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Awake Fiberoptic-Guided Nasotracheal Intubation for Anticipated Difficult Airway Management in a Patient With Advanced Oral Tongue Carcinoma: A Case Report

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Abstract

Large oral tongue tumours can complicate airway management through anatomical distortion, restricted intraoral working space, excessive secretions, and the risk of bleeding. Preserved mouth opening and cervical spine mobility may therefore underestimate the difficulty of airway instrumentation. We report the anaesthetic management of a 67-year-old man with a large left oral tongue lesion associated with progressive dysphagia, odynophagia, excessive salivation, and impaired speech. Airway examination demonstrated marked tongue displacement and a modified Mallampati grade IV airway despite adequate mouth opening and preserved cervical spine mobility. Awake fiberoptic-guided nasotracheal intubation was selected to secure the airway before induction of general anaesthesia while maintaining spontaneous ventilation. Preparation included topical oxymetazoline, intravenous glycopyrrolate, nebulised lidocaine, additional local airway anaesthesia, and spray-as-you-go topicalisation. The cumulative administered lidocaine dose was 160 mg. Intravenous midazolam 1 mg was administered for anxiolysis. A 6.5-mm cuffed endotracheal tube was placed through the right nostril on the first attempt, with bronchoscopic visualisation and continuous waveform capnography confirming tracheal placement. No immediate intubation-related complication was reported. The patient underwent tongue lesion excision, left modified radical neck dissection, and percutaneous endoscopic gastrostomy tube insertion. Histopathology confirmed well-differentiated squamous cell carcinoma. He was extubated while fully awake, observed in the post-anaesthesia care unit, and discharged on postoperative day four. This case illustrates anatomy-based selection of an established awake intubation technique when tumour-related distortion is not fully reflected by conventional airway measures. It does not establish comparative superiority or validate a particular topicalisation regimen.

Categories: Otolaryngology, Anatomy, Anesthesiology
Keywords: airway management, anesthesia, awake fiberoptic intubation, awake tracheal intubation, case report, difficult airway, fiberoptic bronchoscopy, head and neck cancer, nasotracheal intubation, oral tongue carcinoma

Introduction

Airway management in patients with large oral tongue tumours requires assessment of both conventional airway predictors and tumour-related anatomical changes. A bulky lesion may displace the tongue, restrict the space required for laryngoscopy, and produce excessive secretions. Instrumentation may traumatise friable tissue and cause bleeding that obscures the airway. Following induction of general anaesthesia, loss of airway tone may further compromise airway patency and complicate ventilation or rescue-device placement. Failure to maintain oxygenation can have serious consequences and may require emergency front-of-neck airway access [1,2].

Awake tracheal intubation permits the airway to be secured before induction while spontaneous ventilation is maintained. Technique selection depends on the anticipated difficulty of intubation and ventilation, the consequences of failure, operator experience, and available rescue arrangements [1-3]. In head and neck malignancy, assessment of the lesion's location and effect on airway access is particularly important [4].

Flexible bronchoscopic techniques have been described extensively in patients with difficult airways caused by head and neck pathology [5,6]. Awake videolaryngoscopy provides another established option, with comparative evidence from randomised trials [7]. Retrograde wire-guided intubation or an awake surgical airway may also be appropriate in selected circumstances [2,3]. Selection must account for the individual anatomy and surgical requirements.

Airway planning extends beyond intubation. Oral cavity and neck surgery may introduce postoperative risks through swelling, bleeding, and altered anatomy, potentially complicating extubation or reintubation. A planned approach to extubation and post-extubation care is consequently important [8].

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We report the case of a patient with a large oral tongue squamous cell carcinoma in whom marked tumour-related distortion coexisted with preserved mouth opening and cervical spine mobility. This case highlights the relationship between the lesion's anatomy and the decision to establish tracheal access while maintaining spontaneous ventilation.

