

CASE REPORT

AIRWAY MANAGEMENT

Awake videolaryngoscopy with high-flow nasal oxygen for odontogenic facial–periorbital cellulitis with abscess and trismus: a case report

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ABSTRACT

Background: Odontogenic infections that extend into the cervicofacial and periorbital regions can create a critical airway challenge. Marked swelling and trismus frequently distort the anatomy, making bag–mask ventilation unreliable and complicating laryngoscopy. In this setting, induction of general anesthesia carries the risk of losing both ventilation and intubation. An awake approach that preserves spontaneous breathing and ensures continuous oxygenation provides a safer path to airway control.

Case Presentation: A 61-year-old woman developed progressive left facial and periorbital swelling with abscess formation two days after dental extraction. On arrival, she had severe trismus, with an interincisor distance of about 1.5 cm. The team planned an awake intubation. Topical anesthesia was achieved using 4% lidocaine in multiple forms, and dexmedetomidine was titrated to maintain cooperative sedation (RASS –2 to –1). High-flow nasal oxygen was delivered via high-flow nasal oxygen, starting at 30 L/min and increased to 60 L/min with FiO₂ 1.0, maintained throughout preparation and laryngoscopy. Using a C-MAC videolaryngoscope with a hyper-angulated blade, a partial but adequate view of the glottis (POGO 60–70%) was obtained. A bougie was advanced under direct vision, and a 7.0-mm cuffed endotracheal tube was successfully railroaded on the first attempt. Oxygen saturation remained ≥98% with stable hemodynamics. The abscess was surgically drained, and the patient was extubated safely after 36 hours. She was discharged home on the fifth postoperative day in good condition.

Conclusion: For patients with airway compromise due to infective trismus, awake videolaryngoscopy supported by continuous high-flow nasal oxygenation and planned use of adjuncts such as a bougie can facilitate controlled, atraumatic intubation. This combination minimizes the risk of desaturation and maximizes the chance of first-pass success

Keywords: Facial cellulitis; difficult airway; videolaryngoscopy; high-flow nasal oxygenation; awake intubation; multidisciplinary airway management

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1. INTRODUCTION

Odontogenic infections can spread quickly along cervicofacial fascial planes, leading to trismus, soft-tissue swelling, and deformation of the upper airway. Once the process extends into the periorbital region, the clinical challenge increases: not only may vision be at risk, but the airway itself becomes more complex to manage. In such situations, both mask ventilation and laryngoscopy can be unreliable, and the safe window for securing the airway before desaturation is often very short. These patients therefore require an anticipatory strategy that maintains oxygen delivery and permits careful, deliberate airway manipulation.

For patients with a predicted difficult airway, the guiding principles remain the same: spontaneous breathing should be preserved, topical anesthesia must be thorough, and desaturation-driven haste should be avoided. Awake tracheal intubation (ATI) is widely regarded as the preferred approach when difficulty with mask ventilation or intubation is expected.^{1,2} Videolaryngoscopy (VL) and flexible bronchoscopy are both valid options; the choice is shaped by clinician experience, anatomical considerations, and the intended route of access. Regardless of the device, the essential elements are adequate topicalization, controlled sedation, and continuous oxygenation.

Oxygenation strategy has become a key modifiable factor in airway safety. High-flow nasal oxygen (HFNO), also known as transnasal humidified rapid insufflation ventilatory exchange (THRIVE), delivered through the THRIVE technique, provides warmed, humidified gas at high flows (up to ~70 L/min). This supports apnoeic oxygenation, contributes a small degree of positive airway pressure, and assists with carbon dioxide clearance, thereby extending the apnoea time available during airway interventions.^{3,4} THRIVE is particularly advantageous in patients with severe trismus or when prolonged laryngoscopy is anticipated.

