Cervical Cancer Screening in Pregnancy

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KEYWORDS

- Cervical cancer • Cervical intraepithelial noeplasia
- Pregnancy • Colposcopy
- Management of cervical intraepithelial neoplasia in pregnancy

Cervical cancer is the most common malignancy diagnosed during pregnancy, with an incidence of 0.45 to 1 per 1000 live births in the United States.[1] Nearly 3% of cases of newly diagnosed cervical cancer occur in pregnant women, probably because it is one of the few cancers for which screening is part of routine prenatal care. The prevalence of abnormal Pap test results in pregnancy does not differ from the age-matched nonpregnant population. In some populations, up to 20% of pregnant women have an abnormal Pap result during pregnancy.[2] This article reviews the literature[3,4] regarding diagnosis and management of cervical dysplasia and cancer in pregnancy.

PHYSIOLOGIC CHANGES OF THE CERVIX IN PREGNANCY

Any clinician who cares for pregnant women is likely aware of the dramatic changes in the cervix as gestation progresses. The cervix undergoes hypertrophy and hyperplasia, with resulting eversion of endocervical epithelium. Increased blood flow leads to the familiar cyanotic hue of the cervix and vaginal walls. There is increased edema and fibromuscular relaxation of the cervix and vagina and copious thick mucus production, which make visualization of the cervix more difficult. Decidualization of the stroma often causes friability, polyps, and plaque-like changes that can be seen grossly and colposcopically (**Fig. 1**).

CYTOLOGIC APPEARANCE

Cytologic specimens are more difficult to interpret in pregnancy;[5–7] however, grade for grade, intraepithelial lesions are cytometrically identical to those in nonpregnant women. Hormonal changes in pregnancy cause changes in squamous and glandular epithelial cells, including hyperplasia and reactive atypia. The Arias-Stella reaction, a hyperplastic epithelial change that simulates malignancy, may cause confusion. Decidualization results in large cells with large nuclei that may be misinterpreted.

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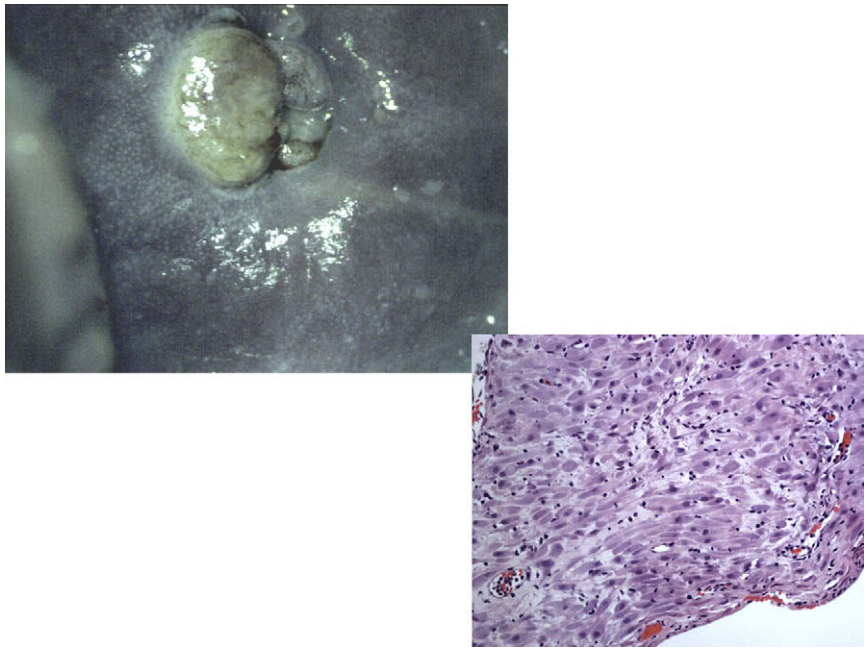

Fig. 1. Plaque-like decidual reaction in cervix. The cervix is seen through a "green" filter. On histology, note the stromal cells with plump polygonal cytoplasm characteristic of decidualization. (*Courtesy of* A. Waxman, MD, MPH, Albuquerque, NM.)

