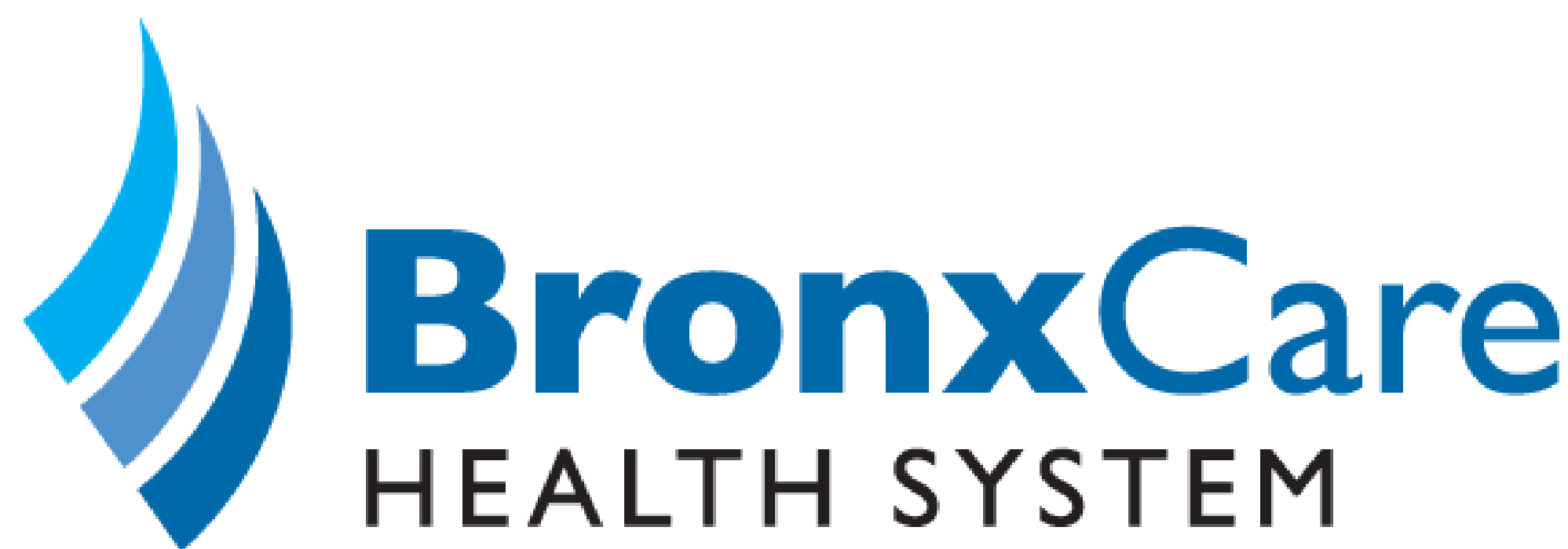


ACEi-ng Difficult Airway Management in Patients Afflicted with Bradykinin Mediated Angioedema

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Introduction

- **Angioedema:** Swelling of soft tissue due to loss of vascular integrity, leading to fluid leakage into interstitial spaces.
- **Bradykinin Mediated vs Histamine mediated:** Two main types; bradykinin-mediated and histamine-mediated (hypersensitivity-like)
- **Bradykinin-mediated angioedema:** Caused by either hereditary loss of C1 esterase inhibitor or drug-induced inhibition of bradykinin metabolism.
- **ACE inhibitors (ACEis):** Common drug cause of bradykinin-mediated angioedema, responsible for 30% of cases, with incidence of 0.1-0.7%, often within first few months of use.
- **Mast cell induced histamine angioedema:** associated with anaphylaxis symptoms like urticaria and can be treated with antihistamines or epinephrine
- **Airway compromise:** Bradykinin-induced angioedema with airway involvement is a medical emergency, requiring urgent airway management, intubation, and treatments like fresh frozen plasma or icatibant.

