Cervical Cancer Treatment

Cervical cancer overview

Cervical cancer is a malignant (http://www.radiologyinfo.org) tumor that starts in the cells of the cervix (http://www.radiologyinfo.org) . This is the lower part of the uterus that connects the uterus (http://www.radiologyinfo.org) and the vagina (http://www.radiologyinfo.org) . According to the American Cancer Society, cervical cancer is most frequently diagnosed in women between the ages of 35 and 44.

Most cervical cancers are the result of a previous infection with the human papilloma virus (HPV) (http://www.radiologyinfo.org) . HPV may be spread through vaginal, anal, or oral sex. HPV vaccination is recommended in adolescents age 11-12 prior to first sexual encounter. However, it is approved for adults up to the age of 26 and considered appropriate in some people up through 45. It is important to note that both men and women can receive the HPV vaccine. For women, regular gynecological care will also help reduce your risk for cervical cancer through routine pap smears and HPV testing. *See the Cervical Cancer page (https://www.radiologyinfo.org/en/info/cervicalcancer) for more information.*

What are my treatment options?

Treatment options overview

Cervical cancer treatment options depend on the stage of the tumor. The stage indicates if and how far cancer has spread to other parts of the body. Your doctor may use CT, MRI, chest X-ray or a PET scan to identify the stage of your cancer. This will help determine what treatments are available to you.

Treatment options include:

- Surgery
- Radiation Therapy
- Chemotherapy
- Targeted Therapy

Your treatment may use one or more of these options. Your doctor will weigh the advantages and disadvantages of each option as they relate to your age, overall health, future childbearing plans and personal preferences.

Surgery:

For Stage 0 or precancerous disease, patients typically undergo one of the following procedures. These procedures allow women to become pregnant in the future:

Cryosurgery: During this procedure, gas is used to cool a metal probe. The probe is placed directly onto the cervix where it freezes and kills abnormal cells. *For more information see Thermal Ablation for Tumor Treatment (https://www.radiologyinfo.org/en/info/thermal-ablation-therapy) .*

Laser Surgery: This procedure uses a focused laser beam to burn off abnormal cervical cells. It may also be used to remove a small piece of the cervix for further lab testing.

LEEP (loop electrosurgical excision procedure)/Conization: This procedure uses a wire loop heated by an electric current to remove abnormal cells from the cervix. In conization, the surgeon uses a scalpel to remove a cone shaped piece of abnormal tissue.

Under special circumstances, early stage cervical cancer patients, who want to become pregnant in the future may undergo:

- **Conization** (described above).
- **Simple trachelectomy:** This surgery removes the cervix.
- **Radical trachelectomy:** In addition to removing the cervix, a margin of the vagina and tissue next to the cervix (or parametrium) is removed but the uterus is kept intact. Pelvic lymph nodes also are removed. The surgeon places a "purse-string" stitch (or cerclage) at the lower end of the uterus. This allows for the possibility of the patient carrying a pregnancy to term. Such a pregnancy would likely be considered high-risk.

The decision to proceed with surgery in patients who do not want to become pregnant depends on stage. Surgical options include:

Simple hysterectomy: This surgery removes the uterus and cervix but leaves the structures surrounding the uterus intact. No lymph nodes are removed. This eliminates any possibility of a future pregnancy.

Radical hysterectomy: This surgery removes the uterus, cervix, upper part of the vagina and some ligaments and tissue near the uterus. Pelvic lymph nodes also are removed. The ovaries are generally not removed. This eliminates any possibility of a future pregnancy.

Hysterectomies can be performed through:

- the vagina (vaginal hysterectomy)
- a large incision in the abdomen (abdominal hysterectomy) or
- a small incision in the abdomen (laparoscopic hysterectomy, which includes robotic assistance).

Any removal of the uterus prevents a woman from becoming pregnant in the future.

