Bronchoscopic Brushing, EBBx, TBBx, cTBNA

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Brushing:

1. Cytology brushing
2. Protected brushing(Infections)

Different sizes:

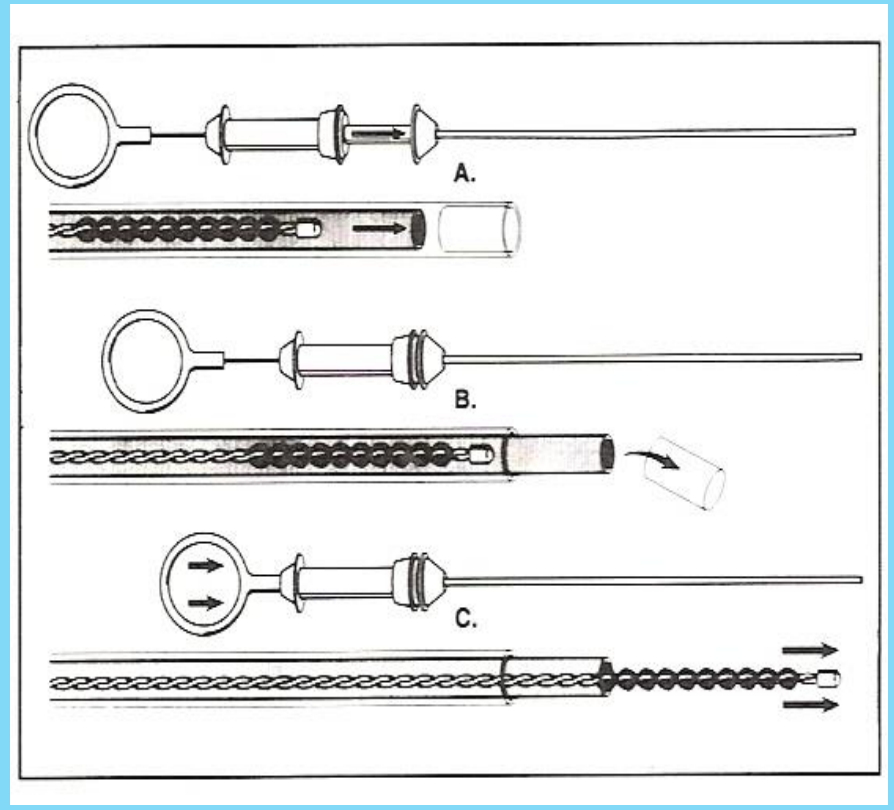
-7 mm rarely used

-3 mm standard cytology brush

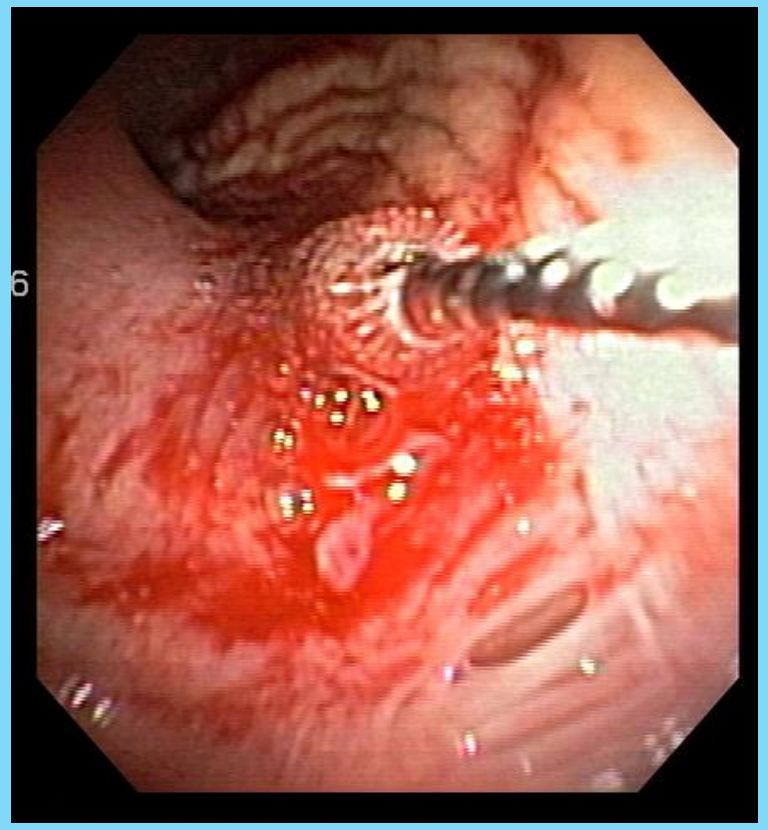
Protected Brush:

-Avoid upper airway contamination

-For diagnosis of infection/quantitative Cultures



Flexible Bronchoscopy: Wang and Mehta



Bronchial Brushing:

Indications:

- Visible abnormality of airway mucosa
- Visible masses or nodules
- Peripheral infiltrates
- Peripheral nodules/masses
- Diagnosing intraepithelial lesions during autofluorescence

Contraindications:

- Consent not available/non-cooperative patient
- Equipment not available/Inadequate training
- Coagulopathy, on anti coagulation/anti-platelets
- Medical instability
- Severe hypoxia
- Status asthmaticus
- Malignant arrhythmia
- Bleeding disorders including thrombocytopenia
- Severe Uremia and pulmonary hypertension

Complications :

- Bleeding
- Pneumothorax

Technique:

-Advance catheter in the desired segment-then extend brush " Brush out" (up to 5 cms)

-Avoid any push back on scope or catheter when extending brush out

-5-10 back and forth movements over visible lesion or blindly in distal airway

-May rotate the brush to increase sampling

-Retract back the brush in the bronchoscope " brush in".

Collect sample in appropriate container, can cut and save brush as well

How to increase yield :

-Using brushes with longer bristles

-Brushing vigorously and for a longer period of time.

-Making sure brushes are in contact with the mucosal abnormality.

-Pirouette technique: rotation in combination with long-axis motion

ENDOBRONCHIAL Biopsy:

Different forceps commonly used:

Serrated forceps and cup forceps

Cup forceps with central tooth

Hot Biopsy Forceps

ENDOBRONCHIAL Bx:

Indications:

a. Visible airway mucosal abnormalities

b. Visible airway nodules or masses

c. Suspected sarcoidosis (even if airway mucosa appears normal)

d. In case of abnormal autofluorescence to diagnose intraepithelial lesions (dysplasia, metaplasia, carcinoma in-situ)

Contraindications:

Consent not available/non-cooperative patient
Equipment not available/Inadequate training
Coagulopathy, on anti coagulation/anti-platelets
Medical instability
Severe hypoxia
Status asthmaticus
Malignant arrhythmia
Bleeding disorders including thrombocytopenia
Severe Uremia and pulmonary hypertension

Complications:

-Bleeding
-Airway compromise

Chest 1991;100:1141-7 , Profuse bleeding less likely than in Transbronchial biopsies

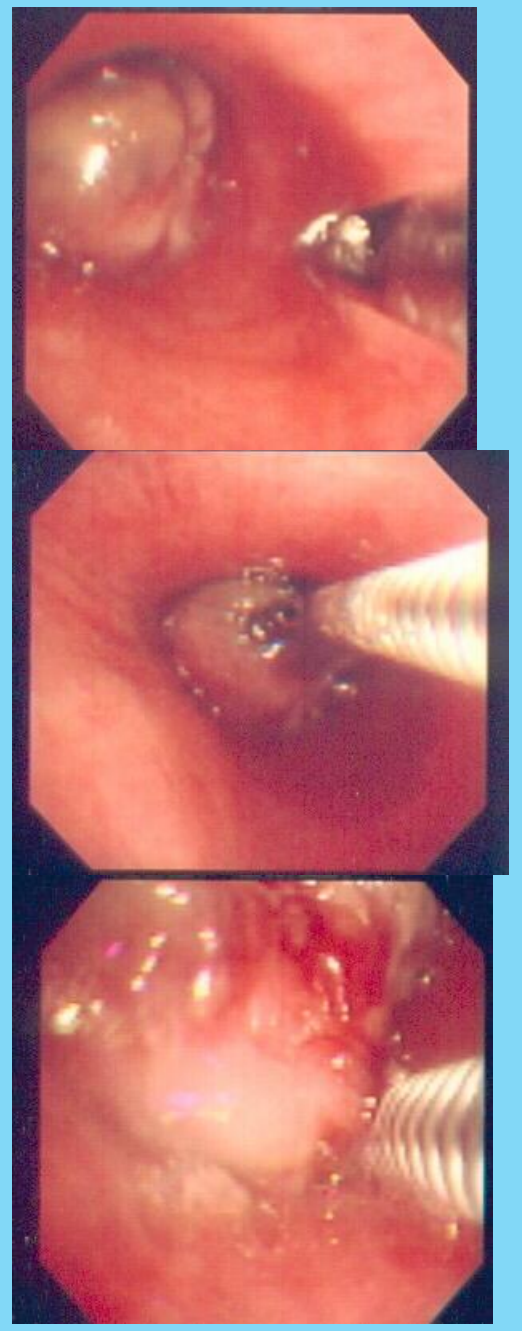
Increased risk in Uremia, pulmonary hypertension, liver disease, thrombocytopenia and immunosuppression

