quetta, Pakistan.

Results: Of 600 request forms reviewed, 416(69.3%) were included with stated clinical indications. Among these, 154(25.6%) were from Bolan Medical Complex Hospital and 36(6%) were from other medical centers, that did not specify patient clinical histories or indications. The majority 416(69.3%) of scans were conducted in the first trimester. Additionally, only 36 of the requests with clinical history were deemed inappropriate.

Conclusion: Healthcare providers need to standardize request forms for obstetric investigations thoroughly, as a significant proportion of cases advised had no patient history or indications. The standardization of indication for sonography is crucial in the resource-starved health settings of Balochistan. This will channel the resources toward where it's needed expedite scan time and be beneficial for those who truly indicate it.

Keywords: *Assessment, obstetric ultrasound, tertiary facility, Balochistan.*

INTRODUCTION

Ultrasound imaging has significantly enhanced maternal health by enabling early detection of complications such as morbidly adherent placenta, ectopic pregnancy, and uterine anomalies [1]. Beyond addressing pregnancy-related concerns, obstetric ultrasonography is a regular radiological convention used to assess intrauterine gestation in early pregnancy, fetal anatomy during mid-term, and fetal growth in late stages [2]. It plays a crucial role in evaluating fetal viability, anomalies, and overall well-being [3]. Early ultrasound scans, typically performed before 13 weeks and 6 days of gestation, confirm viable intrauterine pregnancies, while second-trimester scans (ideally between 18-20 weeks) focus on fetal anatomical surveys. Third-trimester examinations, conducted after 32 weeks, assess detailed fetal growth [4-6]. Throughout pregnancy, obstetric ultrasound offers a precise and secure method for clinically evaluating the pregnant uterus and monitoring fetal development [7].

The American College of Radiology (ACR), American College of Obstetricians and Gynecologists (ACOG), and American Institute of Ultrasound in Medicine (AIUM) collaborated to establish updated guidelines in 2023 by conducting obstetrical ultrasound examinations. These guidelines specify essential elements such as

determining amniotic fluid volume, cardiac activity, placental position, fetal number, presentation, biometry, and anomaly scans in the second and third trimesters [8, 9]. Ultrasound screening aids in improving maternal and prenatal healthcare by offering an evaluation of the fetus, uterus, and placenta without radiation exposure [10]. Facilitating early diagnosis of potential issues like multiple gestations, evaluation of cervical length, fetal growth, fetal anomaly, suspected uterine anomalies, vaginal bleeding, abdominal and pelvic pain [11].

However, challenges arise when clinical information from requesting practitioners is inadequate, potentially impacting the accuracy and interpretation of ultrasound results and leading to potential patient mismanagement [12]. A study in Norway highlighted that pregnant women often expect ultrasound examinations regardless of medical indications. In private diagnostic facilities, economic incentives may lead some sonographers to overlook clinical indications [13]. While human studies have not definitively proven harmful effects, imprudent use of diagnostic ultrasound could theoretically pose risks [14].

Ultrasound remains a cornerstone in obstetric diagnostics, with digital ultrasound emerging as the predominant modality in radiological practices. Adherence to established etiquettes or rules for demanding obstetric ultrasound and maintaining awareness aligns with "as low as reasonably achievable" (ALARA) principles to ensure safe usage [15]. Nevertheless, midwives'

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and obstetrician's personal convictions can shape their ultrasound referral practice, potentially causing inappropriate use. This study reviews the appropriateness of indications for obstetric ultrasound in a tertiary facility in Balochistan, comparing findings against ACR-AIUM-ACOG guidelines to gauge adherence to professional standards.

METHODS

This retrospective study examined all request forms for obstetric scans conducted at Bolan Medical Complex Hospital Quetta Balochistan Pakistan from 1st January 2023 to 31st December 2023, Bolan Medical Complex Hospital, a public tertiary care facility, serves as a referral center for healthcare facilities across the province. The scans were performed using a Toshiba ultrasound machine (Aplio 400) equipped with curvilinear transducers operating at a frequency of 2.5MHz. These scans were conducted under the supervision of three consultant radiologists, each with over 10 years of experience in obstetric ultrasonography.

