IF : 4.547 | IC Value 80.26 VOLUME-6, ISSUE-5, MAY-2017 • ISSN No 2277 - 8160

Original Research Paper Gynaecology

A STUDY ON ROLE OF ULTRASOUND IN FIRST TRIMESTER BLEEDING

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ABSTRACT

Vaginal bleeding affects approximately 15 % to 20 % of 1st trimester pregnancies with a fetal loss rate of approximately 50 %.(1,2). Hertig & Livingston quoted some 50 years ago an incidence of at least 16 % which is probably still correct today(3).The natural worry of women with threatened abortion is the loss of their pregnancy and in about 30% 50 % of the cases that fear may be justifiable (4, 5).Thus 1st trimester bleeding is one of the important causes for emergency hospital admissions. For generations, diagnosis of the etiology of 1st trimester bleeding was based on history, physical examination and clinical findings. These provide only inconclusive information at best, and the physician has to rely on his /her expertise and experience for managing the case. Ultrasonography steps in here and today the most common indication for ultrasound in 1st trimester is vaginal bleeding. The first ultrasonic devices for imaging the fetus in utero were developed almost a half-century ago. These early instruments demonstrated the potential to provide high-resolution fetal images, information previously not available without hazard. Since then, diagnostic ultrasound not only has gained wide clinical acceptance because of its ease of use and patient comfort but has also profoundly influenced the general practice of medicine and especially obstetrics.

KEYWORDS : ultrasound, pregnancy, bleeding, first trimester, prognosis.

HISTORY

'SONAR' is an abbreviation of the phrase 'sound navigation and ranging'. It is a method of selecting objects by means of sound waves reflected back from them. As far back as mid 1880 scientists were experimenting with sound. A major step towards its practical implementation was taken by Curie brothers with their discovery of piezoelectric effect.

Galton in 1883 was the first to produce experiment with sound above the range of human hearing. In France Langevin produced and experimented with high frequency SONAR beams using quartz crystals. He was able to transmit sound through water in an effort to locate underwater objects. Tarun have reported that the compressive strength of rubberized concrete can be improve when fine aggregate was fully replaced by fine crumb rubber. He also indicated that if the rubberParticles have rougher surface or given a pretreatment, the better and improved bonding may develop with the surrounding matrix, and that may result in higher compressive strength.

In 1958 Ian Donald and colleagues at the University of Glasgow published the first paper describing the application of ultrasono graphy in obstetrics and gynecology.(6,7,8)

In 1961 the first paper on ultrasonic measurement of biparietal diameter was published by the same group.(6,7,8).Since then research has grown at an exponential rate and virtually the entire human body has been ultrasonically explored.

PHYSICS OF ULTRASOUND, MECHANISM AND PRINCIPLES:

Sound is a form of mechanical energy that travels through solid or liquid media as pressure waves. during the propagation these sound waves cause a pressure rise in the system so that the molecules in a medium become crowded (compression) or they may cause a pressure drop such that the molecules move apart (Rarefaction).Thus sound waves are moving surfaces of high and low pressures. These surfaces are called waveforms. The shape of a waveform depends on the shape of the source or the interface.

ULTRASOUND AND PIEZOELECTRIC EFFECT:

Sound frequencies above 20 KHz are known as ultrasound. To produce vibrations at the rate of millions of cycles per second special materials with piezoelectric properties are used. These piezoelectric elements are solid non conducting substances that demonstrate physical properties whose measurements are different along different axes (anisotropic). When compressed in certain directions, these elements undergo electrical polarization.9 A corresponding voltage is produced proportional to the pressure change. This is known as the piezoelectric effect. The reverse piezoelectric effect occurs when the element is subjected to an electrical field wherein compression or expansion of the element occurs This effect allows interconversion between sound and electricity and forms the basis of ultrasound.

AIMS AND OBJECTIVES

The objectives of conducting the study are:

1. To assess the role of sonography in management of cases of vaginal bleeding in the first trimester of pregnancy.
2. To determine if there is any co relation between the diameter of the hematoma in cases of threatened abortion and the outcome of the bleeding episode.
3. To determine if there exists any correlation between age, parity, occupation, blood group and the prognosis of the episode.

MATERIAL AND METHODS

A retrospective study was conducted involving 100 cases of first trimester bleeding per vaginum in one of the tertiary care teaching hospitals in Mumbai done over a period of three years.

Patients presented with first trimester bleeding per vaginum, a detailed history and clinical examination was conducted to arrive at a provisional diagnosis in each case.

