喉科 - 特殊個案

Laryngeal Trauma: To Intervene or To Observe?

Presenter：PGY1 黃子勳
Mentor：洪偉誠醫師

Patient information

- 59-year-old female　ID：
- 155cm/60kg
- Past history：Schizophrenia
- Surgery history：Nil
- Social history：Nil
- TOCC：Nil
- Allergy: Nil

Chief complain

Hoarseness after neck trauma for 1 day

History of Present Illness on 04/08

- Blunt trauma to the throat (Accidental collision with a table corner) →Neck ecchymosis
- Visit ENT LMD first→vocal cord swelling?
- Refer to FEMH Chest OPD
- Hoarseness, chest tightness, and intermittent dyspnea was noted
- Refer to ENT OPD

Physical examination

HEENT：Ecchymosis over the left neck

Chest：Stridor(+)

Heart：RHB

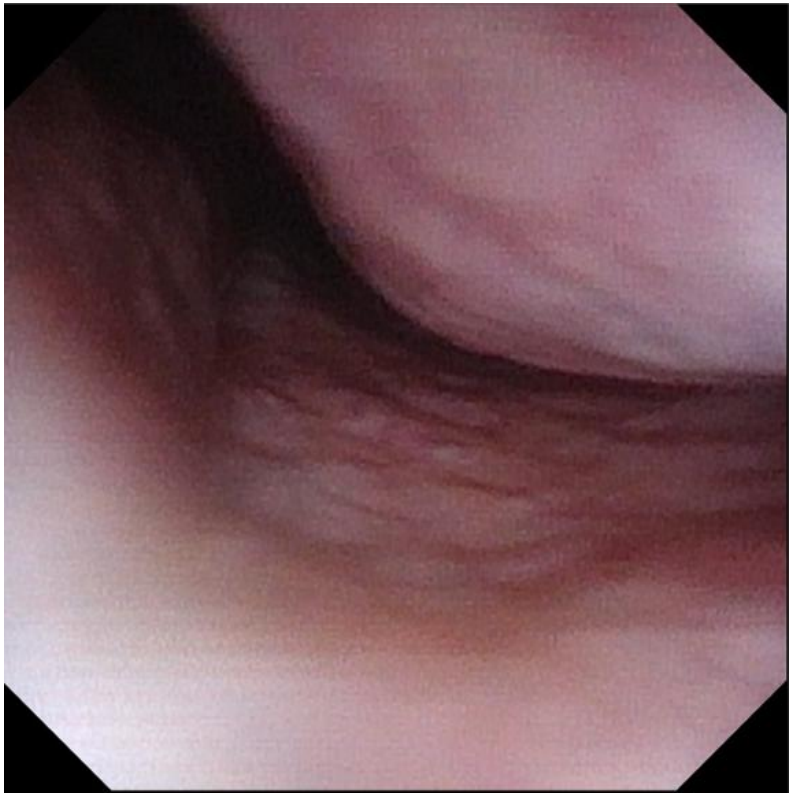
Abdomen：No tenderness

Extremities：Freely movable

Original chest Xray

No active lung lesion

Flexible nasopharyngeal laryngoscopy



Flexible nasopharyngeal laryngoscopy

Vocal Folds: Bilateral ecchymosis present

Subglottis: Significant ecchymosis and swelling of the subglottic area

→Airway compromise was highly suspected

→Refer to ER for emergent management

ER cource

- After discussion with the pt and family for the condition of airway compromise , they agree intubation
  - Inform the risk of intubation failure and the possibility of tracheostomy
- Check EKG, BCS, CBC/DC, coagulation
- Arrange CT neck
- Transfer to ICU

最後報告日期：2026-04-08 16:40 (檢體序號： 6048287131)

歷史資料	項目名稱	檢體類別	檢驗報告	單位	正常值(Low)	正常值(High)
---	CBC-I	Blood				
查看	HGB	Blood	14.2	g/dL	12.0	16.0
查看	HCT	Blood	44.0	%	35.0	48.0
查看	MCV	Blood	88.0	fL	82.0	101.0
查看	RBC	Blood	5.00	10^6/µL	3.80	5.50
查看	MCHC	Blood	32.3	g/dL	31.0	36.0
查看	WBC	Blood	5.84	10^3/µL	3.80	10.40
查看	Platelet	Blood	212	10^3/µL	140	400
查看	MCH	Blood	28.4	pg	27.0	33.0
查看	RDW-CV	Blood	12.8	%	11.5	14.5
查看	PDW	Blood	11.4	fL	9.0	17.0
查看	MPV	Blood	10.20	fL	9.10	11.90
查看	Plateletcrit	Blood	0.22	%	0.18	0.39

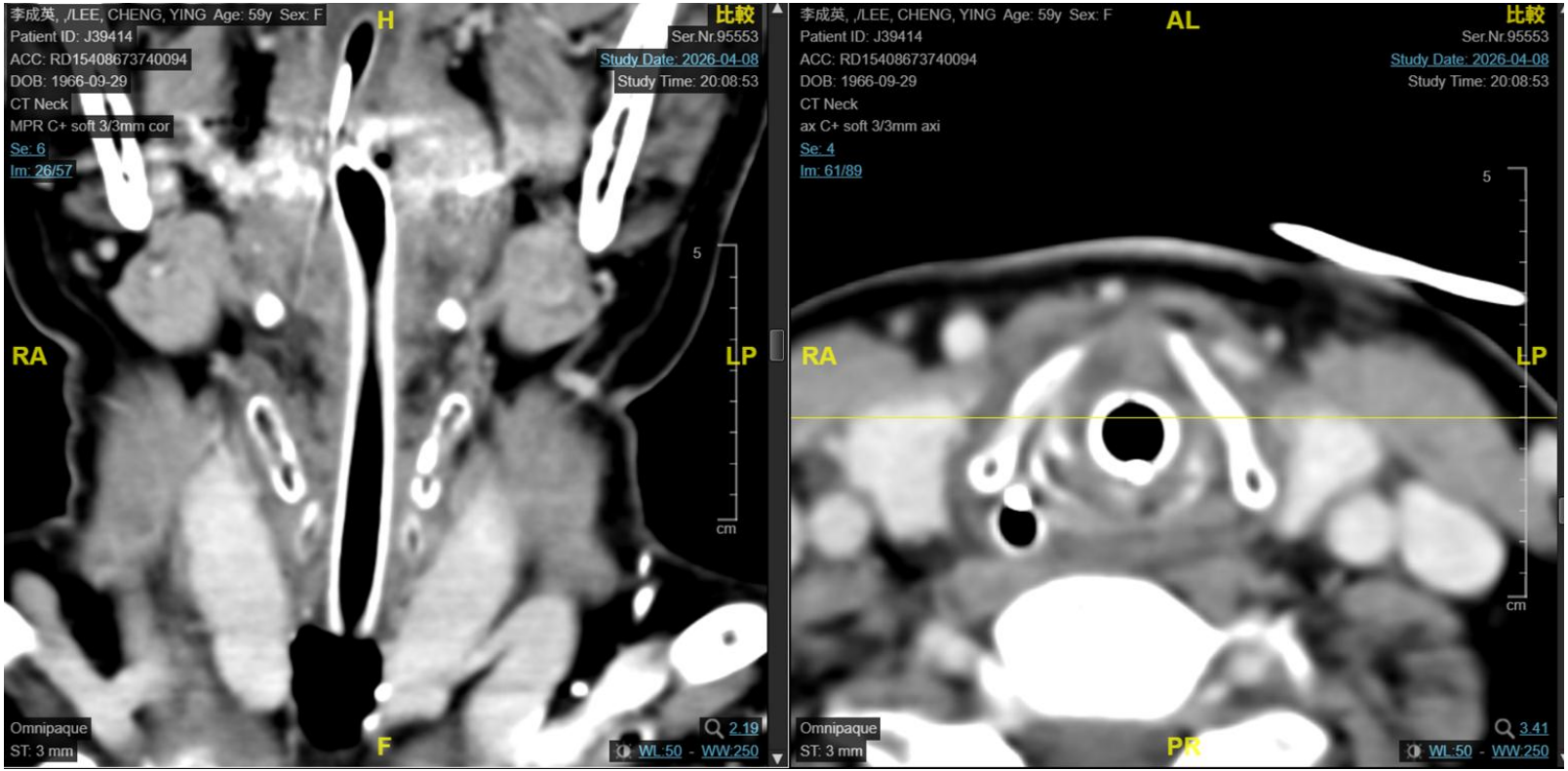
最後報告日期：2026-04-08 16:41 (檢體序號： 6048287130)

