ND-YAG LASER

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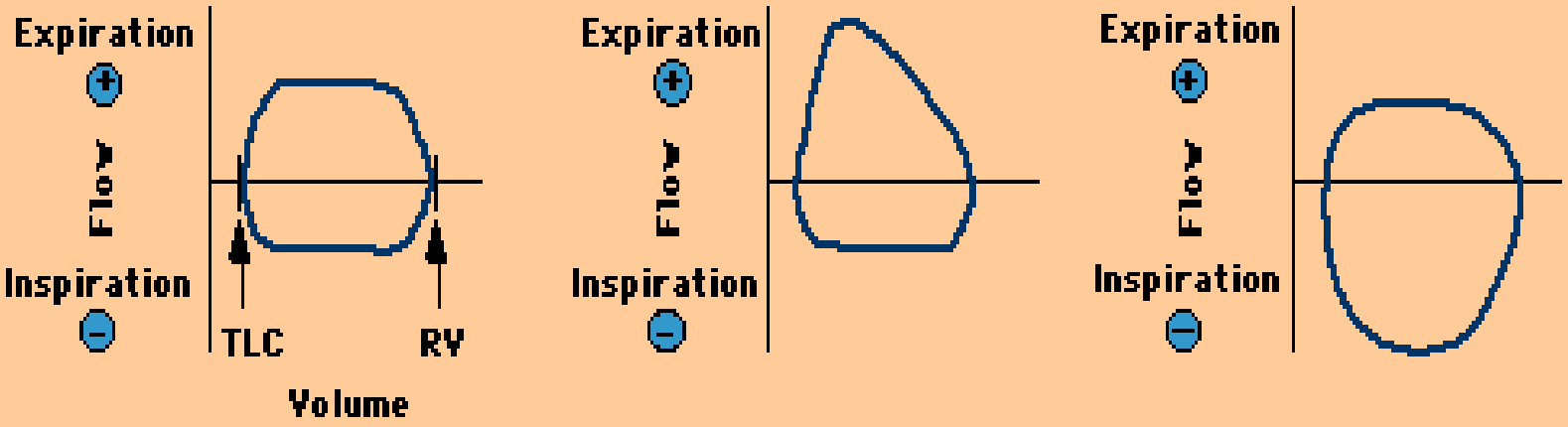
Different Lasers for the Tracheobronchial Tree

	Carbon dioxide	Nd-YAG	Argon	Diode
Wavelength(nm)	10600	1060	488-514	805
Bronchoscope	RB	RB / FB	RB / FB	FB
Tissue absorption	High	Low	Selective	Low
Tissue penetration (mm)	0.1	4	1	1-2
Coagulation	Low	High	Medium	Medium
Cutting effect	High	Low	Low	Low

