

THE DIAGNOSTIC ACCURACY OF TRANSABDOMINAL SONOGRAPHY (TAS) IN EARLY (FIRST TRIMESTER) DETECTION OF ECTOPIC PREGNANCY USING HISTOPATHOLOGY AS GOLD STANDARD IN HIGH RISK PATIENTS

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ABSTRACT

BACKGROUND: The ectopic pregnancy is the leading cause of pregnancy related death in the first trimester. Transvaginal sonography (TVS) is considered most sensitive and specific test for diagnosing ectopic pregnancy but its availability and expertise are limited. Since early diagnosis of ectopic pregnancy is essential to save the life and future fertility of mother, it is important to assess the value of transabdominal sonography (TAS) in diagnosis of ectopic pregnancy. **OBJECTIVE:** To determine the diagnostic accuracy of transabdominal sonography (TAS) in first trimester for detection of ectopic pregnancy using histopathology as gold standard in high risk patients. **METHODS:** Total 139 patients diagnosed with high risk for ectopic pregnancy were included. All patients underwent transabdominal sonography (TAS) performed by using convex probe with 3.75 MHz. Surgically evacuated specimens were sent for histopathology. The radiological findings on the TAS were compared with the surgical and pathological findings. Sensitivity, specificity, PPV, NPV, and accuracy of transabdominal sonography calculated taking histopathology as gold standard. **RESULTS:** Mean age was 29 ± 3.2 years. The TAS had a sensitivity of 89.6%, specificity of 64.2%, and accuracy of 87.05% for the diagnosis of ectopic pregnancy with 95.7% positive predictive value and 40.9% negative predictive values. **CONCLUSION:** The transabdominal sonography had a significant role in early detection of ectopic pregnancy and is good test for diagnosing ectopic pregnancy in our set-up.

Key Words: Diagnostic Accuracy, Transabdominal sonography, Ectopic Pregnancy, Histopathology, High Risk Patients

Introduction

The term ectopic pregnancy refers to a gestation in which the fertilized ovum implants at any site other than the uterine cavity.¹ The commonest sites of ectopic pregnancy being fallopian tubes accounting for more than 95%, followed by ampulla 55%, isthmus 25%, fimbria 17% and abdominal cavity 3%.² The

commonest presenting symptoms are abdominal pain, amenorrhea, adnexal tenderness, and adnexal mass and abnormal vaginal bleeding.³

Ectopic pregnancy is a high risk condition that occurs in 1.9% of reported pregnancies.³ The peak age of incidence is 26-30 years. Most of the patients have identifiable risk factors, the important risk factors include primigravida, tubectomy, history of abortion,

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infertility, pelvic inflammatory disease and history of previous surgery.⁴ The spectrum of ultrasound findings in ectopic pregnancy is broad, identification of extrauterine gestational sac containing a yolk sac (with or without embryo) and ectopic heart beat confirms diagnosis and suggestive findings include an empty uterus, cystic or solid adnexal or tubal masses (including the tubal ring sign, representing a tubal gestational sac), and fluid in cul-de-sac.⁵ Various studies of transabdominal sonography for detection of ectopic pregnancy have shown clear diagnosis in 70%-89% cases.⁶⁻⁸ In a study conducted in USA, reported that three patients had ectopic pregnancies which were missed on TVS and diagnosed as ectopic pregnancies on subsequent TAS.⁹

However, TVS is superior to TAS in most cases of pelvic pathology, TAS still be the initial technique for routine evaluation of female pelvis followed by TVS if indicated.¹⁰ Early diagnosis and early intervention would reduce the morbidity in ectopic pregnancy.¹¹ In Pakistan with our cultural and religious background as well as unavailability of facilities and expertise, it is not always possible to perform TVS. TAS is culturally and religiously acceptable as well as non invasive and easier to perform.

Since, early diagnosis of this life threatening condition is essential, it is important to assess the value of transabdominal sonography in diagnosis of ectopic pregnancy. This study determine the accuracy of TAS in diagnosis of ectopic pregnancy, which would help in early and prompt treatment of this condition, therefore decreasing the morbidity and mortality associated with it.

