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MATERNAL MORBIDITIES AS DETECTED ON ULTRASOUND IN PATIENTS REFERRED FOR ANTENATAL ULTRASOUND EVALUATION.

Radiodiagnosis

Vyankatesh Aironi*

MD DNB, Associate Professor, Department of Radiodiagnosis, VCSG Government Institute of Medical Sciences and Research, Srinagar Garhwal- 246174 (Dist. Pauri, Uttarakhand state) *Corresponding Author

ABSTRACT

Antenatal ultrasound screening is used to assess not only fetal well-being, fetal congenital anomalies and syndromes, but also to assess the various maternal conditions associated with gravid state. The aim of our present record based study is to assess burden of maternal morbidities in gravid females and females with amenorrhea suspected to have pregnancy and also any morbid condition in absence of pregnancy but having amenorrhea due to some other cause. This study is conducted on patients referred for antenatal ultrasound examination in our hospital which is a tertiary care centre in hilly region of Garhwal of North Indian state of Uttarakhand.

Materials and methodology: This descriptive retrospective study conducted between March 2016 to December 2016 was assessed from records of antenatal ultrasound studies, with descriptive analysis using tests of significance and proportions wherever necessary.

Results: Total 767 antenatal ultrasound patients referred from Obstetrics and Gynecology department were assessed this period in which 21 positive cases of maternal morbid conditions were found, suggesting a prevalence of 2.74 % of maternal conditions in hilly Garhwal population. Most common maternal condition found was PCOS/ PCOD (6 cases-28.4 %), hepatic conditions (5 cases- 23.82 %), ectopic pregnancy (3 cases-14.3 %) and rest miscellaneous conditions (7 cases)

Conclusion: Antenatal ultrasound study of gravid patients was used in our study to assess burden of maternal morbidities and predict the outcome of such maternal conditions.

KEYWORDS

Antenatal Ultrasound, Maternal, Morbidities, Ectopic Pregnancy.

Introduction:-

The main objective of this record based study done in our tertiary care hospital in hilly terrains of Garhwal is to: i) assess burden of morbid maternal conditions in association with her gravid state on basis of ultrasound findings, ii) assess burden of abnormal gravid situation like ectopic pregnancy (EP) and evaluate morbidity thus caused on ultrasound, as EP can be life threatening condition. iii) guide referring clinician to help in management of such cases in future based on this e4xperience- like medical/ conservative approach, surgical or induction of labor as case may warrant, or even watchful expectancy in special cases based on ultrasound findings. iv) and review literature as to elaborate on preventive measures to detect, screen, and manage maternal conditions.

Materials and methodology:-

This retrospective hospital based study was done using records of antenatal ultrasound studies performed in year 2016 from March to December 2016, done in our hospital (HNB Base Government Teaching hospital) situated in Srinagar town of Garhwal region of Uttarakhand. Total 767 ANC cases of ultrasound were performed on a Toshiba Nemio Ultrasound scanner with Color Doppler using 3.5 Megahertz ultrasound convex probe. Total 21 positive cases of maternal conditions were found who had amenorrhea and suspected to have pregnancy or pregnancy related or associated conditions. Data was retrieved on Microsoft excel spreadsheet and analysis was done using proportions wherever necessary. Data was entered in tabular forms and also bar diagram was used to show proportions/ percentages of cases/ breakdown of clinical cases as assessed and confirmed on ultrasound.

DISCUSSION

Results and related case discussion:-

During the period of **March 2016 to December 20**16, total 767 antenatal ultrasound were performed and 21 **(n= 21)** cases had morbidities in the mother in one form or other either associated with gestation or had abnormal extra-uterine gestation or some suspected to have pregnancy were found otherwise and had either polycystic ovaries or anovulatory cycles which needed medical management**.** So the overall burden of maternal morbidities in antenatal ultrasound in our study is **2.74 %. The age group included in our study was 19 to 40 years. Majority i.e. 19 cases (90.47 % cases) were from 19 to 30 years age and rest two (9.52 % cases) were from 31 to 40 years age group. Table 1** shows composite distribution of cases diagnosis-wise with findings found on ultrasound. Total 21 cases (n=21) were referred for antenatal ultrasound after a brief or prolonged period of amenorrhea with some additional presenting symptom over and above confirmed or suspected pregnancy. **The Chart Diagram shows graphical presentation of percentage prevalence of various maternal conditions found.**

