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Clinico- Sono Correlation in First Trimester of Pregnancy by Transvaginal Approach

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INTRODUCTION

Pregnancy is the best time of a woman's life and can be classified into three trimesters. The first trimester of pregnancy is the most crucial period in pregnancy. During first trimester of pregnancy, a unique and dramatic sequence of events occurs, defining the most critical and tenuous period of human development. Carrying a pregnancy to the second trimester without reassurance of a normal fetus is a traumatic psychological experience for the mother, particularly for one who has had previous mishaps.

In recent years, attention has turned to first trimester screening. There are various technique invasive and noninvasive. Ultrasound is today one of them and an integral part of the obstetrician's armamentarium almost an extension of the examining finger.

The advent of high-resolution transvaginal ultrasound (TVS) has revolutionized our understanding of the pathophysiology and the management of early pregnancy failure. Knowledge of the ultrasound appearances of normal early pregnancy development and a good understanding of its pitfalls are essential for the diagnosis and management of early pregnancy failure.

Transabdominal scanning is used predominantly in second and third trimester of gestation. Its use in first trimester is relatively limited and mostly diagnostic in nature. The introduction of the higher frequency transvaginal probe, with its higher resolution of images, opens new possibilities to study early gestation (**Timor Tritsch**)¹².

Lazarus E⁵ – what is new in first trimester ultrasound. He commented that there are several advantages to ultrasound examination in early pregnancy. Ultrasound performed during the first trimester confirms an intrauterine pregnancy, establish accurate dating, and is crucial in diagnosing early pregnancy failures and ectopic pregnancy.

Hisaya Takeuchi¹¹ - Transvaginal ultrasound in first trimester of pregnancy. He commented that recent improvements in transvaginal ultrasound permit the extremely detailed observation of the morphology of the early conceptus in utero.

Lucie Morin et al⁶ - ultrasound evaluation of first trimester pregnancy complications. They concluded that woman presenting with first trimester bleeding may be incorrectly diagnosed with a missed abortion and (or) may be inappropriately reassured about viability. Transvaginal ultrasound provides improved resolution allowing description of early embryonic development characteristics.

So trans-vaginal ultrasound scan during first trimester of pregnancy is currently considered to be a safe, noninvasive, accurate & cost effective investigation in the fetus. It has progressively become an

indispensable obstetric tool & plays an important role in the care of every pregnant woman. The available evidence does not indicate any deleterious biologic effects on the mother or fetus from the use of diagnostic ultrasound, and the benefits outweigh the risks if any.

Material and method

This study was conducted in Department of Obstetrics and Gynaecology in Index Medical College and Research Centre, Indore from May 2012 to July 2013. Total 100 patients were included in the study.

Selection criteria:-

The criteria for selection of the subjects for the study were the patients having duration of amenorrhoea upto 12 weeks and urine pregnancy test is positive. All patients with more than 12 weeks amenorrhoea or urine pregnancy test negative when amenorrhoea is less than 12 weeks, were excluded from the study.

Detail history of all patients like name, age, parity, socioeconomic status was noted and clinical examination was done. With the help of history and clinical examination, a clinical impression was made about the normal or abnormal pregnancy and scheduled for transvaginal sonography.

Transvaginal Ultrasound Scanning:-

Patients were explained about the technique of transvaginal sonography to reduce the anxiety. The transducer was disinfected after each examination. It was then covered with an ultrasound coupling gel and placed in to a rubber sheath. Care had been taken to avoid any trapping air bubbles, which created any unwanted artifacts on the screen. The calibration of the ultrasound machine (acoustic power, gray scale, frame rate, magnification etc) should be adjusted to the body habitus of the patients and the specific fetal organs which are being evaluated.

Preparation: - The first prerequisite for transvaginal sonography examination was complete emptying of the urinary bladder, because a full bladder may displace the uterus out of focal range of transducer. Furthermore, pressure of the transducer on the bladder may cause discomfort if even a small amount of urine remains.

A woman would need to undress from the waist down, and lie face-up on the examination surface. A bolster may be placed under the hips to tilt the pelvic area upwards to facilitate use of the probe, both for insertion as well as for the ultrasound process itself. It allowed patients free movement and avoid popliteal pressure. This method may be a preferred choice for women who have difficulty with bladder control. A woman may wish to request that she insert the probe herself. Gel that had been warmed will make insertion more comfortable. The examiner may sit or stand at the side of the table so as to allow eye contact with the patient and sonography machine. This position also enabled to operate the transducer with one hand, while the other hand can be used to tilt the uterus or to operate the ultrasound machine and other equipment.

