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## 1. Original Article

### **Controlling bleeding during uniportal thoracoscopic major pulmonary resection**

**HTML PDF VIDEO**

Cite this article: Igai H, Kamiyoshihara M, Matsuura N, Ohsawa F, Numajiri K. Controlling bleeding during uniportal thoracoscopic major pulmonary resection. *Mini-invasive Surg* 2022;6:5. <http://dx.doi.org/10.20517/2574-1225.2021.110>

#### Abstract

**Aim:** In uniportal thoracoscopic major pulmonary resection, it is important to appropriately manage significant vessel injury, to ensure patient safety and minimize conversion to thoracotomy. We analyzed cases of significant vessel injury and investigated efficacy of an algorithm to manage bleeding during thoracoscopic uniportal major pulmonary resection.

**Methods:** A total of 169 patients underwent “uniportal thoracoscopic major pulmonary resection” (lobectomy or segmentectomy) at our department between February 2019 and April 2021. These patients were classified into groups with (group A, n = 8) and without (group B, n = 161) intraoperative massive bleeding. Patient characteristics and perioperative results were compared between the two groups. Patients with significant vessel injury and conversion to thoracotomy were analyzed in detail.

**Results:** Group B had significantly less blood loss (A:  $197 \pm 173$  g; B:  $42 \pm 74$  g,  $P < 0.0001$ ) and shorter-duration postoperative drainage (A:  $2.6 \pm 1.8$  days; B:  $1.6 \pm 1.3$  days,  $P = 0.036$ ). There were no group differences in any other factors. The most frequently injured vessel in group A was the pulmonary artery (75%). Emergent conversion was required in four cases (cases 7, 76, 128, and 133; 2.4%) due to intraoperative bleeding. No patient developed catastrophic bleeding or required an

intraoperative transfusion.

Conclusion: We managed significant vessel injury appropriately during uniportal thoroscopic major pulmonary resection using the troubleshooting algorithm. The algorithm for the uniportal approach was considered effective and easy to apply even by less-experienced surgeons.

## 2. Original Article

**Stapler vs. hand-sewn intrathoracic esophagogastric anastomosis: which anastomotic method renders better results?**

**[HTML](#) [PDF](#)**

Cite this article: Kolokotronis T, Galanis M. Stapler vs. hand-sewn intrathoracic esophagogastric anastomosis: which anastomotic method renders better results?. *Mini-invasive Surg* 2021;5:19.

<http://dx.doi.org/10.20517/2574-1225.2021.07>

### Abstract

Aim: We investigated the impact of the anastomotic method in the frame of open abdominothoracic esophageal resection (hand-sewn vs. stapler anastomosis) in patients with carcinoma submitted to surgery in the University Clinic of Saarland over a 14-year period.

Methods: In total, 176 patients underwent an abdominothoracic resection with intrathoracic anastomosis and conventional gastric conduit formation; two groups of patients were analyzed: end-to-end, hand-sewn anastomosis (Group 1) and end-to-side, circular stapler anastomosis (Group 2). Both groups were compared regarding anastomotic leaks and strictures, postoperative morbidity, 90-day mortality and survival.

Results: The rates of anastomotic leak and stricture in the stapler group were reduced in comparison to hand-sewn group, however without reaching statistical significance (8% vs. 13.5%,  $P = 0.22$ , and 6% vs. 13.5%,  $P = 0.1$ , respectively). In contrast, the

rates of redo surgery (34.1% vs. 8%,  $P = 0.001$ ) and 90-day mortality (11.9% vs. 2%,  $P = 0.02$ ) were significantly higher in the hand-sewn anastomosis group.

Conclusion: The management of anastomotic leak (stent insertion vs. reoperation) combined with the use of stapler to perform intrathoracic esophagogastric anastomosis improved the postoperative outcome after abdominothoracic esophageal resection.

### 3. Technical Note

#### Robotic Ivor Lewis esophagectomy

[HTML](#) [PDF](#)

Cite this article: Ackerman JM, Luketich JD, Sarkaria IS. Robotic Ivor Lewis esophagectomy. *Mini-invasive Surg* 2021;5:14.

<http://dx.doi.org/10.20517/2574-1225.2021.02>

#### Abstract

The addition of robotic-assistance is the latest evolution of minimally invasive esophageal resection and reconstruction. Despite the improved visualization, the addition of wristed instrumentation, and improved ergonomics, there remains a significant learning curve for complex procedures like esophagectomy. In experienced, high-volume centers, robotic-assisted minimally invasive esophagectomy (RAMIE) has demonstrated outcomes equivalent to traditional laparoscopic and thoracoscopic minimally invasive esophagectomy. Herein, the RAMIE procedure is described in detail in key steps. This approach has been established as safe and effective for esophagectomy.

### 4. Review

#### Sublobar resection in high-risk patients for lobectomy: current and future strategy

[HTML](#) [PDF](#) [VIDEO](#)

Cite this article: Dolan DP, Swanson SJ. Sublobar resection in high-risk patients for lobectomy: current and future strategy. *Mini-invasive Surg* 2021;5:3. <http://dx.doi.org/10.20517/2574-1225.2020.101>

#### Abstract

Surgical resection by lobectomy is the gold standard of therapy for early stage non-small cell lung cancer. However, not all patients are medically fit to undergo surgery. In patients considered high-risk for lobectomy, alternative strategies have been developed including radiofrequency ablation, cryoablation, microwave ablation, stereotactic radiation therapy, wedge resection, and segmentectomy. This work reviews the definition of high-risk, and the outcomes that have been associated with each treatment technique. Some technical points regarding wedge resection versus segmentectomy are noted. Future directions are discussed in the context of treatment for patients considered at high-risk for lobectomy.

#### 5. Perspective

**Indications and technical details of sublobar resections for small-sized lung cancers based on tumor characteristics**

##### [HTML](#) [PDF](#)

Cite this article: Kato H, Oizumi H, Suzuki J, Suzuki K, Takamori S. Indications and technical details of sublobar resections for small-sized lung cancers based on tumor characteristics. *Mini-invasive Surg* 2021;5:5. <http://dx.doi.org/10.20517/2574-1225.2020.98>

#### Abstract

With the recent increase in small-sized lung cancers, sublobar resection and minimally invasive surgeries are becoming preferred. In particular, the detection of ground-glass nodules (GGNs) on high-resolution computed tomography has increased. Although lobectomy has been considered a standard procedure for treating lung

cancer, sublobar resections have been indicated for treating GGN-dominant small-sized lung cancers. Wedge resection and segmentectomy have generally been performed as sublobar resection; however, each procedure has some technical advantages and disadvantages. Although anatomical resection as a segmentectomy is a complicated procedure, it has recently been increasingly performed with the accurate anatomical grasp using three-dimensional computed tomography and the identification of the intersegmental plane. Other procedures involving the use of newer technologies can also be performed. Individualized sublobar resection might be a suitable procedure for small-sized lung cancer with the appropriate selection of procedures based on each tumor's characteristics and improving the methods to overcome some technical difficulties.