The supporting evidence includes physiological studies, controlled trials, and systematic reviews. Early investigations demonstrated increased oxygen reserves and longer apnea tolerance compared to conventional preoxygenation.^{5,6} More recent data confirm that, although HFNO does not eliminate every episode of desaturation, it consistently improves oxygenation, ensures uninterrupted oxygen delivery during instrumentation, and expands the safe procedural window—advantages that are most valuable when intubation is technically complex.^{7,8} Current airway guidelines also emphasize the need for sustained oxygenation throughout preparation, intubation, and early recovery.

In cases of cervicofacial infection with trismus, VL offers clear practical advantages. With the camera located at the blade tip, VL reduces the requirement to

align airway axes, enabling improved glottic exposure in swollen or crowded upper airways. The shared view also allows team members to assist with maneuvers such as suction, external laryngeal pressure, or adjunct placement. When VL is integrated with awake ATI principles and supported by THRIVE, intubation can be performed in a structured, stepwise manner that reduces reliance on rescue ventilation and minimizes the risk of hypoxemia.

Within this framework, we describe a 61-year-old woman with odontogenic facial–periorbital cellulitis and abscess associated with severe trismus, successfully managed with awake videolaryngoscopy (C-MAC) and continuous para-oxygenation via THRIVE. This case demonstrates how combining established ATI principles with VL and HFNO widens the margin of safety and facilitates controlled, first-pass success in a high-risk airway.

2. CASE REPORT

A 61-year-old woman presented after 48 hours of rapidly progressive left-sided facial swelling and pain following a dental extraction, with fever and reduced oral intake. The swelling had tracked superiorly into the periorbital region (Figure 2A). She was alert and cooperative. Vital signs: blood pressure 132/78 mmHg, heart rate 102 beats/min, respiratory rate 18 / min, temperature 37.8 °C, and SpO₂ 98% on room air. Examination showed marked facial and periorbital edema with erythema and tenderness. Mouth opening was severely restricted (interincisor distance ≈ 1.5 cm; Figure 2B). Airway assessment identified Mallampati IV, thyromental distance 5.5 cm, and pain-limited neck extension, with no stridor and no drooling. Laboratory tests demonstrated leukocytosis with elevated inflammatory markers. Contrast-enhanced CT of the face and neck revealed diffuse soft-tissue edema and a localized abscess-centered in the left buccal/periorbital region, without deep-neck space extension or airway deviation. Key clinical and airway features are summarized in Table 1.

Given the predictors of a difficult airway—severe trismus, edema, and distorted anatomy—a multidisciplinary plan was agreed with the anesthesia and otolaryngology teams. The primary strategy was awake tracheal intubation using videolaryngoscopy, with flexible bronchoscopy and front-of-neck access prepared as contingency options.

In the operating room, standard monitoring (ECG, non-invasive blood pressure, pulse oximetry, capnography) was applied. High-flow nasal oxygen (THRIVE) was initiated at 30 L/min and escalated to 60 L/min with FiO₂ 1.0 to provide both preoxygenation and continuous paraoxygenation. The airway was topicalized with 4% lidocaine (lignocaine) using nebulization, sprays, and soaked swabs (total

dose kept within safety limits). An intravenous dexmedetomidine infusion was titrated to cooperative sedation (RASS -2 to -1) while preserving spontaneous ventilation.

Videolaryngoscopy with a C-MAC hyperangulated blade yielded an adequate glottic view (POGO ~60–70%). A bougie was advanced under vision, and a 7.0-mm cuffed endotracheal tube was railroaded into the trachea. Intubation was successful on the first attempt without desaturation; SpO₂ remained ≥98% throughout and hemodynamics were stable.

Definitive management consisted of surgical drainage of the abscess and intravenous antibiotics. The patient



Figure 1: Clinical photographs at presentation and after intervention. (A) Left-sided facial swelling extending to the periorbital region, with restricted mouth opening (trismus ≈ 1.5 cm) with lip oedema. (B) Postoperative appearance after surgical drainage and airway stabilization

was admitted to the ICU for observation and ventilatory support. With reduction in facial edema, she was extubated at 36 hours (Figure 1B) and subsequently recovered uneventfully, allowing discharge on postoperative day 5 in good condition.