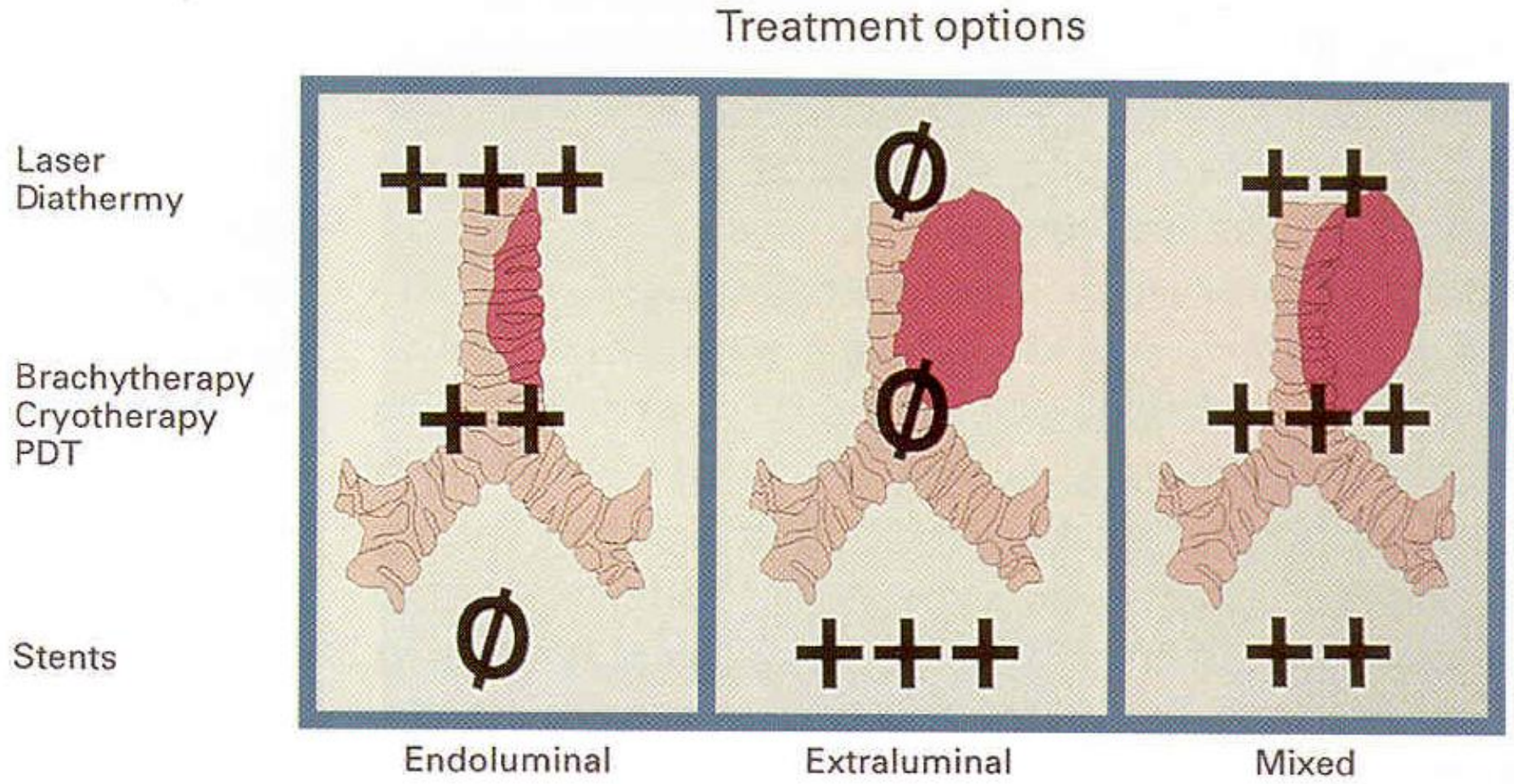
Central Airway Obstruction

Clinical Presentation:

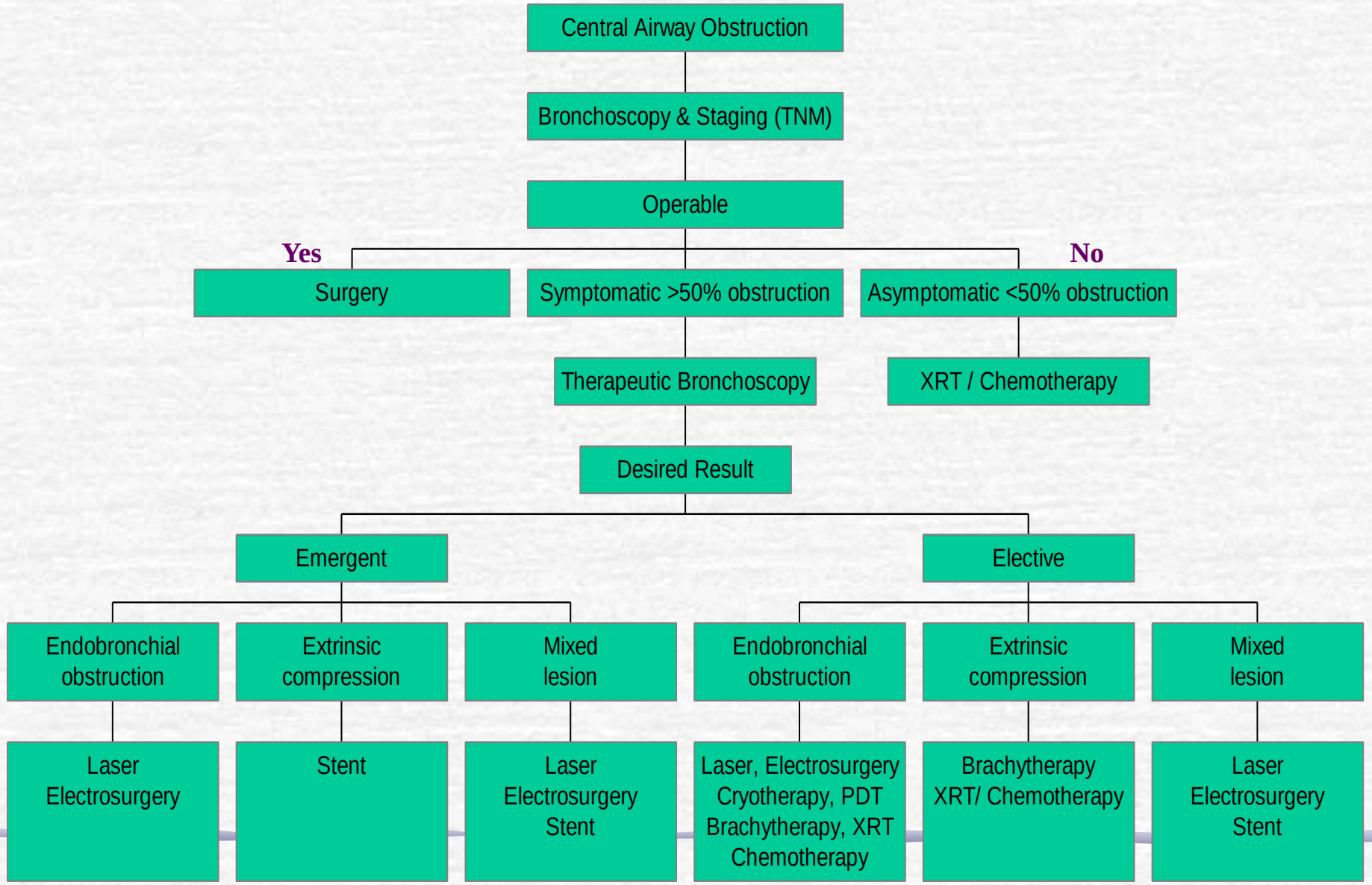
- cough, hemoptysis,
- dyspnea, stridor, wheeze
- hypoxemia, respiratory failure requiring MV
- CXR: atelectasis, post-obstructive pneumonia
- PFT: decreased FEV_1/ FVC, truncated FV loop



