Maxillomandibular Fixation and Anesthesia Management

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Maxillomandibular fixation (MMF) is a frequent issue encountered during the administration of general anesthesia. This article aims to give an overview of MMF from a surgical perspective, complications that can arise from MMF, anesthesia management strategies in MMF cases, and perhaps most importantly, an overview of how to release a patient from MMF in an emergency. Although not encompassing all situations and variables, these topics are covered in a manner that can be easily incorporated into the anesthetist’s practice.

Keywords: Airway emergency, anesthesia complications, difficult airway, intermaxillary fixation, maxillomandibular fixation.

Objectives:
At the completion of this course, the reader should be able to:
1. Describe the details of maxillomandibular fixation.
2. Describe the details of emergency release of maxillomandibular fixation.
3. Discuss anesthesia complications that can arise from maxillomandibular fixation.
4. Discuss methods of obtaining a secure airway in a case requiring maxillomandibular fixation.
5. Discuss methods to provide safe and effective anesthesia care to patients with maxillomandibular fixation.

Introduction
Surgical management of facial fractures is frequently completed in the United States, particularly in large academic medical centers. Management of these fractures often involves application of maxillomandibular fixation (MMF), or “wiring the jaws shut,” which presents multiple challenges to anesthetic management, most notably in securing the airway and dealing with potential airway-related complications. There is often a great deal of confusion and uncertainty present in management of these patients, particularly in how to release the patient from his or her fixation in the event of an emergency. The aim of this AANA Journal Course is to offer insight into the reasons for placing patients into MMF, common types of MMF used, anesthetic management and complications of patients undergoing MMF, and perhaps most importantly, expedient methods for removing MMF in an emergency.

Surgical Considerations With Maxillomandibular Fixation
Fractures involving the facial skeleton and the mandible in particular are frequent, with 21,244 hospitalizations involving completion of a facial fracture repair as the primary procedure in 2008. In fact, mandible fractures are second only to nasal bone fractures in trauma to the facial skeleton. This is especially true in the male population, with several studies finding that nearly 80% of all mandible fractures occur in men. Although some fractures require only conservative management, such as a soft or no-chew diet, many require some form of surgical repair. This can occur through closed reduction, open-reduction internal fixation, or a combination of the two.

A primary tenant of surgical repair of facial trauma is reestablishing the patient’s natural occlusion or “bite.” This not only aids in reduction of the fracture or fractures, but when properly accomplished, allows for the patient’s postoperative ability to chew to be unaffected compared with their pretraumatic state. This frequently requires the use of maxillomandibular fixation (MMF), also known as intermaxillary fixation. These terms refer to wiring the dentition of the maxilla and mandible to-
gether to maintain the reduction of a fracture and/or to prevent movement of the mandible, thereby serving as a "cast" for the face. In fact, these procedures have been noted in great detail throughout history, perhaps most notably by Hippocrates.\(^3\) This fixation may be used both intraoperatively and postoperatively, or may be used only as a temporary intraoperative treatment, with removal before extubation. In addition to the most common trauma-related uses of MMF, other oral and maxillofacial surgery procedures, typically orthognathic surgery, pathology, or reconstruction cases, may require fixation in a similar fashion. Whenever MMF is used, potential anesthetic and patient management issues can arise.

Numerous indications and contraindications for MMF exist and are dependent on the surgical procedure, specific types and locations of fractures, patient age and comorbidities, and surgeon preference. However, some general contraindications for postoperative MMF include an inability to tolerate MMF (eg, noncompliant patients, young children, special-needs patients, and those with psychiatric disorders), severely compromised pulmonary function, seizure disorders, and nutritional or eating disorders.\(^4\)

All forms of MMF, by definition, include a method of fixating the maxillary and mandibular dentition or skeleton together with wires originating from the opposing dental arch or underlying bone. Although not all-encompassing, the following paragraphs cover some of the most common methods used for MMF. Special emphasis should be given to the black arrows in the figures, which indicate the ideal locations that wires should be cut in order to free the fixation in case of an emergency. All referenced wires are 25- to 26-gauge (0.046- to 0.038-cm [0.018- to 0.015-in]) stainless steel.

