Intra-Operative Thoracoscopic Assisting Techniques

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Duke Comprehensive Cancer Center
Duke University Medical Center
Durham, NC
Disclosures

- None
<table>
<thead>
<tr>
<th></th>
<th>How long have you been practicing as a physician assistant?</th>
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<td></td>
<td>&lt; 1 year</td>
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<thead>
<tr>
<th></th>
<th>What types of cases are performed by the surgeons you work with (circle all that apply)?</th>
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<td></td>
<td>Thoracic surgery</td>
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<tr>
<th></th>
<th>Describe your practice setting</th>
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<td>Academic with fellows</td>
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<th></th>
<th>How often do you assist in the OR for any thoracic surgical procedure?</th>
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<td>Never done one</td>
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<th></th>
<th>How often do you assist in the OR in a VATS for any procedure (wedge, lobectomy, decortication, etc)?</th>
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<th></th>
<th>How often do you assist in the OR for an open (thoracotomy) lobectomy?</th>
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<th>How often do you assist in the OR for a VATS lobectomy?</th>
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<th></th>
<th>How confident are you in your knowledge of the steps of VATS lobectomy (knowing what to expect next)?</th>
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<td></td>
<td>Not at all</td>
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<th></th>
<th>How confident are you in your use of the equipment and instruments used for VATS lobectomy?</th>
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<tr>
<td></td>
<td>What equipment?</td>
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<th></th>
<th>What specific topics and/or skills are you hoping to learn from this course?</th>
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**Needs Assessment**

Please circle your answer for each question.
Group A (13)

**Team 1 (4)**
- Bruce Armstrong
- Tiffany Chavez
- Samantha Connerton
- Gerard Francisco

**Team 2 (3)**
- Joshua Gyspers
- Richard Harrison
- Melodie Hays

**Team 3 (3)**
- Nena Hy-Boyer
- Craig Matthews
- Michael Mohr

**Team 4 (3)**
- Aaron Morton
- Aaron Neley
- Kimberlee Parks
<table>
<thead>
<tr>
<th>Team 1 (4)</th>
<th>Team 2 (3)</th>
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<tbody>
<tr>
<td>James Phares</td>
<td>Natalia Young</td>
</tr>
<tr>
<td>Anna Roe</td>
<td>Lindalee Thompson</td>
</tr>
<tr>
<td>Scott Rogers</td>
<td>Nat Biondo</td>
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<tr>
<td>Alia Way</td>
<td></td>
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<tr>
<td>Team 3 (3)</td>
<td>Team 4 (3)</td>
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<tr>
<td>Daniel Byrd</td>
<td>James Mathey</td>
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<tr>
<td>Donald Chavez</td>
<td>Joan Sharlow</td>
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<tr>
<td>Kaitlin Jensen</td>
<td>Tyler Stewart</td>
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8:10 – 9:30 Didactic Session – Balderson

9:30 – 10:45 Lab Session I

Group A- Detail Stations (*one group will have an extra person*)

Proctors- Andrea McNeil and Kim Howard

*Times synchronized to iPhone time*

9:30-9:42 2* participants at each station
9:43-9:55 2* participants at each station
9:56-10:08 2* participants at each station
10:09-10:21 2* participants at each station
10:21-10:33 2* participants at each station
10:33-10:45 2* participants at each station
Group B - Lab Stations

Proctors - Balderson/Meyerson/D’Amico

9:30-10:07 Team 1 Station 1
Team 2 Station 2

Note: Teams 1 and 2 switch station at 9:48

Team 3 Station D’Amico
Team 4 Station Meyerson

10:08—10:45 Team 1 Station Meyerson
Team 2 Station D’Amico
Team 3 Station 2
Team 4 Station 1

Note: Teams 3 and 4 switch stations at 10:26
10:45 - 12:00 Lab Session II

Group B- Detail Stations (*one group will have an extra person)

10:45-10:57  2* participants at each station
10:58-11:10  2* participants at each station
11:11-11:23  2* participants at each station
11:24-11:36  2* participants at each station
11:36-11:48  2* participants at each station
11:48-12:00  2* participants at each station

Group A- Lab Stations

10:45-11:22  Team 1 Station 1
           Team 2 Station 2

Note: Teams 1 and 2 switch station at 11:03

Team 3 Station D’Amico
Team 4 Station Meyerson

11:23—12:00  Team 1 Station Meyerson
              Team 2 Station D’Amico
              Team 3 Station 2
              Team 4 Station 1

Note: Teams 3 and 4 switch stations at 11:41
AKA: How to Help Your Surgeon Overcome The Learning Curve

- **Barriers to Adoption**
  - Qualified Assistance
  - Specific Equipment
  - Specific Instruments
Objectives

- Thoracoscopic Case Preparation
  - Team, Equipment and Instruments, Positioning
  - Equipment
  - Instruments
  - Positioning

