



Radiodiagnosis

ABNORMAL PREGNANCY CONDITIONS IN FEMALE PATIENTS REFERRED FOR ANTENATAL ULTRASOUND STUDY (HOSPITAL-BASED STUDY) IN A TERTIARY CARE HOSPITAL IN GARHWAL

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ABSTRACT Antenatal ultrasound screening is used to assess not only fetal well-being, fetal congenital anomalies and syndromes, but also to assess the various abnormal conditions associated with the gravid state; including miscarriages, placental abnormalities, embryonic and fetal demise, fetal growth retardation, ectopic pregnancy, uterine wall lesions, cervical issues, liquor abnormalities, premature rupture of membranes, etc. The aim of our present record based study is to assess burden of such abnormal conditions during antenatal period in gravid females. 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.

KEYWORDS : Abnormal Pregnancy, Antenatal Ultrasound, Incomplete Abortion, Missed Abortion.

Introduction:-

This retrospective hospital based study of antenatal ultrasound cases derived from ultrasound patient records of hospital done in year 2016, helps us to assess the burden of abnormal pregnancy conditions in local Garhwali population especially of four major districts viz. Pauri, Tehri Garhwal, Chamoli and Rudraprayag; as this is the only tertiary care centre between Char Dhams of Uttarakhand and Rishikesh (plains). It helps in identifying common antenatal issues in the locals and guides the clinicians as to what conditions are common here due to difficult connectivity, remoteness and lack of tertiary centers in interiors of hills. It also helps clinician to plan the therapy like watchful expectancy, induction of labor, Caesarean sections, uterine curettage, laparoscopy, laparotomy, interventional procedures like amniocentesis, karyotyping, etc and even medical management as the case may be. The need of at least four antenatal checkups followed by ultrasound in antenatal period is felt by all clinicians and well established in Indian landscape, whether it be plains or hills! We can assess the common presentations of such subset of patients like vaginal bleeds, miscarriages, even identification of emergent situations like ectopic pregnancy (EP), placental abruptions, placenta previa, acute PROM (premature rupture of membranes), chronic conditions like IUGR, hydramnios, and even fetal demise (IUD). Referral to higher centers in special conditions can also be assessed (as guided by the sonographic and clinical presentation of the case) for specialist and superspecialist services, like cardiac disorders (Rheumatic heart diseases) etc. The need to assess the various conditions by different laboratory tests like TORCH serology, Rh blood grouping, BSL, lipid profiles, etc can be decided from such a database study along with justification for the need of Color Doppler investigation like in IUGR, IUD, nuchal cord, cord blood sampling, etc in special cases when in need. Ultrasound helps in routine assessment of embryonic/ fetal viability, gestational age, presenting part, status of liquor, BPD assessment, biophysical profile, status of placenta, uterine wall and Caesarean scars, scar integrity, status of internal cervical os, cervical length, nuchal cord if any, any fetal congenital anomalies, any uterine congenital anomalies in first trimester, presence of any leiomyomas in uterus, AFI, etc and also the urgent need, if any for C- section can also be assessed. Status of pelvic cavity can also be assessed. Need for Color Doppler and 3-D and 4-D ultrasound cannot be overemphasized as they are well established modes of extended clinical assessment of fetus and mother. Ultrasound machines have become part and parcel of the labor rooms, ER, side labs; and even in clinical setups to avoid patient discomfort and are made readily available to patients wherever possible.

Materials and methodology:-

This descriptive record based study of antenatal ultrasound examinations was done in Department of Radiology, HNB Base Teaching Government Hospital, Srinagar Garhwal, District Pauri in the north Indian state of Uttarakhand; during period of 2016 in months of March to December. Total 767 antenatal ultrasound cases (of patients of age group 19 to 40 years) referred from ANC OPD were assessed on Toshiba Nemio Color Doppler Ultrasound machine