歷史資料	項目名稱	檢體類別	檢驗報告	單位	正常值(Low)	正常值(High)
---	PT	Blood				
---	APTT	Blood				
查看	PT	Blood	10.2	sec	8.0	12.0
查看	INR	Blood	1.01		0.80	1.20
查看	APTT	Blood	24.4	sec	23.3	35.8

最後報告日期：2026-04-08 16:49 (檢體序號： 6048287132)

歷史資料	項目名稱	檢體類別	檢驗報告	單位	正常值(Low)	正常值(High)
查看	Na	Blood	139	mmol/L	136	146
查看	K	Blood	3.9	mmol/L	3.5	5.1
查看	Creatinine	Blood	0.58	mg/dL	0.60	1.20
---	Creatinine & eGFR	Blood				
查看	ALT	Blood	9	U/L		31
查看	Glucose random	Blood	156	mg/dL	70	200
查看	eGFR(CKD-EPI)	Blood	104.2		60.0	
查看	eGFR(MDRD)	Blood	>60.0		60.0	
查看	Sample Hemolysis	Blood	1+			

Neck CT


李成英, /LEE, CHENG, YING Age: 59y Sex: F
Patient ID: J39414
ACC: RD15408673740094
DOB: 1966-09-29
CT Neck
MPR C+ soft 3/3mm cor
Se: 6
Im: 26/57
H
比較
Ser.Nr.95553
Study Date: 2026-04-08
Study Time: 20:08:53
5
RA
LP
cm
Omnipaque
ST: 3 mm
F
2.19
WL:50 - WW:250
李成英, /LEE, CHENG, YING Age: 59y Sex: F
Patient ID: J39414
ACC: RD15408673740094
DOB: 1966-09-29
CT Neck
ax C+ soft 3/3mm axi
Se: 4
Im: 61/89
AL
比較
Ser.Nr.95553
Study Date: 2026-04-08
Study Time: 20:08:53
5
RA
LP
cm
Omnipaque
ST: 3 mm
PR
3.41
WL:50 - WW:250

ICU course&treatment

04/09

- Antibiotic initiated with Unasyn 1500mg Q6H
- Steroid with Solu-Medrol 40mg Q12H
- Schizophrenia control

04/10

- Famotidine 20mg IVDRIP QD
- Cuff leak test→Fail

04/11

- Portable fiber：Smooth NP, much saliva pooling over larynx, larynx cannot clearly seen

Cource&treatment

04/14

- Cuff-leak test Pass
- Famotidine PO BID

04/15

- Epinephrine 1mg in 9ml N/S, Inhale 4ml Q6H
- Extubation with bronchoscope
- ENT fiber：Right VF mild hematoma, bil VF edematous much improved, fair VF motion

04/16

- Solu-Medrol 40mg QD
- Epinephrine Inhale QID

Bronchoscopy

Vocal cord:

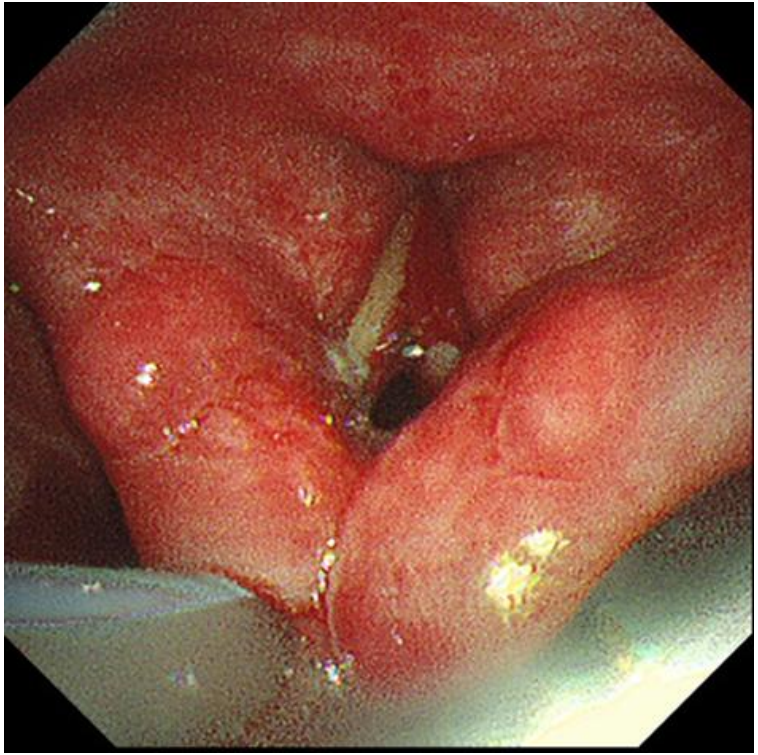
- Right VF hematoma
- Symmetric, movable, no palsy

04/17

- Transfer to ward

4/18

- MBD



Discharge diagnosis

- 1. Fracture of left side of thyroid cartilage
- 2. Acute respiratory failure status post endotracheal intubation with mechanical ventilation since 2026/4/9-4/15
- 3. Schizophrenia

Discussion

Laryngeal Trauma

Claude Nganzeu, MD[a,b], Antoinette Esce, MD[a,b],
Sara Abu-Ghanem, MD, MmedSc[c], Duncan A. Meiklejohn, MD[a,b],
H. Steven Sims, MD, FACS[d,*]

KEYWORDS

• Laryngeal trauma • Airway • Fracture • Thyroid • Cricoid

KEY POINTS

- Traumatic laryngeal injuries are rare but potentially lethal injuries.
- Management of laryngeal trauma is based on severity and multiple classification systems exist.
- Early intervention to preserve airway and laryngeal function improves long-term outcomes.

