Thoracoscopic lobectomy: Mediastinal lymph node dissection

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Slide #1
Thanks Steve, I appreciate the opportunity to be the token American on the agenda.

Slide #2
I have no conflicts related to this presentation.

Slide #3
So as Steve mentioned, there are oncologic concerns that persist, despite the evidence. Oncologic outcomes as defined by the ability to achieve a complete resection, survival and other oncologic surgical outcomes, immunologic competence, compliance with adjuvant therapy, and I’ll focus on mediastinal lymph node dissection ...

Slide #4
It’s an important component of the assessment and management of patients, and although rigid standards around the conduct and extensiveness of mediastinal lymph node staging do not exist, current guidelines suggest that at least three mediastinal lymph nodes should be included, in addition to all N1 nodes.

Slide #5
These are the NCCN guidelines. N1 and N2 node resection and mapping using the ATS map, should include at least three lymph node stations at N2 and all N1 stations. And that video-assisted approaches are reasonable, at least by the guidelines.

Slide #6
I think several factors explain the incomplete adoption of VATS lobectomy today – inadequate training and concerns regarding oncologic effectiveness, which hopefully I’ll be able to address, and one specific concern is the mediastinum.

Slide #7
So there are numerous studies that support that thoracoscopic staging is adequate and several are called to question.
One excellent study was a study from 1998, where patients underwent VATS lobectomy and then thoracotomy. The lymph node dissection was done at the VATS procedure and then redone at thoracotomy …

And there was very little … 3.5% and 2%, respectively, in two patients, so in this study, which I think is as good a study as can be done, VATS held up against thoracotomy, and there really was little extra tissue.

Another excellent study, 100 patients with clinical Stage I. End-points, there was no difference between the mediastinal lymph node stages in the open or VATS groups and no differences in survival.

Another study, 350 patients with clinical Stage I disease, either VATS or open thoracotomy …

Every single station was measured …

No difference in the total number of lymph nodes or the total mediastinal lymph nodes on either the right side or the left side …

And a larger study -- 770 patients. Upstaging from N0 to N2 was found in 69 patients and the rate of lymph node upstaging was similar between the VATS and open groups. The 3-year and 5-year survival was the same. So I think that that’s a complete list of studies that demonstrate that this is acceptable.

Now there are several studies that call to concerns. So this was a study by Barnes looking at a small number of VATS lobectomies compared to a larger series of open lobectomies. There were no differences in N1 staging, but there were fewer N2 nodes by VATS versus thoracotomy, specifically fewer level 7 lymph nodes by VATS compared to thoracotomy. No difference in 2-year survival. Now in speaking with the authors about this study, they admit that this was a point of experience and not technique.

A present by Dr Boffa from the STS group paper that causes some concern. Over 11,000 VATS and open lobectomies were looked at. Upstaging in the open group was slightly higher but statistically significantly higher than the VATS group. N0 to N1 was higher in open than VATS but the N0 to N2 was similar. And among the propensity-matched pairs, the N0 to N1 upstaging
was still lower than VATs, but you are looking at one to two percentage points differently. Now it’s hard for me to understand why N0 to N1 upstaging would be worse with VATS, but not N2, but that’s what the data showed. But they also showed, however, that the amount of upstaging was directly and geometrically related to …

Slide #17
… surgeon experience. So if surgeons had done less than 50 VATS, their degree of upstaging was significantly less than thoracotomy patients. But if they’d done more than 50 VATS, it was at least as good, if not better. There are two papers also causing concern that were presented at the STS and discussed in a subsequent debate …

Slide #18
… one from the Danish Lung Cancer Registry over a 4-year period looking at VATS versus open. The numbers of lymph node stations were not different, but the nodal upstaging was significantly more frequent after a thoracotomy – both N0 to N1 and N0 to N2, in more than just a couple of percentage points.

Slide #19
Another paper from Stanford looked at 130 patients, the slight majority of which were open patients. The mean number of lymph nodes in each group … in the open group was higher, 15.4 versus 9.8, and the upstaging in the open was higher, although the 3-year survival rate was lower. Again, in discussion, the authors noted that this was not related to the technique of the procedure, but perhaps to the attitude of the surgeon in the procedure. However, the publication still remains.

Slide #20
So we performed a study in the NCNN database, which is, unlike the STS database, which is an excellent database; this is a mandatory database and a completely audited database. This was presented at the STS and in the *Annals of Thoracic Surgery*.

Slide #21
There were several thousand patients in the database and it looked at four variables: the number of N2 lymph nodes resected; the percentage of patients that met the guidelines, in other words three or greater mediastinal lymph nodes …

Slide #22
.. the total number of lymph nodes, N1 plus N2, as well as the degree of upstaging and downstaging. So in a 3-year period, there were 4,000 patients in the database and …

Slide #23
We compared the open versus the VATs patients and there were no differences in the demographic variables.