## 6. Review

### **Quality of life, pain, and functional respiratory recovery after lobectomy for early stage non-small cell lung cancer: a review of the literature comparing minimal invasive and open procedures**

[Full-Text](#) [PDF](#)

Cite this article: Alexandre G, Valérie L. Quality of life, pain, and functional respiratory recovery after lobectomy for early stage non-small cell lung cancer: a review of the literature comparing minimal invasive and open procedures. *Miniinvasive Surg* 2020;4:35. <http://dx.doi.org/10.20517/2574-1225.2020.07>

#### Abstract

The recent improvement in surgical techniques for non-small cell lung cancer enables evident better results in term of postoperative recovery with lower adverse events. Even though the interest in minimally invasive procedures has increased, more subjective advantages are not always so apparent in the literature. There is indeed a growing interest in the daily life of patients including their management of physical and emotional pain, the perception of quality of life, and pulmonary function recovery.

This review aims to highlight the advantages of minimal invasive surgery on pain, quality of life, and functional pulmonary recovery after lobectomy alone for early stage non-small cell lung cancer. Minimal invasive techniques or limited sparing open techniques offer better results in term of postoperative pain than open non-sparing techniques, allowing a lighter analgesia protocol. However, these clear benefits seem to disappear in the mid-term postoperative period. Studies suggest that minimal invasive surgery is non-inferior to thoracotomy in terms of quality of life, and seems to give patients at least a better vision of their health, but larger-scale studies are needed to demonstrate its superiority. Data show clear advantages in the postoperative pulmonary function recovery for minimal invasive surgery compared to that of open procedures, although sparing and anterior incisions can show equivalence. That benefit does not seem to persist in the mid and long term. Nevertheless, the posterolateral thoracotomy appears to have the worse effect on the loss of pulmonary function.

## 7. Review

### **Robotic versus open and video-assisted thoracoscopic surgery approaches for lobectomy**

[Full-Text](#) [PDF](#)

Cite this article: Montagne F, Bottet B, Sarsam M, Mbadinga F, Chaari Z, Rinieri P, Melki J, Peillon C, Baste JM. Robotic versus open and video-assisted thoracoscopic surgery approaches for lobectomy. *Mini-invasive Surg* 2020;4:17. <http://dx.doi.org/10.20517/2574-1225.2019.74>

#### Abstract

More and more data are available on the benefits of minimally invasive thoracic surgery compared to open thoracic surgery in the curative treatment of early-stage non-small cell lung cancer. However, results are conflicting, especially when video-assisted thoracoscopic surgery (VATS) is compared to robotic-assisted

thoracoscopic surgery (RATS) for lobectomy. Our goal is to report the main results of recent systematic reviews and meta-analyses comparing RATS, VATS, and open surgery for lobectomy. Using PubMed database, we selected systematic reviews and meta-analyses, which compared the short-term outcomes of patients treated by RATS, VATS, or open surgery for lobectomy. In all but one of the systematic reviews, robotic lobectomy allowed similar short-term outcomes as VATS lobectomy and better short-term outcomes than open surgery. One meta-analysis by O'Sullivan et al. found that robotic lobectomy was associated with fewer adverse events ( $P < 0.00001$ ) and lower 30-day mortality ( $P = 0.001$ ), compared to VATS lobectomy. Robotic lobectomy could be a valid alternative to VATS and open lobectomy. Short-term outcomes do not appear to be different between VATS and RATS cohorts, except in one recent meta-analysis, which reported the superiority of RATS compared to VATS. Without cost analysis and randomized controlled trials with long-term outcomes, no strong conclusions can be drawn.

## 8. Review

### **Nodal upstaging robotic lobectomy for non-small cell lung cancer**

[Full-Text](#) [PDF](#)

Cite this article: Zirafa CC, Romano G, Nesti A, Davini F, Melfi F. Nodal upstaging robotic lobectomy for non-small cell lung cancer. *Mini-invasive Surg* 2020;4:13.  
<http://dx.doi.org/10.20517/2574-1225.2019.35>

#### Abstract

Nodal upstaging takes place when unsuspected lymph node metastases are detected by pathological evaluation, after surgical treatment for non-small cell lung cancer. In early stages non-small cell lung cancer, nodal upstaging amounts to 4.8%-24.6%, depending on several factors, such as accuracy of preoperative staging, localisation and size of tumour and number of lymph nodes removed. Nodal upstaging is considered a surrogate of the completeness of thoracic oncologic surgery; for this

reason, various studies focus on the evaluation of its rate in the different surgical approaches used to treat lung cancer. In this analysis, a high percentage of upstaging is observed in robotic surgery, having similar values to open surgery results, usually considered the gold standard in terms of oncologic radicality. In fact, thanks to its features, robotic surgery allows carrying out a thorough lymphadenectomy in the most comfortable manner, ensuring an excellent vision and manoeuvrability of the instruments even in the most remote areas of the thorax. According to these results, robotic surgery constitutes a safe and radical surgical option, showing encouraging results on the efficacy of lymphadenectomy and, consequently, on its the long-term outcomes.

## 9. Review

### **Robotic lobectomy costs and quality of life**

[Full-Text](#) [PDF](#)

Cite this article: Nishimura JM, Goodwin M, Kneuert P, Moffatt-Bruce S, Merritt RE, D'Souza DM. Robotic lobectomy costs and quality of life. *Mini-invasive Surg* 2020;4:11. <http://dx.doi.org/10.20517/2574-1225.2019.48>

#### Abstract

The surgical approach for lobectomy has changed over time with recent data demonstrating that the majority are performed using a minimally invasive approach. While the use of the robotic platform for pulmonary resection has been shown to have acceptable clinical outcomes, cost and quality of life need to be considered when starting a robotic lobectomy program. In this review, we evaluate the literature on cost of robotic lobectomy and quality of life. The results suggest that early experience in a robotic lobectomy program may be associated with relatively higher index hospital costs when compared to video-assisted thoracoscopic surgery; however, with increased experience and volume, the difference may no longer be of significance. When compared with thoracotomy, the cost is comparable if not less costly and may

even be profitable for the hospital. Quality of life appears to be acceptable in the early experience of robotic lobectomy.