- Otolaryngologic Clinics of North America, 2023
- (Category Otorhinolaryngology, 31/67, 2024 journal IF： 1.4)

Introduction & Epidemiology

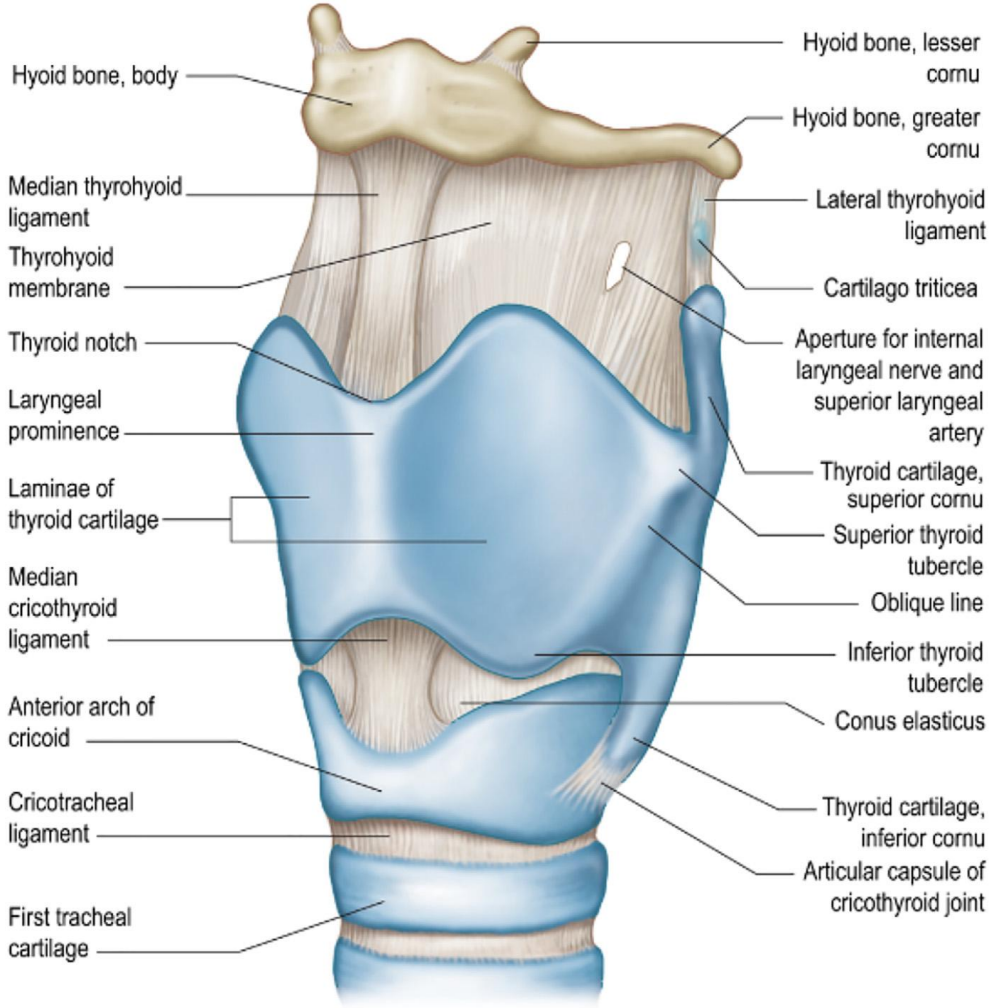
- Incidence between 1/5,000 to 1/137,000 ED visits
- Anatomic Protection: Protected by mandible superiorly, sternum inferiorly, and C-spine posteriorly.
- Primary Goals: Airway patency > Voice quality > Swallow safety

