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ORIGINAL ARTICLE

CERVICAL PREGNANCY AND ITS DIFFERENTIAL DIAGNOSIS –ENDO-VAGINAL 3 DIMENSIONAL ULTRASOUND EVALUATION

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ABSTRACT: AIM: The purpose of this work is to establish the role of Three Dimensional ultrasound in improving the diagnostic ability in cervical pregnancy and also to differentiate it from other cervical pathologies with increased confidence levels. **METHODS:** In our unit we came across three cases of cervical ectopic pregnancies which were evaluated by 2D, Colour Doppler and 3Dimensional ultrasound. Other common cervical pathologies were also evaluated with the same protocol. **RESULT:** In our study three cases of cervical pregnancies were assessed with 3 Dimensional ultrasound along with conventional 2 Dimensional and colour Doppler, 3Dimensional assessment has given a definitive diagnosis in all the cases and it also helped in confidently differentiating other cervical pathologies which mimic cervical ectopic pregnancy. We demonstrated a crater in the ballooned cervix which is considered pathognomonic of cervical pregnancy. We call this as a "Crater Sign". **CONCLUSION:** We consider 3D demonstration of cervical pregnancy was confirmative and is useful in differentiating other cervical pathologies.

KEYWORDS: Cervical pregnancy, 3 Dimensional, Crater sign.

INTRODUCTION: Ultrasound is the imaging modality of choice in the diagnosis of ectopic pregnancy (EP). In a woman with positive pregnancy test, presenting with pain and bleeding, in the absence of an intrauterine gestational sac, diagnosis of EP is considered until proven otherwise.[1] Presence of an extra-ovarian mass further increases the possibility of an EP.

Cervical pregnancy is a rare form of EP wherein the pregnancy implants in the lining of the endocervical canal. It accounts for less than 1% of Ectopic pregnancies.[2,3,4,5,6] The incidence is approximately 1 in 9000. Cervical pregnancy is more common in pregnancies resulting from assisted reproductive techniques.[7,8]

Ultrasound Features of Cervical Pregnancy:

- Normal sized body of the uterus.
- Closed internal os.
- Enlarged cervix (Gives appearance of an hourglass).
- Presence of gestational sac below the internal cervical os.
- Oval or circular gestational sac with yolk sac and an embryo.
- Negative sliding sign.[9] (Gestational sac not sliding in the cervical canal on movement with a trans-vaginal (TV) probe).
- Grey scale imaging - Hyperechoic trophoblastic ring in the area of invasion.
- Colour Doppler - Reveals trophoblastic flow.[10]

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Differential Diagnosis:

- Intra-uterine pregnancy with low implantation – The gestational sac is above the internal os, cervical canal is not dilated.
- Nabothian cysts - Absence of trophoblastic tissue.
- Miscarriage – Enlarged body of the uterus, crenated gestational sac, no embryo or yolk sac, open internal os, no peri-trophoblastic flow, positive sliding sign. (Gestational sac sliding in the cervical canal on movement with a trans-vaginal probe.[9])

AV malformation – Normal sized uterus and cervix with an anechoic area which on colour Doppler reveals vascular content

MATERIALS & METHODS: In this study we included cases who clinically presented with clinical triad of pain, bleeding and positive pregnancy test and absence of gestational sac in the uterus. Few cases had negative pregnancy test but presented with pain and vaginal spotting. This study is done with Voluson Expert (GE) and S2000 (Siemens) ultrasound equipment's. This study was undertaken in our unit from January 2009 to December 2011. Initially 3Dimensional evaluation of normal cervix was undertaken to understand the anatomical disposition (Fig. 1).

Fig. 1: Normal cervix on Endo-vaginal 3 dimensional Ultrasound

All these patients were evaluated initially by 2 Dimensional ultrasound followed with colour Doppler wherever required. In most of the cases a reasonable diagnosis is made. To improve the diagnostic confidence we subjected all these patients to 3 Dimensional ultrasound examination.

We diagnosed three cases of Cervical ectopic pregnancy, we could identify four cases of low implantation of intra-uterine pregnancy, five cases of miscarriage and six cases with Nebotian cyst and a single case of cervical AV Malformation.

RESULTS:

Cervical Pregnancies: A 29-year-old woman who conceived with in-vitro fertilisation and embryo transfer (IVF-ET) for infertility due to tubal factor. Two embryos were transferred. At 6 weeks of pregnancy, with a β human chorionic gonadotrophin (HCG) concentration of 57,754 IU/L, TV ultrasound examination revealed a gestational sac with a yolk sac and fetal node with cardiac activity in the uterine cavity.

