Testicular Cancer - Treatment

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Treatment Options

This section outlines treatments that are the standard of care (the best proven treatments available) for testicular cancer. When making treatment plan decisions, patients are also encouraged to consider clinical trials as an option. A clinical trial is a research study to test a new treatment to evaluate whether it is safe, effective, and possibly better than standard treatment. Your doctor can help you review all treatment options. For more information, see the Clinical Trials [2] and Current Research [3] sections.

Treatment overview

In cancer care, different types of doctors often work together to create a patient?s overall treatment plan that combines different types of treatments. This is called a multidisciplinary team [4] and includes a urologist and medical oncologist (a doctor who specializes in treating cancer with medication) and sometimes a radiation oncologist (a doctor who specializes in giving radiation therapy to treat cancer).

Descriptions of the most common treatment options for testicular cancer are listed below, followed by treatment options by the cancer?s stage. Treatment options and recommendations depend on several factors, including the type and stage of cancer, possible side effects, and the man?s preferences and overall health.

Most often, testicular cancer can be successfully treated with surgery, and/or radiation therapy, and/or chemotherapy. Men with testicular cancer may have concerns about how their treatment will affect their sexual function, fertility, and quality of life, and they may want to discuss these topics with their doctor before treatment begins. Sometimes, more than one treatment option is available. The final choice of a treatment plan depends on the patient?s specific situation. Learn more about making treatment decisions [5].

Surgery

Surgery is the removal of the tumor and surrounding tissue during an operation. There are different types of surgery used to treat testicular cancer, each is described further below.

If a decision is made to perform an orchiectomy, a sample of blood will be collected before surgery to test for levels of serum tumor markers because they are often helpful in planning treatment and follow-up care.

Radical inguinal orchiectomy

Treatment of testicular cancer usually starts with surgery to remove the affected testicle, called radical inguinal orchiectomy. This is done through an incision in the groin (along the beltline). It is used to diagnose and treat both early-stage and later-stage testicular cancer, regardless of the type of tumor. In stage I non-seminoma testicular cancer, a man?s blood serum markers should return to normal after this surgery. For later-stage cancer, a radical inguinal orchiectomy may, occasionally, be delayed until after treatment with chemotherapy is finished.

The removal of one testicle typically does not affect a man?s testosterone level if he still has the other testicle, and it is a normal size. If a man?s testosterone level is reduced, symptoms may include decreased sex drive (libido), inability to achieve a normal erection and orgasm, fatigue, hot flashes, and mood changes as well as loss of muscle mass. Orchiectomy is unlikely to make a man infertile (unable to bear children) because the remaining testicle will still produce sperm. However, men with testicular cancer are more likely to be infertile than other men, even before being diagnosed with cancer. It appears that the cancer itself may cause some men to become infertile. Sperm counts usually improve after the testicle with cancer is removed.

A man may develop cancer in both testicles either at the same time or at different times, but this is rare (about 2% of men with testicular cancer). If a bilateral orchiectomy (removal of both testicles) is performed, the man will no longer produce sperm or testosterone and will not be able to biologically produce children. If the doctor recommends removing the testicle in a man with one testicle, the patient should consider storing sperm in a sperm bank before surgery if possible, so that he will be able to have children later if he wishes. In addition, for men who have had both testicles removed, testosterone hormone replacement therapy will be needed.

Men can choose to have an artificial (prosthetic) testicle implanted in the scrotum that has a weight and texture that is somewhat similar to a normal testicle but not exactly the same. Some men find that prosthetic testicles are uncomfortable. Each man is encouraged to talk with his doctor about the best timing of this implantation. Some men prefer to wait until after the active treatment period is over to give this option full consideration.

Retroperitoneal lymph node dissection (RPLND)

This is surgery to remove the retroperitoneal lymph nodes that lie at the back of the abdomen. RPLND may be considered for men with clinical stage I and IIa non-seminomas and men with retroperitoneal masses that remain after finishing chemotherapy for late-stage disease. In men with non-seminomas, any masses larger than 1 cm that remain after chemotherapy are removed if it is surgically feasible, but for men with pure seminomas, masses smaller than 3 cm are usually left in place and monitored for changes with CT scans. RPLND is usually performed as an open operation with an incision down the middle of the abdomen. Doctors are studying the use of laparoscopic RPLND, which uses several smaller incisions instead of the one large incision, but that approach is not yet widely used and may not be as effective.