For endobronchial/mucosal lesions:

Visualize and stabilize scope in airway

Grasp as much tissue as possible
Keep scope as close to target as possible

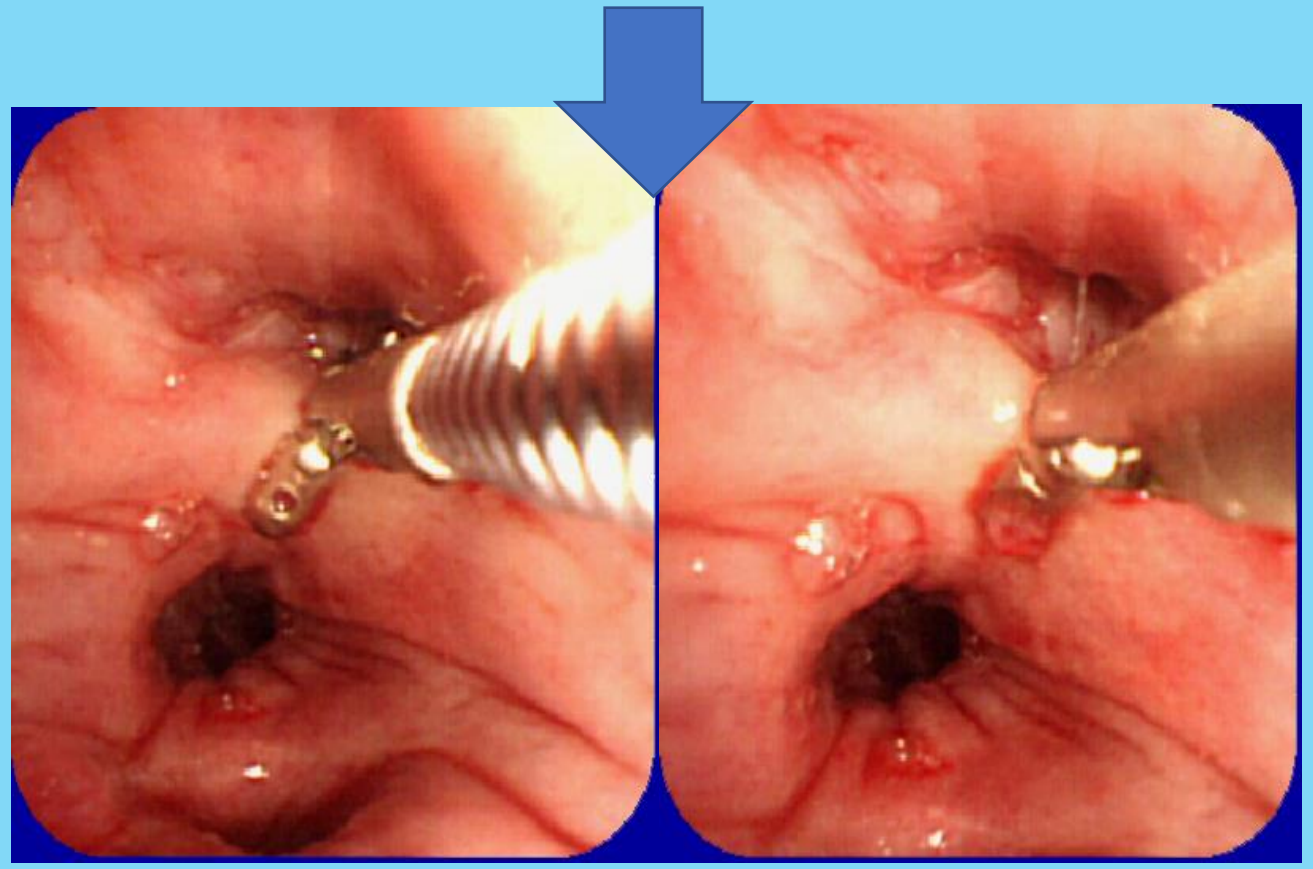
Tugging sensation is felt when forceps is retracted



Additional Points:

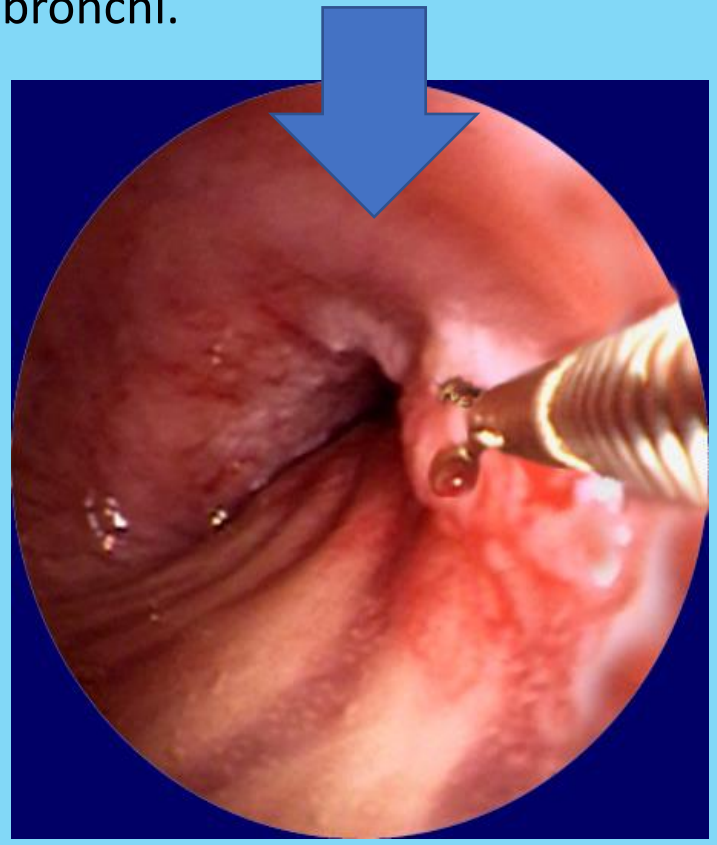
-Obtain deep submucosal biopsies to increase yield for small cell carcinoma, Amyloidosis, Sarcoidosis and other infiltrating processes.

-Get close to the target area with the bronchoscope.



Deep submucosal sampling with cupped forceps

Use forceps with central tooth, especially if lesion is along lateral wall of trachea or bronchi.

