

Anaesthesia for maxillofacial surgery

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Abstract

Airway management is central to anaesthesia for maxillofacial surgery. Not only is there a shared airway to contend with, difficult airways are frequently encountered. The main pathologies that present for surgery include trauma, infection, cancer and craniofacial deformities. All of these may present an airway challenge in either elective or emergency settings but a similar approach to the airway can be used in all these scenarios. Other surgical procedures include dental extractions, temporomandibular joint (TMJ) arthrocentesis, salivary gland surgery and facial aesthetic surgery.

It is vital that clear airway management plans including rescue plans are made at the outset. These must be communicated to the surgical and anaesthetic team in advance. Trauma is excluded as it will be covered in a separate review article.

Keywords Airway management; CICO; craniofacial surgery; dental abscess; enhanced recovery; fiberoptic intubation; head and neck cancer; maxillofacial; tracheostomy

Royal College of Anaesthetists CPD Matrix: 1B02, 1C01, 2A01, 2A03, 2A05, 3A01, 3A02

Preoperative assessment

The first priority in airway assessment is to determine whether airway compromise is present. Airway compromise may present overtly with stridor, gurgling, drooling or inability to speak. Less overt symptoms that should be specifically enquired about are hoarseness, dysphagia, drooling and orthopnoea as these may signify impending airway obstruction.

Airway difficulty should be anticipated in patients who have had previous radiotherapy and/or complex reconstructive surgery. In two large studies, independent predictors of difficulty or inability to facemask ventilate included neck radiation changes, male sex, sleep apnoea, Mallampati score of III or IV, presence of beard, body mass index over 25 kg/m², age over 55 years, lack of teeth and history of snoring.¹ Previous anaesthetic charts can provide valuable information regarding airway management.

A standard airway examination should be performed with particular attention to swellings or masses, mouth opening, tongue enlargement and ability to protrude the tongue.

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Learning objectives

After reading this article, you should be able to

- identify symptoms and signs that indicate impending airway compromise
- discuss choice of airway technique for a range of oral maxillofacial procedures including rationale behind your choice
- outline the important factors in optimizing vascular perfusion for free flap tissue transfer reconstructive surgery

Nasendoscopy is useful for examining the upper airway to assess the significance of any swelling, distortion or peri-glottic lesions. This may be complemented by CT, MRI and reconstructed images. Three-dimensional (3D) images and use of post-reconstruction processing software allows the creation of a virtual 3D endoscopy.² Discussion with both the surgeon and radiologist regarding pathology, level and severity of stenosis or presence of sub-glottic extension is useful. It is important to be aware that supraglottic tumours may cause difficult tracheal intubation.

Intraoperative anaesthesia

The main intraoperative consideration is the choice of an appropriate airway technique and airway device tailored to the patient and surgical procedure.

Airway devices include:

- Laryngeal mask airways (standard or flexible) for simpler procedures including dental extractions and superficial facial surgery
- Endotracheal tube (oral, nasal or submental)
 - If dental occlusion needs to be assessed post-procedure a nasal tube is preferred. A preformed north-facing nasal tube facilitates surgical access, however does not allow for easy suctioning. A laser tube for laser surgery or micro-laryngoscopy tube may be necessary for examination under anaesthesia procedures.
- A surgical airway (cricothyroidotomy, surgical tracheostomy or percutaneous tracheostomy).

Communication with the surgeon as well as with the rest of the anaesthetic team regarding the airway plan and rescue plans should be carried out well in advance so that additional resources/staff are close at hand.

As the airway is shared, it is important to ensure that the airway conduit used is secure along with all its connections. An airway conduit can become occluded when a Boyle Davis gag is applied.

Other possible requirements include:

- Use of a throat pack

With intra-oral procedures, there is airway soiling, therefore a throat pack is generally used intraoperatively. It is vital to communicate to the theatre team that a throat pack has been inserted so that it can be clearly marked on the patient and documented on a visible location (e.g. theatre whiteboard).

- Extended breathing circuits

These may be required. Patients are usually positioned on a head-up tilt to improve venous drainage. A head ring/horseshoe headrest and a shoulder support may be required.

- Eye protection

Eye pads with/without viscous ointments are used. Surgical shields are the alternative to eye pads if the pads are impinging on the surgical field.

- Antibiotic prophylaxis (e.g. co-amoxiclav 1.2 g intravenously).
- Steroids (e.g. dexamethasone 4–8 mg intravenously).

This may help reduce postoperative airway swelling.

- Active warming

For longer cases, a forced air warming blanket and intravenous fluid warmer are used.

- Venous thromboembolic (VTE) prophylaxis

For longer cases, VTE prophylaxis should be considered (e.g. enoxaparin 40 mg subcutaneously, thromboembolic deterrent stockings and pneumatic calf compression boots). Pressure care should also be instituted.

