



Development Procedure of Lung Cancer Surgery

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Surgery is the removal of the tumor and some surrounding healthy tissue during an operation. Surgery is also used to examine the nearby axillary lymph nodes, which are under the arm. A surgical oncologist is a doctor who specializes in treating cancer with surgery. Learn more about the basics of cancer surgery.

Generally, the smaller the tumor, the more surgical options a patient has. The types of surgery for breast cancer include the following:

Lumpectomy. This is the removal of the tumor and a small, cancer-free margin of healthy tissue around the tumor. Most of the breast remains. For invasive cancer, radiation therapy to the remaining breast tissue is often recommended after surgery, especially for younger patients, patients with hormone receptor negative tumors, and patients with larger tumors. For DCIS, radiation therapy after surgery may be an option depending on the patient, the tumor, and the type of surgery. A lumpectomy may also be called breast-conserving surgery, a partial mastectomy, quadrantectomy, or a segmental mastectomy. Women with BRCA1 or BRCA2 gene mutations who have been newly diagnosed with breast cancer may be eligible to receive breast-conserving surgery. So may women with newly diagnosed breast cancer who carry a moderate-risk gene mutation, like CHEK2 or ATM. Your genetic mutation status alone should not determine which course of treatment may be best for you.

Mastectomy. This is the surgical removal of the entire breast. There are several types of mastectomies. Talk with your doctor about whether the skin can be preserved, called a skin-sparing mastectomy, or whether the nipple can be preserved, called a nipple-sparing mastectomy or total skin-sparing mastectomy. A nipple-sparing mastectomy may be a treatment option for certain women with a BRCA1 or BRCA2 gene mutation or for women with a moderate-risk gene mutation, like CHEK2 or ATM. Your doctor will also consider how large the tumor is compared to the size of your breast in determining the best type of surgery for you.

Lymph node removal and analysis

Cancer cells can be found in the axillary lymph nodes in some cancers. It is important to find out whether any of the lymph nodes near the breast contain cancer. This information is used to determine treatment and prognosis.

Sentinel lymph node biopsy. In a sentinel lymph node biopsy (also called a sentinel node biopsy or SNB), the surgeon finds and removes 1 to 3 or more lymph nodes from under the arm that receive lymph drainage from the breast. This procedure helps avoid removing a larger number of lymph nodes with an axillary lymph node dissection (see below) for patients whose sentinel lymph nodes are mostly free of cancer. The smaller lymph node procedure helps lower the risk of several possible side effects. Those side effects include swelling of the arm called lymphedema, numbness, and arm movement and range of motion problems with the shoulder. These are long-lasting issues that can severely affect a person's quality of life. Importantly, the risk of lymphedema increases with the number of lymph nodes and lymph vessels that are removed or damaged during cancer treatment. This means that women who have a sentinel lymph node biopsy tend to

be less likely to develop lymphedema than those who have an axillary lymph node dissection (see below).

To find the sentinel lymph node, the surgeon usually injects a dye and/or a radioactive tracer behind or around the nipple. The injection, which can cause some discomfort, lasts about 15 seconds. The dye or tracer travels to the lymph nodes, arriving at the sentinel node first. If dye is used, the surgeon can find the lymph node when it turns color. If a radioactive tracer is used, it will give off radiation which helps the surgeon find the lymph node.

The pathologist then examines the lymph nodes for cancer cells. If the sentinel lymph node(s) are cancer-free, research has shown that it is likely that the remaining lymph nodes will also be free of cancer. This means that no more lymph nodes need to be removed. If only 1 or 2 sentinel lymph nodes have cancer and you plan to have a lumpectomy and radiation therapy to the entire breast, an axillary lymph node dissection may not be needed. In general, for most women with early-stage breast cancer that can be removed with surgery and whose underarm lymph nodes are not enlarged, sentinel lymph node biopsy is the standard of care. However, in certain situations, it may be appropriate to not undergo any axillary surgery. You should talk with your surgeon about whether this may be the right approach for you.

Axillary lymph node dissection. In an axillary lymph node dissection, the surgeon removes many lymph nodes from under the arm. These are then examined for cancer cells by a pathologist. The actual number of lymph nodes removed varies from person to person. An axillary lymph node dissection may not be needed for all women with early-stage breast cancer with small amounts of cancer in the sentinel lymph nodes. Women having a lumpectomy and radiation therapy that have a smaller tumor (less than 5 cm) and no more than 2 sentinel lymph nodes with cancer may avoid a full axillary lymph node dissection. This helps reduce the risk of side effects and does not decrease survival. If cancer is found in the sentinel lymph node, whether additional surgery is needed to remove more lymph nodes depends on the specific situation.

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