

*Original Research Article*

## Obstetric Sonography in First Trimester Vaginal Bleeding (A Single Institution Study)

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Abstract

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Vaginal bleeding in first trimester is potentially alarming and approximately half of these women lose their pregnancies. This demands evaluation without deleterious effect on the embryo. A retrospective observational cohort study evaluating causes of first trimester vaginal bleeding in University of Uyo Teaching Hospital (UUTH), Uyo, Nigeria using ultrasonography. Criteria for admission into the study: (a) first-trimester vaginal bleeding; (b) an abdominal and/or transvaginal ultrasound scan performed in Department of Radiology, UUTH, Uyo on referral or repeated after 10 days in cases of ambiguity. Outcome variables- viable pregnancy, incomplete miscarriage, complete miscarriage, ectopics, trophoblastic pregnancy, anembryonic pregnancy, embryonic demise, threatened miscarriage, subchorionic haematoma and others. Results were statistically analyzed using SPSS Chicago 13. 645 women had first trimester obstetric ultrasonography during the period under review (8/1/2013-12/2/2016). 63.72% (n=411) of these women had first trimester vaginal bleeding. Peak frequency was seen in the 20-29 age range with 212 women (51.58%). The commonest ultrasonographic finding was incomplete miscarriage (n=221, 53.77%). This was followed by anembryonic pregnancy (n=42, 10.22%) and viable pregnancy (n=40, 9.73%). The least finding was trophoblastic pregnancy (n=2, 0.49%). The ratio of viable normal pregnancy to abnormal-complicated pregnancies was 1:9.27. 65.21% of all first trimester pregnancies with vaginal bleeding ended up in pregnancy loss. The most frequent ultrasonographic findings among women in Uyo, Nigeria with first trimester vaginal bleeding is incomplete miscarriage. The accompanying pregnancy loss far outweighed viability.

**Keywords:** First trimester, Miscarriages, Pregnancy, Vaginal bleeding

### INTRODUCTION

Vaginal bleeding is an unwelcome development to any pregnant woman irrespective of the trimester. This is because it may be a harbinger of an untoward obstetric entity. It is potentially alarming when seen in early pregnancy (Hasan et al., 2009; Dighe et al., 2008). The fright arising from such experience mandates the pregnant woman to seek medical help. This fright is even heightened if one remembers that approximately half of patients with first trimester vaginal bleeding will lose the

pregnancy and most miscarriages are known to occur during the first trimester (Hasan et al., 2009; Dighe et al., 2008; Deutchman et al., 2009; Basama and Crosfill, 2004). This scenario culminates in vaginal bleeding being known to be the commonest cause of presentation to the emergency department in first trimester (Dighe et al., 2008). It is noteworthy that at this early stage of pregnancy, physical evaluations have major pitfalls and beta serum human chorionic gonadotropin ( $\beta$ hCG) assay

is not comprehensive in the elucidation of the aetiology of vaginal bleeding (Dighe et al., 2008). Therefore a safe imaging modality like sonography must be invoked to determine the presence of normal gestation, viability and gestational dating. The advent of Ultrasonography has enabled events during early pregnancy to be visualized in vivo for the first time (Jauniaux et al., 2006; Doubilet et al., 2013; Jauniaux et al., 2005). The diagnosis of a normal intrauterine pregnancy not only helps the physician in terms of management but also gives psychologic relief to the pregnant woman and even the spouse (Dighe et al., 2008).

Ultrasonography when incorporated into first trimester management will go further to identify the cause of vaginal bleeding. The differential considerations of first trimester bleeding are spontaneous abortion, incomplete miscarriage, gestational trophoblastic disease, subchorionic hemorrhage, embryonic demise, anembryonic pregnancy, failed (or failing) intrauterine pregnancy, complete miscarriage and ectopic pregnancy (Hasan et al., 2009; Dighe et al., 2008; Deutchman et al., 2009; Doubilet et al., 2013). Non-obstetric causes of bleeding, are cervicitis, vaginitis, cystitis, trauma, cervical cancer, endometrial polyps; or non-vaginal causes of bleeding, such as hemorrhoids (Deutchman et al., 2009). Improved ultrasound technology and high-frequency endovaginal transducers have enabled early diagnosis of causes of first trimester vaginal bleeding thereby decreasing maternal morbidity and mortality (Dighe et al., 2008; Jauniaux et al., 2005).