(Model SSA- 510A; Toshiba Corporation, Tokyo, Japan) using 2- 5 MHz ultrasound convex transducer. Overall 91 positive cases of abnormal pregnancy conditions were identified from 767 cases, the data of which was retrieved on a predesigned proforma and was recorded and tabulated including variables at the time of diagnosis (including details of patient name, age, region, present weight, blood pressure results, past history, present complaints, any laboratory test results, ultrasound findings, sibling history, last menstrual period dates (LMP), any previous ultrasound results, history of past miscarriages, etc). The patients were evaluated by ultrasound with full bladder especially in first trimester or partially full bladder in second / third trimester with coupling gel applied over maternal abdomen in presence of a female attendant. Uterus, cervix, intra-uterine conceptus, products of conception, internal os, cervical length, details of embryo/ fetus, pouch of Douglas, peritoneal cavity, all were visualized as the case may be. Adnexae were also evaluated and vascularity assessed wherever necessary. Data obtained was entered on a Microsoft excel spreadsheet to apply statistical analysis, using proportions wherever necessary. All data was statistically analyzed using standard methods like percentage analysis, averaging and graphical analysis was also performed, tables showing variables and common conditions were prepared to give results and conclusive methodical analysis of study done, which are discussed in further paragraphs.

Results (Case-related discussion):-

The present study of abnormal pregnancy related conditions done in our tertiary care center situated in Garhwal, deals with locals coming right from Indo-Tibetan border and surrounding four main districts of Garhwal region. We came across 91 abnormal cases out of total 767 antenatal ultrasound cases in year 2016, indicating overall prevalence (disease burden) of 11.9 % in pregnant women. The major presenting complaints of such positive cases included vaginal spotting and bleeding, PV (per vaginum) leaking of liquor, lower abdominal pain, perception of reduced or absent fetal movements, obvious lack of abdominal girth, sometimes pendulous abdomen with maternal discomfort and even emergent symptoms of maternal shock, acute pain in abdomen, convulsions, etc depending upon underlying condition [Table 1 and Bar Diagram A]. Nearly 56% cases had vaginal bleeding / spotting, whereas 26.4 % cases had complaints of reduced, (even absent) fetal movements. Table 3 reveals that 42.9 % cases came from Pauri district, whereas 20.9 % cases each came from Rudraprayag as well as Tehri district each. Table 2 reveals the various abnormal pregnancy conditions like Incomplete abortion (36.3% cases), Missed abortion (9.8 % cases), IUD (5.5 %), IUGR (8.8 %), subchorionic bleeds (12.1%), placental abruption (6.6 %), placenta previa (5.5% cases) and other miscellaneous conditions forming about 15.4 % of cases. Obviously abnormal situations predominate in first trimester (59/91 cases) whereas 19 / 91 cases presented in second trimester and about 13 / 91 cases presented in third trimester.

We found three cases of ectopic pregnancy, out of which a 40 years woman (multipara) presented with circulatory shock due to ruptured live tubal ectopic with moderate hemoperitoneum on ultrasound

assessment, and underwent immediate laparotomy. One had cervical ectopic, and other lady had chronic TO mass due to chronic ectopic (a local doctor-GP). The major subset of the cases belong to Incomplete abortion category, who presented with vaginal bleedings and mostly had retained products of conception (RPOC) on ultrasound assessment, and some of these cases had open cervical os with effaced cervix [Table 5]. Only one case of RPOC was due to bicornuate uterus with gestation in left uterine horn. Abnormal liquor conditions like polyhydramnios was seen in 4 cases, out of which one was due to oesophageal atresia (36 weeks live IU gestation), other one was due to Anencephaly (28 weeks live IU gestation), third was due to maternal viral hepatitis, last one was idiopathic in origin and underwent laboratory evaluation. PROM led to oligohydramnios in two cases and was advised induction of labor by the clinician. A monochorionic diamniotic twin live pregnancy in third trimester was complicated by fetofetal transfusion syndrome (TTTS) with stuck donor twin with low weight and oligo-hydramniotic sac, whereas the recipient twin had higher EFW and had hydramniotic sac. One case of first trimester live Dichorionic diamniotic twin gestation showed subchorionic small bleed, with characteristic 'twin peak' sign denoting its chorionicity⁸ on ultrasound [Figure 4]. Red degeneration of uterine fibroid was seen in serial follow-up ultrasound of a relative of resident doctor with increasing fibroid size, increasing vascularity and increasing lower abdominal pain as pregnancy advanced. A third trimester case had LUS fibroid of 7 x 6 cms size, which obviously precluded normal vaginal delivery.