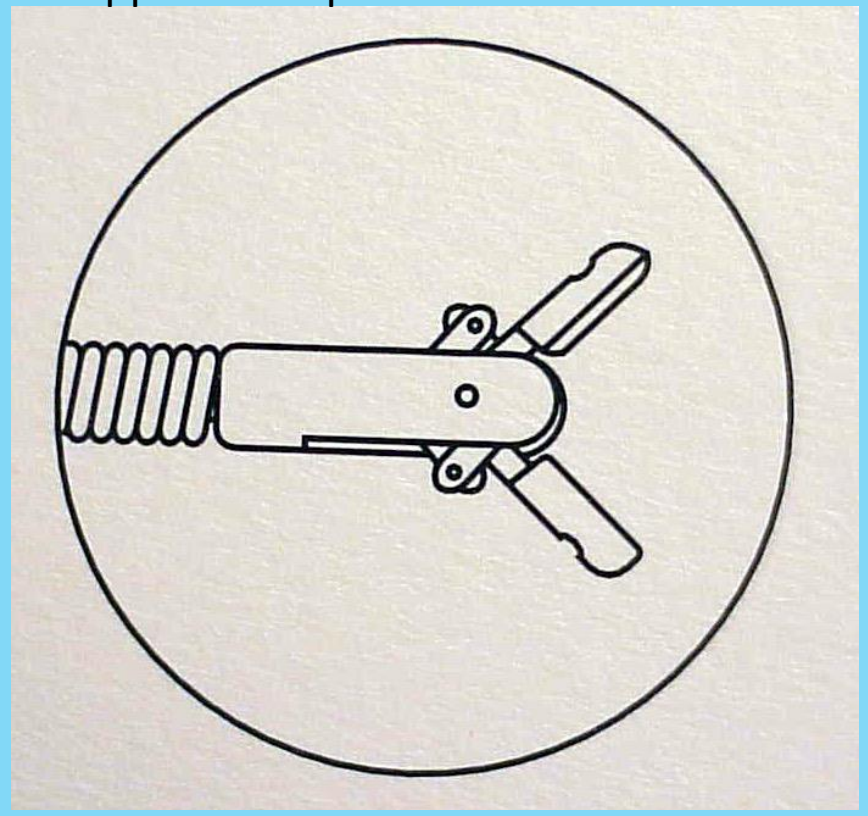


Lateral sampling with forceps with central tooth

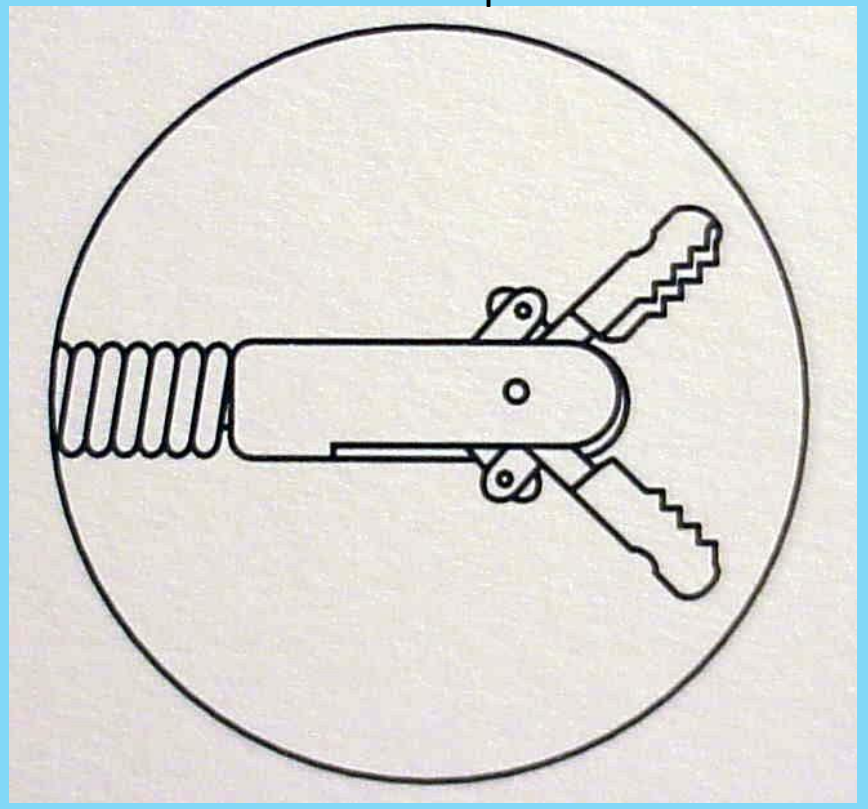
Transbronchial Lung bx:

Forceps:

Cupped forceps



Toothed forceps



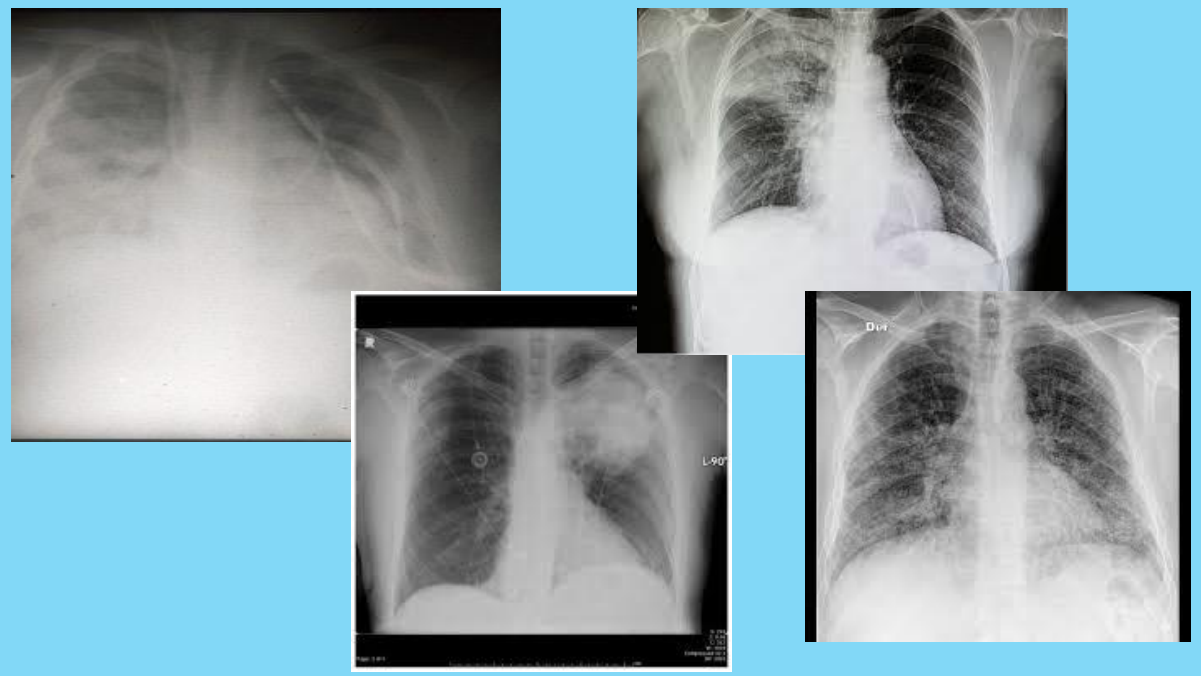
Indications:

Diffuse and localized lung infiltrative disease

a. Infectious lung disease
b. Interstitial lung disease
c. Carcinoma or lymphoma

Pulmonary nodules

Lung masses



Contraindications:

Inadequate equipment/consent not available

Inadequately trained personnel/uncooperative patient

Coagulopathy/Bleeding disorders/Anticoagulation

Anti-platelet medications

Thrombocytopenia

Conditions causing increase risk of bleeding

a. Uremia
b. Pulmonary HTN
c. Liver disorders

Excessive risk of respiratory failure or death

a. History of pneumonectomy
b. Impending Respiratory failure
c. Poor lung function
d. Medically unstable
e. Acute myocardial infarction
f. Status asthmaticus
g. Severe arrhythemia
h. Pregnancy <28 weeks unless life threatening

Complications:

Pneumothorax

Risk 1-4 %

Bleeding

1.2 – 40% varies with studies and patient population.