## Aim

This retrospective observational cohort study reviews the causes of first trimester vaginal bleeding and their sonographic findings in University of Uyo teaching hospital (UUTH), Uyo, Nigeria.

## METHODS

The ultrasonographic data bank of Radiology Department of UUTH, Uyo, Nigeria was retrospectively reviewed for obstetric scans. The period reviewed was from 8<sup>th</sup> January 2013 to 12<sup>th</sup> February, 2016. Demographic data like age, parity, menstrual period (LMP) and special maternal gestational history were recorded. First trimester ultrasonography were earmarked out and reserved for this study. From the later those who had record of vaginal bleeding in first trimester pregnancy were finally isolated. When multiple results exist for a patient, the last scan result was chosen for this study. When ambiguity exist for viability in early pregnancy, to reduce the risk of inadvertent harm to potentially normal pregnancies repeat scan was done after 10days

The ultrasonographic examinations were performed by Radiology Residents and Radiologists in the department. Toshiba TA311 model, manufactured on 5<sup>th</sup> October, 2012 with 3.5MHz (convex) probe and 5MHz (trans-vaginal) probe was the ultrasound scan machine used for this study. The obstetric ultrasonographic findings in first trimester vaginal bleeding were recorded into groups according to sonographic diagnosis like threatened miscarriage, ectopics, anembryonic gestation etc. This analysis focused on bleeding episodes that occurred during the first trimester, regardless of whether a miscarriage occurs.

A normal pregnancy should exhibit a gestational sac when  $\beta$ -hCG levels reach 1,500 to 2,000 IU per L, a yolk sac when the gestational sac is greater than 10 mm in diameter, and cardiac activity when the crown-rump length is greater than 5 mm (Deutchman et al., 2009; Doubilet et al., 2013; Allison et al., 2011). Anembryonic pregnancy (blighted ovum) is presence of gestational sac larger than 18mm without evidence of embryonic tissues like yolk sac or embryo. Embryonic demise or failed pregnancy (missed abortion) is when embryo is larger than 5mm without cardiac activity (Doubilet et al., 2013; Deutchman et al., 2009). Gestational trophoblastic disease or hydatidiform mole is placental proliferation in the absence of a fetus (complete mole) or partial mole when co-existing with a fetus (Deutchman et al., 2009). Threatened miscarriage is bleeding before 20 weeks in the presence of an embryo with cardiac activity and closed cervix (Deutchman et al., 2009). Inevitable miscarriage is bleeding in the presence of a dilated cervix and indicates that passage of conceptus is unavoidable (Deutchman et al., 2009). Complete miscarriage is complete passage of all products of conception (Deutchman et al., 2009). Incomplete miscarriage is when some but not all products of conception are expelled. An adnexal mass or intraperitoneal bleeding with empty uterus may suggest ectopics.

Incomplete data and acyesis despite positive  $\beta$ hCG test were exclusion criteria. Systematic screening for uterine fibroids was discountenanced in this study. Data was statistically analyzed using SPSS Chicago 13

