

Clinics in Diagnostic Imaging (92)

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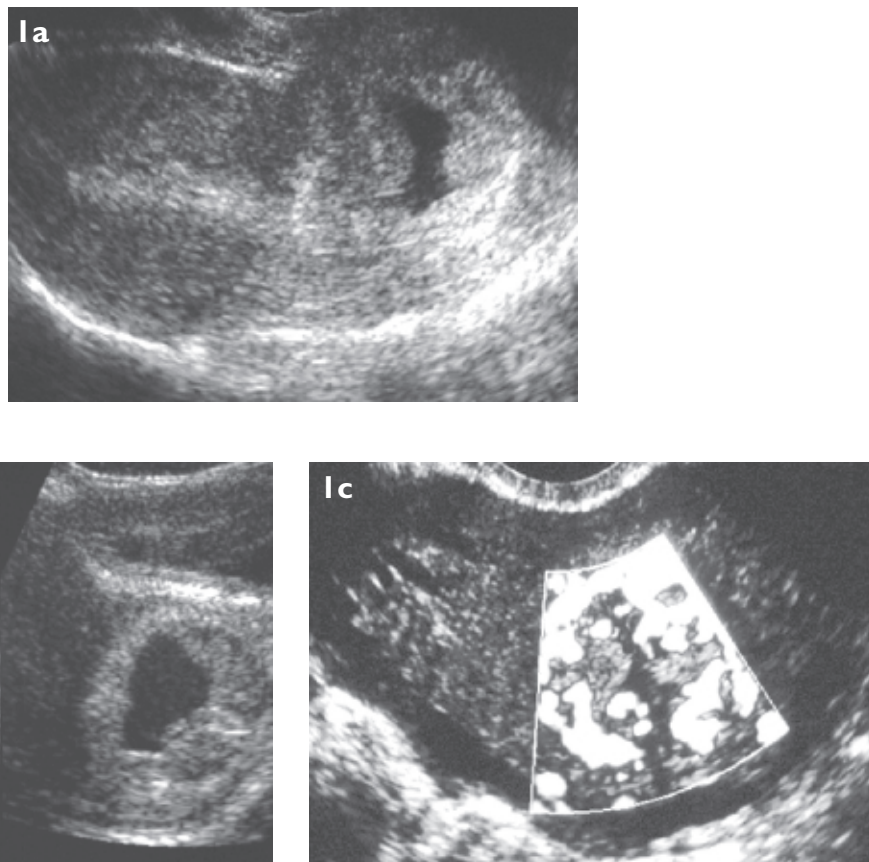


Fig. 1 (a) Sagittal transvaginal US image of the uterus and cervical canal. (b) Coronal transvaginal US images of the cervical canal. (c) Colour Doppler transvaginal US image of the cervical canal.

CASE PRESENTATION

A 43-year-old woman presented with a ten-day history of lower abdominal pain and two days of vaginal bleeding, requiring three to five pads a day. She had been amenorrhoeic for eight weeks. Her obstetric history was: gravida 3 para 2 with one miscarriage and two previous Caesarian sections. Abdominal examination was unremarkable. Her vital

signs were: blood pressure 130/80 mmHg, pulse rate 87 per minute and temperature of 37°C. Speculum examination revealed a bulky, purplish cervix with blood clots at the cervical os. The external cervical os was closed. Her urine pregnancy test was positive and her beta human chorionic gonadotrophin (β hCG) level was 2102.2 IU/mL. What does ultrasonography (US) of her pelvis show (Figs.1a-c)? What is the diagnosis?

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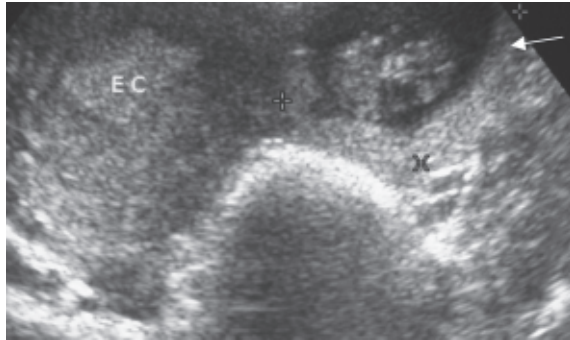


Fig. 2 Transverse transvaginal US shows a complex mass (arrow and between cursors) within the left adnexa, separate from the uterus, that represents a tubal pregnancy. Note the ring-like appearance of the trophoblastic tissue. [EC = endometrial cavity]