## 10. Review

### **Long-term survival of robotic lobectomy for non-small cell lung cancer: a literature review**

[Full-Text](#) [PDF](#)

Cite this article: Ricciardi S, Davini F, Zirafa CC, Romano G, Melfi FMA. Long-term survival of robotic lobectomy for non-small cell lung cancer: a literature review.

Mini-invasive Surg 2020;4:1. <http://dx.doi.org/10.20517/2574-1225.2019.50>

#### Abstract

Even though robotic-assisted surgery is increasingly used for resection of non-small cell lung cancer (NSCLC), data on long-term oncologic outcomes of robotic surgery are still not well defined. The primary endpoint of this review is to analyse the long-term results of robotic lobectomy in NSCLC patients. A systematic research was performed using the PubMed database. Articles published from January 2008 to January 2019 were included. We excluded studies that did not provide results for the long-term outcomes of robotic lobectomy, studies that had fewer than 50 cases and ones that focused on results of sub-lobar resections. Therefore, ten eligible studies were included in this analysis. In total, 2873 patients, with a mean age ranging between 66 and 68 years, who underwent robotic lobectomy for NSCLC, were analysed. Most patients (81%) had early-stage disease. The five-year overall survival for stage I disease fluctuated between 77% and 100%. The five-year disease-free survival was reported to be near 73%. We can conclude that robotic assisted lobectomy is an effective minimally-invasive procedure for lung resection. The current literature shows that robotic lobectomy is associated with long-term survival

and lasting disease-free survival, equivalent to those reached by video-assisted thoracic surgery and open approach.

## 11. Review

### **Minimally invasive surgical approaches to thoracic sympathectomy for hyperhidrosis**

[Full-Text](#) [PDF](#)

Cite this article: Gharagozloo F, Meyer M. Minimally invasive surgical approaches to thoracic sympathectomy for hyperhidrosis. *Mini-invasive Surg* 2020;4:48.

<http://dx.doi.org/10.20517/2574-1225.2020.35>

#### Abstract

Thoracic sympathectomy is used for the palliation of hyperhidrosis. However, significant controversies surround the optimal surgical approach and the extent of sympathectomy. The determinants of success in the surgical palliation of hyperhidrosis are the postoperative rate of anhidrosis, recurrence of symptoms, and rate of compensatory hyperhidrosis. This paper attempts to shed light on the controversies by examining the historic background, clearly defining the anatomic considerations, and outlining the various surgical approaches culminating with robotic selective dorsal thoracic sympathectomy.

## 12. Review

### **Current state of minimally invasive treatment of locally advanced non-small cell lung cancer**

[Full-Text](#) [PDF](#)

Cite this article: Dolan DP, Dezube AR, Swanson SJ. Current state of minimally invasive treatment of locally advanced non-small cell lung cancer. *Mini-invasive Surg* 2020;4:40. <http://dx.doi.org/10.20517/2574-1225.2020.17>

#### Abstract

Locally advanced non-small cell lung cancer (NSCLC) has historically been defined as Stage III by the IASCLC staging. While the workup for these patients has been standardized, the treatment algorithms remain unclear. The use of neoadjuvant chemotherapy, radiotherapy, and now immunotherapy still awaits results in terms of optimal regimen. Surgery for local disease control is routinely used and this group of patients have historically been treated with open thoracotomy for resection. Only in the last 10-20 years have minimally invasive surgical methods been applied for treatment. Video-assisted and robotic-assisted thoracoscopic surgery have retrospectively been shown to be safe and effective with equivalent or better perioperative outcomes, long-term overall and disease-free survival, mediastinal lymph node staging to open thoracotomy, and the ability to operate on patients who are too sick for thoracotomy. This review shows that minimally invasive surgery for treatment of locally advanced NSCLC disease should now be routinely offered to patients as the initial surgical method of resection.

#### 13. Review

##### **MIS AI - artificial intelligence application in minimally invasive surgery**

**[Full-Text](#) [PDF](#)**

Cite this article: Nawrat Z. MIS AI - artificial intelligence application in minimally invasive surgery. *Mini-invasive Surg* 2020;4:28.  
<http://dx.doi.org/10.20517/2574-1225.2020.08>

#### Abstract

This chapter is devoted towards analyzing the progress and barriers to the development of artificial intelligence (AI) and medical robotics in minimally-invasive surgery. The less invasive the surgical intervention and the further the surgeon is from the operating table, the greater the roles of decision support systems (AI) and performance of specific tasks (by medical robots).

#### 14. Review

##### **Robotic esophagectomy: the evolution of open esophagectomy to current techniques and a review of the literature**

**Full-Text** **PDF**

Cite this article: Hasson RM, Fay KA, Phillips JD, Millington TM, Finley DJ. Robotic esophagectomy: the evolution of open esophagectomy to current techniques and a review of the literature. *Mini-invasive Surg* 2020;4:45. <http://dx.doi.org/10.20517/2574-1225.2020.10>

#### Abstract

Esophageal cancer persists as one of the most common causes of cancer-related death and 5-year survival remains poor at 20%. Surgical resection is the gold standard for treatment and cure, and the development of minimally invasive surgery has increased the popularity of robotic-assisted minimally-invasive esophagectomy. The benefits described include less morbidity and greater patient satisfaction compared to open techniques. Nevertheless, institution capabilities and surgeon experience are strong determinants of whether a robotic program will be adopted for oncologic esophageal care. Thus, we review the available literature regarding the history of esophagectomy, evolution to minimally invasive approaches, the introduction of robotic-assisted esophagectomy including its respective outcomes in comparison to open and minimally invasive approaches, and future directions.

## 15. Technical Note

### **Uniportal video assisted thoracoscopic left upper bronchial sleeve lobectomy in a pediatric patient**

**[Full-Text](#) [PDF](#)**

Cite this article: Abu Akar F, Shaqqura B, Rumman N, Soultanis KM. Uniportal video assisted thoracoscopic left upper bronchial sleeve lobectomy in a pediatric patient. Mini-invasive Surg 2020;4:25. <http://dx.doi.org/10.20517/2574-1225.2019.66>

#### Abstract

Endo-bronchial tumors are sporadic in the pediatric population. Pneumonectomy is rarely indicated and best to be avoided if possible due to the morbidity it may cause. In children, preserving as much of the lung parenchymal tissue as possible is crucial and maintaining the integrity of the "still maturing" chest wall may reduce the risk of developing scoliosis and chest deformities in the future. The integration of minimally invasive surgical techniques and parenchymal sparing procedures represents the best possible outcome for these patients. Of course, oncological principles should be re-spected when such a procedure is performed. We present the first report in the literature of a "left" upper lobe sleeve resection in an 8 year old patient via a single port video-assisted thoracoscopic surgery technique.