3 types of Malignant Tracheal Obstruction



Algorithm for Management of Central Airway Obstruction



Factors that influence outcome of Nd-YAG LPR

Factors	Favorable	Unfavorable
Location	Trachea, main bronchi	Lobar, segmental
Type of lesion	Endobronchial	Extrinsic
Appearance	Exophytic	Submucosal
Involvement	Localized (1 wall)	Extensive (>1 wall)
Length of lesion	< 4cm	> 4cm
Distal lumen	Visible	Not visible
Duration of collapse	< 4-6 weeks	> 4-6 weeks
Clinical status		
Hemodynamics	Stable	Unstable
Oxygen	< 40% FiO2	> 40% FiO2
Coagulation profile	Normal	Abnormal
Pulmonary vascular supply	Intact	Compromised

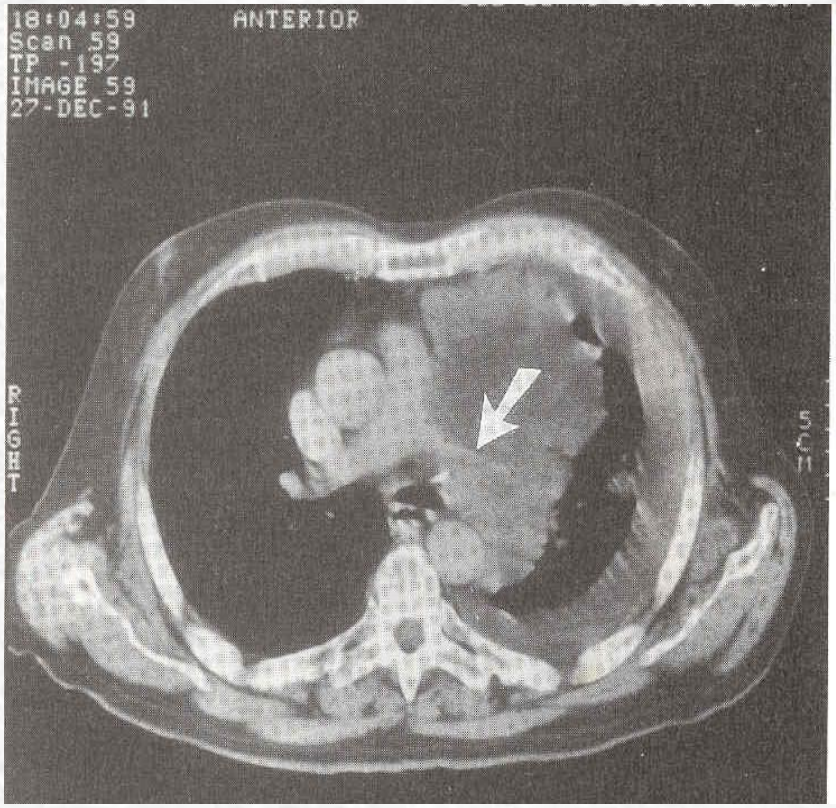
Favorable factors for Laser

- Ideal patient: symptomatic, unresectable, exophytic lesion that is recurrent/ resistant
- Ideal lesion: endobronchial,