Aftercare- Because of the small amount of gel used on the probe for easier insertion, a woman may wish to use a sanitary pad to protect her underpants from any minor leakage after she stands up. After the test a woman will be able to resume her regular scheduled activities.

Checklist while examination:-The following checklist applied to identify the abnormally developing gestation-

1. Inspect gestational sac size and shape.
2. Document the trophoblastic ring.
3. Check internal characteristics of the sac. (Intrauterine debris may indicate a poor prognosis).
4. Scrutinize the sac for fetal cardiac pulsations.

5. Attempt to identify the fetal pole. Evaluate the fetal outline and presence or absence of fetal movements.
6. Attempt to locate the yolk sac.
7. Document the location of the sac to exclude atypically located the pregnancies (cervical, inevitable abortions).
8. Check the integrity of the sac and myometrium. (Separation of the sac from the myometrial wall may indicate bleeding).
9. Follow up studies are often necessary to confirm a normal or abnormal first trimester study.

Observations- On the basis of clinical examination and transvaginal sonography, following finding were collected

Table-1 Distribution of cases according to type of pregnancy by clinical examination at the time of first visit.

Table -1 shows, out of 100 cases, 65 cases (65 %) were diagnosed as normal pregnancy, while remaining 35 cases (35 %) were diagnosed as abnormal pregnancy.

Table -2 Distribution of cases according to age

Table – 2 shows distribution of cases according to age group. Maximum number of patients diagnosed as normal pregnancies were belongs to younger age group (42 % in 21-30). Maximum number of abnormal pregnancy patients belongs to >31 yrs age group (26 %).

Table – 3 Distribution of cases according to socio-economic status

Socioeconomic status	Normal pregnancy	Abnormal pregnancy		
	No of cases	Percentage	No of cases	Percentage
Poor	30	30%	27	27 %
Low middle	30	30 %	6	6 %
Upper middle	3	3 %	1	1 %
High	2	2 %	1	1%
Total	100			

Table -3 shows that maximum cases of our study belong to low middle to poor socioeconomic status.

Table – 4 Distribution of cases according to parity

Parity	Total no of normal pregnancy	Percentage	Total no of abnormal pregnancy	Percentage
0	15	15 %	1	1 %
1	14	14 %	2	2 %
2	12	12 %	2	2 %
3	11	11 %	4	4 %
4	6	6%	4	4 %
5	5	5 %	5	5 %
6	1	1 %	8	8 %
7	1	1 %	9	9 %
Total	100			

Table - 4 shows that normal pregnancy was detected in primigravida while abnormal pregnancy seen in multipara females.

Table – 5 Distribution of normal pregnancy cases as per number of fetuses by TVS

No of fetus	No of cases	Percentage	Outcome	
Singlet	62	62 %	7 cases turned out to be missed ,all of them terminated and 5 cases underwent threatened abortion, all of them continue as normal pregnancy till end of first trimester of pregnancy.Rest all were continued as normal pregnancy.	
Twin(diamniotic dichorionic)	3	2	3%	One Blighted ovum One continued as normal pregnancy
		1		All continued as normal pregnancy

Table -5 shows that 62cases (62 %) of normal pregnancy group were singlet and all continued to second trimester while 3 cases (3%) shows twin pregnancy. In 2 cases of twin pregnancy, one was blighted ovum while other developed normally till end of trimester.

Table -6 Distributions of cases of abnormal pregnancy by TVS

Type of abnormal pregnancy	No of cases	Percentage
Abortions	28	28 %
Ectopic pregnancy	5	5 %
Hydatiform mole	1	1 %
Congenital anomalies	1	1 %
Total number of case	100	

Table -6 shows that most of the abnormal pregnancy cases were belongs to abortion i.e. 28 cases (28%) , Only 5 cases (5 %) were of ectopic pregnancy, one case was of hydatiform mole and one case was of congenital anomaly.

Table-7 Distribution of cases of abortion diagnosed by transvaginal sonography in overall first three months.

Type of abortion	No of cases	Percentage
Threatened abortion(choriodecidual haemorrhage)	15	15 %
Missed abortion(fetal demise)	15	15%
Incomplete abortions	6	6%
Complete abortion	3	3%
Blighted ovum	1	1%
Total case	100	

Table -7 shows that majority of patients were of threatened abortion (choriodecidual haemorrhage) (15 cases, 15 %), and missed abortion(fetal demise) (15 cases, 15%), and followed by incomplete abortion (6 cases, 6 %). Complete abortion was found in 3 cases (3%) and blighted ovum was in 1 case (1%).

