



TMH
Thoracic Surgery
Handbook

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Foreword:

Welcome to thoracic surgery. This handbook is meant to serve as a guide to provide a basic understanding of the procedures and protocols used on the thoracic surgery service at The Miriam Hospital. **The templates provided do not substitute for clinical judgment and communication with attendings.** Any suggestions for its improvement are welcomed.

The Seven Cs:

1. COMMON SENSE

Do not follow rules blindly. Use common sense and clinical judgement.

2. COMMERADERIE

When in doubt, do not be afraid to ask for help or advice. Remain confident but humble.

3. COMMUNICATE

Discuss your plans / thoughts clearly with patients, families, nursing staff and other medical teams. Verbal communication is key. It avoids redundancy, unnecessary calls, medical mistakes and unhappy families/patients.

4. CHARTS

Document clearly but CONCISELY all significant events

5. COURTESY

Be courteous and charming. People will enjoy working with you. This will make most people go out of their way to help you.

6. CALM

Remain calm and polite – ALWAYS. Even if you are ready to explode inside, remain collected. Think twice before speaking. Take appropriate measures after the negative encounter.

7. CALL

You must call me for:

- New admissions
- New consults
- Unexpected deaths
- Significant changes in clinical status (ICU transfer, intubation, start of new vasopressors)

EXPECTATIONS FROM RESIDENTS:

1. 24/7 coverage **in conjunction with** thoracic PA of all thoracic patients in CVT-S / CVT-I / Wards / Consult list.
2. Concise daily progress notes on all thoracic patients **ONLY** when Emily Perkins P.A. is not working (ie. weekends / vacation).
3. Completing discharge paperwork **ONLY** when Emily Perkins P.A. is not working (ie. weekends / vacation).
4. Answering thoracic consults **ONLY** when Emily Perkins P.A. is not working (ie. nights / weekends / vacation).
5. Participating in surgical procedures depending on resident availability. Residents **ALWAYS** have priority over surgical PA in the operating room. Some minor thoracic surgical procedures do not require any “resident coverage” even if surgical PA is not available. Please communicate with attending.
6. Reviewing history and imaging studies before scrubbing in a surgical procedure. Please site mark patient / update H&P when necessary.

CONTACTS:

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IF I DO NOT ANSWER MY PAGER, CALL MY CELLULAR (617) 893-9115

Emily Perkins P.A. Pager: (401) 350-3190

Jodi Mendez (secretary) Office: (401) 793-5144

If you have questions, if you are missing an H&P, if you need more info about a patient, call my office secretary (Jodi Mendez).

WEEKENDS: If you are not able to get a hold of me after several attempts (pager/cellular), page the general surgery attending on-call at TMH.

Chest Tube Insertion:

1. **Lab values:** INR <1.5 and Platelets > 50 000 (in elective situations).
2. **Correct side:** Confirm with CXR/Chest CT to determine ideal placement of tube.
3. **Position:** For most chest tube insertions, the patient should be placed in the lateral decubitus position with their arm raised above their head. Attempt to displace the latissimus dorsi as posteriorly as possible.
4. **Placement:** For most patients, the anterior or mid axillary line in the 6th interspace is appropriate which corresponds to the nipple line in males and just under the breast tissue in females. If possible, try to avoid going thru a large amount of adipose tissue or muscle.

In patients with **previous thoracotomies**, the placement of the chest tube is usually ABOVE the incision. A CT scan is extremely helpful to guide chest tube placement

5. **Analgesia:** IV narcotics +/- midazolam. In addition, use 20cc of 1% lidocaine not only in the skin but also into the subcutaneous tissue and just above pleura.
6. **Skin incision:** Incise 1.5cm with a knife just above the rib. Dissect bluntly with a Kelly clamp staying just above the rib. Do NOT create a tunnel. First, insert your finger in the pleural cavity to ensure there are no adhesions.
7. **Select a chest tube:** Air: 24 or 28FR straight chest tube to apex
Fluid: 28 or 32FR right angle chest tube to base
8. **Tube position:** Guide to appropriate position. If using a trocar to guide the chest tube, do NOT allow the pointed tip to be exposed. Do NOT allow the unexposed trocar to enter the chest cavity >2cm.
9. **Suture:** Place a 0 silk in the middle of the incision to help close the incision at the time of eventual chest tube removal. Wrap it around the shaft of the chest tube and tape the ends to the chest tube. Place a second 0 silk at the edge of the incision to secure the tube.
10. **Dressing:** Place a discrete dry gauze dressing. No need for Vaseline or Xeroform around chest tube. Have RN change dressing daily.
11. **CXR:** Confirm adequate placement with a CXR
12. **Analgesia:** Toradol IV around the clock + narcotic prn

Chest Tube Removal:

Confirm: Output < 300cc/ 24h
No air leak

When to clamp a chest tube

If uncertain if there is an air leak vs a large “swing”: clamp the chest tube for 4-12h and obtain a CXR. If there is no new pneumothorax or S/Q emphysema, it must be a “swing” and you may remove the chest tube

Position: Patient supine usually in lateral decubitus (not sitting in a chair)

Stitch: Unsecure chest tube by cutting securing stitch but NOT the skin closing stitch which is wrapped around the shaft of the chest tube.

Remove: Remove the chest tube in a swift but steady manner at the beginning of FORCED EXPIRATION

Tie: Tie GENTLY the 0 silk skin closing stitch. Overzealous tightening of the stitch leads to skin necrosis.

CXR: Obtain CXR 1-4 hours after chest tube removal
If there is a NEW, small pneumothorax, repeat CXR in 4-12h
If new small pneumothorax is stable and asymptomatic: d/c pt

Dressing: Place a SMALL discrete dry gauze dressing. No need for Vaseline or Xeroform on the wound. **Instruct patient to remove dressing the next day and take a regular shower.** No need to put on another dressing unless there is oozing from wound.

