

# Videothoroscopic resection for lung cancer: moving towards a “standard of care”

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**Abstract:** Videothoracic surgery for lung cancer is now an established practice but there is a division of opinion between surgeons whose aim is to spare all patients a thoracotomy and those who have not adopted videoscopic methods for routine lobectomy. The latter remain in the majority; most patients at present have a thoracotomy. Surgeons from Europe and America met in Catania, Sicily at the 3<sup>rd</sup> Mediterranean Symposium on Thoracic Surgical Oncology to explore the evidence and the routes to making videothoroscopic surgery a standard of care. Evidence from one completed randomized controlled trial (RCT) and several propensity score matching studies indicate that less invasive surgery is at least as safe as thoracotomy. By the accepted standards of an oncological lobectomy which include clearance of the primary cancer and the intended lymphadenectomy or sampling, the operations are equivalent. Clinical effectiveness in achieving long-term cancer free survival is likely. However, the co-existence of videothoracoscopy has encouraged smaller non-muscle cutting incisions and the avoidance of rib spreading, narrowing whatever gap there may have been in terms of the patients’ experience.

**Keywords:** Lung cancer; lobectomy; videothoracoscopy

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Today’s thoracic surgeons would hardly recognize lung resection for cancer as it used to be. Brock advocated radical pneumonectomy as the ideal if one were to achieve cure (1) and during 35 years of his career 71% of his patients had a pneumonectomy (2). Posterolateral thoracotomy was the standard of care and in addition to extensive muscle cutting, ribs were variously excised or divided, and often fractured, in order to create the generous access required by the great men. Surgeons gradually accepted the lesser operation of lobectomy as being oncologically adequate and recognized that it was preferable in terms of morbidity and conservation of lung function (3). If today’s patient undergoing surgery can be spared a thoracotomy and have an equally effective operation it would seem inevitable, and rightly so, that modern techniques of minimal access and thoracoscopic visualization will progressively displace thoracotomy in the surgery of lung cancer. That is the goal of Marcello Migliore, leader of the series of Mediterranean

Symposia on Thoracic Surgical Oncology. Dr. Migliore has adopted progressive refinements in videothoracic surgery as a pioneer of single incision and single-trocar techniques over nearly two decades (4,5). Surgeons from Europe and America joined him in Catania, Sicily at the 3<sup>rd</sup> Mediterranean Symposium on Thoracic Surgical Oncology to explore the evidence and the routes to making videothoroscopic surgery a standard of care.

## Safety

A central concern in all surgery is the safety of patients. The introduction of laparoscopic cholecystectomy led to rapid expansion of the technique. Abdominal surgeons, responding to patient pressure and wanting to retain ‘market share’ rushed into adoption of the new laparoscopic technique leading to what was seen to be a ‘health and financial disaster’ (6). This was less of a problem with thoracoscopic surgery, at

least in Europe where lung resection is mainly, or exclusively, carried out by highly trained thoracic surgeons. There will have been accidents in the learning curve no doubt but also adoption was adequately cautious. It is probably fair to say that ‘safety’ in terms of perioperative mortality and morbidity is comparable and probably better than with thoracotomy when used in trained hands (7).

### Efficacy

Here I make a distinction between efficacy and effectiveness (8). In the rather formulaic language of Evidence Based Medicine, efficacy relates to whether the technique achieves the initial intention of the treatment which is to remove the lobe successfully. That can be determined by observational data in a series of cases (9,10). With practice and developing skill, the frequency with which the operation has to be aborted to achieve lobectomy has progressively fallen but it has to be recognized that not being able to put their hands into the chest put ‘keyhole surgery’ outside the comfort zone of many capable surgeons. Videothoracoscopy requires being able to interpret the image on the screen. There may be a variable aptitude in spacial interpretation located in the brain’s parietal lobe which makes it easier for some and harder for others. It may not be attainable by all. Trainees brought up in an operating room where video is used all the time either habituate to videosurgery or opt out, preferring to work in another field. The rewards for mastering the technique are excellent intraoperative visualization for the surgery and a smoother recovery for the patient (7). Since the symposium a randomized controlled trial (RCT) has reported on 301 evaluable patients. Videothoracoscopic surgery was associated with less postoperative pain and better quality of life than anterolateral thoracotomy (11).