Table – 8 Distribution of overall abnormal pregnancy cases according to weeks of gestation

Type of abnormal pregnancy	4-6.5 weeks	6.5 -9.5 weeks	9.5 – 12 weeks
Blighted ovum		1	-
Threatened abortion (choriodecidual haemorrhage)	5	8	2
Incomplete abortion	5	1	-
Complete abortion	1	2	-
Missed abortion(fetal demise)	6	9	-
Hydatiform Mole	-	-	1
Ectopic pregnancy	1	4	-
Congenital anomaly			1
Total – 47	18	26	3

Table-8 shows majorities of the abnormal pregnancy were in between 4-9.5weeks of gestation i.e. early first trimester.

Table – 9 Correlation of clinical diagnosis with ultrasonography in overall first trimester

Clinical diagnosis	no of cases	Ultrasonographic diagnosis	No of cases
Threatened abortion	10	Threatened abortion	7, 4 turned out to be missed abortion.
		Missed abortion	3
Incomplete abortion	7	Incomplete abortion	6
		Threatened abortion	1
Complete abortion	4	Complete abortion	3
		Missed abortion	1
Missed abortion	5	Missed abortion	4
		Threatened abortion	1

Hydatiform Mole	2	Hydatiform mole	1
		Threatened abortion	1
Ectopic pregnancy	6	Ectopic pregnancy	5
		Blighted ovum	1
Normal pregnancy	66	Normal pregnancy	53
		Missed abortion	7
		Threatened abortion	5
		Congenital anomaly	1

Table-9, shows that transvaginal sonography improves the clinical diagnosis.

Table- 10 - Clinico-sonogarghical correlation of threatened abortion and its outcome

No of cases	Pain	Bleeding	Clinical diagnosis	Ultrasonographic diagnosis	Outcome	
12	Mild	Mild	Threatened abortion (10)	Threatened abortion (7)	Missed abortion (4)	Termination
					Continue as normal pregnancy (3)	
				Missed abortion (3)	Termination	
		Moderate	Missed abortion (1)	Threatened abortion (1)	Missed abortion (1)	Termination
			Incomplete abortion (1)	Threatened abortion(1)	Missed abortion(1)	Termination
1	No pain	Mild	Hydatiform mole (1)	Threatened abortion(choriodecidual haemorrhage) (1)	Continue as normal pregnancy (1)	
5	No pain	No bleeding	normal pregnancy(5)	Normal pregnancy(5)	Threatened abortion(5) and all continue as normal pregnancy in 2 trimester	

Table -11 Clinico-sonogarghical correlation of incomplete abortion and its outcome

No of cases	Pain	Bleeding	Clinical diagnosis	Ultrasonographic diagnosis	Outcome	
7	Mild	Severe(5)	Incomplete abortion (7)	Incomplete abortion (6)	Suction evacuation	

	Moderate	Mild(2)		Threatened abortion (1)	Missed(fetal demise) abortion (1)	Termination
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Table -12 Clinico-sonogaphical correlation of Hydatiform mole and its outcome

No of cases	Pain	Bleeding	Clinical diagnosis	Ultrasonographic diagnosis	Outcome
1	Mild	Moderate	Hydatiform Mole	Partial Hydatiform Mole	Suction evacuation
1	No Pain	Mild	Hydatiform Mole	Threatened abortion	Continue as normal pregnancy

Table – 13 Clinico-sonogaphical correlation of Missed abortion and its outcome

No of cases	Pain	Bleeding	Clinical diagnosis	Ultrasonographic diagnosis	Outcome	
5	Mild	Moderate	Missed abortion (5)	Missed abortion(fetal demise) (4)	Termination	
				Threatened abortion (1)	Missed abortion (1)	Termination
3	Mild	Mild	Threatened abortion (3)	Missed abortion(fetal demise) (3)	Termination	
7	No pain	No bleeding	Normal pregnancy (7)	Normal pregnancy (7)	Missed abortion(7)	
6	Mild	Mild	Threatened abortion(4)	Threatened abortion(6)	Missed abortion(6)	
		moderate	Missed abortion (1)			
			Incomplete abortion(1)			

Table – 14 Clinico-sonogarpical correlation of complete abortion and its outcome

No of cases	Pain	Bleeding	Clinical diagnosis	Ultrasonographic diagnosis	Outcome
4	No pain	No Bleeding	Complete abortion (3)	Complete abortion (3)	No intervention needed
	No pain	Mild	Complete abortion (1)	Missed abortion (1)	Suction evacuation