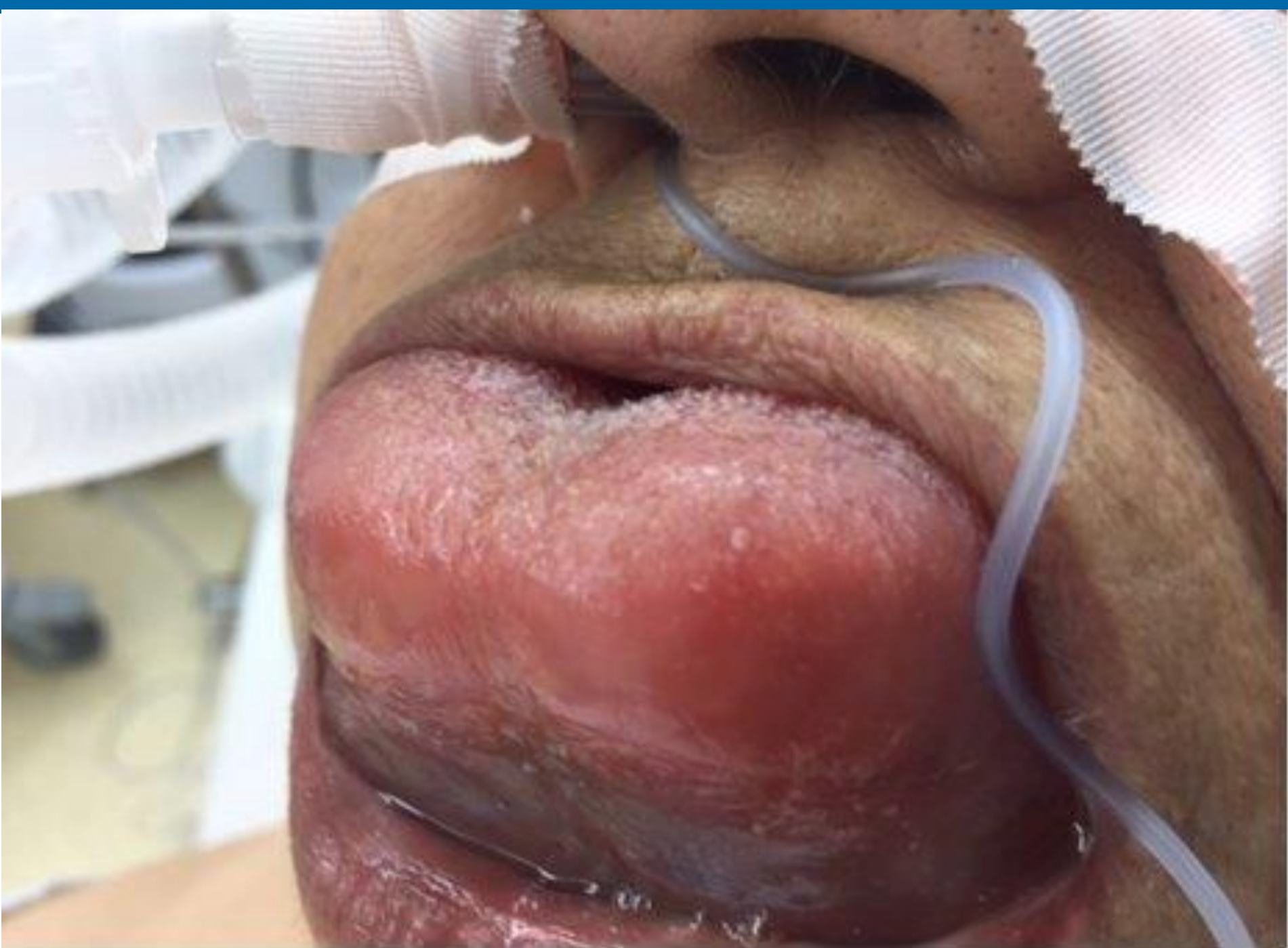


Figure 1: Case 2 post intubation displaying severe macroGLOSSIA due to angioedema swelling



Figure 2: Case 3 post intubation displaying similar severe macroGLOSSIA due to angioedema swelling