Bleeding > 50 ml approximately 1-2%

Increased in uremia and immunocompromised patients

Death

Risk estimated at 0.04 -0.12 %

Increased risk of complications:

-Emphysematous lungs
-Biopsy around bullae and blebs
-Stiff lungs of ILD
-Active vasculitis
-Bx of middle lobe or lingula
-Bx of superior segment of lower lobes

Technique:

With or without floro : technique is same with minor differences

Advantage of floro:

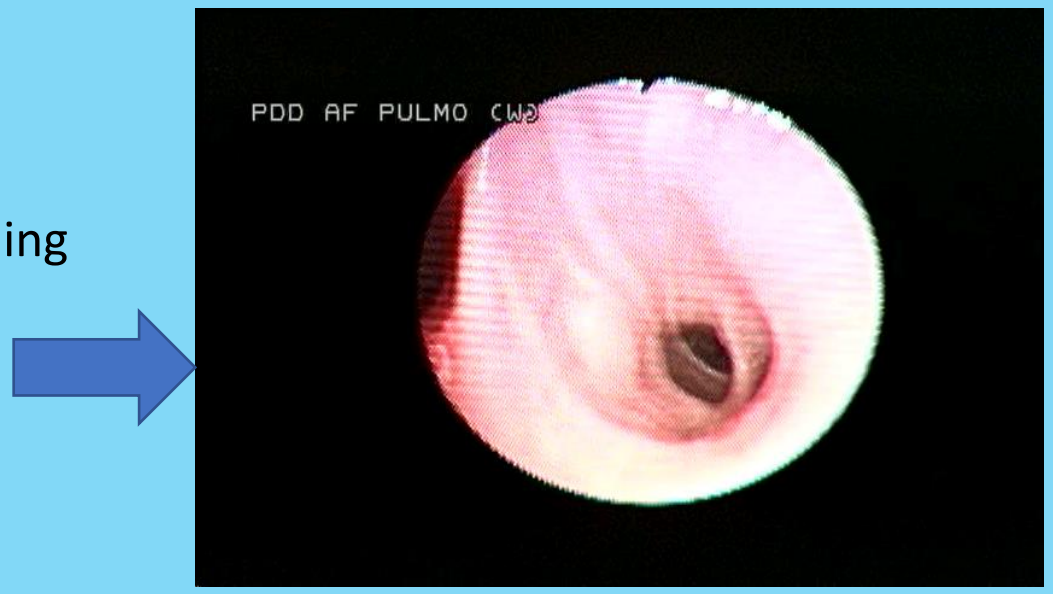
- Localize abnormalities
- Prevent pneumothorax
-Extract foreign bodies
-Perform biopsy or brushing of solitary pulmonary nodules/masses
-Improve diagnostic yield
-Detect pneumothorax
-Increase physician comfort

Andres G et al, Chest 1988;94:557
TBLB: 122 with & 135 without Fluoroscopy
Diagnostic yield higher for focal diseases with Fluoro (pre-CT era), complication rate same

Mulligan S et al, ARRD 1988; 137:486
N=168, Retrospective, AIDS & PCP, yield and complications same

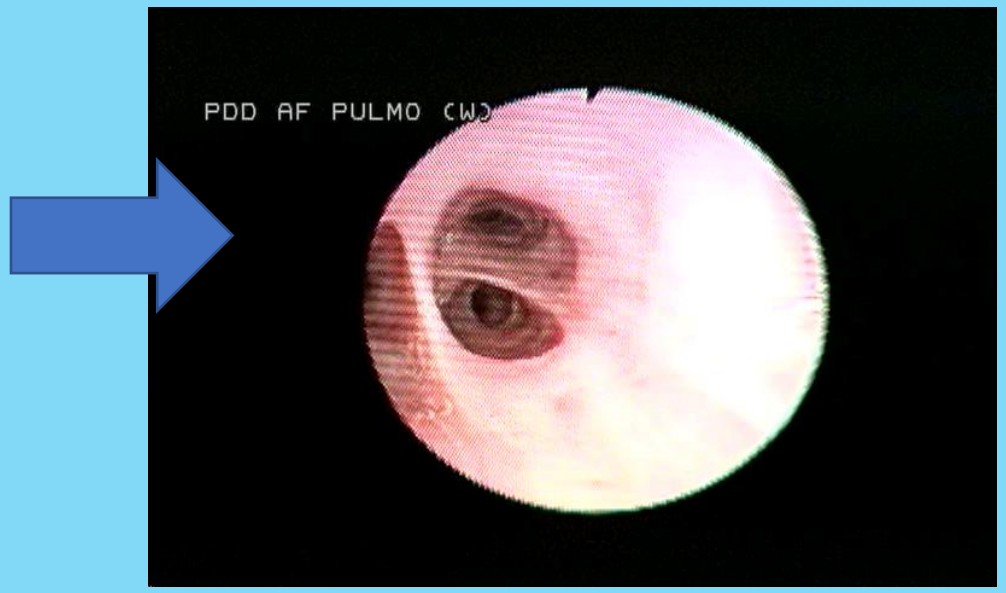
Wedge technique

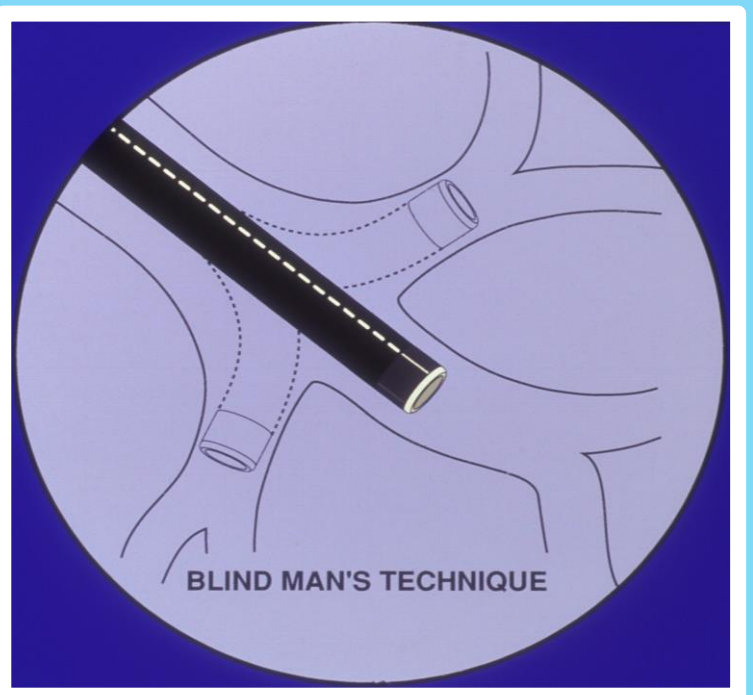
-Keeps scope in optimal position
-Allows suction and tamponade in case of bleeding



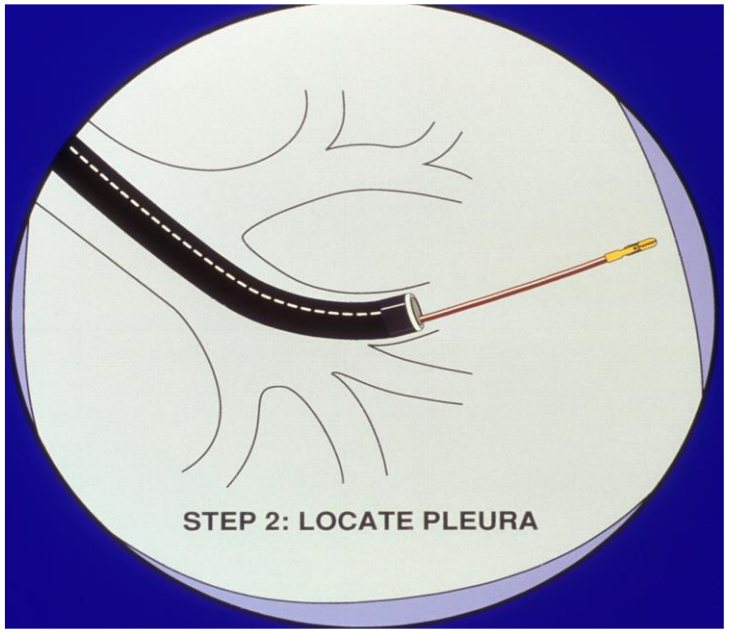
Full view technique

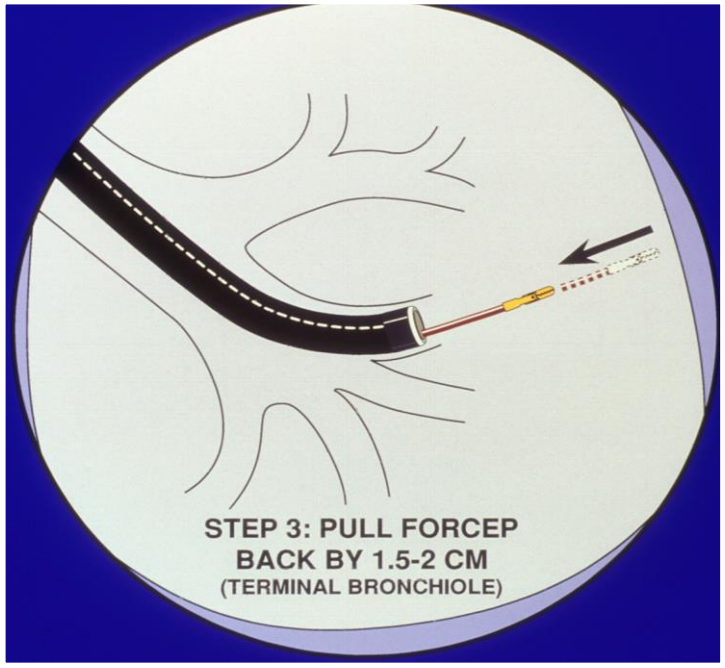
-Keeps segmental airways in view
-Ability to better visualize bleeding if it occurs and
-Control patency of contra lateral lung
-Ability to guide forceps into multiple specific segments

