Robotic Sublobar Resection for the Surgical Management of Isolated Pulmonary Nodules

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Robotic Sublobar Resection for the Surgical Management of Isolated Pulmonary Nodules

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Background
- Techniques for anatomic pulmonary resection:
  - Rib-sparing thoracotomy - current standard of care
  - Video-assisted thoracoscopic surgery - similar perioperative and oncologic efficacy
  - Robotic-Assisted Lung resection - newer, minimally invasive option
- Theoretical advantages of robotic lung surgery: 7 degrees of freedom, 3-D Hi-Definition camera, dexterity, no fulcrum effect, operating surgeon may use three arms simultaneously, seated position more comfortable for operating surgeon
- Few studies to date evaluate robotic-assisted segmentectomy for lung lesions. We present our initial experience with robotic assisted segmentectomy at LVHN with previously established data on the topic.

Methods
- Retrospective review of all robotic segmentectomies performed at LVHN
- October 2011 through June 2014: 186 robotic pulmonary resections performed.
- Total of 36 robotic anatomic segmentectomies performed.
- Perioperative outcomes evaluated: Length of stay, operating room time, conversion rate, estimated blood loss, 30-day mortality, hospital based complications, number of lymph nodes, tumor size, surgical margin, FEV1, recurrence. Conversions were excluded in analysis.
- All cases were performed by a single surgeon (M.F.S) with the use of the Da Vinci robotic system.

Results
- Conversion rate 5.5% (2/36); excluded from further analysis
  - Mean age: 65.4(41-83)
  - Mean EBL: 51.9mL (20-150)
  - Mean tumor size was 1.57cm (0.7-3)
  - Mean lymph nodes removed: 21.9 (5-34)
  - Median Length of stay: 2 days
  - Complication rate: 23.53%
    - Mean BMI: 27.9(17.9-42.3)
    - Mean OR time: 121 minutes (49-315)
    - Positive margins: 0/34
    - Mean Lymph node stations: 3.32 (0-7)
    - Readmission rate was 11.76% (n=4/34)

Discussion
- Only about 20-30% of all anatomic lung resections are performed using VATS.
- Technical difficulty of VATS may be a barrier to minimally invasive chest surgery, which robotic surgery may overcome.
- Current literature suggests that robotic surgery may offer similar results as VATS but with a faster learning curve.
- Longer follow-up period is needed to assess long term oncologic efficacy. Cost analysis should be performed to evaluate if the higher price of the robotic system outweighs the possibly decreased OR time and hospital stay.

Conclusion
- The study demonstrates the feasibility, safety, and efficacy of robotic-assisted pulmonary segmentectomy for the treatment of isolated lung tumors.
- Robotic-assisted segmentectomy appears to offer shorter length of stay, EBL, and OR time than video-assisted or open techniques [3-11]. Further studies would be needed to compare robotic segmentectomies to VATS procedures.
- Robotic-assisted segmentectomy may be a beneficial procedure in the treatment of early stage lung tumors, as it can be performed with acceptable mortality, morbidity, recurrence, and length of stay.

Table 1. This table presents some results alongside of previously published data. Compared to the other published date, our results have the lowest intraoperative estimated blood loss as well as post-operative length of stay.

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<th>Lead Author</th>
<th>Year</th>
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<th>V/R/O</th>
<th>LOS (days)</th>
<th>Operative time (min)</th>
<th>Operative blood loss (mL)</th>
<th>30 Day Mortality</th>
<th>Complication Rate (%)</th>
<th>Mean Follow-up (months)</th>
<th>Lymph Node Harvested (stations)</th>
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