ULTRASOUND DIAGNOSIS OF ECTOPIC GESTATION.

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SUMMARY

Ectopic pregnancy should be diagnosed at the earliest, preferably in an unruptured state, so much so, maternal morbidity could be minimised and the tubal function preserved for future fertility. Subjects at high risk for development of ectopic gestation and those with abnormal pregnancy symptoms should be carefully investigated.

All ectopic gestations diagnosed in unruptured or ruptured state were either ampullary (5 patients) or interstitial (1 subject) in this study, and hence had a definite history of amenorrhoea of minimum 40 days or more from the LNMP. Ultrasound diagnosis of intrauterine pregnancy is possible by 33rd to 35th day of LNMP, and surely by 40th day. Hence we suggest that routine and careful sonographic evaluation of potential candidates will either exclude an ectopic gestation by diagnosing an intrauterine gestation, or diagnose all the ampullary ectopic gestations in unruptured state (which form the major bulk of ectopic pregnancies).

Diagnosis of intact tubal pregnancy is by locating the typical adnexal ring, as observed in 33.33% of our subjects; and these subjects do not need a further laparoscopic confirmation. Quite often, ectopic gestation is suspected at sonography by not locating an intrauterine gestation sac in subjects with (i) more than 40 days of amenorrhoea, (ii) pregnancy symptoms, (iii) and/or a positive immunological test for pregnancy. These subjects as well present certain sonographic landmarks such as a poor decidual reaction, fluid in peritoneal cavity or complex adnexal masses. In 66.67% of our subjects ectopic gestation was suspected by these findings and confirmed at laparoscopy.

A good decidual reaction of the endometrium, by contrast, indicates either an intrauterine pregnancy or presence of a corpus luteal cyst, and not suggestive of ectopic gestation. Same way, to suggest pathological collection of blood in the peritoneal cavity the collection should be seen upto behind the uterine fundus, adnexal region and/or the flanks. This is in addition to collection in the pouch of Douglas.

Diagnostic accuracy could be maximised and errors minimised if sonographic evaluation is complemented by the clinical data. This study suggests that majority of unruptured tubal ectopic gestations could be diagnosed without a recourse to beta-hCG estimation.

Introduction

Diagnostic ultrasound is gaining a pivotal role in the diagnosis of unruptured ectopic gestation. Its fundamental role includes a confirmed diagnosis of intra-uterine pregnancy, so much so, an ectopic gestation is excluded. Sometimes an un-challenged diagnosis of ectopic pregnancy is made at sonographic examination by the presence of the typical 'adnexal ring'. A third, indirect role of sono-graphy, is to identify fluid collection behind the uterus and cul-de-sac, complex adnexal mass and poor decidual reaction in subjects with other evidences of preg-nancy.

In this communication we present our experience with all the three diagnostic roles of ultrasound in ectopic gestation, and discuss how sonography has further improved our conservative management of tubal ectopic pregnancies. The advant-ages of complete reliance on sonography for excluding the diagnosis of ectopic gestation, and the set backs of total re-liance on sonography for diagnosis of ectopic gestation are highlighted in this communication. Subjects with frank in-traperitoneal hemorrhage are excluded from this study, since they are best clini-cally diagnosed and quickly managed.

Material and Methods

Over a period of 2 years and 6 months 400 subjects underwent ultrasound exami-nation during early pregnancy. Ectopic pregnancy was diagnosed in 9 subjects (2.25%). The indications for early preg-nancy scan included pregnancies achiev-ed following treatment for infertility, early

pregnancy complaints and high risk sub-jects. The stages at which the condition was diagnosed include, unruptured in 3 subjects, tubal rupture in 3 subjects and pelvic hematocele in 3 subjects. (Table I).

We insist that subjects achieving con-ceptions following a period of infertility must have an early scan on 33rd to 35th day of LNMP, particularly so when con-ception followed induction of ovulation, or when spontaneous conception occurs after diagnostic laparoscopy or HSG, and in subjects conceiving following tubal sur-geries.

An ectopic gestation was located in one subject undergoing sonography-monitored induction of ovulation employing clomi-phene citrate and hCG. This was among the 100 pregnancies achieved following ovulation induction employing mainly clomiphene citrate.

Subjects who complain of pain and or bleeding in early pregnancy are subjected to sonographic examination, and majority of the ectopic gestations reported in this series (7 of the 9) were indentified in this group of patients.

Those who had a previous ectopic gesta-tion, those conceiving following IUCD usage or with the IUCD, and those who had undergone tubal sterilization are the other subjects who are carefully screened for ectopic gestation. One subject in this series, a case of unruptured ampullary ectopic gestation, was diagnosed in a pati-ent who had undergone tubectomy for ectopic gestation in the contralateral tube.

