Comparing Robotic Lung Resection With Thoracotomy and Video-Assisted Thoracoscopic Surgery Cases Entered Into The Society of Thoracic Surgeons Database

Farivar AS, Cerfolio RJ, Vallières E, Knight AW, Bryant A, Lingala V, Aye RW, and Louie BE.
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This paper discusses "Robotic Lung Resection", performed using robotic-assisted *da Vinci*® technology.

This prospective study was designed to compare the benefits of a robotic-assisted approach versus national outcomes after video-assisted thoracic surgery (VATS) and thoracotomy. Data from all consecutive robotic-assisted anatomic lung resections were collected from two institutions (n = 181) from January 2010 until January 2012 and matched against the same variables for anatomic resections via thoracotomy (n = 5913) and VATS (n = 4612) from the Society of Thoracic Surgeons (STS) National Database.

Key Takeaways

- The study demonstrated a statistically significant decrease in 30 day mortality and postoperative blood transfusions after robotic-assisted lung resection versus VATS and thoracotomy
- Robotic-assisted lung resection patients had a shorter length of stay (LOS) versus VATS and thoracotomy
- The authors observed fewer air leaks and intraoperative blood transfusions with robotic-assisted lung resection compared to thoracotomy
- There was less need for perioperative bronchoscopy and reintubation as well as a reduction in pneumonias and atrial arrhythmias versus thoracotomy

Study Limitations

The study included significantly more patients with clinically staged T2a and N1 disease and ASA IV status in the thoracotomy group than in the robotic-assisted cohort. This suggests that larger tumors and those with positive hilar nodes were resected via thoracotomy, which may partially account for some of the increased complications and duration of chest tube drainage noted in the open cohort. Additionally, the data came from an administrative database and were subject to the variances in reporting from individuals who voluntarily submit data.

Data

Study Arm (n)

	Open (4,612)	VATS (5,913)	Robotic-Assisted (181)
Comparator	STS database		2 centers
LOS, days	7.3 (<.0001)*	5.3 (<.0001)	3.2
Chest tube duration, days	4.8 (<.0001)	3.7 (.0005)	2.9
30 day Mortality %	2.0 (<.0001)	0.9 (<.0001)	0
Post-Op Blood Transfusion %	7.8 (<.0001)	3.7 (.0019)	0
Post-Op Air Leaks (> 5 days) %	10.7 (.0419)	8.9 (NS)**	6.1
Intra-Op Blood Transfusion %	4.8 (<.0001)	1.3 (NS)**	0

*All p values are versus Robotic-Assisted
**Not statistically significant

Conclusion

The study suggests benefits for robotic-assisted lobectomy relative to VATS, including shorter LOS and lower 30 day postoperative mortality. The findings also support previously published data that minimally invasive techniques may reduce complications and mortality relative to thoracotomy for early-stage lung cancer as well as for some less common benign indications for anatomic lung resection.

Financial Disclosure

One or more of the authors have received compensation from Intuitive Surgical for consulting and/or educational services.

Thoracic Surgery Risks

Pulmonary Resection (Wedge Resection, Segmentectomy, Lobectomy): persistent air leak, pneumonia, prolonged mechanical ventilation >48 hours, atrial fibrillation, acute respiratory distress syndrome (ARDS), chylothorax, re-intubation, arrhythmias, bronchopleural fistula, phrenic nerve injury, esophageal injury, difficulty breathing, collapsed lung, pulmonary volvulus, recurrent laryngeal nerve injury leading to vocal cord dysfunction.

Important Safety Information

Serious complications may occur in any surgery, including *da Vinci*® Surgery, up to and including death. Examples of serious or life-threatening complications, which may require prolonged and/or unexpected hospitalization and/or reoperation, include but are not limited to one or more of the following: injury to tissues/organs, bleeding, infection and internal scarring that can cause long-lasting dysfunction/pain. Individual surgical results may vary.

Risks specific to minimally invasive surgery, including *da Vinci*® Surgery, include but are not limited to, one or more of the following: temporary pain/nerve injury associated with positioning; a longer operative time, the need to convert to an open approach, or the need for additional or larger incision sites. Converting the procedure could result in a longer operative time, a longer time under anesthesia, and could lead to increased complications. Contraindications applicable to the use of conventional endoscopic instruments also apply to the use of all *da Vinci* instruments. You should discuss your surgical experience and review these and all risks with your patients, including the potential for human error and equipment failure. Physicians should review all available information. Clinical studies are available through the National Library of Medicine at www.ncbi.nlm.nih.gov/pubmed.

Be sure to read and understand all information in the applicable user manuals, including full cautions and warnings, before using *da Vinci* products. Failure to properly follow all instructions may lead to injury and result in improper functioning of the device. Training provided by Intuitive Surgical is limited to the use of its products and does not replace the necessary medical training and experience required to perform surgery. Procedure descriptions are developed with, reviewed and approved by independent surgeons. Other surgical techniques may be documented in publications available at the National Library of Medicine. For Important Safety Information, indications for use, risks, full cautions and warnings, please also refer to www.davincisurgery.com/safety and www.intuitivesurgical.com/safety. Unless otherwise noted, products featured are available for commercial distribution in the U.S. For availability outside the U.S., please check with your local representative or distributor.

Precaution

The demonstration of safety and effectiveness for the specific procedure(s) discussed in this material was based on evaluation of the device as a surgical tool and did not include evaluation of outcomes related to the treatment of cancer (overall survival, disease-free survival, local recurrence) or treatment of the patient's underlying disease/condition. Device usage in all surgical procedures should be guided by the clinical judgment of an adequately trained surgeon.

The friable nature of pulmonary tissue enhances the risk of vascular, bronchiolar or other injury that will be difficult to control when using this device. Published clinical experience as well as clinical studies performed to support this marketing clearance have demonstrated that even surgeons considered expert in laparoscopy/thoracoscopy have substantial learning curves of 10 to 12 cases (Falk, et al., Total endoscopic computer enhanced coronary artery bypass grafting, *Eur J Cardiothorac Surg* 2000; 17: 38-45).

All materials will eventually become obsolete. When referencing printed or digitally replicated materials, please note the revision date that follows the part number (PN). Consult your *da Vinci* representative or visit the *da Vinci* Online Community for the latest revision.

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