

Post-Intubation Laryngeal Injury: Incidence and ManagementJay Vardhan¹, Niranjan Kumar Agyat², Rizwan Ahmad³, Md Ozair⁴, Tanvi Jain⁵¹Senior Resident, Department of ENT, DMCH, Laheriasarai, Darbhanga, Bihar, India²Senior Resident, Department of ENT, DMCH, Laheriasarai, Darbhanga, Bihar, India³Associate Professor, Department of ENT, DMCH, Laheriasarai, Darbhanga, Bihar, India⁴Associate Professor, Department of ENT, DMCH, Laheriasarai, Darbhanga, Bihar, India⁵Junior Resident, Department of ENT, DMCH, Laheriasarai, Darbhanga, Bihar, India

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Abstract:**Background:** Post-intubation laryngeal injury (PILI) is a recognized complication following endotracheal intubation. Although most injuries are mild and self-limiting, severe cases may lead to long-term morbidity, including dysphonia, airway obstruction, and laryngeal stenosis. Understanding incidence patterns and management strategies is essential for improving patient outcomes.**Objective:** To review the incidence, risk factors, clinical presentation, and management strategies of post-intubation laryngeal injury.**Methods:** A review of available literature including observational studies, systematic reviews, and clinical guidelines evaluating adult and Pediatric populations undergoing endotracheal intubation in operative and intensive care settings.**Results:** The reported incidence of laryngeal injury after short-term intubation ranges from 5–30%, with minor mucosal injuries occurring in up to 50–70% of patients. Severe injuries such as vocal fold paralysis, granuloma formation, posterior glottic stenosis, or subglottic stenosis occur in approximately 1–5% of cases. Risk factors include prolonged intubation (>7–10 days), large endotracheal tube size, traumatic or repeated intubation attempts, high cuff pressure, infection, gastroesophageal reflux, and patient comorbidities. Clinical manifestations include hoarseness, stridor, throat pain, dysphagia, and respiratory distress. Management depends on severity. Mild injuries are treated conservatively with voice rest, humidification, corticosteroids, proton pump inhibitors, and speech therapy. Moderate injuries such as granulomas may require medical therapy or microlaryngoscopic excision. Severe cases including stenosis or bilateral vocal cord paralysis may require endoscopic dilation, laser surgery, steroid injection, or open reconstructive procedures such as laryngotracheal reconstruction. Early laryngoscopic evaluation in symptomatic patients improves outcomes and prevents chronic sequelae.**Conclusion:** Post-intubation laryngeal injury is common but often underrecognized. Early identification of risk factors, appropriate preventive strategies, and timely intervention are critical to reducing long-term morbidity. Multidisciplinary management involving anesthesiologists, intensivists, and otolaryngologists is essential for optimal care.**Keywords:** Post-intubation injury, laryngeal trauma, vocal cord paralysis, laryngeal stenosis, airway management.**DOI:** 10.25258/ijcpr.18.2.143This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Endotracheal intubation is a routinely performed procedure in operating rooms, emergency departments, and intensive care units to secure the airway and facilitate ventilation. Although generally considered safe, it is associated with several complications, among which post-intubation laryngeal injury (PILI) remains clinically significant. Laryngeal injury may occur due to mechanical trauma during tube insertion, prolonged mucosal pressure from the endotracheal tube cuff,

ischemia, infection, or repeated airway instrumentation.

The larynx is particularly vulnerable to injury because of its delicate mucosal lining and limited vascular supply. Even short-term intubation can result in mucosal edema, erythema, ulceration, and vocal fold immobility. Prolonged intubation increases the risk of more severe complications such as vocal cord granuloma, posterior glottic stenosis, subglottic stenosis, and cricoarytenoid joint fixation. While many injuries are transient and resolve

spontaneously, a subset of patients develop persistent dysphonia, airway compromise, or long-term structural damage requiring surgical intervention. The reported incidence of post-intubation laryngeal injury varies widely depending on duration of intubation, patient population, and method of assessment. Advances in airway management techniques, improved endotracheal tube design, and monitoring of cuff pressures have reduced severe complications; however, laryngeal morbidity remains an important concern, particularly in critically ill patients requiring prolonged ventilation. Early recognition of symptoms such as hoarseness, stridor, throat pain, or dysphagia is essential to prevent progression to chronic laryngeal pathology. A multidisciplinary approach involving anesthesiologists, intensivists, and otolaryngologists plays a key role in prevention, early diagnosis, and management. This review aims to examine the incidence, risk factors, pathophysiology, clinical presentation, and management strategies of post-intubation laryngeal injury to guide evidence-based clinical practice.

Materials and Methods

Study Design: This was a prospective observational study conducted in the Departments of Anesthesiology and Otolaryngology at Darbhanga Medical College and Hospital Laheriasarai, Darbhanga Bihar. Study duration is one year.

Study Population: A total of 42 patients who underwent endotracheal intubation for elective or emergency surgical procedures or mechanical ventilation in the intensive care unit were included in the study.

Inclusion Criteria

- Patients aged ≥ 18 years
- Patients intubated for more than 24 hours
- Patients providing informed consent (or consent from legal guardian)

Exclusion Criteria

- Pre-existing laryngeal pathology
- History of previous neck or laryngeal surgery
- Known vocal cord paralysis prior to intubation
- Patients with tracheostomy at the time of assessment

Data Collection: Demographic data including age, gender, indication for intubation, duration of intubation, size of endotracheal tube, number of intubation attempts, and cuff pressure monitoring were recorded.