Case 1

A 51 year old HIV positive male with a history of hypertension on Lisinopril, presents to the emergency room complaining of rapidly progressing sudden onset throat pain and swelling that started earlier in the morning prior to taking his home medications. Further imaging with CT neck revealed extensive diffuse angioedema of the upper aerodigestive tract as well as esophageal wall thickening which may be associated with angioedema or reactive lymph nodes from HIV. Conservative management in the emergency room was unsuccessful and the patient began displaying signs of dyspnea, so an airway code was called where laryngoscopic evaluation showed a Grade 4 airway requiring emergent airway protection. The patient was orally intubated with a cuffed Miller 3 #7.0 and placement was confirmed with a satisfactory positive end tidal CO2 (ETCO2), breath sounds, and chest x-ray. The procedure is completed with no further complications and subsequent vitals continue to be stable.

Case 2

A 68 year old female with a past medical history of hypertension and type 2 diabetes mellitus successfully underwent a surgical incision and drainage of the left foot and is recovering in the post-anesthesia care unit (PACU) when she began complaining of swelling around the lips. At the initial presentation, the patient was hemodynamically stable, saturating well, and able to participate in conversation comfortably. Prior to this event in the operating room, the patient was given 2 mg midazolam and was induced with 250mg of propofol, 100mcg fentanyl, and 120 mg succinylcholine. To alleviate the lip swelling, the patient was administered 50 mg IV diphenhydramine and 10 mcg IV epinephrine twice, which was successful in reducing the lip swelling. However, an hour later the patient developed a new onset of severe macroGLOSSIA with concomitant signs of airway closure like dyspnea and difficulty speaking (Figure 1). The decision was made to prophylactically intubate the patient in the operating room to protect the airway and the surgical team was asked to standby in case a surgical airway was needed following a failure to intubate. Following administration of 2 mg midazolam for sedation, a 4% lidocaine spray via atomizer was administered into the nostrils and the patient was intubated with an endotracheal tube into the right nostril using a pediatric fiberoptic scope. Placement was confirmed with direct visual confirmation and satisfactory ETCO2 readings