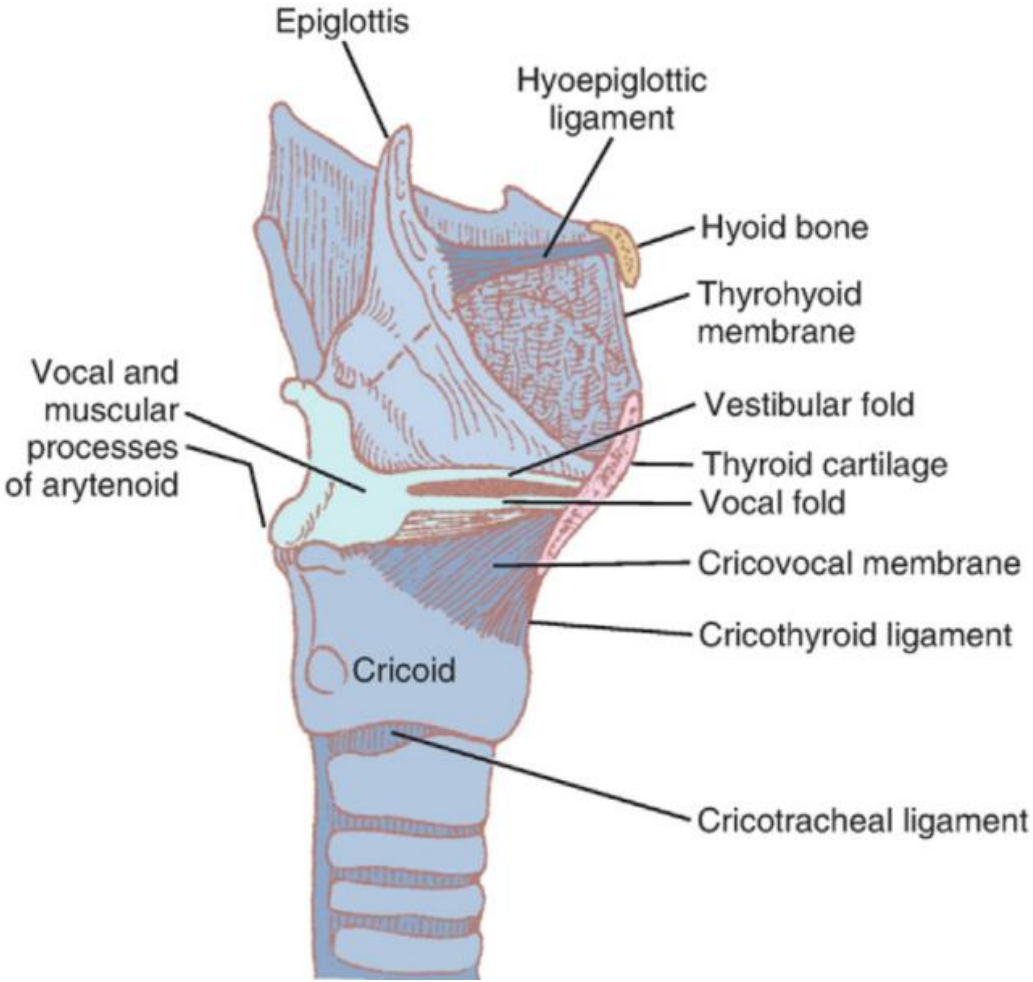
Anatomy & Clinical Correlations

- Epiglottis：Leaf-shaped, Injury can lead to stridor, dysphonia, respiratory distress, and airway compromise
- Thyroid Cartilage: Largest, fractures directly affect vocal cord tension and airway diameter
- Cricoid Cartilage: Fracture leads to subglottic narrowing and associated with laryngotracheal separation
- Arytenoid Cartilages: Dislocation lead to vocal fold immobility, mimicking RLN paralysis

Anatomy & Clinical Correlations

- Superior Laryngeal Nerve (SLN)：
  - External branch provides motor of cricothyroid muscle, injury limits the ability of higher pitched voice
  - Injury of internal branch causes loss of sensation, leading to aspiration and dysphagia
- Recurrent Laryngeal Nerve (RLN)：Controls most intrinsic muscles; injury results in vocal cord paralysis


Hyoid bone, body
Hyoid bone, lesser cornu
Hyoid bone, greater cornu
Median thyrohyoid ligament
Lateral thyrohyoid ligament
Thyrohyoid membrane
Cartilago triticea
Thyroid notch
Aperture for internal laryngeal nerve and superior laryngeal artery
Laryngeal prominence
Thyroid cartilage, superior cornu
Laminae of thyroid cartilage
Superior thyroid tubercle
Median cricothyroid ligament
Oblique line
Inferior thyroid tubercle
Anterior arch of cricoid
Conus elasticus
Cricotracheal ligament
Thyroid cartilage, inferior cornu
Articular capsule of cricothyroid joint
First tracheal cartilage


Epiglottis
Hyoepiglottic ligament
Hyoid bone
Thyrohyoid membrane
Vocal and muscular processes of arytenoid
Vestibular fold
Thyroid cartilage
Vocal fold
Cricovocal membrane
Cricothyroid ligament
Cricoid
Cricotracheal ligament

Mechanisms of Injury

- Blunt Trauma (Most Common)：Caused by motor vehicle accidents, sports, or strangulation.
- Penetrating Trauma：Result from stabbings or gunshot wounds. More likely to have concomitant esophageal or vascular injury

Clinical Assessment

- Classic Triad: Hoarseness, Stridor, Subcutaneous emphysema
- Physical Exam: Tenderness over anterior neck , crepitus, dysphagia and hemoptysis.
- Image:
  - Flexible laryngoscopy (in stable patient)
  - Thin-cut CT with 3D reconstruction

Fuhrman-Schaefer System

Table 1
Fuhrman-Schaefer classification of laryngeal injuries, with permission[8]

Stage	Injury
I	Minor laryngeal hematoma, edema, laceration; no detectable fracture
II	Edema, hematoma, mucosal disruption with no exposed cartilage, nondisplaced fractures
III	Significant edema, noted mucosal disruption, exposed cartilage with or without cord immobility, displaced fractures
IV	Significant edema, noted mucosal disruption, exposed cartilage with or without cord immobility, displaced fractures with 2 or more fracture lines, skeletal instability, anterior commissure trauma
V	Complete laryngotracheal separation

Table 2
Legacy Emanuel Medical Center laryngeal injury classification, with permission[8]

Stage	Diagnostic Findings
I	Minor airway Symptoms ± voice changes No fractures Small lacerations
II	Airway compromise Nondisplaced fractures No cartilage exposure Voice changes ± Subcutaneous emphysema
III	Airway compromise Edema Mucosal lacerations Palpable laryngeal fractures Exposed cartilage Subcutaneous emphysemas Voice changes
IV	Airway compromise Mucosal lacerations Exposed cartilage Palpable displaced laryngeal fractures with skeletal instability Subcutaneous emphysemas Voice changes

Airway management

- Intubation should perform by experienced physician
  - Airway should be intact with minimal visible injury
  - Blunt intubation create false passage and soft tissue damage
  - If intubation is unsuccessful or airway is unstable, surgical airway is needed
- Awake Tracheostomy is preferred
  - Cricothyrotomy carry the risk of laryngotracheal separation
- A 15-years retrospective study shows ~60% (35/56) of pts managed without invasive airway

Clinical, Radiologic, and Endolaryngeal Findings in Laryngeal Fractures: A 15-Year Case Series, 2022 OTO open

Conservative Treatment

- For Schaefer Stage I
- Reversible injuries (mild edema, small hematoma, minor lacerations)
- Head of bed elevation & Voice rest
- Steroid therapy (Both IV & Inhale)
- PPI：Prevent irritation from digestive systems
- For the first 24 hours at least, serial flexible laryngoscopy and airway monitoring should be performed

