

# **Cervical pregnancy**

## **3D/4D Ultrasound Study**

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## **Definition**

Implantation of the fertilized ovum with subsequent development within the cervical structure without involvement of the corpus uteri (below the level of the internal os) results in cervical pregnancy.

This form of ectopic pregnancy has potentially life-threatening consequences primarily due to hemorrhage (Baptisti, 1953; Pritchard and MacDonald, 1980).

## **Incidence**

Cervical pregnancy is an infrequent form of ectopic gestation.

The incidence is 1:16,000 gestations over a 15-year period (Sheldon et al. 1963), 1:18,000 (Dees 1966), 1:2,400 pregnancies (Khosravi et al., 1976); The incidence is 1:7,040 pregnancies over an eight-year period (Gitstein et al. 1979).

A remarkably high occurrence (1 in 1,000 pregnancies) was registered by Shinagawa and Nagayama (1969) in Japan. This dramatic increase was ascribed to the high number of artificial abortions performed in that country. Many early cervical pregnancies terminate in abortion due to the unfavorable site of nidation and therefore elude detection or misdiagnosed as early abortion or simply discarded because of lack of sufficient proof (Resnick, 1962; Rothe and Birnbaum, 1973).

## **Etiology**

The etiology of cervical pregnancy is considered unknown.

Several contributing factors include

- Previous surgical trauma,
- Multiparity,
- High maternal age,
- Previous abortion,
- Uterine leiomyomas,
- Atrophy and malformation,
- Rapid tubal transport of the fertilized ovum,
- Abnormal timing of fertilization in relation to the menstrual cycle,
- Previous cesarean section, and
- Recent use of oral contraceptives has been noted.

The definitive cause of implantation inside the cervical canal is not known. Four postulates had been provided to explain the ectopic nidation of the ovum at this site.

Studdiford (1945) postulated rapid passage of the fertilized ovum through the endometrial cavity as the cause of cervical implantation.

Schneider (1946) believed that the speed of travel of the ovum, coupled with its rate of ripening, may determine the site of implantation.

Ellingson (1950) proposed that an unfertilized ovum may reach the cervical canal where implantation occurs.

Iffy (1962) suggested that delayed ovulation and fertilization in relation to the menstrual cycle and displacement of the ovum by the menstrual flow result in cervical implantation.

### ***Classification According to the Site of Origin***

David et al, (1980) have proposed a classification to simplify and standardize the terminology.

1. **Isthmico-cervical pregnancy**: a very low lying placenta extending from above, into the cervix.
2. **Pure cervical pregnancy**: very rarely reaches midpregnancy.
3. **Cervico-isthmic pregnancy**: transgression of a primary cervical pregnancy upward into the isthmus.
4. **Cervico-isthmic-corporal pregnancy**: further involvement of the corporate cavity

### ***Pathophysiology and Fate of Pregnancy***

After implantation of the ovum in the cervix, the environment is not capable of satisfying the needs of the growing ovum, since normal placental attachment is hindered by the incomplete decidual reaction.

Direct invasion of trophoblastic tissue into the fibromuscular elements of the cervix produces edema, necrosis, hemorrhage, and round cell infiltration.

The pregnancy eventually terminates when invasion, erosion, or rupture of a large vessel results in excessive bleeding.

Separation and expulsion of the products of conception may occur through the external os, or the chorion may erode the cervical wall with rupture into the vagina, parametrium, or the peritoneal cavity. The insufficient decidual response in the cervix leads to abnormal adherence of the placenta, accompanied by an incomplete separation and profuse bleeding.

The evacuation of the products of conception usually results in alarming bleeding since the cervix possesses little, if any, contractile potential (Studdiford, 1945; Duckman and Amico, 1951). A case of choriocarcinoma following a cervical pregnancy has been reported by D'Antonio and Magumo (1969).

## ***CLINICAL Presentations***

### **Symptoms**

1. Amenorrhea

Cervical pregnancy rarely progresses beyond the twentieth week of gestation, however, exceptions do exist (Pisarski, 1960; Mitrani, 1973).