Stitch: Remove it in 5-10 days (usually in my office if pt is discharged)

Spontaneous Pneumothorax:

1. Obtain history: timing, occupation, social situation, previous PTX, trauma, COPD,
2. **Not all pneumothoraces need a chest tube** – use **clinical judgement** in every case
3. Ascertain the pneumothorax is not a large COPD bulla (in older COPD patients)
4. Place a 24F or 28F straight chest tube to the apex
5. If the chest tube lands in the fissure but the lung is fully re-expanded, leave it be.
6. Obtain a CT Scan next day if patient is > 40 years old (R/O underlying disease)
7. Wait >24h to obtain CT Scan to decrease likelihood of seeing confounding re-expansion pulmonary oedema
8. Indications for VATS bullectomy / pleurectomy:
 - a. 2nd episode of spontaneous ptx
 - b. 1st episode with hemothorax, severe tension ptx
 - c. Inability for pt to seek prompt medical attention if has a 2nd episode
 - d. Persistent air leak > 3 days (except severe COPD pts)

Pleural Effusions:

1. Place a 28F straight to apex or right angled chest tube towards the base. If suspect frank blood, place 32F chest tube
2. Drain the initial **1000cc** of effusion, then:
 - a. If the patients is experiencing severe pleuritic pain, clamp chest tube. Unclamp after 1h and allow the rest of the effusion to drain.
 - b. If the patient is doing well, do NOT clamp chest tube. Allow complete drainage of the effusion.
 - c. **Re-expansion pulmonary edema** is a rare phenomenon (<1%). It is NOT directly to the volume of effusion drained but rather pleural pressure changes.
3. Coughing fits sometimes occur as the lung re-expands. Self-limited (usually 20 min). No treatment is usually necessary.
4. Send fluid for analysis if necessary: cultures, cytology, cell count, biochemistry (LDH, albumin, triglycerides)

Malignant Pleural Effusions:

1. Confirm malignancy with positive cytology or presence of ipsilateral lung cancer / metastases
2. Consider talcage if: Most of the effusion is drained
Lung is re-expanded
Chest tube drainage < 300cc / 24h
3. Consider PleurX if: Lung does NOT re-expand
Chest tube drainage < 300cc / 24h
Pt had previous talcage

PleurX catheters

Catheters: PleurX catheters are tunneled, in-dwelling, semi-permanent catheters placed in the pleural cavity usually for malignant effusions.

Placement: Placed at bedside or in my office.
If loculated effusion – refer to VIR for image-guided placement

Drainage: Need special PleurX drainage kit found in central supply at TMH.
Usually done at home by patients, family members or VNA

Frequency: PRN: Drain only as need be for symptomatic relief of dyspnea related to a malignant effusion. Usually every few days (2-7 days).

Technique: Please refer to my Instruction Manual found in the Appendix section.

Pleuritic chest pain during drainage signifies that the effusion is completely drained and drainage with the suction bottle should be stopped. A self-limited cough (10-20 minutes) is not uncommon. A slightly bloody drainage is sometimes expected.

Removal: PleurX catheters need to be removed if get infected or no drainage x 2-3 weeks.
Most pts keep their catheters for several weeks/months.

Removal is done under local anaesthesia by dissecting out the felt cuff under the skin insertion site.

Talcage:

1. 5g of talc + 20cc of 2% plain lidocaine mixed in a bag or syringes of 100cc of saline.
2. Obtain IV tubing, 18G needle, alcohol swab, small Tegaderm, second 100cc bag of plain saline
3. Give to the patient pre-procedural analgesia
4. Clamp most proximal portion of Pleurovac clear rubber tubing if there is no air leak. If there is an air leak, call the attending surgeon.
5. Shake the talc mixture bag well just before instillation
6. Swab with alcohol the rubber tubing proximal to the clamp, insert tangentially 18G needle into the tubing and instill all the talc mixture. Chase it with the second 100cc saline bag.
7. Remove needle and place an occlusive Tegaderm over the hole.
8. Leave the chest tube clamped for 2 hours
9. Self-limited pleuritic pain is common after talcage (1-2h)
10. It is NOT necessary to have the patient rotate positions to distribute the talc in the pleural cavity.
11. No CXR is necessary after the procedure

EGD (esophago-gastro-duodenoscopies):

1. Endoscopy Unit – outpatient procedure
2. Remove dentures + use mouth guard
3. Use IV midazolam (versed) +/- fentanyl with O2 sat probe monitor
4. Place O2 sat probe
5. Spray back of pharynx with lidocaine spray x 2
6. In selected patients, serial dilation over a guide wire using Savary dilator can be performed
7. Routine post-procedure CXR is not necessary
8. F/U per the attending

Awake Bronchoscopy:

1. Endoscopy Suite / Ward / ICU
2. Obtain adult VIDEO bronchoscope from Operating Room (with slit tip 10cc syringe to flush AND with the 2 grey plastic caps which click on it – for suction and flushing)
3. Avoid using a pediatric bronchoscope in an adult (poor optics, poor suction)
4. Use of IV sedatives is sometimes needed
5. Place O2 sat probe
6. Spray the nostrils, back of mouth, vocal cords and carina with liquid lidocaine
7. Insert the scope through a nostril, preferably NOT the mouth
8. Suction out mucous with saline
9. Flush out scope at end of procedure by suctioning lots of saline
10. Routine post-procedure CXR is not necessary
11. F/U per the attending

Laser Bronchoscopy:

1. Operating Room
2. General anaesthesia
3. Needs a #8 ETT or bigger
4. May use LMA if lesion is in trachea
5. Obtain CXR in PACU
6. F/U per the attending

Endobronchial Ultrasound (EBUS):

1. Outpatient procedure to biopsy mediastinal lymph nodes / masses
2. Performed in the OR
3. General anaesthesia - need minimum #8 ETT
4. Need on-site cytopathologist to read FNA
5. No routine CXR post-op
6. Tylenol only
7. F/U in 1 week in office at 195 Collyer St, Providence - Tel (401) 793-5144

Percutaneous Tracheostomy:

