

Aspiration & Vocal Fold Motion Impairment in Cardiac Surgical Patients:

Distinct Risk Factors Suggest Different Underlying Mechanism's of Injury.

Emily Plowman, Amber Anderson, Justine Dallal York, Lauren DiBiase, Eric Jeng, Neil Chheda.

Aerodigestive Research Core, Speech Language and Hearing Science, Surgery, Otolaryngology, University of Florida.

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BACKGROUND:

- Dysphagia and vocal fold motion impairment (VFMI) are prevalent in cardiac surgical patients and associated with significant morbidity and mortality.
- Risk factors for which patients develop postoperative VFMI or dysphagia are currently unclear.
- This knowledge gap has hindered implementation of preventative best practices guidelines or provision of triaged postoperative care to high risk patients.

AIMS:

Determine demographic, surgical and endotracheal factors associated with postoperative aspiration and VFMI in adult cardiac surgical patients.

METHODS:

- **Design:** Single site prospective open-label study.
- **Inclusion Criteria:** Adults post-cardiothoracic surgery, no history of dysphagia, extubated, off HF oxygen.

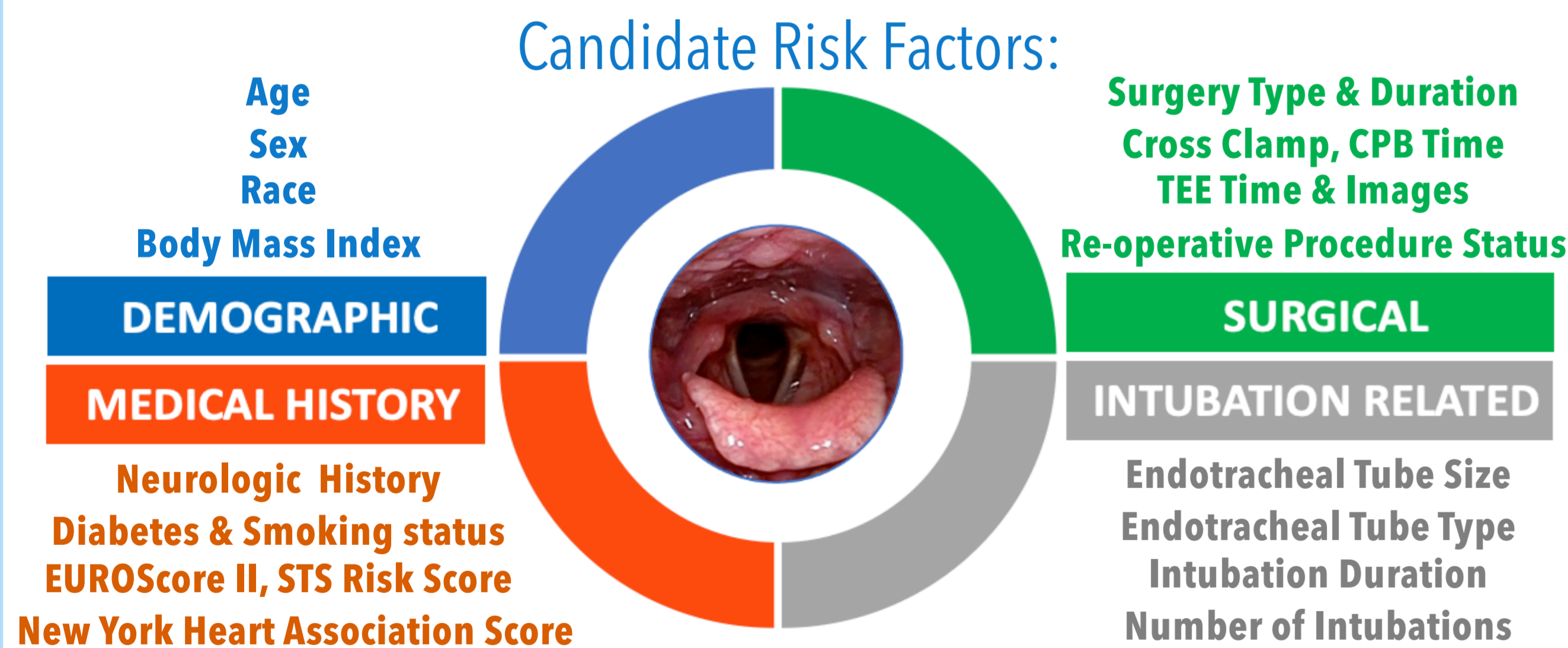


Fig 1. Summary of participant variables collected.

