MIDAS: Minimally Invasive Diagnosis and Surgery for Management of Lung Nodules
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Earlier diagnosis of lung cancer may result in a stage shift and generate enhanced survival. Achieving diagnosis of small peripheral nodules and GGO’s is challenging and may not routinely be accomplished endoscopically or with a minimally invasive surgical approach. An algorithm utilizing robotic navigational bronchoscopy for diagnosis and/or localization combined with robotic pulmonary resection may reduce number of interventions, truncate time to definitive therapy, decrease anesthesia risks, increase likelihood of achieving minimally invasive resection, and enhance patient satisfaction while reducing patient anxiety. We are evaluating the impact of single episode of anesthesia for diagnosis and surgical resection.

Methods
All patients undergoing Ion navigational bronchoscopy were entered into an IRB approved registry. Patients were stratified by clinical elements and radiographic characteristics for likelihood of malignancy; patients who were felt to have significant likelihood of malignancy were offered simultaneous diagnosis and resection. Localization with ICG (0.4 cc) was performed for lesions less likely to be visually identified including small, deep, semisolid nodules and GGO. All resections were performed utilizing a da Vinci Xi robot and intraoperative localization was performed with Firefly.

Patient Characteristics: N = 34
- Age: Mean 71.1, Range 34 – 88
- Sex: Female 24, Male 10
- FEV1: 1.95 L (0.93 -3.7)
- Smoking History: Never 6, Former 20, Active 8

Indocyanine green (ICG) with Firefly during Xi resection

Value Proposition for Single Episode of Anesthesia
- Shortened timeline from nodule identification to definitive therapy
- Stage shift to earlier stage and improved outcomes
- Elimination of high anxiety interval between diagnosis and resection
- Enhanced patient satisfaction with a comprehensive plan
- Potential reduction in risks associated with multiple anesthetic events
- Increased likelihood of maintaining a minimally invasive surgical approach
- Maximize pulmonary parenchymal sparing procedures
- Decreased impact on family resources
- Earlier return to employment and usual lifestyle

Results
- Robotic Resections: N = 34
  - Lobectomy 14
  - Segmentectomy 6
  - Sublobar 16
  - ICG Localization 16
  - Lymphadenectomy all

Pathology
- Malignant 29
  - NSCLC 23
  - SCLC 1
  - Metastasis 5
- Benign 5
  - granulomatous

Nodule Characteristics
- Solid 21
- Semisolid 8
- GGO 5

Size
- SUV Median 5.3

Stage of NSCLC
- Stage 1a 14
- Stage 1b 6
- Stage 2 2
- Stage 3a 2

Major Complications
- Morbidity 0
- Mortality 0
- Conversions from robotic 0

Conclusions
Single episode of anesthesia for robotic bronchoscopy and resection is a safe and effective procedure. ICG Localization facilitated maintaining a minimally invasive approach; there were no conversions. Ninety four percent of patients offered MIDAS elected to proceed with the combined approach. Patients uniformly expressed satisfaction with shortened timeline to definitive therapy eliminating the waiting interval between nodule diagnosis and resection. Impact on operating room efficiency can be managed with patient selection and team preparation. Single episode of anesthesia may reduce risk, increase patient satisfaction, and enhance short- and long-term outcomes.