

Dysphagia &
Dysphonia

following

Anterior Cervical
Spine Surgery

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ArSHA 2018

Goals

- What is anterior c-spine surgery?
- Common complications
- Impacts on voice & swallowing anatomy
- Presentation of Dysphagia & Dysphonia
- SLP's role
- Recommendations for therapy

Your Cruise Director

- Laura Wolford, PhD, CCC-SLP
Midwestern University
- Clinical experience
 - Trauma 1 hospitals
 - Long-term acute care hospitals
 - Acute rehab

Anterior Cervical Spinal Surgery

- Anterior approach to cervical spine (c-spine)
- Multiple procedures
 - ACDF (anterior cervical discectomy & fusion)
 - Total disc replacement (TDR)
 - Etc.

Development of the Anterior Approach

- Through 1950s: Almost solely posterior surgeries (Dweik, Van den Brande, Kossmann, & Maas, 2013)
- Late 1950s: Anterior approach developed
 - Improved lighting & imaging
 - Improving minimally invasive technique
 - Little/no manipulation of spinal cord (Moftakhar & Trost, 2004)
- 1990-1999: Over 500,000 ACDFs completed in USA (Angevine, Arons, & McCormick, 2003)
- ~2010: Moving to outpatient procedure (Adamson et al., 2016)

Reasons for Surgery

Typically c-spine pain caused by...

- Degenerative disc disease
- Nerve compression
- Cervical cord compression
- Trauma/instability

Surgical Procedure

- Small incision in anterior neck
 - To left or right side of trachea

Surgical Procedure

Soft Tissue Retraction

- Medial
 - Trachea, esophagus, & thyroid
- Lateral
 - Sternocleidomastoid & carotid sheath
(includes CN X: Vagus)

Surgical Procedure

- Damaged disc / pathology may be removed
- Bone/synthetic graft and/or stabilizing plate may be inserted
- Surgical closure

**Complications of Anterior
C-Spine Surgery**

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Typical Causes of Complications

- Retraction injury
 - Pulling of trachea, esophagus, CN X, etc.
 - Damage from retractor teeth

- Mechanical irritation
 - Obstruction to esophagus/trachea from hardware
 - Vocal fold/tracheal irritation from intubation
 - Erosion (rare) : loosening/migration of implant
(Song & Choi, 2014)

- Surgical trauma
 - Cut to esophagus, nerve, etc.
 - Hematoma

Incidence of Dysphagia

- Higher incidence of dysphagia anteriorly (50%) than posteriorly (20%) (Smith-Hammond, New, & Pietrobon, 2004)

- Incidence & Prevalence – highly unclear
 - 9.5% to 85% (Skeppholm et al., 2012)
 - "Dysphagia" – inconsistent definition
 - Bazaz dysphagia score - Sore throat? Aspiration?

- Considered inevitable
 - Expected to improve quickly

- >4 weeks = chronic

Dysphagia Trajectory

- 1-79% one week after surgery
- 50.2% after 1 month
- 13-21% at 12 months (plateau)

(Wong, Song, & Zhu, 2017; Rihn, Kane, & Albert, 2011; Jiang, Jiang, & Dai, 2012)

Risk Factors for Dysphagia

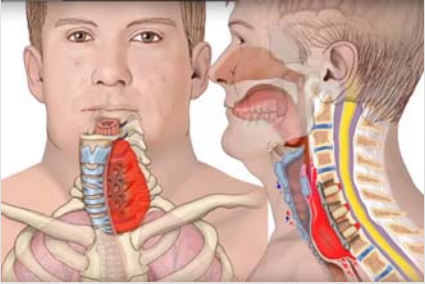
- Length of surgery time
 - Longer surgery = more likely (Anderson & Arnold, 2013)
- Three or more levels fused
 - Instead of the more common one or two levels (Anderson & Arnold, 2013)
- Fusion higher in the cervical spine
 - Above C4 (Mehra et al., 2014)
- Female gender
 - Possibly due to smaller structures (Anderson & Arnold, 2013)

Causes of Dysphagia

- Esophageal impingement
 - Hematoma
 - Hardware migration (becoming very rare)
- Soft tissue damage
 - Swelling
 - Scarring
- RLN damage
 - Reduced glottic closure
 - May be asymptomatic

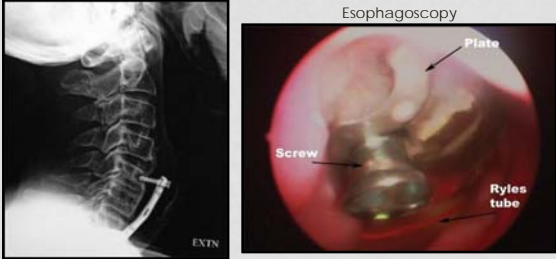
Esophageal Impingement

Hematoma



Esophageal Impingement

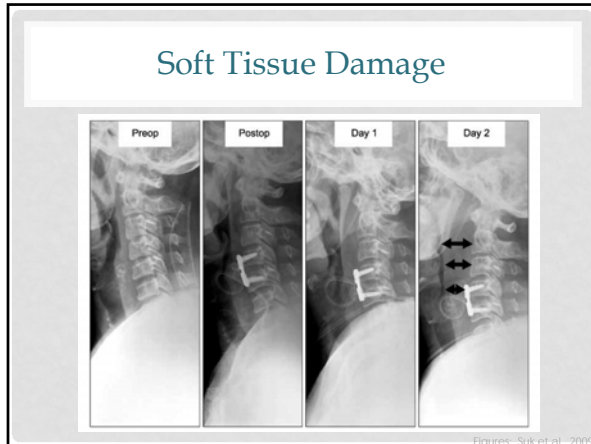
Hardware Migration/Screw Extrusion (rare)