8. Performed in ICU at the bedside (not in the OR)
9. Obtain adult VIDEO bronchoscope from Operating Room (with a 10cc slit tip syringe to flush AND with the 2 grey plastic caps which click on it – for suctioning and flushing)
10. Obtain “Blue Rhino Trach Set” from locked supply closet in ICU
11. Need sterile gowns, gloves, masks, large drape (the rest is included in “Blue Rhino Set”)
12. Advise ICU nurse to draw up versed or propofol and fentanyl
13. Advise respiratory tech to increase FiO₂ to 100% and place on set respiratory rate
14. Ask respiratory tech to have in the room the emergency intubation kit including laryngoscope + ETT
15. Place patient at the very tip of the head of the bed
16. Place patient in maximum neck extension by placing transverse shoulder roll
17. One operator performs bronchoscopy from head of the bed with respiratory tech’s assistance, second operator performs simultaneous tracheostomy from from right side of patient
18. No post-procedure CXR is necessary

PEG:

1. Usually performed at the same time as a percutaneous tracheostomy
2. Obtain the gastroscope and PEG kit from the Operating Room front desk.
3. Use similar set up as percutaneous tracheostomy
4. Keep PEG attached to drainage bag x 24h
5. May use it for meds immediately
6. Start tube feeds 24h post-op

Mediastinoscopies:

1. Incision: Cervical mediastinoscopy (C-med): cervical incision
 Anterior mediastinoscopy (A-med): left anterior chest wall incision
2. Indication: Obtaining biopsies of mediastinal lymph nodes
 Staging of lung cancer
3. Main OR: Outpatient procedure
4. General anaesthesia
5. Complications (<1%): pneumothorax, chylothorax, recurrent laryngeal nerve injury, significant hemorrhage requiring emergent sternotomy or thoracotomy.
6. Immediate post-op hoarse voice is usually from ETT irritation (not RLN injury)
7. In the PACU: Cervical mediastinoscopy: No CXR
 Anterior mediastinoscopy: Routine CXR (as L pleural space was entered)
9. Discharge: Tylenol / NSAIDS usually enough but give Vicodin (30 tabs) just in case
 Shower in 24h
 Return to work in 72h
 Drive in 24h or when off narcotics
 F/U in 1 week: Office at 195 Collyer St, Providence Tel: (401) 793-5144
 For any questions, call Emily Perkins P.A. or my office.

Esophageal Stents:

1. Indications: Malignant strictures
Malignant T-E fistulae
Esophageal perforations on selected cases
Intractable benign strictures
2. Operating Room– outpatient procedure
3. General anaesthesia
4. Placed using flexible gastroscope **under fluoroscopy**
5. Complications: Perforation
Stent migration
Bleeding
Aspiration
6. Routine post-op CXR: Document baseline stent position
R/O perforation
7. Routine post-op antibiotics (microperforations): Clinda 600mg liquid po q6h x 48 hrs
8. Consult with Dietician (as inpatient or outpatient)
9. Diet: Provide patient with Nutritional Guide after Esophageal Stent Placement
(see appendix section of this handbook)

Puree diet x 48h
Mechanical soft until further notice
Must always eat and sleep with head of bed at 45 degrees
Crush all pills if possible
10. F/U per the attending

Thoracoscopic/VATS Wedge Resections:

Indications: Diagnoses and excision of lung nodules
Treatment of lung cancers in selected patients
Treatment of pulmonary metastases
Diagnosis of diffuse pulmonary infiltrates

Incisions: Usually two or three 1-3 cm port incisions (including chest tube site)
Sometimes one incision must be extended to 4-5cm.
Usually closed with subcuticular stitches + dermabond

Postoperative Care:

- Monitoring: Remove A-line in PACU if doing well
May travel off telemetry if stable

- CXR
 - #1 In PACU
 - #2 If PACU CXR OK, next CXR only after chest tube removal POD#1
 - #3 If chest tube remains: Daily AM CXR

- Labs: No routine labs (unless clinically indicated)

-

- IVF: Minimal IVF (ie 50cc/h) - INT IV as soon as tolerating p.o. fluids

Try to avoid giving fluid boluses post-op
Tolerate urine output 20cc/h

For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
Obtain CXR if suspect retained blood in the chest
Check Hct (transfuse as clinically indicated)
If asymptomatic and urine output > 20cc/h: no treatment

- Analgesia: No epidural
Use PCA or IV narcotics prn
In addition, Toradol IV around the clock (not prn)

- Meds: Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH). May take aspirin.

Prophylaxis – Antibiotics: Ancef 1g IV q8h x 2 doses
Prophylaxis - DVT: Heparin 5000 units S/Q bid
Prophylaxis – GI: Colace 100mg po bid

- Diet: Liquid diet on day of surgery and advance as tolerated
- Ambulation: Out of bed to chair the evening of surgery
Must ambulate on POD #1
- Chest tube Overnight suction to -20cm H2O
AM rounds POD #1: if no air leak and < 300cc total output: Remove chest tube (no need to wait for AM CXR)
- Consults: Respiratory consult routinely

PT consult prn (pt weak, not very mobile)
- Discharge: Aim is to fast-track patients for discharge home on afternoon of POD#1
- F/U: 1-2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144
- Instructions: NSAIDS + Vicodin (60 tabs)
Shower: 24h after chest tube removal if closing stitch used
Shower: 72h after chest tube removal if NO closing stitch used
Driving: May NOT drive for at least a week or while using narcotics
Work: Do not return to work until after f/u visit in 2 weeks
For any questions, call Emily Perkins P.A. or my office at (401) 793-5144

VATS bullectomy / partial pleurectomy:

- Indications: Treatment of spontaneous ptx or secondary ptx associated with COPD
- 2nd episode of ipsilateral spontaneous ptx
 - 1st episode with hemothorax or severe tension ptx
 - Inability for pt to seek prompt medical attention if has a 2nd episode
 - Persistent air leak > 3 days (except severe COPD pts)

Incisions: Usually two or three 1-3 cm port incisions (including chest tube site)
Closed with subcuticular stitches + Dermabond

Postoperative Care:

- Monitoring: Remove A-line in PACU if doing well
May travel off telemetry if stable
- CXR In PACU + Daily AM CXR
- Labs: No routine labs (unless clinically indicated)
- IVF: Minimal IVF (ie 50cc/h) - INT IV as soon as tolerating p.o. fluids
Try to avoid giving fluid boluses post-op
Tolerate urine output 20cc/h
Expect a chest tube output higher than a regular VATS wedge because of the partial pleurectomy
For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
Obtain CXR if suspect retained blood in the chest
Check Hct (transfuse as clinically indicated)
If asymptomatic and urine output > 20cc/h: no treatment
- Analgesia: No epidural
Use PCA or IV narcotics prn
In addition, Toradol IV around the clock (not prn)
- Meds: Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH). Ask attending about restarting aspirin.