Material & Methods

The study was carried out in department of Radiology, obstetrics & gynecology, and pathology at Jinnah post graduate medical center, Karachi from 30th January 2009 to 30th July 2009. Approval from institutional ethical committee and inform consent from patients were obtained. Transabdominal ultrasound was performed by using convex probe with 3.75 MHz. Serial longitudinal and transverse images were taken. 139 pregnant women in first trimester who were sus-

pected as high risk patients for ectopic pregnancy were included in this study. After performing TAS; those participants who were diagnosed with ectopic pregnancy or with negative transabdominal sonography underwent surgery. Surgically evacuated specimen was sent for histopathological findings to the laboratory. Patients showing presence of intrauterine pregnancy on ultrasound and suspected ectopic pregnancy but not fit for surgery were excluded from study.

All relevant features including patient's age, TAS findings and histopathological findings were recorded on performa. Data was analyzed by using SPSS version 21. Frequency and percentage were calculated for transabdominal ultrasound findings and histopathological findings. Age was presented by Mean \pm SD. Sensitivity, specificity, positive and negative predictive values of TAS were calculated by taking histopathology as gold standard.

Result

The mean age of study participants was 29 ± 3.2 years. 63 (45.3%) patients were ≤ 25 years and 76 (54.7%) patients were aged >25 years. Among patients who were clinically suspected of ectopic pregnancy, 117 (4.2%) were found positive on TAS and 125 (89.9%) were positive in histopathology (Tab. 1).

	Transabdominal Sonography (TAS)		Histopathology	
	n	%	n	%
Positive Ectopic Pregnancy				
Yes	117	84.2	125	89.9
No	22	15.8	14	11.1

Table 1: Assessment of Ectopic Pregnancy, (n=139)

With respect to diagnostic criteria of ectopic pregnancy, ectopic mass with fluid in pouch of Douglas was found in 76.1% patients, ectopic mass in 10.3%, ectopic gestational sac in 12.0%, pseudo gestational sac with single ring in 16.2%, ectopic cardiac activity in 2.6%, ascites with echoes in 30.0%, "Ring of fire" sign in 6.0%, enlarged size of the uterus in 4.3%, and thickened endometrium in 56.4% (Tab. 2).



Diagnostic criteria	n	%
Ectopic mass with fluid in pouch of Douglas	89	76.1
Ectopic mass	12	10.3
Ectopic gestational sac	14	12.0
Pseudo gestational sac with single ring	19	16.2
Ectopic cardiac activity	3	2.6
Ascites with echoes	35	30.0
“Ring of fire” sign	7	6.0
Enlarged size of the uterus	5	4.3
Thickened endometrium	66	56.4

Table 2: Ultrasound features of Ectopic Pregnancy, (n=117)

The sensitivity, specificity, positive predictive value, negative predictive value, and diagnostics accuracy of TAS was calculated taking histopathology as gold standard. It was observed that in both diagnostic procedures ectopic pregnancy was found positive in 112 patients (true positive) and in 9 patients it was found negative (true negative) in both diagnostic procedures. The results showed that sensitivity, specificity, PPV, NPV, and diagnostics accuracy of transabdominal sonography was 89.6%, 64.2%, 95.7%, 40.9%, and 87.05% respectively (Tab. 3).

Ectopic Pregnancy		Histopathology		
		Positive	Negative	
Transabdominal Ultrasound	Positive	112	5	117
	Negative	13	9	22
Total		125	14	139
Sensitivity	Specificity	PPV	NPV	Accuracy
89.6%	64.2%	95.7%	40.9%	87.05%

Table 3: Sensitivity, Specificity, Positive Predictive And Negative Predictive Value Of Transabdominal Ultrasonography

Discussion

Among life threaten conditions like ectopic pregnancy; the prevalence increases as mortality decreases.¹² Ectopic pregnancy is not only a diagnostic challenge but also a therapeutic emergency.¹³ Difficulty in diagnosis is because it remains asymptomatic in early weeks of gestation. In 1981 Kadar et al reported Beta HCG level as an important indicator and its serial estimation in developing pregnancy.¹⁴ Serum Beta HCG level >1500 IU/ml and absence of uterine preg-

nancy is a presumptive evidence of ectopic pregnancy.¹⁵

Since the introduction of ultrasonography in clinical practice, it has revolutionized the diagnosis and hence management of ectopic pregnancy.¹⁶⁻¹⁷ Ultrasound can identify the gestational sac and fetal cardiac activity as well as normal pregnancy. Both transabdominal sonography (TAS) and transvaginal sonography (TVS) are effective tool in diagnosis of ectopic pregnancy. Mohsin M et al in 400 patients with query of ectopic pregnancy performed initially TAS followed by TVS. Positive diagnosis was made in 96.3% cases.¹⁸