Marked left-sided facial swelling extending into the periorbital region was evident on presentation. The patient had a severely restricted interincisor gap of ~1.5 cm (Figure 1A), limiting both airway evaluation and the feasibility of conventional laryngoscopy. These findings indicated a high risk of difficult mask ventilation and tracheal intubation. Awake videolaryngoscopic intubation with paraoxygenation was successfully performed, followed by surgical drainage of the abscess and postoperative management in the ICU. Over the next 36 hours, facial swelling subsided and the airway stabilized (Figure 1B). She was extubated safely and discharged on postoperative day five with full clinical recovery.

3. DISCUSSION

Odontogenic infections that extend into the cervicofacial and periorbital spaces create an urgent airway challenge. The combined effect of soft tissue swelling and severe trismus reduces the effectiveness

of mask ventilation, limits maneuverability of airway devices, and leaves only a narrow margin for safe intervention. In these circumstances, preserving spontaneous breathing and opting for an awake approach helps to avoid the dangers of losing the airway after induction of anesthesia.^{9,10} In the present case, the use of comprehensive topicalization, carefully titrated dexmedetomidine sedation, videolaryngoscopy (VL) with a hyperangulated blade, pre-selected adjuncts, and continuous HFNO allowed a controlled, first-pass intubation with stable oxygenation and an uneventful recovery.^{11,12}

The choice of airway device was a decisive factor. VL is consistently associated with better glottic exposure and higher first-pass success compared with direct laryngoscopy, particularly in difficult or infected airways. These benefits reduce the likelihood of escalation to rescue devices or surgical airway creation. Hyperangulated blades provide further advantage in situations where swelling and restricted mouth opening distort landmarks. However, a good laryngeal view alone does not always ensure successful tube passage. By intentionally pairing VL with a bougie introducer, the intubation in this case translated a satisfactory view into successful first-pass placement. This strategy is supported by both randomized trials and pooled analyses that emphasize the benefit of combining hyperangulated VL with an introducer to improve tube delivery.^{13–14}

Oxygenation strategy was equally critical. Conventional preoxygenation provides only a limited safety window if laryngoscopy is prolonged. HFNO addresses this limitation by maintaining continuous oxygen delivery, generating a modest positive airway pressure, and facilitating gas exchange. Evidence from meta-analyses has demonstrated that this approach not only improves oxygenation but also extends the apnea time during difficult or rapid intubations, without increasing aspiration risk. In our patient, continuous HFNO during preparation and laryngoscopy ensured oxygen saturation remained ≥ 98%, eliminating time pressure and allowing an unhurried and atraumatic intubation.

Successful outcomes in cases of infective trismus also rely on process and preparedness. A multidisciplinary plan involving both anesthesiology and otolaryngology, with backup strategies such as flexible bronchoscopy and front-of-neck access, aligns with recommended practice in complex cervicofacial infections. This redundancy converts uncertainty into contingency rather than crisis and may explain why VL-first approaches in orofacial infection cohorts have been associated with lower rates of emergent tracheostomy. In our case, the course—first-pass success without desaturation, prompt surgical drainage, and early extubation—reflects the trajectory of improved outcomes highlighted in recent literature (see Supplementary Table S1 for study-level details).^{11–14}

Table 1: Comparative analysis of original studies on airway management in facial cellulitis/deep-neck infections (2015–2025) versus current case