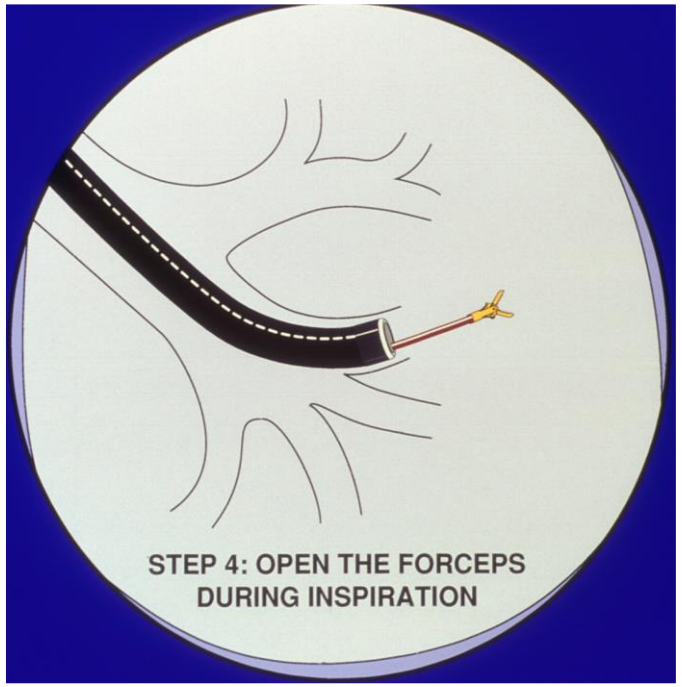


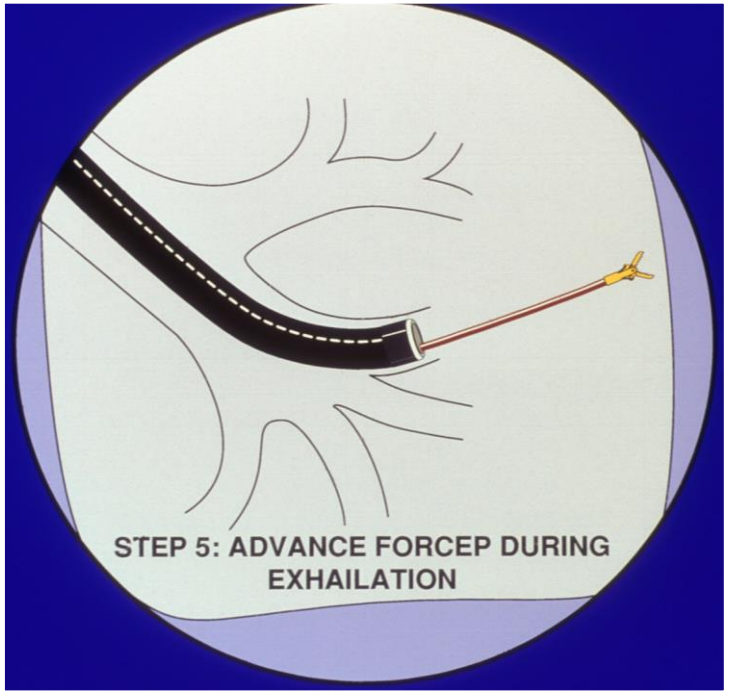

BLIND MAN'S TECHNIQUE

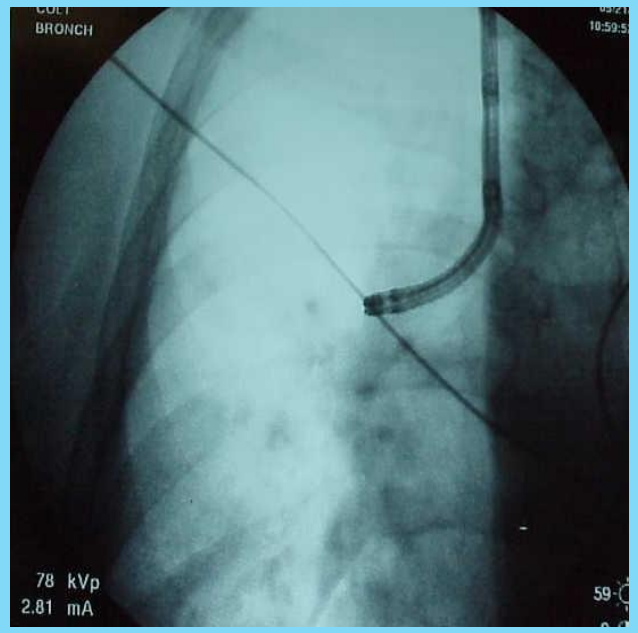

STEP 1: WEDGE THE FFB

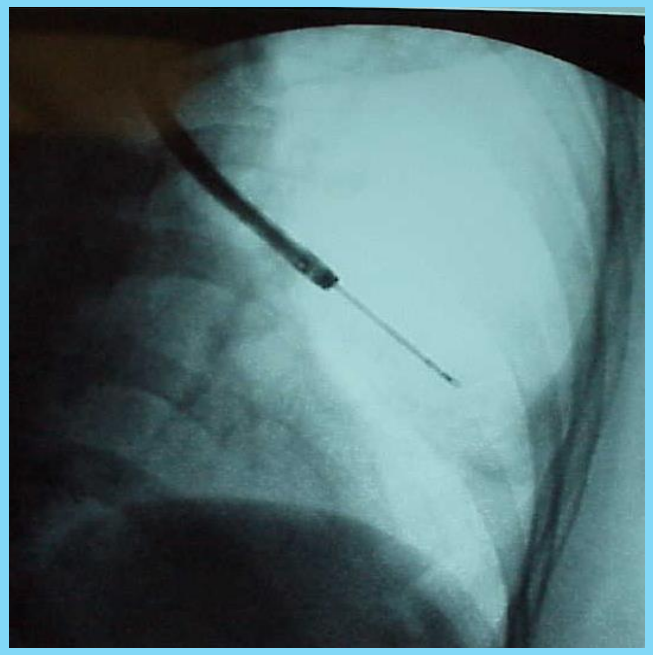

STEP 2: LOCATE PLEURA

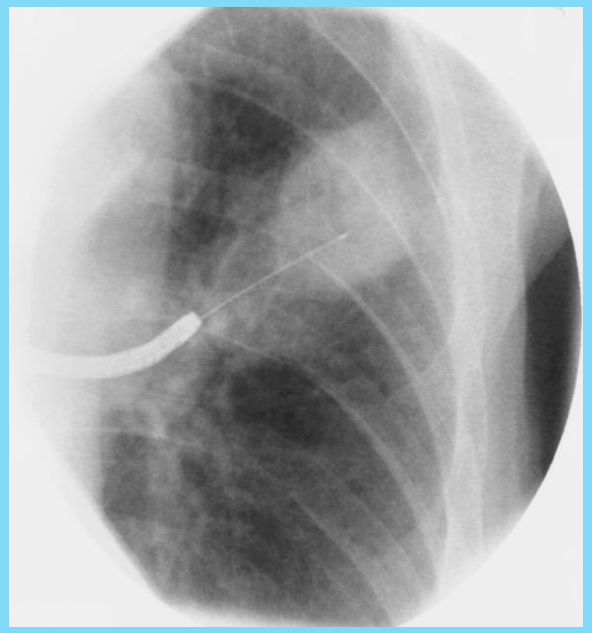

STEP 3: PULL FORCEP
BACK BY 1.5-2 CM
(TERMINAL BRONCHIOLE)