Imaging of Vocal Fold Movement & Swallowing:

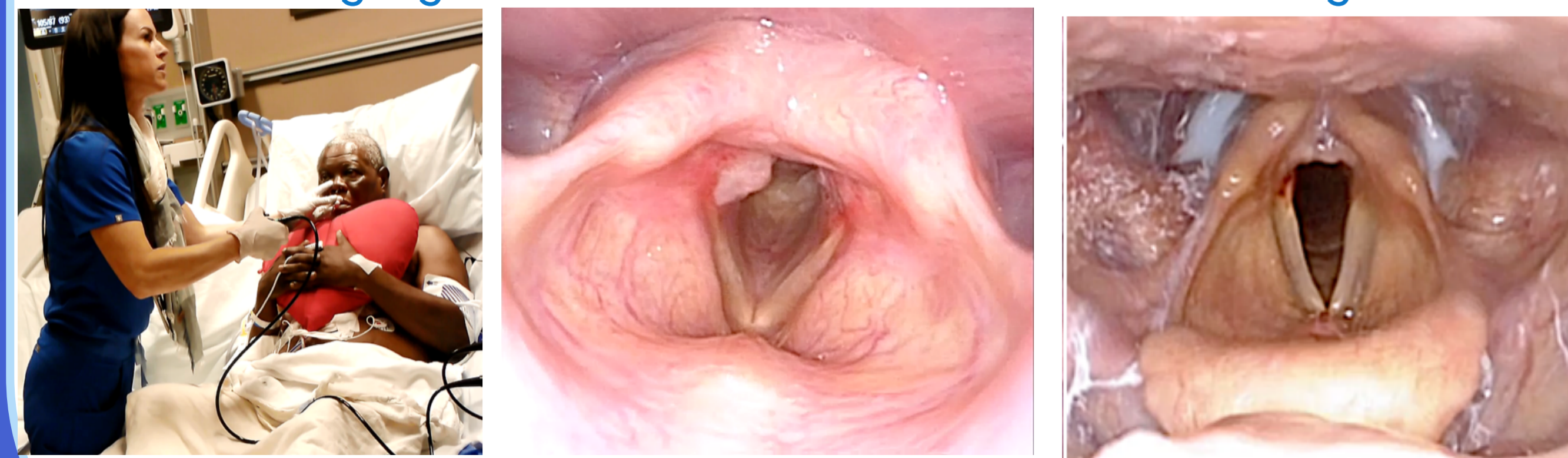


Fig 2. Bedside direct imaging (FEES) performed within 72 hours of extubation.

Blinded Analyses:

- **VFMI:** A blinded laryngologist rated vocal fold motion integrity as: Complete, Partial VFMI, or Complete VFMI.
- **Aspiration:** Independent duplicate blinded ratings of the penetration aspiration scale (100% agreement required).

Table 1. Penetration Aspiration Scale.

Score	Definition:
1	Material does not enter airway.
2	Material enters airway, remains about VF, is ejected from airway.
3	Material enters airway, remains above VF, not ejected from airway.
4	Material enters airway, contacts VF, is ejected from airway.
5	Material enters airway, contacts VF, is not ejected from airway.
6	Material enters airway, passes below VF, is ejected.
7	Material enters airway, passes below VF, not ejected despite effort.
8	Material enters airway, passes below VF, no effort made to eject.



