# Sonographic Evaluation of Ectopic Pregnancies

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**This study was carried out in the Radiology Department, District Head Quarter Teaching Hospital (D. H. Qr) and Dera X-Rays / Ultrasound Clinic, Dera Ismail Khan, NWFP, by performing abdominal and pelvic ultrasonography of all the suspected patients and endo-vaginal of selected cases by comparing with other modalities used for the diagnosis of pregnancy especially the ectopic. Eighty-five percent cases of ectopic pregnancies were diagnosed by abdominal / pelvic ultrasonography, while this ratio was increased up to 95% by endo-vaginal ultrasonography in those cases where the abdominal sonography was not helpful for accurate diagnosis. The study concluded that increased availability of ultrasonography leads to improve quality in the detection of ectopic pregnancy. It is necessary to screen all the patients with first trimester cramping and bleeding by ultrasonography.**
**Key words: Extra- Uterine pregnancy, Ultrasonography**

Ectopic pregnancy occurs when a fertilized ovum implants at a site other than the endometrial lining of uterus, like ovary, fallopian tubes, interstitium (cornu) cervix and peritoneum[1]. A definite ectopic pregnancy is characterized by the presence of thick, brightly echogenic ring like structure outside the uterus with a gestational sac containing an obvious fetal pole, yolk sac or both[2].

Presence of adnexal mass other than a simple cyst with a history of amenorrhea and without obvious echoes of gestational sac / fetal pole raises the suspicion of ectopic pregnancy. The absence of an intra-uterine sac in conjunction with hCG values above than the discriminatory cutoff value signifies ectopic pregnancy; however, the absence of an intra-uterine sac has no diagnostic significance when associated with hCG values below the discriminatory zone. An intra-uterine sac associated with hCG levels above the discriminatory zone reliably indicates an intra uterine pregnancy, but at hCG values below the zone, it is suggestive of an abnormal pregnancy, either a missed abortion or an ectopic pregnancy. When there is an adnexal mass, fluid in culde sac, measurable circulating hCG with no intra uterine sac are highly specific rather definite findings for the diagnosis of ectopic pregnancy[3].

An interstitial (cornual) ectopic pregnancy is one that implants at the vascular region of uterus near the insertion of fallopian tube so they grow rapidly. It is a rare form of ectopic pregnancy that carries a higher morbidity and mortality than other tubal pregnancies. Because of its increased size and partial endometrial implantation, these advanced ectopic pregnancies can be misdiagnosed as an intra uterine pregnancy. A clue to the diagnosis of an interstitial ectopic pregnancy is the eccentrically located gestational sac surrounded by asymmetric myometrial mantle and a separate empty uterine cavity with endometrial echoes is most common findings. If myometrial thickness around the gestational sac is less than 5 mm it is suggestive of interstitial ectopic pregnancy. The differential diagnosis must take into consideration a pregnancy within one horn of a bicornuate uterus and a pregnancy within a myomatous uterus. Trans-vaginal ultrasonography reveal an interstitial line, a useful diagnostic sign of interstitial ectopic pregnancy, which extends from uterine cavity to the gestational sac[4,5,6].

About 30% of women with extra- uterine pregnancies have no sonographic evidence of adnexal mass, free intra peritoneal fluid or in culde sac. A pseudo gestational sac (decidual reaction and an echoic fluid in the endometrial cavity) can be seen in 10-20% cases of ectopic pregnancies[7].

Incidence of ectopic pregnancies are steadily increasing in women having prior tubal infection, induced abortion with D and C, ligation, surgery and fallopian tubes anatomical abnormalities, endometrial abnormalities, pelvic inflammatory disease, pelvic adhesions, tumors, septate uterus, presence of intra uterine device in use of oral contra captives.

Those females taking fertility drugs have a higher risk of ectopic pregnancy though it is decreasing with increasing parity[1]. Most women with a history of ectopic pregnancy do not become pregnant again but of those who do, 25% will have another ectopic[8]. Its occurrence is mostly in women aged 25-34 years but women aged 40 and above had 5.9 fold, while of 35-39 years had a 2.6 fold higher risk of death than that of women 25-29 years. It also leads to fetal wastage, maternal morbidity and problem of future fertility. Patients referred for ultrasonography abdomen / pelvis, with various presenting complaints like pelvic pain, vaginal bleeding with a Hx. of 6-12 weeks amenorrhea.

Initially the pain is localized to the side of ectopic but after rupture, pain becomes more diffuse up to shoulder with faintness. The classic triad of vaginal bleeding, adnexal tender ness, and adnexal mass are present in less than 30% of ectopic pregnancies[9]. Culde sac is considered as potential space, especially in the evaluation of patients at high risk for ectopic pregnancy[10]. In trans-abdominal scanning, a full urinary bladder is used to displace bowel gas and serve as acoustic window to allow a large viewing field of pelvis but in trans-vaginal scanning, high

frequency transducer is used which enables optimal imaging of organs close to the probe, including endometrium, tubo-ovarian abscesses, uterine fibroids even an infected pelvic kidney. A normal fallopian tube may not be visualized at endo-vaginal ultrasonography, however a fluid or pus filled tube can be identified therefore it is the preferred technique of ultrasonography. Also a full urinary bladder is not necessary for this, which delays the examination like in the abdominal ultrasonography[11].