Case Presentation

A 67-year-old man weighing 59.5 kg presented for elective excision of a large left oral tongue lesion, left modified radical neck dissection, and percutaneous endoscopic gastrostomy (PEG) tube insertion. He had first noticed a small ulcer on the left lateral border of his tongue approximately four months earlier. During the preceding six weeks, progressive enlargement was associated with dysphagia, predominantly to solid food, odynophagia, excessive salivation, impaired speech, and persistent left-sided tongue pain. He consequently changed to a predominantly liquid diet. He denied dyspnoea, choking episodes, or aspiration. His medical history revealed no known comorbidities, previous surgery, regular medications, or drug allergies. He was a non-smoker but reported a long-standing history of tobacco and areca nut chewing.

Functional capacity was assessed through a history: the patient reported walking independently and climbing one flight of stairs without breathlessness or chest pain. His Eastern Cooperative Oncology Group (ECOG) performance status was 0 [9]. At preoperative evaluation, he was hemodynamically stable with normal oxygen saturation on room air. Cardiovascular, respiratory, and neurological examinations were unremarkable. Complete blood count, coagulation profile, renal function, and liver function tests were within normal limits. Electrocardiography showed sinus bradycardia with first-degree atrioventricular block. American Society of Anesthesiologists (ASA) physical status was recorded as II in the pre-anaesthetic assessment.

Airway assessment and planning

Mouth opening exceeded three fingerbreadths. Cervical spine mobility was preserved. Thyromental distance was 7 cm, and neck circumference was 38 cm. Trismus was not present. Multiple dental caries were noted, and no loose teeth were present.

A large ulceroproliferative lesion involved the left lateral and posterolateral tongue, extending toward the floor of the mouth and adjacent gingiva. The lesion displaced the tongue toward the contralateral side and restricted intraoral working space (Figure *1*). Its posterior extent could not be adequately visualised clinically. Oral malodour was present, and the modified Mallampati classification was grade IV [10].



FIGURE 1: Preoperative clinical photograph demonstrating a large ulceroproliferative lesion involving the left lateral and posterolateral tongue with extension to the floor of the mouth.

The lesion caused marked distortion of the oral cavity, displacement of the tongue toward the contralateral side, and narrowing of the available working space for conventional airway instrumentation.

Nasal patency was assessed by asking the patient to breathe through each nostril while the opposite nostril was occluded, demonstrating better airflow through the right nostril. The right nostril was therefore selected for nasotracheal intubation.

Despite preserved mouth opening and neck mobility, direct laryngoscopy was anticipated to be difficult because of tumour-related distortion and restricted posterior oral access. Instrumentation also posed a risk of tumour trauma and bleeding. These findings raised concern that induction before securing the trachea could complicate ventilation and rescue airway instrumentation. The airway plan was discussed by the consultant anaesthesiologist and the on-call ENT surgeon. Awake fiberoptic-guided nasotracheal intubation was selected to maintain spontaneous ventilation until tracheal access was secured and to preserve oral access for surgery.

A consultant anaesthesiologist performed the intubation, while a second anaesthesiologist administered sedation and monitored the patient. The on-call ENT surgeon was present in the operating theatre, with surgical-airway equipment immediately available. The agreed strategy for unsuccessful awake intubation was to stop instrumentation, maintain oxygenation, and reassess if the patient could not tolerate the attempt. The alternative airway plan and criteria for postponing surgery were discussed with the surgical team. The patient and his family were counselled about the procedure, potential complications, possible emergency front-of-neck airway access, postoperative ventilation, and intensive care admission.

Airway preparation and awake intubation

A difficult-airway cart was prepared with a flexible fiberoptic bronchoscope, alternative airway devices, suction equipment, and emergency surgical airway equipment. Continuous electrocardiography, pulse oximetry, and non-invasive blood pressure monitoring were instituted. The patient's upper body was elevated approximately 45° above horizontal (Figure *2*). Elevating the head of the bed to 45° dramatically optimizes functional residual capacity (FRC), improves pre-oxygenation efficiency, extends safe apnea time, and utilizes gravity to prevent the soft palate, tongue, and pharyngeal tissues from collapsing backward into the airway.



FIGURE 2: Awake fiberoptic-guided nasotracheal intubation performed through the right nostril in the 45° sitting position.

Standard monitoring, supplemental oxygen via nasal cannula, and topical airway anesthesia were used while preserving spontaneous ventilation throughout the procedure.