< 4cm, arises from 1 wall of trachea/ main bronchus, visible distal lumen and distal lung collapse <6 wks

Unfavorable Factors/ Contraindications

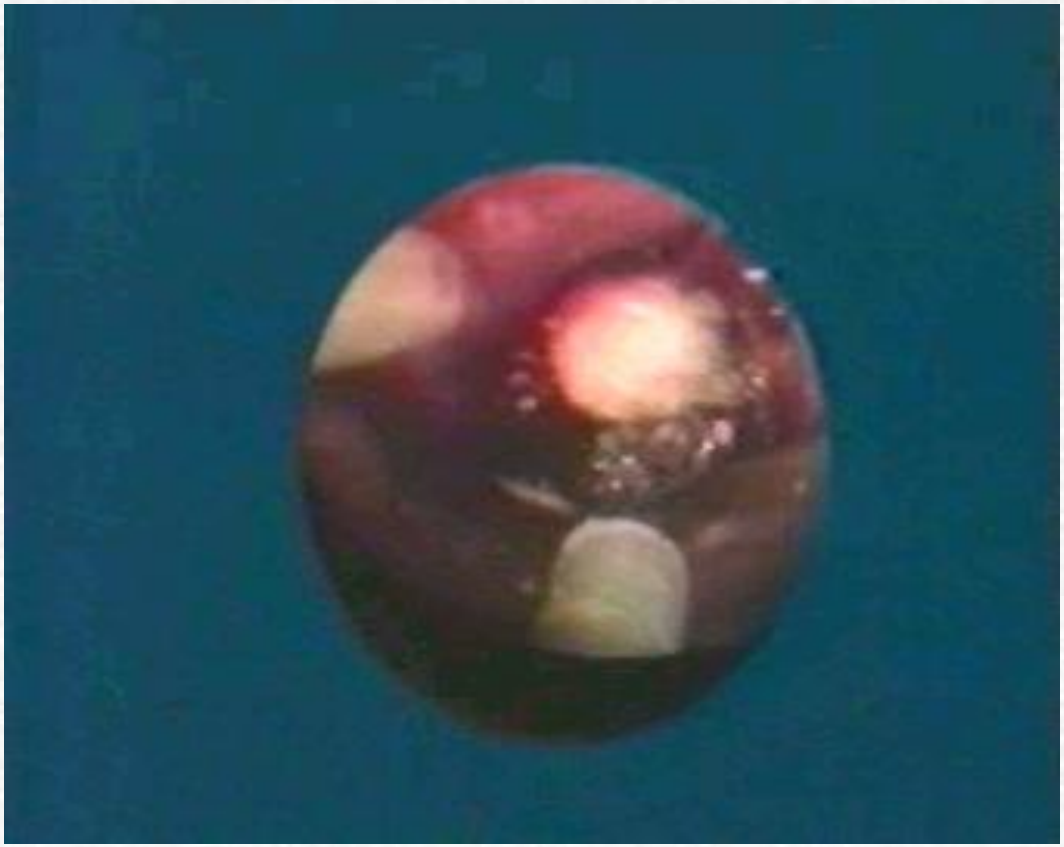
- Contraindications that apply to routine bronchoscopy and anesthesia
- Extrinsic compression of airway with no endobronchial component
- Direct involvement or compression of pulmonary artery by tumor
- Contiguous involvement of trachea and esophagus by tumor
- Lung collapse of more than 4-6 weeks
- High O2 requirement



Technique of NDYAG Laser "Rule of 4"

Maximum length of lesion	4cm
Duration of collapse	< 4 weeks
Initial settings	
Power (watts)	
Noncontact	40 watts
Contact	4 watts
Pulse duration	0.4 seconds
Distances	
Endotracheal tube to lesion	> 4cm
Fiber tip to lesion	4 mm
FB to tip	4 mm
FiO2 during LPR	< 40%
Number of pulses between cleaning	< 40
Procedure time	< 4 hours
Toral number of repeat laser treatments	< 4
Life expectancy	> 4 weeks
Laser team individuals	4

ND YAG LASER PHOTORESECTION



Results and Complications

- Improves airway patency 79-92%
- Effective in symptom relief, improves QOL
- Obviate need for MV
- Survival benefit: controversial
- Complementary to XRT, chemotherapy, stenting.
- Safe procedure: 0- 2.2% complication rate
- Complications:
  - Perforation of major intrathoracic blood vessel
  - Endobronchial ignition/ airway fire
  - Airway perforation
  - Cerebral air embolism, retinal damage, infection (laser plume)