

SCOTT SWANSON: I am Scott Swanson, a thoracic surgeon at Brigham Women's Hospital, professor of surgery at the Harvard Medical School, and director of the Minimally Invasive Thoracic Surgery Program here at the Brigham, and chief surgical officer at the Dana-Farber Cancer Institute. And I'm going to present a case of a minimally invasive right upper lobe resection for lung cancer.

The patient is a 42 year old nurse who developed neck pain in the past and had a neck MRI approximately four months before this operation. And she was found to have arthritis of her cervical spine. But unrelated to that, was one inch or 26 millimeter mass in her cerebellum. That was removed through brain surgery and she was found to have metastatic depositive cancer to her brain.

CT scan showed the primary site in her right upper lobe, which was 2.5 centimeters in size. She then had a PET scan that showed uptake in that mass and around the hilum of the right lung. And underwent media mediastinoscopy to show that the mediastinal lymph nodes were free of cancer. At that point, she was referred to me.

And I performed a right VATS upper lobectomy and node dissection after she finished the brain radiation to treat the depositive cancer in her cerebellum.

Here we see the co-existing CT and PET scan from that patient's chest evaluation. On the left side of the slide, you see a CAT scan with a spiculated mass on the right apex that measures 25 millimeters or about an inch in diameter. And on the right side of this slide, you see the PET scan that shows activity of that mass.

Here we have the patient positioned in the left lateral decubitus position so that's her right chest and we're pointing out the incisions. Here we've made incisions and we're beginning the operation. That's the phrenic nerve running down the anterior hilum, that white band. And there's the lung being retracted back. We're bringing our anterior access incision down right over the anterior hilum. We have a posterior incision through which we have an instrument grabbing that lymph node in the posterior mediastinum and removing it with the Bovie cautery device, at this point, to rule out any evidence of metastatic disease.

And, again, we're doing the same thing in anteriorly where we're removing the paratracheal nodes. Again, to be sure there's no evidence of metastatic disease in the mediastinum prior to moving forward with our resection.

So we're finishing the removal of the right paratracheal node and those are sent off to pathology and we get immediate evaluation and we learned that those were free of tumor. So we're now proceeding ahead had with the right upper lobectomy.

Here, we're dissecting out the upper pulmonary vein from the anterior hilum using soft-- what are called Endo kitners-- a soft blunt dissection technique to free up that vein. Here, we have two branches of the upper vein dissected free. We're dividing the smaller branch with our ultrasonic energy device, which is something we use now that speeds up an operation and makes it safer for the patient.

And here we are dividing that small branch with that device. Once that's divided, we come around the bigger trunk, which you're seeing there. And prior to that, we remove a lymph node that's sitting just above that vein, just on top of the pulmonary artery and superior vena cava. Both for purposes of understanding the cancer better and staging it, but also creating space to allow us to divide these structures.

Here, we're coming around that upper vein with an Endo kitner placed through the poster port. And that allows us to make sure we have room to pass our stapler. Which will be coming through next. And this is a mechanical stapler that lays down staples on each side. And then a knife down the middle to divide that structure.

So here we are placing a stapler on the upper pulmonary vein. And this stapler's coming through that posterior port. The camera's coming through the inferior port and there's a ring forcep pulling the lung out of the way through that access or interior port, as well.

So now we've divided that upper pulmonary vein and that's step one of the right upper lobectomy. We now will dissect free the pulmonary artery and there you can see there are some lymph nodes sitting just above the pulmonary artery. Just superior to it. Between the pulmonary artery and the bronchus.

These are level 10 lymph nodes which are being removed in their entirety. So that we both stage this patient as well as completely resect any disease. And there we are getting the last set of lymph nodes from that station removed.

Once we do that, there's room to dissect around that truncus anterior branch of the pulmonary artery to the right upper lobe. We're doing that with a right angle through that anterior access incision. And now we bring a stapler through the camera port to place around that truncus anterior branch. And the camera's now in that interior access incision.

So this is all done safely under direct vision and we're available with sponge sticks to help if there's any issues with any bleeding around those staple-line. There you can see the staple-line is intact on each side. Now there's one further branch which may be the posterior ascending branch to the right upper lobe. Or one of the two posterior ascending branches and we're dividing that with this ultrasonic energy device. Which again, has revolutionized the speed and safety of minimally invasive surgery over the last several years.

With that completed, there's lymph nodes around that bronchus that we're going to divide and lymphatics. And again, the energy device-- the ultrasonic energy device-- is a very nice way to manage this. It's bloodless, and it's quick, and it's safe.

And so once we do that, we mobilize all those lymph nodes up onto the right upper lobe bronchus underneath those lymph nodes. You can see the right upper lobe bronchus. We remove them.

And again, here's an outside view of what we're doing. Those are the two screens that we use to visualize what we're doing during the operation. Now we're coming around that right upper lobe bronchus with a right angle placed to the access incision that the suction device is coming in through the camera incision and shows that we have a nice straight line.