Radiation therapy:

Radiation therapy uses high-energy x-rays or other forms of radiation to kill cancer cells or keep them from growing. Two types of radiation therapy — external beam therapy (EBT), brachytherapy or both — are typically used to treat cervical cancer. Radiation therapies are often used together or in combination with surgery.

- External Beam Therapy (EBT): EBT delivers high-energy x-ray or electron beams to the tumor. Beams are usually generated by a linear accelerator (https://www.radiologyinfo.org/en/info/linac) and targeted to destroy cancer cells while sparing surrounding normal tissues. Many patients receive a type of EBT called Intensity-Modulated Radiation Therapy (IMRT). IMRT is a type of 3-D radiation that safely and painlessly delivers a precise radiation dose to a tumor while minimizing the dose to surrounding normal tissue. EBT typically requires daily treatment over a period of four to six weeks. *See the External Beam Therapy page (https://www.radiologyinfo.org/en/info/ebt) and the Intensity-Modulated Radiation Therapy page (https://www.radiologyinfo.org/en/info/imrt) for more information.*
- Brachytherapy or internal radiation therapy: Brachytherapy uses a delivery device to place radioactive material inside the patient on a temporary or permanent basis. This kind of radiation only travels short distances as opposed to EBT. It allows your doctor to use a higher total dose of radiation to treat a smaller area in less time than EBT.
- Cervical cancer brachytherapy is known as intracavitary brachytherapy. A device containing radioactive material is inserted into the vagina, the cervix and sometimes into the tissue surrounding the cervix. There are two types of

intracavitary brachytherapy:

1. Low-dose rate (LDR) brachytherapy: LDR is performed in a hospital setting and requires a patient to stay overnight for several days. Patients are typically given medication to help them relax during the procedure, which is performed in an operating room usually under general anesthesia. For women who still have a uterus, the delivery devices are known as a tandem and ovoid applicator. The tandem is inserted through the cervix and into the uterus, and the ovoid is placed near the cervix. The radioactive sources are then inserted into the tandem and ovoid. To protect healthy tissue, sterilized material is often placed around the applicator to push the bladder and rectum away from the treatment area. Once the device is in place and the radiation material is inserted, the patient is moved to a shielded hospital room where the radiation is delivered over a period of two to three days. During this time, the patient will receive medication to remain comfortable. Trained nurses and physicians will care for the patient over the course of treatment but will take precautions to avoid radiation exposure.
2. High-dose rate (HDR) brachytherapy: This treatment may be delivered on an outpatient basis, although on occasion the device that is implanted will remain in place overnight and may require a brief hospital stay. HDR brachytherapy requires several treatments, usually separated by a period of days or even up to a week. Insertion of the HDR brachytherapy device (most frequently a tandem and ovoid applicator) may be performed under general anesthesia or moderate sedation. The patient typically undergoes a CT or MRI scan to help the radiation oncologist plan where the radiation should be delivered. The tandem is inserted through the cervix and into the uterus, and the ovoid is placed near the cervix. The patient is then moved to a shielded room and connected to the source of radiation, which is delivered through the applicator and removed after several minutes. Frequently a few treatments will be delivered, spaced over a period of a day or two. There is no radioactivity in the radiation applicator between treatments. The patient will stay in a standard (non-shielded) hospital room in-between treatments. Patients are given medication to help them relax during the procedure. Intracavitary brachytherapy may be used for women who have had radical hysterectomies and who no longer have a uterus and cervix. Instead of inserting a tandem and ovoid, a shorter device called a cylinder is placed into the vagina. A tube with radioactive material is then placed through the cylinder to deliver the radiation locally. *See the Brachytherapy page (https://www.radiologyinfo.org/en/info/brachy) for more information.*

Chemotherapy:

This treatment administers drugs intravenously (by vein) or by mouth to kill cancer cells or to keep them from reproducing. IV chemotherapy is typically used in combination with radiation to decrease the chance of the disease returning elsewhere in the body. When chemotherapy is given with radiation for cervical cancer, it is given at a lower dose. This has been shown to help the radiation therapy work better. Like radiation therapy, chemotherapy can ease symptoms and increase survival for patients with tumors that have spread (metastasized). Patients usually receive chemotherapy over a set period of time with breaks in between to ease potential side effects. These effects may include abnormal blood-cell counts, fatigue, diarrhea, mouth sores and a compromised immune system.

