

# A Case of Difficult Airway With Severe COPD: When ET-CO2 and Direct Fiberoptic Visualization is Not Enough

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## BACKGROUND

A 69 year old woman with a history of severe COPD (FEV1 0.88, FEV1/FVC 44%), osteoarthritis with limited cervical spine mobility, scoliosis, previous posterior cervical spinal fusion from C2-C7 and lumbar spine decompression was scheduled for occiput to T3 revision of posterior spinal fusion. She presented with symptoms of cervical myelopathy and was found to have severe spinal cord compression from C7-T2. Patient had been wheelchair bound since 7 months prior and recently developed bladder and bowel incontinence and loss of upper motor function. On physical exam, patient was 4'6" and barrel chested with short neck and limited cervical mobility. On previous airway recorded from a year prior, an LMA size 3 was placed after 3 attempts with moderate difficulty secondary to cervical neck fusion. Decision was made to intubate patient using asleep fiberoptic approach.

## CASE

Patient was induced with lidocaine 60 mg, succinylcholine 100 mg, and propofol 100 mg. A fiberoptic scope was inserted with a grade 1 view of vocal cords and ETT was advanced after direct visualization of tracheal rings. ETT was connected to circuit with no ET-CO2, no fogging of ETT, no breath sounds on auscultation, and collapsed tissue on fiberoptic visualization. ETT was pulled out suspecting esophageal intubation and fiberoptic displacement out of the trachea during ETT advancement. Patient was bag-masked with ease initially but became progressively more difficult. Fiberoptic scope was reinserted again and ETT was advanced after view of vocal cords with again no ET-CO2 and delivery of minimal tidal volumes. We made two more attempts using fiberoptic with no view of the vocal cords on each subsequent attempt. We ultimately made the decision to intubate using a McGrath 3 blade. We obtained a grade 1 view and two more attempts at intubation yielded the same result of no ET-CO2 tracing and peak pressures less than 50 cm H2O. Finally ET-CO2 was visible after bag-mask ventilation with peak pressures of 60-70 cm H2O. Patient was given albuterol, propofol, and a repeat dosing of succinylcholine with gradual return of ET-CO2 of 70 mmHg and in an upsloping pattern characteristic of bronchospasm. Fiberoptic scope was used at this time and correct positioning of ETT was confirmed. Heart rate and pressures were stable throughout.

## METHODS OF CONFIRMING ETT PLACEMENT

### Physical

- Auscultation
- Bag masking with cuff down
- Forcefully pressing on sternum while listening at the end of the ETT for air
- Intentionally advancing ETT to R mainstem and auscultating the R side of chest

### Tactile

- Palpation of ETT through cricoid cartilage
- Palpation of ETT inside patient's mouth within the interarytenoid groove
- Bag-valve-mask ventilation (feel of ETT in trachea vs esophagus)
- Cuff palpation in the suprasternal notch
- Use of bougie to feel tracheal rings

\* Gold standard

### Visual

- Direct visualization of ETT through cords
- Chest wall rise
- Abdominal distention
- ETT fogging
- Cyanosis

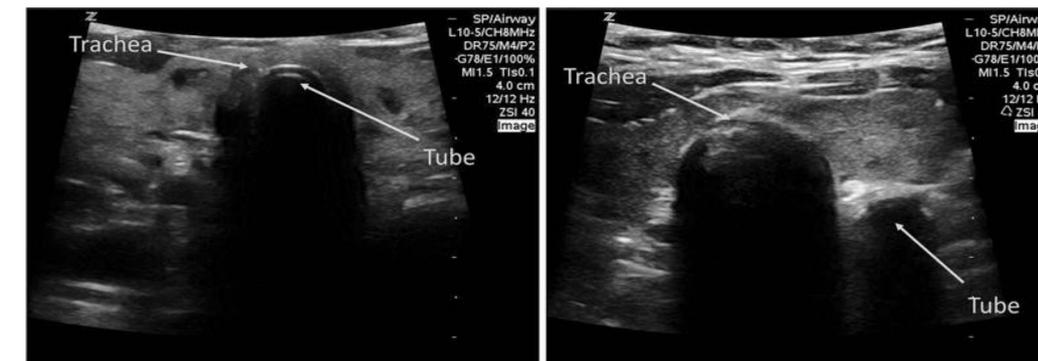
### Others

- Pulse oximetry
- Fiberoptic bronchoscopy
- Chest radiography
- Capnography\*
- CO2 detection
- Suction device
- Light transmission
- Sound transmission
- Cuff pressures
- Gas flow monitoring
- Impedance
- Ultrasound visualization

## SIGNS AND SYMPTOMS OF BRONCHOSPASM

- Wheezing
- Rapidly increasing peak inspiratory pressures
- "Shark fin" appearance on capnography
- Decreasing exhaled tidal volumes
- Falling oxygen saturation
- Auto-peep
- Hypotension secondary to auto-peep

## USE OF ULTRASOUND FOR ETT CONFIRMATION



Transtacheal ultrasound scanning is a relatively newer technique for confirming endotracheal intubation. A systematic review and meta-analysis by Gottlieb et al examined 17 prospective and randomized controlled trials involving total 1,595 patients and found that ultrasound was 98.7% sensitive and 97.1% specific for confirmation of correct ETT positioning. The study found that this was true regardless of location, type of provider, type of ultrasound, or experience level. Mean time for confirmation was determined to be 13.0 seconds.

## CONCLUSION

Our patient likely had severe bronchospasm evidenced by the upsloping ET-CO2 even though none of the signs and symptoms of bronchospasm were initially apparent except for the loss of ET-CO2. Loss of end-tidal and collapsed airway on fiberoptic visualization made it difficult to determine ETT position. Our patient was likely intubated correctly multiple times. In retrospect, ultrasound confirmation could have been an option. Our case highlights the need to be aware of the different modalities of ETT confirmation.

### References

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