



Restoring laryngeal function

Swallowing • Secretion management • Voice

Management-focused perspective for adult ICU and post-ICU patients



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First Principle: The Inflated Cuff Blocks Functional Airflow

When Inflated, The Cuff Diverts Expiration Away From The Larynx — Limiting Secretion Clearance, Swallowing Rehabilitation And Voice.

Cuff Inflated = No Translaryngeal Expiratory Flow



Therapeutic Goal: Restore Upper-Airway Expiratory Flow

Secretion Clearance

Cough + Oral Expectoration

Voice / Communication

Phonation + Participation

Swallowing Rehabilitation

Subglottic Pressure + Sensory Input

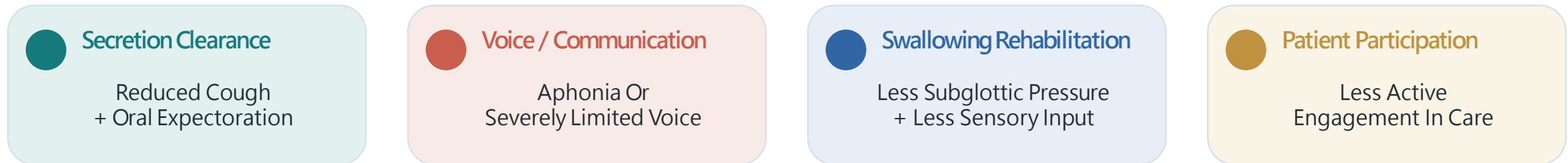
Key Message: Do Not Wait Passively For « Full Recovery »
Rehabilitate By Progressively Restoring Physiology When Respiratory Status Allows.

The Inflated Cuff: Ventilation Tool, Functional Barrier

When Inflated, The Cuff Seals For Ventilation — But Blocks Translaryngeal Expiratory Flow.



Airflow-Dependent Functions Affected



Key Message: Cuff Status Alone Does Not Define Swallowing Safety — And An Inflated Cuff Blocks Airflow-Dependent Rehabilitation.

Secretion management is swallowing management

Treat the mechanism — the goal is manageable saliva, not a dry mouth.

1

Improve clearance first

- Positioning + head control
- Oral hygiene / reduce bacterial burden
- Humidification / HME; avoid thick plugs
- Respiratory physiotherapy + suction when needed
- Restore airflow to support cough and oral expectoration

Poor Secretion Clearance May Limit Cuff-Deflation Tolerance.

2

Identify the mechanism

Pooling ≠ always overproduction

Impaired automatic saliva swallowing

vs

True hypersialorrhea

Support saliva swallowing and airway protection — do not simply suppress secretion.

3

Reduce saliva if needed

Short-term / systemic

- Sublingual atropine
- Glycopyrronium

Evidence mainly extrapolated from neurological sialorrhea.

Focal / longer-lasting

- Botulinum toxin → parotid + submandibular glands

Best direct tracheostomy-specific signal, but small studies only.

Target: secretions compatible with cuff deflation, swallowing rehabilitation and upper-airway airflow.

Swallowing rehabilitation is not“ thicken and wait’

Management should both compensate and restore.

COMPENSATE make swallowing safer now

- Upright posture / head control
- Bolus volume and pacing
- Texture / viscosity adaptation
- Fatigue management
- Safe feeding environment

REHABILITATE train the impaired function

- Therapeutic swallowing trials
- Targeted swallowing exercises
- Sensory stimulation
- Cough and airway-clearance training
- Respiratory–swallow coordination

Tailor treatment to the pathophysiology — not to the mere presence of the tracheostomy.

Evidence for dysphagia therapy in tracheostomized adults

Useful, but still fragmented.

KADRI et al. 2026 Scoping review

24 studies
adults with tracheostomy

MULTIMODAL

Most therapy programmes combine motor, sensory and tracheostomy-related interventions.

PES

Pharyngeal electrical stimulation: most prominent specific technique; decannulation signal in selected neurogenic dysphagia.

RESPIRATORY APPROACHES

Respiratory-phase interventions are emerging; relevant because swallowing and breathing are coupled.

LIMITATION

Dose, frequency, outcome measures and protocols remain heterogeneous.

What to say clinically: offer structured, individualized rehabilitation —but avoid claiming that one conventional exercise is proven for all tracheostomized ICU patients.