Newer, advanced chemotherapy options help avoid damaging healthy tissue while stopping cancer cells from spreading and reproducing.

Targeted therapy/monoclonal antibodies and immunotherapy:

Targeted therapy gives small amounts of manmade "monoclonal" antibodies to patients through intravenous (IV) infusion. Monoclonal antibodies mimic the body's natural antibodies that identify and fight foreign objects such as viruses and bacteria. Once inside the body, monoclonal antibodies latch onto substances on the surface of cancer cells. This kills the cancer cells or blocks their growth. Bevacizumab (Avastin®) is a common monoclonal antibody used for cervical cancer. Once inside the body, it binds to a protein called vascular endothelial growth factor and helps prevent the growth of new blood vessels that feed cancer cells. This therapy is generally used to treat cancer that has spread outside the cervix and its immediate area. It is also used to treat recurrent cervical cancer. Recent data suggests that Pembrolizumab (Keytruda®), an immune therapy, can be used in cervical cancers that make too much of the protein PDL-1. PDL-1 binds to the protein PD-1, which keeps your body from killing cancer cells. Pembrolizumab works by blocking this attachment. This therapy is used to treat cancer that has stopped

responding to chemotherapy, cannot be removed by surgery, or has returned.

How can I choose from among the options?

In addition to talking with family and friends, you will need a team of doctors to help advise you. This team will include your gynecologist, a gynecologist oncologist, and a radiation oncologist. A gynecologist oncologist specializes in women's reproductive cancers. The gynecologist oncologist surgically removes cancer or helps radiation oncologists implant radioactive materials. A radiation oncologist uses radiation to treat cancer. You and your care team will create your treatment plan. Your plan will mostly be determined by the stage and severity of your cancer. It will also depend on your future plans for pregnancy. Early stage cervical cancer is typically treated with surgery or radiation combined with chemotherapy. Advanced or recurrent cervical cancers are typically treated with a combination of radiation and chemotherapy. Sometimes, advanced cervical cancer patients will only receive chemotherapy.

If I choose surgery, will I need radiation therapy or vice versa?

Your doctor may recommend more treatment based on the results of surgery. Depending on what kind of surgery was performed, you may need more invasive surgery and/or radiation with chemotherapy. Chemotherapy helps radiation work better. This combination is used to treat most cervical cancer patients.

Radiation therapy alone is not typically used to treat cervical cancer. If your health prevents you from having surgery or chemotherapy, you may receive radiation on its own. For the most part, surgery is not an option for patients with advanced cervical cancer, where disease has spread to other parts of the body or is large in size.

How effective is modern radiation treatment of cervical cancer?

Modern technology and recent advances in treatment software allow doctors to deliver more of the radiation dose directly to the cervix and avoid surrounding healthy tissue. Doctors use various imaging techniques to visualize the cervix and surrounding tissue in three dimensions. This allows the radiation dose to be tailored more precisely to the individual patient's unique needs. Improved brachytherapy devices help minimize the radiation dose that will be delivered near the bladder and rectum. This reduces the risk of side effects and complications. The goal of treatment today is to safely provide a higher dose of radiation, to improve the chances of a cure.

What happens during radiation therapy?

Radiation therapy uses high-energy x-rays (photons). Used at high doses (many times those used for x-ray imaging exams), it can destroy cancer cells with each treatment. This happens at a microscopic level. Patients do not feel the radiation during treatment. They will only hear some electrical noise from the machine and may notice safety warning lights in the room.

