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# Thoracotomy introduced by video-assisted thoracoscopic surgery in border-line candidates for surgery

## ABSTRACT

***Background:*** *Unlike an ordinary thoracoscopy, the video-assisted thoracoscopic surgery (VATS) enables a better exploration of the pleural region and mediastinum, thus providing a better insight in the tumor size and localization, as well as its interrelationship to other intrathoracic organs. Furthermore, VATS also secures a safer and better approach to the hilus of the lungs and mediastinum, enlightening the presence, size and localization of enlarged lymph nodes, as well as an involved perinodal tumor growth.*

***Materials and methods:*** *We have attempted an experimental investigation to find out whether VATS could introduce thoracotomy in border-line surgery candidates and thus increase the number of operable patients on the one hand, and on the other decrease the number of explorative thoracotomies. In a four-years period we have performed thoracotomy introducing VATS in 64 border-line surgery candidates.*

***Results:*** *Thirty patients avoided the explorative thoracotomy due to their inoperability confirmed by VATS. In 34 patients VATS was succeeded by thoracotomy which finally terminated as an exploration due to inoperability in only nine patients (in these patients a real insight into the tumor spread was unabled by adhesions). The other 25 patients were submitted to some kind of resection, although their tumor was over-staged and they would not otherwise have been operated on. Since the videothoracoscopic operability staging (VOS) was not applied in all surgery candidates but only in border-line cases, no significant decrease of the number of explorative thoracotomies has been achieved. Explorations indicated by carcinosis of the pleura without a pleural effusion may also account for this.*

***Conclusion:*** *In our opinion, the routinely applied VOS may result in a significant decrease of explorative thoracotomies which could then be reserved for border-line cases where VOS is not applicable due to pleural adhesions.*

***Key words:*** *Video-assisted thoracoscopic surgery (VATS); Operability staging; Lung cancer; Explorative thoracotomy; Resectability*

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## INTRODUCTION

An accurate staging is crucial for the surgical treatment of malignant tumors. So far, the preoperative operability staging has been based on the clinical and radiologic operability assessment, sometimes including mediastinoscopy, parasternal mediastinectomy, Daniels's biopsy of the prescalenous lymph nodes, as well as a standard thoracoscopy. Despite all these operability assessment criteria and procedures, some patients have been suspended from surgery (due to tumor overstaging), while in some others the surgery has been terminated as an exploration (due to tumor understaging). By the advent of the video-assisted thoracoscopic surgery (VATS), it has become possible to explore some regions of the mediastinum and pleural area which were hardly reachable by former diagnostic procedures (aortic window, subazygous region, posterior mediastinum, paraoesophageal region). VATS represents a step-forward in regard to computerized tomography screening (CT) since it provides us with an opportunity to inspect and sample the CT detected mediastinal lymph nodes, offering an accurate staging of the disease after thus obtained sample has been histologically examined.

Neither the local infiltrating (large mediastinal blood vessels involved), nor the perinodular tumor growth in lymphadenopathy can be discovered by mediastinoscopy. The videoscopic operability staging (VOS) is the method of choice in these cases. It provides a direct insight into the size and localization of the tumor, its relation to other intrathoracic structures, as well as into the presence of the perinodal tumor growth in hilar and mediastinal lymph nodes. In the course of the intervention, by either a blunt or sharp resection, it could be differentiated between adhesions, a close contact between the tumor and intrathoracic structures or a real tumor infiltration (1-5).

## MATERIALS AND METHODS

Over the period February 6, 1996 - December 31, 1999 there were 252 video-assisted thoracoscopic surgeries (VATS) performed at the Thoracic surgery centre of the Institute of lung diseases in Sremska Kamenica. Indications

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for VATS are reviewed in Table 1.

