An Analysis of Scoliosis Effects on Tracheostomy Tube Fit in Pediatric Patients

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BACKGROUND

Pediatric patients with scoliosis may be at risk for tracheal abnormalities

- Tracheal compression between innominate artery and vertebrae
- Tortuous trachea
- Difficulty with home tube changes
- Poor positioning of tube
- Need for custom tracheostomy tube

Potential for increased risk of late tracheo-innominate fistula in patients with neuromuscular disorders.

PURPOSE

To describe the effects of location and severity of scoliosis on the trachea in patients with a tracheostomy tube

METHODS

Retrospective review of patients 21 years and younger with a tracheostomy and scoliosis. Age at time of tracheostomy placement, duration of tracheostomy and ventilator dependence, location and degree of scoliosis were obtained. Archived tracheoscopy videos were assessed for tracheostomy tube fit, irritation of the trachea, view of the carina and curvature of the trachea. Patients were divided into 2 groups based on presence of spine curvature from C6 – T3 (limits of trachea) greater than 30 degrees (Group A) and less than 30 degrees (Group B).

1) Fit of tracheostomy tube	a. Less than 25% of airway obstructed- trachea just distal to trach tube b. 25- 50% of airway obstructed c. 50-75% of airway obstructed d. 75-100% of airway obstructed
2) If obstruction of tube, position of obstruction	a. Left b. Right c. Anterior d. Posterior
3) View of carina	a. Less than 25% of view of carina and bronchi obstructed b. 25 - 50% of view of carina and bronchi obstructed c. 50 - 75% of view of carina and bronchi obstructed d. 75 - 100% view of carina and Bronchi obstructed
4) Irritation of trachea	a. No mucosal irritation b. Superficial irritation with no sloughing of epithelium c. More than superficial irritation/full thickness erosion d. Granulation tissue
5) Curve of trachea	a. Center b. Left of center c. Right of center

Fig 1: Proposed Tracheostomy Evaluation Scale

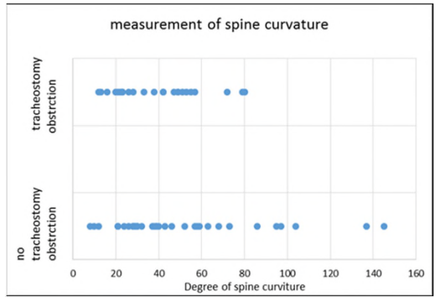

Fig 2: Measurement of Spine Curvature

RESULTS

A total of **59 patients** met inclusion criteria. The median age at time of tracheostomy tube placement was 1.45 years and median trach duration was 10.26 years. **45 patients (76%)** were ventilator dependent.

22 patients were in Group A and **37 patients in Group B**

- 12 out of 22 (54.5%) >30 degree curvature patients versus 9 of 37 (32.4%) <30 degree curvature patients had an obstructed view of carina (p= 0.094)
- 9 out of 22 (40.9%) Group A patients versus 10 of 37 (32.4%) Group B patients had irritation of trachea (p= 0.09)
- 13 out 22 (59.1%) Group A versus 14 of 37 (37.8%) Group B patients had a notable curve of trachea on tracheoscopy
- (p= 0.11)

These values were not statistically significant

CONCLUSION

A large percentage of tracheostomy patients with scoliosis are ventilator dependent. Patients with a spine curvature of 30 degrees or greater from C6 to T3 may have a more obstructed view of carina, a higher incidence of tracheal irritation and notable curvature of trachea on tracheoscopy. Further work is needed to analyze the effects of scoliosis and fit of tracheostomy tube at time of direct laryngoscopy and bronchoscopy surveillance in the OR.

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