Six cases were referred for routine antenatal ultrasound when they presented in antenatal OPD of hospital whereas rest of 14 cases were advised emergency antenatal ultrasound due to various symptoms like vaginal bleeding/ spotting, PV leaking of liquor, lower abdominal pain, fever, jaundice and hematemesis in the patients (**Table 3**). **Table 2** shows district-wise distribution of cases and shows 57.14 % cases coming from nearby Pauri district as hospital situated in Srinagar town of Pauri district. Rudraprayag and Tehri Garhwal are two nearby districts and thus rest of the cases were mostly from these two districts (14.3 % and 19.04 % cases respectively). **Table 3** shows the various symptomatologies within this subset of female patients coming to antenatal clinic with some complaints (clinical symptoms) or for routine checkup with presumed pregnancy. **Table 4** shows overall prevalence of each maternal morbid condition diagnosed on antenatal ultrasound as overall prevalence as mentioned above is 2.74 %.

Majority of the maternal conditions detected incidentally on ultrasound was Polycystic ovarian syndromes (6 cases) who had presented with prolonged amenorrhea, suspected to be pregnant (perceived by patient themselves), were married and attended antenatal OPD clinic for getting routine checkup and later found to have polycystic ovaries on ultrasound **(Figure 1**). They were treated medically with ovulation inducing agents like clomiphene citrate. Few of them turned up later for follicular monitoring on ultrasound. Two cases of right ovarian cysts were treated conservatively as they had benign unilocular cysts due to anovulatory cycles. Out of this, one female had IUCD **[Figure 2]** (seen as bright echogenic tubular structure in mid-cervical canal on USG) in her cervix and needed removal of IUCD. **Table 5** reveals that 10 cases had no pregnancy and only 8 cases had intra-uterine gestation. Rest of three cases had ectopic pregnancy-out of which one (Nepali resident) had moderate hemoperitoneum due to ruptured right tubal ectopic pregnancy and was immediately operated upon. She had significant free fluid in abdomen, was in circulatory shock, in pain and had live ruptured tubal ectopic of 13 weeks gestation. This lady was 40 years old (advanced maternal age), multipara, illiterate and there was no family planning measure used. One case of right chronic ectopic in a medical professional was treated conservatively and later was lost for follow-up. Cervical ectopic (**Figure 4)** pregnancy had PV bleeding and was called for treatment in the respective department.

The ultrasound diagnosis in these maternal conditions helps in treatment of the abnormal condition in the mother (female patient), prognosticate case, and determine whether medical treatment will

help, surgical intervention will help or whether watchful expectancy is needed. The mother having viral hepatitis developed polyhydramnios due to viral infection and thus needed admission with medical management and pregnancy was monitored closely as she had internal echoes in liquor. A case of first trimester gestation with dark liver (viral hepatitis) and history of hematemesis also needs medical management and strict bed rest. Two cases having maternal hepatosplenomegaly had naturally a systemic infection in addition to her gestational status (both were in second trimester) and needed admission with medical management. The one case of maternal hepatosplenomegaly presenting in first trimester had PV bleed with small subchorionic bleed and needed medical management with indoor admission and strict bed rest. The gravid females having hepatosplenomegaly needed serological assessment of mother for TORCH group of infections. Usually such cases of TORCH infections lead to first trimester fetal anomalies and if presenting later usually develop polyhydramnios. Lastly the two cases of fibroid- a) A medical professional with first trimester early live gestation had large fundal subserosal fibroid **(Figure 3)** and needed strict monitoring of gestational status as later she developed red degeneration of fibroid with enlargement of fibroid on serial follow-up ultrasound. b) Other case had large lower uterine segment (LUS) fibroid uterus along with 30- weeks live gestation and thus needs strict monitoring with watchful expectancy till and when fetus attains maturity and C-section is thus warranted for as normal vaginal delivery is not possible with such large LUS fibroid uterus.

The only one case of PV leaking had reduced liquor with open internal os and active leaking of liquor and thus needed induction of labor to prevent fetal morbidity and mortality. One case of PCOS had Adenomyomatosis of uterus with pain in abdomen, needed medical treatment. One case of pseudocyesis of pregnancy was referred for ultrasound as she had prolonged amenorrhea with personal perception of fetal movements due to bowel gases and ultrasound revealed no pregnancy. She had anxiety and had shown herself for perceived pregnancy in at least five ultrasound clinics outside. She needed counseling and reassurance. There was a gravid female with 26 weeks live gestation having medical renal disease (MRD) and had deranged renal function tests. She needed medicine referral and close monitoring of pregnancy as eventually oligohydramnios develops in such cases.