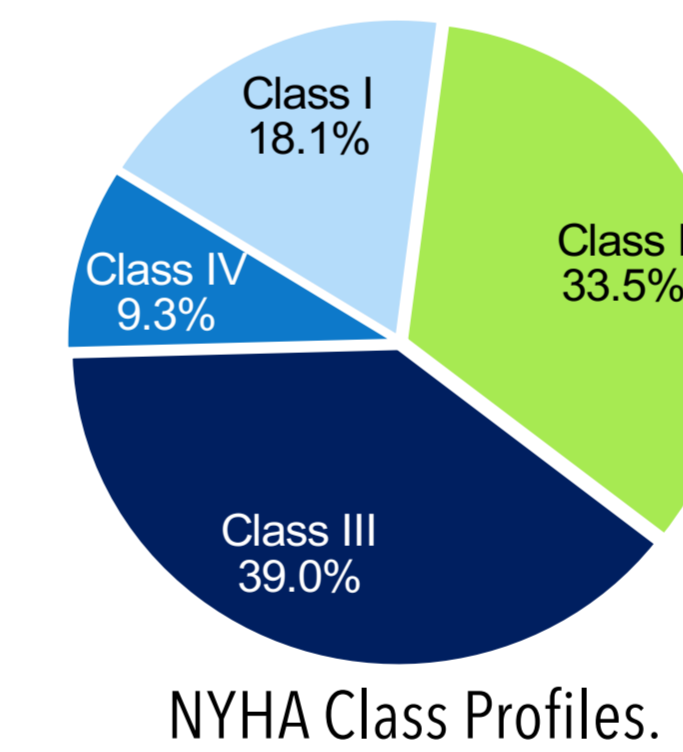
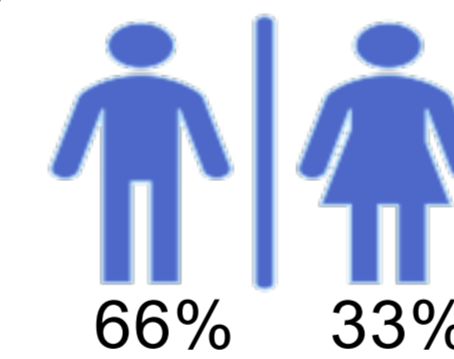
Statistical Analyses:

- **Univariate:** Descriptives, t-test's, Fisher's Exact test, Chi Square.
- **Multivariable:** Akaike's information criterion, receiver operator characteristic curve analysis with Youden J-index for cut offs.

RESULTS:

Participant Demographics:

- 200 cardiac surgical patients participated.
- Mean Age: 62.7 (SD:12.2)
- Mean BMI: 29.9 (SD:6.4).
- Mean EuroSCORE II: 9.5 (SD:9.4).



Risk Factors for Postoperative Vocal Fold Motion Impairment:

Table 2. VFMI Independent Risk Factors.