**Patients and methods**

This study was carried out in the Radiology Department, D. H. Qr. Teaching Hospital, Dera Ismail Khan, Dera X-Rays / Ultrasound Clinic and Aijaz Ultrasound Clinic for Doppler / trans-vaginal ultrasonography during 2000-2005.

Total cases of ectopic pregnancy diagnosed by the ultrasonography were 32, most of them presented with amenorrhea of 2-3 months, pain lower abdomen / pelvis, vaginal bleeding but in few cases, the severity of lower abdominal pain was much increased up to the shoulder tip with cramp rather in a position of clinical shock. Abdominal ultrasonography done in all 32 patients but in few cases, trans-vaginal ultrasonography was necessary to perform due to difficulty in the proper diagnosis but patients were reluctant not to do because of religious and socio-cultural factors, however they were convinced and procedure was performed by Lady Doctor along with monitoring of findings by the Radiologist in adjacent room due to lack of competent female Sonologist.

**Results**

Out of 32 patients included in the study, 22 revealed minimal to moderate quantity of free fluid in culde sac with an echogenic ring in the fallopian tube, mostly on the lateral end, the adnexal tubal ring in ultrasonography. For proper diagnosis of ectopic pregnancy, differentiation of tubal ring echogenicity from the echogenicity of ovarian parenchyma and corpus luteum is important. It is worth mentioning that tubal ring of an ectopic pregnancy is more echogenic then ovarian parenchyma, and the corpus luteum is usually equal to or less echogenic then the ovary. Echogenicity of an adnexal mass may help to distinguish the tubal ring of an ectopic pregnancy from a corpus luteum.

In 15 cases fetal pole / yolk sac, visualized with active cardiac activity in 8 patients. In 6 patients, an adnexal mass visualized with small rounded sonolucent centre and echogenic walls but without fetal pole / yolk sac. Minimal free fluid in culde sac also visualized, still it was difficult to differentiate these from corpus luteum cyst, so trans-vaginal procedure performed which confirmed these cases as of ectopic pregnancy.

One patient with repeated tubal pregnancy, initially on the right side, then on left, presented both the times with severe pain lower abdomen, significant quantity of thick consistency free fluid in culde sac / pelvic cavity. First time a gestational sac of 8 weeks 4 days age visualized (Fig. 1) in the ampullary part of fallopian tube with active cardiac activity. Second time she came with 10 -11 weeks amenorrhea and sufficient free fluid in the pelvis on Pelvic Ultrasonography but failed to outline any gestational sac/echogenic ring in the fallopian tube. Due to acute emergency with patient going to shock , no other diagnostic investigation performed and laporotmy done with most probable suspicion of burst ectopic tubal pregnancy and that was proved .

Two cases were found with no amenorrhea but two months history of irregular menstrual cycle. Ultrasonography revealed a minimal quantity of free fluid in culde sac, with ill-defined echoes in the uterine canal, suspected the cases of ectopic pregnancies with pseudo gestational sac in the uterine cavity. One case, married 2-3 months ago, with no history of amenorrhea but a complaint of lower abdominal discomfort and irregular last menstrual cycle completed few days ago. Ultrasonography outlined a moderate quantity of free fluid in the pelvis / hepato renal recess without any internal echogenic foci just like ascites. No adnexal mass / any evidence of ectopic gestation visualized, so case referred to the Medical Specialist with a finding of ascites. On examination, he observed guarding in the lower abdomen so case referred to the Surgeon in suspicion of burst tubal pregnancy, as bowel sounds were positive. Patient got admitted for proper investigation and management. Gradually the condition of patient got deteriorated with drop page of hemoglobin up to 6.3 gram %. Repeated sonography after 8 hours gap outlined significant increase in the quantity of free fluids with internal echogenic foci as visualized in free blood. On laporotomy, there was burst fallopian tube with no obvious gestational sac / fetus (P.O.Cs mixed with free blood got sucked by the sucker).

Three cases, attended the hospital with severe pain lower abdomen / pelvic cavity for the last10-12 hours with amenorrhea of 2-3 months going to shock. Ultrasonography outlined a massive free fluid in the pelvis / abdomen up to hepato renal recess, declared the cases of burst ectopic pregnancies, though no gestational sac visualized.