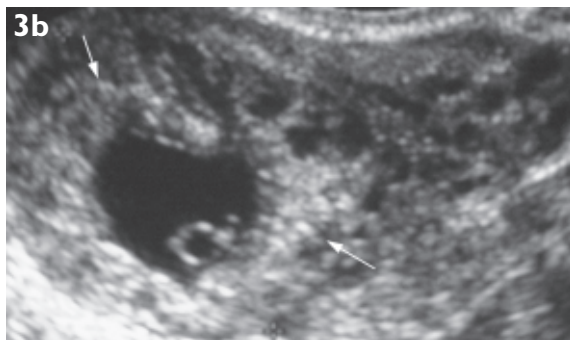
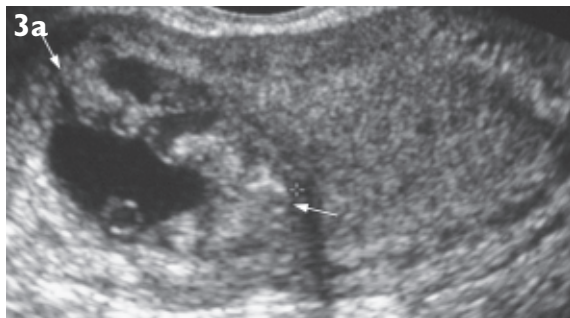


Fig. 3 Interstitial pregnancy. (a) Transverse and (b) sagittal views on transvaginal US shows the uterus with a complex ring-like mass (arrows and between cursors) in the region of the right cornu in a 32-year-old lady who presented with acute onset of per vaginal bleeding and lower pelvic pain. She was unsure of the dates of her last menses and tested positive on urine pregnancy test. There is no myometrium surrounding the mass and a yolk sac is present. Diagnosis of right interstitial pregnancy was confirmed at surgery.

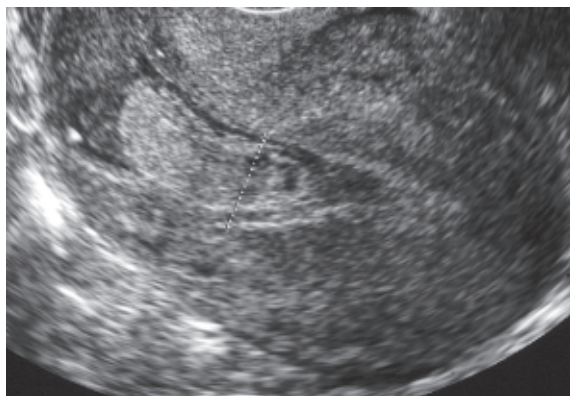


Fig. 4 Missed abortion. Sagittal transvaginal US image shows a hyperechoic mass within the lower end of the uterus that enters the endocervical canal. There is no evidence of increased hyperechoic trophoblastic tissue around the walls of the endocervical canal.

IMAGE INTERPRETATION

Sagittal (Fig. 1a) and coronal (Fig. 1b) transvaginal US images show an irregular hyperechoic mass within the endocervical canal. The endometrial cavity is empty. Colour Doppler US images (Fig. 1c) show that there is no appreciable flow within the mass. No foetal heartbeat was detected. Invasion of the trophoblastic tissue into the cervical walls can also be appreciated.

DIAGNOSIS

Non-viable cervical ectopic pregnancy.

CLINICAL COURSE

The patient was given a course of intramuscular methotrexate with folic acid rescue. Repeat US showed shrinkage of the complex cervical mass. Serial β hCG measurements revealed a decreasing trend. The patient had persistent bleeding, requiring more than three pads a day, and had foul-smelling vaginal discharge for two weeks. She underwent an evacuation of the uterus, yielding a small amount of products of conception. Histological examination revealed degenerate, partly-calcified products of conception with features of chronic endometritis. She was well when sent home two days after surgery. She was subsequently discharged completely from further follow-up.

DISCUSSION

Cervical pregnancy is a rare form of ectopic pregnancy with an incidence of less than 1% of all ectopic pregnancies. The other known sites of ectopic pregnancies include the ampulla (80%) (Fig. 2), isthmus (11%), fimbria (4%), interstitia (3%) (Figs. 3a-b) and cornua (2%)⁽¹⁾. They are estimated to occur in 1:1000⁽²⁾ to 1:18000 of all pregnancies⁽³⁾. In the past, cervical pregnancy was associated with high morbidity and detrimental consequences on the future fertility of affected patients. The aetiology of cervical pregnancy is unknown. It is believed that local cervical abnormalities, often of iatrogenic origin, predisposes towards cervical pregnancy. Such conditions include previous curettage and dilatation, Asherman's syndrome, previous Caesarian section, previous uterine or cervical surgery, and in-vitro fertilisation/embryo transfer⁽²⁾.