Table – 15 Clinico-sonogarpical correlation of Ectopic pregnancy and its outcome

No of cases	Pain	Bleeding	Clinical diagnosis	Ultrasonographic diagnosis	Outcome
6	Mild	Mild	Ectopic pregnancy (6)	Blighted ovum (1)	Termination
				Ectopic pregnancy (5)	On laparotomy 5 were ectopic (tubal – ampullary(4),isthmic(1)

Discussion

This study has been undertaken to examine pregnant woman in the first trimester with transvaginal ultrasonography and clinico-sonogarpical correlation was done. Vaginal bleeding is a leading cause of presentation for emergency care during the first trimester of the pregnancy. Categorization of pregnant woman in first trimester as a normal pregnancy and early diagnosis of abnormal pregnancy is utmost important which gives much relaxation to patients as well as their family. Clinical assessment of the pregnancy outcome at this stage is less reliable. US examination is crucial in establishing IUP and early pregnancy failure and to exclude other causes of bleeding, such as ectopic pregnancy and molar pregnancy. Diagnosis of a normal IUP at this stage not only assists the physician in an expectant management, but also gives a psychologic boost to the patient. With recent advances in US technology and the availability of high-frequency transvaginal transducers, reliable diagnosis of early pregnancy failure can be made even before the embryo is visible. (Paspulati RM, Bhatt S, Nour SG , 2008) ⁸.

Early diagnosis of abnormal pregnancy helps the clinicians for proper management and also reduces the cost of treatment. Schauburger C W, Mathiason MA, Rooney B L (2000) ⁹ assess the outcome (to the end of the first trimester) of pregnancies with vaginal bleeding and the influence of ultrasound-acquired information on care and cost of care.

In this study all patients were examined clinically and provisional diagnosis was made and subsequently transvaginal sonography done to confirm it. Out of 100 patients, 65 cases (65 %) were diagnosed as normal pregnancy, while remaining 35 cases (35 %) were diagnosed as abnormal pregnancy (table-1). Maximum number of patients diagnosed as normal pregnancies were belongs to younger age group. 22 % belongs to 21-25 age groups while 20 % belong to 26-30 age group. Total 42 % of normal pregnancies cases belong to 21-30 age groups. Maximum number of abnormal pregnancy patients belongs to >31 yrs age group (26 %). This shows that as the age of the patient's increases, number of abnormal pregnancy also increases (table-2).

Multipara females were diagnosed with more abnormal pregnancy features than primigravida (table-4). P. Sipil (1990) ⁷ did study “whether grand multiparity (parity of 6 or more) still carries risk” and support our finding.

Dighe M, Cuevas C (2008) ¹ concluded that improved ultrasound technology and high-frequency endovaginal transducers have enabled early diagnosis of abnormal and ectopic pregnancies, decreasing maternal morbidity and mortality.

Hernadi L, Torocsik M (1990) ² reported their results obtained by performing transvaginal sonography in 180 patients in the first trimester of pregnancy. It has been found that both normal and pathological cases could be diagnosed 1 week earlier than had been possible with transabdominal method. High sensitivity was found in ectopic pregnancies especially in un-ruptured cases.

Jariour L, Kletzky OA (1991) ³ studied the reliability of transvaginal sonography in detecting first trimester changes. In 132 patients found that 113 had an intrauterine pregnancy and 19 had an ectopic pregnancy and concluded that a fetal crown-rump length compatible with gestational age and fetal heart motion seen by transvaginal US can predict a term pregnancy in greater than 90% of patients. Considering the various available studies, we did transvaginal sonography as gold standard protocol in all patients and assessed our results.

Transvaginal sonography shows that out of 65 clinically diagnosed normal pregnancy group, 62 cases (62 %) were singlet and all continued to second trimester while 3 cases (3%) shows twin pregnancy. In 2 cases of twin pregnancy, one was blighted ovum while other developed normally till end of trimester (table-5).

The main differential considerations of first trimester bleeding are abortion, ectopic pregnancy, gestational trophoblastic disease or congenital anomalies. On classification of abnormal pregnancies, most of them were belongs to abortion i.e. 28 cases (28%), Only 5 cases (5 %) were of ectopic pregnancy, one case was of hydatiform mole and one case was of congenital anomaly (table-6).

Abortion cases were sub classified clinically in to threatened abortion (15 cases, 15 %), missed abortion (15 cases, 15%), incomplete abortion (6 cases, 6 %), complete abortion (3 cases, 3%) and blighted ovum (1 case, 1%) (table-7). Majorities of the abnormal pregnancy were in between 4-9.5 weeks of gestation i.e. early first trimester (table-8).