The reports for all requested scans were obtained from the Picture Archiving and Communications System (PACS) after receiving a permit from hospital administrations. Clinical histories and the ages of pregnant women were documented based on information as requested and were provided in the forms, along with documenting the gestational stage. Only request forms with corresponding scan reports retrievable from PACS were included in the study; others were excluded.

Requests were categorized by origin *i.e.* (Bolan Medical Complex Hospital or external centers) and assessed as appropriate or inappropriate. The authors of this study assess requests individually to determine their appropriateness. They compared the clinical details or history provided on the request forms against the composite guidelines from the American College of Radiology (ACR), American Institute of Ultrasound in Medicine (AIUM), and American College of Obstetricians and Gynecologists (ACOG) for performing obstetric ultrasound.

Appropriateness was determined using two criteria: Firstly, requests without clinical history or indications were deemed inappropriate, while those with provided history or indications were considered appropriate. Secondly, for requests with a clinical history or indications, appropriateness was further evaluated based on whether the requested scans and the stage of pregnancy aligned with the ACR-AIUM-ACOG guidelines [16].

The collected data, comprising clinical history/indication, gestational age, request origin, and demographic

information, were entered into SPSS (version 22) for Windows. Analysis was conducted using descriptive statistics such as frequencies and percentages, and results were presented through tables and charts.

To assess the appropriateness of request forms (based on the presence or absence of clinical history/indication) and scan indications between requests originating from Bolan Medical Complex Hospital (BMCH) and those from outside BMCH, Chi-square tests were performed.

The study received approval from the Ethical Review Board of Bolan Medical Complex Teaching Hospital (IRB-13/2023-BMCH). The anonymity and confidentiality of all participants were strictly maintained throughout the study to uphold ethical standards and protect the privacy of individuals involved.

RESULTS

In this study, a total of 600 request forms were reviewed, with a mean age of 27.95 years ranging from 18 to 50 years. The majority 360(60%) of scans were conducted during the third trimester. Out of the 600 forms, 416(69.3%) included clinical indications. Of these, 275(66.1%) requests were deemed appropriate, primarily originating from Bolan Medical Complex Hospital (BMCH) practitioners (**Table 1**).

However, a significant finding was that 154(83.6%) of the request forms lacking clinical history or indication were from BMCH, which was statistically significant ($p < 0.001$). Among the 60 request forms from other health centers, 36(23.3%) did not provide patient history, reflecting a similarly high proportion ($p < 0.001$).

This data underscores the importance of ensuring that request forms for obstetric scans include adequate clinical history or indication, as outlined by professional guidelines (**Table 2**). It also highlights the need for ongoing education and monitoring to improve the quality of ultrasound requests and ultimately enhance patient care.

DISCUSSION

Ultrasound technology has revolutionized medical diagnostics by providing accurate assessments without the use of ionizing radiation, making it safe for pregnant patients [17]. However, ensuring appropriate use of obstetric ultrasound remains crucial. This study, the first of its kind in our tertiary facility, offers valuable insights into its utilization.

Of the 600 request forms reviewed, 40.4% lacked clinical history or indication (**Table 1**). Previous studies have also highlighted deficiencies in filling out radiological request forms. Notably, a weighty

Table 1: Statistical demographic.

Variable	Count
Age	
Minimum	18
Maximum	50
Mean	27.95
Analysis of request forms	
Presence of history/ indications	416(69.3%)
No history/ indication	184(30%)
Origin of the request	
BMCH	429(71.5%)
Outside BMCH	171(28.5%)
Appropriate scan indication	
Appropriate	304(73.0%)
Inappropriate	178(42.0%)

Table 2: Scan indication for different trimesters.