In underdeveloped countries like Pakistan, these sophisticated equipment and expertise cannot be offered to every pregnant female. Moreover, due to cultural and religious constraints and limited availability of facilities and expertise it is not feasible in our setup. Transabdominal technique is easier to perform, more easily available, convenient for the patient and does not need to be performed by a particular gender as is mostly the problem in our society. Dallas et al performed TAS on 66 patients with suspected ectopic pregnancy and reported clear diagnosis in 69.6% cases.⁶ Chichia A et al in a study conducted in Tunis on TAS for ectopic pregnancy showed clear diagnosis in 89% cases.⁷ Ahmed et al conducted a study in Nishtar Hospital Multan to assess the efficacy of TAS in the early detection of ectopic pregnancy. Results confirmed on laparotomy showed that clear diagnosis was made in 88.2% of cases and false positive diagnosis in 11.3% cases.⁸ In our study clear diagnosis was made in 112 patients (89.6%) by TAS. The slight discrepancy in sensitivity of our study and that of Dallas et al could be due to less number of patients and misinterpretation of few cases in their study.⁶

Combining both transabdominal and transvaginal sonography improves diagnostic accuracy. In a study conducted by Zinn et al reported three patients with negative TVS who had obvious ectopic pregnancies on subsequent TAS.⁹ Athey et al reviewed 45 consecutive cases of proven ectopic pregnancy for which both TAS and TVS were performed. TVS was superior to TAS in 22 cases (49%) and inferior in 3 cases (7%) while in 20 cases (44%) the two methods yielded similar information.¹⁹ Our study showed 87% diagnostic accuracy without help of TVS. These cases remind us of the valuable information that can be

obtained with the transabdominal approach and the complementary role it plays with endovaginal sonography.²⁰ Many other studies reveal similar findings.²¹⁻²⁵

In setup where sophisticated equipment and expertise are available TAS is used as screening or initial test while TVS is much superior and promising for more accurate result. Braffman et al did screening of 1427 patients for ectopic pregnancy which included TAS followed by TVS and 81% patients were clearly diagnosed. The sensitivity and specificity was 99% and 84% respectively.²⁶ Using sonography and correlation with serial Beta HCG or other established criteria can further improve the diagnosis. Shalev et al evaluated 840 pregnancies with TVS and correlated it with serum Beta HCG level (>1500 IU/ml). the sensitivity and specificity was 87% and 94% respectively.²⁷ Naseem I et al reported 100% sensitivity and specificity using both TAS and TVS correlated with serum Beta HCG.²⁸ But they had less number of patients and used many established criteria.

The purpose of this study was to determine the importance of TAS in detection of ectopic pregnancy. This study included pregnant women of first trimester who were referred at the discretion of emergency physicians or gynaecologist and obstetricians for ultrasound in suspicion of ectopic pregnancy. Our study proved that TAS has 90% sensitivity, 64% specificity and 87% accuracy without correlating Beta HCG or established criteria. This study has proved the role of TAS in early diagnosis of ectopic pregnancy which is in agreement with previous researchers. Although TAS has few limitations like operator dependence, getting full bladder and an acoustic window in presence of bowel gases, but good clinical approach can serve as a good starting point while managing a patient with ectopic pregnancy. The importance of clinical history and examination as well as serial Beta HCG and laparoscopy could never be neglected. Therefore, it is required that the emphasis should be made on better clinical training of the concerned doctors, so that patients may be managed without any wastage of time where such facilities are not available.

There are two main limitation of the study; first small sample size not representative of population and second whether the sensitivity and specificity of TAS

increased when clinical and Beta HCG level added to criteria.

Conclusion


The transabdominal ultrasound has a significant role in early detection of ectopic pregnancy. It may decrease delays in appropriate surgical therapy as well as unnecessary delayed observation. It can also be the first line investigation in the emergency department in unstable patients suspected of ectopic pregnancy and wherever facilities and expertise for transvaginal sonography are not available.

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