Cytotrophoblast and syncytiotrophoblast cells also may be seen in cytologic specimens. Immature metaplastic cells are often present in large numbers, which may appear similar to high-grade intraepithelial lesions, and there are more inflammatory cells. Despite these challenges, cervical cytology remains an effective screening tool for cervical cancer. Prenatal care provides an opportunity for screening because many women seek health care only when pregnant. It is appropriate to screen all pregnant women who are older than age 20 or sexually active more than 3 years when they present for their first prenatal visit.[8]

COLPOSCOPIC APPEARANCE

The colposcopic appearance of the cervix also changes dramatically throughout pregnancy. Even in the first trimester, edema, cyanosis, and friability can make colposcopy difficult. As pregnancy progresses, decidualization of the stroma often becomes prominent, appearing colposcopically as densely acetowhite plaque-like lesions with spidery superficial blood vessels. Cyanosis of the stroma causes a distinctly dusky appearance, and normal capillaries often have a ring of acetowhite decidualized stroma surrounding them, which causes a "starry sky" appearance. Active immature metaplasia often produces large areas of thin acetowhitening and may have fine mosaic and punctation vessels, making it difficult to distinguish from low-grade dysplasia.

Intraepithelial lesions are difficult to grade during pregnancy because the changes described previously tend to distort the colposcopic findings on the cervix that clinicians rely on to assess the grade of dysplasia. On one hand, edema of the cervix

makes acetowhite epithelium tend to look less intense, which makes the lesions appear less severe. On the other hand, vasodilation causes intraepithelial blood vessels to be larger, which makes lesions look more severe. In individual patients, these changes can be challenging to interpret (**Fig. 2**). More importantly, subtle signs of invasion are easy to miss within a high-grade intraepithelial lesion.

Colposcopic Technique

In early pregnancy, no changes in patient positioning are needed. As pregnancy progresses, patients may develop symptoms of supine hypotension during colposcopic examination, so folded sheets may be needed to wedge the right hip off the table. Visualization of the cervix can be difficult in pregnant women. Relaxation and redundancy of the vaginal walls, well known to all practitioners who care for pregnant women, can obscure the cervix even with a large speculum in place. It is important to use the largest (in width and depth) speculum a patient can tolerate. If separating the blades using the screw on the handle does not provide adequate exposure, a vaginal sidewall retractor can be used. The vaginal walls also can be retracted with a condom placed over the speculum and opened at the distal tip. Some clinicians advocate the use of a glove finger; however, this approach usually limits how far the speculum can be opened. If the cervix is displaced posteriorly, sometimes it can be coaxed between the blades of the speculum by flexing a patient's hips (modified McRobert's position).

Cervical mucus is usually thick, opaque, and tenacious, and pulling on the mucus is not usually successful because the cervix produces rapidly. Sometimes twisting the mucus around a dry cotton swab allows the twisted strand to be mobilized more easily. It often takes more time and more liberal application of acetic acid for the acetowhitening reaction to take place. The cervix is friable, so care must be taken to spray or dab the acetic acid rather than rub. Pregnant women often experience more burning sensation with application of acetic acid compared with nonpregnant