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Interestingly, there was another gestational sac with a yolk sac and fetal node with cardiac activity in the cervix below the internal os (Fig 2), confirming a diagnosis of heterotopic pregnancy.

Fig. 2: Trans-vaginal Ultrasound scan showing - Heterotopic Pregnancy – Gestational sac with yolk sac and fetal node in the uterine cavity another gestational sac with yolk sac and fetal node in the cervix below the internal os.

Fig. 2

31-year-old woman who conceived with ovarian hyper-stimulation and intrauterine insemination. At 6 weeks of pregnancy, with a β hCG concentration of 48,554 IU/L, TV ultrasound examination revealed a gestational sac with yolk sac and a viable fetus in the cervical canal. Uterine cavity was empty, internal os was closed and the sliding sign was negative. Colour Doppler revealed peri-trophoblastic flow. 3 D TV ultrasound revealed a typical ballooning of the cervix with positive "Crater Sign" (Fig 3).

Fig. 3: Dimensional trans-vaginal ultrasound revealing hour glass uterus with empty uterine cavity and ballooned cervix with a gestational sac and fetal node presenting as "Crater sign" due to hypertrophied trophoblastic invasion.

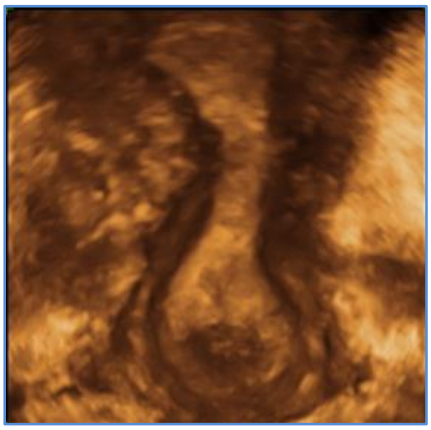

Fig. 3

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Fig 4: 2 Dimensional trans-vaginal ultrasound of the uterus and cervix showing desidual reaction in the uterine cavity with a gestational sac with fetal node below the internal os in the cervix.

Fig. 4

Fig 5: Dual frame imaging of 2 Dimensional trans-vaginal ultrasound of the uterus and cervix with colour Doppler showing peri-trophoblastic flow around the gestational sac.

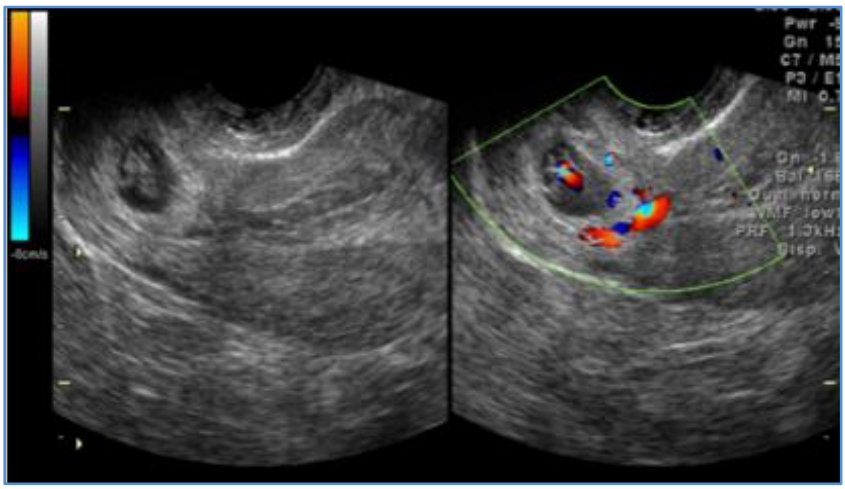

Fig. 5

A 33-year-old female, with a history of two miscarriages, conceived after two cycles of IVF. Three embryos were transferred and after 4 weeks, with a β hCG concentration of 54,354 IU/L, TV ultrasound examination revealed an empty uterine cavity. There was a gestational sac with yolk sac and fetal node with cardiac activity below the internal os. Colour Doppler showed peri-trophoblastic flow. (Fig 4 & 5) 3-D TV ultrasound examination revealed an hourglass uterus with distended cervix with a fetal node and shape was characteristically once again crater shaped, which is due to hyperechoic trophoblastic invasion (Fig. 6).