Arch bars (Figure 1), also known as "surgical braces," are one of the most common methods of applying MMF.\(^4\)
They consist of a flat stainless-steel band with integral lugs or “hooks” that allow for interarch fixation, with the lugs oriented toward the gingiva or “gum” tissue. The arch bar is secured to the dentition with multiple circumdental wires, typically a single wire for every 1 or 2 teeth. The fixation wires are then placed around opposing lugs in a box pattern, typically engaging multiple lugs on each arch bar, with between 3 and 5 per case.

Ivy loops (Figure 2) are another common method of MMF application. They consist of a twisted wire with a loop on the end. The free ends of the wire are inserted between 2 teeth and then passed opposite each other around the adjacent teeth, then back together after one end of the wire passes through the loop, and finally twisted together to secure the loop in place. The fixation wires are then placed between opposing loops, often between 3 and 5 per case.

A method that continues to grow in popularity is that of MMF screws and “hybrid” MMF. Both reduce treatment time and potentially operator injury from a decrease in the number of sharp wires used in application. The MMF screws (Figure 3) are secured in bone between tooth roots, and the integral channels are used to secure fixation wires. Often, 2 to 4 fixation wires are used per case. Hybrid MMF (Figure 4) uses a combination of a modified arch bar and fixation screws to stabilize the arch bar to underlying bone instead of the traditional circumdental wires. Fixation is completed in a similar fashion to that of arch bars, often with 3 to 5 fixation wires per case.

Other methods of MMF that occasionally are used are skeletal fixation, use of modified dentures or splints, and existing orthodontic appliances or “braces”. Skeletal fixation uses wires passed through or around bones to provide anchorage independent of the dentition. Loops formed from the opposing wires are visible in the oral cavity, which are then secured with fixation wires between them. Dentures, partial dentures, or specially constructed splints can also be used to secure MMF by first anchoring them to the underlying bones or adjacent teeth with wires or screws. When used in this fashion, modifications to the prostheses are necessary. Orthognathic surgery cases often use previously placed orthodontic appliances (Figure 5) as a portion of the MMF system and may also include an occlusal splint used to set the patient’s occlusion intraoperatively and potentially postoperatively.
Maxillomandibular fixation is secured via fixation wires applied around the orthodontic brackets, bands, and/or arch wires already present.

All the previously mentioned methods can also use elastic or rubber bands (Figure 6) to secure the MMF rather than traditional wires. Although generally not as rigid as wire fixation, elastic bands do have the added benefit of being easier to remove in an emergency, often with a sharp pair of scissors or even a hemostat.

When used in the postoperative period for continued immobilization, MMF may be maintained for up to 6 to 8 weeks in adults. This is dependent on the surgical procedure, specific types and locations of fractures, patient age and comorbidities, and surgeon preference. During this time, the patient is limited to a liquid diet. All medications must also be in liquid form or crushed and mixed with liquids, unless the patient has missing teeth or the ability to pass any medications posterior to the dentition before swallowing.

In regard to medications, postoperative pain control is often a major area of concern with patients who have sustained facial trauma or those undergoing other oral and maxillofacial surgery procedures. With a large portion of traumatic injuries, the trauma itself often results in neurologic injury because many of the sensory branches of the trigeminal nerve course within and exit through bones of the facial skeleton. The use of closed reduction and especially open reduction of fractures, or orthognathic surgical procedures, often results in an insult associated with these nerves due to the manipulation of bones and soft tissues. The amount of pain, or lack thereof, that patients may experience in the postoperative period is often surprising to some anesthesia providers, and this should be planned for accordingly.