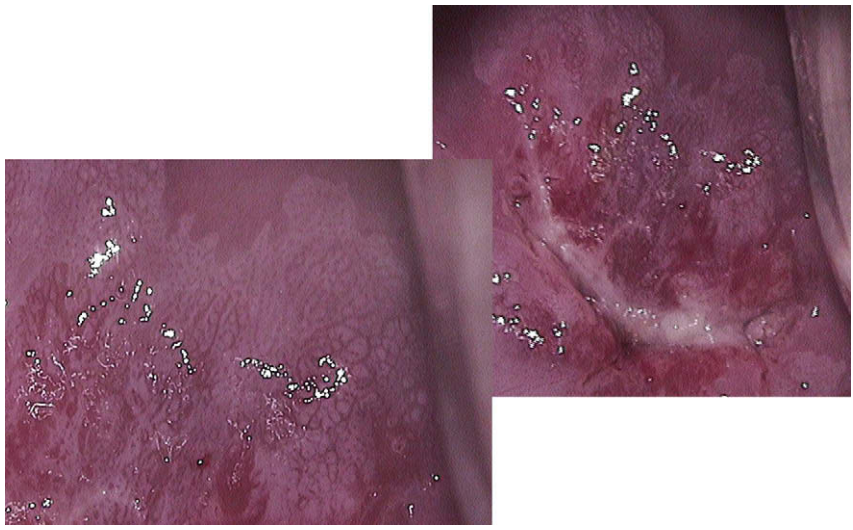

Fig. 2. Anterior lip of cervix on an 18-year-old woman at 20 weeks' gestation. Pap smear indicated low-grade squamous intraepithelial lesion. Inset shows prominent mosaic and punctation patterns. (*Courtesy of* A. Waxman, MD, MPH, Albuquerque, NM.)

women. Late in pregnancy, effacement and dilation of the cervix add to the challenges in visualizing dysplastic changes. Colposcopy in late gestation should be limited to patients most likely to have malignancy based on epidemiologic, cytologic, and gross findings.

Biopsy Technique

There is no evidence that biopsy of the pregnant cervix is any more risky than biopsy outside of pregnancy. Anecdotally, most clinicians note brisker bleeding, but there is no increase in the risk of clinically significant hemorrhage. Biopsies are indicated when the results could potentially impact a patient's management options. The American Society for Colposcopy and Cervical Pathology consensus guidelines recommend biopsy of lesions suspicious for cervical intraepithelial neoplasia (CIN) 2,3 or cancer.[9] A small, sharp biopsy forcep is especially important in pregnancy. It is helpful to prepare by placing an absorbent pad beneath the patient's buttocks extending beneath the speculum handle. Immediately after obtaining the biopsy specimen, pressure with a large swab prevents blood from welling up. After handing off the specimen, a second small swab with a hemostatic substance, such as Monsel's paste or silver nitrate, can be readied for application. Only then should the pressure be released. Both of these hemostatic agents are caustic, so care should be taken to apply as little as needed to the cut stroma, minimizing the amount on the epithelial surface. If bleeding is excessive, cautery, fine suture, or vaginal packing may be needed. Although this bleeding may result in anxiety on the part of the patient and the clinician, adverse effects are unlikely.

HISTOLOGIC APPEARANCE

Similar to cytologic changes, histologic changes in the cervix associated with pregnancy make interpretation of biopsies challenging. Glandular hyperplasia and atypia, decidual reaction, Arias-Stella reaction, and immature metaplasia may be present even in small punch biopsies. It is still appropriate to perform biopsies when indicated; it is incumbent on the clinician to notify the pathologist of a patient's gestational age. A small prospective study showed a high concordance between colposcopic prediction during pregnancy and the ultimate histologic diagnosis.[10] Several other larger retrospective studies confirmed a high correlation between antepartum colposcopic impression and histologic diagnosis.[11,12]

MANAGEMENT OF THE ABNORMAL PAP TEST RESULT IN PREGNANCY

Indications for colposcopic examination are similar for pregnant and nonpregnant women. The only exception in the American Society for Colposcopy and Cervical Pathology guidelines is that deferral of colposcopy until the postpartum period in women with low-grade squamous intraepithelial lesions or atypical squamous cells of uncertain significance (ASCUS) human papillomavirus (HPV)-positive status is acceptable.[9] Colposcopy is still preferred for women over age 20 and should be pursued in women with infrequent screening or women who may not access health care after pregnancy. Women with atypical glandular cells should undergo colposcopy, but endocervical and endometrial curettage are contraindicated because of concern about disrupting the gestation. Colposcopic examination is indicated for nonadolescents with all other intraepithelial lesion or neoplastic findings on Pap test (**Fig. 3**).

Biopsy should be considered if colposcopic findings suggest high-grade changes or worse. Because colposcopic appearances are difficult to interpret, biopsy documentation is particularly important in ruling out early invasive disease.