## 16. Original Article

### **Robotic lateral heller myotomy without fundoplication for achalasia**

**[Full-Text](#) [PDF](#)**

Cite this article : Gharagozloo F, Atituzzman N, Atiquzzman B. Robotic lateral heller myotomy without fundoplication for achalasia. Mini-invasive Surg 2020;4:22. <http://dx.doi.org/10.20517/2574-1225.2019.61>

#### Abstract

**Aim:** Laparoscopic anterior esophageal myotomy with a Dor anterior fundoplication is the most commonly performed surgical myotomy procedure. A lateral esophageal myotomy without an antireflux procedure performed through a left thoracotomy has been associated with the lowest rate of postoperative gastroesophageal reflux and the highest rate for relief of dysphagia. The surgical robot allows for the lateral myotomy procedure to be performed by laparoscopy rather than thoracotomy. We studied our experience with Robotic Lateral Heller Myotomy Without Fundoplication (RLHM) for achalasia.

**Methods:** A retrospective review was conducted of the patients with achalasia who underwent RLHM. All patients completed a subjective dysphagia score questionnaire, received an Eckardt Score, and underwent manometry and pH testing preoperatively, as well as at 6 and 12 months following the myotomy procedure.

**Results:** Forty-eight patients underwent RLHM. The median operating room time was 85 min (range 60-132 min). There was no conversion to a laparotomy. Median hospitalization was 2 days (range 2-3 days). There were no mucosal perforations, complications, or deaths. Following RLHM, the Lower Esophageal pressure decreased from 35 mmHg (range 18-120 mmHg) to 13.2 mmHg (range 9.8-16.6 mmHg) ( $P < 0.0001$ ). The length of the Lower Esophageal high-pressure zone decreased from 5.5 cm (range 4-9 cm) to 2.2 cm (range 1.5-2.8 cm) ( $P < 0.0001$ ). Two patients (2/48) (4.2%) had pathologic gastroesophageal reflux. The median acid exposure in all patients was 0.4% (range 0%-17.8%), and the median Demeester score was 7.5 (range 2-125). The Eckardt score decreased from  $6.3 \pm 1.8$  to  $0.8 \pm 1.8$  at 1 month ( $P < 0.0001$ ), and  $0.8 \pm 1.1$  at 12 months ( $P < 0.0001$ ).

**Conclusion:** RLHM is associated with excellent relief of dysphagia and a low incidence of new gastroesophageal reflux.

## 17. Original Article

### Robotic selective thoracic sympathectomy for hyperhidrosis

[Full-Text](#) [PDF](#)

Cite this article: Gharagozloo F. Robotic selective thoracic sympathectomy for hyperhidrosis. *Mini-invasive Surg* 2020;4:14.

<http://dx.doi.org/10.20517/2574-1225.2019.55>

## Abstract

**Aim:** Thoracic sympathectomy is indicated in patients with upper extremity hyperhidrosis. The success of dorsal thoracic sympathectomy is judged by the rates of relief of hyperhidrosis, recurrence, and compensatory hyperhidrosis. We studied robotic selective sympathectomy (RSS) directed at the division of the preganglionic and postganglionic rami without interruption of the sympathetic chain.

**Methods:** During RSS, the preganglionic and postganglionic sympathetic fibers and communicating rami to intercostal nerves 2, 3, and 4 are divided. The sympathetic chain is left intact.

**Results:** Forty-seven patients underwent RSS. RSS was performed in a staged fashion with the more symptomatic side first, followed by the contralateral side after at least four weeks. Mean operative time was  $67 \pm 13$  min for unilateral RSS. There was no conversion to thoracotomy. The mean increase in ipsilateral palmar temperature was  $1.2 \pm 0.3$  °C. Median hospital stay was three days (range 1-4 days). Complications included transient heart block after sympathectomy on the second side in 1/47 (2%) and transient partial Horner's syndrome which resolved in two weeks in 1/47 (2%). There was no permanent Horner's syndrome. Relief of hyperhidrosis was seen in 98% of patients. At a mean follow up of  $28 \pm 6$  months, 46/47 (98%) patients were free of sustained compensatory hyperhidrosis.

**Conclusion:** RSS is associated with excellent relief of hyperhidrosis and the lowest reported rate of compensatory hyperhidrosis.

## 18. Technical Note

### **Subxiphoid uniportal video assisted thoracoscopic lobectomy in a pediatric patient**

**[Full-Text](#) [PDF](#)**

Cite this article: Abu Akar F, Shaqura B, Rumman N, Jiang L. Subxiphoid uniportal video assisted thoracoscopic lobectomy in a pediatric patient. Mini-invasive Surg 2020;4:10. <http://dx.doi.org/10.20517/2574-1225.2019.65>

#### Abstract

Thoracoscopic surgeries have witnessed tremendous and prompt recent development, especially in the field of uniportal video assisted thoracoscopic surgery (VATS) surgery. It is now possible to perform the most complex surgeries through this technique, which is of great benefit to the patient by significantly reducing the level of postoperative pain and complications of surgery. As surgeons gain experience in this field, their confidence and ability to push the limits and develop technologies are increasing. Performing uniportal VATS surgeries in children is a significant challenge for the surgeon due to the limited size of the thoracic cavity and the difficulty of the instrumentation. Here, we report the first case in the literature (as far as we know) of a uniportal Subxiphoid VATS lobectomy in a 2.5-year-old child. In conclusion, Subxiphoid uniportal VATS lobectomy is feasible in pediatric patients and may have some benefits over the intercostal approach.

## 19. Original Article

### **Robotic vs. traditional stapler use in robotic portal anatomic lung resection**

**[Full-Text](#) [PDF](#)**

Cite this article: Phillips JD, Fay KA, Hasson RM, Millington TM, Finley DJ.

Robotic vs. traditional stapler use in robotic portal anatomic lung resection.

Mini-invasive Surg 2020;4:12. <http://dx.doi.org/10.20517/2574-1225.2020.02>

## Abstract

**Aim:** Currently, there is a paucity of data comparing robotic to traditional video-assisted thoracic surgery stapling devices and the effects on perioperative outcomes during robotic anatomic lung resection. We sought to investigate our institutional experience with patients undergoing robotic anatomic lung resection stratified by the type of stapler used over a contemporary period.

**Methods:** We performed a retrospective review of a prospectively maintained thoracic surgery database and evaluated all patients who underwent robotic anatomic lung resection between January 2015 and December 2018. Patients were grouped based on the type of stapler used during surgery and preoperative characteristics and intraoperative and postoperative outcomes were compared.