The inability to move one's mandible can be quite disconcerting to patients and cause a great deal of anxiety. It is imperative that the procedure and postoperative course be explained to the patient in detail before the procedure to lessen the patient's anxiety levels, both before and after surgery. The first author (KMS) has found that most seasoned oral surgeons and anesthesia providers were much faster at the MMF release compared with ward nurses and the patient's family members. It is important to have the oral surgeon and anesthesia provider present during extubation in case MMF release is needed.

The most important point to realize with MMF is that despite the seemingly great number and complex nature of the wires and other hardware present in the oral cavity, removal is generally straightforward. The wires that run across the dentition or between the jaws, typically in a vertical or oblique fashion, are the wires that should be cut to allow access to the airway. Wires present around teeth or bones, which generally constitute most of the wires present, can typically be avoided altogether. If the wire loop is cut near the location where both ends of the wire are twisted together (and often rosetted, or turned 180° back on itself), this limits the number of wire fragments that pose a potential aspiration risk. In the case of Ivy loops, the relatively small loops of the fixation wires can be difficult to access and free, so some degree of untwisting of the wires may be necessary. This is best accomplished with a hemostat or, if available, a wire twister, which provides a better grip because of the cross-hatched nature of the instrument jaws, like a needle holder. However, in an extreme emergency, all vertical or oblique wires may be cut to allow faster access to the airway, keeping watch for the potentially dangerous wire fragments. Again, in the case of elastic MMF, scissors or hemostats can be used to rapidly remove the fixation, while one still keeps watch for potentially dangerous elastic fragments. Nishioka et al reported a case of an aspirated fixation wire following removal of MMF for emergency airway management after respiratory arrest on the inpatient unit. The wire was identified in the trachea via direct laryngoscopy during emergent intubation but was unable to be retrieved. The aspirated wire was subsequently retrieved by an otolaryngologist using rigid bronchoscopy.

**Intubation and Extubation Strategies With Maxillomandibular Fixation**

Nasotracheal intubation is generally necessary to complete cases requiring MMF. Nasotracheal intubation has been described for several decades and has been facilitated using blind, direct, fiberoptic, and video laryngoscopies. One of the authors (ST) typically relies on direct laryngoscopy for nasotracheal intubation in patients with a nondifficult airway. Nasotracheal intubation presents a unique set of challenges compared with orotracheal intubation.

The most common complication following nasotracheal intubation is epistaxis. Most bleeding arises from abrasions of the nasal mucosa but can also result from avulsion of nasal polyps, turbinates, adenoids, or tonsils or following posterior pharyngeal wall injury. Rare complications have been described and include...
avulsion of a turbinate, avulsion of a tumor, bacteremia secondary to nasal mucosa abrasion, and retropharyngeal laceration.\textsuperscript{11} A variety of techniques are described for nasotracheal intubation to decrease the amount of epistaxis associated with the intubation.

A variety of agents have been used to produce vasoconstriction of the nasal mucosa and reduce the incidence of epistaxis during nasotracheal intubation. Topical vasoconstrictors such as epinephrine, oxymetazoline, phenylephrine, cocaine, and lidocaine with epinephrine have all been described in the literature.\textsuperscript{12} All these medications cause vasoconstriction, and all have cardiovascular side effects following systemic absorption through the nasal mucosa. Thrush\textsuperscript{13} reported a case of a cardiac arrest after thermosoftening and vasoconstriction of the nasal mucosa. There are several methods for decreasing the amount of epistaxis, even after thermosoftening and vasoconstriction of the nasal mucosa and bleeding following nasotracheal intubation.\textsuperscript{22}

Before nasotracheal intubation, it has also been suggested that well-lubricated nasal airways of gradually larger sizes be introduced to dilate the passageway and prevent distortion and obstruction before intubation.\textsuperscript{17} The technique has been shown to reduce the severity of bleeding; however, it fails to decrease the incidence of bleeding following nasotracheal intubation.\textsuperscript{22}