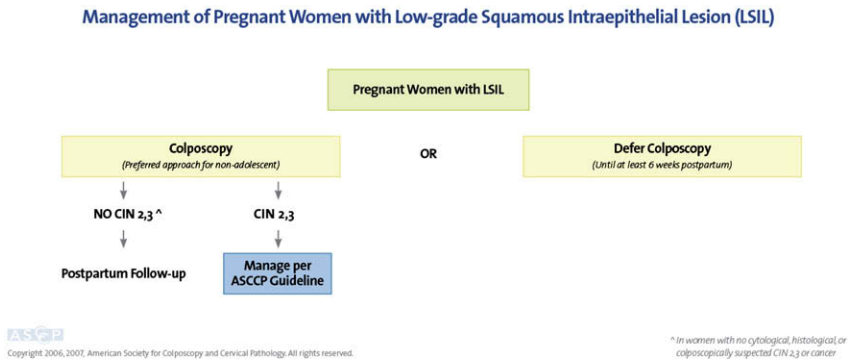

Fig. 3. Management of pregnant women with low-grade squamous intraepithelial lesion. (*Reprinted from* The Journal of Lower Genital Tract Disease Vol. 11 Issue 4, with the permission of ASCCP © American Society for Colposcopy and Cervical Pathology 2007. No copies of the algorithms may be made without the prior consent of ASCCP.)

MANAGEMENT OF COLPOSCOPIC FINDINGS

Low-Grade Lesions

Pregnant women with no cytologic or colposcopic evidence of high-grade disease may be safely managed without biopsy. Repeated colposcopy during pregnancy in women with no evidence of CIN 2,3 or cancer on cytology, colposcopy, or biopsy is unnecessary is termed "unacceptable" in the American Society for Colposcopy and Cervical Pathology guidelines.[9] Postpartum, these women can be evaluated with either repeat colposcopy and Pap test or with Pap test alone, with colposcopy being reserved for women with persistent abnormalities.

High-Grade Lesions

Pregnant women with high-grade lesions on cytology and correlating colposcopy, with or without biopsy, may be followed with repeat colposcopy at intervals no shorter than 12 weeks at the discretion of the clinician. There are no data to support the value of repeat evaluation, however. Women with high-grade cytologic findings but no colposcopic evidence of high-grade disease may undergo repeat colposcopy in an effort to locate the source of the abnormal cells. On the other hand, the American Society for Colposcopy and Cervical Pathology guidelines recommend that repeat evaluation with cytology and colposcopy be deferred until at least 6 weeks postpartum in the case of high grade squamous intraepithelial neoplasia (HSIL) cytology without colposcopic confirmation of CIN 2,3 or cancer. This recommendation, however, is based on expert opinion without strong evidence to support it.

Unsatisfactory Colposcopic Results

Most of the time, the transformation zone can be assessed readily in pregnancy. Eversion and gaping of the endocervical epithelium facilitate examination of the squamocolumnar junction. If the colposcopy is unsatisfactory early in gestation, it should be repeated in the second trimester. In almost all women, colposcopic examination becomes satisfactory by the end of the second trimester. In many cases, a ring forceps may be used successfully in place of an endocervical speculum. If the transformation zone still cannot be visualized in its entirety, the risk of diagnostic conization must be balanced against the likelihood of malignancy. In most women, it is appropriate to defer further evaluation until the postpartum period.

CONIZATION IN PREGNANCY

The indications for conization in pregnant women are different from those in nonpregnant women. Therapeutic conization is contraindicated in pregnancy. Diagnostic conization should be reserved for situations in which there is a significant risk of invasive cancer that cannot be diagnosed colposcopically and the finding of cancer would change the management of the patient. In younger women who have been screened regularly and in whom there is no cytologic, colposcopic, or histologic evidence of malignancy, conization can be deferred even if there is lack of correlation between Pap and biopsy results or an unsatisfactory colposcopy result. Indications for conization in pregnancy include microinvasion or adenocarcinoma in situ on a punch biopsy or strong colposcopic, cytologic, or histologic suspicion of invasion that cannot be confirmed. Conization in pregnancy is associated with significant morbidity, specifically hemorrhage, infection, and pregnancy loss or preterm delivery. The hemorrhage risk has been shown to correlate with trimester in which the conization is performed, with the greatest risk of more than 500 mL of blood loss approaching 10% in the third trimester.[13] Overall, fetal death rate is quoted at approximately 5% and most commonly results from chorioamnionitis or prematurity. The rate of preterm delivery is 10% to 15%.