Indication	First Trimester n (%)	Second Trimester n (%)	Third Trimester n (%)
High-risk pregnancy	18(3)	42(7)	90(15)
Fetal viability	30(5)	12(2)	24(4)
Fetal anomaly	0(0)	540(90)	78(13)
Confirmation of pregnancy	120(20)	18(3)	6(1)
Fetal measurement, presentation, liquor, placenta	0(0)	12(2)	60(10)
Bleeding	30(5)	42(7)	60(10)
Dating of pregnancy	0(0)	24(4)	42(7)
Placenta previa	0(0)	30(5)	180(30)
Anemia in pregnancy	0(0)	48(8)	120(20)
Amniotic fluid disorder	0(0)	48(8)	90(15)
Hypertension in pregnancy	2(12)	36(6)	150(25)

proportion of requests often lack essential clinical information, which can hinder accurate diagnosis and delay treatment initiation [18]. Despite this, our study found a high completion rate for patient names and ages on all forms, suggesting a positive trend in adherence to basic form completion standards among Tertiary care practitioners compared to their counterparts in other parts of the province.

Among forms with clinical history provided, only a small fraction (29 out of 314) were deemed inappropriate based on ACR-ACOG-AIUM guidelines (Table 1). These instances primarily involved inaccurate pregnancy dating beyond the recommended gestational windows, which can significantly affect clinical decision-making [19]. Specifically, dating pregnancies beyond the second trimester (22 weeks) or attempting fetal anomaly screenings in the first trimester were identified as inappropriate practices according to established guidelines [20].

Ultrasound is crucial for detecting fetal anomalies during the second trimester due to optimal visualization capabilities [21]. Conversely, relying on ultrasound for dating pregnancies or detecting anomalies outside recommended gestational periods can lead to inaccuracies and potential clinical challenges [22]. Our study focused exclusively on ACR-AIUM-ACOG guidelines for assessing appropriateness, acknowledging variations in guidelines among different professional organizations.

In conclusion, while ultrasound plays a pivotal role in prenatal care, adherence to standardized guidelines is essential to optimize its diagnostic efficacy and ensure patient safety.

Due to limited resources, lack of standardization of request forms by clinicians, and limited access to patient data and long-term follow-up, it is challenging to determine the appropriateness.

CONCLUSION

This study underscores a significant issue: a substantial number of practitioners fail to include clinical history or indications on obstetric scan request forms. This omission can profoundly impact the quality of patient care and subsequent clinical decisions. Request forms provide a vital tool for the exchange of information between clinicians and imaging practitioners, facilitating appropriate diagnostic procedures. Adequate information is essential for guiding the correct type and timing of ultrasound examinations, thereby optimizing their diagnostic utility and efficacy in patient management.

Continuing medical education is strongly recommended to reinforce the significance of accurately finalizing request forms for investigations. This educational initiative should emphasize the specific indications for first-, second, and third-trimester ultrasound examinations. Such knowledge ensures that ultrasound resources are used judiciously and only when clinically warranted, thereby enhancing patient outcomes and overall healthcare efficiency.

ETHICS APPROVAL

The study received approval from the Ethical Review Board of Bolan Medical Complex Teaching Hospital (IRB-13/2023-BMCH). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/ or national research committee and the Helsinki Declaration.

CONSENT FOR PUBLICATION

Informed consent was obtained from the participants of the study.

AVAILABILITY OF DATA

The data that support the findings of this study is openly available in Radiology Department, Bolan Medical Complex Hospital, and is easily accessible.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Declared none.

AUTHORS' CONTRIBUTION

Benazir Gul: Study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Naseebullah: Data collection, analysis and interpretation of results, and manuscript preparation.

Atiqa Hassan: Study conception and design and data collection.

Malik Jahangir Gul: Data analysis and interpretation of results, and manuscript preparation.

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