Unruptured Ectopic Pregnancies: There were 3 intact ectopic pregnancies, 2 in the ampullary segment, and one in the in-terstitial part of the tube:

1. A nulliparous, recently married subject, who was 29 years old, reported with 45 days' amenorrhoea (cycle length

TABLE I
Ultrasound Diagnosis of Ectopic Gestation (9 Cases)

Nature of ectopic pregnancy	Risk factor	Clinical suspicion	Exclusive sonography diagnosis	Laparoscopy confirmation
Unruptured—ampullary	Previous ectopic	Syncopy	Adnexal ring fetal pole cardiac flicker	nil
Unruptured—ampullary	nil	nil	Adnexal ring	nil
Unruptured—interstitial	nil	Pelvic mass	Adnexal sac with fetal pole and cardiac flicker	nil
Early rupture—ampullary	Induction of ovulation with CC/hCG	pelvic tenderness and bleeding	Fluid collection	Laparoscopy confirmation
Tubal abortion—ampullary	nil	Syncopy and tenderness	Fluid collection	Laparoscopy confirmation
Pelvic hematocele (3 subjects)	nil	Pelvic mass	Complex mass	Laparotomy

28 to 30 days) and slight vaginal bleeding. The monoclonal hCG pregnancy test was positive on the day of ultrasound scan. Sonography evidenced a typical bright 'adnexal ring' on the left side, measuring 2.5 cms in diameter. Some amount of fluid collection in the cul-de-sac was also located. Uterine cavity did not image a gestational sac, and showed a poor decidual reaction when compared to that seen in early intrauterine pregnancy and corpus luteum cyst. The adnexal ring evidenced an echogenic area inside the chorionic vesicle, probably representing the fetal pole; but no cardiac flicker was located. (Fig. 1).

With this sonographically confirmed diagnosis of ectopic gestation, laparoscopy was performed on the next day, and in the meanwhile she had developed acute pain on the left side. There was minimal intraperitoneal bleeding, just smearing the peritoneal surface, and around 100 ml collected in the cul-de-sac. Left tube was harbouring an unruptured ectopic gestation in the ampullary segment, but was otherwise looking normal. The contralateral tube and both ovaries were inspected. Both tubes evidenced patency and healthy fimbria, both ovaries normal with the right ovary revealing a fresh corpus luteum with ovulatory stigma (opposite side of ectopic gestation). There were no peritoneal adhesions or endometrial deposits. Uterus was bulky, and evidenced no pathology except for a minute seeding fibroid.

A linear salpingostomy was performed at laparotomy and the products were easily removed and perfect hemostasis

was ensured. It was decided against fimbrial evacuation (milking) because products were not loose in the tubal lumen and the sac was far away from the fimbrial end; Fimbrial evacuation at this stage will cause undue mucosal trauma and more of tubal scarring than salpingostomy. Tubal serosa and broad ligament were infiltrated with dilute oxytocin solution (to avoid bleeding), and a linear incision for 1 cm was made on the antimesenteric border of the ampullary segment and at the maximum bulge of the ectopic mass. Monopolar cautery knife was employed for the sharp incision. The products were evacuated and the tube was thoroughly lavaged with ringer lactate solution. There was no bleeding at the placental bed or at the cut edges of the tube. The lateral edges of the tubal incisions were approximated by 4 'O' vicryl, and this was to avoid bleeding from the angles. The tubal incision was left open for secondary healing.

This subject conceived within 6 months of surgery. Scan during early pregnancy, at 35th day of LNMP, revealed an intrauterine gestational sac, and subsequent scan had evidenced a live fetus within the intrauterine gestation sac. This time presumably she had conceived through the operated tube (left) because she experienced ovulation pain on the left side.

2. An unruptured ampullary ectopic gestation was diagnosed in a grand multiparous subject reporting with syncopal attack and 44 days amenorrhoea. She had undergone tubectomy for ectopic gestation earlier. Sonography imaged the typical adnexal ring on the left side, measuring 2.0 cm, and the fetal pole with cardiac flicker could be clearly visualised inside the adnexal ring. Uterine cavity was normal, and there was evidence of fluid in the cul-de-sac. She was managed by immediate laparotomy and salpingectomy on the confirmed sonographic diagnosis of ampullary ectopic gestation.

3. A primiparous subject, in whom a cornual pregnancy was suspected on clinical grounds (12-13 weeks of amenorrhoea) revealed the following sonographic findings: Uterus was bulky and the cavity was normal, and the mass close to the uterus carried a gestation sac measuring 8.9 cms, with a fetal pole measuring 4.9 cm by CRL (11. weeks and 4 days). The fetal cardiac motion and body movements were visible. She underwent cornual resection, as an elective procedure.

Among the 3 subjects with unruptured ectopic gestation, a diagnosis on clinical ground was made on 2 subjects, and the first patient did not have the least clinical suspiscion and the diagnosis was exclusively based on sonographic findings.

