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Case Report

Endotracheal intubation in severe post-burn mentosternal contracture: An anesthetist's challenge: A case report

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Abstract

Background: Post-burn mentosternal contracture presents major challenges during airway management due to restricted mouth opening, distorted cervical anatomy, trachael deviation and limited neck mobility in reconstructive surgery.
Case Presentation: A 19-year-old male with severe type 3b mentosternal contracture following extensive flame burns, who required reconstructive surgery. A planned strategy involving facemask ventilation, contracture release under sedation and local anesthesia, and subsequent videolaryngoscopic intubation was employed. Following release, neck extension and mouth opening improved, allowing successful bougie-assisted intubation despite significant anatomical distortion. Intra-operative and post-operative periods were uneventful.
Conclusion: This highlights the need for individualized airway strategies in severe post-burn neck contractures, supporting contracture release prior to intubation where conventional or fibreoptic techniques may be impractical.

Keywords: Airway management, Post-burn mentosternal contracture, Type 3b mentosternal contracture, Major anaesthetic challenge, Contracture release, Indirect videolaryngoscopy.

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1. Introduction

Post-burn mentosternal scar contracture with limited head and neck mobility poses a major anesthetic risk during reconstructive procedures. Patients may present with restricted mouth opening, reduced oropharyngeal space, distortion in the anatomical alignment of the airway structures, cervical spine distortion, and fixed neck flexion deformity. These factors create significant challenges for direct laryngoscopy and endotracheal intubation.[1,2]

Difficult anesthetic decision-making is common in mentosternal contracture reconstruction.[3] Several airway techniques—including the intubating laryngeal mask airway, oesophageal Combitube™, retrograde wire technique, and fibreoptic-assisted bronchoscopy—have been reported. However, according to Onah,[4] depending on the severity and type of the mentosternal contracture, intubation may be impractical without prior contracture release. Early release of the contracture is therefore crucial to ensure airway control.[1]

We present the case of a 19-year-old male with extensive post-burn contractures involving the scalp, face, and anterior chest.

2. Case Presentation

A 19-year-old male presented with a 4-year history of extensive flame burns resulting in healed scars over the scalp, entire face, and anterior neck with fixed flexion deformity. The lower lip was completely everted and fused to the chest wall. Additional findings included severe lower eyelid entropion and absence of the right ear. He was diagnosed with multiple post-burn contractures, including right elbow contracture, right type 3 axillary contracture, and type 3b mentosternal contracture (Onah's classification). (**Figure 1** and **Figure 2**)



Figure 1: Pre-operative anterior view of the mentosternal scar



Figure 2: Pre-operative lateral view of the mentosternal scar

Pre-operative examination and routine investigations were within normal limits. Airway assessment revealed mouth opening of less than two finger breadths. Mallampati scoring was not possible due to microstomia and fixed neck flexion while sternomental and thyromental distances measurement were not possible due to anatomical distortion. Pre-operative X-ray and CT scan for airway assessment showed no evidence of temporomandibular ankyloses or shoulder joint instability. Centrality of the tracheal could not be determined radiologically.

High risk informed consent was obtained for anesthesia and possible emergency tracheostomy, and approval to use clinical images for this report was granted.

A difficult airway plan involving face mask ventilation, followed by contracture release under sedation with local anesthesia and subsequent videolaryngoscopic intubation, was adopted and surgical airway was the alternative plan.

A difficult airway cart involving a videolaryngoscope, McCoy laryngoscope with different blades, endotracheal tubes both conventional and armoured types with stylets, gum elastic bougie, various oropharyngeal airways, and a tracheostomy set were prepared with the surgical team on standby.

In the theatre, multiparameter monitoring (NIBP, SPO2, ECG) was instituted. IV access was secured on the left upper limb, and IV fluid commenced. Pre-medication with glycopylorrate 0.2mg and ondansetron 4mg were given. Sedation was achieved with ketamine 50mg followed by aliquots of 20mg, with oxygen administration via face mask at 4-6L/min. LocaL infiltration of the scar was done with 40ml of 0.5% lidocaine followed by mentosternal contracture release. Following scar release, neck extension and mouth opening improved with interincisor distance <3cm. Anesthesia was induced with ketofol (50mg ketamine and 50mg propofol). Mask ventilation test was confirmed and muscle relaxation achieved with suxamethonium 100mg. Indirect videolaryngoscopy revealed a Cormack–Lehane grade 2 view with leftward tracheal deviation. A gum elastic bougie was inserted with difficulty due to distorted surrounding anatomy. Railroading the armoured tube was unsuccessful because the tube's flexibility prevented navigation of the distorted pathway. However, a conventional endotracheal tube, aided by its firmness, was successfully railroaded. Tube placement was confirmed via capnography and bilateral breath sounds.