RPLND for stage I and IIa non-seminomas. About 30% of patients with clinical stage I non-seminoma who have an RPLND are found to have lymph nodes with cancer; in other words, the surgery shows that they have stage II disease. Doctors are now able to better determine which stage I tumors are at a higher risk of having spread to the lymph nodes or beyond, based on the results of the pathology tests performed on the tumor in the testicle after it is removed. This makes it possible to determine which men are more likely to have cancer found in the lymph nodes during RPLND and which are most likely to need chemotherapy after RPLND. Decisions about whether to have an RPLND may be based on the patient?s risk factors. If an RPLND is needed for stage I non-seminoma, it is usually done within six weeks after orchiectomy.

If 5 or fewer lymph nodes have cancer but none are larger than 2 cm (pN1), this surgery alone is successful for 80% to 90% of men, while about 10% to 20% of men will have a recurrence. If more lymph nodes have cancer (pN2 or pN3), surgery alone is successful for about 50% of patients, while the other 50% will have a recurrence. The advantage of the RPLND is that it can cure most patients with small lymph node metastases, provide a more accurate assessment of the extent of disease, and avoid the need for frequent CT scans of the abdomen during follow-up care. It also reduces the chance that a man with early-stage (stage I) testicular cancer will be given unnecessary chemotherapy.

Just as RPLND may show cancer in lymph nodes that appeared normal on CT scans for men with clinical stage I non-seminomas, surgery may also show that there is no cancer in lymph nodes that were enlarged on a CT scan (men with clinical stage II disease). For men with clinical stage IIa testicular non-seminomas, 20% to 40% will actually have pathological stage I cancer, meaning that the cancer has not spread to any lymph nodes. In these situations, the use of RPLND can help many men avoid unneeded chemotherapy.

It is important to remember that the RPLND is a complex operation requiring experience and skill in order to remove all of the appropriate lymph nodes and to minimize the side effects of the operation. RPLND should only be done by a surgeon who is highly experienced with this operation.

Some patients may experience temporary side effects from RPLND, such as bowel obstruction (blockage) or infection. This procedure should not affect a man's ability to have an erection, orgasm, or sexual intercourse, but it may cause infertility because it can interfere with nerves that control the ejaculation of sperm. Therefore, men are encouraged to bank sperm before RPLND. There are surgical techniques that are usually successful at sparing the nerves involved with ejaculation, and it is recommended that a man discuss this with his surgeon. The main disadvantage of this surgery for stage I non-seminoma is that 70% of patients are cured by removal of the testicle alone; for these men, a RPLND offers no curative benefit, although it does allow the man to avoid the regular CT scans needed with active surveillance, as well as, possibly, peace of mind.

Also, despite the surgery, about 10% of testicular cancers recur even if the lymph nodes were not found to have cancer. If the RPLND finds that the lymph nodes have cancer, then a decision needs to be made whether to give two courses of chemotherapy (see below) to decrease the chance of recurrence to about 1%. However, it is equally reasonable to ?watch and wait? (also called active surveillance, see below) and begin treatment with chemotherapy only if the cancer recurs. This is because this type of cancer has a greater than 95% chance of being cured with three cycles of chemotherapy if the recurrence is diagnosed early through regular monitoring.

RPLND to remove residual tumors after chemotherapy. RPLND performed after chemotherapy is a more complex operation and is more likely to cause infertility (from being unable to ejaculate) and other side effects. However, the surgical removal of any masses larger than 1 cm that remain after chemotherapy for non-seminomas is believed to be an essential part of treating the disease when such an operation can be safely done. About half of men going through such surgery will have a mass that contains either teratoma (about 35-40%) or one of the other germ cell cancers (10-15%). The other 40% to 50% of men will have no tumor. Some treatment centers will perform an RPLND after chemotherapy in men who had enlarged retroperitoneal lymph nodes before chemotherapy even if the lymph nodes return to normal size (less than 1 cm) after chemotherapy. Some treatment centers may not recommend RPLND if a CT scan taken after chemotherapy is normal. For men found to have teratoma, no additional treatment is given after RPLND. For men found to have one of the other germ cell tumors (seminoma, embryonal carcinoma, yolk sac tumor, or choriocarcinoma), additional chemotherapy is generally recommended after RPLND.