Second principle: The speaking valve is a rehabilitation tool

It Redirects Expiration Through The Upper Airway — Not Only For Voice.



Same Physiological Intervention → Several Functional Targets

VOICE / COMMUNICATION

Phonation
Participation In Care

SECRETION CLEARANCE

Cough
Oral Expectoration

SWALLOWING REHABILITATION

Subglottic Pressure
Sensory Input

Aspiration: Encouraging Signal, But Evidence Remains Heterogeneous.

Restore voice early: it matters to patients

Communication is a clinical priority, not a comfort extra.

**To be seen and heard
as a whole person"**

Qualitative metasynthesis of adult ICU tracheostomy experience: having a voice helps patients be treated and perceived as a whole person.

**Trach weaning
11 DAYS EARLIER**

**Return to phonation with early cuff deflation + in-line
speaking valve during mechanical ventilation**

Small RCT, n=30; no increase in complications; secondary outcomes not significantly changed.

Voice restoration = needs, pain, consent, anxiety, participation in care

If cuff deflation is not possible: do not leave the patient voiceless

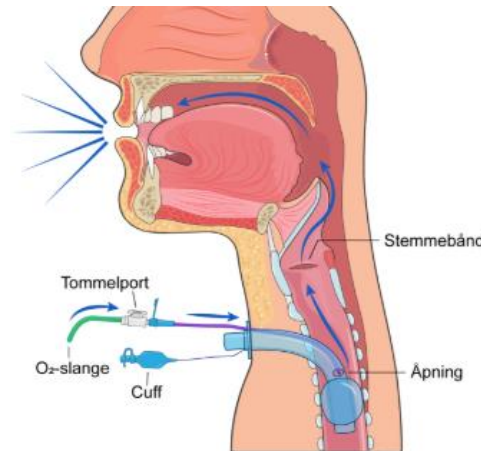
Above-cuff vocalization and augmentative communication may be considered.

TRADITIONAL VOICING not feasible

ventilatory dependence
airway instability
poor cuff-deflation tolerance

ABOVE-CUFF VOCALIZATION

low-flow gas through speech
lumen
while cuff remains inflated



SAFETY CONDITIONS

selected adults
experienced team
time-limited use
monitor air trapping / mucosal
injury / misconnections

Always provide a communication pathway: writing board • alphabet board • tablet / AAC • yes/no system

A Practical Rehabilitation Pathway

A Management Sequence Connecting Secretions, Swallowing And Voice.



Loop Back If Fatigue, Secretion Overload, Respiratory Intolerance Or Poor Functional Progression.

This Is A Practical Sequence, Not A Universal Protocol: The Pace Depends On Respiratory Safety And Patient Tolerance.

TAKE-HOME MESSAGES

1

Think rehabilitation, not tube care.

Tracheostomy management is part of swallowing and voice therapy.

2

Restore airflow when safe.

Cuff down, tube optimisation, valve or capping are functional interventions.

3

Treat secretions as dysphagia.

Saliva clearance, cough and oral hygiene are central to progression.

4

Give the patient a voice early.

Speaking valve, ACV or AAC: communication is participation in care.

5

Stay evidence-honest.

Multimodal therapy is supported; protocols and dosing remain heterogeneous.

Restoring laryngeal function = restoring physiology + training function + restoring personhood.

Restoring laryngeal functions

Clinical Case

Management-focused perspective for adult ICU and post-ICU patients



First ORL functional assessment

66-year-old man; severe respiratory and medical background.

Acute ICU story

- 28 Jul 2016: acute respiratory failure
- Mixed aetiology: COPD exacerbation + cardiac decompensation
- Pulmonary infection treated with antibiotics
- Failed extubation on 5 Aug: sudden desaturation and hypoxic cardiac arrest
- Emergency re-intubation, then tracheostomy on 12 Aug

Pre-existing clue

In 2015, the flow-volume loop already showed inspiratory flattening and stridor was reported, although ENT endoscopy and CT did not identify an obstruction.

What hypotheses would you keep open at this stage?