Nasotracheal intubation using a gum elastic bougie has been described to facilitate passage of the nasotracheal tube into the posterior pharynx and to aid in difficulty passing the tube into the trachea.\textsuperscript{23} After vasoconstriction of the nasal mucosa, a lubricated gum elastic bougie can be passed through the nares into the pharynx. The nasotracheal tube is then advanced over the gum elastic bougie into the posterior pharynx. The gum elastic bougie is then removed from the nares, and the nasotracheal tube is advanced under direct laryngoscopy into the trachea with Magill forceps. If there is difficulty in passing the tube into the trachea under direct laryngoscopy, the gum elastic bougie may be advanced through the nasotracheal tube and guided into the trachea during direct laryngoscopy. The nasotracheal tube can then be advanced over the gum elastic bougie into the trachea, and the gum elastic bougie removed.

In some instances, nasal intubation is either not feasible or contraindicated. An obvious alternative to standard oral endotracheal intubation is a tracheotomy. However, in many routine cases, tracheotomy is not a necessary procedure. Whenever possible, tracheotomy should be avoided because of the surgical risks and complications inherent to the procedure, as well as the relatively short duration that the secured airway is often required for noncomplicated oral and maxillofacial surgery procedures.

If a patient is missing teeth or has sufficient space posterior to the dentition, an armored endotracheal tube can be used to secure the airway in a retromolar fashion.\textsuperscript{24} By using an armored tube, bends that would commonly kink a standard endotracheal tube can be used. In some circumstances, nonrestorable or potentially healthy posterior teeth can be extracted to provide sufficient space to allow for intubation in this manner.

Another alternative intubation technique is a submental intubation.\textsuperscript{25} This technique is particularly useful when intraoperative MMF or access to the nasal-orbital regions is required, when a retromolar technique is not feasible, and when a tracheotomy is not desired. Submental intubation is also achieved through the use of an armored endotracheal tube initially placed in the
standard transoral fashion. After proper preparation and draping of the patient, an incision is made in the right submental region. Underlying tissues are then bluntly dissected with a hemostat until the instrument is palpated in the floor of the mouth, with the proceduralist taking care to avoid damage to vital structures such as the submandibular duct and the lingual nerve. A small incision is placed over the palpated hemostat tips, which are then advanced into the oral cavity. At this time, the anesthesia circuit is disconnected, the tube connector removed, and the cuff balloon and endotracheal tube are pulled through the floor of the mouth and out the submental region with the hemostat. The circuit is reconnected and the endotracheal tube is secured to the skin with sutures after verification that the tube has remained in the proper position. Once the procedure is complete, MMF is released and the submental intubation is reversed before extubation, with closure of the incisions as appropriate.

At the emergence phase, the anesthesia provider must decide whether to extubate the patient while the patient is still deeply anesthetized or fully awake. Awake extubation includes removing the nasotracheal tube following the return of laryngeal reflexes, coughing, eye opening, and purposeful movements. Awake extubation helps to minimize aspiration, airway obstruction, and laryngospasm. Awake extubation may increase bleeding secondary to the patient coughing and bucking during emergence. Deep extubation includes removal of the nasotracheal tube before return of laryngeal reflexes and may reduce coughing with extubation. Deep extubation may be associated with laryngospasm, increased airway obstruction, and potential pulmonary aspiration if vomiting occurs between extubation and return of laryngeal reflexes.26 Following deep extubation, the patient will emerge through stage 2 of anesthesia and is at risk of these complications, which requires vigilant monitoring during this time.

### Other Anesthesia Considerations With Maxillomandibular Fixation

Anesthesia-related complications and difficult management scenarios can arise following MMF. Most issues occur following emergence from anesthesia or during care in the postanesthesia recovery room. These issues may manifest as postoperative nausea and vomiting (PONV), aspiration, failure to remove a throat pack before MMF, pulmonary edema, respiratory difficulty, anxiety, and postoperative pain control. These issues may be relatively easy to deal with and result only in a less-than-ideal anesthetic or can lead to substantial morbidity or even mortality.