Prophylaxis – Antibiotics: Ancef 1g IV q8h x 24h only
Prophylaxis - DVT: Heparin 5000 units S/Q bid
Prophylaxis – GI: Colace 100mg po bid

- Diet: Liquid diet on day of surgery and advance as tolerated
- Ambulation: Out of bed to chair the evening of surgery
Must ambulate on POD #1
- Chest tube **Suction to -20cm H2O x 48h** (to allow pleurodesis)
POD #2: if no air leak and < 300cc total output and no residual air space:
Remove chest tube
- Consults: Respiratory consult routinely

PT consult prn (pt weak, not very mobile)
- Discharge: Aim is to fast-track patients for discharge home on afternoon of POD#3
- F/U: 2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144
- Instructions: NSAIDS + Vicodin (60 tabs)
Shower: 24h after chest tube removal if closing stitch used
Shower: 72h after chest tube removal if NO closing stitch used
Driving: May NOT drive for at least a week or while using narcotics
Work: Do not return to work until after f/u visit in 2 weeks

For any questions, call Emily Perkins P.A. or my office.

VATS / Open Decortication:

Indications: Empyema
Fibrothorax

Incisions: VATS: Usually two or three 1-3 cm port incisions (including chest tube site)
Sometimes one incision must be extended to 4-5cm.
Usually closed with subcuticular stitches

Open: 10 – 15 cm serratus sparing postero-lateral thoracotomy

Postoperative Care:

- Monitoring: Remove A-line in PACU if doing well
May travel off telemetry if stable
- CXR Daily AM CXR
- Labs: Follow WBC x 3 days
- IVF: Minimal IVF (ie 50cc/h) - INT IVF as soon as tolerating p.o. fluids
May use fluid boluses more liberally (3rd spacing)
For low BP: **May use fluid boluses as much 3rd spacing occurs**
Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
Obtain CXR if suspect retained blood in the chest
Check Hct (transfuse as clinically indicated)
Decrease epidural rate if not in pain
If asymptomatic and urine output > 20cc/h: no treatment
- Analgesia: Usually no epidural
Use PCA or IV narcotics prn
In addition, Toradol IV around the clock (not prn)

- Meds: IV antibiotics according to clinical situation

Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH). Ask attending about restarting aspirin.

Prophylaxis - DVT: Heparin 5000 units S/Q bid
Prophylaxis – GI: Colace 100mg po bid
- Diet: Liquid diet on day of surgery and advance as tolerated
- Ambulation: Out of bed to chair the evening of surgery
Must ambulate on POD #1
- Chest tube: Keep suction -20cm H2O x 48 hrs

By convention: Anterior: basilar chest tube
Posterior: apical chest tube
- Consults: Respiratory consult routinely

PT consult routinely
- Discharge: Aim is to discharge home or transfer to medical service once chest tubes out
- F/U: 2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144
- Instructions: Antibiotics per discussion with attending

NSAIDS + Vicodin (60 tabs)
Shower: 24h after chest tube removal if closing stitch used
Shower: 72h after chest tube removal if NO closing stitch used
Driving: May NOT drive for at least a week or while using narcotics
Work: Do not return to work until after f/u visit in 2 weeks
For any questions, call Emily Perkins P.A. or my office.

Lobectomy:

Indications: Treatment of lung cancers in selected patients
Treatment of pulmonary metastases close to hilum or deep in parenchyma
Treatment of severe bronchiectasis

Incisions: Open: 10 – 15 cm serratus sparing postero-lateral thoracotomy
VATS: 4 total: Three 1 cm incisions (including chest tube site) and a 4cm “working” port

Postoperative Care:

- Monitoring: Remove A-line on day of surgery if doing well
May travel off telemetry if stable
- CXR In CVT-S + Daily AM CXR
- Labs: Routine CBC, Chem 7 on POD #1 only
Otherwise, no routine labs necessary (unless clinically indicated)
- IVF: Minimal IVF (ie 50cc/h) - INT IV as soon as tolerating p.o. fluids
Try to avoid giving fluid boluses post-op
Tolerate urine output 15cc/h
For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
Obtain CXR if suspect retained blood in the chest
Check Hct (transfuse as clinically indicated)
Decrease epidural rate if not in pain
If asymptomatic and urine output > 15cc/h: no treatment
Diuresis: Routinely, start with low dose **Lasix IV** on AM of **POD #2**
- Analgesia: Routine use of epidural
Discuss with anaesthesia if need to alter epidural (low BP, sedation, pruritis)
In addition, Toradol IV around the clock (not prn)

Contraindications to toradol: active bleeding, renal insufficiency, NSAID associated GI ulcers, anaphylaxis – NOT COPD!)

- **Meds:** Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH). Ask attending about starting aspirin.

Prophylaxis – Antibiotics: Ancef 1g IV q8h x 2 doses
Prophylaxis - DVT: Heparin 5000 units S/Q bid
Prophylaxis – GI: Colace 100mg po bid

In addition: Some lobectomy patients should have **lopressor IV or PO** if not already on B-blockers. (COPD is not a contraindication). Ask attending.
- **Diet:** Liquid diet on day of surgery and advance as tolerated
- **Ambulation:** Out of bed to chair on AM of POD #1
Must ambulate by PM of POD #1
Incentive spirometry
- **Chest tube** Suction to -20cm H2O overnight only
No need to wait for AM CXR to place on waterseal
Place on waterseal even if there is an air leak

Place suction back on if: Significant drop of lung on waterseal CXR
Increasing S/Q emphysema

Remove chest tube when: No air leak x 24h
Output < 300cc / 24h
- **Foley:** Remove on POD #1 – **even if they have an epidural**
- **Consults:** Respiratory consult routinely

PT consult routinely
- **Discharge:** Aim to discharge home on POD #3 or 4
- **F/U:** 2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144