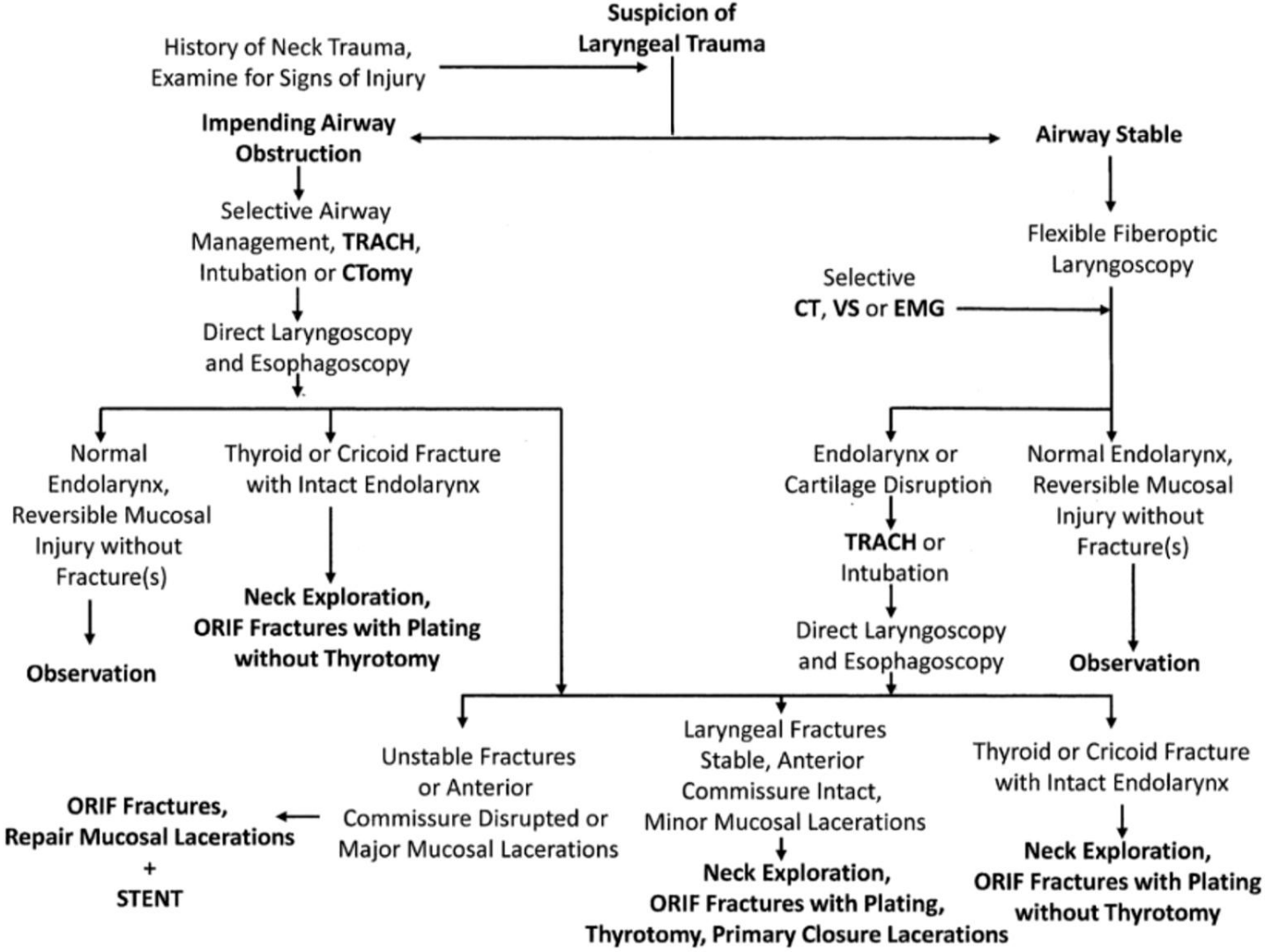
Laryngeal Trauma, Its Types, and Management 2022, Cureus

Share-decision making

- For Schaefer Stage II
- Schaefer (Pro-OP)
  - Surgical fixation even for non-displaced fractures
  - fx may widen weeks after injury and affect the function of the larynx
  - Lower OP threshold in those fractures involving the anterior angle of the thyroid cartilage
- Moonsamy (Pro-Conservative)

Surgical Strategy

- For Schaefer Stage III to V pt
- Surgical repair within 24–48 hours is better
- ORIF with miniplates or non-absorbable suture
- Endolaryngeal stent can consider for comminuted fractures
    - Schaefer recommend against the use of stents if proper mucosal repair
    - If stents are used, soft rather than hard
    - Remove within 14 days to prevent pressure necrosis or granulation


Suspicion of Laryngeal Trauma
History of Neck Trauma, Examine for Signs of Injury
Impending Airway Obstruction
Airway Stable
Selective Airway Management, TRACH, Intubation or CTomy
Direct Laryngoscopy and Esophagoscopy
Flexible Fiberoptic Laryngoscopy
Selective CT, VS or EMG
Normal Endolarynx, Reversible Mucosal Injury without Fracture(s)
Observation
Thyroid or Cricoid Fracture with Intact Endolarynx
Neck Exploration, ORIF Fractures with Plating without Thyrotomy
Endolarynx or Cartilage Disruption
TRACH or Intubation
Direct Laryngoscopy and Esophagoscopy
Normal Endolarynx, Reversible Mucosal Injury without Fracture(s)
Observation
Unstable Fractures or Anterior Commissure Disrupted or Major Mucosal Lacerations
ORIF Fractures, Repair Mucosal Lacerations + STENT
Laryngeal Fractures Stable, Anterior Commissure Intact, Minor Mucosal Lacerations
Neck Exploration, ORIF Fractures with Plating, Thyrotomy, Primary Closure Lacerations
Thyroid or Cricoid Fracture with Intact Endolarynx
Neck Exploration, ORIF Fractures with Plating without Thyrotomy

Back to our Pt

- Schaefer Stage II (Non-displaced thyroid fracture)
- Symptoms progress in a day
- First flexible fiberoptic laryngoscopy→Intubation→Neck CT
- Can consider ICS in initial treatment in ICU

Case report-1

Mehrabi *et al.*
International Journal of Emergency Medicine (2022) 15:55
https://doi.org/10.1186/s12245-022-00459-9