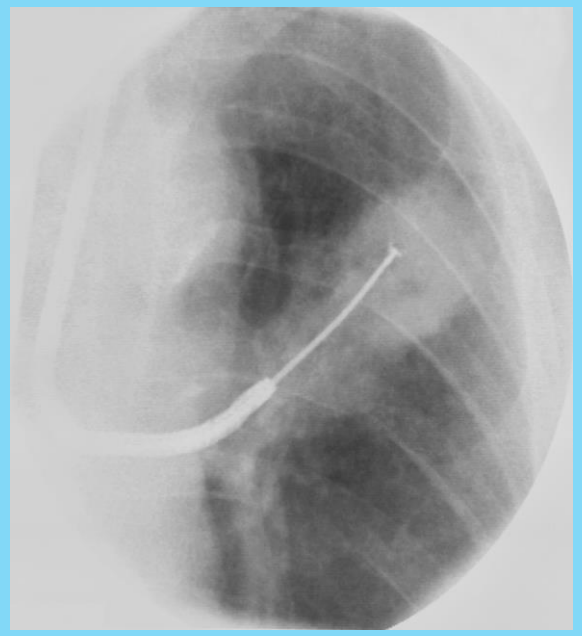

STEP 4: OPEN THE FORCEPS
DURING INSPIRATION

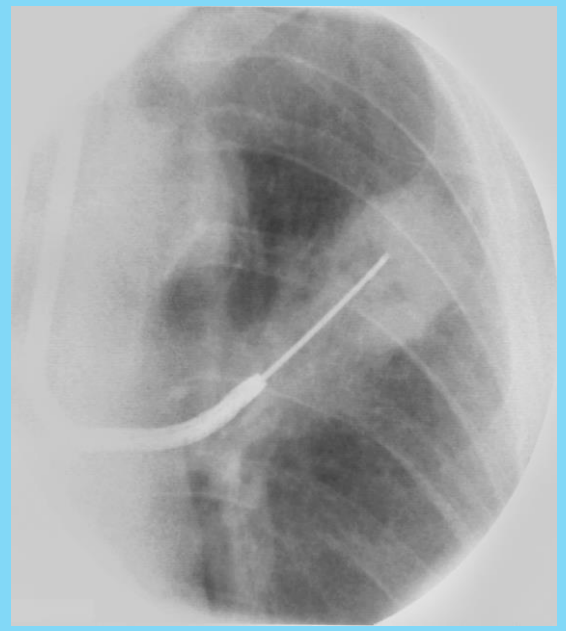

STEP 5: ADVANCE FORCEP DURING
EXHAILATION


BRONCH
78 kVp
2.81 mA









Important additional points to consider:

-Inform the patient that “there are no nerve endings in the airway, so the biopsy itself will not hurt”.

-Forewarn the patient to “raise hand” if pain is felt at any time during the procedure

-Prefer biopsies from the lung periphery (as close to the pleura as possible) because bronchial vessels are smaller in the distal airways and forceps are most likely to “pinch” through bronchial mucosa to obtain representative tissue (contains alveoli and bronchioles) from lung parenchyma.

-Avoid the lingula and right middle lobe because of proximity to fissures and risk of pneumothorax.

-When in apical segments of upper lobes, keep the scope in the central airway and try entering the apical segments of the upper segments using only fluoroscopy to guide the forceps into the appropriate segment.

-Shaking the forceps if they don’t open immediately

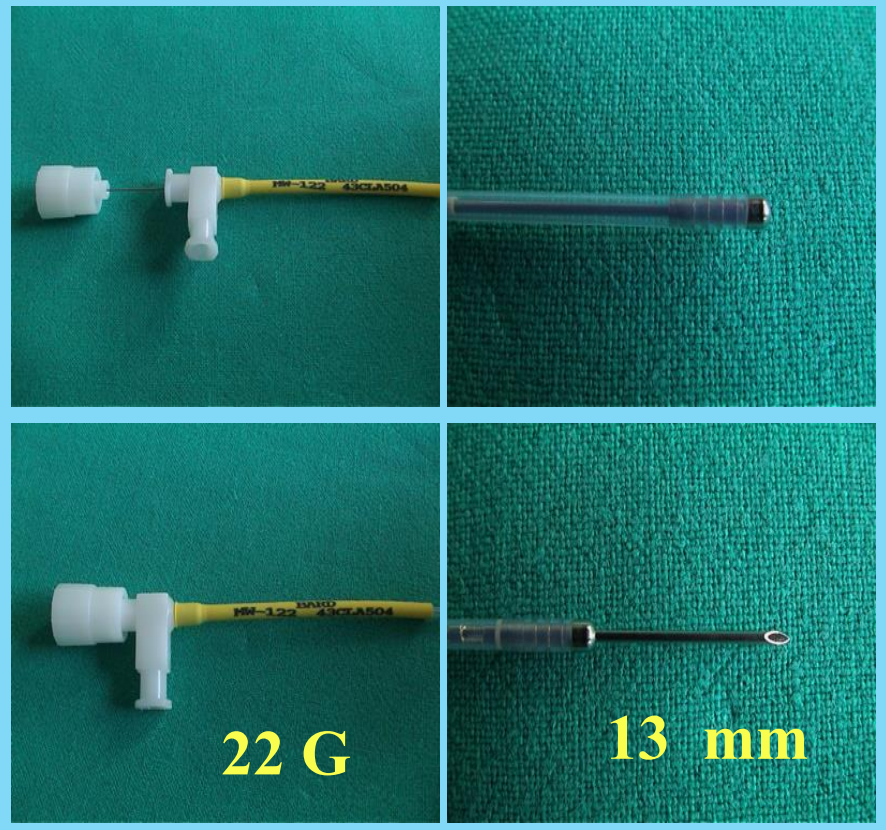
-If the scope is “over wedged”, pull forceps back slightly and bring the working channel into the midline and off the bronchial wall to make room for the forceps as it exits the working channel.

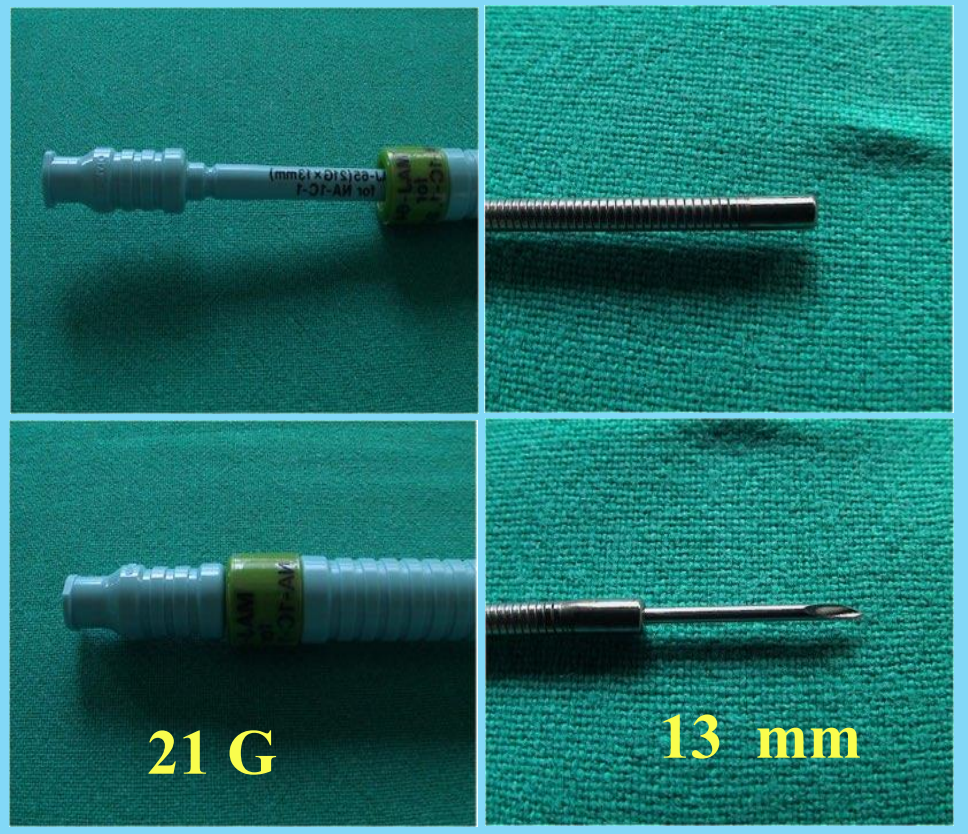
-Change the angle of the forceps if they do not advance further into the periphery (forceps are probably caught on a spur)