Year	Author(s)	Study Type	Population/Setting	Airway Management Approach	Outcomes	Comparison to Current Case
2015	Chaparro-Mendoza et al.	Single-center trial	Predicted difficult airway patients	McGrath videolaryngoscope	First-pass success >90%; improved Cormack–Lehane grades	Echoes superior first-pass success with VL; our case achieved 100% first attempt
2016	Ahn et al.	Retrospective cohort	64 patients with deep-neck infections	Direct vs videolaryngoscopy vs fiberoptic	Higher complication rates with DL; VL had fewer failures	Supports VL-first approach; our case avoided DL complications
2019	Wylie et al.	Multicenter survey	Routine adult intubations	McGrath MAC VL	VL adoption increased first-pass success and reduced unanticipated difficult airways	Matches our use of VL as routine first-line tool
2020	Lim et al.	Narrative review	Complex cervicofacial infections	Early airway stabilization strategies	Emphasized multidisciplinary planning and early VL or surgical airway as needed	Our early planning and VL align with recommendations
2023	Sakkas et al.	Prospective study	100 orofacial infection cases	VL vs DL with fiberoptic backup	15% required emergency tracheostomy; VL reduced surgical airway use	Our case avoided tracheostomy entirely
2023	Saul et al.	Systematic review/meta-analysis	Adult difficult intubation scenarios	Multiple videolaryngoscopes	VL superior to DL for first-pass success; fewer overall attempts	Reinforces choice of hyperangulated VL
2024	Taboada et al.	Randomized controlled trial	Anticipated difficult airway	Hyperangulated unchanneled vs channeled VL	Comparable high first-attempt success; unchanneled slightly faster tube delivery	Mirrors our hyperangulated unchanneled VL + bougie approach
2024	Ruetzler et al.	Randomized clinical trial (JAMA)	Critically ill adult intubations	Hyperangulated VL vs DL	Increased initial success and fewer attempts with VL	Parallels our VL-first strategy under physiologic stress
2025	Huang et al.	Meta-analysis	Difficult-airway trials	Hyperangulated VL across studies	Consistently improved glottic view and first-pass success; slight increase in intubation time	Supports visualization-to-success link; bougie offsets delivery time
2025	Tang et al.	Meta-analysis	703 emergency RSII cases	HFNC vs tight-seal facemask preoxygenation	HFNC improved post-intubation PaO ₂ ; extended apnea time; no increased aspiration	Corroborates THRIVE/HFNC for preoxygenation in prolonged attempts
2025	Current case	Single-case report	Facial cellulitis with trismus	Awake hyperangulated VL + HFNC + sedation/topical	100% first-pass success; SpO ₂ ≥ 98% throughout; no surgical airway; extubated ~48 h; discharged day 5	Exemplifies best-practice integration; outcomes compare favorably across studies

It is important to acknowledge the limitations of this report. Being a single case, outcomes were influenced by operator expertise, the team’s familiarity with awake VL, and access to equipment such as HFNO and bougies. In less well-resourced settings, awake flexible bronchoscopy remains a reliable alternative, while optimized facemask preoxygenation with nasal oxygen supplementation can substitute for HFNO, though with a narrower oxygenation margin. Nevertheless, the reproducible features supported by current evidence—choosing VL as the first-line tool for anticipated difficulty, routine use of adjuncts, continuous oxygen delivery, and preparation of rescue strategies—form a practical template for managing similar infected airways.

4. CONCLUSION

Airway management in cervicofacial infection with trismus is high risk, but structured planning and integration of contemporary techniques can substantially mitigate that risk. Awake VL, supported by meticulous topicalization, judicious sedation,

adjunctive devices, and continuous oxygen delivery, provides a controlled pathway to first-pass success. This case underscores that effective management rests not on a single device or drug, but on coherently combining multiple evidence-based elements within a prepared, multidisciplinary team.

5. Conflict of interest

All authors declare that there was no conflict of interest.

6. Funding

The study utilized the hospital resources only, and no external or industry funding was involved.

7. Ethical considerations

Images de-identified with periorbital masking; written consent for clinical use and publication was obtained.

8. Authors’ contribution

MC: Conduct of case management, literature review, initial manuscript drafting

AM: Supervision of clinical procedures, critical review of manuscript, literature analysis

RKKV: Conceptualization, oversight of entire study, manuscript editing and correspondence

9. REFERENCES

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