

## Role of Ultrasound in Early Pregnancy

S. Nayak<sup>1</sup>, C. Singh<sup>2</sup>, M. K. Khatua<sup>3</sup>, S. Rath<sup>4</sup>

<sup>1</sup>Tutor, Department of Anatomy, SCB Medical College, Cuttack, Odisha, India

<sup>2</sup>Senior Resident, Department of Radiology, AIIMS, New Delhi, India

<sup>3</sup>Assistant Surgeon, District Head Quarter Hospital, Koraput, Odisha, India

<sup>4</sup>Professor, Department of Anatomy, MKCG Medical College, Berhampur, Odisha, India

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**Abstract:** The development of a baby is quite an intricate journey. From the moment that the egg and sperm meet, a baby is beginning the developmental process. This early part of development lays the foundation for a healthy pregnancy and the birth of a healthy baby. Ultrasounds can be used to visually monitor the development taking place in the uterus and to measure the progress. In the present study, 100 women in early pregnancy were evaluated sonographically. Along with a detailed history taking to know the LMP and other abnormal symptoms, they were clinically examined thoroughly to find out the duration of pregnancy as well as any complications associated. All the 100 cases were subjected to ultrasonic evaluation routinely; once or more. Some cases were advised for a urinary hCG examination in order to facilitate the provisional diagnosis. Routine screening could detect 60% cases as normal pregnancy without any obvious abnormality whereas abnormal cases like missed abortion (10%), incomplete abortion (7%); ectopic pregnancy and molar pregnancy etc. constituted the rest 23% in this series. The abnormal pregnancy conditions like ectopic pregnancy, molar pregnancy, multiple pregnancy and pregnancy with ovarian cyst were also better detected by U/S even before the patient became symptomatic.

**Keywords:** blighted ovum, ectopic pregnancy, incomplete abortion, molar pregnancy, multiple pregnancy, ovarian cyst

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### I. Introduction

Life before birth is an area of interest since long. But initially for such studies we had to depend on aborted samples. Now study of embryo has become non-invasive with the help of ultrasonography. Ultrasounds can be used to visually monitor the development taking place in the uterus and to measure the progress. Ultrasonographic study in pregnancy is not only a dependable tool for the obstetricians to avert any undue bias with empirical treatment but also a useful tool for study of embryological developments and anomalies in utero for correlation with the available literatures in the field of embryology.

The average human ear can detect sound waves with frequencies between 20 Hz and 20,000 Hz (20 KHz). Ultrasound is cyclic sound pressure with a frequency greater than the upper limit of human hearing. Ultrasound was understood to be a potential imaging utility since the 1940s, borrowed from RADAR (radio detection and ranging) and SONAR (sound navigation and ranging) technology used during the World War II. An ultrasonic pulse is generated in a particular direction. If there is an object in the path of this pulse, part or all of the pulse will be reflected back to the transmitter as an echo and can be detected through the receiver path. In medical ultrasound, frequencies higher than 1.5 MHz and up to 20MHz are used.

Obstetric ultrasound is primarily used to:

- Date the pregnancy (gestational age).
- Confirm fetal viability by checking for the fetal movement and heartbeat.
- Determine location of the gestational sac (intrauterine vs. ectopic).
- Check the location of the placenta in relation to the cervix.
- Check for the number of fetuses (multiple pregnancy).
- Check for major physical abnormalities.
- Assess fetal growth (for evidence of intrauterine growth retardation (IUGR)).
- Ultrasound scanners using pulsed wave and color Doppler are used to visualize arteries and veins.

### II. Materials And Methods

The present study was undertaken in the department of Radiology, V.S.S. Medical College & Hospital, Burla. A total no. of 100 cases was studied. The cases of early pregnancy of various period of gestation up to two months with different parity were taken for study. The cases were selected at random from the patients attending the outpatient department for confirmation of pregnancy or admitted to the ward for therapeutic abortion or some early pregnancy complications. The cases resided at Burla or came to Burla from other parts of

Western Odisha. The study was strictly voluntary and detailed information about the study and maintenance of subject confidentiality and anonymity was given to the woman.

### **2.1 Methods:**

A detailed clinical history of each case was taken with reference to Age, Parity and with special reference to previous and present obstetric and menstrual history. Leading questions were asked about irregular bleeding P/V, pain abdomen, excessive discharge, vomiting and history of any previous operations. The last menstrual date was asked in each case.

Thorough general, systemic and obstetric examination was done. Period of gestation was assessed by various clinical methods. They were also advised to do the various routine hematological investigations, urine and stool examination, FBS, serum VDRL, ABO grouping, Rh-typing and whenever required, urinary hCG examination.