- Instructions: May restart aspirin on day of discharge (if not already restarted in-house)

Ask attending about restarting plavix/Coumadin/LMWH

Do not send patient home on lopressor (unless on it at home)

Shower: 24h after chest tube removal if closing stitch used

Shower: 72h after chest tube removal if NO closing stitch used

Driving: May NOT drive for at least 2 weeks or while using narcotics

Work: Do not return to work for 4-12 weeks (depending on occupation)

For any questions, call Emily Perkins P.A. or my office at (401) 793-5144

Pneumonectomy:

Indications: Treatment of lung tumors involving hilum or bronchial tree such that a sleeve lobectomy is not possible

Incisions: Similar to open lobectomy: 10–15 cm serratus sparing postero-lateral thoracotomy

Postoperative Care:

“You run them so dry, you should see tumbleweeds in their rooms and dust from their foley”

24h stay in CVT-S

- **Monitoring:** Remove A-line on POD #1 if doing well
May travel off telemetry if stable
- **IVF:** Minimal IVF (ie 30cc/h) - INT IV as soon as tolerating p.o. fluids
Try to avoid giving fluid boluses post-op
Tolerate urine output 15cc/h

For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output (if chest tube present)
CXR: R/O Mediastinal shift
R/O Rapid fluid accumulation (ie blood) in operated cavity
Check Hct (transfuse as clinically indicated)
Decrease epidural rate if not in pain
If asymptomatic and urine output > 15cc/h: no treatment
- **Diuresis:** Routinely, start with **Lasix IV** on PM of **POD #1**
- **Analgesia:** Routine use of epidural
Discuss with anaesthesia if need to alter epidural (low BP, sedation, pruritis)
In addition, Toradol IV around the clock (not prn)

Contraindications to Toradol: active bleeding, renal insufficiency, NSAID associated GI ulcers, anaphylaxis – NOT COPD!

- Meds: Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH) Discuss with attending restarting aspirin.

Prophylaxis – Antibiotics: Ancef 1g IV q8h x 2 doses
 Prophylaxis - DVT: Heparin 5000 units S/Q bid
 Prophylaxis – GI: Colace 100mg po bid

In addition: All pneumonectomies should have **lopressor IV or PO** if not already on B-blockers. (COPD is not a contraindication)

- Diet: Sips only on day of surgery and advance slowly as tolerated
 Liquid restriction: 1.5L per day
Strict NPO if patients has hoarse voice (ie recurrent nerve injury)
 * Aspiration pneumonia is poorly tolerated post pneumonectomy *

- Ambulation: Out of bed to chair on AM of POD #1
 Must ambulate by PM of POD #1
 Incentive spirometry

- Chest tube Usually there is NO chest tube

If there is a chest tube:

- NEVER place it to suction
- Used to monitor bleeding and equilibrate mediastinum.
- Remove it on POD #1

- CXR In PACU + Daily AM CXR

What to look for on CXR:

Fluid level

Hemithorax should be ¾ full by POD #4

Rapid fluid accumulation: usually blood, rarely chyle

Dropping fluid level: R/O BPF, leaking out from skin incision

Mediastinal position

Shift toward operated side: OK as long as hemodynamics OK

Shift away from operated side: R/O BPF, remaining lung atelectasis

Contralateral pleural effusions should be tapped under U/S guidance

Pulmonary oedema and pneumonia should be treated aggressively

- Foley: Remove on POD #1 – even if they have an epidural
- Labs: Routine CBC, Chem 7 on POD #1 only
Chem 7 qAM x 4 days
Other labs as clinically indicated

Keep K >3.8 and Mg >1.5 to prevent A fib
Tolerate small rise in creatinine (ie continue diuresis)
If Creatinine rises > 1.8: eliminate nephrotoxic drugs + decrease lasix
- Consults: Respiratory consult routinely

PT consult routinely
- Discharge: Aim to discharge home on POD#4-5
- F/U: 2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144
- Instructions: May restart aspirin on day of discharge (if not already restarted in-house)

Ask attending about restarting plavix/Coumadin/LMWH

Do not send patient home on lopressor (unless on it at home)

Send patients home on lasix:
 Not on lasix at home pre-op: Lasix 20mg po qday x 7 days
 On lasix at home pre-op: Double their usual dose of lasix x 7 d

Do not send patient home on lopressor (unless on it at home)

Shower: On day of discharge
Driving: May NOT drive for at least 2 weeks or while using narcotics
Work: Do not return to work for 6-12 weeks (depending on occupation)
For any questions, call Emily Perkins P.A. or my office at (401) 793-5144

Extrapleural Pneumonectomy (EPP):

Indications: Pleural mesothelioma
Thymoma (Stage IVa)
Diffuse pleural sarcoma
Rare cases of lung cancer (NSCLC - T4N0M0 with pleural effusion)

Incisions: 20 cm postero-lateral thoracotomy

Technique: Pneumonectomy with extra-pleural dissection (higher blood loss!)
Resection of pericardium and diaphragm
Reconstruction of pericardium and diaphragm with Goretex

Postoperative Care:

Very similar to pneumonectomy patients

“You run them so dry, you should see tumbleweeds in their rooms and dust from their foley”

48h stay in CVT-S

- Monitoring: Remove A-line on POD #1 if doing well
May travel off telemetry if stable
 - IVF: Minimal IVF (ie 30cc/h) - INT IVF as soon as tolerating p.o. fluids
Try to avoid giving fluid boluses post-op
Tolerate urine output 15cc/h
For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
CXR: R/O Mediastinal shift
R/O Rapid fluid accumulation (ie blood) in operated cavity
Check Hct (transfuse as clinically indicated)
Decrease epidural rate if not in pain
If asymptomatic and urine output > 15cc/h: no treatment
- Diuresis:** Routinely, start with **Lasix IV** on PM of **POD #1**

- Analgesia: Routine use of epidural
Discuss with anaesthesia if need to alter epidural (low BP, sedation, pruritis)
In addition, Toradol IV around the clock

(Contraindications to Toradol: active bleeding, renal insufficiency, NSAID associated GI ulcers, anaphylaxis – NOT COPD)
- Meds: Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH). Do NOT restart aspirin for 5 days.