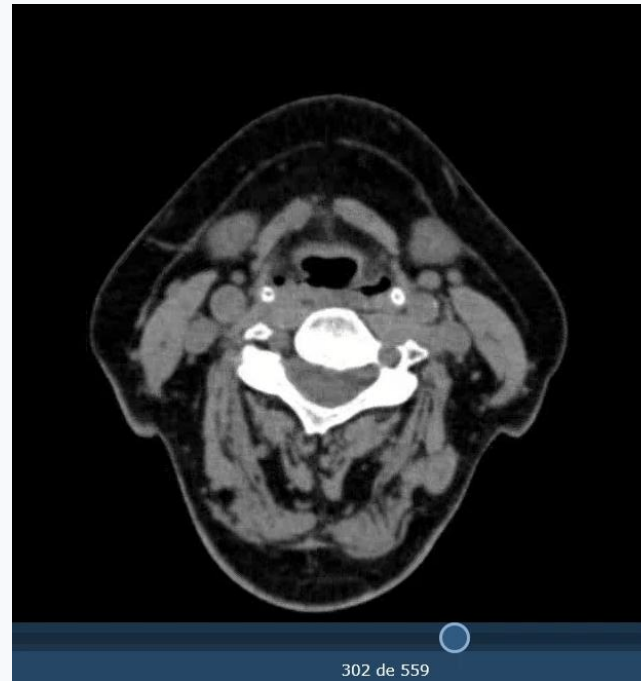
Second ORL functional assessment

Six weeks after tracheostomy

22 Sep 2016

Clinical update

- NPO since admission; nasogastric feeding
- Marked saliva stasis in the oropharynx
- With cuff deflated and tube occluded: inspiratory discomfort
- Wet voice
- Endoscopy: bilateral vocal fold immobility in adduction + supraglottic oedema



Functional profile

- Airway**
Severely restricted
- Breathing**
Poor occlusion tolerance
- Voice / speech**
Wet / limited
- Swallowing**
Unsafe secretions

DISCUSSION STOP

What would you do?

Historical constraint: thrombocytopenia + very narrow laryngeal airway.

What was done first — conservative, functional management

The immediate aim was to maintain stimulation and communication while avoiding additional risk.

SWALLOWING / NUTRITION

- No return to oral feeding
- Only 1–2 teaspoons of thick texture in therapy for stimulation
- Optimise anti-reflux treatment; consider short oral corticosteroids
- Discuss gastrostomy if no improvement

TRACHEOSTOMY

- No immediate tube change
- Cuff deflated when clinically tolerated
- Re-inflate the cuff if fever, inflammation or bronchial congestion occurs
- Speaking valve requested for speech therapy sessions only at first

DIAGNOSTIC WORK-UP

- Close the diagnosis?
- Posterior fossa MRI?
- Neurological evaluation ± EMG ?

DISCUSSION STOP

Would your first priority have been airway, swallowing safety, communication, or diagnostic certainty?

Early follow-up — aspiration risk persists

04 Oct 2016

Clinical update

- Respiratory infection attributed to persistent salivary aspiration
- Cuff inflated at night, deflated during the day
- Speaking valve not tolerated
- The patient can speak briefly by occluding the tube
- Thick-texture trials allowed only during speech therapy

Functional profile

- Airway**
Still very narrow
- Breathing**
Night cuff needed
- Voice / speech**
Brief occlusion only
- Swallowing**
Salivary aspiration

DISCUSSION STOP

Would you keep trying a speaking valve?

Or would you prioritise secretion control and defer communication goals?

Functional improvement despite fixed airway limitation

21 Dec 2016

Clinical update

- Historical context: cholecystectomy was planned but GA considered contraindicated.
- Oral intake resumed: mixed then regular textures
Carbonated drinks tolerated
- No cough or fever
- Tube capped 12 h/day, open at night
- FEES: one direct liquid aspiration, corrected by slowing the sip

Functional profile

 Airway
Closed immobile larynx

 Breathing
Cap 12 h/day

 Voice / speech
Functionally usable

 Swallowing
Much improved

Decision stop — the airway procedure is possible, but is it timely?

At this point, swallowing improved enough to consider intervention, but the global balance was still uncertain.