And we switch that out and place the Endo stapler, which again, is around the right upper lobe bronchus. It's the last structure that we divide. The veins first, then the two arteries, and now the bronchus.

And this is a heavier staple load that is used for more robust tissue, such as a bronchus. And again, it lays down three rows on each side, cuts in between. And there we are looking from the outside at the surgeons at the table.

And now we're going to complete the fissure between the upper and middle lobe. And that's done again with an Endo stapler. In this case, it's placed through the posterior port with a ring forcep through the anterior port to hold traction. And we place a sequential series of 45 millimeter Endo staple-lines to create the fissure between the upper and middle lobe anteriorly. And the upper and lower lobe posteriorly.

And they were completing that staple-line to separate out the lobe from the rest of the tissue. You could see there's one last connection posteriorly, which we'll divide with that ultrasonic energy device. This will complete the dissection section of the upper lobe.

And we'll place that specimen in a reinforced bag, which you can see there. The white bag which has a string at the top, it allows us to close it off so that as we remove the specimen, there's no chance of any contamination of cancer cells in the chest. So we place the specimen in the bag and then we close the top of the bag with a string and then it slides out through that interior access incision, which is approximately three to four centimeters in length.

And because the lung is mostly air, it's very easy to remove that specimen through a small incision. And there it is, the tumor. You can see spiculating of upper lobe. And there are the hilar structures, the vein, artery, and the bronchus.

So it's a standard upper lobectomy done minimally invasively. It's no different than how we would do them through an open thoracotomy. We'll send that off to the pathology lab while we're finishing the surgery to make sure our margins are all clear.

Now we're going to complete the lymph node dissection of the hilum and mediastinum. And there we are removing the lymph nodes from underneath the azygos vein between the hilum and the upper mediastinum. And we'll completely remove all lymph nodes between the vena cava anteriorly and the trachea posteriorly and down to the pericardium at the base of this dissection plane.

You can see the divided artery in the foreground. Now we're carrying our dissection up above the azygos vein to the upper mediastinum. Again, to completely remove all lymph nodes. Again, just as we would do in an open fashion. And there we placed a little bit of surgical cellulose to help ensure hemostasis in that dissected area.

Now we retract the lung to be sure we're hemostatic. And then we retract it anteriorly. And now we're looking at the posterior mediastinum in the subcarinal space. You can see the left main stem to the left. Right main stem to the right. Pericardium deep.

And we've removed all those lymph nodes in that subcarinal space. Done a full subcarinal node dissection. And then carry out hemostasis.

There's our access incision, which is approximately 4 centimeters. And we have two further ports. One for the chest tube, which you can see. Now we're testing our bronchial stump to make sure it's pneumostatic or airtight. And you see no bubbling of water as they expand the lung to tell us that bronchial stump is fine.

That completes the operation and the patient is awake from the anesthesia and allowed to extubate and go to the recovery room.

This patient's post-operative course was uneventful. She stayed three days in the hospital. She went home taking Motrin or ibuprofen for pain. And an occasional oxycodone for the first one to two weeks. We saw her back in the office two weeks after surgery. She was feeling well without pain or any other problems.

She had-- at that point-- was taking an occasional Motrin and no more narcotic. Which is very different from what we see with thoracotomy patients. Generally, they take narcotics on a regular basis for the first to three to six weeks. By being in such good shape, patients heal better, they feel better, and they have much less problems with complications around pneumonia or other issues that might relate to being less active.

Turned out her pathology showed she had a 2.6 centimeter tumor involving the visceral pleura of the right upper lobe. And also that lymph node at the base of the bronchus was positive. She therefore went on to receive without any problem four cycles of adjuvant chemotherapy.

So in summary then, that's lobectomy, or minimally invasive lobectomy for lung cancer is a major advance in lung cancer surgery. It allows patients with many other issues to undergo surgery without complication. In this case, we had a patient who had a craniotomy and a removal of a brain tumor. And then had external beam radiation and she was able to undergo a minimally invasive lobectomy shortly after her last dose of radiation. Which is different than if we had used a thoracotomy. We probably would have had to wait longer before doing her surgery to allow her to gain strength.

And, in addition, because her surgery was so atraumatic, the patient was able to get onto her chemotherapy quickly after her surgery. And currently the patient's doing very well. Approximately eight months after her surgery without any problems.

So again, a minimally invasive lobectomy is associated with a lower mortality of the surgery, lower complication rate of the surgery, and allows patients to return to full activity without pain earlier than if they'd had a more traditional thoracotomy incision. And also to receive other treatments, such as chemotherapy more readily.

We've also found that if patients who otherwise might not be candidates for a thoracotomy are able to undergo a VATS approach to their lung cancer surgery, people with significant heart disease, overwhelming issues with emphysema, or other medical comorbidities who were prior to this unfit for surgery, and now are able to go through this operation and get a chance at cure from their cancer.

I would like to thank you for your attention and watching this video. If you have any questions or any other issues regarding it, please do not hesitate to contact me at the site below.