Based on the clinical diagnosis cases were classified as-
Abortion (all types)
Ectopic Pregnancy
Vesicular Mole

These patients were subjected to a USG examination to confirm the diagnosis and treatment was carried out accordingly. Apart from routine investigations, detailed investigations were carried out specific to each case as indicated. Patients with a doubtful USG were treated conservatively and a repeat USG was done after 7 days.

Patients with threatened abortion with viable pregnancy were treated conservatively till the patients can be discharged safely. The diameter of the haematoma was measured by USG and correlated with the prognosis of the bleeding episode.

A subchorionic hematoma was defined as a anechoic area that separated the chorion form the inner aspect of the uterus.With tzhe correction of fluid in the intra uterine cavity.The size of the hematoma was graded according to the percentage of the chorionic sac circumference elevated by the hematoma as follows:

Small indicated less than one third of the chorionic sac circu mfer ence Moderate indicated one third to one half of the chorionic sac circu mfer ence Large indicated two thirds or greater of the chorioni c sac circumference

OBSERVATIONS

Table 1-AGE WISE DISTRIBUTION

Age in Years	No. Of Cases
20	19(19%)
21-30	66(66%)
= or >31	15(15%)

As seen in this table majority of the cases of first trimester bleeding were in the age group 21- 30 years while patient at the two extremes of the spectrum completed the list.

Table 2-GRAVIDA WISE DISTRIBUTION

Gravidity	No. of Cases
Primi	33(33%)
G2-G4	60(60%)
Grand multi	7 (7%)

This table shows that the incidence of first trimester bleeding is more in multigravidas followed by primigravidae.

Table 3-DURATION OF GESTATION

Duration of gestation	No. of cases
Up to 8 weeks	35(35%)
8 – 12 weeks	65(65%)

This table shows that as the duration of gestation increases the incidence of episodes of first trimester increases.

Table 4- CLINICAL DIAGNOSIS

Clinical diagnosis	No. of cases
Threatened abortion	59 (59%)
Incomplete abortion	27 (27%)
Complete abortion	2(2%)
Inevitable abortion	1(1%)
Missed abortion	6(6%)
Ectopic pregnancy	3(3%)
Vesicular mole	2(2%)

Threatened abortion accounted for 59 % of all the cases and other types form 36 % of the total.

Ectopic pregnancy (3%) and vesicular mole (2%) completed the list.

Table 5- CORELATION OF CLINICAL WITH USG DIAGNOSIS THREATENED ABORTION (59 cases)

USG Diagnosis	No. Of Cases
Viable pregnancy	43(72.88%)
Blighted ovum	12(20.3%)
Complete abortion	2 (3.3%)
Delayed menses	2(3.3%)

Of the 59 cases diagnosed as threatened abortion 43 were demonstrated as viable pregnancies by ultrasound.12 cases were diagnosed as blighted ovum and complete abortion and delayed menses completed the list.

Table 6- COMPARISON OF RATE OF SPONTANEOUS ABORTION WITH DURATION OF GESTATION

Duration of gestation	No. of cases
< 8 weeks	30 (86%)
>8 weeks	23 (43%)

Of the 53 cases that resulted in spontaneous abortion majority of them occurred within 8 weeks of gestation. The rate of spontaneous abortions with respect to the incidence of first trimester bleeding is almost double in the group of gestational age less then 8 weeks.(86% Vs. 43%)

CORELATION OF CLINICAL DIAGNOSIS WITH USG DIAGNOSIS

The two cases of vesicular mole diagnosed clinically were confirmed to be so by sonography.

A provisional diagnosis of ectopic gestation was made in the present series. This was confirmed on ultrasonography in 66.67 % of cases. Scanning revealed Tubo-ovarian mass in 33.33 % of the cases.

Table- 7 COMPARISON OF SIZE OF HEMATOMA AND ITS CORELATION WITH THE OUTCOME

Size of hematoma	No. of cases	Outcome
Small	22	Continuation of pregnancy
Medium	17	Continuation of pregnancy
Large	4	Spontaneous abortion

Of the 59 cases of threatened abortion 43 turned out to be viable pregnancies. These cases were treated conservatively while remaining underwent dilatation and evacuation.39 of these 43 cases continued with the pregnancy while 4 aborted giving a continuation rate of 84.8 %.

DISCUSSION

Vaginal bleeding during early part of pregnancy often implies the presence of an underlying abnormality which cannot be diagnosed conclusively by clinical examination. Ultrasonography is useful in all such cases.

In our study a spontaneous abortion rate of 53% was noted .Similar findings have been found by Helen Choi et al29(2000).This was also congruent with the studies of Berry C L et al30 (1980) ,Hertig A T & Livingston R G(1944)3 and Cunningham F G (2001).