Intra-uterine fetal demise (IUD) was seen in five cases, out of which one had placental abruption, other was due to subchorionic bleed and rest of the three other had no obvious cause [Figure 1 and 2].

General considerations (Discussion):-

We will elaborate in detail on miscarriages- the main abnormal condition seen in our study. It is reported that about 15% of clinically detected pregnancies undergo spontaneous miscarriage; and this loss is estimated to be 2- 3 times higher in very early and often clinically unrecognized pregnancies, denoting local trauma/ jerk to be inciting factor^{1,4}. 25 % of patients in first trimester develop vaginal self limiting spotting; the cause being implantation of the conceptus into decidualised endometrium¹. However in few of such cases, cervix dilates, and miscarriage occurs with a bout of lower abdominal pain. Such cases on ultrasound show RPOC in uterine lumen and need uterine curettage¹. In cases of PV bleeding, if cervical os is found to be closed it is termed as threatened abortion, wherein the embryo is live. 50 % of such cases have natural outcome and rest 50 % abort eventually¹. The term 'Missed abortion' is used interchangeably with 'Embryonic demise', when os is closed and embryo is dead¹. Blighted ovum indicates a situation in which no embryonic pole is seen, yolk sac is > 6 mm in diameter, and os is closed¹. Differential diagnosis of threatened abortion includes EP^{6,9} and GTD (molar pregnancy-gestational trophoblastic disease)^{1,4}. Herein ultrasound helps in first trimester bleeds to assess viability of embryo/ fetus, status of os and cervical length⁹, presence of any RPOC, in addition to ruling out EP; along with additional help by serum hCG levels^{1,8}. In case of absent IU sac with high hCG levels above discriminatory levels⁸, ectopic pregnancy should be suspected. The case might need assessment by TVS (Transvaginal sonography) with Doppler to demonstrate 'trophoblastic ring' around adnexal pregnancy if found^{6,9}. Treatment of EP can then be planned by clinician depending upon findings on ultrasound of site of ectopic, presence of hemoperitoneum, etc.

Bland subchorionic bleeds¹ (which form 26 % of our cases in our study) are found in first trimester and are believed to occur due to effects of chorionic frondosum derived from fetus over the decidua basalis, with erosive effect leading to venous bleeds and separation of margin of placenta or a marginal sinus¹. It is also termed as 'perigestational' or implantation bleeds¹. Incidence of miscarriages increase by two- three folds cases with subchorionic bleeds and need extra care, bed rest and follow up in antenatal clinics. Cases with live embryo have favorable outcome. Normal fetal heart rate (FHR) during 5- 6 weeks gestation is 100- 115 per minute, whereas in 7-9 weeks gestation it is around 140 Bpm¹. However if in first trimester, fetal bradycardia occurs (FHR < 100 Bpm) in presence of vaginal bleeding, it indicates an ominous sign, usually ending in spontaneous abortions. Such fetal bradycardias are found commonly (as reported in past studies) in aneuploidies (Trisomy 13, 18 and 21 as well as Turner

syndrome)¹.