- Blood transfusion
- Anti-emetics
- Multi-modal analgesia

Tracheal extubation must be planned and prepared for carefully. In an uncomplicated airway, the trachea can be extubated either 'deep' or 'awake' at the end of surgery. Deep extubation may confer the benefits of a smooth awakening with no coughing, however awake extubation minimizes the chance of pulmonary aspiration of intra-oral debris.

If a throat pack is in, it should be removed from the patient at the end of the procedure. Suction under direct vision prior to tracheal extubation is important to clear any intra-oral clots that may have formed. A slightly head-up position is helpful for wakening.

Postoperative complications

Most oral and maxillofacial surgical procedures have the potential to compromise the airway postoperatively.³

It is essential to anticipate the possibility of airway compromise postoperatively and consideration should be given as to whether it may be appropriate to:

- awaken the patient and extubate the patient's trachea immediately postoperatively
- admit to the intensive therapy unit for a delayed tracheal extubation
- insert a tracheostomy.

Head and neck infection

The most frequent source of infection is a dental abscess. This can affect the airway when there is spread into deep fascial spaces. The commonly involved spaces are the buccal, submandibular and sublingual space (Figure 1).

Trismus is usually the main problem affecting the airway. Marked limitation of mouth opening may necessitate an awake nasal fiberoptic intubation (AFOI). Less commonly, but more serious, is the potential for airway obstruction. This can occur in two situations:

- spread of infection into the parapharyngeal space
- bilateral infection of the submandibular and sublingual space.

The former may cause no visible swelling. It is important, therefore, to enquire about symptoms or signs of airway

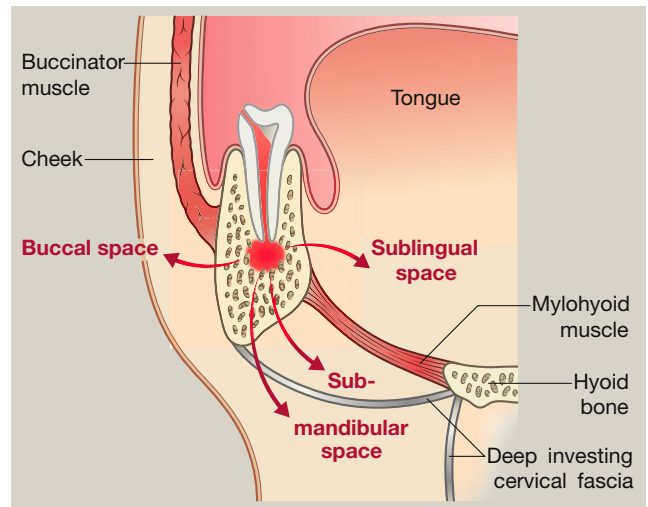


Figure 1 Coronal section of right mandible showing potential paths of spread of infection from a carious wisdom tooth.

compromise and to review the results of imaging and flexible nasendoscopy.

The latter is a special condition known as Ludwig's angina. Airway obstruction occurs due to elevation of the tongue. Inability to protrude the tongue is a sensitive indicator of this condition. It is affected because of the C shape of the genioglossus muscle. The concavity of the C shape produces the sublingual space. Oedema or pus in this space prevents the muscle folding over itself to enable tongue protrusion.⁴

Generally, if there is sufficient mouth opening, the airway can usually be secured initially with general anaesthesia (GA) and direct/indirect laryngoscopy.

Where AFOI is required for tracheal intubation, note that topicalization with local anaesthesia may only be partially effective in infected tissue.

In cases of severe airway obstruction or in the case of failed AFOI, an awake tracheostomy under local anaesthesia may be required. It would be prudent to request that the surgeons prepare and infiltrate the neck with local anaesthetic and adrenaline **prior** to AFOI in preparation for tracheostomy. It is also best to carry out the AFOI in the operating theatre rather than in the anaesthetic room. Emergency surgical tracheostomy may be technically more challenging with anterior swelling of the neck.

If significant laryngeal swelling is noted intraoperatively then either delayed extubation in the critical care unit or elective tracheostomy can be performed. When tracheal extubation is being considered, establish that a 'cuff down' leak is present to exclude significant airway swelling prior to extubation.

Pulmonary aspiration is a risk if there is spontaneous or iatrogenic rupture of the abscess. As such, extra care with airway instrumentation is recommended. In addition to airway complications, pre-maxillary spread can lead to orbital cellulitis which in turn can lead to cavernous sinus thrombosis. In severe cases systemic sepsis or mediastinitis can occur with high mortality.

Head and neck cancer

Tumours are usually squamous cell carcinomas which metastasize to lymph nodes in the neck. Oral cancers are

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