Other types of surgery to remove tumors remaining after chemotherapy

After chemotherapy, some men may have tumors remaining in lymph nodes outside the retroperitoneum, in the lungs, liver, or other organs. These tumors should also be removed if it is safe to do so. This may involve surgery in more than one part of the body. This type of surgery is complex and requires an experienced team of surgeons. If only some of the remaining tumors can be removed, then surgery is not usually performed.

Learn more about cancer surgery [6].

Active surveillance for clinical Stage I testicular cancer

As described above, after having a radical inguinal orchiectomy, one option for clinical stage I seminomas and non-seminomas may be active surveillance. Active surveillance will only be considered as an option if the serum tumor markers are normal or return to normal after the cancerous testicle is removed. A doctor may recommend this approach, in which the patient is monitored closely and active treatment begins only if the cancer recurs. This option involves regular doctor appointments for CT scans, chest x-rays, physical examinations, and blood tests for tumor markers. This approach requires dedication by the doctor and patient to stick to the surveillance schedule so that any recurrence can be detected at an early stage. The main advantage of this approach is that it avoids any further treatment after orchiectomy (such as chemotherapy, radiation therapy, or additional surgery) for the 80% of men with seminoma and 70% of men with non-seminoma who do not need more treatment after surgery. For an individual patient, the risk of recurrence may be higher or lower based on certain risk factors determined by the pathologist?s examination of the testicular

tumor after the testicle has been removed.

The surveillance schedule for non-seminomas involves testing every one to two months for the first two years and less often thereafter. The surveillance schedule for seminomas is much less intense, with testing performed every four months for the first two to three years and less often thereafter. Patients generally have follow-up screening for at least ten years after their diagnosis.

Chemotherapy

Chemotherapy is the use of drugs to kill cancer cells, usually by stopping the cancer cells? ability to grow and divide. Systemic chemotherapy is delivered through the bloodstream to reach cancer cells throughout the body. A chemotherapy regimen (schedule) usually consists of a specific number of cycles given over a set period of time. A patient may receive one drug at a time or combinations of different drugs at the same time.

In general, patients with later-stage disease receive more chemotherapy. The appropriate chemotherapy depends on the stage of the cancer and whether it is a seminoma or a non-seminoma. Chemotherapy for specific stages is discussed further below.

Chemotherapy works very well for testicular cancer but can cause side effects and complications. Most of these side effects usually go away once treatment is finished, but some can show up much later (called late effects [7]). Balancing the risks and benefits of chemotherapy is an important issue for men with testicular cancer. However, metastatic testicular cancer (stage IIC-III) can generally only be cured with chemotherapy, so for men with metastatic testicular cancer, the benefits of chemotherapy typically outweigh the risks. On the other hand, men with stage I testicular cancer almost never die of the disease regardless of which treatment they receive, so risks of chemotherapy may outweigh the benefits for these men.

The side effects of chemotherapy depend on the individual and the dose used, but they can include the following:

Nausea and vomiting [8]**.** This is common during each cycle of chemotherapy. Vomiting can often be prevented using the appropriate medications. Drugs that prevent vomiting are given before chemotherapy on each of the days the drug cisplatin (Platinol) is given. These drugs are very effective. One of these antinausea drugs is a cortisone-like steroid called dexamethasone (multiple brand names). Another class of drugs, called serotonin antagonists, blocks a chemical called serotonin from entering the brain and triggering the part of the brain that controls vomiting. The combination of these drugs significantly reduces or even prevents vomiting in a majority of men, although they do not get rid of all nausea. A third drug is metoclopramide (Reglan). If a stronger antinausea treatment is needed, aprepitant (Emend) can be added to the combination of dexamethasone and a serotonin antagonist. Other drugs, such as prochlorperazine (Compazine), promethazine (Phenergan, Provigan, Zipan), or lorazepam (Ativan) may also be helpful. Learn more about preventing vomiting caused by cancer treatment [9].

Fatigue [10]**.** Tiredness and loss of energy are among the most common side effects of chemotherapy. Almost all men who have chemotherapy for testicular cancer will experience some fatigue, but the severity varies widely from person to person.

Reduction in the number of blood cells. Chemotherapy may cause a reduction in the number of white cells [11] (cells that fight infections), red blood cells [12] (cells that carry oxygen), or platelets [13] (cells that cause blood to clot). Because lower levels of these cells can interfere with blood clotting and the body?s ability to fight infections, it is important to seek help immediately if you have bleeding, infection, and/or a fever. Infections during chemotherapy can be very serious, and even life-threatening, if they are not treated immediately, and fever is often the only warning of an infection.