Prophylaxis – Antibiotics: Ancef 1g IV q8h x 2 doses
Prophylaxis - DVT: Heparin 5000 units S/Q bid
Prophylaxis – GI: Colace 100mg po bid

In addition: All pneumonectomies should have **lopressor IV or PO** if not already on B-blockers. (COPD is not a contraindication)
- Diet: Start liquid diet only on POD 1
Liquid restriction: 1.5L per day
Strict NPO if patients seem to have hoarse voice (ie recurrent nerve injury)
* Aspiration pneumonia is poorly tolerated post pneumonectomy *
- Ambulation: Bedrest x 24h
Must ambulate by POD #2
Incentive spirometry
- Chest tube If there is a chest tube:
 - NEVER place it to suction
 - Used to monitor bleeding and equilibrate mediastinum.
 - Remove it on POD #1
- CXR On arrival to CVT-S + daily AM CXR

What to look for on CXR:

Fluid level

Hemithorax should be ¾ full by POD #4

Rapid fluid accumulation: usually blood, rarely chyle

Dropping fluid level: R/O BPF, leaking out from skin incision

Mediastinal position

Shift toward operated side: OK as long as hemodynamics OK

Shift away from operated side: R/O BPF, remaining lung atelectasis

Contralateral pleural effusions should be tapped under U/S guidance

Pulmonary oedema and pneumonia should be treated aggressively

- Foley: Remove on POD #1 – even if they have an epidural

- Labs: Routine CBC, Chem 7 qAM x 4 days
Other labs as clinically indicated

Minimal elevation in cardiac enzymes and ST changes are expected as pericardium was resected and myocardium manipulated.

Keep K >3.8 and Mg >1.5 to prevent A fib

Tolerate small rise in creatinine (ie continue diuresis)

If Creatinine rises > 1.8: eliminate nephrotoxic drugs + decrease lasix

- Consults: Respiratory consult routinely

PT consult routinely

- Discharge: Aim to discharge home on POD# 5-7

- F/U: 2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144

- Instructions: May restart aspirin on day of discharge (if not already restarted in-house)

Ask attending about restarting plavix/Coumadin/LMWH

Do not send patient home on lopressor (unless on it at home)

Send patients home on lasix:

Not on lasix at home pre-op: Lasix 20mg po qday x 7 days

On lasix at home pre-op: Double their usual dose of lasix x 7 d

Shower: On day of discharge

Driving: May NOT drive for at least 2 weeks or while using narcotics

Work: Do not return to work for 6-12 weeks (depending on occupation)

For any questions, call Emily Perkins P.A. or my office at (401) 793-5144

Resection of mediastinal mass:

Indications:	<u>Anterior mediastinum:</u>	Thymoma Ectopic thyroid tissue Germ cell tumors
	<u>Middle mediastinum:</u>	Bronchial / Pericardial cysts
	<u>Posterior mediastinum:</u>	Neural tumors
Incisions:	<u>Anterior mediastinum:</u>	Full or partial sternotomy
	<u>Middle mediastinum:</u>	Right VATS or thoracotomy
	<u>Posterior mediastinum:</u>	Ipsilateral VATS or thoracotomy

Postoperative Care:

- Monitoring: Remove A-line on day of surgery if doing well
May travel off telemetry if stable
- CXR In PACU + qAM as long as chest tube in place
- Labs: Routine CBC, Chem 7 on POD #1 only
Otherwise, no routine labs necessary (unless clinically indicated)
- IVF: Maintenance IVF x 24h - INT IVF when tolerating p.o. fluids

For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
Obtain CXR if suspect retained blood in the chest
Check Hct (transfuse as clinically indicated)
Decrease epidural rate if not in pain
If asymptomatic and urine output > 20cc/h: no treatment
- Diuresis: No need for lasix

- Instructions: May restart aspirin on day of discharge (if not already restarted in-house)

Ask attending about restarting plavix/Coumadin/LMWH.

Shower: 24h after chest tube removal if closing stitch used

Shower: 72h after chest tube removal if NO closing stitch used

Driving: May NOT drive for at least 2 weeks or while using narcotics

Work: Do not return to work for 4-12 weeks (depending on occupation)

For any questions, call Emily Perkins P.A. or my office

Esophagectomy:

Indications:	Esophageal cancer Esophageal perforations in selected patients End-stage achalasia Strictures (rarely)
Incisions:	<u>Modified McKeown:</u> Cervical anastomosis (at 16-18cm) <u>OR set-up</u> 1 st set-up - R thoracotomy 2 nd set-up - Laparotomy + L neck
	<u>Ivor-Lewis:</u> Thoracic anastomosis (at 20-25cm) <u>OR set-up</u> 1 st set-up - Laparotomy 2 nd set-up - R thoracotomy
	<u>Trans-hiatal:</u> Cervical anastomosis (at 16-18cm) <u>OR set-up</u> Only 1 set-up – Laparotomy + neck (no thoracotomy)
	<u>L Thoraco-abdominal:</u> Thoracic anastomosis (25-30cm) <u>OR set-up</u> Only 1 set-up – L thoraco-abdo
	<u>Minimally invasive:</u> Modified McKeown <u>or</u> Ivor-Lewis

Postoperative Care:

Minimum 24 h CVT-S stay

- **Monitoring:** Remove A-line on POD #1 if doing well

May travel off telemetry if stable
- **CXR** On arrival to CVT-S + Daily AM x 3 days
- **Labs:** Routine CBC, Chem 7 on arrival to CVT-S + qAM x 3 days
Otherwise, no routine labs necessary (unless clinically indicated)
- **IVF:** Unlike pulmonary surgery, generous IVF (**D5NS + 20KCl 150cc/h**) x 48h

Liberal use of fluid boluses first 48h post-op

For low BP: Stop loproressor / other anti-hypertensive meds
R/O excessive chest tube output
Obtain CXR if suspect retained blood in the chest
Check Hct (transfuse as clinically indicated)
Decrease epidural rate if not in pain
If asymptomatic and urine output > 20cc/h: no treatment

Diuresis: Consider low dose **IV Lasix** on AM of **POD #3**
- **Analgesia:** Routine use of epidural
Discuss with anaesthesia if need to alter epidural (low BP, sedation, pruritis)
Toradol IV around the clock (unless contraindicated: active bleeding, renal insufficiency, NSAID associated GI ulcers, anaphylaxis – NOT COPD)
- **Meds:** Must take all their regular home meds starting POD #1
(except coumadin, plavix, LMWH). Ask attending about aspirin.