Another important condition is disorders originating from placenta; namely- placenta previa and abruptio placentae which give rise to antepartum hemorrhage (APH). We always look for lower edge of placenta on sonography to see whether it is covering internal os or not, a low lying placenta indicating that its lower edge is within 2 cms distance from internal os of cervix, whereas if it reaches and covers it; it is termed as 'placenta previa'^{2,4}. As gestation advances; the placenta usually is carried away towards fundus due to differential growth of LUS of uterus leading to elongation of uterus². Placenta previa is most common cause of third trimester vaginal bleeds, the incidence being 0.5 – 1 % at term with increased incidence in multipara, advanced maternal age, history of previous C-section, abortions². It is termed as 'complete', when a placental portion completely covers internal os; it is called 'marginal' if the tissue reaches the os but does not cover it². 'Central placenta previa' term indicates that the midportion of placenta and not just the edge covers the os. TAS (transabdominal sonography) is usually used to assess the severity and grade of placenta previa as well as status of os and cervix². In third late trimester even translabial ultrasound can help in detection when maternal bladder is empty, pubic bone produces shadowing or in case of maternal obesity. Overfull urinary bladder can give false impression of placenta previa on USG^{2,9}. An Abruptio placentae is an acute disorder which leads to retroplacental clot (RPC); the incidence of which is 5 %, in pathological specimens. In our study, it is about 6.6% (06/91 cases)^{2,4}. It occurs commonly in PIH, substance abuse, anticardiolipin antibodies, blunt trauma and chorioamnionitis². If 30- 40 % of stripping of placenta from uterine wall occurs due to large RPCs, the outcome can be dismal, especially IUD occurs with greater than 50% stripping of placenta from uterine wall (RPC volume > 50 ml)². Ultrasound is best to assess the RPC and its volume using formula for prolate ellipsoid volume (Volume= Pi/7 x Ax B x C= 3.14/7 x A x B x C= A x B X C/2). In our UG days, a senior gynecologist used to say that a fist-sized RPC indicated 500 volume of blood. Focal myometrial contraction or a leiomyomas can mimic RPC on sonography. Hence sometimes Color Doppler study is used to identify absence of vascularity in the clot. Clinical incidence of abruption is 0.5 to 1 %; and it is leading cause of perinatal mortality (15- 20 %) ². It leads to maternal shock, DIC with acute pain in lower abdomen with or without vaginal bleeding². It is common in women with substance abuse, advanced age². In chronic cases it leads to IUGR.

Abnormal liquor conditions like polyhydramnios and oligohydramnios need also to be discussed in short as they too form the spectrum of abnormalities. Polyhydramnios^{3,7} is caused by i) maternal factors (20 % causes) - like DM, Rh incompatibility, PIH, TORCH group of infections, CHF. ii) Fetal anomalies (20% causes) - like CNS, GI, cervical anomalies all of which lead to impaired swallowing of liquor. iii) Idiopathic origin- 60 % of causes^{4,7}. Oligohydramnios is common in fetal urinary tract anomalies, IUGR, PROM, postmaturity⁴. Fetal growth retardation (IUGR) is another important condition which is best diagnosed in third trimester by serial ultrasound and Color Doppler, by evidence of discrepant BPD, FL and AC with poor weight (usually < 2200 gm wt), reducing liquor and presence of diastolic notch in uterine Doppler flow pattern, reduced diastolic flow in umbilical artery, and fetal brain sparing effect in fetal MCA on Color Doppler flow velocimetry^{4,7}. IUGR is commonly associated with substance abuse, debilitating maternal illnesses, PIH, malnutrition, etc⁷. Thus far we have considered all major abnormal pregnancy conditions which we found in our study.

Conclusion:-

By far overall prevalence of incomplete abortion in our study in local population is 4.3 %; that of missed abortion is 1.2 % (Table 2); overall prevalence of IUD is 0.65%, ectopic pregnancy 0.4 %, abruption placentae- 0.8 %, IUGR- 1.04%. There is higher overall prevalence of bland subchorionic bleeds of 1.43 % in locals. Such findings which are tabulated in this study give an insight that almost 11.9 % antenatal cases did not have favorable outcome and these values could be detected on transabdominal sonography, thereby inferring the valuable role of ultrasound in diagnosis and decision making of various abnormal conditions seen during antenatal period, allowing clinician to predict outcome of pregnancy and treat wisely according to information gained hereby. Additional benefit obtained by TVS, translabial sonography and Color Doppler flow velocimetry need not

be overemphasized as these are well- established modes of extended clinical examination in today's clinical practice to achieve good results from all diagnostic paraphernalia we have in our armamentarium.

Table 1:- Distribution of cases symptom-wise

Sr No	Symptom/ history	No.(n= 91)	%
1	PV bleeding	44	48.4 %
2	PV spotting	06	6.6 %
3	PV leaking	03	3.3 %
4	Abs. fetal movements	05	5.5 %
5	Routine antenatal checkup	24	26.4%
6	Fall from height	01	1.1 %
7	Maternal factor	03	3.3 %
8	Abortifacient intake	01	1.1 %
9	Tubal ligation failure	01	1.1 %
10	Pain in lower abdomen	01	1.1 %
11	Pre-eclampsia	01	1.1 %
12	Post-dated pregnancy	01	1.1 %