Two drops of 0.05% oxymetazoline were administered to each nostril three minutes before instrumentation. Glycopyrrolate 0.2 mg was administered intravenously as an antisialagogue. Airway topicalisation consisted of three nebulisations of 2 mL of 2% lidocaine, administered 15 minutes apart, with oxygen delivered by nasal prongs between nebulisations. A paratracheal block was performed using 2 mL of 1% lidocaine, followed by spray-as-you-go topicalisation with a further 2 mL of 1% lidocaine. Lidocaine 4% was unavailable at our facility; therefore, 2% lidocaine was used for nebulization.

Oxygen was delivered through nasal prongs at 3 L/minute between nebulisations and during scope insertion. Midazolam 1 mg was administered after topicalisation and before introduction of the bronchoscope. The patient remained cooperative and maintained spontaneous ventilation. Airway preparation and medication administration are summarised in Table *1*.

Intervention	Preparation or administration
Patient position	Upper body elevated approximately 45 degrees above horizontal
Nasal vasoconstrictor	Oxymetazoline 0.05%, two drops in each nostril, 3 minutes before instrumentation
Antisialagogue	Glycopyrrolate 0.2 mg intravenously
Nebulised lidocaine	Three administrations of 2 mL of 2% lidocaine, 15 minutes apart
Total nebulised lidocaine dose	120 mg
Additional airway block	Paratracheal block using 2 mL of 1% lidocaine
Lidocaine dose for the block	20 mg
Spray-as-you-go topicalisation	2 mL of 1% lidocaine
Spray-as-you-go lidocaine dose	20 mg
Cumulative administered lidocaine dose	160 mg
Sedation	Midazolam 1 mg intravenously, administered after topicalisation and before introduction of the bronchoscope
Oxygen between nebulisations	Nasal prongs at 3 L/min
Oxygen during intubation	Nasal prongs at 3 L/min during bronchoscope insertion

TABLE 1: Airway preparation for awake fiberoptic-guided nasotracheal intubation

The cumulative administered lidocaine dose was 160 mg (approximately 2.69 mg/kg for a body weight of 59.5 kg).

A flexible bronchoscope preloaded with a 6.5-mm cuffed endotracheal tube was introduced through the right nostril. The vocal cords were identified (Figure *3*), and the bronchoscope was advanced through the glottis into the trachea under direct vision. The tube was advanced into position. Tracheal placement was confirmed by bronchoscopic visualisation and continuous waveform capnography; bilateral chest expansion was also observed.