**Results:** In total, 634 lung resections occurred during the study period. Of those, 236 met inclusion criteria, and 49 cases (20.8%) fully utilized the robotic stapler. We found no clinically significant difference in preoperative or intraoperative characteristics between groups, except operative time was longer in the robot stapler group. This was likely related to surgeon learning curve. There were no differences between groups in postoperative outcomes or complications.

**Conclusion:** We found equivalent rates of complications, prolonged air leak, and chest tube duration between the two groups. Based on our data, we recommend that surgeons use the stapling device with which they are most confident.

## 20. Review

### **Pain management following robotic thoracic surgery**

**[Full-Text](#) [PDF](#)**

Cite this article: Gharagozloo F. Pain management following robotic thoracic surgery.

Mini-invasive Surg 2020;4:8. <http://dx.doi.org/10.20517/2574-1225.2019.62>

## Abstract

For robotic thoracic surgical patients, minimizing pulmonary complications is the key to decreasing morbidity. Once the pain is controlled, the morbidity associated with thoracic surgery is decreased. Consequently, control of pain is the core requirement in robotic thoracic surgical patients. Appropriate pain control depends on a multifaceted program that is based on an understanding of the pathophysiology of pain. A multifaceted pain control program after robotic surgery needs to address local and systemic pain pathways. This review outlines such a multifaceted program with the use of subpleural catheters for prolonged ambulatory infusion of local anesthetic for 10 days, nonsteroidal anti-inflammatory agents, and measured use of narcotic analgesics.

## 21. Original Article

**Thoracic surgery by minimally invasion robot-assisted in children: “experience and current status”**

**[Full-Text](#) [PDF](#)**

Cite this article: Navarrete-Arellano M. Thoracic surgery by minimally invasion robot-assisted in children: “experience and current status”. Mini-invasive Surg 2020;4:9. <http://dx.doi.org/10.20517/2574-1225.2019.70>

## Abstract

**Aim:** We report our experience in minimally invasive thoracic robot-assisted surgery in children, and a current analysis is carried out on this topic.

**Methods:** Observational, prospective, and longitudinal studies were performed for children with thoracic pathology treated with robotic surgery, from March 2015 to April 2019. We used the “da Vinci surgical system” (Intuitive Surgical, Inc., Sunnyvale, CA. USA). Registered variables included demographic data, diagnosis, surgery, total time, time of console surgery, bleeding, hemotransfusions, conversions,

complications, postoperative (PO) stay, and follow-up. Measures of central tendency were used. Research Ethics Committee of Hospital approved the study. We conducted a detailed non-systematic review of previous publications of children undergoing thoracic robotic surgery.

Results: We treated 11 children, with average age of 5.7 years and weight of 21.3 kg. Diagnosis were: congenital cystic adenomatoid malformation, intralobar sequestration, diaphragmatic paralysis, diaphragmatic eventration, mediastinal teratoma, Ewing's tumor of the fourth left rib, and pulmonary tuberculosis. Surgeries performed were: four lobectomies, four diaphragmatic plications, two tumor resections, and a case of pleural and lung biopsies. The average of console surgery time was 166.45 min, PO stay was 3.6 days, and follow-up was 24.7 months. Conversions and PO complications were 9.1%, and there were no intraoperative complications and mortality. Currently, the number of children treated with thoracic robot-assisted surgery has barely reached 100 cases.

Conclusion: Our results are encouraging, although our experience is limited to a few cases. Robotic surgery for the treatment of thoracic pathology is feasible and safe, and has advantages. To date, very few patients have been treated, and few pediatric surgeons worldwide have applied thoracic robotic surgery in children.

## 22. Technical Note

### **Early experience of uniportal video assisted thoracoscopic surgery in a New Thoracic Unit in Hospital Kuala Lumpur, Malaysia**

[Full-Text](#) [PDF](#)

Cite this article: Sathiamurthy N, Diong NC, Dharmaraj B. Early experience of uniportal video assisted thoracoscopic surgery in a New Thoracic Unit in Hospital Kuala Lumpur, Malaysia. *Mini-invasive Surg* 2020;4:38.

<http://dx.doi.org/10.20517/2574-1225.2020.25>

## Abstract

The evolution of video technology and instrumentation have revolutionised the way lung resections are performed without compromising outcomes. In a new thoracic surgery setup, we have adopted the uniportal video assisted thoracoscopic surgery (U-VATS) technique for lung resections in most of our cases. A retrospective review of operative records from July 2017 till June 2019 in Hospital Kuala Lumpur (HKL) for all thoracic surgeries was done. Patients were divided into two groups: those that underwent U-VATS surgery in the first and second year as part of the learning curve. The operative time, blood loss, lymph node yield, duration of drain placement, and length of hospital stay were compared between the groups. The most common indication for U-VATS surgery was malignant lung tumors (21%) followed by ruptured bullae (20%) and empyema thoracis (15%). The average time taken for lobectomies performed for non-small cell lung cancer was 201 min. U-VATS decortication caused the most amount of blood loss with an average of 350 mL, followed by aspergilloma at 315 mL and bronchoplasty at 250 mL. The rest of the procedures had < 150 mL of blood loss. There was no significant difference in the parameters compared between procedures in the two groups. No mortality was seen. The learning curve of U-VATS was used as a guide to gradually increase the complexity of cases performed in a pyramidal manner. U-VATS is an alternative and promising minimal access approach in thoracic surgery that can be safely performed in Malaysia.

## 23. Review

### **Robotic thymectomy for myasthenia gravis**

**[Full-Text](#) [PDF](#)**

Cite this article: Mammana M, Comacchio GM, Dell'Amore A, Faccioli E, De Franceschi E, Rossi S, Rea F. Robotic thymectomy for myasthenia gravis. *Mini-invasive Surg* 2020;4:37. <http://dx.doi.org/10.20517/2574-1225.2020.24>

## Abstract

Thymectomy is an effective treatment option for the management of myasthenia gravis, as demonstrated by a recent multicenter randomized clinical trial. Complete removal of all thymic tissue, including ectopic foci, increases the chance of achieving a remission or a substantial improvement of the disease; therefore, extended transsternal thymectomy was long considered the procedure of choice. Over the years, several minimally invasive approaches have been proposed, with the aim to reduce perioperative morbidity and to improve aesthetics; however, concerns exist that through such approaches, it may not be possible to achieve a complete resection. Robotic thymectomy seems to overcome many of the limitations associated with other minimally invasive approaches. The available evidence suggests that robotic thymectomy for myasthenia gravis is a safe procedure, and that long-term neurological outcomes are satisfactory.