## RESULT

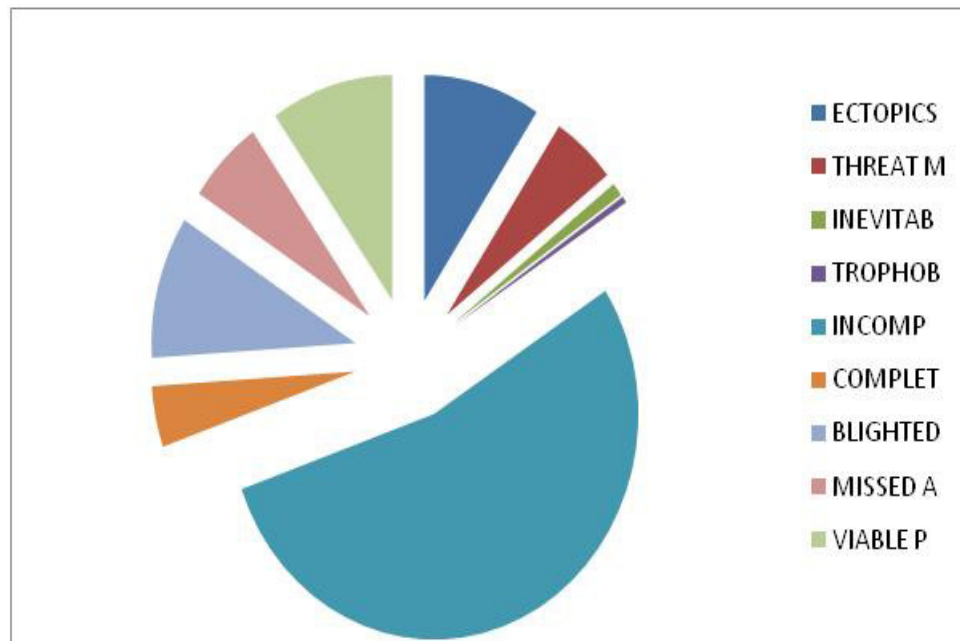
645 women had first trimester obstetric ultrasonography during the period under review. Out of this number, 411 women had first trimester vaginal bleeding. This constitutes 63.72%. The peak frequency was seen in the 20-29 age range with 212(51.58%), followed by 30-39 with 159 (38.69%). The least frequency was seen in the 50-59 age range with one patient (0.24%) (See table 1). The commonest ultrasonographic finding was incomplete miscarriage (n-221, 53.77%). This was followed by anembryonic pregnancy (n-42, 10.22%) and viable pregnancy (n-40, 9.73%). The least finding was

**Table 1.** Showing studied population

Age Range	Frequency	Percentage (%)
10-19	26	6.33
20-29	212	51.58
30-39	159	38.69
40-49	13	3.16
50-59	1	0.24
TOTAL	411	100

**Table 2.** Showing frequency of obstetric ultrasonographic findings among pregnant women with first trimester vaginal bleeding

Aetiologies	Frequency	Percentage (%)
Ectopics	38	9.24
Threatened Miscarriage	21	5.11
Inevitable Miscarriage	4	0.97
Trophoblastic Pregnancy	2	0.49
Incomplete Miscarriage	221	53.77
Complete Miscarriage	18	4.38
Anembryonic Pregnancy	42	10.22
Missed Abortion	25	6.08
Viable Pregnancy	40	9.73
Total	411	100

**Figure 1.** Piechart showing frequency of ultrasonographic findings among pregnant women with first trimester vaginal bleeding. (THREAT M-Threatened miscarriage, INEVITAB-Inevitable miscarriage, TROPHOB-Trophoblastic pregnancy, INCOMP-Incomplete miscarriage, BLIGHTED-Blighted ovum, MISSED A-Missed miscarriage, VIABLE P-Viable pregnancy)

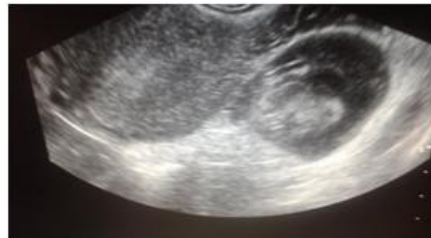
trophoblastic pregnancy (n=2, 0.49%). (See table 2 and figure 1). The ratio of viable normal pregnancy to abnormal-complicated pregnancies was 1:9.27.

65.21% of all first trimester pregnancies with vaginal

bleeding ended up in pregnancy loss as observed in first scan and repeated scan after 10days. Some abdominal ultrasonograms showing some of the causes of first trimester vaginal bleeding (Figure 2-5).



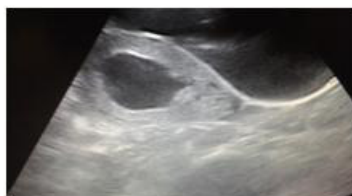
**Figure 2.** First trimester abdominal ultrasonogram showing an embryo that is devoid of cardiac pulsations (Embryonic demise).



**Figure 3.** First trimester abdominal ultrasonogram showing left adneval gestational sac harbouring a living embryo. This is adjacent to an empty bulky uterus. (Unruptured ectopic pregnancy).