Loss of hair [14]**.** For most patients, hair loss occurs after four weeks. However, it grows back about four months after chemotherapy has ended. At times, it may grow back a different texture (such as curly, if it used to be straight) or a different color. However, patients who are balding before chemotherapy do not grow more hair after completing chemotherapy than they had before chemotherapy.

Numbness and tingling [15]**.** The chemotherapy used for testicular cancer sometimes causes nerve damage that causes a partial loss of feeling in the hands and/or feet. Numbness and tingling after chemotherapy often improves over time, but it may be permanent.

Hearing loss. Chemotherapy can cause loss of hearing for high-pitch sounds and can cause ringing in the ears, which is called tinnitus. Hearing loss, when it occurs, is usually permanent.

Kidney damage. Mild reductions in kidney function are common after chemotherapy, but it is unknown whether mild reductions actually cause any medical problems. Rarely, chemotherapy can cause more severe kidney damage that prevents the kidneys? from functioning completely.

Skin marks. Bleomycin (Blenoxane) can sometimes leave some brown patches on the skin.

Fertility [16]**.** Chemotherapy can cause lowered sperm counts and increase the risk of infertility.

Lung damage [17]**.** Slightly reduced lung function is common after chemotherapy with bleomycin. Rarely, the effects of bleomycin on the lungs can cause death.

Chemotherapy may also increase risk of secondary cancers many years after treatment, as well as cardiovascular disease and infectious diseases. Learn more about common side effects [18]. Other side effects that can last for a long time after chemotherapy are described in the After Treatment [19] section. Talk with your doctor about your risk of long-term side effects before starting chemotherapy.

Learn more about chemotherapy [20] and preparing for treatment [21]. The medications used to treat cancer are continually being evaluated.

Talking with your doctor is often the best way to learn about the medications prescribed for you, their purpose, and their potential side effects or interactions with other medications. Learn more about your prescriptions by using searchable drug databases [22].

Radiation therapy

Radiation therapy is the use of high-energy x-rays or other particles to kill cancer cells. A radiation therapy regimen (schedule) usually consists of a specific number of treatments given over a set period of time. The most common type of radiation treatment is called external-beam radiation therapy, which is radiation therapy given from a machine outside the body. For testicular cancer, the radiation is generally directed at lymph nodes in the abdomen. Often, the radiation is also targeted at lymph nodes on the same side of the pelvis as the testicle where the cancer started.

Radiation therapy is more effective for treating seminoma than non-seminoma and is used in specific circumstances for testicular cancer. The only common use of radiation therapy in testicular cancer is for high risk stage I, IIA, and IIB pure seminomas. However, at many treatment centers, active surveillance (or, less commonly, carboplatin [Paraplatin] chemotherapy) is used instead of radiation therapy as the preferred treatment of stage I seminomas because of the risk that radiation therapy may cause other cancers and cardiovascular (heart) disease. Radiation therapy is also sometimes used to treat brain metastases from either seminomas or non-seminomas, but testicular cancer rarely spreads to the brain.

Side effects from radiation therapy may include fatigue, mild skin reactions, upset stomach, loose bowel movements, and peptic ulcers. Medications may be helpful to prevent or reduce nausea and vomiting during radiation therapy. Most side effects go away soon after treatment is finished. Radiation therapy can also cause problems with sperm production and the remaining testicle needs to be shielded if the man wishes to try to preserve fertility [23].

Radiation therapy may increase risk of secondary cancers many years after treatment, as well as cardiovascular disease and gastrointestinal disease. Talk with your doctor about your risk of long-term side effects before starting radiation therapy.

Learn more about radiation therapy [24].

Palliative/supportive care

Cancer and its treatment often cause side effects. In addition to treatment to slow, stop, or eliminate the cancer, an important part of cancer care is relieving a person?s symptoms and side effects. This approach is called palliative or supportive care, and it includes supporting the patient with his or her physical, emotional, and social needs.

Palliative care can help a person at any stage of illness. People often receive treatment for the cancer and treatment to ease side effects at the same time. In fact, patients who receive both often have less severe symptoms, better quality of life, and report they are more satisfied with treatment.

Before treatment begins, talk with your health care team about the possible side effects of your specific treatment plan and supportive care options. And during and after treatment, be sure to tell your doctor or another health care team member if you are experiencing a problem, so it is addressed as quickly as possible. Learn more about palliative care [25].

