Anaesthetic challenges in a patient with Ludwig angina: A case report

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To the Editor:
We present a case report of a 19 year old mentally challenged male child admitted with Ludwig's angina who was posted for surgical incision and drainage. The clinical scenario was further compounded by restricted mouth opening since childhood. Endotracheal intubation was successfully accomplished with awake fibreoptic bronchoscopy. Alternative methods for securing airway in such patients are discussed.

Background
Patients with deep neck infections, especially with Ludwig's angina, are at risk of airway management mishaps. Skillful airway management is critical but there is no consensus over the safe method of airway control in such patients. The presence of swelling in the neck, elevation of the tongue, trismus or pharyngeal and glottic oedema create formidable problems. We herewith report a case of Ludwig's angina where the situation was further complicated by restricted mouth opening (since early childhood) and mental retardation.

Case report
A 19-year old, mentally retarded male, weighing 55 kg was admitted with Ludwig's angina and was booked for surgical incision and drainage. He gave a history of dental extraction 10 days previously, following which he developed fever, pain and swelling over the lower part of the face and upper part of the neck. Antibiotics and release incisions under local anaesthesia did not relieve his symptoms. He eventually developed swallowing and breathing difficulty. His cardiovascular and respiratory examination was normal. On examination swelling was present in the submandibular region and anterior part of the neck. The patient had restricted mouth opening (one finger), which had been present since childhood, and was aggravated by the development of facial swelling. Mallampati grading (MPG) could not be assessed due to restricted mouth opening. Extension and flexion of the neck was restricted because of pain. His laboratory investigations were within normal limits. Soft tissue neck x-rays showed an increase in the submandibular and pretracheal space. Ultrasonography (USG) reported fluid collection in the submandibular region and neck, anterior to the thyroid and between the strap muscles of neck, bounded laterally by the carotids, tracking deep along the lateral border of the thyroid.

Oral ranitidine 150 mg was given on the evening prior to surgery and on the morning of surgery. An awake nasal fibreoptic intubation was planned. On the day of surgery preoperative counselling of the patient was performed. This was difficult due to his mental status. On arrival in the operating room nasal packing was performed with 2% lignocaine with adrenaline 15 minutes prior to surgery. The patient was again counselled and reassured. Monitors for ECG, non-invasive blood pressure (NIBP) and pulse oximetry were applied and an intravenous (IV) line was established with an 18G cannula. Intravenous glycopyrrolate 0.4 mg, hydrocortisone 100 mg and midazolam 1 mg were given prior to the procedure. The oral cavity was topicalised with 2% lignocaine, followed by 10% lignocaine spray in the oropharynx. Lignocaine gel was instilled into the nostril. A well lubricated fibreoptic bronchoscope (FB) with a 7.0 mm ID cuffed flexometallic endotracheal tube mounted over it was introduced nasally with minimal discomfort to the patient. The base of the tongue was swollen, and the epiglottis was not visualised through FB. There was difficulty in localising the glottic inlet as the laryngeal cartilages could not be clearly identified and the vocal cords were inflamed and oedematous. On further advancing the scope the carina was visualised, the tube was then advanced and the FB removed. The patient remained comfortable throughout the procedure. On connecting the tube to the anaesthesia circuit end-tidal carbon dioxide measurement (EtCO₂) confirmed the tube placement. Subsequently anaesthesia was induced with propofol and pethidine was used for analgesia. Anaesthesia was maintained using isoflurane and 60% nitrous oxide in oxygen. Atracurium was used to achieve muscle relaxation. The subsequent intraoperative course was uneventful. Residual neuromuscular blockade was reversed with neostigmine and glycopyrrolate at the end of surgery, and extubation was performed when the patient was fully awake. The patient was observed for 24 hours.
in the respiratory intensive care unit, and was discharged home on the seventh post operative day.