Conization Technique

In general, a full cone-shaped excision is not needed in pregnancy. Only the portion of cervical epithelium and stroma needed to make a diagnosis should be excised, with no attempt to remove all of the dysplastic tissue. Often, this approach results in either a wedge or a shallow disc- or coin-shaped specimen. Patients must be counseled that further therapy is needed in the postpartum period to address the remainder of the lesion. The complication rate of conization is related to gestational age, with the lowest rates of morbidity earlier in pregnancy. Conization is best avoided in the third trimester because there is an increased risk of hemorrhage and preterm delivery and possibly an increased risk of cervical laceration at the time of delivery.

Conization in pregnancy should be carried out in the operating room, preferably under regional anesthesia if feasible. If the fetus is at a gestational age of viability, continuous fetal monitoring is appropriate; for the previable fetus, intermittent auscultation with documentation of normal fetal heart tones before and after the procedure is adequate. Some clinicians have advocated prophylactic use of tocolytic agents, such as betamimetics and prostaglandin inhibitors, whereas others have recommended using such agents only if uterine contractions occur perioperatively. Intraoperative colposcopy is used to delineate the area to be excised. Acetic acid and Lugol's iodine are safe to use. It is generally recommended to perform excision with a knife. Several case reports recently discussed safe use of loop excision in pregnancy.[14–16]

There are multiple strategies for decreasing the risk of heavy bleeding. The use of intracervical vasoconstricting agents during pregnancy remains controversial. There is concern that resultant vasospasm of the uterine arteries may lead to fetal hypoxia. Transient abnormalities of the fetal heart rate tracing are not unusual, but their long-term significance is unclear. Sutures at 3 o'clock and 9 o'clock at the cervicovaginal junction can be placed before incision to ligate the descending cervical branches of the uterine artery. A McDonald-type cerclage suture also can be placed before incision high in the cervical stroma without advancing the bladder. This suture can be left untied so that the cervix is less distorted during the excision and it can be tied if bleeding is excessive. It may be left in place or removed at the end of the procedure if hemostasis is not a concern. Once the tissue has been excised, electrofulguration

can be used at the stromal bed to obtain hemostasis. A running, locking, delayed-absorbable suture also can be placed from side to side for a wedge-shaped excision or placed circumferentially for a wider, more superficial excision. Topical hemostatic agents, such as Monsel's solution, gelatin paste, oxidized regenerated collagen, microfibrillar collagen, or gelatin sponge soaked in thrombin, also can be applied. Vaginal packing can be used if needed as an adjunct to any of these techniques of hemostasis.

POSTPARTUM MANAGEMENT

The cervix undergoes tremendous remodeling and repair in the postpartum period, whether the infant was born by cesarean or vaginal delivery. Ideally, evaluation of dysplasia is best postponed until 8 to 10 weeks postpartum to allow adequate healing and decrease artifact. In some health care settings, it may be difficult for patients to return or have insurance coverage beyond the postpartum period, so earlier evaluation may be appropriate; however, it is best to wait a minimum of 6 weeks postpartum to perform cytology, colposcopy, and biopsies. Postpartum cytology, colposcopy, and biopsies as indicated should be performed in women who have had HSIL, atypical glandular cells, or ASC-H Pap tests during pregnancy, regardless of the findings during pregnancy. Women who have had cytologic and colposcopic evidence of low-grade dysplasia during pregnancy may be managed postpartum with Pap testing, deferring repeat colposcopy unless subsequent cytology is abnormal.[9] Women with low-grade squamous intraepithelial lesion or ASCUS HPV-positive status who have had colposcopy deferred during pregnancy should undergo colposcopy postpartum.