The patient was mechanically ventilated to maintain EtCO2 between 30-40mmHg. Anesthesia was maintained with isoflurane 1-2% in Oxygen 2-4L/min while muscle relaxation was maintained with pancuronium, and multimodal analgesia with fentanyl 100mg and paracetamol 15mg/kg. Intra-operative and post-operative periods were uneventful, and the patient was

extubated fully awake. (**Figure 3** and **Figure 4**- immediate post-op period).



Figure 3: Immediate post-operative view of the released anterior chest and neck



Figure 4: Immediate postoperative view of the released anterior chest and neck

3. Discussion

Post-burn mentosternal contracture presents a significant challenge to the anesthetist due to restricted mouth opening, reduced oropharyngeal space, heavily fibrosed neck and chest scars, and limited atlanto-occipital extension. These factors render intubation difficult and increase the risk of failed facemask ventilation.[5]

The principles of difficult airway management include airway assessment, preparation of human and material resources, airway control, contingency planning, and adequate monitoring. According to ASA guidelines,[6] predictors of difficult intubation include mouth opening, Mallampati score, thyromental distance, neck mobility, and facial anatomy, as well as imaging findings such as cervical spine X-ray or CT scan. Onah's classification[4] has been proposed as an independent predictor of difficult intubation in mentosternal contractures.

In this case, pre-operative airway measurements were largely impossible due to extreme facial and cervical distortion. Although imaging showed no temporomandibular ankylosis, the patient was classified as type 3b, indicating a high likelihood of difficult intubation.

Various airway strategies have been proposed for severe neck and facial contractures,[7] including awake fibreoptic bronchoscopy, face mask ventilation with subsequent contracture release, intubating LMA, and surgical airway. Fibreoptic bronchoscopy is widely considered the gold standard for difficult intubation,[8,9] but severe anatomical distortion may render it unsuccessful.[2,10] Hans et al[11] noted that bronchoscopy becomes difficult in cases with extreme soft-tissue retraction.

Onah[4] reported that all type 3 mentosternal contracture cases required contracture release prior to intubation because attempts at intubation beforehand were impractical. Our patient—type 3b—also benefited from contracture release under sedation before intubation. (**Figure 5** and **Figure 6**- 13 days post-op)



Figure 5: 13 days post-operative anterior view of the chest and neck



Figure 6: 13 days post-operative lateral view of the chest and neck

The difficulty encountered during bougie placement and tube railroading in this case was likely due to distortion of the alignment of the larynx, pharynx, and trachea, as previously described by Han et al.[11]

Although the 2025 ASA Difficult Airway Algorithm recommends attempting videolaryngoscopy or direct laryngoscopy before alternative airway approaches,[6] exceptional scenarios such as extensive neck and facial contracture warrant modification of standard algorithms.[4,11]

Thus, our approach—face mask ventilation, contracture release, then videolaryngoscopic intubation—was justified and successful.

4. Conclusion

Effective airway management in patients with severe post-burn mentosternal contracture requires individualized strategies. Pre-operative assessment, preparation of alternative airway plans, and consideration of contracture release prior to intubation are critical to achieving a safe anesthetic outcome.

Author Contributions

Iheanyi Ihunanya Anokwute: Conceptualization, patient management, airway management, literature review, manuscript drafting, critical revision, and final approval of the manuscript.

C. Ozor: Clinical management, anesthesia management, data collection, manuscript review, critical revision, and final approval of the manuscript.

M.C. Odiakosa: Anesthesia management, data collection, clinical interpretation, manuscript editing, critical revision, and final approval of the manuscript.

O. Nwachukwu: Surgical management, clinical supervision, manuscript review, critical revision, and final approval of the manuscript.

Abbreviations

ASA: American Society of Anesthesiologists; CT: Computed Tomography; ECG: Electrocardiogram; EtCO2: End-tidal Carbon Dioxide; IV: Intravenous; kg: Kilogram; L: Liter; LMA: Laryngeal Mask Airway; mg: Milligram; min: Minute; ml: Milliliter; mmHg: Millimeters of Mercury; NIBP: Non-Invasive Blood Pressure; SpO2: Peripheral Capillary Oxygen Saturation.

Declaration of Patient Consent

Appropriate patient consent. In the consent form was taken and the patient has given his consent for reporting his clinical information and images in the journal.

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None.

Conflict of Interest

None.

Use of Artificial Intelligence (AI)

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, interpretation, or writing of this manuscript.

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