Conventional Transbronchial needle aspiration(cTBNA):

Originally done with rigid bronchoscopy and rigid needle
Use expanded with flexible bronchoscope after new needle came out in 1970s
Especially useful for level 7, 4R and 4 L lymph node stations

Needle used is called Wang needle





Indications:

-Focal or diffuse endobronchial mucosal or submucosal infiltration suggestive of infection carcinoma or lymphoma

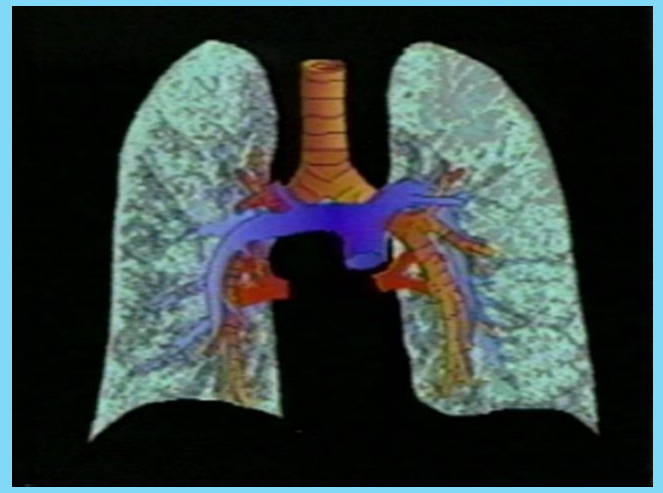
-Pulmonary nodules and masses

-Mediastinal LAD and masses

-Endobronchial lesions especially those with extensive vascularization.

Contraindications:

Consent not available/non-cooperative patient
Equipment not available/Inadequate training
Coagulopathy, on anti coagulation/anti-platelets
Medical instability
Severe hypoxia
Status asthmaticus
Malignant arrhythmia
Bleeding disorders including thrombocytopenia
Severe Uremia and pulmonary hypertension



Complications:

-Perforation of great vessels

-Pneumomediastinum

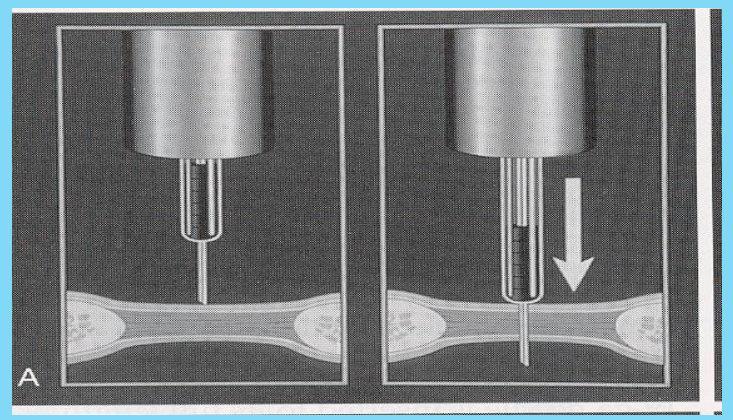
-Air embolus

-Airway bleeding

-Pneumothorax

-Equipment related : tearing of bronchoscope

Techniques:



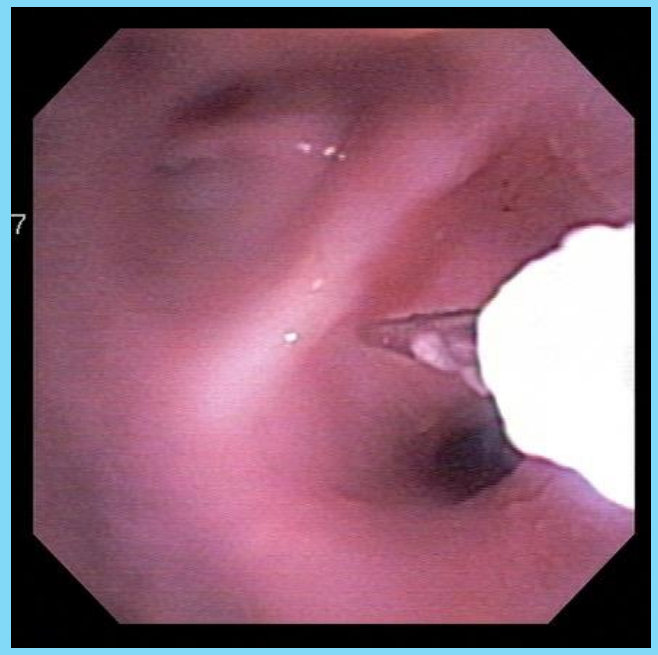
Uptodate image

JABBING

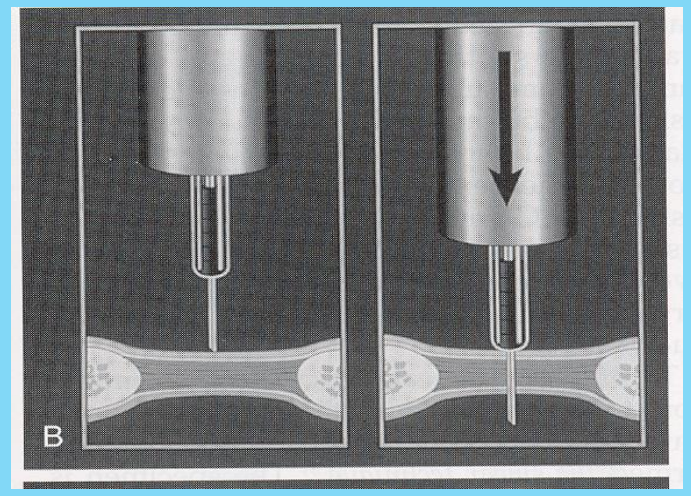
Lesion/site of puncture visualized, bronchoscope secured

-Needle out.

-Hold scope firmly at the mouth or nostril and push the needle through the tissues.



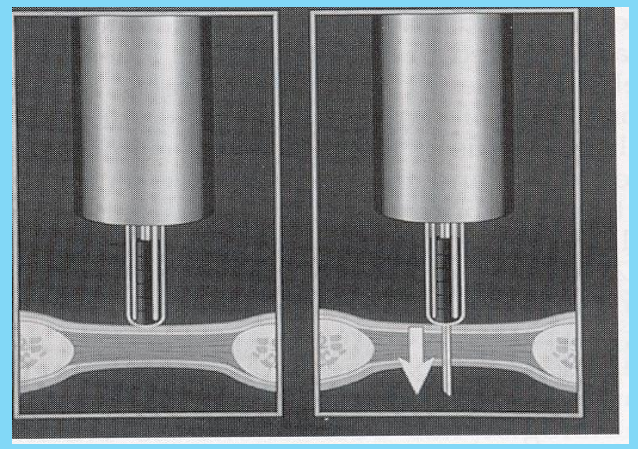
Piggyback

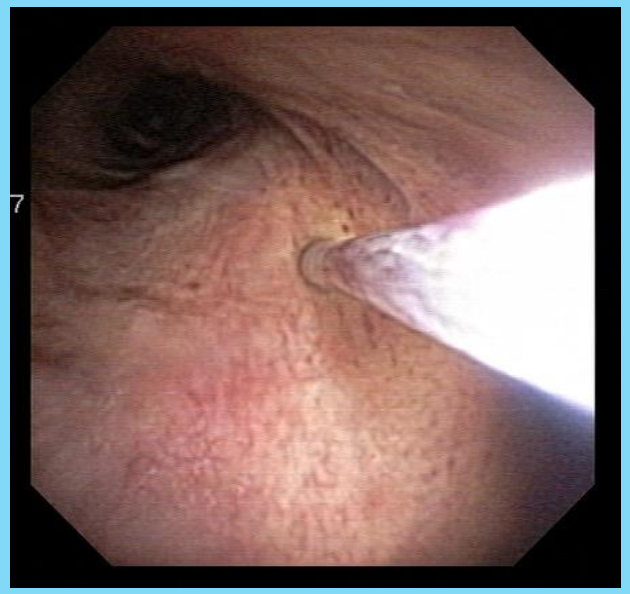


Uptodate image

-Needle out.
-Hold catheter against insertion channel using fingers.
-Advance scope and catheter together in order to penetrate airway wall with needle. Hub against wall

