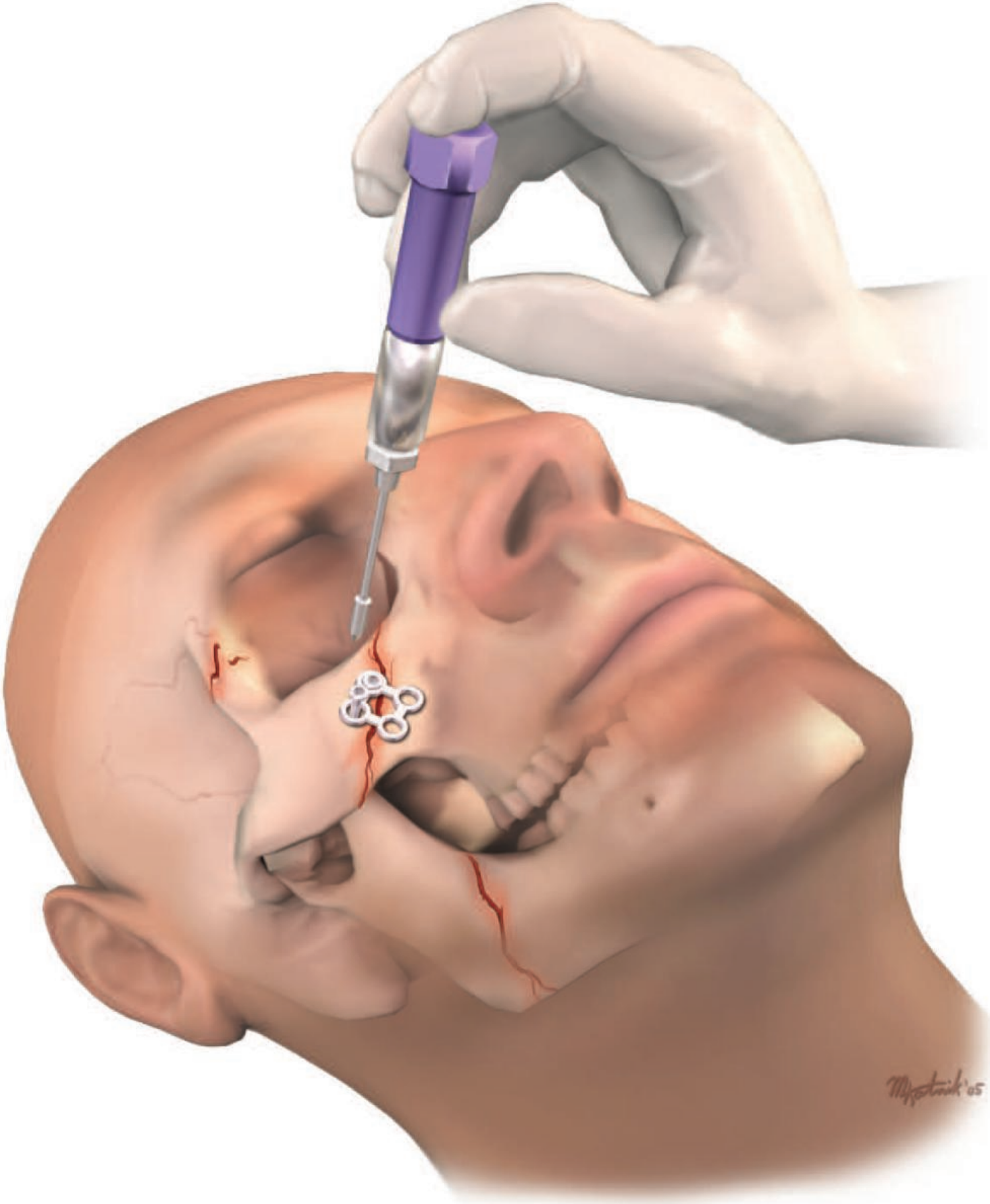


SURGERY of the Head and Neck

ORAL SURGERY AND FRACTURE MANAGEMENT

Mary Sutton, CST, CFA

Many of the surgeries in the oral cavity deal with the excision of cancerous lesions on structures within the cavity. There are also surgeries dealing with the fixation of fractures and helping a patient overcome sleep apnea. Some of the surgeries dealing with the excision of cancerous lesions may require major reconstruction and will be described when discussing that surgery. Any specific anatomy or instrumentation will be discussed with each surgery.