Management must be based on postpartum findings. Numerous studies have elucidated the natural history of CIN during pregnancy.[2,17–20] The collective body of literature suggests that at least half of women with dysplasia diagnosed during pregnancy have no evidence of disease postpartum. Of the remaining women, most have no change in the degree of dysplasia, with a substantial minority demonstrating worse disease. The rate of progression from high-grade preinvasive disease to carcinoma during pregnancy is probably on the order of 0.4%. Many of these studies are limited by the fact that follow-up was by cytology only and that a significant number of women were lost to follow-up. Many of these studies were conducted before the high rate of spontaneous regression of CIN in nonpregnant women was well understood. Although it was previously thought that remodeling and repair of the cervix after pregnancy contributed to disease regression, it may be that the high rates of postpartum regression simply reflect the natural history of HPV infection of the cervix.

Fetal Risks

It is well recognized that HPV infection can be transmitted vertically from mother to infant during the process of parturition, but the absolute risk of transmission is uncertain. Infants and children of mothers with HPV disease rarely are diagnosed with either genital HPV lesions or respiratory papillomatosis. There are no data about vertical transmission of high-risk HPV types. Genital HPV infections in children must prompt a careful investigation of the possibility of sexual abuse; however, cases of mother-to-child transmission in the apparent absence of sexual misuse are reported. Juvenile respiratory papillomatosis is a life-threatening disorder involving laryngeal papillomatosis, usually related to HPV 11. Almost all cases are associated with extensive condylomata of the maternal genital tract, but it is theoretically possible that maternal HPV carriage in the absence of overt warts may result in vertical transmission.[21] It is assumed that transmission occurs during vaginal delivery in settings with a high viral

load. Population registry-based studies suggest that the risk of juvenile respiratory papillomatosis is low.[22,23] Currently, it is reasonable to counsel pregnant women who have CIN but not extensive condylomata that there is negligible risk to their fetus.

Invasive Carcinoma

Invasive carcinoma of the cervix complicates approximately 0.5 to 1 per 1000 pregnancies in the United States. Diagnosis may be delayed because the symptoms of cervical carcinoma, such as bleeding or discharge, overlap with those of normal pregnancy. Once a malignancy is diagnosed by punch biopsy or conization, patients are best served by consultation with a multidisciplinary team, including specialists in gynecologic oncology, maternal-fetal medicine, neonatology, radiation oncology, and psychology and spirituality.

Staging

Patients must undergo appropriate staging before management decisions can be made. Cervical cancer staging is based on clinical examination, histologic findings of biopsies and conization specimens, and imaging studies of the chest and kidneys. These findings are classified according to the International Federation of Gynecology and Obstetrics scoring system, which is indicated in **Table 1**. The prognosis or survival rate depends on the stage of disease at the time of diagnosis, with 5-year rates of 99% for stage IA1, 95% to 98% for stage IA2, 90% for stage IB1, and 75% for stage IB2.[24] The prognosis of cervical cancer in pregnant patients is unchanged stage for stage.

Pregnant women should undergo staging with imaging, using strategies to limit the amount of ionizing radiation. CT is not absolutely contraindicated for the purpose of assessing for lymphadenopathy or hydronephrosis, because radiation exposure is within the clinically acceptable range, but other imaging modalities are available and should be considered. MRI has been shown to be fairly accurate in predicting parametrial involvement (up to 93%). It also has a high sensitivity and specificity in predicting nodal metastases for lymph nodes larger than 1 cm (88% and 91%, respectively).[25] (Of note, these data are based on the nonpregnant population.) Imaging of the urinary tract may be deferred in patients in whom extracervical disease is unlikely, such as stage IA or microscopic/ small stage IB (< 1 cm). For patients with higher stage disease or high-risk histology, ultrasonography or MRI may be considered in place of intravenous pylegram to rule out stage III disease.[25] A chest radiograph exposes pregnant patients to a minimal amount of radiation and should be obtained in patients with more than microscopic disease to evaluate for pulmonary metastases.

Management

The general principles regarding management of cervical cancer are altered during pregnancy. Definitive therapy results in pregnancy loss, but postponement of therapy may compromise maternal health. Decisions regarding the balance of fetal and maternal risks must be individualized depending on gestational age, cancer stage, and patient wishes.