Patients with cervical ectopic pregnancy classically present with painless first trimester vaginal bleeding. The presence of lower abdominal pain is not uncommon, particularly in more advanced pregnancies⁽⁴⁾. Clinical signs suggestive of cervical pregnancy include a soft cervix which is disproportionately enlarged compared to the uterus, often having a distended bluish or

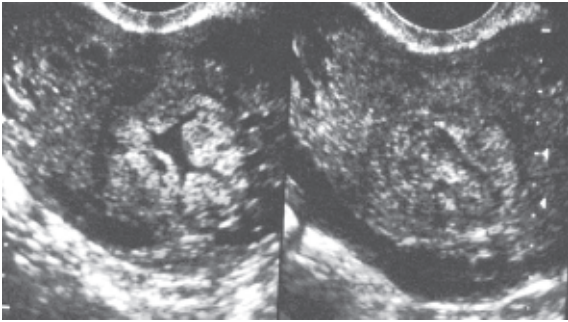


Fig. 5 Cervical ectopic pregnancy. Sagittal transvaginal US images shows the typical ring-like appearance of trophoblastic tissue within the endocervical canal.

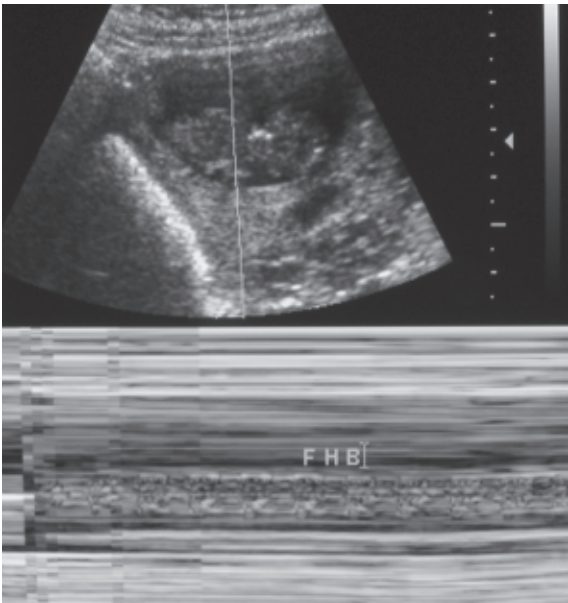


Fig. 6 Doppler US study shows the presence of foetal heartbeat within a complex adnexal mass, confirming the presence of an ectopic pregnancy.

purplish appearance, a partially-open external os and profuse haemorrhage on manipulation of the cervix⁽⁵⁾. It should be noted that none of these clinical signs are diagnostic or are invariably present in cases of cervical pregnancy. This accounted for the high rates of morbidity and mortality in the past. Imaging is very useful and in current practice, radiological evaluation is mandatory in all cases of suspected cervical pregnancy.

The radiological modality of choice for evaluation of cervical pregnancies is US. Transvaginal US scanning is particularly valuable in the assessment of cervical pregnancies. It improves visualisation in cases of early pregnancy, allowing for assessment of the gestational sac, as well as of the endometrium and adnexae. However, it has a limited field of view and transabdominal US, though inferior in imaging detail, may be useful in more advanced cases of cervical pregnancy⁽⁵⁾. Another advantage of transvaginal US is the ability to assess the blood supply of the pelvic structures using colour Doppler mode.

The first documented US study for cervical pregnancy was by Raskin in 1978⁽⁶⁾. He suggested four criteria for the diagnosis of cervical pregnancy, namely: cervical enlargement, uterine enlargement, diffuse amorphous intrauterine echoes and absence of intrauterine pregnancy. With the advent of transvaginal US, these criteria have been refined. In 1993, Tritsch et al⁽⁷⁾ proposed further criteria, namely: dilated and barrel-shaped cervix, closed internal os, and the placenta as well as entire chorionic sac containing the pregnancy must lie below the level of the internal os. The visualisation of a closed internal os is critical for distinguishing a true cervical pregnancy from an isthmico-cervical pregnancy and an incomplete abortion (Fig.4). Timor-Tritsch et al proposed that the level of insertion of the uterine arteries be used to identify the level of the internal cervical os. Jurkovic et al have also proposed the use of a "sliding sign" on transvaginal scanning where the gestational sac of an abortus slides against the endocervical canal following gentle pressure by the sonographer⁽⁸⁾. In a cervical pregnancy, this sign will not be seen. Another important feature of cervical pregnancy is trophoblastic invasion of the endocervical tissue. Cervical mucosa has no protection against trophoblast invasion and allows deep penetration of any proliferating chorionic villi into the fibromuscular layer. On transvaginal scanning, this may be seen as a hyperechoic trophoblastic ring in the area of invasion⁽⁹⁾ (Fig. 5).