Patient to remain STRICT NPO
 - **may have green swabs for lips only (not to swallow)**
 - **may have oral hygiene care**

PREFERRED ROUTE OF ADMINISTRATION OF MEDS

IV > liquid via NGT > crushed via NGT > liquid only via J-tube

Via NGT: use liquid form or crush pills

Via J-tube: use liquid form only

Prophylaxis – Antibiotics: Ancef 1g IV q8h x 2 doses
Prophylaxis - DVT: Heparin 5000 units S/Q bid (even if epidural in place)
Prophylaxis – GI: Pantoprazole 40mg IV q24h
No need for colace (ie tube feeds)

In addition: All esophagectomies with thoracotomies should have **lopressor IV or PO** if not already on B-blockers. (COPD is not a contraindication)

- **NGT:** NGT to LWS with saline irrigation q4h
Remove NGT on POD 7 if Barium Swallow shows no leak and no severe gastric outlet obstruction.

- **Diet:** NPO x 7 days (all meds via IV / NGT / J-tube)

NPO until Barium Swallow on POD 7 shows no leak

POD 7: Sips of water / juice

POD 8: Puree diet

Tube feeds: Begin Jevity 1.2 at 30cc/h on POD 3 and advance slowly to goal rate.

Obtain nutrition consult

Once patient tolerates tube feeds at goal, begin cycling TF (feed 12h overnight – ie 8pm to 8am).

Patient is discharged on puree + cycled tube feeds (12h) until F/U office visit in 2 weeks

- **Ambulation:** Out of bed to chair on AM of POD #1
Must ambulate by PM of POD #1

Laparoscopic or Open Nissen / Hiatal Hernia / Heller Myotomy:

Indications:	Lap Nissen:	Intractable GERD (+/- Barrett's esophagus)
	Lap Hiatal Hernia:	All hiatal hernias (types II-IV) Combined with Nissen fundoplication
	Lap Heller myotomy:	Achalasia Hypertensive LES Usually combined with a Dor fundoplication

Incisions: Five (5-10mm) laparoscopic abdominal incisions

Postoperative Care:

- **Monitoring:** Remove A-line in PACU if doing well
May travel off telemetry if stable
- **CXR** In PACU only (R/O pneumothorax, R/O aspiration)
Mediastinal air is very common: self limited, no treatment
- **Labs:** No routine labs necessary (unless clinically indicated)
- **IVF:** Unlike pulmonary surgery, maintenance IVF (D51/2NS + 20KCl 100cc/h) x 24h
For low BP: Stop loproressor / other anti-hypertensive meds
Examine abdomen to R/O intra-abdo hemorrhage
Check Hct (transfuse as clinically indicated)
If asymptomatic and urine output > 20cc/h: no treatment
Diuresis: No need for lasix
- **Analgesia:** PCA or IV narcotics
Toradol IV around the clock (not prn)

- Meds: Must take all their regular home meds starting POD #1 (except coumadin, plavix, LMWH). Ask attending about aspirin.

Patient to remain STRICT NPO

Give IV version of meds or crush meds and give thru NGT.

Prophylaxis – Antibiotics:	Ancef 1g IV q8h x 2 doses
Prophylaxis - DVT:	Heparin 5000 units S/Q bid
Prophylaxis – GI:	Colace liquid 100mg NGT bid Pantoprazole 40mg IV q24h

MUST avoid nausea/vomiting: Ondansetron (Zofran) 4mg IV q6h around the clock x 48h

No need for prophylactic B-blockers

- NGT: NGT to LWS with saline irrigation q4h

Keep NGT until you discuss with attending if a Barium Swallow is necessary on POD #1

- Diet: If Barium Swallow shows no leak: start clear liquids and advance to puree.

Patient is discharged on puree diet until F/U office visit in 2 weeks

- Ambulation: Must ambulate on POD #1

- Discharge: Aim to discharge home on POD 2 on puree diet

- F/U: 2 weeks in my office at 195 Collyer St, Providence Tel: (401) 793-5144

- Instructions: May restart aspirin on day of discharge (if not already restarted in-house)

Ask attending about restarting plavix/Coumadin/LMWH.

Shower: on day of discharge

Driving: May NOT drive for at least 1 week or while using narcotics

Work: Do not return to work for 2-6 weeks (depending on occupation)

For any questions, call Emily Perkins P.A. or my office

Atrial Fibrillation:

“The treatment of atrial fibrillation is usually more problematic than atrial fibrillation itself”

Incidence: Occurs usually on POD #2

Lobectomy:	10-15%
Pneumonectomy:	15-20%
Intra-pericardial Pneumonectomy	20-40%

Presentation: Usually benign and self-limited
Very rarely a sign of myocardial ischemia/infarction
Symptoms: dyspnea, chest pain, anxiety, thromboembolism

Natural history: 70-80% patients with post-thoracotomy A Fib resolved by 8 weeks

1. Get EKG to confirm (may have benign rate-related ST-T changes)
2. Place patient on telemetry
3. Do **NOT** obtain cardiac enzymes and R/O for MI for every benign post-thoracotomy episode of A Fib
4. Check electrolytes: Replete electrolytes: K>3.8 and Mg >1.5
5. If hemodynamically **unstable**: Cardioversion (**Synchronized** with 50 J to 100 J)
6. If hemodynamically **stable**: Rate control
7. RATE CONTROL (Goal: HR < 100)
 - Start with **Lopressor IV + PO**:
Lopressor 5mg IV q5 min boluses (up to 20 mg)
In addition, Lopressor 25-50 mg PO TID
Titrate PO Lopressor up as tolerated next day
 - If this lopressor fails:
Add **Diltiazem** drip at 5 mg/hr and titrate up to 20 mg/hr

- If BP low,
Small amount of fluid boluses (albumin or hetastarch if possible)
Start **Digoxin** 0.5 mg IV x 1 then 0.25mg IV q6hrs x 2 then 0.125 mg po qday
 - If rate NOT controlled or if A Fib persists > 24h:
 - a. Call attending +/- cardiologist
 - b. **Amiodarone** -
 - Load IV: 150 mg (may repeat prn)
 - Infusion: 1 mg/hr for 6 hours followed by 0.5 mg/hr
 - Load PO: 200-400 mg TID x 2 weeks and then taper
 - c. Alternative: **Sotalol** -
 - Sotalol 30 – 60 mg PO BID and titrate to max dose of 120 mg PO BID
8. A FIB > 48h (constant or intermittent)
- Anticoagulate: Please CONFIRM with attending beforehand.