## 24. Original Article

### **Video-assisted thoracoscopic thymectomy: bilateral approach**

**[Full-Text](#) [PDF](#)**

Cite this article: Brandolini J. Video-assisted thoracoscopic thymectomy: bilateral approach. *Mini-invasive Surg* 2020;4:45.

<http://dx.doi.org/10.20517/2574-1225.2020.27>

## Abstract

**Aim:** The advantages and feasibility of video-assisted thoracoscopic surgery (VATS) in the surgical management of early resectable thymoma and thymic hyperplasia have largely been described and adopted in many thoracic surgery units. In order to allow for resection of all immunogenic thymic cells in patients with myasthenia gravis, surgical removal of the whole thymus gland including perithymic and

pericardiophrenic fatty tissue becomes imperative. It is also important to achieve radical resection and excision in cases of thymoma.

Methods: Numerous technical variations of VATS thymectomy have been reported in literature. In this study, the surgical technique of a minimally invasive, extended thymectomy through a bilateral approach is illustrated with key features highlighted.

Results: In our experience, no conversion to the open transternal approach, surgical mortality or major complications were observed; the median length of hospital stay was 3 days.

Conclusion: Bilateral video-assisted extended thymectomy is an effective, safe and well-tolerated approach, with surgical benefits and clinical outcomes similar to other thoracoscopic techniques.

## 25. Review

### **Standardized definitions and concepts of radicality during minimally invasive thymoma resection**

[Full-Text](#) [PDF](#)

Cite this article:

DeIaco G, Brascia D, Geronimo A, Sampietro D, Fiorella A, Schiavone M, Panza T, Signore F, Marulli G. Standardized definitions and concepts of radicality during minimally invasive thymoma resection. *Mini-invasive Surg* 2020;4:63.

<http://dx.doi.org/10.20517/2574-1225.2020.37>

#### Abstract

Radical thymectomy is the gold standard treatment for thymoma; in particular, completeness of surgical resection of a well-encapsulated thymoma and adequate margins are considered the most important prognostic factors. According to the

International Thymic Malignancy Interest Group instructions, in fact, the thymus should be resected en bloc with its upper cervical poles and the surrounding mediastinal fat and through a no-touch surgical technique. For years, the open approaches have been considered the gold standard treatment for thymic masses, because of technical advantages and proved good oncological results. When applied to properly chosen patients on the basis of the tumor stage, dimension, and histology, minimally invasive approaches could be as effective as open ones in terms of long-term outcomes. To accomplish a minimally invasive thymoma resection, several minimally invasive techniques (transcervical, subxiphoid, thoracoscopic, and robotic) have been described, each presenting advantages and drawbacks. Moreover, when dealing with early stage neoplasms, many authors have proposed to perform the thymomectomy alone, not involving the rest of the thymic gland, but evidence is still imprecise and vague, and some studies have described a higher rate of local recurrence when using this technique. Finally, many studies suggest that surgeons with expertise in minimally invasive lymphadenectomy for lung cancer may easily endorse the idea of nodal dissection, to be performed at least in advanced thymomas involving neighboring structures, large masses, and thymic carcinomas.

## 26. Review

### **The technique of robotic lobectomy I: right-sided lobes**

[Full-Text PDF](#)

Cite this article: Gharagozloo F, Meyer M. The technique of robotic lobectomy I: right-sided lobes. *Mini-invasive Surg* 2020;4:55.

<http://dx.doi.org/10.20517/2574-1225.2020.42>

#### Abstract

Robotic Lobectomy has been evolving over the past decade and is an oncologically efficacious procedure. Although robotic lobectomy is performed more frequently around the world, it accounts for a small percentage of all lobectomies. The major

determinants for the lower level of adoption of the robotic lobectomy procedure are 1. The lack of concise step by step procedure outlines for the surgeons who are transitioning from either open or video-assisted thoracic surgical procedures to robotics, or 2. A strategy for control of catastrophic bleeding during the robotic lobectomy procedure. The Technique of Robotic Lobectomy Part I outlines a stepwise approach to robotic lobectomy for the right upper, middle, and lower lobes. Part II outlines a stepwise approach to robotic lobectomy for left upper, and lower lobes. Part III outlines a methodical technical approach for the control of catastrophic bleeding complications.

## 27. Review

### **The technique of robotic lobectomy II: left sided lobes**

[Full-Text PDF](#)

Cite this article: Gharagozloo F, Meyer M. The technique of robotic lobectomy II: left-sided lobes. *Mini-invasive Surg* 2020;4:56.

<http://dx.doi.org/10.20517/2574-1225.2020.43>

#### Abstract

Robotic lobectomy has been evolving over the past decade and has been shown to be an oncologically efficacious procedure. The Technique of Robotic Lobectomy I outlined the stepwise approach to robotic lobectomy of the right upper, right middle and right lower lobes. This paper outlines the stepwise technical approach to robotic lobectomy of the left upper and lower lobes. The accompanying paper, Technique of Robotic Lobectomy III: Control of Bleeding Complications, outlines a methodical technical approach for the control of catastrophic bleeding complications.

## 28. Review

### **Technique of robotic lobectomy III: control of major vascular injury, the 5 “P”’s**

[Full-Text](#) [PDF](#)

Cite this article: Gharagozloo F, Meyer M. Technique of robotic lobectomy III: control of major vascular injury, the 5 “P”s. *Mini-invasive Surg* 2020;4:57.  
<http://dx.doi.org/10.20517/2574-1225.2020.44>

#### Abstract

Robotic Lobectomy has been evolving over the past decade and has been shown to be an oncologically efficacious procedure. Although robotic lobectomy is performed more frequently in centers around the world, it accounts for a small percentage of all lobectomies. One of the major causes of reluctance to adopt robotic lobectomy and segmentectomy procedures by surgeons is the fear of bleeding complications, as well as the lack of a standardized reproducible approach to these potentially catastrophic events. This paper outlines a proven strategy for control of bleeding complications during robotic lobectomy and segmentectomy procedures: the 5 “P”s of Prevention, Preparedness, Poise, Pressure, and Proximal Control.

## 29. Editorial

### **Awake minimally invasive surgery as a game changer in lung cancer**

[HTML](#) [PDF](#)

Cite this article: Elkhayat H, Rivas DG. Awake minimally invasive surgery as a game changer in lung cancer. *Mini-invasive Surg* 2020;4:85.  
<http://dx.doi.org/10.20517/2574-1225.2020.76>

#### Abstract

Surgery still offers the best option for patients with early stage non-small cell lung cancer that can tolerate surgery. With the increase in screening programs, more patients are diagnosed at early stages of cancer. Sadly, not all of them are fit for

surgery, but with minimally invasive approaches, large number of those patients can be offered surgery and get a better overall survival. Awake non-intubated video assisted thoracic surgery resection is one of the most recent technique that we believe to be a game changer in this spectrum of patients who were previously classified as medically inoperable.

