



## Cervical Cancer Treatment

### Cervical cancer overview

Cervical cancer is the term used to describe malignant tumors that start in the lining of the cervix – the lower part of the uterus that connects the uterus and the vagina. Each year in the United States, approximately 13,000 women are diagnosed with cervical cancer. Half of all cervical cancer cases occur in women between 35 and 55 years of age.

Most cervical cancers are a result of a previous infection with the human papilloma virus (HPV), which is spread through vaginal, anal or oral sex. Thanks to the use of regular pap smear testing for early detection, cervical cancer is no longer the leading cause of death for American women. Cervical cancer rates are expected to continue falling due to increased HPV vaccination rates. See the Cervical Cancer page for more information.

### What are my treatment options?

#### Treatment options overview

Treatment options for cervical cancer depend on the stage of the tumor, or how far it has spread within the cervical wall, nearby tissues and the colon or rectum. CT scans, MRI of the body, chest X-rays or PET will help your physician identify the stage of your cancer (called staging), which will determine the treatment options available to you.

There are four types of treatment options available; your physician may use a combination of these therapies. To determine your treatment plan, your physician will balance the advantages against the disadvantages as they relate to your age, overall health, future plans for having children and your personal preferences.

Standard options include:

#### **Surgery:**

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

**Cryosurgery:** During this procedure, a cold metal probe is placed directly onto the cervix, killing the

abnormal cells. See the Cryotherapy page for more information.

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

**LEEP (loop electrosurgical excision procedure)/Conization:** During this procedure, a wire loop heated by an electric current removes cells and a thin layer of tissue in the lower genital tract. Conization is similar to the LEEP procedure except that the surgeon uses a scalpel to remove a cone shaped piece of abnormal tissue.

For more advanced cervical cancer, patients typically undergo one of the following procedures:

**Radical trachelectomy:** During this surgery, the cervix and the upper part of the vagina are removed but the uterus is kept intact. The surgeon places a "purse-string" stitch in place of the cervix, which allows for the possibility of the patient carrying a pregnancy to term. Such a pregnancy would likely be considered high-risk.

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

**Radical hysterectomy:** This surgery removes the uterus, cervix, the upper part of the vagina and some ligaments and tissue near the uterus. Pelvic lymph nodes are often removed as well. The ovaries and fallopian tubes are generally not removed. This would eliminate any possibility of a future pregnancy.

Hysterectomies can be performed through the vagina (vaginal hysterectomy), through a large incision in the abdomen (abdominal hysterectomy) or through a small incision in the abdomen (laparoscopic hysterectomy, often with robotic assistance). Removal of the uterus prevents a woman from becoming pregnant.

Depending on the staging and severity of the cancer, the surgeon may also remove part of the colon, rectum or bladder.

### **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:** During external beam therapy, high-energy x-ray or electron beams are delivered to the tumor. Beams are usually generated by a linear accelerator and targeted to destroy cancer cells while sparing surrounding normal tissues. Many patients receive a type of external beam therapy called Intensity-Modulated Radiation Therapy (IMRT). IMRT is a type of 3-D radiation that uses linear accelerators to safely and painlessly deliver 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 for more information. See the Intensity-Modulated Radiation Therapy page for more information about

## IMRT.

- Brachytherapy or internal radiation therapy: Brachytherapy uses a delivery device to place radioactive material inside the patient on a temporary or permanent basis to damage cancer cells' DNA and destroy their ability to divide and grow. This kind of radiation only travels short distances as opposed to external beam radiation. It allows your doctor to use a higher total dose of radiation to treat a smaller area in less time than conventional external beam radiation therapy.
- Cervical cancer brachytherapy is known as intracavitary brachytherapy. The radioactive materials are placed in a device that is then 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: This procedure is performed in a hospital setting and requires a patient to stay in the hospital 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 tandem and ovoid 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 takes place on an outpatient basis. HDR brachytherapy requires several treatments, usually separated by a period of days or even up to a week. The procedure for HDR brachytherapy is similar to LDR brachytherapy and 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 tandem and ovoid applicator and then removed after several minutes. Patients are given medication to help them relax during the procedure. Following the procedure, patients remain in the recovery room for a short period of time.

For women who have had radical hysterectomies and who no longer have a uterus and cervix, intracavitary brachytherapy may be used. 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 for more information.