Postoperative nausea and vomiting can be life-threatening if aspiration or airway obstruction occurs secondary to vomiting, particularly in the presence of MMF. Perrott et al27 found PONV to be the most common complication following oral and maxillofacial surgery. Silva et al28 found numerous predictive factors for PONV following orthognathic surgery. These predictive factors included female gender; younger age (15-25 years old); nonsmokers; history of motion sickness, PONV, vertigo, or migraine headaches; intraoperative use of volatile anesthetics; maxillary surgery; surgical procedure length greater than 1 hour; use of postoperative opioids; and high pain levels in the postanesthesia care unit (PACU). The number of predictive factors was directly proportional to the prevalence of PONV. For patients with several predictive factors, the anesthesia provider may consider total intravenous anesthetics, prophylactic antiemetics before emergence, or the use of opioid adjuvants (eg, ketorolac and acetaminophen) to better control postoperative pain and decrease the dose of opioid needed to control pain.

Maxillomandibular fixation precludes the patient’s ability to open his or her mouth and decreases the capability to expectorate accumulated blood, sputum, or refluxed gastric material. Pulmonary aspiration of oral secretions has also been reported following MMF.29 Blood is a gastric irritant and increases the risk of postoperative vomiting. The placement of a throat pack before the surgical procedure decreases the accumulation of blood and surgical debris in the airway and gastrointestinal tract.

Gastric suctioning should be performed before emergence. The risk of postoperative vomiting and aspiration can also be reduced with gastric emptying. Suctioning can remove any blood or surgical debris that may advance into the hypopharynx or stomach during the procedure. This is especially important if there was copious bleeding during the procedure.30 The surgical team can suction the stomach via an orogastric tube at the end of the procedure before placement of the MMF. If this is not feasible, a nasogastric tube can be placed intraoperatively so that the gastric contents can be suctioned before emergence from general anesthesia. Alternatively, a flexible suction catheter may be able to be placed in a retromolar fashion into the oropharynx to suction any remaining material before extubation, when a Yankauer suction may not allow for proper access. The use of intraoperative and postoperative antiemetic agents and the elevation of the head of the bed

### Table 1. Causes of Retained Throat Pack During Head and Neck Surgery

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<thead>
<tr>
<th>Cause</th>
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<td>Unexpected rapid recovery from anesthesia</td>
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<tr>
<td>False statement of throat pack removal by</td>
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<tr>
<td>surgical team</td>
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<tr>
<td>Throat pack placement overlooked by surgical team at conclusion of procedure</td>
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<tr>
<td>Additional throat pack placement and unaccounted</td>
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<tr>
<td>Failure to communicate presence of throat pack by primary anesthetist during intraoperative handoff</td>
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<tr>
<td>Throat pack placement overlooked by surgical team at conclusion of procedure</td>
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<tr>
<td>False statement of throat pack removal by surgical team</td>
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<td>Unexpected rapid recovery from anesthesia</td>
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The National Patient Safety Agency in the United Kingdom suggests the use of at least 2 of the procedures from each column.

Table 2. Procedures for Reducing the Risk of Throat Pack Retention

<table>
<thead>
<tr>
<th>Visual check</th>
<th>Documentation</th>
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</thead>
<tbody>
<tr>
<td>Place visible label on patient (ie, head). Label is removed concurrently with removal of throat pack.</td>
<td>Perform formalized, recorded 2-individual accounting of insertion and removal of throat pack</td>
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<tr>
<td>Place label on artificial airway device (ie, endotracheal tube)</td>
<td>Record the insertion and removal of throat pack on swab count board</td>
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<tr>
<td>Attach throat pack to artificial airway device (tape or suture placed through throat pack)</td>
<td></td>
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<tr>
<td>Leave throat pack protruding from mouth for easy identification</td>
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Table 2. Procedures for Reducing the Risk of Throat Pack Retention

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are also important management tools. In the presence of active vomiting, the patient should be educated preoperatively to sit upright and lean over, allowing the accumulated gastric contents to freely run out of the mouth and nose while remaining in MMF.