Soft Tissue Damage

Frempong-Boadu et al., 2002

- 23 patients
- VFSS before & 1 month after ACDF
- Pre-Op: 48% dysphagia
 - Post-Op: 1 worsened, 3 improved, 7 unchanged
- 1 month Post-Op: 86% dysphagia
 - 61% pre-vertebral or pharyngeal swelling



Recurrent Laryngeal Nerve Damage

- Frequency btw. 1-11% (Butler, Sweeney, & Connoly, 1976; Paniello, Martin-Bredahl, Kenhkener, & Riew, 2008)
- Jung et al.
 - 10.8% patients after ACDF = asymptomatic RLN paresis/paralysis
- Fountas et al.
 - 3.1% symptomatic RLN paresis/paralysis

Recurrent Laryngeal Nerve Damage

Even more common reoperatively

Erwood et al., 2016

- 345 articles
- Reoperative ACDF
- Frequency of 14.1% RLN damage reoperatively

Image Adapted from: Vocal cord paralysis. by Dr. J. Wikimedia et al.

Recurrent Laryngeal Nerve Damage

- Recommended endoscopy for reoperative ACDF
 - Risk of bilateral VF paralysis, may obstruct airway if medial

However...

- ~1.6% general population with asymptomatic RLN palsy (Curley & Timms, 1989)

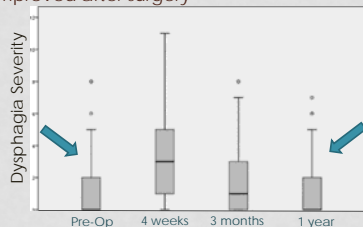
Skeppholm, Ingebro, Engström, & Olerud (2012)

- 45 patients with anterior c-spine surgery
- Validated the "Dysphagia Short Questionnaire"



Skeppholm, Ingebro, Engström, & Olerud (2012)

- 15 patients had baseline dysphagia
 - Likely due to degenerative disc disease
 - Improved after surgery



- 1 year - group mean back to baseline

Implications for Treatment

- May be on caseload!
- Late referrals
- Know warning signs
- Clinical swallow exam = limited efficacy
 - Silent aspirators
 - Imaging results a poor predictor of patient sensation

Implications for Treatment

- Providing compensatory techniques
 - Especially for those at high risk
 - Pre-surgery counseling?
- Neck bracing may limit compensatory postures
- Pre-surgical dysphagia
 - Already on caseload?
 - Consider taking baseline data

Implications for Evaluation

- Imaging important
- FEES
 - Visualize vocal fold medialization
- VFSS
 - May visualize submucosal changes (edema, hematoma, hardware migration, etc.)

Dysphonia following Anterior C-Spine Surgery
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Dysphonia

- Incidence
 - 10-30% at >2 years after (Yang et al., 2016; Yue, Brodner, & Highland, 2005)
 - 1.6% RLN injury
- Typical Presentation
 - Wet vocal quality
 - Hoarse voice
 - Discomfort

Causes of Dysphonia

- Intubation injury
 - Granulomas, vocal fold injury
 - Odynophonia → Reduced respiratory drive → Strain
- CN X injury
 - RLN & SLN in the carotid sheath
 - Vocal fold paralysis/paresis may be asymptomatic.
- Resonator edema
 - Poor resonance → increased strain

Implications for Treatment

- Endoscopy
 - Risk for bilateral paralysis in a second cervical surgery
- Consider VF medialization
 - Thyroplasty
 - Surgical medialization
- Reduce laryngeal hyperfunction

SLP's Role

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Where do we fit in?

- Dysphonia & Dysphagia almost inevitable
 - May not receive consult until far post-surgery
 - May already be on caseload w/ baseline dysphagia
- Know warning signs
 - Hematomas & complications can be life-threatening
- Understand physiologic changes
 - Implications for therapy & pt education

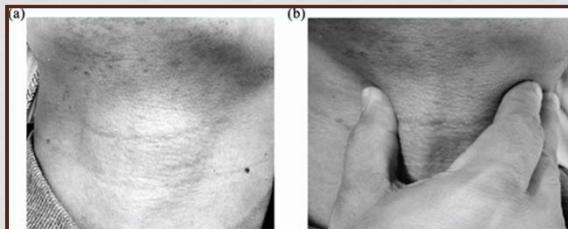
Evaluating Voice & Swallowing

- Imaging important
 - May be insensate to deficits
 - May have sensation but no observable deficits
- Laryngoscopy/stroboscopy prior to surgery
 - Respiratory risks for bilateral vocal fold paresis/paralysis, even without known prior history
- Imaging for dysphagia
 - FEES: Visualize vocal fold movement
 - VFSS: Visualize changes to submucosal structure

New Frontiers: Preoperative Tracheal Retraction Exercises

- Chaudry et al., 2017
 - Manual preoperative tracheal retraction exercises
 - Lowered post-operative dysphagia severity
- Surgeon conducted TRE
 - Supine, Bolster under neck to extend
 - Tracheal sheath moved left & right 1 min
 - Trachea stretched to left by 1 cm
 - 5x/day, 15 counts each time

Preoperative Tracheal Retraction Exercises



Chaudry et al., 2017

Preoperative Tracheal Retraction Exercises

Chen et al., 2012

Preoperative Tracheal Retraction Exercises

- Under direction of surgeon
- Conducted by...
 - Surgeon (Chaudry et al., 2017)
 - Medical Staff (Chen et al., 2012)
 - Patient (Shen et al., 2010)

...Us?

References

- Under direction of surgeon
- Conducted by...
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...Us?

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