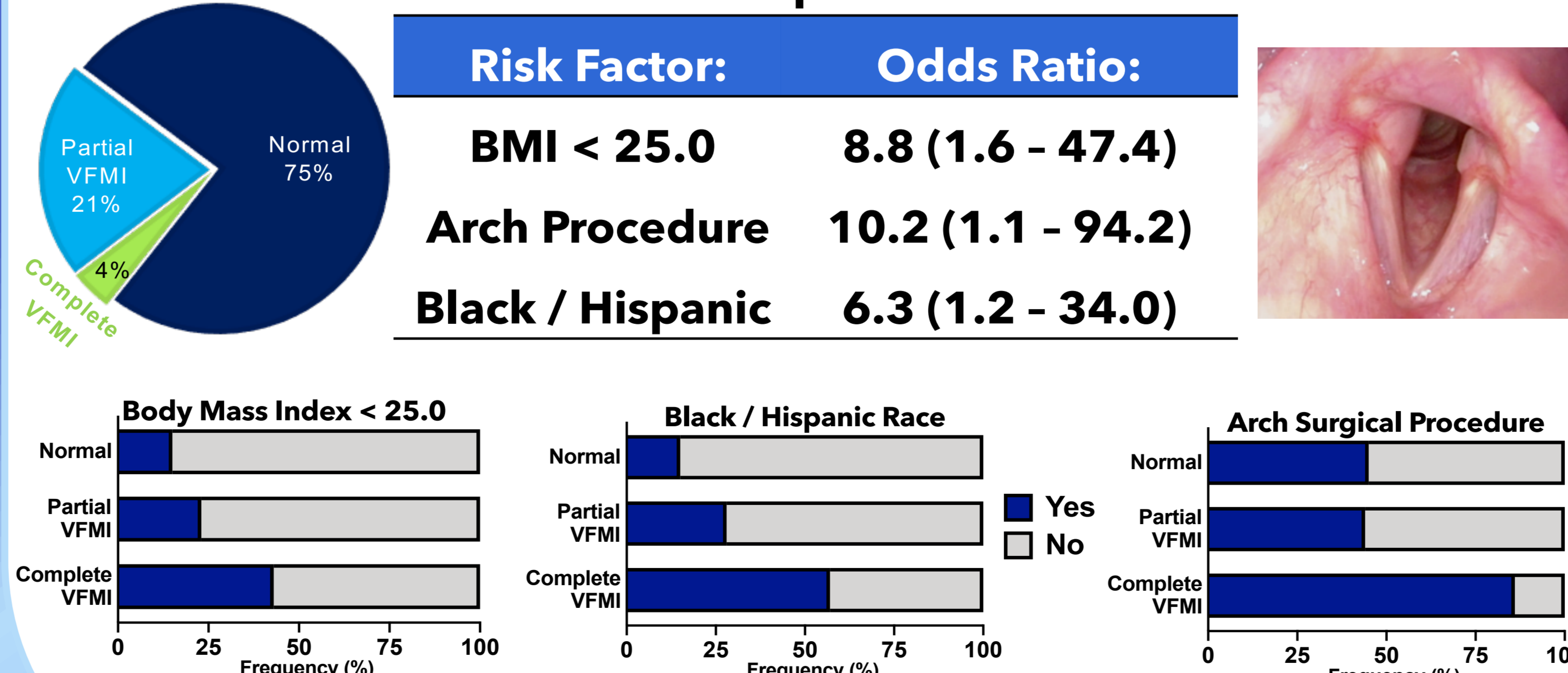


Fig 3. VFMI was more frequent in patients with lower BMI, in Black or Hispanic patients & arch-related procedures.

Risk Factors for Postoperative Aspiration:

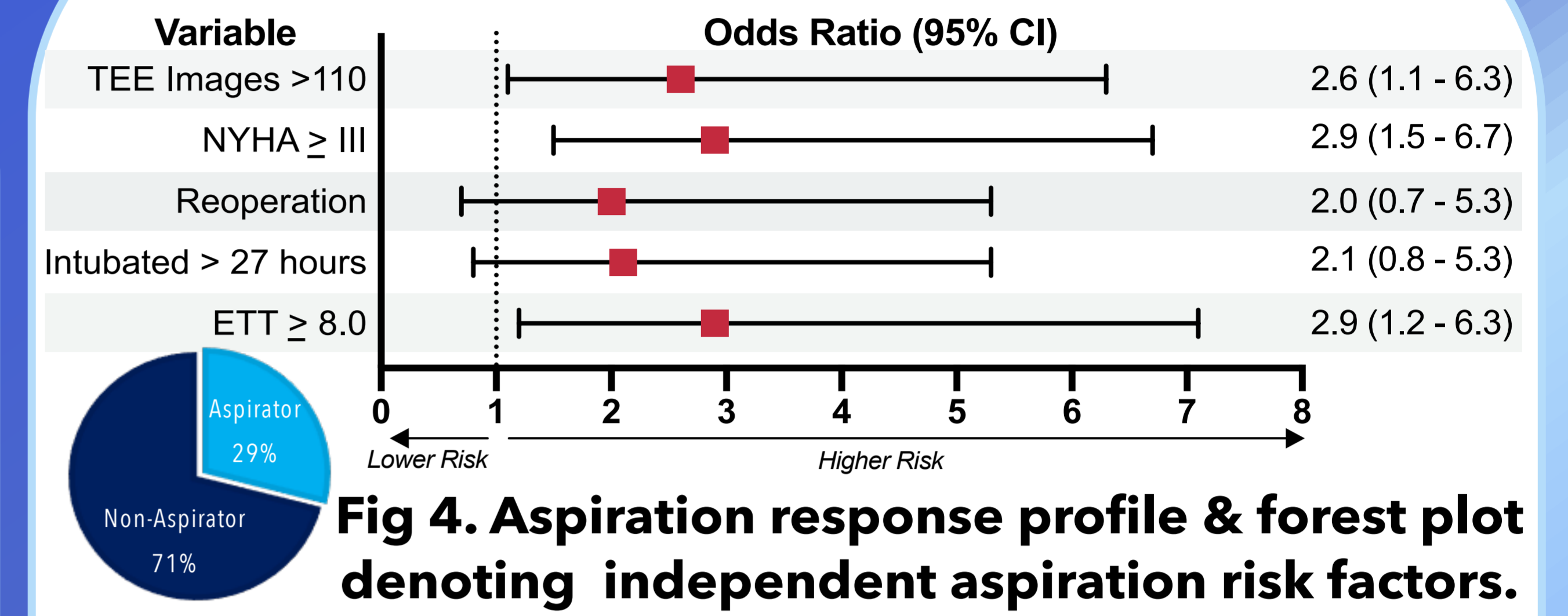


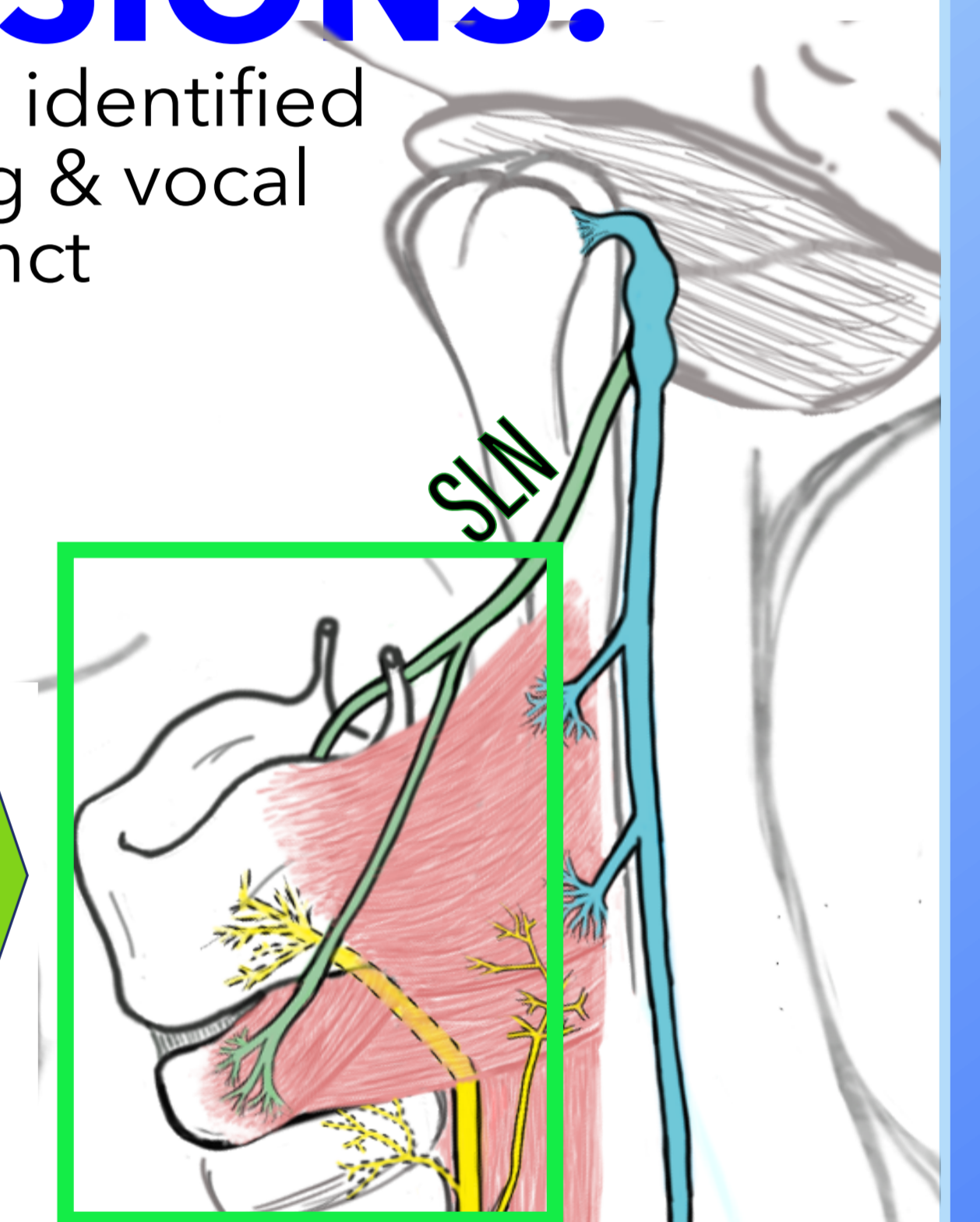
Fig 4. Aspiration response profile & forest plot denoting independent aspiration risk factors.