- Thoracoscopic Assisting Techniques
  - The Camera Pilot
  - Tricks of the trade
  - helpful thoracoscopic assisting maneuvers
Basic Concepts in VATS

- Best results with a dedicated team
- Visualization is an important key to success
  - Difficult angles
  - Multiple instruments through the same incision
  - High rent district
Basic Concepts in VATS

- No insufflation needed
  - Ribs maintain the workspace once the lung is collapsed

- No ports needed
  - Only one port is usually used for the camera
  - Allows multiple instruments per incision

- Incision Placement is critical
  - Ribs limit motion of the camera
    - Too much torque on ribs will cause post-op neuropathic pain
The Thoracoscopic Lobectomy Team

- **Surgeon**
- **Camera Pilot**
  - Goal is seamless view with minimal communication and correction by the surgeon
- **Scrub tech**
  - Should know the instruments and backup plans (sponge stick)
  - Should aspire to familiarize with the intended steps and common maneuvers of the procedure
    - Sxn-disecting clamp-sxn-stapler
- **Circulator**
  - Should know the types of staple loads used and where to find them quickly
  - Support Personnel who are familiar with ordering procedures
Consistency

- Consistent assistants are more important than the level of training
  - Partner, Resident, Physician Assistant, Nurse, Scrub Tech

- However, the higher the level of training and/or experience, the better the procedural insight, understanding of thoracic anatomy, etc.

- Ex. Understanding the difference between a PTX vs Tension PTX
Building a Team

Communication
- Clarify the names of instruments
  - Often local names
    - “long curved empty”
    - “Scanlan clamp”
- Clarity is essential among Surgeon, Scrub, Circulator and First Assist (Camera Pilot)
- Over time the surgeon and camera pilot should develop a language that quickly and efficiently communicates the needs of the surgeon
- “The Sterile Cockpit”
The First Assistant = Camera Pilot

What to look for in a Camera Pilot

- Interest in minimally invasive surgery
  - Passion, patience, reverence (root word of passion is..)
- Experience in thoracic surgery
- Willingness to learn thoracoscopic anatomy
  - (hilar perspective as opposed to “fissure” perspective)
- Knowledge of instrumentation
- Knowledge of equipment
- A resonant appreciation for the technical contribution to the case

Of the above only Interest is mandatory the rest can be learned and developed
Camera Pilot

- Poor Camera operation can make for a painfully long case
  - When the scope has to be removed to be cleaned
  - When the pilot has difficulty reintroducing the scope into a complex hemithorax
    - Smudge
    - Reproducing the a consistent view in scope angle and horizon

- Poor Camera operation can impact the safety of a case
  - If the surgeon cannot visualize......
Camera Pilot needs a working knowledge of the function of the camera/scope/monitors

- Proper use of 30 degree, flexible tip or other scope optimizes the surgeon’s view
- In the HD world it is VERY IMPORTANT to understand how the technology functions and what the technological implications are for the surgeon.
  - Ex. Low light = grainy picture = loss of resolution = loss of ability to visualize planes…
- Helpful in troubleshooting
Camera Operations

- Camera Pilot should understand the steps for the intended procedure
  - Allows anticipation of the surgeon’s next move

- The camera view is very much a dance, the surgeon must be allowed to move within the frame as opposed to being led.
  - The pilot must know (or ask) what should be in the center of the screen (instrument, structure etc)

- Goal is for the only perception of movement on the monitor to be the maneuvers of the surgeon

- The Pilot must come to appreciate the value
Thoracoscopic Equipment
Thoracoscopic Equipment
Thoracoscopic Equipment- Storz
Thoracoscopic Equipment- Storz
Thoracoscope - Design

- ALL Thoracoscopes are VERY fragile.
- 10lbs of force will break a 10mm scope
  - The weight of the camera alone can damage the outside casing
  - A dent in the casing means that light fibers can be broken.
  - Think of the times where you THINK the scope is in focus but it is not in certain areas of the field.
- 3lbs of force will snap a 5 mm scope
  - Will bow 20 degrees before resistance can be detected
Thoracoscope Design
Thoracoscopic Equipment - Olympus
Thoracoscopic Equipment - Olympus
Thoracoscopic Equipment - Olympus
Beware Scope Damage
Determining the damaged scope
Chipped Distal Lens
Broken Light Fibers
Rod Lens No Longer Lines Up
Thoracoscopic Instruments
Thoracoscopic Instruments
Thoracoscopic Instruments - Scanlan
Thoracoscopic Instruments
Thoracoscopic Instruments
Thoracoscopic Instruments - Wexler
Thoracoscopic Instruments - Covidien
Thoracoscopic Instruments-
Covidien
Thoracoscopic Instruments - Ethicon
Patient positioning - Bean Bag
**Patient Positioning**