A throat pack is placed during oral surgery to prevent the entry of blood and surgical debris into the airway and gastrointestinal tract. Failure to remove the throat pack before MMF and anesthetic emergence may result in fatal airway obstruction. A retained throat pack can also produce esophageal obstruction or be swallowed and lead to bowel obstruction. Iwai et al presented a case in which the patient was extubated, with a retained throat pack that was later found to be in the stomach requiring endoscopy for removal. In this case, the throat pack was not a part of the nursing instrument count and neither the surgeon nor anesthesiologist confirmed the pack removal before emergence and extubation. Other authors presented a case in which the patient was extubated and was breathing spontaneously and well oxygenated in the PACU when it was noted that the throat pack had not been accounted for in the sponge count. An airway examination was completed to the level of the vocal cords, and no foreign body was found. A chest radiograph revealed a radio-opaque, x-ray–detectable gauze (Ray-Tec) in the midline above the diaphragm. The throat pack was vomited by the patient and did not cause airway obstruction because this patient did not require postoperative MMF.

An investigation of throat pack retention in oral and maxillofacial surgery was conducted by Knepl and Blackburn in the United Kingdom. The causes of a retained throat pack are found in Table 1. Incorporating the throat pack in the nursing sponge count fails to ensure throat pack removal at the conclusion of the surgical procedure. There are a variety of methods for the accounting and removal of throat packs. These include the placement of a heavy suture through the pack that extends outside the mouth; suturing the throat pack to the endotracheal tube; placing a label on the endotracheal tube; ventilator, or patient’s forehead; nonuse of multiple packs; or placing a reminder wrist band on the anesthetist. All these techniques may help to ensure that the throat pack is removed before extubation. However, none of these methods can replace good communication among the operating room team.

At the authors’ institution, we have multiple modalities to aid in avoiding throat pack retention. We have recently converted from using radiopaque gauze to a radiofrequency chip–embedded gauze for throat packs (that still retain the radiopaque feature). The radiofrequency identification technology (RFID) has been shown to be a reliable sponge-tracking device and correctly detects retained sponges. At the conclusion of the surgical procedure, the tracking device is placed over the patient to help detect retained sponges, in addition to the correct nursing instrument and sponge count. In the case of inadvertent throat pack retention, the detector would alert the operating room team to a retained throat pack before the patient’s emergence from anesthesia. In addition to RFID, the pack is part of the nursing surgical sponge count, and a visual cue is on the operating room door. A permanent, nonremovable sign with a sliding tab is attached to the interior of the operating room door, which when slid open, prominently states “throat pack” when a throat pack is in place. Following the removal of the throat pack, the tab is slid closed, which shows only a blank space. This prominent visual clue serves as a reminder to ensure that the throat pack was removed before the patient leaving the operating room if the sign has not been closed following throat pack removal. The UK National Patient Safety Agency has suggested a 2-system check for throat pack insertion and removal (Table 2).

Patients undergoing MMF predominately have their airway managed via nasotracheal intubation. Pulmonary edema, in the setting of MMF, can be seen as both postobstructive and acute onset in the setting of nasotracheal intubation. Case reports of noncardiac pulmonary edema presenting during or immediately following orthognathic surgery procedures have been published. Without appropriate levels of anesthesia and neuromuscular blockade, pulmonary edema can occur during endotracheal intubation or following extubation and is postobstructive in nature. In these cases, the intrathoracic pressure is raised against a closed glottis from laryngospasm or airway obstruction secondary to redundant pharyngeal tissues.