Discussion (General Considerations):-

We now deal with some general considerations of various maternal morbidities or co-morbidities encountered in our study. We deal with important conditions like hepatic disorders in mother, ectopic pregnancy and polycystic ovaries which form major subset of our study. Later we will elaborate on other conditions. Most common situation in gravid patients was maternal hepatic disorder (viral hepatitis and hepatosplenomegaly) which commonly presented with fever, jaundice, one with hematemesis even. These all had systemic infection and viral hepatitis had viral origin which needed indoor admission and medical management. It should be noted that incidence of intrauterine infections thus developing due to maternal status is between 3 to 15 %[2, 13]. TORCH group of infections influence both severity and likelihood of fetal infection with infection spreading through placental barrier or fetal membranes[2, 13]. Infection is assessed by serological assessment of maternal antibodies especially in such cases of hepatosplenomegaly[2]. They can cause polyhydramnios like other maternal situations like diabetes mellitus, Rh incompatibility, pre-eclampsia, viral infections[3,4,13]. These maternal causes make up for 20 % of all causes of hydramnios[1, 3, 4, 13]. In one of our case internal echoes in liquor were seen in mother having viral hepatitis in third trimester pregnancy. This can lead to preterm labor and histological chorio-amnionitis[2, 3, 13]. Vaginal leaking in gravid uterus (PROM-premature rupture of membranes) is known to cause oligohydramnios and preterm birth with increased perinatal morbidity and mortality with high incidences of fetal pulmonary hypoplasias[3]. Fetal infections are also common in PROM. Cervical length is assessed by ultrasound and in cases of PV leaking of liquor, cervical lengths greater than 25 are reassuring[2]. Internal os diameter is also measured in case of funneling of internal os. Cervical cerclage is used as treatment for cases of early presentation of mid-trimester PROM to avoid preterm births[2,3,11,13].

We need to consider ectopic pregnancy in detail as it is a life threatening important condition often missed on transabdominal ultrasound. In fact most gynecologists recommend all to be 'ectopic minded' and have high index of suspicion in cases of amenorrhea presenting with vaginal bleed and pelvic pain. It is responsible for 80 % of all maternal mortalities in first trimester. It occurs due to implantation of conceptus outside uterine cavity. 95 % of ectopics are tubal whereas 5 % cases are non-tubal[10]. In our study the overall burden of ectopic pregnancies is 0.4 %, the worldwide prevalence being 1%[10]. The locals of hills here thus have a less burden of ectopic pregnancy compared to worldwide data. Ectopic pregnancy EP) is usually an extra-ovarian adnexal mass and most frequently presents as a live extra-uterine embryo with either PV bleeding or amenorrhea or lower abdominal pain with vaginal bleeding[1,2,10]. Shoulder tip pain may arise due to hemoperitoneum[10]. Circulatory shock may occur due to massive hemoperitoneum. Urine pregnancy test (UPT) is usually positive. Uterus shows no sac or any embryo, but decidual reaction (pseudogestational sac). Enlargement of the fallopian tube is due to recurrent bleeding in the wall by the conceptus, rather than the products of conception itself[8] – This actually produces an adnexal mass lesion. Later free fluid may be seen in abdomen on ultrasound due to hemoperitoneum[1, 2]. Transabdominal ultrasound (TAS) followed by transvaginal sonography helps in early diagnosis especially in clinically stable patients and allows for conservative treatment salvaging uterus and subsequent fertility, especially in interstitial and cervical types of EPs[10]. Color Doppler study might help in detection of trophoblastic ring of vascularity around conceptus in adnexal and also to rule out intra-uterine gestational sac[1, 2, 10]. Very rarely heterotopic pregnancy may be seen but that is very rare (incidence is 1: 20,000 to 1: 50, 000) (increased incidence to 1: 100, due to ovulation inducing agents, in-vitro fertilization, embryo transfer, history of previous pelvic surgery[2, 10]). Cervical ectopic comprises just 1 % of all ectopic cases[1]. Incidence of Cervical EPs is as low as 1: 8600 to 1: 12400[10]. They bleed profusely as cervix is fibrous[2,10]. Treatment is conservative, like local KCl injection, systemic or local methotrexate, or preoperative uterine artery embolization before dilatation and curettage[2,10].