### 30. Review

#### **Sublobar minimally invasive surgery vs. stereotactic ablative radiotherapy for early stage non-small cell lung cancer**

##### **HTML PDF**

Cite this article: Galvez C, Bolufer S, Corcoles JM, Lirio F, Sesma J, Mafe JJ, Cerezal J. Sublobar minimally invasive surgery vs. stereotactic ablative radiotherapy for early stage non-small cell lung cancer. *Mini-invasive Surg* 2020;4:86.

<http://dx.doi.org/10.20517/2574-1225.2020.86>

##### Abstract

Although lobectomy has been traditionally considered the standard treatment for early stage non-small cell lung cancer (NSCLC), lung-sparing resections usually called “sublobar resections” have exponentially increased in their use in the age of minimally-invasive surgery. Sublobar resection, especially anatomical segmentectomy, has shown comparable oncological outcomes in tumors less than 2 cm in diameter without nodal involvement and distant metastasis. On the other hand, more advanced radiation techniques such as stereotactic ablative radiotherapy, have shown excellent local control rates in stage I NSCLC, with low rates of post-treatment complications, so not only is its role growing in inoperable patients, but also in standard-risk stage I patients. There is a need for multicenter randomized trials addressing specifically this issue. This review aims to collect comparative data about the outcomes of both treatment strategies in early stage NSCLC.

### 31. Review

#### **3D printing applications for percutaneous structural interventions in congenital heart disease**

**[HTML](#) [PDF](#)**

Cite this article: Tredway H, Pasumarti N, Crystal MA, Farooqi KM. 3D printing applications for percutaneous structural interventions in congenital heart disease.

*Mini-invasive Surg* 2020;4:78. <http://dx.doi.org/10.20517/2574-1225.2020.77>

#### Abstract

The past several decades have seen remarkable advancements in percutaneous interventions for treatment of congenital heart disease (CHD). These advancements have been significantly aided by improvements in noninvasive diagnostic imaging. The use of three-dimensional (3D) printed models for planning and simulation of catheter-based procedures has been demonstrated for numerous cardiac defects and has been shown to reduce complications, procedure times, and limit radiation exposure. This paper reviews the process by which patient-specific 3D cardiac models are produced, as well as numerous applications of these models for use in percutaneous interventions in CHD.

### 32. Review

#### **The technique of robotic anatomic pulmonary segmentectomy II: left sided segments**

**[HTML](#) [PDF](#)**

Cite this article: Gharagozloo F, Meyer M. The technique of robotic anatomic pulmonary segmentectomy II: left sided segments. *Mini-invasive Surg* 2020;4:68.

<http://dx.doi.org/10.20517/2574-1225.2020.60>

#### Abstract

Anatomic pulmonary segmentectomy and mediastinal nodal dissection has been advocated in patients with smaller tumors or patients with limited pulmonary reserve. The overall 5-year survival and the lung cancer-specific 5-year survival following anatomic segmentectomy have been shown to be equivalent to that of lobectomy. Robotic surgical systems have the advantage of magnified, high-definition three-dimensional visualization and greater instrument maneuverability in a minimally invasive platform. These robotic systems can facilitate the dissection of the bronchovascular structures and replicate the technique of segmentectomy by thoracotomy. Greater experience with the robotic platform has resulted in a reproducible anatomic segmentectomy technique. This is a companion paper to The Technique of Robotic Anatomic Segmentectomy I: Right Sided Segments. This paper outlines the technique of anatomic pulmonary segmentectomy for the left lung: Left Upper Lobe (LUL) Anterior Segment (S3), LUL Apicoposterior Segment (S1 + S2), LUL Lingulectomy (S4, S5), Left Lower Lobe (LLL) Superior Segmentectomy (S6), and LLL Basal Segmentectomy (S7-S10).

### 33. Review

**The technique of robotic anatomic pulmonary segmentectomy I: right sided segments**

**[HTML](#) [PDF](#)**

Cite this article: Gharagozloo F, Meyer M. The technique of robotic anatomic pulmonary segmentectomy I: right sided segments. *Mini-invasive Surg* 2020;4:66. <http://dx.doi.org/10.20517/2574-1225.2020.53>

#### Abstract

Anatomic pulmonary segmentectomy and mediastinal nodal dissection have been advocated in patients with smaller tumors or patients with limited pulmonary reserve. The overall five-year survival and lung cancer-specific five-year survival following anatomic segmentectomy have been shown to be equivalent to lobectomy. Robotic

surgical systems have the advantage of magnified high-definition three-dimensional visualization and greater instrument maneuverability in a minimally invasive platform. Robotics can facilitate the dissection of the broncho-vascular structures and replicate the technique of segmentectomy by thoracotomy. Greater experience with the robotic platform has resulted in a reproducible technique. The Technique of Robotic Anatomic Segmentectomy Part I outlines a stepwise approach to robotic segmentectomy of S1, S2, S3, S4, S5, S6, and S7-S10 of the right lung. The Technique of Robotic Anatomic Segmentectomy Part II outlines a stepwise approach to robotic segmentectomy to the left lung.

#### **34. Case Report**

##### **Primary lung carcinoma with tracheal bronchus treated with uniportal video-assisted thoracoscopic upper lobectomy: a case report**

**[HTML](#) [PDF](#)**

Cite this article: Dharmaraj B, Sathiamurthy N, Diong NC, Balasubbiah N. Primary lung carcinoma with tracheal bronchus treated with uniportal video-assisted thoracoscopic upper lobectomy: a case report. *Mini-invasive Surg* 2020;4:65. <http://dx.doi.org/10.20517/2574-1225.2020.51>

##### **Abstract**

Tracheal bronchus is a rare, congenital abnormality of the tracheobronchial tree. Majority of patients with tracheal bronchus are asymptomatic. Lung malignancy associated with tracheal bronchus is rare. An asymptomatic 40-year-old female was diagnosed with right upper lobe lung carcinoma. CT thorax revealed a right upper lobe tracheal bronchus. The patient underwent right uniportal video-assisted thoracoscopic (VATS) lobectomy and recovered well. To our knowledge, this is the first reported case of primary lung carcinoma with tracheal bronchus treated with right uniportal VATS upper lobectomy in Malaysia, and the second reported case internationally.

### 35. Review

#### **Robotic esophagectomy: how I do it?**

[HTML](#) [PDF](#)

Cite this article: Khaitan PG, Lazar JF, Margolis M, Henderson HR, Watson TJ.