Pulmonary edema may also occur in the absence of marked increases in peak airway pressures. Kademani et al reported a case of acute-onset (“flash”) pulmonary...
edema whose cause was thought to be secondary to a hypertensive crisis precipitated by the injection of ephedrine-containing local anesthetic and nasal phenylephrine, followed by β-blocker (esmolol) administration to control the hypertensive crisis.44 There were no signs of increased peak airway pressures before the development of pulmonary edema and lung volumes remained unchanged. Approximately 10 minutes after the resolution of hypertension, pink frothy exudate was noted in the endotracheal tube. The patient’s oxygen requirements increased, and 100% oxygen was required to maintain an oxygen saturation of 95%.

Respiratory distress is a common finding postoperatively following orthognathic surgery and is the second most frequent complication.17 Barton and Harris demonstrated that intermaxillary fixation reduces the peak inspiratory flow by an average of 82%. The stress and anxiety the patient experiences postoperatively and the reduction in peak inspiratory flow may heighten the patient’s perception of suffocation, and the perceived lack of air entry may further complicate respiratory mechanics.14 Signs of respiratory distress may include fast or very slow intentional respiratory rate and stridor, indicating abnormal airflow in the upper airway.17 Stridor may result from the presence of postoperative airway edema or the presence of bleeding or secretions, and may lead to gasping, wheezing, tachypnea, and eventually cyanosis. The patient may be flushed or diaphoretic initially and become cold, mottled, and cyanotic as respiratory distress continues. Dexamethasone has been shown to decrease edema after oral surgery when given preoperatively and immediately postoperatively.20,46 Proper surgical hemostasis, atraumatic intubation, and airway suctioning are the best management methods for bleeding concerns.

Recognizing respiratory difficulty in the postoperative period is essential to alleviate further decline in respiratory status. Pre-procedural counseling concerning patient experiences postoperatively will decrease postoperative anxiety.6 If the patient expects to emerge from anesthesia with MMF in place, he or she may be coached to breathe nasally and to take slow deep breaths rather than short shallow breaths. Techniques that may help to alleviate postoperative anxiety include cool humidified oxygen, nasal airways to open the nares and make airflow easier, removal of other objects (if applicable) that may impede nasal airflow such as nasogastric tubes, the administration of nasal decongestants, and frequent oropharyngeal and nasal suctioning.7 If none of these measures reduce the patient’s anxiety and the respiratory status continues to worsen, evident by increased work of breathing, oxygen desaturation, cyanosis, or absence of respiratory effort, the patient should be prepared for immediate reintubation. If oral reintubation is anticipated, this will require the removal of MMF.

Postoperative anxiety and pain will make respiratory difficulty worse because anxiety and pain can cause hyperventilation. In most cases, these patients will require some type of opioid for postoperative pain control. The dosing of opioid pain medications after extubation in the PACU should be conservative and titrated slowly to avoid severe respiratory depression or respiratory arrest. Ketorolac and acetaminophen should also be given, when appropriate, to decrease the amount of opioid needed to control pain.47,48 If pain is well treated and the anxiety level continues to be high, a small dose of benzodiazepine may help to calm the patient. The anesthesia provider should always be aware of the patient’s respiratory status while administering these medications to avoid respiratory depression. Respiratory difficulty and anxiety after MMF are common and pose a unique challenge for both the surgical and anesthesia teams. Both teams must be intimately involved in the patient’s immediate postoperative care to ensure adequate respiratory status while alleviating the patient’s pain and anxiety.7

Conclusion

Maxillomandibular fixation (MMF) is a frequent situation encountered during the administration of general anesthesia. It is essential to recognize the types of MMF used and be aware of strategies not only to manage potential complications but also to avoid them in the first place. Should major airway complications arise, knowing how to quickly release a patient from MMF is paramount to the patient’s safety and overall outcome.

REFERENCES


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