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Fig 6: 3 Dimensional trans-vaginal ultrasound of cervix and uterus shows empty uterine cavity, cervix revealing gestational sac with peri-trophoblastic invasion presenting as a "Crater Sign".

Fig. 6

Fig 7: Multi- axis view of the uterus and cervix in a patient with miscarriage. 2dimensional sections show ill-defined echoes in the cervix.

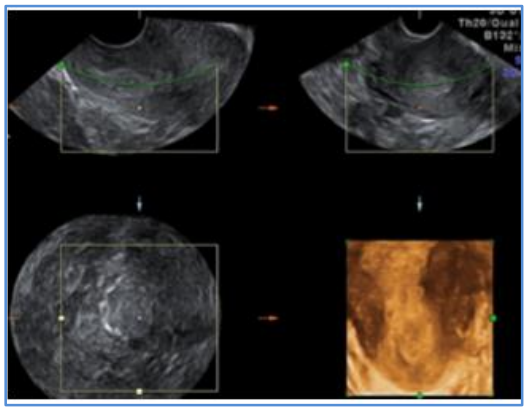

Fig. 7

Fig 8: 3Dimensional trans-vaginal view of cervix shows ill-defined echoes with- out a crater or hour-glass appearance*.*

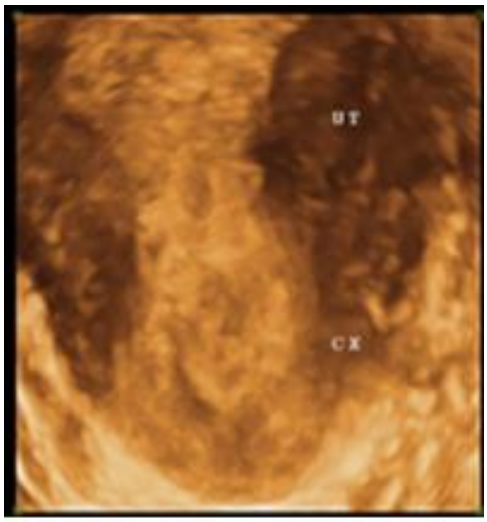

Fig. 8

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Patients with miscarriage presented clinically with lower abdominal pain, and vaginal bleeding. 2 dimensional ultrasound revealed thick uterine cavity with distended cervix containing ill-defined echoes. Colour Doppler of the cervical contents showed irregular vascularity.

Three Dimensional endo-vaginal examination showed ill-defined echoes without a crater or hour-glass appearance. (Fig 7 & 8)

Six patients with lower abdominal pain and occasional spotting with negative pregnancy test were subjected for conventional 2 Dimensional trans-vaginal examination with showed an anechoic area in the cervix.

Three dimensional endo-vaginal examination typically revealed the anechoic area outside the cervical canal without ballooning of cervix or the crater sign. These cases were confidently diagnosed as Nebothian cysts. (Fig 9 &10)

Fig 9: Two Dimensional trans-vaginal ultrasound reveals an anechoic area in the cervix.

Fig. 9

Fig 10: Three dimensional endo-vaginal examination typically revealed the anechoic area outside the cervical canal without ballooning of cervix or the crater sign, diagnosed as Nebothian cysts.

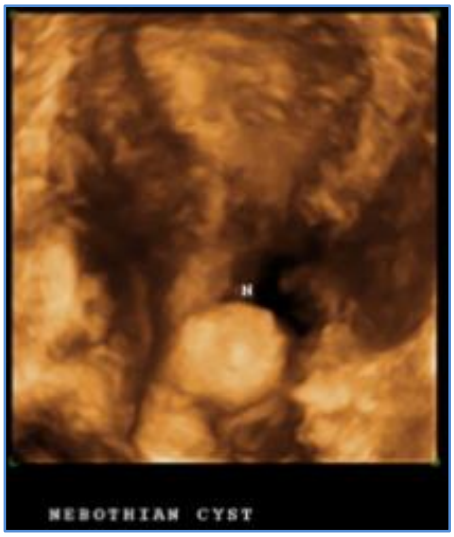

Fig. 10

DOI: 10.14260/jemds/2015/2124

Fig. 11: 2 dimensional ultrasound revealed an anechoic area in the cervix

Fig. 11

Fig. 12: On Colour Doppler the anechoic area is seen containing vascular components.