International Journal of Emergency Medicine

CASE REPORT Open Access

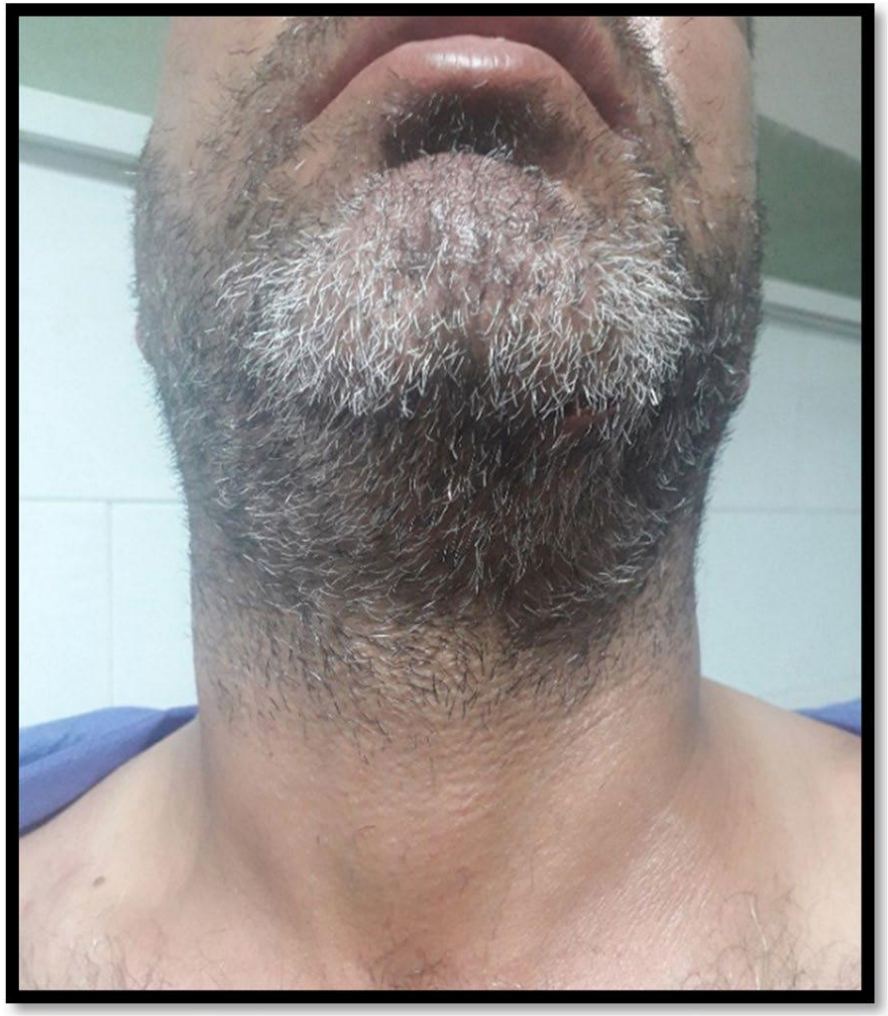
Isolated comminuted fracture of the cricoid cartilage and narrowing of the airway after a traumatic blunt injury of the neck: a case report

Saadat Mehrabi, Reza Hosseinpour and Mohammad Javad Yavari Barhaghtalab*

- Journal：International Journal of Emergency Medicine, 2022
- (Category Emergent Medicine, Q2, 2024 journal IF： 2.0)

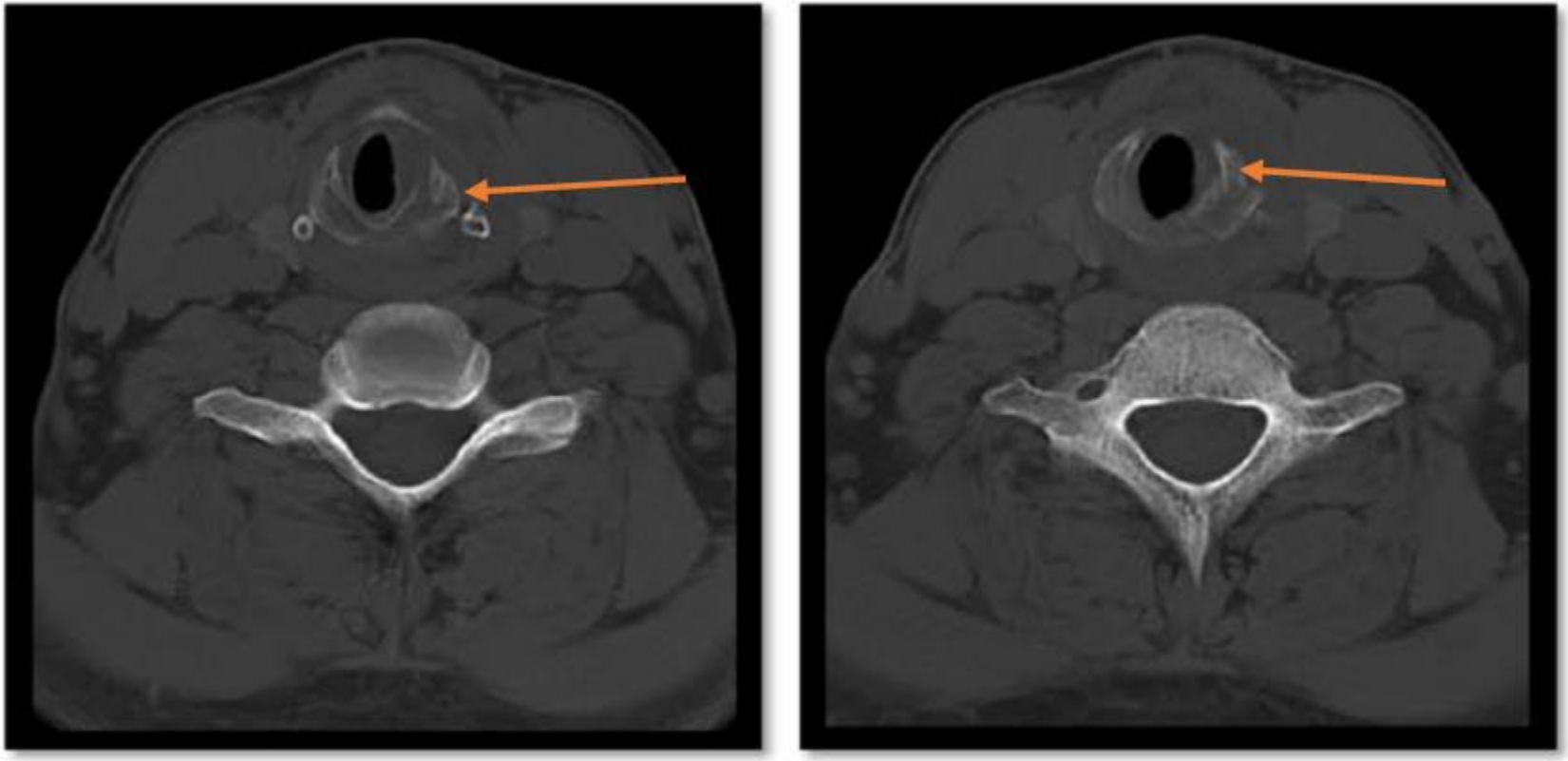
Case Introduction & Initial Presentation