### Effectiveness

The whole purpose of the surgery is to cure cancer. Consistent success in safe removal of the lobe may be a matter of in-hospital observational studies as a measure of efficacy. That does not necessarily mean that the operation is effective in curing cancer. Specifically in this case evidence of effectiveness requires long-term measures of overall survival and cancer free survival that are comparable with lobectomy through a thoracotomy. That requires direct comparison of like with like. Ideally that would be evidence gained from RCTs. RCTs take time to set up and accrue patients and require some

years of follow-up to be meaningful. Meanwhile, propensity score matching of existing data has provided an estimate. In a matching study by Dr. Subroto Paul, overall survival, cancer specific survival and disease free survival in two groups of 1,195 patients were similar and there was no indication that thoracoscopic surgery is inferior to lobectomy (12).

### N-2-ology

There has been a resurgence of interest in the significance of N2 disease. It has been argued that rigorous preoperative staging is now redundant because N2 disease should not per se be a contraindication to lobectomy. Systematic lymph node dissection will provide pTNM staging and that will guide adjuvant therapy (13). It should be remembered that there is very little RCT evidence for the surgical management of lung cancer (14). This is the ‘elephant in the room’ when surgeons start debating oncologically merits of one operation versus another. It is far from clear what to do about N2 disease, whether it is identified prior to surgery (15) or intraoperatively (16). Nevertheless the challenge has been put up: do surgeons performing videothoracoscopic surgery for lung cancer do the job of N2 diagnosis and clearance as well as it is done at thoracotomy? The answer is that they do: *“Patients who underwent thoracoscopic lobectomy had more lymph nodes harvested than did those who underwent thoracotomy lobectomy in the full (mean 20.1 v 17.7,  $P=0.005$ ) and matched (mean 19.9 v 17.6,  $P=0.03$ ) cohorts. Furthermore, a significantly greater proportion of patients had at least 12 nodes resected (37.1% v 29.1%,  $P<0.001$ )”* (12). Whether that influences outcome is uncertain (15).

### Technique and nomenclature

I have chosen in my commentary to move away from the term ‘VATS’ which stands for ‘video assisted thoracic surgery’. I have preferred the term ‘videothoracoscopic’ meaning only that the view is via a thoracoscope. In contemporary thoracoscopic lobectomy the essential feature is that the view is acquired and displayed using video technology, not by direct vision. The necessity for some sort of utility incision to allow for the removal of the lobe alters the requirements of the technique compared with surgery for pleural disease (4,17). In thoracoscopy there is no need for snug fitting ports as there is with laparoscopy; in laparoscopy they are essential so that the CO<sub>2</sub> insufflated to obtain a view does not escape. In the chest the lung is collapsed and the ribs maintain the space. An incision large

enough to remove a lobe containing a tumour allows for insertion of a thoracoscope and some standard instruments thus departing from three-port VATS with triangulation of the videocamera and the instruments. Migliore has used the term “single-trocar” (4) and latterly favours “uniportal” (5). Other authors refer to “single-port” video-assisted thoracoscopic surgery (18). Dr. Semih Halezeroğlu proposed at the symposium that the key feature for the patient was that there was one incision and that there was no rib spreading. To that I would add avoidance of ports that have to be angled with consequent pressure on intercostal nerves. He proposed that “single incision” should be the defining criterion. A proposal arose from the symposium to standardise these terms.

## Conclusions

Videothoracic surgery for lung cancer is an established practice and deserves to be recognised as equivalent to thoracotomy in terms of clinical effectiveness and safety and may be superior in terms of the patients’ experience.

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## Footnote

*Conflicts of Interest:* The author has no conflicts of interest to declare.

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