Transvaginal ultrasonography also affords the ability to assess the blood supply to the pelvic organs using colour and spectral Doppler modes. In both early normal and abnormal intrauterine pregnancies, there is peritrophoblastic blood flow on colour Doppler examination⁽¹⁰⁾. High peak systolic velocity (>20 cm/s) and low impedance to flow (pulsatility index <1.00) are the classical characteristics of the flow velocity waveforms. In patients with ectopic pregnancies, the vascular supply to the ectopic sac also demonstrates similar features⁽¹¹⁾. In cases of cervical pregnancy, an extensive vascular supply with the characteristics of peritrophoblastic blood flow can be seen originating in the maternal arteries at the implantation site within the cervix, below the level of the internal os. Such Doppler findings complement those found on B-mode US, aiding the diagnosis of cervical pregnancy. Products of conception transiting through the cervix after detaching from their normal intrauterine implantation site will not display any peritrophoblastic blood flow as they are separated from their maternal blood supply. Thus, a cervical pregnancy can be differentiated from an incomplete abortion using of Doppler studies.

US have accuracy rates of up to 80% in the assessment of ectopic pregnancies, particularly in cases where the β hCG levels are $>1,500$ IU/mL and the patient is amenorrhoeic for six weeks or more⁽¹²⁾. The US finding of cardiac activity in the foetus raises the sensitivity and specificity to almost 100%⁽¹³⁾ (Fig. 6). Foetal heartbeat should be identifiable in a foetus within a gestational sac having a mean diameter of 16 mm or more⁽¹⁴⁾. Doppler studies, coupled with transvaginal US, increases the accuracy of US in diagnosing ectopic pregnancy to up to 90%⁽¹⁵⁾. It should be noted that an incomplete abortion or missed abortion where the product of conception lies within the endocervical canal may often be confused with a cervical pregnancy. In cases of non-viable cervical pregnancies where the foetal heartbeat is not seen, the risk of mistaking an abortion for cervical pregnancy increases. Other cervical masses that can mimic a cervical pregnancy include gestational trophoblastic disease, degenerative leiomyomata and cervical malignancy⁽¹⁶⁾. Careful US examination, relevant biochemical tests, in particular the trend of serial (hCG levels, and judicious eliciting of the described signs will aid in distinguishing a true cervical pregnancy from other causes of a cervical mass.

Doppler analysis may also play a role in the therapeutic management of cervical pregnancy. There have been many reports of attempts at surgical removal of even small amounts of trophoblastic tissue in cervical pregnancies, leading to severe bleeding and other complications⁽¹⁷⁾. In patients treated with methotrexate, the placental tissue is often retained within the cervical canal for long periods of time and attempts to remove it prematurely can lead to severe haemorrhage and eventual hysterectomy⁽¹⁸⁾. Doppler studies are helpful in assessing the residual blood supply in such cases, aiding the planning of any surgery. Leeman and Wendland have documented that a gestational sac is often persistent, despite clinical resolution⁽¹⁹⁾. In a review of patients diagnosed with ectopic pregnancies and treated with methotrexate, Brown et al found that persistent ultrasonographical findings were common⁽²⁰⁾. Cervical pregnancies which go undetected till the second or third trimester generally present with massive haemorrhage which can only be controlled by hysterectomy⁽²¹⁾. Prognosis improves markedly if early diagnosis in the first trimester is made, particularly on US.

Management of cervical pregnancies can be classified as surgical or conservative. Surgical treatment of cervical pregnancies mainly involves dilatation and curettage in combination with various techniques designed to prevent or limit blood loss. Methods reported include

using a Foley catheter inserted into the cervical canal as a tamponade device, the use of cervical cerclage and preoperative ligation as well as embolisation of the uterine arteries. Conservative treatment of cervical pregnancy was first reported in 1975, involving the use of chemotherapeutic agents injected either locally or systemically⁽²²⁾. Systemic treatment usually involves the use of methotrexate given intramuscularly as was the case with our patient. Local injections with methotrexate and potassium chloride have also been utilised⁽²³⁾. Other agents such as actinomycin-D and etoposide are not widely used, and little evidence exists to evaluate their effectiveness compared to methotrexate and potassium chloride. Published studies indicate that primary conservative treatment of early cervical pregnancy carries a better prognosis than surgery. It has been suggested that non-viable cervical pregnancies should be treated with systemic methotrexate while local injection of methotrexate or potassium chloride is the most effective treatment of a viable early cervical pregnancy⁽²⁴⁾. The role of surgery should be as a method of last resort when conservative treatment has failed.

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ABSTRACT

A 43-year-old woman presented with a 10-day history of lower abdominal pain and two days of vaginal bleeding. Ultrasonography showed a sac-like structure within the endocervical canal. The structure had a thick echogenic rim. No foetal heartbeat was seen. Intramuscular methotrexate was given and evacuation of the uterus yielded a small amount of tissue which was revealed histologically as products of conception, confirming the diagnosis of a cervical ectopic pregnancy. The clinical and imaging features of cervical ectopic pregnancy are highlighted.

Keywords: cervical ectopic pregnancy, ultrasonography, transvaginal ultrasonography, abortion

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