## 2. Pain

The majority of cases reveal no history of pain. The absence of pain in the presence of vaginal bleeding has been considered characteristic of this type of gestation. Primarily because the uterine body has no involvement, contractions are not provoked, and painful cramps are not felt (Resnick, 1962).

In advanced cases, cramping, lower abdominal pain and discomfort, backache, and dysuria may be present (Mortimer and Aiken, 1968; Gitstein et al., 1979).

## 3. Bleeding

Approximately half of the patients will experience spontaneous bloody vaginal discharge or irregular vaginal bleeding with or without history of amenorrhea. Severe bleeding may result from attempts to remove the products of conception in patients with undiagnosed cervical pregnancies who request termination of pregnancy.

### **Physical Findings:**

On pelvic examination, the cervix appears distended and soft. The products of conception may be felt within the cervical canal.

In early cervical pregnancy, the uterus is relatively firm and may be mistaken for a myoma affixed to the pregnant uterus.

If the pregnancy continues, a mass resembling a pregnant uterus is felt above the symphysis. On top of this is found a smaller mass, the empty corpus uteri (hourglass-shaped uterus).

### ***DIAGNOSTIC CRITERIA***

### **PATHOLOGIC CRITERIA:**

The pathologic criteria for diagnosis of cervical pregnancy were set forth by Rubin (1911).

1. Cervical glands must be opposite the placental attachment.
2. The attachment of the placenta to the cervix must be intimate.
3. The placenta must be situated, in whole or in part, either below the entrance of the uterine vessels or below the peritoneal reflection on the anterior and posterior surfaces of the uterus.
4. Fetal elements must not be present in the corpus uteri.

Rubin's criteria require pathologic examination of the excised uterus. However, **if the uterus is preserved, these criteria cannot be applied.** Therefore, **Duckman (1951) suggested the following diagnostic criteria:**

1. A dilated, thin-walled cervical canal containing histologic evidence of gestation.
2. A patulous external os, and
3. Small and firm corpus uteri with normal-size internal os resting on top of the dilated cervix.

### **CLINICAL CRITERIA:**

Paalman and McElin (1959) offered several active clinical signs to establish the diagnosis:

1. Amenorrhea followed by uterine bleeding without cramping pain.
2. A softened and disproportionately enlarged cervix equal to or larger than, the corporal portion of the uterus (an hourglass-shaped uterus).
3. Products of conception entirely confined within, and firmly attached to, the endocervix.
4. A snug internal os.
5. Partially open external os

### **SONOGRAPHIC CRITERIA:**

Recently, ultrasonography has facilitated early diagnosis of cervical pregnancy (Kobayashi et al, 1969; Raskin, 1978; Chow and Lindahl, 1979; Gitstein et al, 1979).

The sonographic criteria for the diagnosis of cervical pregnancy are the following:

1. Diffuse amorphous intrauterine echoes.
2. Empty uterus (absence of an intrauterine pregnancy where the double ring gestational sac sign is not seen).
3. Uterine enlargement.
4. Characteristic enlargement of the cervix containing the products of conception. Occasionally, a constricted isthmic portion (internal os) is present.

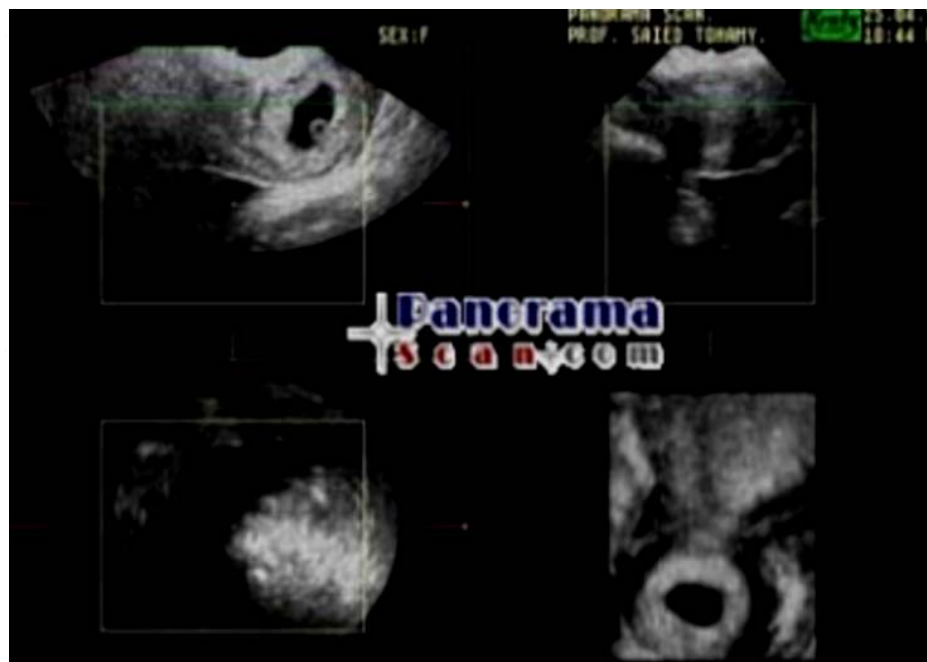
The present author criteria are derived from a three dimensional study in cases of suspected cervical ectopic pregnancy.