Treatment by stage of the cancer

The treatment choices for testicular cancer depend on whether the cancer is a seminoma or non-seminoma (see Overview [26]) and the stage of the cancer (see Staging [27]). After a physical examination, staging tests, and the removal of the cancerous testicle, you and your doctor will discuss your treatment options. Treatment options for early stage, later stages, and recurrent seminoma and non-seminoma are described in more detail below.

Clinical stage I non-seminoma testicular cancer

About one-third of patients with clinical stage I non-seminoma have small areas of metastatic cancer that cannot be seen by CT scans when diagnosed but will grow and be found with time. The rest are cured by having their testicle removed. Most recurrences of stage I non-seminoma occur within nine months after diagnosis and occur in the retroperitoneum. The options for men with clinical stage I disease are:

- Active surveillance. This option involves CT scans of the abdomen and pelvis every three to six months for the first year, every four to nine months in the second year, and every six to twelve months in the third to fifth year. Chest x-rays with physical examinations and tumor marker tests to measure beta-hCG and AFP are done every one to two months for the first 12 months, every two to three months in the second year, every three to four months in the third and fourth years, every six months in the fifth year, and then annually. If the cancer recurs, three cycles of chemotherapy successfully treats more than 95% of men. RPLND may be used to treat recurrent cancer if it is limited to the retroperitoneal lymph nodes.
- RPLND. As described above, this is surgery to remove the retroperitoneal lymph nodes in the back of the abdomen. After an RPLND, the risk of recurrence is less than 10% if no cancer is found at surgery. Most of these recurrences occur in the lungs or the lymph nodes in the chest and they almost always occur within two years after the RPLND.
- Chemotherapy. This option involves receiving chemotherapy shortly after the testicle has been removed surgically, called adjuvant chemotherapy. The most commonly used approach has been to give two, three-week cycles of bleomycin, etoposide (Toposar, VePesid), and cisplatin, a regimen called BEP. The advantage of this approach is that it lowers the recurrence rate from 30% down to less than 3%. The main disadvantage is that 70% of patients do not need chemotherapy because they have already been cured with the surgical removal of the testicle. Therefore, some doctors recommend against using chemotherapy for clinical stage I non-seminoma, while others may recommend using adjuvant chemotherapy only for men who have a higher risk of recurrence so that fewer men receive unnecessary treatment.

Clinical stage I seminoma testicular cancer

More than 80% of men with clinical stage I seminoma are cured with orchiectomy alone while the remaining 15% to 20% will have a recurrence if given no additional treatment. Most recurrences occur within 12 months after diagnosis and the location of the recurrence is typically in the retroperitoneum. Recurrences of stage I seminoma can almost always be cured with radiation therapy at the time of recurrence, although a small number of men will need chemotherapy.

- Active surveillance. Active surveillance is the standard method of managing stage I seminoma. Using a surveillance program, the risk of death from stage I seminoma is less than 1%. Unlike surveillance for non-seminomas, surveillance for seminomas does not require frequent visits to the doctor. While this can vary, a common schedule is that men are seen every four months for the first two to three years, every six months for the next three years, and then annually until at least ten years after the diagnosis of testicular cancer. At each visit, the following are performed: a CT scan of the abdomen and pelvis, a chest radiograph, and a physical examination. Blood tests to measure the serum tumor markers beta-hCG and AFP may be done at the same time, but more research is needed to determine if testing serum tumor markers is helpful for these men.

- Adjuvant radiation therapy (radiation therapy after surgery). Seminoma is much different from non-seminoma, and early-stage seminoma can be effectively treated with radiation therapy. The chance of recurrence can be decreased to less than 5% with 10 to 15 treatments of radiation therapy to the retroperitoneum. Additional radiation therapy to the pelvis does not reduce the overall risk of recurrence, but it does reduce the risk of a recurrence in the pelvis. Some doctors prefer to treat only the retroperitoneum. Others prefer to include the pelvis in order to prevent recurrences in that area and to eliminate the need to perform imaging tests of the pelvis to monitor for recurrence.

The disadvantage of radiation therapy for clinical stage I seminoma is that more than 80% of men receive treatment that they do not need because they were cured with the orchiectomy. This is a concern because radiation therapy increases the risk of developing secondary cancers and cardiovascular disease.

