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Review Article

Otolaryngologic complications of anterior cervical discectomy and fusion: dysphagia and recurrent laryngeal nerve injury: an interdisciplinary narrative review

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ABSTRACT

Anterior cervical discectomy and fusion (ACDF) is a common orthopaedic procedure for cervical spondylosis, radiculopathy, and myelopathy. While effective, it carries significant otolaryngologic risks, primarily postoperative dysphagia and recurrent laryngeal nerve (RLN) injury leading to dysphonia. Reported dysphagia incidence ranges from 1% to 79% in the short term and persists beyond 12 months in a subset of patients, while RLN palsy occurs in 0.9–9% of primary cases and up to 14.1% in revisions. These complications arise from soft-tissue edema, retraction trauma, hardware irritation, and neuropraxia involving the RLN, superior laryngeal nerve, and pharyngeal musculature. This review synthesizes current evidence on pathophysiology, risk factors (female sex, smoking, diabetes, obesity, multilevel surgery, revision procedures, and lower cervical levels), diagnosis (patient-reported outcomes, videofluoroscopic swallow study [VFSS], fiberoptic endoscopic evaluation of swallowing [FEES], and laryngoscopy), and management. Prevention strategies include retractor release every 15 minutes, endotracheal cuff pressure monitoring (<20 mmHg), left-sided approaches, and intraoperative neuromonitoring. Early otolaryngology referral improves outcomes through swallow therapy, vocal fold medialization, or rare surgical interventions.
Interdisciplinary collaboration between spine surgeons and otolaryngologists is essential for preoperative counselling, perioperative optimization, and postoperative care. Standardized screening protocols and validated outcome measures are needed to reduce underreporting and improve patient quality of life.

Keywords: Anterior cervical discectomy and fusion, Dysphagia, Recurrent laryngeal nerve injury, Dysphonia, Otolaryngology, Spine surgery

INTRODUCTION

Anterior cervical discectomy and fusion (ACDF) remain the gold-standard surgical treatment for degenerative cervical spine disease.[1] Although ACDF achieves high fusion rates and neurologic improvement, postoperative dysphagia and voice changes represent the most frequent patient-reported complications and often prompt otolaryngologic consultation.[2] These issues stem from the anatomic proximity of the surgical corridor to critical swallowing and phonatory structures, including the pharynx, oesophagus, larynx, and branches of the vagus nerve.

Dysphagia after ACDF can range from mild transient discomfort to severe aspiration risk, prolonging hospital stays, increasing pneumonia rates, and impairing quality of life.[3] RLN injury manifests as hoarseness, weak cough,

or aspiration and may be transient or permanent.[4] Despite extensive literature, wide variability in incidence reflects inconsistent diagnostic methods—many studies rely on unvalidated patient-reported tools rather than instrumental assessments such as VFSS or FEES.[5]

This interdisciplinary review, authored by otolaryngologists and spine surgeons, examines the incidence, pathophysiology, risk factors, diagnosis, prevention, and management of these complications to foster collaborative care.

Pathophysiology

Post-ACDF dysphagia arises from multiple mechanisms: (1) prevertebral soft-tissue edema and hematoma causing mechanical compression of the pharynx/esophagus; (2) retraction-induced neuropraxia of the RLN (at C6–C7), internal branch of the superior laryngeal nerve (C3–C4), or hypoglossal nerve (C2–C3); (3) direct trauma to pharyngeal constrictors and suprahyoid muscles; and (4) hardware prominence or graft displacement irritating the posterior pharyngeal wall.[6] Intubation-related laryngeal edema further compounds risk.

RLN palsy typically results from stretch, compression against the endotracheal tube, or ischemia during retraction. The right RLN has a more oblique course and may be at slightly higher risk with right-sided approaches, although evidence is mixed.[7] Delayed-onset dysphagia (>1 year) may occur from hardware migration or pseudoarthrosis.[8]

Epidemiology and risk factors

Dysphagia incidence varies widely. Large database analyses report new postoperative dysphagia codes in 14.4% of ACDF patients, with 18.8% diagnosed within 6 months.[9] Meta-analyses show higher rates after multilevel versus single-level procedures (6.6% vs. 4.0% at 12–24 months).[10] A recent retrospective cohort found 20.6% of ACDF patients developed dysphagia within 1 year.[11]

Independent risk factors include female sex (OR 1.14), smoking (OR 2.51), diabetes (OR 2.18), obesity (OR 2.50), multilevel or revision surgery, operative time >200 minutes, blood loss >100 ml, and surgery at or below C6.[12] Prolonged symptoms (>12 months) correlate with low cervical approaches.[13]

RLN palsy occurs in 1.2% overall (no significant difference between single- and multilevel in meta-analysis), but revision ACDF increases risk to 14.1%.[4,14] Most cases are transient, resolving within 3 months, though permanent deficits occur.

Clinical presentation and diagnosis

Patients typically report dysphagia, odynophagia, globus, or choking within days to weeks postoperatively. Voice changes (hoarseness, breathiness) suggest RLN involvement. Aspiration risk warrants urgent evaluation.

Diagnosis begins with validated tools: Eating Assessment Tool-10 (EAT-10) for dysphagia and Voice Symptom Score (VoiSS) for dysphonia.[13] Instrumental assessment is gold standard—VFSS detects penetration/aspiration, while FEES evaluates laryngeal sensation and pharyngeal function without radiation.[15] Flexible laryngoscopy confirms vocal fold immobility. Barium swallow or CT may identify hardware issues or abscess.

Management and prevention

Most dysphagia resolves conservatively within 3–6 months with dietary modification, postural manoeuvres, and speech-language pathology swallow therapy [9]. Persistent cases benefit from early otolaryngology referral; medialization laryngoplasty addresses unilateral RLN palsy. Tracheostomy is rare.

Prevention is critical and includes loosening or repositioning of the intraoperative retractors every 15 minutes to reduce recurrent laryngeal nerve (RLN) compression, maintaining endotracheal cuff pressure below 20 mmHg after retractor placement, considering a left-sided surgical approach and intraoperative electromyographic neuromonitoring, using low-profile implants and ensuring meticulous haemostasis, and providing preoperative counselling with consideration of steroid administration to mitigate postoperative oedema.[16-18]

CONCLUSION

Dysphagia and RLN injury remain underrecognized yet impactful complications of ACDF. Otolaryngologists play a pivotal role in diagnosis and rehabilitation, while spine surgeons drive prevention. Routine screening with validated instruments, early interdisciplinary referral, and standardized protocols will optimize outcomes. Future prospective studies using objective swallowing assessments are warranted to refine risk stratification and refine surgical techniques.

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