Ruptured Ectopic Pregnancies: There were 3 subjects in this group, including one with early ampullary tubal rupture following induction of ovulation with CC and hCG. All these subjects had clinical suspicion, indirect sonographic evidences such as fluid in pouch of Douglas, pseudo sac or complex adnexal masses. Following laparoscopic confirmation, segmental resection (anovulatory subject) or salpingectomy (multiparous subjects) was performed. In one subject after laparoscopic confirmation of diagnosis tubectomy was carried out through a minilaparotomy incision following slight extension of the second puncture laparoscopy incision.

Pelvic Hematocele: There were 3 subjects with complex adnexal masses located at sonography (Fig. 2). All of them had clinical suspicion of ectopic gestation, based on pelvic masses and anaemia. All were managed by laparotomy.

Diagnosis of Intra-uterine Pregnancy: There were at least 100 subjects, among the 400 studied, who had vaginal bleeding in the first trimester of pregnancy, and there were 30 subjects who were suspected to be having ectopic pregnancy on the ground of short period of amenorrhoea, pain abdomen, slight vaginal bleeding or sometimes vague pelvic mass. By imaging a gestation sac intra-uterine, we could exclude the possibility of ectopic gestation in all these 30 subjects. We had performed sonography as early as 33 to 35 days of LNMP and looked for the bright echogneic sac inside the uterine cavity. Double ring appearance is quite often encountered as a further proof for intrauterine gestation. Later in pregnancy, presence of yolk sac, presence of fetal pole, and fetal cardiac flicker confirm the intrauterine sac as the true gestation sac (Fig. 3 and 4).

Sonographic Exclusion of Ectopic Gestation: We had studied 7 nonpregnant subjects suspected to have ectopic pregnancy on the grounds of short period of amenorrhoea and vague complaints. In these situations we had clinched the diagnosis by paying attention mainly to the endometrial pattern. Endometrial pattern suggestive of proliferative (estrogenic) or hypoplastic (or atropic as seen in puerperium) nature excluded a diagnosis of ectopic pregnancy. A bright echogenic decidua quite often indicated very early pregnancy or a corpus luteum cyst than an ectopic gestation which was attended with poorly echo-producing decidual reaction. Two cases of intraperitoneal hemorrhage caused by rupture of corpus luteum cysts were pre-operatively diagnosed by the sonographic appearance of the decidua.·

Locating the morphology of follicular cyst, corpus luteum cyst, or endometrial cysts, none of which have a bright echogenic ring, also helped in excluding the condition. Absence of fluid in pelvic cavity, particularly behind the posterior uterus and fundus is an adjunctive in the exclusion.

During this period of study of 400 subjects, which included diagnosis of ectopic gestation in 9 subjects, we missed one case of ampullary ectopic gestation and over diagnosed ectopic rupture in one subject.

Discussion

This study highlights the various diagnostic strategies of ultrasound in ectopic gestation. First and foremost is the diagnosis of intrauterine pregnancy by ultrasound in patients suspected to have ectopic gestation, and thus excluding the possibility of ectopic gestation in 30 patients. Proliferative endometrium or atrophic endometrium located at scan precluded the diagnosis of ectopic pregnancy in 7 subjects reporting with short period of amenorrhoea. Cystic masses in the adnexum which fail to image a bright echogenic ring and normally seen as sono-lucent cysts also preclude the diagnosis of ectopic gestation.

The second category of subjects are those who have clinical or hormonal diagnosis of pregnancy, but suspected to have ectopic gestation. Failure to locate an intrauterine gestation sac in patients with symptoms of pregnancy or amenorrhoea of 35 to 40 days or more from LNMP raises the strong suspicion of ectopic gestation, particularly when a poor decidual reactions, fluid in POD extending to uterine fundus or adnexal region or complex adnexal mass are located. Under these situations a diagnostic laparoscopy has confirmed ectopic gestation in 6 subjects, which form the two-third of the total ectopic pregnancies diagnosed.

The third category are those in whom a clear echogenic 'adnexal ring' with fetal pole was located outside the uterine cavity. These subjects do not need a further laparoscopic confirmation, and should be taken up for management of ectopic gestation on a sonographically confirmed diagnosis. There were 3 such subjects, one with interstitial pregnancy and the other two ampullary ectopics. Linear salpingostomy was offered for ampullary gestations, and one of them achieved an intrauterine conception after 6 months of surgery.

From this study it is evident that a meticulous sonographic search in high risk subject will diagnose ectopic gestation in atleast 90% of occasions, and a false positive diagnosis could be avoided if a careful thought is given to the various sonographic landmarks. We also observe that 33.33% of ectopics could be diagnosed in unruptured state primarily by sonography.

See Figs. on Art Paper III