ORAL ANATOMY

The oral cavity functions in the articulation of speech, mastication of food, and as an alternate airway. The boundaries of the oral cavity are the lips, the anterior tonsillar pillars, the hard and soft palate, and the buccal mucosa. The floor of the mouth is made up of the mucosa overlying the sublingual and submandibular glands. Contents of the oral cavity are the teeth and gums, the tongue, and the orifices of the ducts of the salivary glands (Figure 1).

INSTRUMENTATION AND SUPPLIES

When preparing for oral surgeries that deal with excision of cancerous lesions, the surgical technologist should start with the standard neck set. Some neck sets also contain instrumentation to deal with the oral cavity structure; however, an oral, dental, and facial set may be warranted according to the situation. Retractors, such as a Jennings mouth gag or a dental mouth prop, may be needed to hold the mouth open. Anthony suction tips may be useful within the mouth.

If working on the mandible, bone instruments are needed. These instruments should include a Freer elevator, small key elevators (usually ¼″ and ½″), Lewin bone clamps, and osteotomes and a mallet. When splitting the mandible to access a lesion, a mandibular reconstruction set with plates and screws is warranted. A sagittal saw is also necessary to split the mandible or to cut out any bone involved with a cancerous lesion. Tooth extraction instruments may also be required for patients with lesions involving the gums, mandible or maxilla.

Supplies needed for oral surgeries include: X-ray detectable 4″ x 4″ sponges; a suction apparatus; monopolar and bipolar electrosurgical supplies, including a Teflon® tip for the electrosurgical pencil (to prevent the pencil tip from sticking to the mucosa of the oral cavity); 2-0 silk suture for tongue retraction; and absorbable suture for repairing the defect. If major reconstruction is required to repair the defect, additional supplies must be brought into the room.

It is a good habit to have a tracheotomy set and tracheotomy tubes available. Prophylactic tracheotomy may be performed preoperatively, if significant swelling of the tongue (to the point of airway obstruction) is expected.

Glossectomy

Glossectomy is removal of all or part of the tongue to remove cancerous lesions. Tongue cancer is typically a disease of the middle-aged and elderly. It most commonly affects men. Most patients with tongue cancer have a history of long-term tobacco and/or alcohol use. Depending on the staging and type of the cancer, a neck dissection may also be performed.

The patient is placed under general anesthesia. A direct laryngoscopy and esophagoscopy may be performed to check for spread of the disease. If only working within the mouth, a skin prep may not be necessary. Often, though, a skin graft is used to repair the defect. In these cases, the skin graft site is prepped and draped separately. Some surgeons will reprep and drape when performing a neck dissection or perform the neck dissection first. Others will prep and drape for the neck dissection along with the draping for the glossectomy and skin graft. They will cover the neck during the glossectomy, then change gloves before proceeding to the neck dissection.

A mouth prop or gag is used to open the mouth, and a 2-0 silk suture is placed through the tip of the tongue for retraction. With the silk suture, the tongue can be pulled upward for easier visualization. The lesion is identified and excised, taking a margin of normal tissue with the lesion. The tumor should be sent for margins before closing the defect. The defect may be repaired simply by closing it upon itself.

If the defect is too large, a skin graft is used for repair. A split-thickness skin graft is taken with a dermatome, usually from the thigh on the affected side. The skin-graft site is treated for bleeding and dressed appropriately. The skin graft is sewn to the sides of the defect with an absorbable suture.

A bolster may be used as a pressure dressing on the defect. When using a bolster, the suture lengths are kept long to tie the bolster down to the repaired defect. The bolster is made up of some type of antibiotic gauze (eg Xeroform™ gauze) surrounding cotton balls that are coated with an antibiotic ointment. The suture lengths are tied over the bolster to hold the skin graft down and allow better healing with no dead spaces.