**Discussion**

Ludwig's angina is defined as potentially lethal, rapidly spreading cellulitis, that involves sublingual and submandibular spaces, which is manifested by a brawny suprathyroid induration, tender swelling in the floor of the mouth, and elevation and posterior displacement of the tongue.\(^1\) It was first described by Wilhem Friedrich Von Ludwig 1836.\(^2\) Predisposing factors include dental caries, recent dental treatment, sickle cell disease, a compromised immune system, trauma, tongue piercing and may occur in caries, recent dental treatment, sickle cell disease, a compromised pain, neck swelling, fever, toothache, malaise, dysphagia and symptoms are related to the rapidly evolving cellulitis. Severe pain, neck swelling, fever, toothache, malaise, dysphagia and foetid breath are common.\(^6\) Swelling of the floor of the mouth, trismus, oedema and abscess formation lead to the narrowing and ultimate loss of the airway.\(^6\) Streptococci and anaerobes were most frequently isolated from culture.\(^6\) In the preantibiotic era, the reported mortality was as high as 54%. In the present scenario, where patients are treated with antibiotics, it varies between 0-8.5%.\(^6\) Appropriate therapy includes maintenance of the airway, antibiotics and surgical drainage.\(^3\)

Airway management of patients with Ludwig's angina presenting for surgical drainage is a challenging task for the anaesthesiologist. There is no consensus regarding the airway management in the available literature. The recommendations are based on the author's personal experience and available resources. The suggested methods include tracheostomy, conventional laryngoscopy and intubation (after administration of muscle relaxants), awake blind nasal intubation and awake fibreoptic intubation.\(^1\) Decompression of Ludwig's angina under cervical block has also been reported.\(^10\)

Tracheostomy using local anaesthesia was considered as the gold standard for management of these patients in the past.\(^5\) However tracheostomy in a patient with a compromised airway and distorted anterior neck anatomy can be very difficult or even impossible.\(^11\) Other complications include the risk of the spread of infection to the medistinum, aspiration of pus, rupture of the innominate artery, spread of infection to the thorax, airway loss and tracheal stenosis.\(^6,13\) We deferred tracheostomy in this patient as the swelling was extending to the lower part of the anterior neck, but a tracheostomy kit was kept ready for an emergency situation.

Distorted anatomy of the airway, tissue immobility and limited access to the mouth make orotracheal intubation with rigid laryngoscopy difficult. In the early stages, trismus can be overcome by induction of general anaesthesia. However in advanced cases the induction of general anaesthesia may precipitate complete airway closure and make face mask ventilation and tracheal intubation impossible, thus necessitating emergency tracheostomy.\(^14,15\) Laryngoscopy and intubation was out of the question in our case as the patient had had limited mouth opening since childhood.

Infrequent success on the first pass and increased trauma with repeated attempts leading to complete airway obstruction makes blind nasal intubation not a good option for airway management.\(^13\) The first successful fibre optic nasotracheal intubation in a patient was first reported in the year 1974.\(^13\) Ovassapian et al, in the year 2005, reported 100% success in 25 attempted intubations with fibreoptic bronchoscopy in patients with deep neck infection. Fibreoptic intubation, either oral or nasal, can be extremely difficult because of anatomic distortion, erythema, tissue oedema and immobility. However, failure to intubate is usually due to inadequate preparation, poor quality FB and inadequate expertise to perform the procedure.\(^1,3,6,17\) Application of adequate topical anaesthesia prior to instrumentation can prevent complications like laryngeal spasm and airway loss. Death from airway loss can still occur in patients with advanced deep neck infections.

In our patient, the key to success was meticulous preoperative counselling and adequate preoperative planning of the anaesthesia. Fibreoptic intubation is a sophisticated and less invasive method of securing airway in patients with deep neck infection and should now replace the gold standard tracheostomy in managing the same. The use of tracheostomy should be reserved for more dire and emergency situations. Recently Awake fibrecapnic intubation (AFcI) is a technique wherein a suction catheter is advanced through the working channel of the bronchoscope and via this catheter repeated CO\(_2\) measurements are possible when visibility of pharyngeal and laryngeal structures is limited, when anatomy is unrecognisable or in the case of severe airway obstruction.\(^16\) Considering the above fact we would like to suggest that AFcI will also be a useful and safe technique for intubation in patients with Ludwig's angina, especially when complicated with airway distortion and obstruction.

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