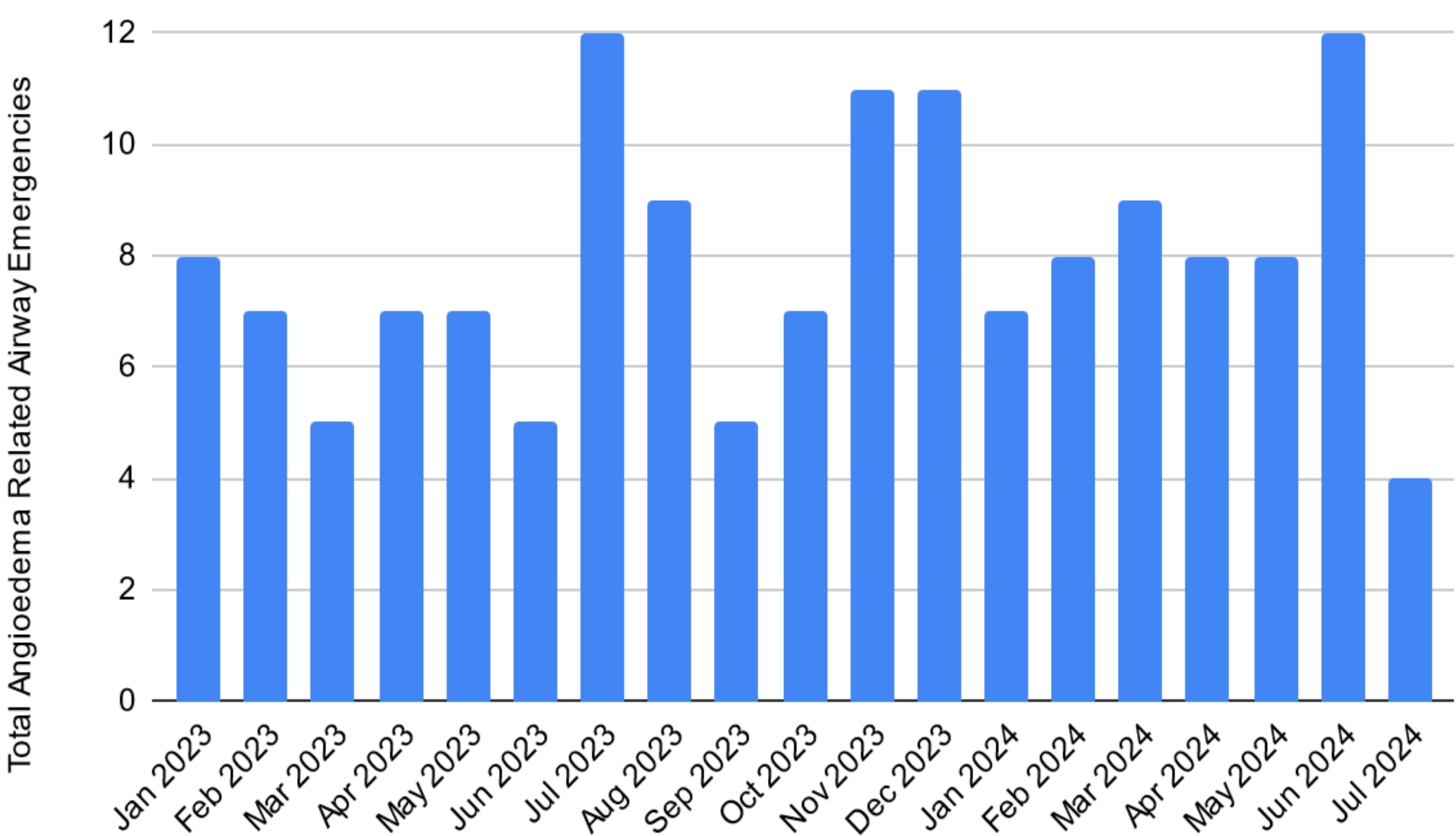
Case 3

A 78 year old man with a past medical history of hypertension treated with lisinopril presents with severe macroGLOSSIA and difficulty breathing. Bradykinin mediated angioedema is immediately suspected and the patient is brought to the operating room floor and prepared for an awake intubation using the fiber optic scope, similarly to the patient in Case 2. The airway is topicalized with benzocaine spray and 2 mg midazolam is administered for sedation. The patient's neck is draped in sterile fashion and local anesthetic is injected in anticipation of potentially requiring a surgical airway. An endotracheal tube is then passed into the right nostril under fiber optic scope guidance and secured. Good tube positioning and positive ventilation is confirmed with appreciable chest movement, tube condensation, and positive ETCO2 readings.

Discussion

- **Rapid Sequence Intubation (RSI):** Gold standard care for critically ill patients needing airway protection, involving sedative and neuromuscular blocking agent (NMBA) for smooth intubation, with a >70% first-attempt success rate.
- **Concerns in Angioedema:** RSI in severe angioedema cases with airway obstruction is challenging due to risks associated with paralytic agents like succinylcholine (rapid onset, 5-15 min duration) and rocuronium (slower onset, 45 min duration).
- **Alternative Approach:** In cases of severe airway obstruction, fiber optic awake intubation via nasal approach with trach airway prepped as backup may be preferred to avoid the risks of paralysis if intubation is unsuccessful.
- **Angioedema Incidence in Bronx Hospital:** Higher-than-literature rates of angioedema-related airway swelling, with improved outcomes due to increased provider education and enhanced inter-department communication.
- **Protocol Changes:** Faster recognition of bradykinin-mediated angioedema (vs. histamine-mediated) allows for quicker treatment with 2-4units of fresh frozen plasma, tranexamic acid, and Icatibant (Bradykinin B2 receptor antagonist), potentially reducing need for emergency intubation. Requirement for intubation post-therapy is made based on clinical judgement
- **Recurrence Risk:** Patients with a history of severe angioedema, particularly those with airway compromise, are at high risk for recurrence and should have optimized home medications to prevent future incidents.

Angioedema Related Airway Emergencies at Bronxcare



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