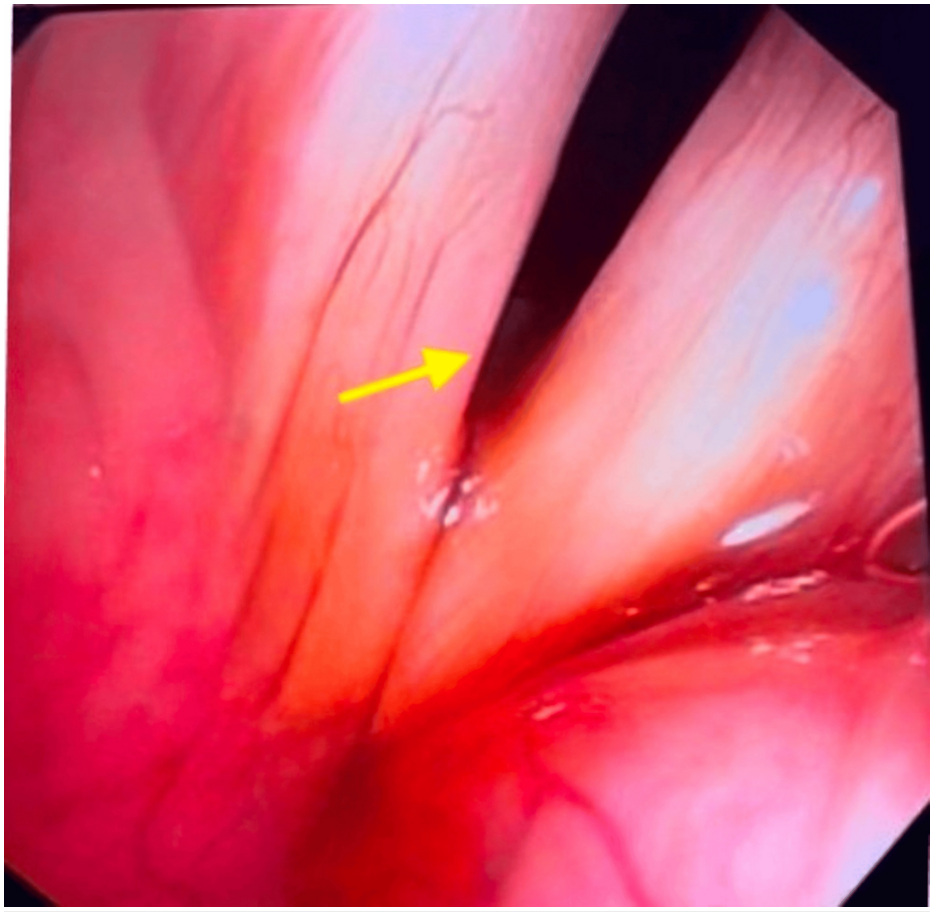


FIGURE 3: Endoscopic visualization of the glottic inlet during awake fiberoptic nasotracheal intubation.

The vocal cords and glottic opening are visible immediately before advancement of the bronchoscope into the trachea. The yellow arrow indicates the glottic opening.

Intubation succeeded on the first attempt, and the interval from bronchoscope insertion to confirmation of tube placement was four minutes. During this period, peripheral oxygen saturation (SpO2) was 97-99%, heart rate 60-74 beats/minute, and blood pressure 118-136/68-80 mmHg. No desaturation, clinically significant haemodynamic instability, epistaxis, tumour trauma, or airway obstruction was reported.

General anaesthesia and surgery

After tracheal tube placement was confirmed, general anaesthesia was induced with intravenous propofol 50 mg and fentanyl 100 μg. Adequate anaesthetic depth was assessed by the absence of response to verbal commands and loss of the eyelash reflex before atracurium 30 mg was administered. Additional doses of atracurium were given as required throughout the operation. Anaesthesia was maintained with sevoflurane in an oxygen-air mixture.

The patient underwent tongue lesion excision, left modified radical neck dissection, and PEG insertion. Surgery lasted 180 minutes. Estimated blood loss was 200 mL, and 1,000 mL of crystalloid was administered. Intraoperatively, no airway obstruction, oxygen desaturation, or ventilation difficulties were observed.

Extubation and postoperative airway care

At completion of surgery, the anaesthesiologist and surgeon reassessed the airway. No active oral bleeding or clinically significant swelling was observed. The team proceeded with awake extubation after assessing airway patency and recovery.

Residual neuromuscular blockade was managed with neostigmine 2.5 mg and glycopyrrolate 0.2 mg. Recovery was confirmed using quantitative neuromuscular monitoring, demonstrating a train-of-four ratio of 0.95. Before extubation, the patient was fully awake, followed verbal commands, and demonstrated a strong cough and the ability to swallow and manage secretions. Respiratory rate was 16 breaths/minute, and

SpO2 was 99% while receiving 40% oxygen through the anaesthetic circuit. Spontaneous ventilation was regular, with adequate tidal volumes and an end-tidal carbon dioxide of 38 mmHg.

Extubation was performed in the operating theatre with the patient in a head-up position and the consultant anaesthesiologist, anaesthetic assistant, and operating surgeon present. The contingency plan included reintubation using a flexible bronchoscope or videolaryngoscope, with difficult-airway equipment immediately available and the on-call ENT team prepared for emergency front-of-neck airway access. The tube was removed while the patient was fully awake. Immediate assessment demonstrated unobstructed airflow, regular chest movements, bilateral breath sounds, and no stridor. SpO2 was 99% while receiving oxygen at 5 L/minute through a face mask.