Robotic esophagectomy: how I do it?. *Mini-invasive Surg* 2020;4:51.

<http://dx.doi.org/10.20517/2574-1225.2020.34>

#### Abstract

Compared to the open approach, minimally invasive esophagectomy (MIE) offers several advantages including smaller incisions with decreased pain, improved cosmesis, and earlier return of the patient to baseline function. Robotic-assisted minimally invasive esophagectomy (RAMIE) builds on standard MIE by offering three-dimensional visualization, better instrument articulation, tremor filtration, and superior ergonomics, all of which facilitate technical precision and surgeon comfort. An evolving literature demonstrates that when performed by experienced surgeons, RAMIE leads to improved perioperative outcomes with long-term oncologic equivalency to open approaches, and may offer advantages compared to traditional MIE. This review focuses on the key steps of performing 3-field McKeown, 2-field Ivor Lewis, and transhiatal robotic esophagectomies, data regarding the short- and long-term outcomes, and a brief overview of upcoming trials comparing RAMIE with MIE.

### 36. Review

#### **Stereotactic radiotherapy for early-stage non-small cell lung cancer**

[HTML](#) [PDF](#)

Cite this article: Reverberi C, Trovò M. Stereotactic radiotherapy for early-stage non-small cell lung cancer. *Mini-invasive Surg* 2020;4:43.

<http://dx.doi.org/10.20517/2574-1225.2020.33>

## Abstract

Surgical resection is treatment of choice for early stage non-small cell lung cancer, even though 20%-30% of patients do not undergo surgery. Compared to conventional fractionated radiotherapy, stereotactic body radiotherapy (SBRT) has demonstrated excellent local control (LC) and overall survival (OS). Central and ultra-central lesions present higher toxicity rates after SBRT because of their proximity to mediastinal structures. Dose escalation studies have documented that 10-12 Gy per fraction is the maximal tolerable dose with acceptable rates of treatment adverse events and survival. Peripheral lesions can be safely treated with high radiotherapy dose (biologically equivalent dose of  $\geq 150$  Gy) and a different SBRT dose schedule has showed comparable results with LC rates  $> 90\%$  and OS comparable to surgical resection. Elderly patients, defined as 75 years or older, are a subgroup of patients who may benefit the most from SBRT, as they have higher morbidity and mortality risks because of comorbidities and decreased lung function. At present, there are no randomized studies comparing SBRT with surgery for patients who are potential candidates for surgical removal. Retrospective studies and systematic reviews have showed encouraging results in terms of cancer-specific survival and LC.

## 37. Original Article

### **Robotic bronchial sleeve resections: technical details and early results**

[Full-Text](#) [PDF](#)

Cite this article: Durand M. Robotic bronchial sleeve resections: technical details and early result. Mini-invasive Surg 2019;3:35.

<http://dx.doi.org/10.20517/2574-1225.2019.31>

## Abstract

Aim: We report our four-arm robotic bronchial sleeve anatomical lung resection technique and its early results.

Methods: We retrospectively collected all the four-arm robotic sleeve anatomical lung resections we performed in our institution from February 2014 to August 2019. We reported the results as a series of cases.

Results: During that period, 582 robotic procedures were performed by a single surgeon, of which 486 were major anatomical lung resections. From this group, 10 patients (2%) underwent bronchial sleeve resections. All patients were treated on the right lung. Neither conversion nor major events occurred during surgery. The first bronchial sleeve was performed for Patient 219. The mean length of procedure was 164 ( $\pm$  43) min. One patient died during hospitalization due to a non-related complication (gastric massive bleeding). Three patients had no complications. Six had minor complications (Clavien Dindo Grade 2) resulting in prolonged length of stay. The mean length of stay was 10 ( $\pm$  5.7) days. No bronchial fistula occurred. All resection margins were R0.

Conclusion: Four-arm robotic bronchial sleeve is a feasible and safe procedure. Telemanipulation surgery offers excellent technical conditions to ensure a hand-sewed anastomosis and R0 resection. The technical principle and dissection are the same as those of open surgery. Patient selection and mastering of the telemanipulation device are mandatory to perform these complex and rare procedures.

### **38. Original Article**

**Factors on nodal up-staging in clinical N0 adenocarcinoma patients who had minimally invasive anatomic lung resections**

**[Full-Text](#) [PDF](#)**

Cite this article: Cosgun T, Kaba E, Ayalp K, Toker A. Factors on nodal up-staging in clinical N0 adenocarcinoma patients who had minimally invasive anatomic lung resections. *Mini-invasive Surg* 2019;3:32.

<http://dx.doi.org/10.20517/2574-1225.2019.024>

## Abstract

**Aim:** The incidence of adenocarcinoma among lung cancer patients has increased in recent years. We identified the factors affecting lymph node status in patients with primary lung adenocarcinoma who underwent minimally-invasive anatomic resection.

**Methods:** We retrospectively analyzed the medical records of primary lung adenocarcinoma patients who underwent minimally-invasive anatomic lung resections and mediastinal lymph node dissection between January 2012 and December 2017. We evaluated lymph node positivity and nodal status in each T and histologic subgroup, tumoral prognostic characteristics, minimally-invasive surgical methods and resection type.

**Results:** Of 473 patients who underwent anatomic resection for lung cancer between January 2012 and December 2017, 274 underwent minimally-invasive anatomic lung resections for primary lung cancer, 158 adenocarcinoma patients were analyzed in this study. Nodal status and number of positive lymph nodes were similar in the stages T1, T2, T3. Lymphovascular invasion ( $n : 78$ ) and micropapillary predominance tended to be significant predisposing factors for lymph node metastasis. Mean dissected lymph node number was significantly higher in patients who underwent Robot-assisted thoracoscopic surgery compared to Video-assisted thoracoscopic surgery ( $P < 0.05$ ), and in those who underwent lobectomy compared to segmentectomy ( $P < 0.05$ ).

**Conclusion:** We were unable to demonstrate a relationship between T stage and N status. Factors contributing to unexpected N positivity were tumor characteristics that could not be identified in the preoperative period. We recommend performing systematic mediastinal lymph node dissection regardless of the size and histopathologic type of adenocarcinoma. In our study, robotic surgery and lobectomy operation showed superiority in dissecting more lymph nodes.

## 39. Preface



**Preface to special issue on “Minimally Invasive Surgery of the Thymus Gland”**

**Full-Text PDF**

Cite this article: Solli P. Preface to special issue on “Minimally Invasive Surgery of the Thymus Gland”. *Mini-invasive Surg* 2019;3:28.  
<http://dx.doi.org/10.20517/2574-1225.2019.37>