Stage IA1

This diagnosis is confirmed after conization of the cervix shows only microinvasion. If the margins of the specimen are negative, several studies have demonstrated good outcomes with expectant management, with colposcopy and pelvic examinations every trimester. A small study of four patients with IA1 adenocarcinoma of the cervix diagnosed during pregnancy demonstrated no cases of invasive carcinoma in the postpartum period. All patients were followed without any interventions.[26] A slightly

Table 1
International Federation of Gynecology and Obstetrics staging and classification of cancer of the cervix

Stage	Classification
0	Carcinoma in situ
I	Carcinoma strictly confined to the cervix
IA	Carcinoma identified only microscopically, maximal stromal invasion depth of 5 mm and width of 7 mm
IA1	Maximal invasion depth of 3 mm and width of 7 mm
IA2	Invasion depth > 3 mm but $\leq$ 5 mm, maximal width of 7 mm
IB	Microscopic lesions > IA or clinical lesions confined to the cervix
IB1	Lesions $\leq$ 4 cm
IB2	Lesions > 4 cm
I	Involvement of upper two thirds of vagina or parametria (not extending to pelvic sidewall)
IIA	Involvement of upper two thirds of vagina
IIB	Involvement of parametria without extension to pelvic sidewall
III	Involvement of lower one third of vagina or extension onto pelvic sidewall or nonfunctioning kidney or hydronephrosis (unless attributable to other known causes)
IIIA	Involvement of lower one third of vagina
IIIB	Extension to pelvic sidewall, nonfunctioning kidney, or hydronephrosis
IV	Extension outside the reproductive tract
IVA	Involvement of bladder or rectal mucosa
IVB	Distant metastases

larger group of patients—eight—with squamous cell carcinoma were followed for up to 25 weeks, again with no cases of invasion.[27]

If conization margins are positive, the risk of residual disease is significant.[28] Invasive disease has not been completely ruled out in this situation. Repeat conization is absolutely necessary in the postpartum period for these reasons. During the pregnancy, patients may be followed with serial colposcopic examinations.

Stage IA2, IB, or Nonbulky IIA

The diagnosis of invasive cervical cancer in pregnancy poses a significant dilemma for patients and physicians. The health of the mother and fetus are essentially at direct juxtaposition. The possible detrimental effects of treatments on fetal health must be weighed against maternal desires to continue the pregnancy. The gestational age at the time of diagnosis has a great impact on management. When cervical cancer is diagnosed near term, treatment can be deferred until delivery, which should take place as soon as fetal lung maturity is demonstrated. If the patient is diagnosed before 20 weeks' gestation, termination of pregnancy is an option so that definitive management is not delayed. If cancer is diagnosed in mid-pregnancy, the decision whether to delay treatment until the postpartum period or terminate the pregnancy must be individualized. The definitive therapy is not different in pregnant patients—surgery and chemoradiation. What is different, however, is the presence of a fetus that may be harmed by those treatments and the timing of treatment. These specific treatment options are discussed later as they relate to pregnant patients.

LOCALLY ADVANCED DISEASE

The standard of care for patients with stages IIB to IVA disease is chemoradiation. The addition of cisplatin to primary radiation therapy in the treatment of cervical cancer has been shown to improve the 5-year survival rate by 12% over radiation therapy alone.[29,30] Regardless of gestational age at diagnosis, it is appropriate to consider prompt and definitive treatment. Radiation therapy results in fetal demise; however, passage of the products of conception may be delayed significantly. Several cases of administration of chemoradiation during pregnancy have been reported in the literature.[31,32] In one case report, two patients with stage IB2 squamous cell carcinoma were diagnosed during the second trimester and treated with whole pelvic irradiation concurrent with cisplatin radiosensitization.[31] Both cases required medical inductions of labor because of fetal demise without subsequent miscarriage.

Chemotherapy

Cisplatin is the most effective cytotoxic drug in the treatment of cervical cancer. Data examining the use of cisplatin during pregnancy are limited to case reports. One such report describes several cases, but with no direct causal effect elucidated. They reported on two infants with intrauterine growth restriction, two with moderate bilateral hearing loss, and one with idiopathic ventriculomegaly.[33] Chemotherapy during pregnancy is usually administered before late third trimester, which allows potential clearance of the chemotherapy and accounts for a known side effect of cisplatin—namely, transient neutropenia.[34] The earlier administration of therapy allows for bone marrow recovery.