Two cases, one with a history of 7-8 weeks amenorrhea and vaginal bleeding. Some Sonologist declared a case of Missed; the patient performed D and C by some L.H.V. who perforated the uterus during dilatation and curettage. Ultrasonography outlined a gestational sac in right fallopian tube with 7 weeks 4 days age non-alive fetus and marked quantity of free fluid in culde sac (Fig. 2), while the second case of 16-17 weeks gestation gone through D and C by some Dai in a village as a case of old / missed with retained P.O.Cs without prior performing ultrasonography and brought to the hospital in the sub-clinical shock. Ultrasonography outlined a 15 weeks age non-alive fetus in right adnexal region / lateral

end of fallopian tube with a minimal free fluid in culde sac (Fig.3)

Two cases, one presenting with a history of amenorrhea 4-5 months and severe pain lower abdomen / pelvis one day. Ultrasonography abdomen / pelvis outlined 16 weeks age alive fetus in the right fallopian tube with intact gestational sac walls but moderate free fluid in culde sac / pelvic cavity, due to burst fallopian tube (Fig. 4) while a second with the complaint of recurrent pain right side pelvis with secondary infertility. Ultrasonography pelvis outlined a gestational sac in lateral end of right fallopian tube with 7 weeks 5 days age alive fetus (Figs. 5-6)

Fig 1. Eight weeks 4 days age right tubal pregnancy with empty uterine canal and significant free fluid in calde sac / pelvic cavity

Fig 2. Seven weeks 3 days age right tubal pregnancy with empty uterine canal and significant free fluid in calde sac / pelvic cavity

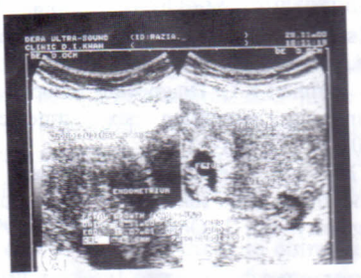
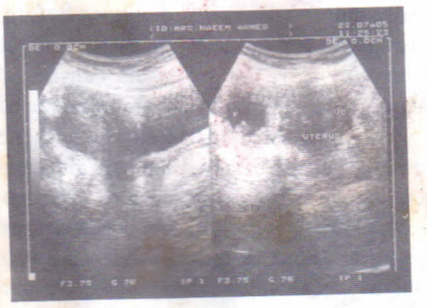


Fig 3. Fifteen weeks age non-alive fetus in right fallopian tube with minimal free fluid in calde sac

Fig 4. Sixteen weeks age alive fetus in right fallopian tube with intact gestational sac walls and moderate quantity of free fluid in calde sac / pelvic cavity

Figs 5: Seven weeks 5 days age alive fetus in right fallopian tube with empty uterine canal

Figs 6: Seven weeks 5 days age alive fetus in right fallopian tube with empty uterine canal



**Discussion**

In this study, ultrasonography gave 95% accurate results compared with other modalities used for ectopic pregnancy. Serum B-Hcg test can detect the pregnancy 6 days after conception[12]. There is direct correlation between gestational sac size and exponential rise in B-Hcg during first 5 weeks of pregnancy. Hence by comparing ultrasound findings with B-Hcg levels, the concept of discriminatory zone develops[13]. Several studies on the use of serial B-Hcg as primary diagnostic criteria have been completed; the results are widely varied with respect to sensitivity and specificity for delineating an ectopic pregnancy, including10-15% of viable intra uterin pregnancies misdiagnosed as ectopic[14]. B-hCG levels must

be carefully considered in conjunction with the ultrasonographic findings, as low B-hCG levels may be misleading and need further development. Stiil it can be helpful in determining the efficacy of ultrasound for the diagnosis. An ultrasound negative for intra uterine pregnancy with B-hCG of 1500 m IU/ml is strongly suggestive of ectopic[15].

**Conclusion**

Ultrasonography as a first step is most efficient and accurate method of diagnosing ectopic pregnancies[16], also non-invasive, relatively low cost and readily available[14]. It is a reliable test than other modalities used for the diagnosis of normal and ectopic pregnancy, but still tubal pregnancy remains a clinical challenge in spite of improvement in diagnostic tests and procedure.

Diagnostically, new3-D technology is more reliable then previous 2-D[17] while Sector transducer is more reliable than Convex and Linear. Trans-vaginal ultrasound, where available, has become the standard since its ability to visualize a gestational sac is much preferred to similar visualization by the trans-abdominal ultrasound[18]. Color Doppler has been a useful adjunct but its application has not changed the diagnostic accuracy as achieved with the combination of B-hCG and endo-vaginal sonography[19].

Early and accurate diagnosis remains the corner stone for immediate and skillful surgery for proper management of ectopic pregnancies[20], which is responsible for 10% of maternal mortality, the second leading cause of maternal death and 10 times greater than those associated with child birth[21]. Ideally one would like to diagnose before the onset of hypotension and peritoneal signs, which would require surgical intervention. If the diagnosis can be made early enough such that the ectopic mass is un-ruptured and less than 4cm in size, medical management with hemotherapeutic agents is possible. Early diagnosis and treatment not only prevent maternal mortality but also enhance recovery time, preserve fertility and reduce health care cost[22].

Early and accurate diagnosis of ectopic pregnancy by the endo-vaginal sonography is practiced but most of our Radiologists / Sonologists are male and sometimes patients do not allow even for abdomino-pelvic ultrasonography. A vast majority of patients do not allow for endo-vaginal ultrasonography even by the female Sonologists because of religious and socio-cultural factors.

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