**Figure 4.** First trimester abdominal ultrasonogram showing a bulky uterus. The endometrial cavity harbours a snow storm echogenic material without an embryo (Complete mole)



**Figure 5.** Gravid uterus that is empty of an embryo or yolk sac (Anembryonic pregnancy).

## DISCUSSION

The frequency of incomplete miscarriages in this study of first trimester vaginal bleeding is mind-boggling and must warrant dedicated and targeted approach to stem the tide. This entity alone took 53.77% of all cases (see table 2). It inappropriately overshadows clinical conditions that give a ray of hope to the pregnant woman. These clinical conditions that suggest that the embryo or fetus is still viable are threatened miscarriage and viable pregnancy. Both conditions only added up to 14.84% giving a ratio of 0.27:1 when this summated value is compared to incomplete miscarriage. The concern is raised because incomplete miscarriage is a non-salvageable condition that places a lot of anguish on the pregnant woman since it is obvious to her that she has irremediably lost her pregnancy. The picture becomes gloomier when one considers other parameters in this study like complicated pregnancies that were associated with embryonic/fetal loss. These are missed abortion, complete miscarriage and inevitable miscarriage aside from the noted incomplete miscarriage. These four ultrasonographic parameters constituted 65.21% (n=268) of studied population. This is untoward as by and large the pregnant woman is aware of the fate that befell her. This may probably not be limited to the loss as she may still submit to therapeutic evacuation if conservative or medical management does not suffice to rid off retained products. As the optimal mode of management is determined by gestational age, volume of retained products, maternal hemodynamic stability, the presence of infection, and patient preference (Allison et al., 2011).

63.72% of our studied patients had first trimester vaginal bleeding. This is quite a high value when compared to two other studies which recorded 26.70% (Harville et al., 2003) and 26.59% (Hasan et al., 2010) respectively. Their lower incidences may have risen from their larger sample sizes of more than 4000 pregnant women. Further dilution of incidence to 14.21% was observed when the studied sample was increased to 16,506 patients (Weiss et al., 2004). Most documented estimates of bleeding prevalence in early pregnancy are imprecise and range from 7 to 24% (Hasan et al., 2010). Maternal characteristics associated with bleeding include fibroids, prior miscarriage, maternal age (particularly between 28 and 34 years), more years of education, long ( $\geq 34$  days) and short ( $< 27$  days) cycle length and nulliparity (Hasan et al., 2009; Hasan et al., 2010; Allison et al., 2011; Arck et al., 2008). Endocrine factors like progesterone deficiency, thyroid diseases and uncontrolled diabetes are other risk factors. Genetic aneuploidy accounts for about one half of spontaneous abortions (Deutchman et al., 2009). Others are occupational chemical exposure, radiation exposure, uterine congenital anomaly immunological like antiphospholipid syndrome, lupus; infections like chlamydia, herpes, gonorrhea, listeria, mycoplasma,

syphilis toxoplasmosis, ureaplasma (Gracia et al., 2005).

Bleeding in the first trimester is known to carry a higher rate of miscarriage than bleeding in the second trimester (Basama and Crosfill, 2004). In this study, 65.21% of all first trimester vaginal bleeding at first and repeated 10 day scans ended up in pregnancy loss. This value is higher than 42.84% (Harville et al., 2003) and 58.83% (Gracia et al., 2005). First trimester miscarriages seen in two other studies. It is known that about one half of those who bleed will miscarry (Deutchman et al., 2009). The higher values of miscarriage or pregnancy loss in this study might not be unrelated to late presentation to hospital by women bleeding per vagina in first trimester. Some may presume it is normal and may not present to hospital when the bleeding is spotting, shallow and faint. But they become horrified on sighting heavy bleeding that is comparable to menses. Then, they will be compelled to seek medical help, at which time the pregnancy may have become irrecoverable. This might be the observed scenario in this study as there is robustness of first trimester bleedings that ended up in pregnancy loss (65.21%) and paucity of threatened miscarriages (5.11%) (see table 2, figure 2) Heavy bleeding in the first trimester, particularly when accompanied by pain, is associated with higher risk of miscarriage (Harville et al., 2003; Juliano et al., 2008).