There is a wide variation in abortion rates from 0 % to 53% among various studies and can be best explained in part by the rather small number of patients in most of these studies, some of which may also have an over representation of high risk pregnancies. Also, variation in the population studied may be a major factor in the divergent findings.

When the age incidence in the study was evaluated the maximum no. of cases were in the age group of 21- 30 years. According to the study done by Noori Chowdary (1996)31 the mean age at presentation was 26.7 years.

The duration of gestation was less than 8 weeks in 35 % of the cases and between 8 and 12 weeks it was 65%.These results are similar to those quoted by Bharadwaj N (1988) when in that study the respective incidences were 30 % and 57 % respectively.

In a study done by Genevieve L Benett et al (1996)32 the incidence was 2.3 times higher in women who presented with vaginal bleeding at 8 weeks of gestation or less compared with that in women who presented with bleeding at more than 8 weeks of gestation.

Clinical diagnosis of threatened abortion was made in 59 % of the cases, while 23 % of the cases were thought to be incomplete abortion. Missed abortion was suspected in 5 % of the cases while diagnosis of vesicular mole was made in 2 % and ectopic gestation in 3 %.These findings are in keeping with those by Bharadwaj N (1988) and Malhotra J et al (1987)33.However these findings differ

from those of P Reddy Rani34 et al (2000) wherein various types of abortion form 61 % ectopic pregnancy 21 % and vesicular mole 18 %.

The diagnosis of Blighted ovum was made in 12 cases(20.3%) while USG revealed complete abortion and delayed menses in 2 cases each (3.39% each).These results are consistent with those of Malhotra J et al (1987). Also according to the study of P Reddy Rani et al(2000) 13 of 52 cases of threatened abortion were diagnosed to be Blighted ovum(25%).

The diagnosis of incomplete abortion was confirmed in 27% of cases in our study.This has varied from 1 % - 85% among different studies.

Of the 3 cases suspected to be ectopic gestation, 2 were confirmed by USG examination and 1 was found to be a tubo-ovarian mass. This was further confirmed after correlation with serum B HCG levels.

The 2 cases of Vesicular mole clinically were confirmed on USG. Both these cases were those of complete Vesicular mole. This finding is similar to one by Bharadwaj N. P Reddy Rani34 et al in their study, diagnosed 18 cases of vesicular mole out of 100 cases of first trimester vaginal bleeding on clinical basis. On USG examination 14 had complete mole 3 had partial mole and USG was inconclusive in 1 case.

The cases of Vesicular mole underwent dilatation and evacuation. They were followed up with serial USG and serum B HCG levels.

Cases of missed abortion and Blighted ovum were subjected to dilatation and evacuation.

Of the 59 cases of threatened abortion 43 turned out to be viable pregnancies. These cases were treated conservatively while remaining underwent dilatation and evacuation.39 of these 43 cases continued with the pregnancy while 4 aborted giving a continuation rate of 84.8 %.These results are in concordance with those of Stabile et al34, Joupilla et al1, Pederson & Mantoni26 et al and Goldstein et al.38 According to all these studies the vast majority of the cases of threatened abortion with detectable cardiac activity will continue with pregnancy.

In all 43 cases of viable pregnancy the size of subchorionic hematoma was measured and graded according to the percentage of chorionic sac circumference elevated by hematoma as follows:

1.Small indicated less than 1/3 of the chorionic sac circumference
2. Moderate indicated 1/3 to ½ of the chorionic sac circumference
3. Large indicated 2/3 or greater of the chorionic sac circumference.

All 4 threatened abortions that eventually aborted had large subchorionic hematomas. This observation corresponds to that of Genevieve Benett L et al32(1996) who found that the rates of spontaneous abortions in Pregnancies with small and moderate sized separations to be 7.7% and 9.2 % respectively, but the rate nearly doubled (18.8%) when the separation was large.

CONCLUSION

Ultrasonography is a non-invasive and safe aid for evaluation of vaginal bleeding in 1st trimester of pregnancy. These cases present a confusing a scenario to the attending physician. Clinical examination presents an in conclusive picture in many of these cases and the physician has to rely on his/ her experience and judgement.

Sonography comes as a boon in these cases. It is safe both for the mother and the fetus, noninvasive, accurate and helps in making an early diagnosis. This aids in instituting proper management avoiding any delay.

It is particularly useful to detect missed abortion and blighted ovum. These patients can then be subjected to evacuation thus avoiding an unnecessary conservative approach. Sonography can detect a viable pregnancy accurately. This is important since most of these pregnancies eventually have a successful outcome, and conservative approach is feasible.

In cases of vesicular mole, sonography is important not only for diagnosis but for follow up as well. It may also give a clue towards the prognosis in these cases by measuring the diameter of ovarian theca lutein cysts.

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