Table 2:- Distribution of variables diagnosis-wise

Sr No	Final diagnosis	No[x] (n= 91)	% prevalence (x/n)	Overall prevalence (x/ 767)in local population
1	Incomplete abortion	33	36.3 %	4.3 %
2	Missed abortion	09	9.8 %	1.2 %
3	Intra-uterine fetal demise (IUD)	05	5.5 %	0.65 %
4	Oligohydramnios	01	1.1 %	0.13 %
5	Polyhydramnios	04	4.4 %	0.52 %
6	Ectopic pregnancy (EP)	03	3.3 %	0.4 %
7	Placenta previa	05	5.5 %	0.65 %
8	Abruptio placentae	06	6.6 %	0.8 %
9	IUGR	08	8.8 %	1.04 %
10	PV leaking (PROM)	02	2.2 %	0.26 %
11	Subchorionic bleeds (plain)	11	12.1 %	1.43 %
12	Complicated twin pregnancy	02	2.2 %	0.26 %
13	Fibroid uterus	02	2.2 %	0.26 %

Table 3:- Distribution of cases district-wise

Sr No	District	No of cases (n= 91)	% of cases
1	Pauri Garhwal	39	42.9 %
2	Rudraprayag	19	20.9 %
3	Tehri Garhwal	19	20.9 %
4	Chamoli	13	14.3 %
5	Others	01	1.1 %

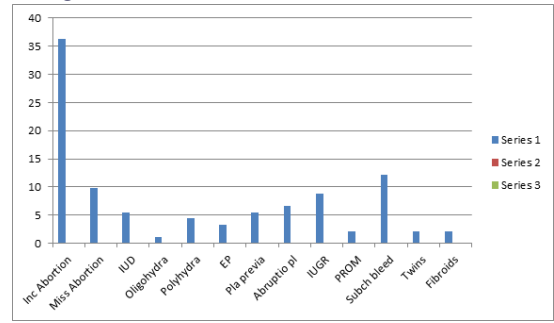
Table 4:- Month-wise distribution of cases

Sr No	Month 2016	ANC cases (a)	Abnormal cases[b] (n= 91)	% (b/a)
1	March	56	09 (9.9 %)	16 %
2	April	52	03 (3.3 %)	5.7 %
3	May	95	17 (16.28 %)	17 %
4	June	72	15 (18.7 %)	20.8 %
5	July	81	10 (16.5 %)	12.34 %
6	August	83	07 (7.7 %)	8.34 %
7	September	97	09 (9.9 %)	9.2 %
8	October	71	05 (5.5 %)	7.04 %
9	November	74	06 (6.6%)	8.1 %
10	December	86	10 (10.99 %)	11.63 %

Table 5:- Features in association with incomplete abortion.

Sr No	Features with Incomplete abortion	No of cases (Total= 33)
1	With RPOC	25
2	With os-open and effaced cervix	03
3	G sac in process of evacuation	02
4	Bicornuate uterus	01

Bar Diagram A



Legend 1:- Sonography image showing early fetal demise with hyperflexed fetal spine, fetus showing constant similar position and absence of heart beats on M-mode. (figure 1)



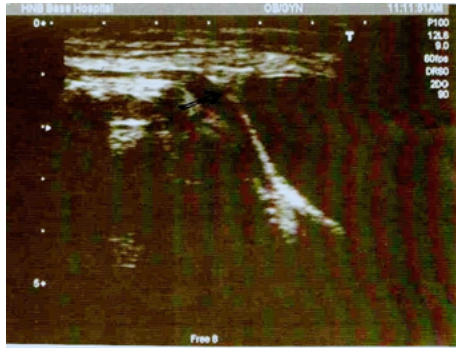
Legend 2:- Late third trimester IUD with Splading's sign, absent blood flow on Doppler, hypoechoic fetal viscera with pleural collections and ascites.(figure 2)



Legend 3:- Type 3 (complete) placenta previa completely covering internal os and preventing engagement of fetal head, cervix is showing normal length.(figure 3)



Legend 4:- Dichorionic diamniotic twin pregnancy which had subchorionic bleed (not shown); showing typical 'twin peak' sign on sonography.(figure 4)



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