9.73% of the studied women with first trimester vaginal bleeding had viable normal pregnancy. This vaginal bleeding despite normal viable pregnancy may be considered to be idiopathic ultrasonographically. Two concepts have been adduced as responsible for first trimester vaginal bleeding, namely luteal-placental shift and concept of placental oxidative stress (Hasan et al., 2009; Hasan et al., 2010; Jauniaux et al., 2006). Bleeding prevalence is highest around gestational week 5–10 (with peak during the sixth and seventh weeks) because first trimester vaginal bleeding is a marker for placental dysfunction (Hasan et al., 2009; Hasan et al., 2010). The luteal-placental shift concept is based on the fact that in very early pregnancy, the corpus luteum produces progesterone. The shift from luteal production to placental production of progesterone occurs by the seventh week of pregnancy and can result in a temporary reduction in progesterone levels if the placenta is not producing sufficiently (Hasan et al., 2009; Pawloski and Kitsantas, 2008). Decreasing levels of progesterone are associated with the onset of menses during menstrual cycle; similarly, decreasing levels during pregnancy may trigger an episode of vaginal bleeding and limit successful maintenance of the pregnancy (Hasan et al., 2009).

The earliest stage of normal pregnancy exist in physiological hypoxia to protect the developing fetus against the deleterious and teratogenic effects of oxygen free radicals (Jauniaux et al., 2006). This is achieved by the blockage of the maternal spiral arteries by the trophoblastic shell until the ninth or tenth week of

gestation when maternal-fetal circulation begins (Hasan et al., 2010). Necrosis and apoptosis of the trophoblastic epithelium of the placental villous tree will lead to remodeling of the arteries and the resultant blood flow to the developing placenta dramatically increases the oxygen tension (Hasan et al., 2009; Hasan et al., 2010; Jauniaux et al., 2006; Jauniaux et al., 2005). Premature onset of maternal-fetal circulation may expose the placenta and fetus to harmful levels of oxidative stress and first trimester bleeding episodes (Hasan et al., 2009; Hasan et al., 2010; Jauniaux et al., 2005; Winikoff, 2006).

We acknowledge important limitations. Our study is limited by a single institution study instead of population based. More so it is a tertiary health facility that usually receives referred and complicated cases, thereby unwittingly restricting our enrollees. One should not also be unmindful that these are bleeding episodes that come to clinical attention as many may not have bothered to attend a hospital and dismissing such bleeding as normal. It is not improbable that many might not have had ultrasound scan even when recommended on account of finance or being desirous of alternative medicine.

It is also noteworthy the deficiencies of some of the documented ultrasonographic results. Because it is astonishing that a condition like subchorionic haematoma in such a pool of first trimester vaginal bleeding was never mentioned. Subchorionic hemorrhage is known to be a common and incidental finding with first trimester bleeding and uncomplicated pregnancies (Deutchman et al., 2009; Leite et al., 2006). In the first trimester of pregnancy, subchorionic haematoma has been described as risk factor for adverse maternal and neonatal complications including preeclampsia, spontaneous abortion, fetal growth restriction, and preterm delivery (Uduma and Ekiko, 2012; Sharma et al., 2003). Subchorionic hemorrhage appears as a crescent-shaped sonolucent area adjacent to the gestational sac, which contains an embryo and yolk sac (Deutchman et al., 2009). It is compared with the size of the gestational sac and classified as small (<20% of the gestational sac), medium (20%–50% of the gestational sac), or large (>50% of the gestational sac) (Leite et al., 2006; Sharma et al., 2003).

However, despite these limitations, the significance of this study is that it has brought to limelight the essential need of avoidance of flippancy on bleeding per vagina during first trimester pregnancy. This is because early intervention may invariably salvage many pregnancies with treatable conditions like hormonal inadequacy, thus requiring progesterone supplementation and extra monitoring. The relevance of this intervention is appreciable against the background of major harvest of incomplete miscarriages in this retrospective study.

## CONCLUSION

The most frequent ultrasonographic findings among women in Uyo, Nigeria with first trimester vaginal bleeding is incomplete miscarriage. The accompanying pregnancy loss in first trimester vaginal bleeding far outweighed viability.

In descending order of frequency of abnormal pregnancies in Uyo, the pattern is anembryonic pregnancy, ectopic pregnancy and trophoblastic pregnancy.

## RECOMMENDATIONS

All cases of first trimester vaginal bleeding should have comprehensive abdominal and/or transvaginal ultrasonographic scans for evaluations.

## Competing Interest

The authors declare no competing interest.

## Authors' Contributions

Uduma FU: conception of the manuscript. Uduma FU, Eduwem DU: retrieve data and analyzed. Abbasiattai A, Ezirim E: Literature search. All authors: drafting the article and revising it critically for important intellectual content and final approval of the version to be submitted. All authors have read and agreed to the final version of this manuscript and have equally contributed to its content.

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