- Adjuvant chemotherapy (chemotherapy after surgery). Chemotherapy for stage I seminoma is a newer and more controversial treatment option than surveillance or radiation therapy. Using carboplatin, studies have shown that the risk of recurrence after orchiectomy can be reduced from 18% to about 2% using two doses of carboplatin and to about 5% using a single dose of carboplatin. Because the use of carboplatin is a newer approach, there is less information on long-term effects after treatment. Therefore, many experts believe that more information is needed before recommending this treatment approach. On the other hand, many other experts have accepted carboplatin as a new treatment option for stage I seminoma, and it is listed as a standard treatment option in most published testicular cancer treatment guidelines. The hope is that carboplatin will cause fewer complications than radiation therapy, but it won?t be known whether this is the case until the men who have been treated with carboplatin have been followed for a longer period of time. Complications from cancer treatments sometimes do not appear until 10 to 20 years later.

Metastatic testicular cancer

If cancer has spread to another location in the body, it is called metastatic cancer. The most common place for testicular cancer to spread is the retroperitoneum.

Patients with this diagnosis are encouraged to talk with doctors who are experienced in treating this stage of cancer, because there can be different opinions about the best treatment plan. Patients may want to talk with doctors experienced in the treatment of metastatic testicular cancer, including seeking a second opinion [28] before starting treatment, so you are comfortable with the treatment plan chosen. This discussion may include clinical trials [2] studying new treatments.

The treatment plan your health care team may recommend is based on many individual factors, including whether the cancer has spread to the brain. Initial treatment is usually chemotherapy unless immediate treatment of the brain is needed. Chemotherapy typically shrinks the size of such tumors in the brain and may remove them entirely over time. If there are any masses remaining after chemotherapy, surgery may be recommended. Radiation therapy to treat the spread of testicular cancer to the brain is controversial. If immediate treatment of a tumor in the brain is needed due to bleeding or swelling or other issues, then removing the mass surgically is usually preferred if it can be done safely, but radiation therapy may be recommended instead of or in addition to surgery depending on the situation. Supportive care will also be important to help relieve symptoms and side effects. Descriptions of the treatment options for metastatic testicular cancer are described below:

Clinical stage II non-seminoma testicular cancer

Surgery to remove the testicle is done first, followed by additional treatment. Factors affecting the post-orchiectomy treatment decision are the patient?s serum tumor marker levels, as well as the size of retroperitoneal lymph nodes. The options for men with clinical stage II non-seminoma after surgery are:

- RPLND. As described above, this is surgery to remove the retroperitoneal lymph nodes in the back of the abdomen. This is recommended after orchiectomy when the serum tumor marker levels have returned to normal, none of the lymph nodes is larger than 2 cm, and there are no more than five enlarged lymph nodes. Chemotherapy may still be needed after RPLND if a large amount of cancer is found in the removed lymph nodes. Men are encouraged to consider sperm banking before RPLND due to the risk of loss of normal ejaculation after surgery.
- Chemotherapy. Combination chemotherapy is given after surgery to remove the testicle. Doctors generally recommend using chemotherapy immediately after surgery when imaging tests show more than five and/or large (bigger than 2 cm) retroperitoneal lymph nodes and/or when serum tumor marker levels remain high after surgery. Men are encouraged to consider sperm banking before chemotherapy due to the risk of infertility after chemotherapy.

Clinical stage II seminoma testicular cancer

Surgery to remove the testicle and lymph nodes with cancer is done first, followed by additional treatment. The main factor in the treatment decision

after surgery for a stage II seminoma is the size of the retroperitoneal lymph nodes.

- Chemotherapy. Chemotherapy with a combination of drugs is given after surgical removal of the testicle when the lymph nodes are larger than 5 cm (stage III) or when there are enlarged lymph nodes spread out over a large area in the back of the abdomen. This is the preferred treatment for men with clinical stage II seminoma. Men are encouraged to consider sperm banking before chemotherapy due to the risk of infertility.

- Radiation therapy. When lymph nodes are less than 5 cm (stages IIa and IIb), surgery is usually followed by radiation therapy to the lymph nodes in the abdomen and pelvis; chemotherapy may also be used. Men are encouraged to consider sperm banking before radiation therapy due to the risk of infertility from radiation.