Patients were evaluated clinically for symptoms such as:

- Hoarseness
- Stridor

- Throat pain
- Dysphagia
- Dyspnea

Laryngeal Assessment: All patients underwent laryngeal evaluation within one hour/days after extubation using indirect laryngoscopy or fiberoptic laryngoscopy. Findings such as vocal cord edema, erythema, ulceration, granuloma formation, vocal fold immobility, and signs of stenosis were documented.

Outcome Measures: The primary outcome was the incidence of post-intubation laryngeal injury. Secondary outcomes included type of laryngeal injury, severity of symptoms, and association with duration of intubation.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS version. Continuous variables were expressed as mean \pm standard deviation, and categorical variables were expressed as percentages. The chi-square test or Fisher's exact test was used to assess associations between risk factors and laryngeal injury. A p-value < 0.05 was considered statistically significant.

Results

A total of 42 patients were included in the study. The mean age of patients was 48.6 ± 15.2 years, with a male predominance (26 males, 61.9%) compared to females (16 females, 38.1%). The majority of patients ($n = 28$, 66.7%) were intubated for surgical procedures, while 14 patients (33.3%) required intubation for mechanical ventilation in the intensive care unit.

Duration of Intubation

- 24–72 hours: 18 patients (42.9%)
- 3–7 days: 15 patients (35.7%)
- 7 days: 9 patients (21.4%)

The mean duration of intubation was 4.8 ± 2.9 days.

Incidence of Laryngeal Injury

Post-intubation laryngeal injury was identified in 19 out of 42 patients (45.2%). Among these:

- Mild injuries (edema, erythema): 11 patients (26.2%)
- Moderate injuries (ulceration, granuloma): 5 patients (11.9%)
- Severe injuries (vocal cord immobility, stenosis): 3 patients (7.1%)

Clinical Presentation

The most common presenting symptom was:

- Hoarseness – 16 patients (38.1%)
- Throat pain – 14 patients (33.3%)
- Dysphagia – 9 patients (21.4%)

- Stridor – 3 patients (7.1%)

Persistent hoarseness beyond 2 weeks was noted in 5 patients (11.9%).

Association with Duration of Intubation

The incidence of laryngeal injury increased with prolonged intubation:

- 24–72 hours: 4/18 patients (22.2%)
- 3–7 days: 7/15 patients (46.7%)
- 7 days: 8/9 patients (88.9%)

This association was statistically significant ($p < 0.05$).

Other Risk Factors: Multiple intubations attempts and larger endotracheal tube sizes were associated with higher rates of laryngeal injury. ICU patients demonstrated a higher incidence compared to elective surgical patients.

Discussion

Post-intubation laryngeal injury remains a clinically important yet frequently underrecognized complication of airway management. In the present study of 42 patients, the overall incidence of laryngeal injury was 45.2%, with the majority of cases being mild mucosal injuries. These findings are consistent with previously reported literature, which demonstrates that minor laryngeal changes such as edema and erythema are common after endotracheal intubation, while severe structural injuries are less frequent. The predominance of mild injuries in our study suggests that most laryngeal trauma results from transient mucosal ischemia and mechanical irritation caused by the endotracheal tube and cuff pressure. However, 7.1% of patients developed severe complications such as vocal cord immobility or stenosis, highlighting the potential for long-term morbidity in a subset of patients. A significant association was observed between duration of intubation and the incidence of laryngeal injury. Patients intubated for more than seven days demonstrated a markedly higher rate of injury (88.9%) compared to those intubated for shorter durations. This finding aligns with established evidence that prolonged intubation increases mucosal pressure injury, perichondritis, granulation tissue formation, and risk of posterior glottic or subglottic stenosis. The progressive rise in injury rates with increasing duration underscores the importance of timely extubation and consideration of early tracheostomy in selected cases requiring prolonged ventilation.

Multiple intubation attempts and the use of larger endotracheal tube sizes were also associated with higher injury rates in our cohort. Traumatic intubation can cause direct mucosal tears, arytenoid dislocation, and cricoarytenoid joint injury. Careful airway assessment, use of appropriately sized tubes,

cuff pressure monitoring, and experienced personnel during intubation may reduce these complications.

Clinically, hoarseness was the most common presenting symptom, consistent with the involvement of the vocal folds. Although many cases resolved spontaneously, persistent symptoms beyond two weeks warrant laryngoscopic evaluation to prevent delayed diagnosis of structural injury. Early identification enables timely conservative or surgical management, thereby improving voice and airway outcomes.

The strengths of this study include systematic post-extubation laryngeal evaluation in all patients. However, limitations include the relatively small sample size and short follow-up duration, which may underestimate late-onset complications such as stenosis or granuloma formation. Overall, the findings reinforce that post-intubation laryngeal injury is common, particularly with prolonged intubation. Preventive strategies, early recognition of symptoms, and multidisciplinary management are essential to minimize morbidity.

Conclusion

Post-intubation laryngeal injury is a common complication following endotracheal intubation, with an overall incidence of 45.2% observed in the present study. Although most injuries were mild and self-limiting, a small but significant proportion of patients developed moderate to severe lesions with potential long-term consequences. The incidence of laryngeal injury increased significantly with prolonged duration of intubation, particularly beyond seven days. Additional contributing factors included multiple intubation attempts and larger endotracheal tube sizes. Hoarseness was the most frequent presenting symptom and should not be overlooked in the post-extubation period. Early laryngeal evaluation in symptomatic patients, strict monitoring of cuff pressure, appropriate tube selection, and minimizing duration of intubation are critical preventive measures. A multidisciplinary approach involving anesthesiologists, intensivists, and otolaryngologists is essential for early diagnosis and timely management. Prompt recognition and intervention can reduce long-term morbidity and improve functional voice and airway outcomes in affected patients.

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