The patient was transferred to the post-anaesthesia care unit (PACU) and observed for two hours. Monitoring comprised continuous pulse oximetry and electrocardiography, with non-invasive blood pressure, respiratory rate, and consciousness assessed every 15 minutes. Oxygen was administered through a face mask at 5 L/minute for the first 30 minutes, then discontinued after satisfactory oxygenation on room air. During PACU observation, oxygen saturation ranged 97-100%, respiratory rate 14-18 breaths/minute, blood pressure 110-130/70-85 mmHg, and heart rate 75-90 beats/minute.

No stridor, increased work of breathing, airway obstruction, or active bleeding was observed, and the patient cleared secretions independently. No immediate post-extubation airway complication was reported. Transfer criteria included full alertness, a patent airway, stable haemodynamic observations, SpO2 of at least 97% on room air, and adequately controlled pain and nausea. Subsequent care took place on the surgical ward, with SpO2, respiratory rate, work of breathing, and consciousness assessed hourly for the first four hours. No further respiratory support or airway intervention was required.

Recovery was reported as uneventful. The neck drain was removed on postoperative day three, and the patient was discharged in stable condition on day four. Histopathology confirmed well-differentiated squamous cell carcinoma of the oral tongue. Outpatient follow-up was arranged for review and further oncological management.

The final histopathology report documented well-differentiated squamous cell carcinoma of the left tongue (Figure *4A*-*4C*). The specimen was received in fragments; the largest tumour mass measured 5.3 × 4.5 × 2 cm. Tumour deposits were present in the fragments designated as the underlying stalk, and the inferior (stalk) margin was reported as involved. Depth of invasion was not determined in the pathology report. Six lymph nodes were identified microscopically, all negative for tumour (Figure *4D*). Outpatient follow-up was arranged for review of the pathology findings and further oncological management.

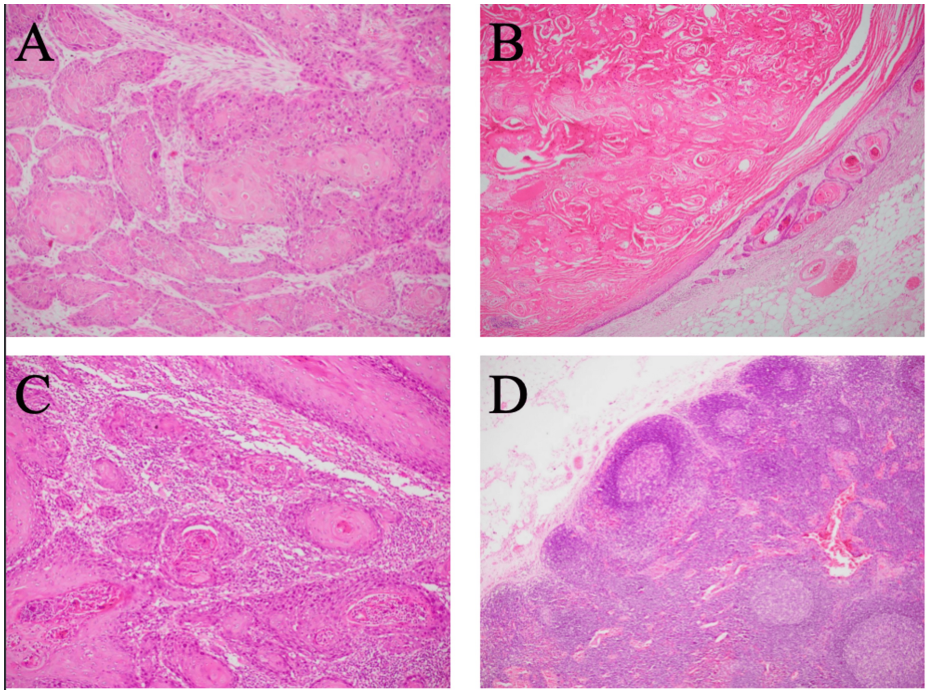


FIGURE 4: Histopathological findings in the excised oral tongue lesion and cervical lymph node (hematoxylin and eosin stained)

(A) Neoplastic squamous cells with hyperchromatic, moderately pleomorphic nuclei, prominent nucleoli, and occasional mitotic figures (×400). (B) Extensive keratinization (×100). (C) Edematous intervening stroma with polymorphonuclear and mononuclear inflammatory infiltrates (×200). (D) Reactive lymph node (×100).