Other rare forms of ectopic pregnancy are: - 1) Interstitial ectopic (2- 4 % of all ectopics)[2,10]:-

2) Scar ectopic pregnancy (extremely rare)[2, 10]:- incidence is 1: 1800 to 1: 2200 pregnancies.

3) Abdominal pregnancy[2, 10]- rare form with implantation usually in ligament of ovary, broad ligament.

PCOS (Polycystic ovarian syndrome) [6, 7, 8, 9, 12] is a broad spectrum metabolic disorder that results in oligomenorrhea, anovulation and causes infertility in most women. They have features of hyperandro genism and menstrual irregularities. On ultrasound, they usually in 60 % cases have bilateral polycystic enlarged ovaries with central echogenic stroma with volumes ranging above 9- 10 cc[6,7,8,9,12].

Similarly maternal co-morbidities like renal parenchymal diseases, anemia, malnutrition, cardiovascular diseases and maternal drug abuse, alcohol abuse and tobacco habits lead to oligohydramnios[1,2,3,5]. Maternal age, smoking, structural uterine anomalies, a history of previous miscarriage all adversely affect the outcome of pregnancy[2,3]. Uterine synechiae, uterine anomalies like septate uterus, fibroids lead to pregnancy losses[2]. Leiomyomas (fibroids) are most common neoplasms of uterus occurring in 20 – 30 % of women above 30 years age. They cause uterine enlargement, surface lobularity and lead to pelvic pain and dysfunctional uterine bleeding as well as anemia[2]. Rapid growth occurs during pregnancy due to high estrogen levels and lead to red degeneration of fibroid (in 50 % of cases)[2]. Fibroids lead to increased risk of abortions, and LUS (lower uterine segment) fibroids preclude normal vaginal delivery, necessitating C-section at term. Adenomyosis of uterus presents as a globular uterus with speckled echotexture on ultrasound with intramyometrial cysts or echogenic foci, presenting with excessive bleeding, and pelvic pain, uterine tenderness, dysmenorrhea[2]. It is very common condition, seen in reproductive age group and recorded to be present in almost 70 % of hysterectomy specimens; caused by migration of endometrial glands into stratum basale of myometrium. Treatment of adenomyosis includes use of oral contraceptive pills, GnRH, NSAIDs, and even hysterectomy in select cases.

Rarely intra-uterine contraceptive devices (IUCD) are seen concomitantly with intra-uterine gestation, or might get misplaced from uterine lumen[2,10]. IUCDs are known to increase incidence of EP if ever pregnancy occurs even in presence of IUCD (contraceptive failure) with clinical presentation of irregular bleeding. They can

migrate into myometrium of uterus. Relation of gestational sac with IUCD is assessed by transvaginal ultrasound (TVS) or transabdominal ultrasound (TAS), whether it is superior or inferior in relation to viable sac and whether its removal is feasible[2]. One such case of IUCD in mid-cervical canal was seen in association with anovulatory cyst of right ovary. They are benign unilocular cysts usually greater than 36 mm but less than 6 cms rarely exceeding upto 10 cm size, rounded anechoic on ultrasound with posterior acoustic enhancement, resolve spontaneously and vey rarely need aspiration under ultrasound guidance. The only complication that can occur is torsion of ovarian cyst and this is a surgical emergency[2].

Preventive aspects in ANC care (with a word about new WHO guidance for antenatal care of mother and baby)[11]:-

Routine ANC guidelines which are coming up and are being formulated by WHO are as follows:-

a) Clinical Interventions:-

i) Educational- includes advice regarding breast feeding, family planning, cessation of alcohol, smoking, and drug abuse, avoiding sexual intercourse, avoiding travel, healthy lifestyle, etc.

ii) Supplementation: - Iron, folic acid, multivitamins, Vitamin C, Magnesium, Zinc.

iii) Prophylaxis: - Vaccines like Tetanus, Flu shot (influenza), antimalarial drugs, low dose aspirin in special conditions, vaccines for diphtheria, pertussis.

iv) Management:- of nausea, vomiting, constipation, breech presentation, oral health, vaginal discharge, hemorrhoids, varicose veins, backache, PV bleeding, Acid peptic disease, fever, frequency of urination, palpitations, breathlessness, syphilis, parasitosis, depression, obesity, diabetes mellitus, hypertension, pre-eclampsia, unintended pregnancy.

b) Screening/ diagnostic procedures:-

1) Routine ABO,D, Rh testing
2) TORCH serological assessment including HIV serology
3) Weight and BMI
4) Serial ultrasound assessment (at least four)
5) Fetal heart auscultation
6) Symphysis-fundal height.
7) Breast and pelvic examination.
8) Fetal movement count, NST,
9) Urinalysis
10) Tests for Thalassemia, sickle cell anemia, diabetes mellitus.
11) Triple serum tests, Quadruple screen tests based on ultrasound in first trimester.