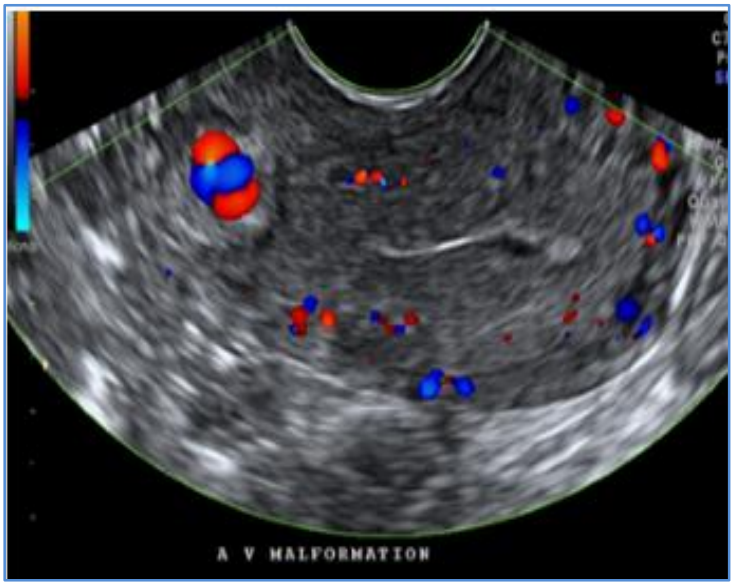

Fig. 12

One patient presented with lower abdominal pain and bleeding with previous history of repeated abortions. 2 dimensional ultrasound revealed an anechoic area in the cervix on colour Doppler the anechoic area is seen containing vascular components, endo-vaginal 3 dimensional ultrasound revealed a hypoechoic area in the wall of the cervix and the cervical canal was devoid of any echoes. (Fig. 11, 12 & 13)

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Fig 13: Endo-vaginal 3 dimensional ultrasound reveals a hypoechoic area in the wall of the cervix and the cervical canal was devoid of any echoes.

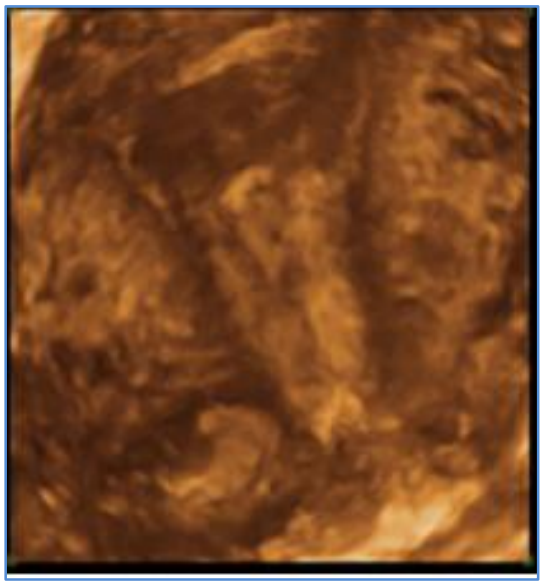

Fig. 13

DISCUSSION: Cervical ectopic pregnancy is diagnosed by characteristic features such as normal sized empty uterine cavity, closed internal os, gestational sac with fetal node and yolk sac in the widened cervical canal, peri-trophoblastic flow on colour Doppler and negative sliding sign on 2dimensional examination.

Endo-vaginal 3 dimensional ultrasound adds another dimension in confidently diagnosing cervical ectopic pregnancy by demonstrating a "Crater Sign" which is due to the hyperechoic trophoblastic invasion of the cervical mucosa.

Cervical ectopic pregnancies sometimes present with ballooned cervical canal with ill-defined echoes (Without a proper yolk sac or fetal node) in the cervical canal but it is always associated with hypertrophic trophoblastic invasion, this feature helps us to identify the crater sign which is characteristic of cervical pregnancy.

Endo-vaginal 3 Dimensional ultrasound is not only useful in diagnosing cervical ectopic pregnancy by demonstrating " crater sign" but it is also useful in differentiating other clinical entities which mimic cervical pregnancy both clinically and sonographically.

Incidence of cervical pregnancy is less than 1% and hence becomes very difficult to diagnose and differentiate from other causes of cervical pathologies. Visualisation of "crater sign" in 3 Dimensional endo-vaginal examination of cervix along with hour-glass appearance of uterus is pathognomonic of cervical ectopic pregnancy.

CONCLUSION: We consider 3D demonstration of cervical pregnancy was confirmative and is useful in differentiating other cervical pathologies.

DISCLOSURE: We have neither any relationship nor financial interest with any companies in performing this study.

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