### **In the figures below:**

The four planner view of cervical ectopic pregnancy with surface rendering and colour flow mapping demonstrates the following diagnostic criteria:

1. Longitudinal plane of the uterus from the fundal line to the external os.  
The uterus shows a decidual reaction with absence of the double contoured gestational sac ring.
2. Transverse plane of the corporeal cervical zone,
3. Coronal plane of the uterus and cervix,
4. 3D view of the corporeal decidual cavity,
5. The junction area of the corpus and cervix at the point of entry of the uterine vessels.
6. The cervical canal is expanded by gestational sac containing embryonic complex and yolk sac with intimate penetration of the chorionic shell into the cervical substance.  
Both the internal and external os are closed. The uterine cavity is empty.
7. The colour flow map of the area of interest shows the sparse corporeal vascularisation in contradistinction with the very rich cervical vascularisation which is remarkable below the point of entry of the uterine vessels at the level of internal os. The vessels are arranged in the form of ring-of-fire around the gestational sac.





The preoperative recognition of cervical, pregnancy will certainly be enhanced by the increased use of ultrasonography in the evaluation of patients with vaginal bleeding during early pregnancy. **These ultrasonic features, coupled with painless first-trimester bleeding, a distended cervix, and a slightly dilated external os should suggest to the physician the possibility of cervical pregnancy.**

## **DIFFERENTIAL DIAGNOSIS**

Seldom is cervical pregnancy recognized clinically prior to surgery. Nelson (1979) found that only 18 percent of patients were suspected of having cervical pregnancy prior to operative intervention.

The most frequent preoperative diagnosis was imminent or incomplete abortion.

The diagnosis is to be distinguished from the following complications resembling cervical pregnancy:

1. The cervical phase of a uterine abortion, including septic abortion (Gabbe et al, 1975).
2. Cervical abortion (spontaneous uterine abortion with retention of the products of conception within the cervical canal due to a resisting external cervical os, thereby ballooning out the cervical canal).

Duckman and Amico (1957) suggested the following criteria for differentiation of cervical pregnancy from a cervical abortion:

1. The corpus above the distended cervix is usually larger in a cervical abortion than in early cervical pregnancy.
2. In cervical abortion, both the internal and external os are dilated, whereas in cervical pregnancy the internal os is virtually closed.
3. In cervical pregnancy, the external os is only partially dilated. In a cervical abortion, the external os usually is closed until the abortion is well advanced since this resistance to dilatation of the external os is responsible for the entity.
4. In curettage of a cervical abortion, the placental tissue can be palpated extending from the cervical canal through the internal os and attached to the uterine wall.
5. Placenta previa.
6. Uterine or cervical neoplasia. The marked vascularity and friable appearance of the gestational process can be confused with a neoplastic condition. Profuse bleeding may occur if the products of conception and cervix are mistaken for a tumor and biopsied.
7. Bleeding varicose veins of the portio.
8. Cervical myoma (Jeffcoate, 1975).