Stage III non-seminoma testicular cancer

- Chemotherapy. Chemotherapy is used for men with non-seminoma that can be seen outside of the testicles on CT scans or chest x-ray. The most common regimen given is BEP. The treatments are given over three week cycles and each drug is given intravenously (IV; injected into a vein). Cisplatin and etoposide are given each day on the first five days. IV fluid is also given before and after the cisplatin to reduce the risk of damaging the kidneys. The treatment takes about six hours on these days. Bleomycin is given once each week, typically on the first, eighth, and 15th day of the 21-day cycles. The treatment takes about 30 minutes on the days when only bleomycin is given. Men are encouraged to consider sperm banking before chemotherapy due to the risk of infertility.

The likelihood of chemotherapy successfully treating this cancer depends on the risk group category (see Staging [27]). More than half of metastatic non-seminoma testicular cancers are classified as good-risk, and more than 90% of these will be successfully treated with three cycles of BEP chemotherapy or four cycles of chemotherapy using etoposide and cisplatin (a regimen called EP) plus surgical removal of any remaining masses. About 25% of metastatic non-seminomas are intermediate-risk disease, and 80% of these are successfully treated with four cycles of BEP plus surgical removal of any remaining masses. Finally, about 15% of metastatic non-seminomas are poor-risk disease, and about 50% to 70% of these are cured with four cycles of BEP plus surgery to remove of any remaining masses. For patients with intermediate-risk or poor-risk disease who cannot be given bleomycin due to side effects, the combination of etoposide, ifosfamide (Ifex), and cisplatin (called VIP) has been shown to work just as well.

- Surgery after chemotherapy. After chemotherapy is completed, x-rays and CT scans are repeated to see if there are any masses of cancer remaining. If cancer is seen, then surgery to remove the masses is considered. The chance of the surgery curing the cancer is higher if the serum tumor markers have been reduced to a normal range by chemotherapy. This surgery is difficult and requires an experienced surgeon who regularly performs either RPLND after chemotherapy or removal of masses from the lungs. Very rarely, if the mass is pressing on the kidney or major blood vessels in the retroperitoneum, then major surgery, such as removal of the kidney and/or blood vessel grafts, may be needed. Often in this situation the nerves that are responsible for ejaculation cannot be spared. It is recommended that men talk about this with their doctors, in addition to the option of sperm banking, preferably before any chemotherapy is given.

During surgery, there is about a 40% to 50% chance that only scar tissue will be found, a 35% to 40% chance there will be teratoma, and a 10% to15% chance of some other type of germ cell tumor (for example, embryonal carcinoma, seminoma, yolk sac tumor, or choriocarcinoma). If cancer is found, two more cycles of chemotherapy may be given. The chemotherapy used is typically either cisplatin plus etoposide, cisplatin plus etoposide and ifosfamide, or cisplatin and ifosfamide combined with either vinblastine (Velban, Velsar) or paclitaxel (Taxol).

Metastatic (stage III) seminoma testicular cancer

- Chemotherapy. Chemotherapy for metastatic seminoma is the same as for metastatic non-seminoma (see above). Most (approximately 90%) of metastatic seminomas are good-risk disease, and about 90% are successfully treated. Approximately 10% of metastatic seminomas are intermediate-risk disease and need four cycles of BEP. Men are encouraged to consider sperm banking before chemotherapy due to the risk of infertility.
- Surgery after chemotherapy/radiation therapy. It is quite common for a mass to be found on imaging tests after chemotherapy or radiation therapy is finished. There is less than a 10% chance that this mass contains cancer and almost no chance that it contains teratoma. The main treatment options are active surveillance or surgery. Such surgery is often very difficult due to a ?scar-like? reaction that makes the mass difficult to remove. This is unique to seminoma. Larger masses are more likely to contain cancer, so some believe surveillance should be used when a mass is smaller than 3 cm and surgery should be used for a mass 3 cm or larger. A specific type of positron emission tomography (PET) scan [29], called an FDG-PET scan may be used. After the FDG-PET scan is done, the surgeon will operate only if the scan results show evidence of cancer in the remaining mass. One study showed that PET scans are more accurate than CT scans for determining if a remaining mass contains cancer, but it should be used only when the remaining mass is larger than 3 cm. The main benefit of PET scans is avoiding unnecessary surgery to remove masses that are noncancerous. If surgery is recommended but the surgeon determines that the mass cannot be removed, then biopsies are often performed to try to find out whether the mass is cancerous. If active surveillance is recommended and the mass grows, chemotherapy is often used. Surgery can be considered if the mass remains after the chemotherapy. If an RPLND is performed, men should consider sperm banking before surgery due to the risk of infertility due to the loss of normal ejaculation.