Clinical provisional diagnosis was changed after doing transvaginal sonography and changed the line of management. Out of 10 clinically diagnosed threatened abortion cases, three cases were diagnosed as missed abortion. Seven cases diagnosed as incomplete abortion clinically; ultrasound revealed incomplete abortion only in six cases and in one diagnosis was turned out to be of threatened abortion. Clinically four cases was diagnosed as complete abortion, but sonographic examination disclosed complete abortion in three cases and missed abortion in one case. Clinically diagnosed five cases of missed abortion when detected sonographically four cases were of missed abortion and one was of threatened abortion. In two cases of hydatiform mole which were diagnosed clinically, one case was of hydatiform mole and one case was of threatened abortion. In six cases of ectopic pregnancy diagnosed clinically, sonography revealed ectopic pregnancy in 5 cases and blighted ovum in 1 case (table-9).

In 65 clinically normal pregnancy, which were found to be normal at first visit sonographically except 1 i.e. congenital anomaly but later on seven case was diagnosed as missed abortion (fetal demise), five were threatened abortion and rest were normal pregnancy on sonographic evaluation.

All cases were followed till end of first trimester and outcome was noted to assess the accuracy of diagnosis made by transvaginal sonography at first visit. On revisit sonographic examination 10 clinical threatened cases were resulted out into 7 threatened abortion and 3 missed abortion, clinically detected 3 cases, each of missed abortion, incomplete abortion, H mole, diagnosed as threatened abortion. 5 clinically as well as sonographically appearing normal pregnancy, found to have threatened abortion in their follow up and continued as normal pregnancy in their 2 trimester of pregnancy (table-10).

In clinically diagnosed incomplete abortion group, on ultrasonography, out of seven, six confirmed as incomplete abortion and pregnancy terminated immediately while one detected as threatened abortion which is later on converted in to incomplete abortion and terminated (table-11).

Out of two clinically diagnosed hydatiform mole group, one is confirmed by USG and terminated while second was diagnosed as threatened abortion and expectant treatment given and pregnancy continued in second trimester (table-12).

Jauniaux et al (1997)⁴ reported that 10 of 11 pregnancies with sonographic features suggestive of HM at 10 to 14 weeks of gestation were pathologically proven HMs indicating that specificity of sonographic diagnosis is high, but allowing no comment on sensitivity.

On considering total no of missed abortion in first trimester, out of five clinically diagnosed missed abortions, four were confirmed and one case was revealed as threatened abortion. Out of three clinically diagnosed threatened abortions, all were detected as missed abortion. Seven patients who were clinically diagnosed as normal pregnancy and confirmed by ultrasonographically, turned out to be missed abortion in further follow up. 6 cases diagnosed threatened abortion by sonography ,turned out to be missed in further course (table-13).

Out of four clinically diagnosed complete abortion cases, three were confirmed as complete abortion and one was detected as incomplete abortion which was treated by suction evacuation (table-14).

Out of six clinically diagnosed ectopic pregnancy,5 cases were confirmed as ectopic pregnancy and one case was diagnosed as blighted ovum which was terminated. All ectopic pregnancy were operated and four were in ampullary and one in tubal region (table-15). **Schwartz and DiPietro(1980)**¹⁰ in their study observed that of the patients who presented with the classic signs and symptoms ,only 14%had an ectopic pregnancy. Clinical triad of pain ,bleeding ,and adenexa mass is only 45% of patients .

This study clearly suggests that pregnancy is a dynamic state in which continuous monitoring are very essential. First trimester of pregnancy is utmost important because maximum pregnancy loss occurs during this period. Clinical examination is not sufficient in various stages and need regular sonographical assessment. In case of development of abnormal symptoms, accurate diagnosis is very important because some situation like missed abortion, trophoblastic disease, ectopic and congenital anomalies needs early termination. On the other hand threatened abortion needs expectant treatment. Transvaginal sonography is a important investigation helps in early diagnosis and proper management of pregnancy. Thus first trimester TVS can avoid continuation of abnormal pregnancy and terminate them timely with much less complications and decreases the maternal morbidity and mortality

Conclusion-

Thus with the above study ,we here come to the conclusion that transvaginal ultrasonography has changed the clinically approach for evaluating patients during the first trimester of pregnancy .Improved high frequency endovaginal transducer enabled early diagnosis of normal pregnancy in asymptomatic women which not only helps the obstetrician in terms of management but also gives psychological relief to the patients.TVS also able to differentiate abnormal pregnancy and their specific problem like spontaneous abortion ,ectopic pregnancy ,and gestational trophoblastic disease, where clinical assessment was difficult. .Thus helped in taking expeditious and appropriate therapy and decreasing maternal morbidity and mortality. However sensitivity and specificity of TVS would have been better if beta HCG level measurement were considered along with it.

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