CONCLUSIONS:

No common risk factors were identified for impairments in swallowing & vocal fold motion, suggesting distinct underlying mechanisms:

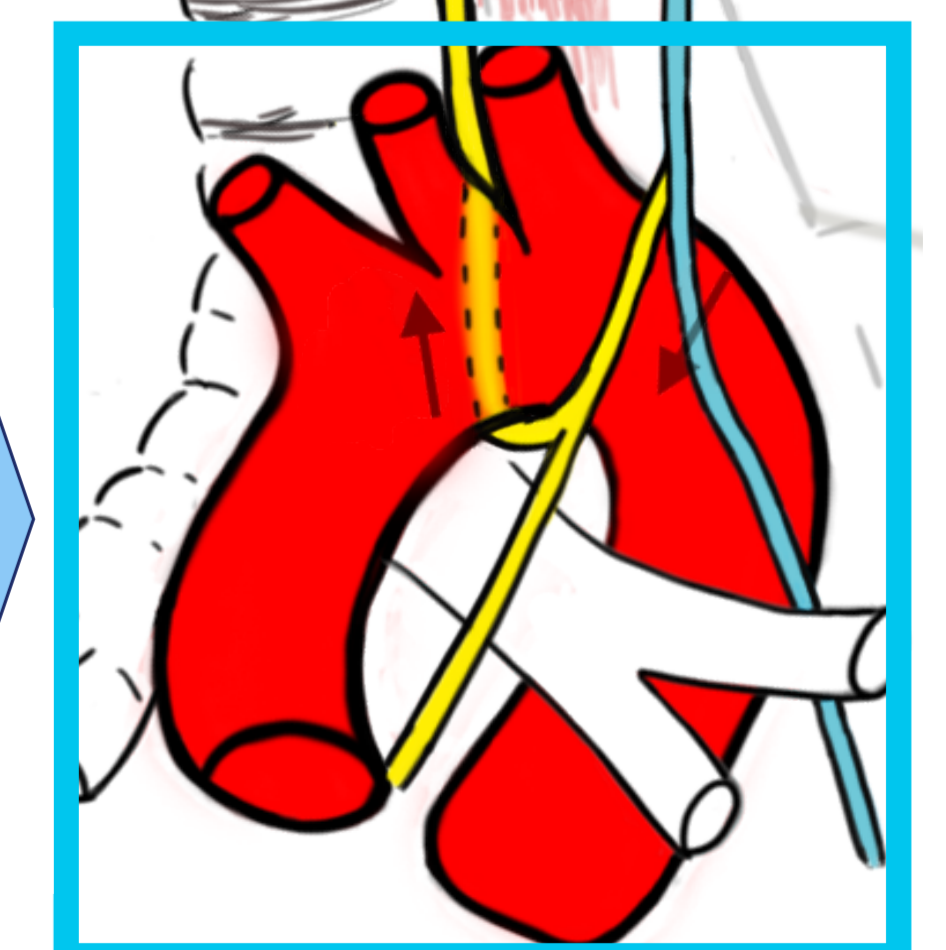
Site of Aspiration Injury:

Identified aspiration-related factors suggest mechanical damage to the aerodigestive tract from excessive TEE manipulations & compression injury to the RLN &/ SLN at the site of the *larynx* from prolonged intubations and oversized endotracheal tubes.



Site of VFMI Injury:

100% left-sided VFMI laterality & VFMI associations with arch-related surgeries suggest direct trauma and/or intra-operative mobilization traction injury to the left RLN at the level of the aortic arch was the primary injury-related contributing VFMI mechanism.



Future research utilizing preoperative imaging and intraoperative RLN monitoring techniques are needed to confirm these preliminary findings.