When a bolster is used, a tracheotomy may be necessary due to the bulk of the dressing in the mouth. Prior to emergence from anesthesia, the tongue is checked for swelling and, if necessary, a tracheotomy is performed. Often, a nasal airway can be placed to maintain patency of the airway after removal of the endotracheal tube. The throat is cleared of debris and, if a throat pack was used, it must be removed prior to extubation. The traction suture and oral retractor are removed. A nasogastric tube may be placed before the patient is awakened.

Postoperatively, the patient may be given prophylactic antibiotics for 24 hours. The patient is fed through the nasogastric tube. If there is no skin graft, the nasogastric tube can be removed when the swelling has reduced and the patient can tolerate fluids. If the patient has a skin graft

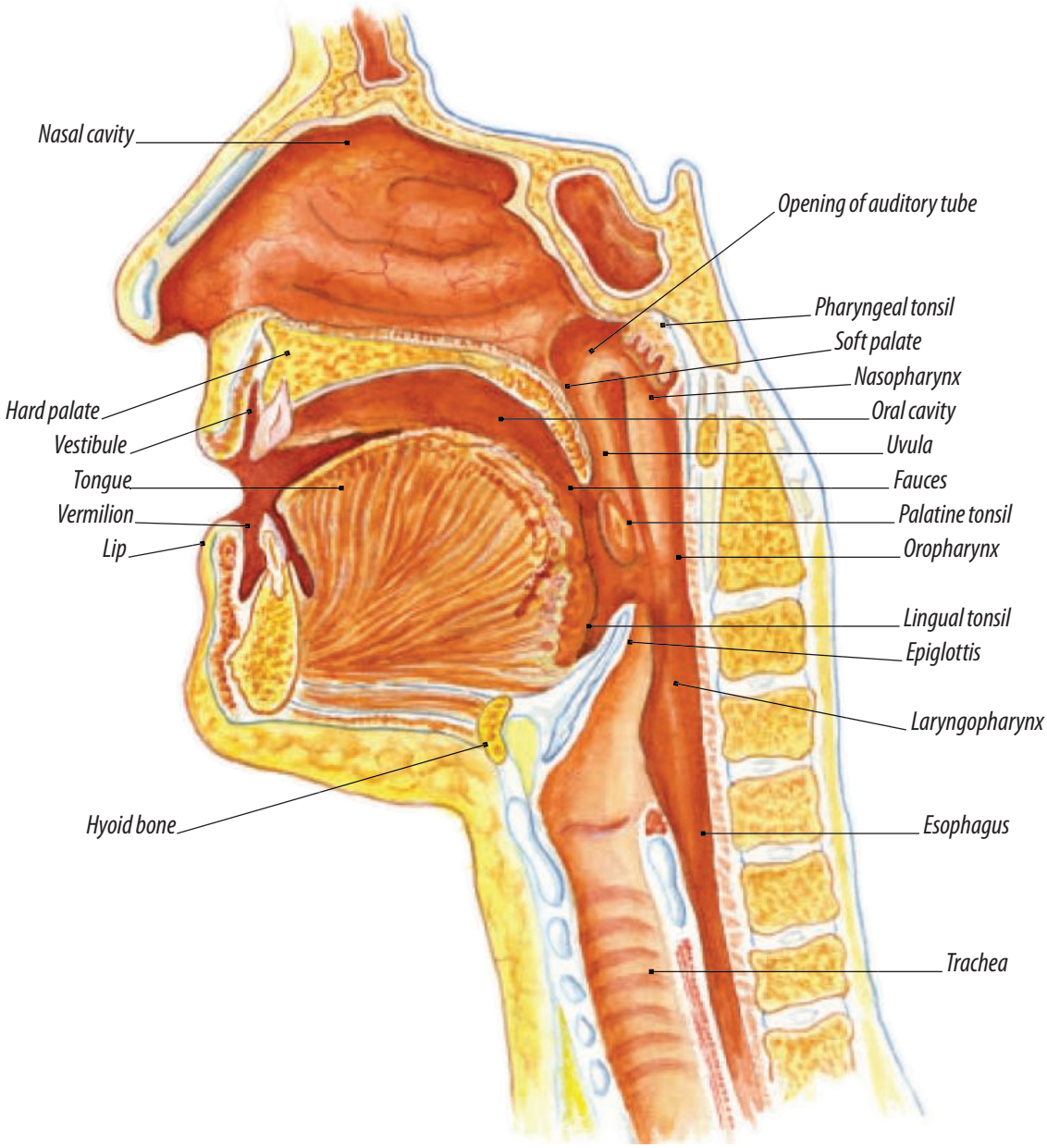


FIGURE 1

Anatomy of the oral cavity.

and bolster, the nasogastric tube is maintained until the bolster is removed and the tongue is able to move, which generally occurs on the fifth postoperative day.