- **Standard lateral decubitis position**
  - Flex the bed
    - Helps keep the camera from hitting the hip which limits camera angles
  - Slightly posteriorly rotated
    - Makes the anterior incision a little easier to access
Patient Positioning - Bean Bag
Patient Positioning - Secure Strap Location (Anterior)
Patient Positioning - Stability
Posterior
Patient Positioning- Secure to Table
Patient Positioning- Table Break (flex)
Table Flex- (flex the inner-space)
Patient Positioning - Axilla and Securing Arms
Patient Positioning- Axilla
Incisions

- Two incisions will allow almost any operation
  - 10 mm camera port
    - 7th or 8th intercostal space, posterior axillary line
  - 3-4 cm anterior access incision
    - 4th or 5th intercostal space, anterior axillary line
Patient Positioning - Marking Incision
Consistent approach is an operative strategy

Use of a consistent patient position and incisions provides consistent exposure for the surgeon

Consistent exposure, regardless of the planned anatomic resection, provides the surgeon a familiar field to develop consistent maneuvers

Beware the theory of triangulation etc.

Predictable and Consistent angles of approach and retraction are key to a successful procedure
Camera Operations

- There must be a clear method of communicating the visual (exposure) needs of the surgeon as:

- The pilot has three perspectives to maintain: the focal length, camera head rotation and the scope angle.
Camera Operations

- Focal Length
- A depth of field must be developed
  - Facilitates depth perception
  - Close but not too close
    - If too close, the camera can affect the instrument angles available to the surgeon
    - A tight focal length can be helpful during delicate dissection but hurtful for frame of reference
  - Anticipate when to pan in and out
    - Understanding the action being performed
      - Adjusting retraction vs. fine dissection on the artery
Focal length - loss of reference
Focal Length – reference
(the power of panning out 2cm!!)
Camera Operations

- Camera head rotation controls:
  Horizon
  - Refers to the structure on which the camera view is based.
Camera Operations

- Third control is the barrel of the light cord which controls the scope angle (exception: Olympus)
- Clock face
  - Refers to the barrel of the light cord on the scope relative to the position of the hour hand on a clock
  - Functionally, this reference can allow the surgeon to request a different angle without having to reach across to adjust the scope angle.
Piloting Technique - One Hand (1)
Piloting Technique - *One Hand* (2)
Piloting Technique - *Two hand (angle)*
Piloting Technique - Scope
Stabilization
Piloting Technique-Parallel with one hand stabilization at the scope
Piloting Technique-Isomer View

*(how well can you back up a trailer from your rear view mirror)*
Camera Operations

- Together the focal length, horizon and scope angle facilitate visual feedback to create as close to a three dimensional view as possible.

- Optimizing these controls also minimize the incidence of intercostal nerve irritation:
  - Beware intercostal compression injury
  - 10mm vs 5mm scope – fragility
    - The scope port and chest tube port are the same and thus require 24fr minimum capacity.
The Complicated Path
Maximize Scope Angle to Locate Back Blade
Communication

- External Cues and Corrective Transitions
  - Leaning in = tighten up the focal length
  - Tilted head (in any direction off of neutral = I am screwing up)
  - Hyper-extending neck = I need to do something to see over the top
  - “Batman” = Camera Drift= I am off of the horizon
Difficult Wedge with Isomer View
Communication to Facilitate Transitions

- Talking through a maneuver can be helpful for your pilot to develop transitional moves.
  - Ex. “We are now going to release the posterior pleural reflection”
  - Functionally the camera will move, without getting smudged, from a survey view to facilitate retraction to a tight view of the bronchus through the pleura.
Follow the entry and exit of a dissecting clamp
Maneuvers

- Ultimately the surgeon and pilot will develop a level of communication such that interruptions are minimized as to not add significant time to the thoracoscopic case.

- Ex. Timing to Clear The smudge
  - Timing of cleaning the lens must be quickly and seamlessly orchestrated
  - NO SURPRISES-The SURGEON has to make the call as to when to clean the scope…clean another’s specs
  - Must be fast (8-10 seconds for maneuver)
Tricks- The Smudge

- For a “True “ Smudge, remove the camera and clean the scope with a warm moist lap pad.
- If the parenchymal field is clear, the scope can be gently wiped along the pleura.
- If the smudge is actually a fogged lens, insertion of the thoracoscopic suction in the field will decrease vapor which will clear the lens.
Tricks

- To create more working space
  - Recruit atelectasis
  - Minimize downside tidal volume
    - Request Vt to be 300mL or less
    - Vmin can be used as ventilation target
    - Will decrease mediastinal excursion
    - Results in more intrathoracic space
Maneuver to improve infrahilar exposure
Hilar Rotation
The Power of Proper Retraction
Soak Staple load to minimize spillage of extra staples
Use of Sterile Water to detect bleeding..
Trick to remove a wedge without an endobag
Intercostal Blocks for Pain Control
Chest Tube Modification
Focal Length, Horizon and Scope Angle
A note about video editing

- Not usually in the assistant’s job description
- But it is a great way to improve skills, anatomical knowledge and steps of the procedure
- It is maddening but valuable to review the replay in early cases
Duke beats UNC!!!