Observations were made on external genitalia, naked eye appearance of Cx and vagina for presence of any erosion, growth or contact bleeding during examination. Lastly bimanual pelvic examination was done to know the size of the uterus, cause of bleeding, if any and presence of any other pathology noted.

All the cases were subjected to ultrasonic evaluation in the following method; abnormal cases were followed up regularly at two weeks interval to adjust the line management of the case.

### **2.2. Ultrasonic Examination:**

The machine used in the department is Siemens Sonoline Adara (B-Mode) with a frequency of 2.6 to 6 MHz (for curvilinear transducer) and 6.5 to 7.5 MHz (for transvaginal ultrasound). The results obtained were correlated with the available literature in the field of embryology.

### **2.3 Procedure:**

The patient is asked to drink a few glasses of water about two hours prior to the test to fill up her bladder. Then the patient was placed in dorsal position keeping her right side towards the examiner and the machine. The lower abdomen was exposed sufficiently and a gel is applied all over the examining region of the woman's abdomen prior to the test. The transducer is placed on the woman's abdomen and rubbed back and forth. Sound waves are sent out through the transducer. The sound waves travel through the abdomen and uterus and bounce off different surfaces. When the sound waves reach the fetus, echoes from the waves are converted into an image, then onto a TV monitor to produce a picture of the fetus and the placenta.

The basic scanning was done with the transducer in longitudinal, transverse, oblique or lateral positions in accordance with the position and orientation of the fetus. Then all the normal and abnormal findings of the fetus, placenta, liquor and other adnexal masses were recorded. Each patient was scanned for 5-15 minutes.

The guidelines followed for examination and recording of the results are as follows:

1. Name:
2. Age:
3. Obstetric status:
4. LMP:
5. Presenting Symptoms:
6. USG Findings:
  - Uterus: -Anteverted/Retroverted
    - Congenital anomaly (Present/Absent)
    - Fibroid (Present/Absent)
  - Cervix: -Length and canal (Closed/Open)
  - Adnexa: -Normal or presence of any solid/cystic T.O. Mass
    - Pouch of Douglas: Collection present or not
  - Gestational sac: -Single/Multiple
    - Turgidity (Normal/Lost)
    - Trophoblastic rim (interrupted or not)
    - Yolk sac (Present/Absent)
    - Wandering or not
  - Fetal Pole: -Present/Absent
    - Number: -Single/Multiple
    - Fetal cardiac activity: -Present/Absent
    - Fetal movement: -Present/Absent
  - Fetal biometry: -Gestational sac measurement
    - Crown-rump length
  - Placenta: -Chorion attachment(Anterior/Posterior/Fundal)
    - Retrochorionic collection (Present/Absent)

**III. Observation:**

Among the 100 subjects scanned during the early pregnancy with different presentations 60 were normal pregnant woman without any complaints. They were scanned either for confirmation of pregnancy or for assessment of gestational age. Among the rest, 30 were with the complaints of bleeding P/V. Out of the 7 cases of pain abdomen, 2 cases were found to be ectopic, 2 cases were molar pregnancy and 1 case was found to be incomplete abortion. Later on rest 2 cases of pain abdomen did not reveal any abnormality either clinically or ultrasonically. 3 cases who presented with severe vomiting did not reveal any pathology and hence considered to be normal pregnancy vomiting.

**Table No. 1 showing the distribution of these cases**

Presentation	No. of Cases	Percentage
Normal pregnancy (asymptomatic)	60	60%
Bleeding P/V	30	30%
Severe vomiting	3	03%
Pain abdomen	7	07%
Total	100	100%

The cases were divided into three groups according to the age as seen in the table.

**Table No. 2 showing the age distribution of the cases:**

Age in years	No. of cases	Percentage
20	20	20%
21-30	60	60%
>30	20	20%
Total	100	100%

The gravidity of the cases analyzed is outlined in the following table:

**Table No. 3 showing the gravidity distribution of cases:**

Gravidity	No. of cases	Percentage
Primi	35	35
Multi (G2-G4)	60	60
Grand Multi (G5)	05	05
Total	100	100

**Duration of pregnancy:**

The cases studied were divided into different groups according to their last menstrual period which is shown in table no. 4

**Table no. 4**

Case groups	No. of cases	Percentage
Known gestational age	84	84
LMP not remembered	7	07
Conceived in lactational amenorrhoea	6	06
LMP not known	3	03
Total	100	100

Out of 3 cases who did not know their LMP,

- One either conceived after D&C or had irregular cycle and presented with intermittent scanty bleeding per vagina without any definite history of amenorrhoea, in whom pregnancy was confirmed only after U/S examination.
- One conceived with the IUD (Cu-T) in situ.
- One case had already undergone bilateral tubectomy and so she was not aware of the pregnancy.

The cases with known LMP were evaluated clinically as well as by sonography whereas the cases not sure of their LMP were evaluated only clinically and the sonographic findings in them were correlated with that of the former group. Table no.5 shows the distribution of cases according to the ultrasonic findings.