Complications of glossectomy include edema and resultant airway obstruction, hematoma, and loss of the skin graft. Also, the lesion can recur if inadequate margins are taken.

Resection of the floor of the mouth

The floor of the mouth is a common site for carcinoma in the oral cavity. As with glossectomy, the patients are often middle aged or elderly and have a history of long-term use of alcohol and tobacco.

Floor-of-mouth lesions may be small, needing a simple excision procedure with a skin graft. Other floor-of-mouth lesions are extensive and may involve the alveolar ridge (gums) and the mandible. Often, these extensive lesions are repaired with some type of flap, usually from the pectoralis major.

Neck dissection is performed on the same side as the lesion, except when the lesion is in the midline, indicating bilateral neck dissections. When removing a small lesion, the surgical team must be prepared to do the more extensive surgery, if the margins continue to come back positive. Sometimes, it is difficult to access a floor-of-mouth lesion. If so, a mandibular split or man-

dibulotomy is performed to reach the lesion. Tracheotomy may be performed, especially when a flap is used to repair the defect.

The patient is placed on the operating table in the supine position and undergoes general anesthesia. The patient's neck is extended, and the patient is prepped and draped, including an area for a skin graft. The mouth is propped open with a mouth prop or gag, and a 2-0 silk suture is placed through the tip of the tongue for retraction. The lesion is identified, and proper exposure is achieved. The lesion is excised, taking a margin of normal tissue. The margins of the tumor are verified by frozen section to be free of tumor and, if clear, the defect is repaired with a skin graft. A nasogastric tube may be placed. The tongue retraction suture and mouth retractor are removed.

If the lesion is extensive, the surgery is more extensive as well. If the mandible needs to be split to get to the lesion, then the lip may also have to be split, and the tissue taken off the mandible to a point past where the area is to be split.

To split the lip, the incision is started in the midline of the lip. Some doctors mark the vermilion of the lip for easier closure. The incision is carried downward, and a small 'V' is made in the incision halfway to the chin to prevent strictures after closing. The rest of the incision is made to the chin and slightly under the chin. The inner lip and buccal mucosa is incised away from the mandible to a point past where the mandible is to be split. The alveolar tissue is excised in the area, and the periosteum of the mandible is elevated away with a key elevator. A sagittal saw is used to split the mandible. The mucosa of the floor of the mouth is dissected from the mandible. The lesion is excised and repaired. The mandible is repaired by plating, and the alveolar ridge is closed. The buccal and inner lip mucosa is sewn back to the tissue around the mandible. The incision is closed.

If the mandible is involved in the tumor, a piece of the mandible is taken with the lesion. The same lip-split incision is made, and a portion of the mandible is resected with the tumor. This is usually for the extensive tumor surgery, where a flap is needed for repair of the defect. Depending on the amount removed, the mandible can be repaired by plating across the deformity or with a fibular or radial forearm free flap. For these extensive lesions or when the mandible is split, a tracheostomy is performed to protect the patient's airway.

Complications of simple resection of a floor-of-mouth tumor are loss of the skin graft and necrosis of the tip of the tongue due to loss of vascularity, which may have been involved in the tumor. Complications of the major resection of a floor-of-mouth tumor include loss of the flap, osteomyelitis of the mandible, and the same complications as the simple resection.

Mandibular resection

Resection of a portion of the mandible can be used to obtain adequate exposure for resection of lesions of the floor of the mouth, as well as to obtain negative margins of resection that may not be achieved without removing the bone. If the tumor has invaded the bone, a more extensive resection of the mandible is needed. The advantage of removing a smaller portion of the mandible is dental rehabilitation. The patient can be easily fitted with dentures. When taking a larger portion of the mandible, the surgeon could decide not to repair the mandible based on the tumor and the postoperative course in treating it.