Frequently Asked Questions

1. May a patient's chest tube be removed from suction for transport?

***YES!** Suction on a chest tube is very rarely absolutely necessary. It is safe for a patient to be disconnected temporarily from suction for transport or ambulation. Upon return to his room, suction may be re-applied if the patient was on it in the first place.*

2. The chest tube was accidentally disconnected. What should I do?

Reconnect the chest tube and place it to suction for 4-6 hours. Obtain a CXR only if you suspect the chest tube migrated, the pt is in distress or s/q emphysema develops. Otherwise, wait for the next AM CXR

3. The pleurovac tipped over and all the liquid spilled out!

Replace the pleurovac. Clamp the chest tube temporarily only when switching over to the new pleurovac

4. The Pleurovac is no longer bubbling. Is it still working?

It depends which column is no longer bubbling and if the chest tube is on suction or waterseal (ie off suction).

The long column of blue water marked to 20cm on the farthest left of the Pleurovac must be bubbling when suction is applied. When the Pleurovac is on waterseal (ie.suction is off), there should be no bubbles in this column.

The small column of blue water marked to 2cm in the middle of the Pleurovac may be bubbling. Bubbles in this small column represent an air leak from the visceral pleura (most common) or a poorly connected system (less common). If there are no bubbles seen in this column at rest or during coughing, there simply is no more air leak. The Pleurovac is still functional.

5. The Pleurovac is no longer oscillating. Is it still working?

***Maybe not!** Oscillations of the thin blue water column with the tiny white ball represent the change in intra-thoracic pressures during respiration. If there are*

no oscillations, the chest tube is either kinked or blocked. Sometimes, however, the patient's respiratory efforts are too weak to generate a significant change in intra-thoracic pressures and therefore too weak to create an oscillation. Take down the dressings, inspect the chest tube and use your clinical judgement.

6. There is still an air leak in the Pleurovac, is it OK to place it to waterseal (ie remove the suction)?

YES! *Suction may be removed safely even if there is a persistent air leak. In fact, some surgeons never use suction. The only reason to place the Pleurovac back on suction is if the patient develops s/q emphysema or the CXR shows a significant collapse of the lung off suction.*

7. The patient is becoming "swollen" and the nurse suspects s/q emphysema. What should I do?

This happens at times. Examine patient for s/q air. Place the Pleurovac on suction. Verify that the chest tube is not kinked or clogged with debris in the plastic tubing. Verify all connections. Verify that there are oscillations in the thin blue water column with the tiny white ball during the patient's respiration. Obtain a CXR.. S/Q air resolves over 48h when the Pleurovac is back on suction or unkinked/unclogged.

8. When should I get a CXR after removing a chest tube?

There are no set rules for this. If the patient is due to go home the same day, obtain a "post-pull CXR" 1-4h after having removed the chest tube. If the patient is not going home that day, obtain the "post-pull CXR" 6-12h later or the preferably the next morning.

9. Should I take out the foley catheter if a patient still has a thoracic epidural?

YES! *The incidence of urinary retention with a thoracic epidural is very low. Elderly men are at slightly higher risk of urinary retention in this situation and one must have a lower threshold to re-catheterize them.*

10. Can S/Q heparin be given if a thoracic epidural is in place?

YES! *The incidence of an epidural hematoma is very low. A single dose of s/q heparin must be held before epidural catheter removal according to anaesthesia protocols.*

11. Why do patients have to be pushed to ambulate as early as POD 1?

Early ambulation is key to a successful recovery from pulmonary surgery. Early ambulation is more effective than incentive spirometry at decreasing atelectasis, pneumonias and prolonged air leaks.

12. The original OR dressing is completely soaked. Should I simply reinforce it?

***NO!** In the same way that you do not put on a second shirt if your shirt gets soaked in the rain, you do not simply place a second dressing on a soaked one. Have the first dressing removed in a sterile fashion and replace it with a new dry one.*

13. The patient had his chest tube removed 24h ago. He just coughed and “blood” poured out of his chest tube site. Should I panic?

***NO!** If a chest tube was removed and no skin closing stitch was used, it is not uncommon for blood tinged pleural fluid to leak from the hole during Valsalva maneuvers. Take down the dressing and close the hole with a stitch. Please use sterile technique and lidocaine. Use your clinical judgement*

If the patient is suddenly in severe shock, prepare to re-open his chest

.

14. The patient is newly confused / agitated / hallucinating. Can I simply give him haldol?

Although post-op delirium and “sun-downing” is common in the elderly, one must always eliminate hypoxia, early sepsis and other metabolic derangements. At a minimum, obtain a set of vital signs, O₂% saturation and review a recent set of labs. Use your clinical judgement.

15. The NGT “accidentally fell out”. Can you place another one?

Review the necessity for the NGT. If the output was low and the patient has no nausea or vomiting, do not replace it. If the patient underwent an esophagectomy within the last 7 days, call the attending.

16. When can a patient shower, return to work, drive?

Please refer to the specific surgical procedure sections.

17. The patient or family want to know their pathology results. Should I discuss the results?

If you are familiar with the case, and the pathology is benign, feel free to share the good news with them. If it is bad news, please defer this to me in a diplomatic fashion.

18. I cannot reach Dr Fontaine on his pager. What should I do?

During office hours, call my office (401) 793-5144. After office hours, call me on my cellular (617) 893-9115. If you cannot reach me after several attempts (pager + cellular), call the general surgery attending on-call for TMH.