Arguments for surgery

- Potential route to decannulation
- Improved swallowing safety compared with September
- Increasing daytime capping tolerance
- Patient may regain upper-airway breathing

Arguments to wait

- Glottic airway still critically narrow
- Difficult airway for anaesthesia
- Planned abdominal surgery
- Pulmonary reserve not yet stable
- Recent history of aspiration

PANEL VOTE

Operate now

Wait and reassess

Keep tracheostomy long term

Setback — pulmonary status changes the airway decision

25 Jan 2017

Clinical update

- Contraindication to general anaesthesia for cholecystectomy
- Recent bronchopneumonia
- Massive secretions through the tracheostomy tube
- Oxygen dependence
- Salivary stasis and some salivary aspiration recurred

Functional profile

- Airway**
Too narrow to decannulate
- Breathing**
Fragile / oxygen-dependent
- Voice / speech**
Tube needed
- Swallowing**
Limited / unstable

DISCUSSION STOP

Would you still propose laser airway surgery?

Historical choice: return home with tracheostomy autonomy rather than surgery.

2017 — same anatomical problem, different functional states

The management question kept changing because the patient kept changing.

JUNE 2017

- Tube capped almost permanently
- Opened mainly for cough or suction (~ 3×/day)
- No aspiration with cream, liquid and soft cake
- Persistent saliva-management fragility
- Tube changed: Shiley #8, fenestrated

NOVEMBER 2017

- Larynx remains very narrow
- Prior exacerbation required tube access for suction
- Nocturnal ventilation stopped
- Hypercapnia when capped 24/24
- Speaking valve worn continuously and better tolerated



ASK THE EXPERTS

For the expert panel: in this patient, does “tolerating capping” mean the same thing as being ready for decannulation?

2018 reassessment

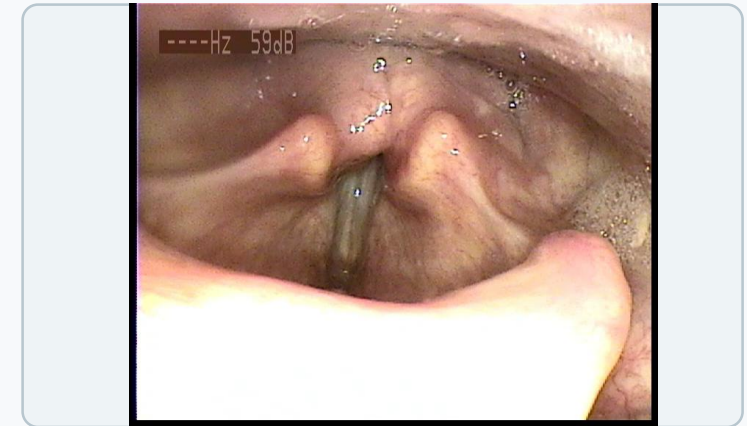
Persistent posterior glottic stenosis, but systemic condition and patient goals have changed.

Clinical context

- Colon cancer surgery in July 2018
- Patient reports feeling much better
- COPD previously oxygen-dependent, now clinically improved
- Cirrhosis and cardiometabolic comorbidities remain important
- Patient actively requests an attempt at tracheostomy weaning

Functional findings

- Shiley #6, cuffless, fenestrated
- Voice acceptable
- Posterior glottic stenosis with very reduced airway
- Secondary laryngeal immobility
- Small-volume madeleine: vallecular residue



EXPERT QUESTION

What would you propose?

Pre-operative panel — define the endpoint before choosing the gesture

AIRWAY

How much enlargement is enough for decannulation?

BREATHING

Can he manage secretions and exacerbations without tube access?

VOICE / SPEECH

What degree of voice deterioration is acceptable?

SWALLOWING

Will widening compromise protection or secretion control?

ASK THE EXPERTS

Would you choose: open-surgery, endoscopic widening, stenting, staged treatment, or continued tracheostomy?

2019 — historical surgical pathway

10 May 2019

Endoscopic surgery
Cricoarytenoid ankylosis confirmed
Right > left
Right partial laser arytenoidectomy
13-mm Montgomery T-tube



One week after
17 May 2019

23 Aug 2019

T-tube removal
After ~ 2,5 months of
stenting



One week after T-tube
removal
4 September 2019

22 Nov 2019

Laser revision
Division of an
anterior synechia



Follow up after 6 months
15 May 2020

Follow-up
23 October 2019

Questions to leave with the panel

- 1 What is the best marker of readiness?
- 2 When does a tracheostomy tube remain a therapeutic tool rather than a failure of decannulation?
- 3 How early should posterior glottic stenosis be addressed when swallowing and pulmonary status are still unstable?

Thank you!

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