**Table no.5: Case distribution after Sonographic Evaluation:**

Sonar findings	No. of cases	Percentage of cases
Normal pregnancy	60	60
Missed abortion	10	10
Incomplete abortion	7	7
Molar pregnancy	3	3
Ectopic pregnancy	3	3

Blighted ovum	4	4
Inevitable abortion	4	4
Pregnancy with uterine anomaly	1	1
Pregnancy with ovarian cyst	6	6
Multiple pregnancy	2	2
Total	100	100

All 100 cases were subjected to ultrasonic evaluation after detailed history taking and clinical examination. 60 cases (60%) were found to be normal pregnancy without any obvious abnormality. 10 cases (10%) were detected as missed abortion of whom one was of 8 weeks and another of 7 weeks pregnancy which were clinically diagnosed earlier and termination was done. All other subjects had sac margins irregular with definite fetal echo not responding to the period of gestation and no cardiac activity was found.

All 7 cases (7%) of incomplete abortion had no evidence of definite sac inside uterine cavity and irregular hyperechoic mass was found at the lower part of uterus or in the dilated internal os. D & E was done in all cases. Four cases (4%) of blighted ovum with thin or irregular gestational sac margin were diagnosed by ultrasound. There was subchorionic haematoma in one of the four cases.

Out of the three cases (3%) of molar pregnancy, 2 cases of eight weeks gestation had typical honeycomb pattern. Others had the picture compatible with missed abortion. All had urinary hCG positive in 1:200 dilution. One had “canon-ball” shadow on X-ray chest. All three were confirmed after evacuation and histopathological study of the specimen.

Of the 3 cases (3%) diagnosed as ectopic pregnancy, one had seven weeks size embryo inside the gestational sac which was near the cornu of uterus but definitely outside the uterine cavity, was confirmed by laparotomy as cornual pregnancy. Other cases showed the evidence of left sided tubal pregnancy with eight weeks size living embryo. One case had right sided ovarian cyst associated with it which was confirmed on laparotomy.

Two cases (2%) of multiple pregnancy had separate amniotic cavity with a distinct septum in between. Out of the 6 cases (6%) of pregnancy with ovarian cyst, one had associated tubal pregnancy, one with incomplete abortion and another with a molar pregnancy. One of the 6 cases was managed conservatively upto 12 weeks and cystectomy was done thereafter. In one case repeat scanning showed regression of the size of the cyst. One case (1%) was found to have bicornuate uterus with missed abortion. But the patient aborted spontaneously after two days.

#### **IV. Discussion:**

Ian Donald, the pioneer of obstetric ultrasound, stated in his Gold Medal address, ‘We are particularly interested in studying the first 12 weeks of intrauterine development which are even more interesting than the last 12 weeks...’ This perception has been greatly augmented in this era by readily available methods using sophisticated instruments such as high resolution real time sonography. Sonography is also an excellent tool to prognosticate the safe continuation of pregnancy especially in subjects who present with a poor obstetric history, vaginal bleeding or abdominal cramps in early pregnancy who pose a diagnostic challenge to the clinicians and sonographers. The results of our study completely correlated with the available literature:

- One in thirteen patients who complained of pain abdomen and bleeding P/V were diagnosed with ectopic pregnancy [1-4].
- Almost 15% of the patients will end up in spontaneous abortion [5-9].
- One in twenty patients has pregnancy with associated ovarian cyst [10-12].
- The percentage for blighted ovum, molar and multiple pregnancies are three for each [13-15].

The objective of prenatal testing is to provide women with information concerning the development and wellbeing of their fetus. Of all the testing options currently available, ultrasound is the most commonly used and most powerful prenatal test for the detection of fetal anomalies.

#### **V. Conclusion:**

All the clinical findings were compared to that detected by sonography which revealed that clinical examination and urinary hCG were not conclusive and give erroneous results very often in conditions like blighted ovum, missed abortion and threatened abortion, etc. But sonography could detect the conditions with 100% accuracy and thus facilitates further line of management.

An ultrasound can provide women with considerable information about the pregnancy at no cost in terms of invasiveness or medical risk. An ultrasound revealing an anatomically normal appearing fetus can provide considerable reassurance and be a positive experience for both the woman and her partner.

Ultrasound has revolutionized the entire system of antenatal care and obstetric practice by not only detecting life and measuring fetal sizes but also determining of morphological normality and evaluation of

circulatory and growth dynamics. Although it appears that there is little scientific evidence to suggest a deleterious or adverse developmental effect of ultrasound on the developing fetus, continual long term prospective studies are required to examine the immediate or the delayed effects, particularly as the use of newer technology of enhanced resolution and imaging increases.

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