Discussion

The principal educational feature is the coexistence of preserved mouth opening and cervical mobility with substantial tumour-related restriction of oral access. The lesion displaced the tongue, occupied intraoral working space, and prevented adequate clinical visualisation of its posterior extent. Secretions and potential bleeding introduced additional difficulty. In patients with head and neck cancer, assessment of the lesion itself is therefore important alongside conventional bedside measures [4,6].

The anticipated difficulty arose from restricted access and potential tumour trauma rather than demonstrated failure of direct laryngoscopy. Securing the trachea while the patient remained awake allowed spontaneous ventilation to continue during instrumentation. This was consistent with recommendations to consider awake intubation when difficulty with airway management is anticipated [1-3]. The absence of reported dyspnoea before surgery did not establish that airway management after induction would be straightforward.

The nasal route preserved oral surgical access and reduced the need to pass the tube through the tumour-bearing mouth. Flexible bronchoscopy allowed navigation under direct vision. Nevertheless, awake bronchoscopic intubation does not eliminate the risks of bleeding or obstruction. Huitink et al. described an adapted fibrecapnic technique in head and neck cancer patients and reported a patient who developed severe tumour bleeding and acute obstruction during tube advancement [5]. Although that technique differs from the one used here, the event illustrates the importance of preparation for deterioration during airway instrumentation.

Awake videolaryngoscopy is another established option. Merola et al. reported shorter intubation times with videolaryngoscopy than with fiberoptic bronchoscopy across the included randomised trials [7]. Such findings do not determine the optimal technique for every tumour-distorted airway. Blade insertion, oral working space, the risk of lesion contact, surgical requirements, and operator expertise remain relevant. The restricted oral access in the current patient supported selection of a flexible nasal approach.

Retrograde wire-guided intubation and an awake surgical airway may be appropriate alternatives in selected circumstances [2,3]. Their suitability depends on anatomy, expertise, urgency, and resources. They should not be presented as having been considered by the treating team unless that discussion is documented. Similarly, equipment preparation alone does not establish immediate availability of a clinician capable of performing emergency surgical airway access. The actual failed-intubation strategy and team arrangements

are necessary components of the case description.

Effective topicalisation, cooperation, oxygenation, and cautious sedation are central to awake intubation. The cumulative administered lidocaine dose was 160 mg. Use of nebulised 2% lidocaine reflected local availability and should not be interpreted as validation of that concentration or the combined regimen. Difficult Airway Society (DAS) guidance recommends testing topicalisation, avoiding substitution of sedation for inadequate airway anaesthesia, and confirming tube placement by visualisation and capnography before induction [1]. Both confirmation methods were reported here. Interpretation of the remaining procedural elements depends on the verified oxygen delivery, block technique, and sedation details.

Postoperative airway assessment is a separate concern from successful intubation. Oral cavity and neck surgery may cause swelling, bleeding, or anatomical changes that complicate extubation and reintubation. Extubation guidance emphasises risk assessment, preparation, and planned postoperative care [8]. Awake extubation and PACU observation were reported in this patient, but these statements alone do not establish recovery from neuromuscular blockade, respiratory adequacy, or suitability for immediate extubation. Interpretation must be supported by the actual airway examination, recovery criteria, rescue arrangements, and postoperative observations.

It has to be noted that as this was a single-patient report, it cannot establish comparative efficacy, general safety, or the contribution of individual medications to the outcome. This report illustrates anatomy-based decision-making when preserved conventional airway measures coexist with substantial tumour-related restriction of access.

Conclusions

A large oral tongue tumour may substantially restrict airway access despite preserved mouth opening and cervical spine mobility. In this patient, awake fiberoptic-guided nasotracheal intubation secured the trachea on the first attempt while spontaneous ventilation was maintained. The case illustrates the importance of assessing tumour-related distortion alongside conventional airway predictors when selecting an airway strategy. It does not establish comparative superiority or validate a particular topicalisation regimen.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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