Stress is laid on early antenatal detection of gestational diabetes, thrombophilia, mental illness, asthma, anemia, thyroid disorder, hemoglobinopathies, and anti-RhD immunoprophylaxis. Last but not the least, - screening for fetal anomalies, screening for Down's syndrome, early first and trimester ultrasound, late USG with color Doppler assessment; all these form important screening tests. Important to note is 1) to attain health promotional activities 2) proper family planning 3) prevention of STDs, by use of contraception.

Conclusion:-

The basic aim of this hospital based retrospective study was to assess maternal disease burden along with gravid status which we found in eight gravid cases, and also assess any abnormal gravid situation like ectopic pregnancy, which we discussed in great detail in 'Results' section with regards to the three ectopic pregnancy cases in which all three led to morbid abdominal pain in all 3 cases with vaginal bleeding and even serious maternal circulatory shock in ruptured tubal live ectopic pregnancy in a Nepali resident-working in Rudraprayag district. So also we wanted to assess the situations which were presumed clinically and by patient as pregnancy but we found otherwise on ultrasound as they though had prolonged amenorrhea; had situations like polycystic ovaries (PCOS), anovulatory cycles and even pseudocyesis in one case which led to amenorrhea for obvious hormonal disturbances for whatever organic or functional cause. The other intention of study was to guide referring clinician to possible medical or surgical intervention or suggest watchful expectancy as discussed earlier with laboratory evaluation wherever required, including indoor admission and prognosticate the gravid situation. We also dealt with a new aspect of WHO guidance under formulation on safe antenatal care with preventive measures at length; the basic goal of all antenatal care being 'safe-motherhood' and 'healthy child', with of course reduced maternal morbidity and mortality as well as reduced perinatal morbidity and mortality.

Table 1: Composite Table showing all variables with diagnosis on Ultrasound.

Sr No	Age (yrs)	Region	History*	USG findings
1	23	Other	PV bleeding	Rt Ovarian cyst with IUCD in mid-cervix, No Gestation
2	23	Pauri	Amenorrhea	PCOS
3	22	Chamoli	Jaundice	30 weeks IU live Gest with hydramnios and hepatomegaly (dark liver)
4	19	Pauri	Routine Checkup	31 wks IU live Gest with 8 x 6 cm fibroid uterus
5	28	Pauri	Pain Abdomen	Rt Ovarian cyst, No Gestation
6	20	Pauri	PV leaking	35 wks *IU live Gest with scanty liquor, os-open
7	26	Pauri	Pain Abdomen	26 wks live IU Gest with maternal medical renal disease
8	40	RPG	Suspected ectopic	Ruptured live Rt Tubal ectopic gestation with moderate hemoperitoneum, CRL= 13 wks GA
9	22	RPG	Haematemesis	10 wks IU live Gest, Dark maternal liver
10	30	Pauri	Routine Checkup	Pseudocyesis, No Gestation
11	31	Pauri	PV spotting	Rt Adnexal TO complex mass ? ectopic -chronic
12	29	TG	Amenorrhea	PCOS
13	23	Pauri	Fever & Pain Abd	10 wks live IU *Gest, small subchorionic bleed with maternal hepatosplenomegaly
14	22	Pauri	Fever	23 wks live IU Gest, maternal hepatosplenomegaly
15	25	TG	Fever	25 wks live IU Gest, maternal hepatosplenomegaly
16	27	Pauri	Routine checkup	6 wks live IU Gest, 10 x 9 x 7 cms Fibroid uterus
17	30	TG	Amenorrhea	PCOS
18	26	Pauri	Pain Abdomen	PCOS with Adenomyomatosis uterus
19	23	Pauri	PV bleeding	Cervical ectopic pregnancy
20	26	TG	Routine Checkup	PCOS
21	27	RPG	Routine Checkup	PCOS

*RPG- Rudraprayag, TG- Tehri Garhwal, IU -Intrauterine, Gest-Gestation

Table 2:- District-wise distribution of patients

Sr No	District	No of cases(a)	a/21(%)
1	Pauri	12	57.14 %
2	Rudraprayag	03	14.3 %
3	Tehri Garhwal	04	19.04 %
4	Chamoli	01	4.8%
5	Other	01	4.8%

Table 3:- Symptom-wise distribution of cases.