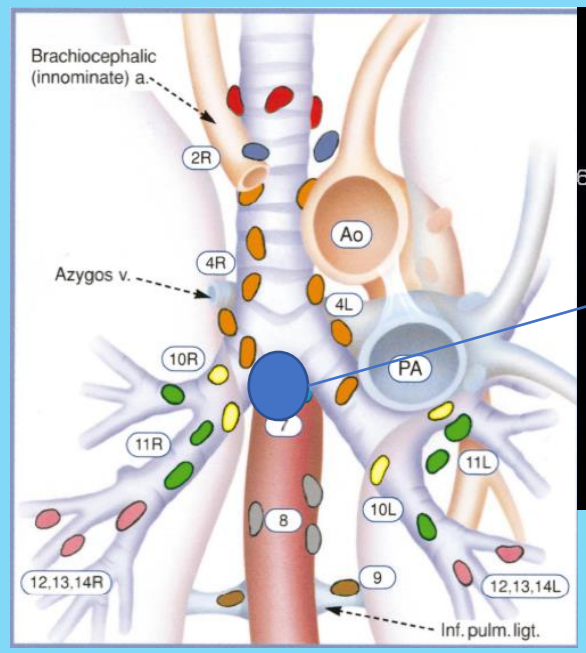
Uptodate image

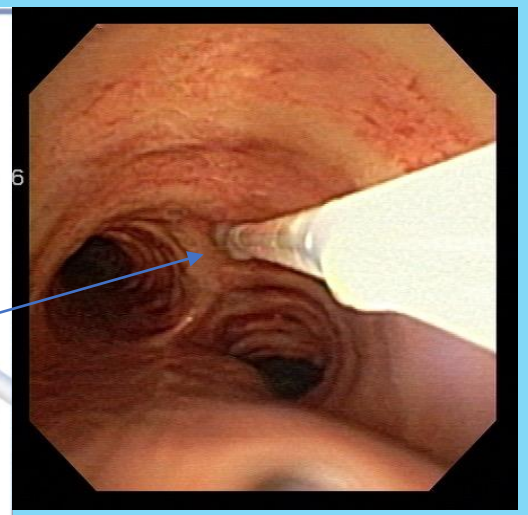




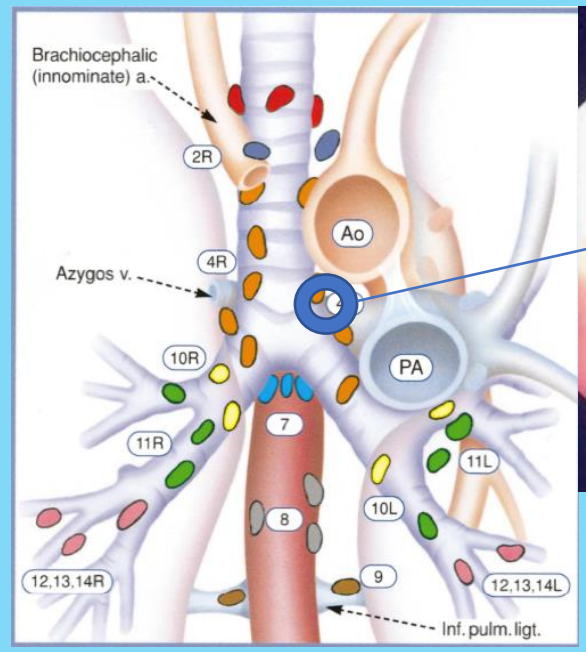
Hub against wall

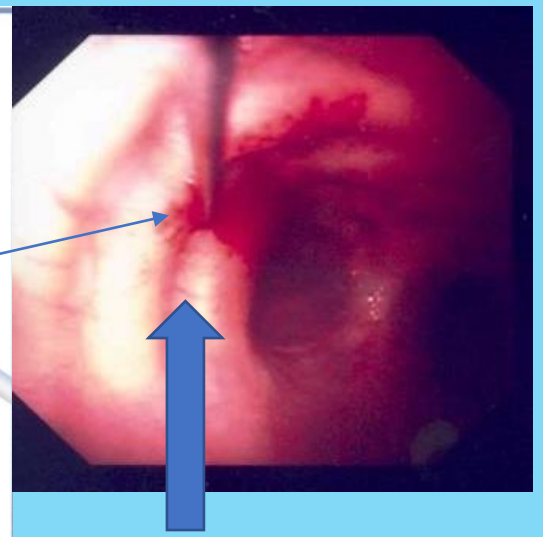
-Needle in
-Push catheter hub against airway wall.
-Hold catheter against airway wall
-Needle out so that it penetrates into the target.



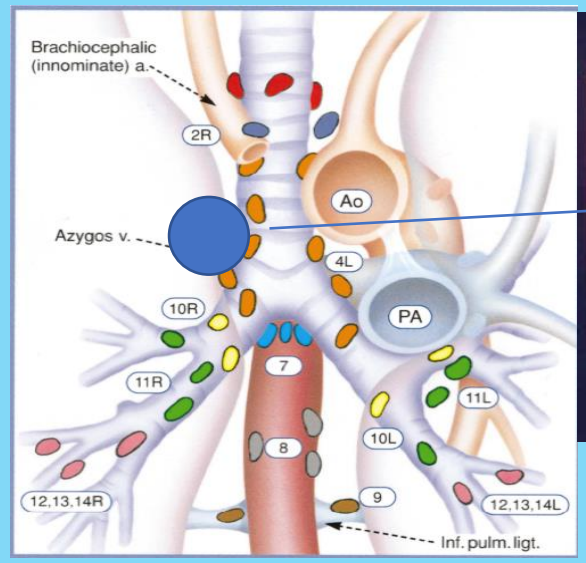


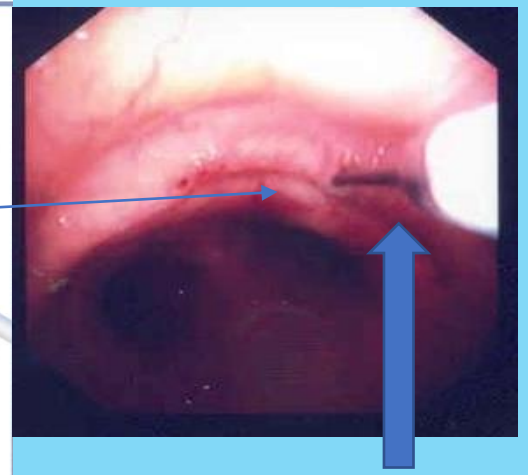
Station 7(Subcarinal)





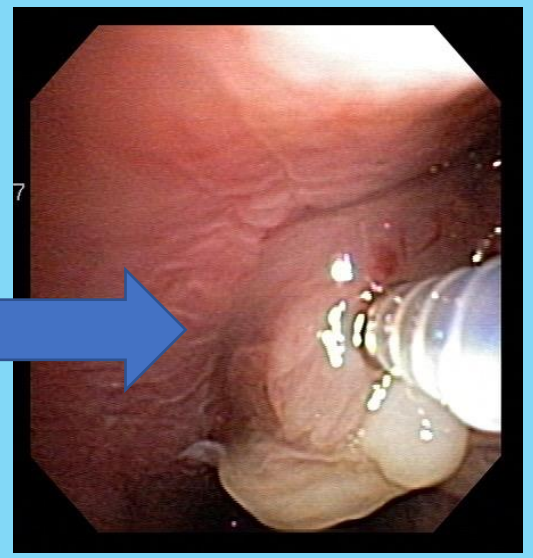
Station 4 L





Station 4R

Endobronchial Aspiration



Q.1 : Which of the following lobes have the increased risk of pneumothorax ?

a. Upper lobes
b. Lingula
c. Middle lobe
d. B and C.

Q.2 : During cTBNA, best yield is noted at which station

a. 10R
b. 5
c. 11L
d. 7

Q.3: All are contraindication for TBLx except

a. Coagulopathy
b. Thrombocytopenia with platelets <50K
c. Peripheral vascular disease
d. Severe pulmonary HTN