**Table 1.** Indications for VATS in our patients

| Video-assisted thoracoscopic surgeries (VATS) | Pts. |
|---|---|
| VOS | 64 |
| Thoracoscopia | 71 |
| Pneumothorax | 25 |
| Decorticatio pulmonum | 15 |
| Biopsio mediastini | 39 |
| Fenestratio pericardii | 7 |
| Resectio atypica pulmonum | 5 |
| Exstirpatio tumoris | 6 |
| Evacuatio haematomatis | 2 |
| Biopsio pulmonum | 2 |
| Symphatectomia | 1 |
| Conversion | 15 |
| Total | 252 |

## RESULTS

In 64 border-line surgery candidates (no matter if their disease was over- or understaged) a standard thoracotomy was preceded by VOS. Carcinosis of the pleura or perinodal hilar or mediastinal tumor growth were discovered in 30 patients, who thus avoided an explorative thoracotomy. A standard thoracotomy was introduced by VOS in 34 patients who seemed operable. Twenty-five of these patients had a pulmonary resection of some type, while in nine patients thoracotomy terminated as an exploration (Table 2).

**Table 2.** VOS introduced standard thoracotomy: results

| VOS introduced standard thoracotomy | Pts. |
|---|---|
| Lobectomia | 5 |
| Pneumonectomia | 10 |
| Pneumonectomia transpericardialis | 1 |
| Sleeve pneumonectomia | 1 |
| Resectio atypica pulm.-metastases | 4 |
| Resectio costarum | 4 |
| Exploration | 9 |
| Total | 34 |

In the patients having had an explorative thoracotomy only, VATS could not provide a thorough insight into the tumor spread and mediastinal involvement due to atelectasis, affecting either one lobe or the entire lung, consequently unabling a safe approach and exploration of the mediastinum. In these patients the exploration was indicated by the tumor involvement of the following organs: esophagus (2 patients), inferior vena cava - intrapericardial infiltration (1 patient), aorta (3 patients), pulmonary artery tree - intrapericardial infiltration (3 patients).

As showed in Table 2, pneumonectomy or an extended pneumonectomy was the most common surgery type. It seems logical since the patients involved had an over-staged tumor and otherwise would not have been operated on. Four patients underwent an atypical resection (mini-thoracotomy) due to metastases (one female patient had three metastatic breast cancers resected in the course of surgery), which were localized deep in the lung parenchyma and were therefore undetectable by VATS.

In patients with a tumor of the ribs detected by VATS, a block resection of the tumor and the ribs was performed in a standard way.

The patients submitted to lobectomy had radiologic evidence ( a standard X-ray finding , CT) of atelectasis in the lobe with enlarged lymph nodes. Since no perinodal tumor growth was evidenced on VATS, the enlarged lymph nodes were removed in the course of a standard thoracotomy. In two of these patients the extent of the lung resection was restricted to lobectomy due to bad lung function findings. This was also one of the indications for VATS application.

## DISCUSSION

The preoperative VATS application is aimed at eliminating the presence of malignant dissemination in the pleura (carcinosis), as well as the local causes of inoperability. The following standard diagnostic procedures are available for the preoperative operability assessment: standard chest X-ray, bronchoscopy, CT of the chest, brain and abdomen, abdomen ultrasonography, scintigraphy of the skeleton (6-11). Mediastinoscopy and biopsy of the prescalenous lymph nodes - Daniel's are rarely performed in our Centre - only in highly selected patients in whom CT or bronchoscopy point to lymphadenopathy or N3 disease. N2 lymphadenopathy is not here considered a cotraindication for surgical treatment.

Roviaro and coworkers have reported 19% of explorative thoracotomies in the total of 2.000 patients operated on lung cancer in the period 1967 - 1990. Due to the improvement of surgical techniques and preoperative operability staging procedures in recent years, they have reduced this rate to 12%. In the VOS series of 155 patients they had only 2.6% of explorations. Duque and coworkers have reported 10.4% of explorations in 605 operated patients. Similar results, with the explorative thoracotomy rate ranging from 10 -20% have been reported by other authors, too (12-15).

The explorative thoracotomy rate we have obtained in our Centre for the period 1993-1999 is 15.7% in 1.004 operated patients. We applied VATS in border-line surgery candidates only, mostly those with an over-staged disease, but not in all patients submitted to surgery for lung cancer. Such a high explorative thoracotomy rate may partially be due to false- negative CT findings, as well as to unexpected carcinosis of the pleura which was not presented by a pleural effusion.

## CONCLUSION

It is our opinion that a routine application of VOS in all lung cancer patients would result in a reduction of explorative thoracotomies at least, which would then be reserved for only those patients in whom VOS is not applicable due to pleural adhesions.

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