## **MANAGEMENT**

### **SURGICAL MANAGEMENT**

#### *1. Abdominal Hysterectomy*

The hemorrhage in cervical pregnancy can be massive and fatal. Nelson (1979) found that approximately 90 percent required

abdominal hysterectomy to control the severe hemorrhage associated with this condition. The average blood loss was 6.4 units.

2. Vaginal Cervicotomy (Matracaru operation)

Experience in Europe with conservative management of early cervical pregnancy has been favorable (Dobrovici, 1968; Siliquini and DeSario, 1969; Parvulescu and Alexandrescu, 1969). A frequently used approach is the so-called vaginal cervicotomy (Matracaru operation) or variations of this technique (Matracaru et al., 1966; Matracaru, 1968).

The technique can be summarized as follows:

- Broad exposure of the pregnant cervix with the aid of adequate vaginal retractors.
- Fixing of the anterior lip of the cervix with two atraumatic cervical clamps.
- Detachment of the urinary bladder.
- Ligation of the cervical branches of the uterine arteries.
- High cervicotomy on the anterior aspect of the cervix, broadly exposing the endocervical cavity.
- Digital removal of the products of conception.
- Curettage of the endocervical cavity to remove adherent fragments.
- Clamping of bleeding sites and hemostasis with catgut sutures, if required.
- Dilatation of the internal orifice with Hegar No. 5 to No. 8, followed by curetting of the uterine cavity.
- Closure of the cervical edges in a single layer with thick catgut. Cervical packing may be needed and removed after 24 hours.

3. Cervical Artery Ligation

Should packing fail to control the bleeding or if hemorrhage is profuse during the curettage, the cervical branches of the uterine arteries can be ligated.

4. Other Methods to control bleeding areas have been attempted, including suturing the cervix, cervical cerclage, resection of the bleeding placental area with reconstruction of the cervix, and cervical amputation, all with some success in individual cases (Duckman, 1951; Dodek, 1965; Mortimer and Aiken, 1968; Rothe and Birnbaum, 1973; Barber and Graber, 1974; Khosravi et al, 1976; Gitstein et al, 1979; Bernstein et al., 1981).

5. Cervical Pregnancy Treated by Local Excision of the gestational sac along with clamping and ligation of the cervix, followed by vaginal packing has been reported (Whittle, 1976).

6. Successful management with cervical suture and intracervical obturator was described recently. The cervix was compressed against a stiff polyethylene Argyle sucker tube inserted in the cervical canal by a 5-mm Mersilene Shirodkar-type suture. The obturator and the stitch

must remain undisturbed for several weeks (Woodforde and Diggory, 1978).

7. More recently, Nelson (1979) described successful conservative management of cervical pregnancy utilizing bilateral internal iliac artery ligation. Following ligation of the hypogastric arteries, the cervix was curetted and intracervical packing was inserted.

### **Conservative Management**

Conservative management involving curettage, cervical packing, ligation of the cervical arteries, amputation, and suturing of the cervix was rarely successful. The majority of the conservatively managed cervical pregnancies were less than eight weeks. When the pregnancy progressed beyond the eighth week, severe hemorrhage invariably occurred, and hysterectomy was required.

Conservative management is desirable, if possible, to preserve the childbearing function, especially in nulliparas. However, conservative treatment should be attempted only in the most favorable cases by experienced gynecologic surgeons. Very early pregnancies (six weeks or less) may be terminated by careful curettage of the endocervix and endometrium (Gitstein et al, 1979). Utmost care must be exercised to avoid cervical rupture or uterine perforation while attempting to remove the products of conception (Wiener, 1979). Several techniques have been recommended with various results.

1. Packing:  
To control bleeding, the endometrial cavity, dilated cervical canal, and vagina have been packed with gauze or GEL FOAM for counter pressure. To create greater pressure, a tight packing of the cervical canal and sewing of the external os together with interrupted sutures over the packing have been attempted. Secondary hemorrhage may occur, however, as much as four or five days later, and even up to six weeks postoperatively after removal of the packing.
2. Methotrexate therapy

### ***Prognosis***

The prognosis for future pregnancies following conservative management is not well documented, although normal pregnancy followed by vaginal delivery after a previous cervical pregnancy has been reported (Sheldon et. al., 1963). The risk of a subsequent cervical pregnancy is unknown.

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