Chemotherapy essentially has two roles in the treatment of cervical cancer: as neoadjuvant therapy or to prevent metastatic disease. Pregnant patients with metastatic disease need to be counseled extensively on the prognosis of their disease and the additional considerations with the presence of the pregnancy. In terms of neoadjuvant therapy, studies in nonpregnant women have demonstrated a survival benefit in patients treated with neoadjuvant chemotherapy followed by radical surgery compared to surgery only, radiation only, or sequential chemotherapy and radiation.[35,36]

Surgery

In patients with microinvasive disease, cesarean hysterectomy is an option, but because of the significant morbidity associated with this procedure, the potential benefits in the setting of good prognosis of this approach need to be explored thoroughly by patients. On the other hand, cesarean delivery is recommended for patients with stages IA2, IB, and IIA disease for reasons addressed previously. In this situation, radical hysterectomy and pelvic/para-aortic lymphadenectomy can be performed at the same time as delivery. This approach has the benefit of a single surgical procedure and no delay between delivery and definitive surgical management. The biggest complications associated with radical cesarean hysterectomy are increased blood loss and requirement for blood transfusion.[37–39]

In patients who desire to maintain their fertility but are candidates for surgical management, trachelectomy is the procedure of choice. There are some reports of radical trachelectomies performed during pregnancy, but they are associated with a high rate of fetal loss and should be avoided.[40,41] This technique is most beneficial for appropriate candidates during the postpartum period. Women with stage IA2 or small IB1 would be ideal candidates.

MODE OF DELIVERY

The decision for a vaginal delivery versus a cesarean delivery depends on the stage of the disease at time of diagnosis. Preinvasive disease has not been shown to be affected by the route of delivery.[42] Even microinvasive or early invasion is not a contraindication to vaginal delivery because maternal prognosis is not thought to be altered by it.[43] The presence of gross tumor of the cervix is a relative contraindication to vaginal delivery for several reasons. Gross tumor has a higher likelihood of bleeding with vaginal delivery. Several reports in the literature have discussed tumor cell implantation in the episiotomy site in women who delivered vaginally in the setting of cervical cancer diagnosis.[44] Nearly 50% of those patients ultimately died of their disease.[45]

OUTCOMES

The prognosis of women diagnosed with cervical cancer during pregnancy seems to be similar to nonpregnant women, stage for stage. Most studies that suggest this are retrospective. A cohort study that compared 40 women with pregnancy-associated cervical cancer to 89 nonpregnant women with cervical cancer demonstrated similar survival rates between both groups.[46] Another study that evaluated 53 women diagnosed with stage IB cervical cancer during pregnancy demonstrated similar 5-year survival rates, which were not changed by the administration of therapy during the pregnancy.[47] On the other hand, the prognosis of the pregnancy is often affected by the diagnosis of cancer. A large study from California showed that women diagnosed with cervical cancer during pregnancy or in the postpartum period have higher rates of spontaneous and iatrogenic prematurity and higher rates of low birth weight and very low birth weight infants.[48]

SUMMARY

Cervical intraepithelial lesions are common in pregnant women. Screening guidelines are no different in the pregnant population from the nonpregnant population. Colposcopic evaluation of women with an abnormal Pap test result should be performed during pregnancy, although it may be deferred until the postpartum period in women with low-grade squamous intraepithelial lesions or ASCUS HPV-positive status. Colposcopic diagnosis is challenging in pregnant women because of pregnancy-related changes in the appearance of the cervix and mechanical difficulties in visualization. The role of colposcopic evaluation is to rule out invasive cancer, because all other abnormalities can be safely managed expectantly until the pregnancy is over. When cancer is diagnosed during pregnancy, patients should undergo staging. Decisions regarding therapy, such as balancing risks to the fetus from therapy with potential risks to the mother from delaying therapy, must be individualized and are best addressed by a multidisciplinary team.

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