## **Chemotherapy:**

This treatment involves the use of drugs given intravenously (by vein) or orally to kill cancer cells or to keep them from dividing and multiplying. Chemotherapy is typically used as a supplemental treatment in combination with radiation to decrease the chance of the disease returning elsewhere in the body. Like radiation therapy, chemotherapy can ease symptoms and increase survival for patients with tumors that have spread (metastasized). Patients usually receive chemotherapy treatment sessions over a set period of time with breaks in between to ease potential side effects, such as abnormal blood-cell counts, fatigue,

diarrhea, mouth sores, and a compromised immune system.

Newer, advanced chemotherapy options have recently been developed. These newer options help avoid damaging normal, healthy tissues while stopping cancer cells from spreading and multiplying.

### **Targeted therapy/monoclonal antibodies immunotherapy:**

With targeted therapy, small amounts of synthetic (made in a laboratory) antibodies, called monoclonal, are given to the patient through an intravenous (IV) infusion. Monoclonal antibodies mimic the antibodies that are naturally produced in the body and 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, killing them or blocking their growth. A common monoclonal antibody used for cervical cancer is Bevacizumab (Avastin®). Once delivered into the body, it binds to a protein called vascular endothelial growth factor (VEGF) and helps prevent the growth of new blood vessels that feed cancer cells. This therapy is generally used to treat cervical cancer that has spread outside the cervix and its immediate area. It is also used to treat recurrent cervical cancer.

### **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, a radiation oncologist and a surgeon. A gynecologist oncologist specializes in women's reproductive cancers. A radiation oncologist specializes in using radiation to treat cancer. The surgeon surgically removes cancer or assists radiation oncologists with implanting radioactive materials. You and your care team will create your treatment plan, which will mostly be determined by the stage and the severity of the cancer. It will also depend on your future plans for pregnancy. For women with early stage cervical cancer, surgery or radiation is typically combined with chemotherapy. For those with advanced cervical cancer or recurrent cervical cancer, women are typically treated with a combination of radiation therapy and chemotherapy. Sometimes women with advanced cervical cancer will only be given chemotherapy such as immunotherapy.

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

If there is evidence that cancer remains following surgical treatment (including Cryosurgery, Laser Surgery, LEEP or Conization) for Stage 0 cervical cancer or pre-cancer, patients will typically need to undergo a more invasive surgery and/or radiation therapy and/or chemotherapy. Depending on the type of cancer found on testing, treatment may only include a simple or radical hysterectomy.

Radiation therapy alone is not typically used to treat cervical cancer. If a patient's health prevents her from being a surgical or chemotherapy candidate, radiation may be used on its own. For patients with advanced cervical cancer, where disease has spread to other parts of the body, surgery may not be an option. For these advanced cancer patients, radiation therapy and chemotherapy are the two treatment options typically used.

The decision to use chemotherapy will be based on the staging of your disease. Chemotherapy is used to treat most patients with cervical cancer except those with very early stage disease.

### **How effective is modern radiation treatment of cervical cancer?**

With modern technology and recent advances in treatment software, physicians can deliver more of the radiation dose directly to the cervix and avoid the surrounding healthy tissue. Physicians use various imaging techniques to visualize the cervix and surrounding tissue in three dimensions so that the radiation dose can 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, reducing 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). When radiation is used at high doses (many times those used for x-ray imaging exams), it can destroy abnormal (cancer) cells with each radiation 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 radiation treatment progresses, it may cause patients to become tired. While adequate rest is important, doctors usually advise patients to try to stay as active as they can. Patients may have upset stomach, diarrhea or loose stools (if radiation is given to the pelvis or abdomen) and nausea and vomiting during EBT. Sometimes 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, the patient must be careful to clean and protect that 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 and 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 such as fatigue, diarrhea, nausea, irritation of the bladder and low blood counts. In addition, 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, making it more difficult to tell which method of radiation therapy is causing the side effects.

These side effects are generally short term, lasting 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, which 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.

- **Weakened bones:** Radiation to the pelvis can weaken the bones, putting 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 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. There are non-invasive treatments available to women who experience lymphedema.
- **Early menopause and infertility:** Women of child-bearing age who may be pregnant or wish to become pregnant should discuss this with their doctor as early menopause and permanent infertility are likely. They are also advised to discuss the possibility of hormone-replacement therapy.

## What kind of treatment follow-up should I expect

Once your cervical cancer treatment is complete, you and your treatment team will decide on a follow-up plan. For early stage cancers, you will most likely follow up with your gynecologist oncologist every six months for the next two years and annually thereafter. You will also need to have an annual pap smear test (including patients who have had a hysterectomy). For patients with more advanced cancer, you 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 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.
- Clinical Trials - from the National Cancer Institute's Web site

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