For many patients, a diagnosis of metastatic cancer can be very stressful and, at times, difficult to bear. Patients and their families are encouraged to talk about the way they are feeling with doctors, nurses, social workers, or other members of the health care team. It may also be helpful to talk with other patients, including through a support group.

Recurrent testicular cancer

A remission is when cancer cannot be detected in the body and there are no symptoms. This may also be called ?no evidence of disease? or NED.

A remission can be temporary or permanent. This uncertainty leads to many survivors feeling worried or anxious that the cancer will come back. While many remissions are permanent, it?s important to talk with your doctor about the possibility of the cancer returning. Understanding the risk of

recurrence and the treatment options may help you feel more prepared if the cancer does return. Learn more about coping with the fear of recurrence [30].

Regular follow-up examinations to check for signs that the cancer may be returning are extremely important. If the cancer does return after the original treatment, it is called recurrent cancer. It may come back in the same place (called a local recurrence), nearby (regional recurrence), or in another place (distant recurrence).

When this occurs, a cycle of testing will begin again to learn as much as possible about the recurrence. After testing is done, you and your doctor will talk about your treatment options. Often the treatment plan will include the therapies described above (such as surgery, chemotherapy, and radiation therapy) but may be used in a different combination or given at a different pace. Your doctor may also suggest clinical trials that are studying new ways to treat this type of recurrent cancer.

For recurrent testicular cancer, treatment usually includes chemotherapy and surgery. If the cancer was stage I and returns during active surveillance, then the most common treatment is chemotherapy with three or four cycles of BEP or four cycles of EP depending on the stage of the cancer. If the cancer is only in the retroperitoneal lymph nodes and is a pure seminoma, then radiation therapy is the usual treatment. If the cancer is only in the retroperitoneal lymph nodes and is a non-seminoma, RPLND alone may be considered instead of chemotherapy.

The standard treatment for recurrent testicular cancer that has previously been treated with chemotherapy is four cycles of additional chemotherapy. The standard chemotherapy regimens include VeIP (vinblastine, ifosfamide, and cisplatin) and TIP (paclitaxel, ifosfamide, and cisplatin). Sometimes, high-dose chemotherapy with stem cell transplantation [31] may be used but it is not known if high-dose chemotherapy works better than standard-dose chemotherapy. If chemotherapy is given, any remaining masses are managed the same way that they are after initial chemotherapy (see above). A recurrence more than two years after treatment should be removed surgically if possible. Chemotherapy may or may not be recommended. A man with recurrent testicular cancer is encouraged to talk with doctors who have experience in treating recurrent testicular cancers before choosing a treatment approach.

People with recurrent cancer often experience emotions such as disbelief or fear. Patients are encouraged to talk with their health care team about these feelings and ask about support services to help them cope. Learn more about dealing with a cancer recurrence [32].

If treatment fails

Recovery from cancer is not always possible. If treatment is not successful, the disease may be called advanced or terminal cancer.

This diagnosis is stressful, and this is difficult to discuss for many people. However, it is important to have open and honest conversations with your doctor and health care team to express your feelings, preferences, and concerns. The health care team is there to help, and many team members have special skills, experience, and knowledge to support patients and their families. Making sure a person is physically comfortable and free from pain is extremely important.

Palliative care given toward the end of a person?s life is called hospice care [33]. You and your family are encouraged to think about where you would be most comfortable: at home, in the hospital, or in a hospice environment. Nursing care and special equipment can make staying at home a workable alternative for many families. Learn more about advanced cancer care planning [34].

After the death of a loved one, many people need support to help cope with the loss. Learn more about grief and bereavement [35].

Find out more about common terms used during cancer treatment [36].

Links:
[1] http://www.cancer.net/about-us
[2] http://www.cancer.net/node/19667
[3] http://www.cancer.net/node/19670
[4] http://www.cancer.net/node/24957
[5] http://www.cancer.net/node/24582
[6] http://www.cancer.net/all-about-cancer/cancernet-feature-articles/cancer-basics/understanding-cancer-surgery
[7] http://www.cancer.net/node/25396
[8] http://www.cancer.net/node/25052
[9] http://www.cancer.net/node/25711
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[30] http://www.cancer.net/node/25241
[31] http://www.cancer.net/node/24717
[32] http://www.cancer.net/node/25042
[33] http://www.cancer.net/node/25281
[34] http://www.cancer.net/node/25113
[35] http://www.cancer.net/node/25111
[36] http://www.cancer.net/node/25382