Slide #24
These are the N2 lymph nodes, open in the red, VATS in the blue. There was no difference in the median or mean number of lymph node stations.

Slide #25
These are the patients who had at least three N2 lymph nodes sampled; 58% in the open, 66% in the VATS. It should be 100% in both, but it wasn’t, but it certainly wasn’t lower in the VATS.

Slide #26
These were the total N1 plus N2 nodes. Median and mean are not inferior in the VATS – in fact the VATS is numerically higher.

Slide #27
This is the degree of upstaging from N0 to either N1 or N2 in VATS versus open, not different, just the down-staging and it was not different.

Slide #28
So in summary, in this study there was difference in the total number of lymph nodes, N2 lymph nodes, more than 3 lymph nodes that were sampled, or the degree of up-staging or down-staging. Looking at the systematic reviews and meta-analyses that have been done regarding local/regional recurrence and overall survival, there is no difference.

Slide #29
This is a study by Tristan Yan published in *Journal of Clinical Oncology* last year. VATS did not demonstrate any difference in local/regional recurrence, which would suggest that the lymph node staging was equal.

Slide #30
And VATS was associated with a reduced systemic recurrence rate and an improved overall 5-year survival. So according to this meta-analysis, if there were any concerns about VATS, they should be completely resolved and in fact the VATS patients did better …

Slide #31
This is all-cause mortality, better for the VATS patients, local/regional recurrence no difference.

Slide #32
In another meta-analysis looking only at propensity-matched groups in the literature, this is by Christopher Cao and was published last year. Looking at the relative risk of all-cause mortality both among the matched and unmatched patients in those three studies and no decrement to the VATS -- VATS was better in all-cause mortality and in lung cancer-specific mortality.

Slide #33
This point has been brought up and I think most of us are proponents of mediastinal lymph node complete dissection.
And some people point to a study, which shows that there’s no difference between sampling and dissection, presented by Gail Darling a couple of years ago at AATS and published in JTCS. I just wanted to make sure that we highlighted and everybody knew what that meant. She looked at patients that were completely staged within the operating room, in terms of tumor size and systematic sampling and then patients were randomized to have a complete dissection and there was no difference in survival.

So systematic sampling is equal to dissection, if you’ve proven that the T is <3 cm, that appropriate preoperative mediastinal lymph node staging had been done, that you’d performed a complete hilar dissection, and that you’d frozen all of the lymph nodes that had been already assessed, both mediastinal and hilar. And then, if you don’t want to do a complete mediastinal lymph node dissection, there is no difference in survival for this select group.

So in summary, there is no difference in the efficacy of mediastinal lymph node assessment by lobectomy, either performed by VATS or open, and concerns about the efficacy should not limit the adoption of thoracoscopic lobectomy.

This is our paradigm. Two incisions for virtually all thoracoscopic lobectomies, with a camera incision in the seventh or eighth intercostal space, a one centimeter incision, as well as an anterior incision, usually 4 to 4.5 cms. The camera incision is behind the line that’s at the anterior superior iliac crest. So this is a right-sided dissection … starting at level 7.

Any variety of instruments can be used. We use specialized thoracoscopic instruments to do the dissection and using some energy source so that small vessels can be done with cautery. Really, any way that you do it open, it can be done thoracoscopically. The key is how to provide the best exposure and that’s why our camera is behind the posterior … er … the anterior superior iliac crest, approximately where you’d consider the posterior-axillary line would be, and we always use a thirty-degree camera to allow visualization on both sides of the stations that we’re dissecting. Suction is used predominantly, it’s actually a good retractor, and it keeps the base of the field dry, which really facilitates the conduct of the operation. You can see the … as similar as in René’s video, you can see the … that’s the left main bronchus that we are peeling lymph node off of there, and now peeling off the aorta and the esophagus. So I think that’s … and the right paratracheal. We tend to do the operation by leaving the azygos vein intact and going under it and actually keeping the pleura intact. You don’t have to do it this way, but it does allow us to get all of the azygos nodes intact with the mediastinal nodes … and we haven’t found it necessary to divide the pleura. So you go along the trachea, then along the pericardial, into the pericardial, where the aortic arch is. Relatively bloodless plain, you see the aortic arch there and then start to do the dissection along the cava, which is where many small vessels would be usually, but some may have come off the
trachea, but there’s our dissection right along the cava. And even though it’s a relatively narrow space, it’s easy enough to get retraction so that visualization is 100% and the resection should be 100%. Unlike open procedures, the angle is directly out towards the thoracic inlet and you just have to be careful. You can get closer to the innominate artery and the recurrent right laryngeal nerve than you think you are getting and it’s important to be careful about that. Some always find it and loop it – I don’t do that, but some do that. So as can be seen, that area is completely cleaned out [ENDS].