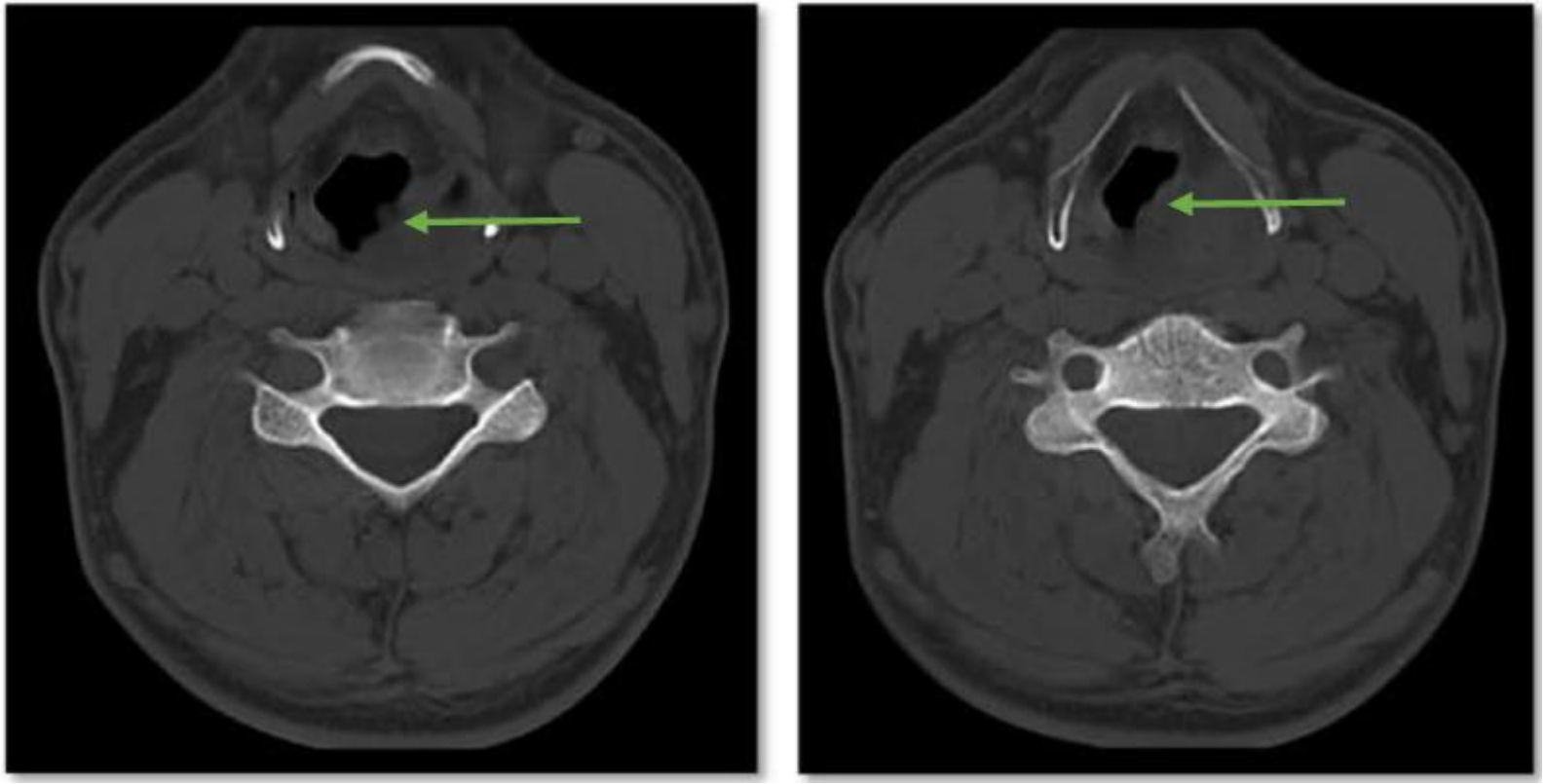
- 43-year-old male
- Mechanism: High-impact blunt neck trauma (Hit by a crane lifting hook)
- Primary Survey (ABCDE):
  - Airway: Patent, no tracheal deviation
  - Breathing: RR 18, SpO2 98% (N/C 3L), Stridor(+)
  - Circulation: BP 100/70 mmHg, HR 92. Bilateral carotid pulses intact.
  - Disability: GCS 15, C-spine stable
  - PE: No external ecchymosis, bruising, or hematoma. No pneumothorax nor subcutaneous emphysema