What are possible side effects of radiation therapy?

As treatment progresses, you may become tired. Adequate rest is important, you should try to stay as active as you can. You may have upset stomach, diarrhea or loose stools (if radiation is given to the pelvis or abdomen), nausea and vomiting during EBT. Some patients will have skin changes or irritation in the area where the radiation has passed through the skin to the cancer. If the irritation leads to peeling, you must be careful to clean and protect the area to avoid infection.

Other side effects from EBT include:

- Radiation cystitis: irritation to the bladder, causing an urge to urinate often.
- Vaginal pain: increased sensitivity and soreness in the vagina, which can also result in discharge.
- Menstrual changes: radiation to the pelvis can affect the ovaries and often result in menstrual changes or early menopause.
- Low blood counts: radiation can affect how your body is functioning overall. This can result in low levels of red blood cells

and/or white blood cells.

Women undergoing brachytherapy often see similar side effects to those associated with EBT. These may include fatigue, diarrhea, nausea, irritation of the bladder and low blood counts. Also, because the radiation used in brachytherapy only travels a short distance, the vagina and the vulva may become red and sore and have a discharge. Patients often receive brachytherapy and EBT close together. This may make it more difficult to tell which treatment is causing the side effects.

These side effects generally last two to three weeks after treatment is over. However, there are some long-term side effects that may or may not resolve.

- Vaginal stenosis: Both EBT and brachytherapy can cause scar tissue to form in the vagina. The scar tissue can make the vagina narrower (called stenosis), less able to stretch, or shorter. This can make sexual intercourse painful.
- Vaginal dryness: Vaginal dryness can be a long-term side effect from both EBT and brachytherapy. Estrogen creams are often used to help improve the dryness, especially if the radiation treatment results in early menopause.
- Irregular bowel movements that may be more frequent or urgent.
- Bowel obstruction that could require surgery to fix.
- Bladder damage that could cause bleeding in the urine.
- Weakened bones: Radiation to the pelvis can weaken the bones. This can put a woman at high risk of fractures. Hip fractures are the most common fracture seen in women, typically within the first few years after radiation. Bone density tests are recommended to monitor this risk. *See the Bone Density Scan page (https://www.radiologyinfo.org/en/info/dexa) for more information.*
- Swelling of the leg(s): If pelvic lymph nodes are treated with radiation, it can lead to fluid drainage problems in the leg. Some women experience swelling in the leg, a condition called lymphedema. Non-invasive treatments for lymphedema are available.
- Early menopause and infertility: Radiation therapy is likely to cause early menopause and permanent infertility. Women of child-bearing age who may be pregnant or wish to become pregnant should talk to their doctors. Talk to your doctor about the possibility of hormone-replacement therapy as well.

What kind of treatment follow-up should I expect?

Once treatment is complete, you and your treatment team will decide on a follow-up plan. Early stage cancers will likely require follow up with your gynecologist oncologist. These appointments should be done every three months for the next two years and every six months for the following three years. Exams are performed annually thereafter. You will also need to have an annual pap smear test (including patients who have had a hysterectomy). Patients with more advanced cancer will need to be followed by both your gynecologist oncologist and radiation oncologist. These appointments will start within weeks of finishing your treatment to address any side effects. Once it is determined that the treatment has worked, your visits will be spaced further apart. At these visits, your doctor may order PET or CT scans. *See the PET/CT Scan page (https://www.radiologyinfo.org/en/info/pet) for more information.*

Are there any new developments in treating my disease?

Clinical Trials

For information and resources about clinical trials and to learn about current clinical trials being conducted, visit:

- RadiologyInfo's Clinical Trials page (https://www.radiologyinfo.org/en/info/screening-clinical-trials) .
- Clinical Trials (https://www.cancer.gov/about-cancer/treatment/clinical-trials/search) - from the National Cancer Institute's Web site

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