Sr No	Presenting complaint	No of Cases (n= 21)
1	PV bleeding	03 (14.3 %)
2	PV spotting	01 (4.8 %)
3	Pain lower Abdomen	03 (14.3 %)
4	Fever	03 (14.3 %)
5	Jaundice	01 (4.8 %)
6	Suspected ectopic (severe abd pain with PV bleeding)	01(4.8 %)
7	Hematemesis	01 (4.8 %)
8	Amenorrhea	02 (9.5 %)
9	Routine ANC checkup	06 (28.6 %)

Table 4:- Condition wise distribution of cases

Sr No	Morbid condition	No of cases (n= 21)[n/21= %]	Gestation (present/ absent)Y/N	Overall prevalence (2.74 %)- Breakup of cases.
1	Polycystic ovaries (PCOS)	06 [28.6 %]	No	0.88 %
2	Maternal Viral hepatitis	02 [9.52 %]	Yes	0.26 %
3	Maternal hepatosplenomegaly	03 [14.3 %]	Yes	0.4 %
4	Ectopic pregnancy	03 [14.3 %]	Yes, Abnormal	0.4 %
5	Ovarian cyst	02 [9.52 %]	No	0.26 %
6	Fibroid uterus	02 [9.52 %]	Yes	0.26 %
7	Medical renal disease (maternal)	01 [4.8 %]	Yes	0.13 %
8	Miscellaneous	02 [9.52 %]	---	0.26 %

Table 5: Table showing status of gestation.

Sr No	Status of pregnancy	No of cases (x)	% (x/21)
1	Intrauterine (IU)Gestation present	08	38.1 %
2	Ectopic Gestation present	03	14.3 %
3	No Gestation (IU or ectopic)	10	47.6 %

Chart Diagram showing percentage prevalence of maternal morbid conditions:-

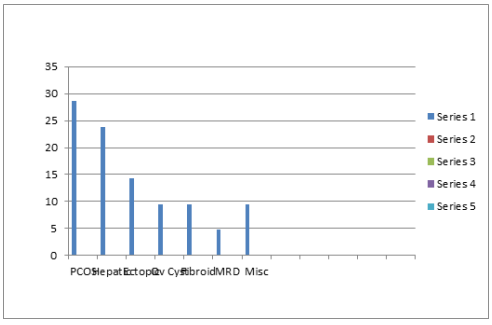

Figure 1:- USG image showing bilateral polycystic ovaries with increased sizes and typical 'string of beads' appearance of small follicles with central echogenic stroma.

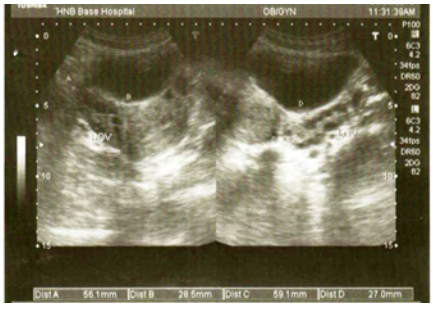

Figure 2:- USG showing IUCD in mid-cervical canal seen as bright echogenic tubular structure with strong beam attenuation.

Figure 3:- USG image of a first trimester gravid female with large fundal subserosal fibroid in uterus seen as rounded hypoechoic structure with internal 'whorled' architecture.

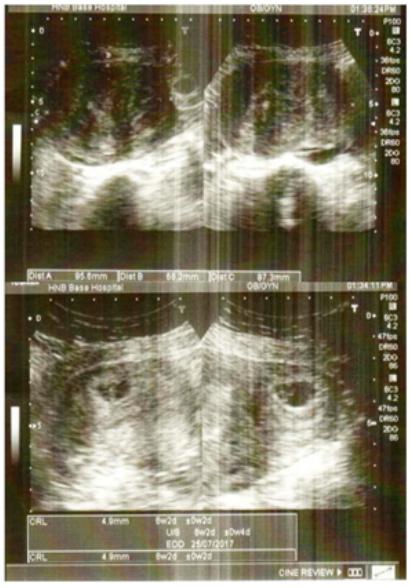

Figure 4:- Ultrasound image of a rare cervical ectopic pregnancy of 8 weeks gestation.

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