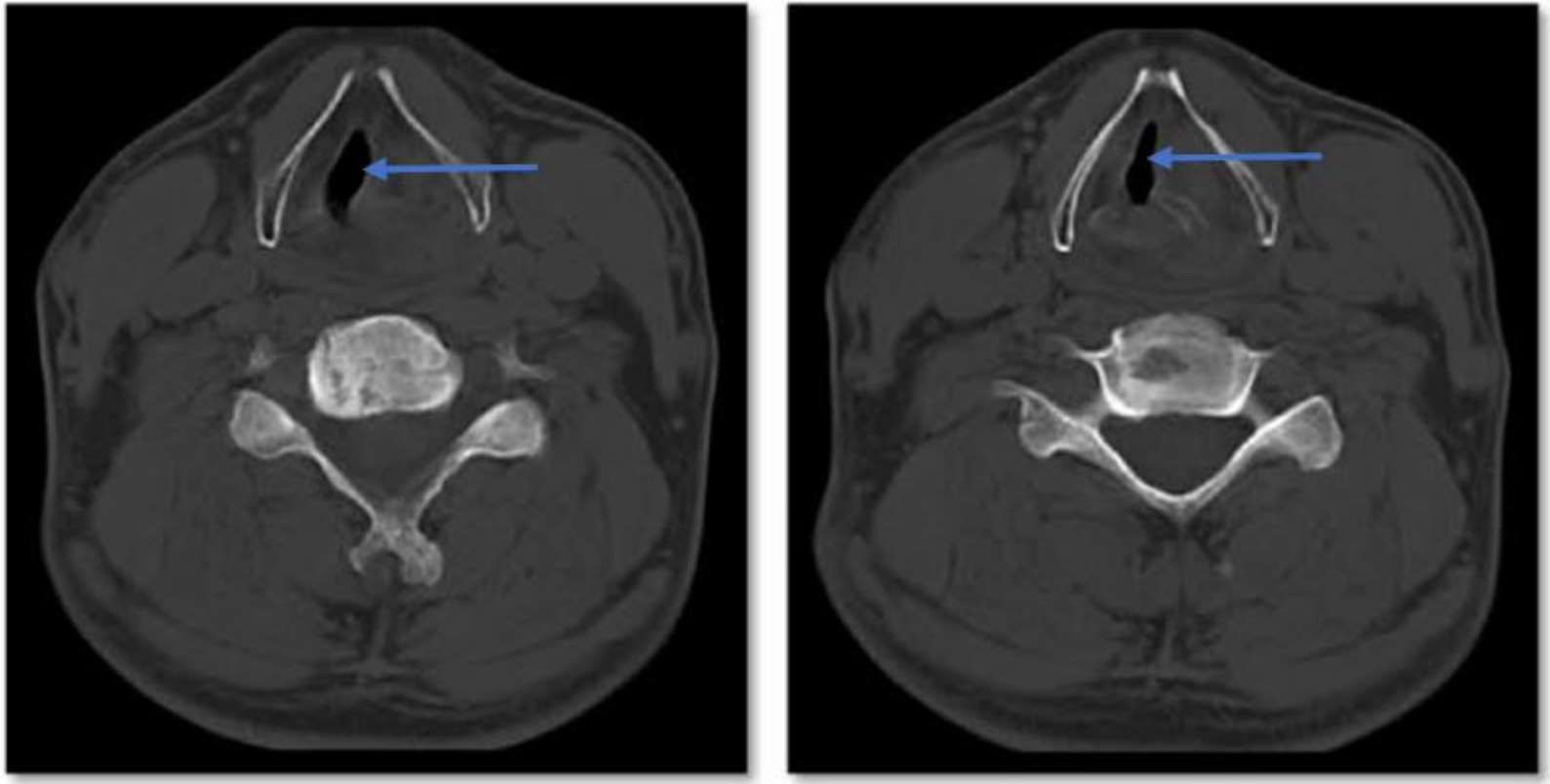


Clinical Progression

- Patient's hoarseness and dyspnea got worse with time
- Neck and chest CT scans were performed
  - Show comminuted fracture of left anterior arch of the cricoid cartilage with mucosal thickening, inflammation, and edema
  - Cause airway narrowing (transverse diameter of the cricoid = 3.7 mm)
- Fiber Laryngoscopy
  - Swelling and congestion of the epiglottis.
  - Edema of the left vocal cord level







Management

- Vital signs remained stable
- Oxygen therapy (3–5 L/min) can maintaine SpO2 > 98%
- Respiratory distress did not progress
- Orotracheal intubation and tracheotomy were not performed
- Pt discharged on Day 4
- Follow-up (Day 11): Dyspnea resolve; Fading dysphonia remain

Discussion

- Isolated cricoid fractures：Rare but carry high mortality due to immediate airway collapse
- Red Flag Sign：Inability to tolerate supine position
  - Consider immediate tracheotomy without performing laryngoscopic examination
- In this patient：
  - Stable vital sign, no respiratory distress, no hematoma
  - No intubation nor tracheostomy were not done
  - Treatment success with supportive care, including continuous monitoring of clinical symptoms and physical examination

Case report-2

The Laryngoscope

WILEY

CASE REPORT OPEN ACCESS

Thyroid Cartilage Fracture Following Endotracheal Intubation

T. Khalid | N. Lloyd | M. Shand | W. Montagne | R. Wang

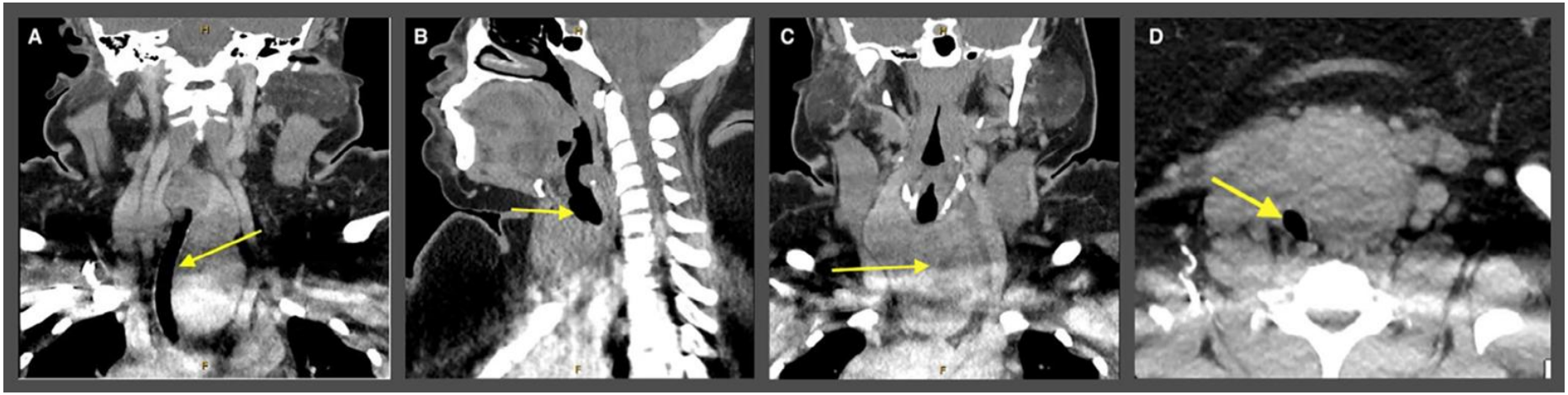
Department of Otolaryngology—Head and Neck Surgery, University of Nevada, Las Vegas, Las Vegas, Nevada, USA

Correspondence: T. Khalid (khalit1@unlv.nevada.edu)

- Journal：The Laryngoscope, 2026
- (Category Otorhinolaryngology, 19/67, 2024 journal IF： 2.0)

Patient Profile

- 41-year-old female, BMI 60
- PHx：Obesity, OSA
- Diagnosis: Come to ER for Acute bronchitis
  - CT show a massive thyroid goiter with substernal extension
  - Tracheal deviation
  - Large mediastinal mass (9.2 × 7.6 cm)
- Referred to cardiothoracic surgery for management


A
B
C
D

Difficult Intubation

Anesthesiologist

- Awake flexible fiberoptic intubation: Fail
- Post-induction (Succinylcholine) using Glidescope + Rigid stylet
  - Stuck at subglottis→Inability to ventilate
- Failed tube exchange →ETT buckled in the oropharynx

ENT

- Miller 2 blade combine with flexible scope to guide a Size 6 ETT into trachea

Intra-operative Finding

After thyroidectomy

- Thyroid Cartilage Fracture (TCF)：Vertical fracture identified
- Subglottic Penetration: ETT visible through a tear in the lateral cricothyroid membrane
- Soft Tissue Injury: Left subglottic mucosal tear
- Mild subcutaneous emphysema in the neck and chest

Surgical Repair

- Laryngeal Reconstruction:
  - Mucosal Repair: 6-0 Prolene for the internal tear.
  - Fracture Reduction: 4-0 Prolene for TCF and cricothyroid membrane
  - Strap muscle flap sewn over the repair site for reinforcement
- Cardiothoracic surgery perform thoracotomy to remove mediastinal thyroid goiter

Post-operative Course

- POD 7: Successful extubation in OR
  - Findings: Bilateral posterior glottis granulomas
- 3-Week Follow-up:
  - Hoarseness improve
  - Wound healed without crepitus
- Flexible Laryngoscopy
  - Bilateral contact ulcers
  - Asymmetric vocal cord motion (Right > Left)

Discussion

- Rare Mechanism
  - TCF from internal iatrogenic force are fewly documented
- In this case: Contributing factors include
  - Tracheal deviation to the right and posteriorly
  - Long-standing morbid obesity
  - Difficult airway exposure
  - Use of a rigid stylet
  - Aggressive intubation with multiple attempts
- TCF and perforation are most likely to have occurred before the patient was turned over to ENT service.

End