When removing any part of the mandible, some teeth may be removed in order to perform a resection. The surgeon must take care not to disturb the roots of the teeth that will not be involved in the resection. A tracheotomy is performed to protect the patient's airway.

The patient undergoes general anesthesia and is placed in the supine position on the operating table with the neck extended. Before prepping and draping, a direct laryngoscopy and esophagoscopy may be performed to check for the spread of the disease. The patient is prepped and draped. The tracheotomy may be performed at the beginning or the end of the procedure, depending on the surgeon's preference. A mouth gag or prop is used to keep the mouth open, and a 2-0 silk suture is placed on the tongue tip for retraction.

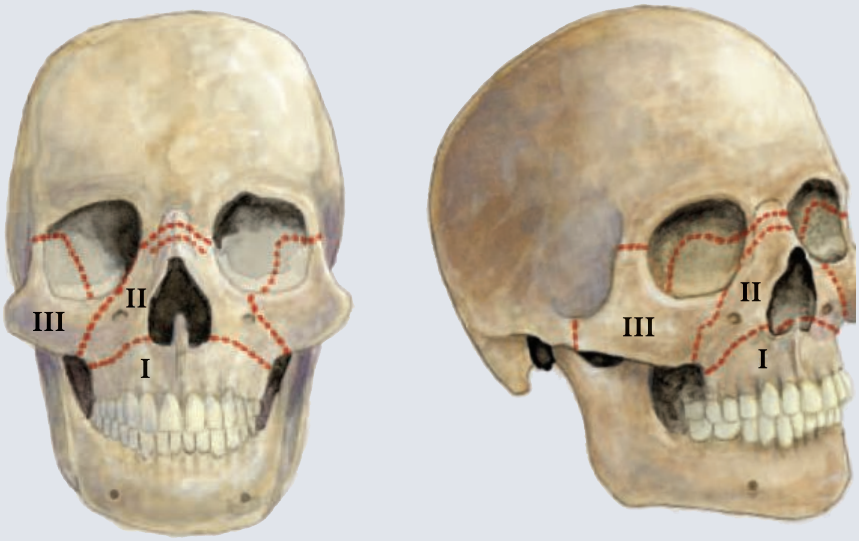
LeFort fractures

In the late 1800s, Renee LeFort took a bowling ball and swung it at different skulls at various speeds to see how the bones fractured. He described different facial fractures according to the type of injury and the energy used to produce them. These LeFort fractures are taught to medical students and residents, but most often facial fractures do not follow LeFort's classifications. They are still used to describe certain craniofacial procedures for patients with craniofacial and upper jaw deformities.

LeFort I: a transverse fracture through the floor of the maxillary sinuses where only the palate moves.

LeFort II: a fracture through the maxillary sinuses, the nasal bones, and the nasoethmoidal complex. It is often called a pyramidal fracture.

LeFort III: a major fracture pattern that goes through the orbits and creates complete or partial craniofacial disjunction.



The lesion is identified, and the amount of the mandible to be resected is decided. A lip split incision may also be performed to provide better exposure. If the patient has teeth, one tooth on either side of the resection must be removed. The alveolar ridge is cut and elevated away on either side of the resection. A sagittal saw is used to cut the mandible, and the remainder of the lesion is excised. The mandible is repaired, usually by a mandibular reconstruction plate and screws. A skin graft is placed over the defect. If the defect is extensive, a flap may be used. The lip split incision is closed, and a nasogastric tube is placed.

The major complication of mandibular reconstruction is a fracture of the mandible. This occurs most frequently in a mandible that is edentulous (toothless), because bone loss is common after tooth loss. Care should be taken to prevent fracture.

Uvulopalatopharyngoplasty (UPPP or UP3)

Uvulopalatopharyngoplasty (UPPP) is the surgical technique of choice for management of obstructive sleep apnea (OSA). Symptoms of OSA include snoring, history of restless sleep, and daytime sleepiness. Before performing surgery, the patient would undergo a sleep study where the patient would be given nasal oxygen by positive pressure. Patients who cannot tolerate the nasal oxygen become candidates for UPPP.

Often a concurrent septoplasty and/or tonsillectomy will also be performed. The septoplasty is performed if the patient has a history of nasal

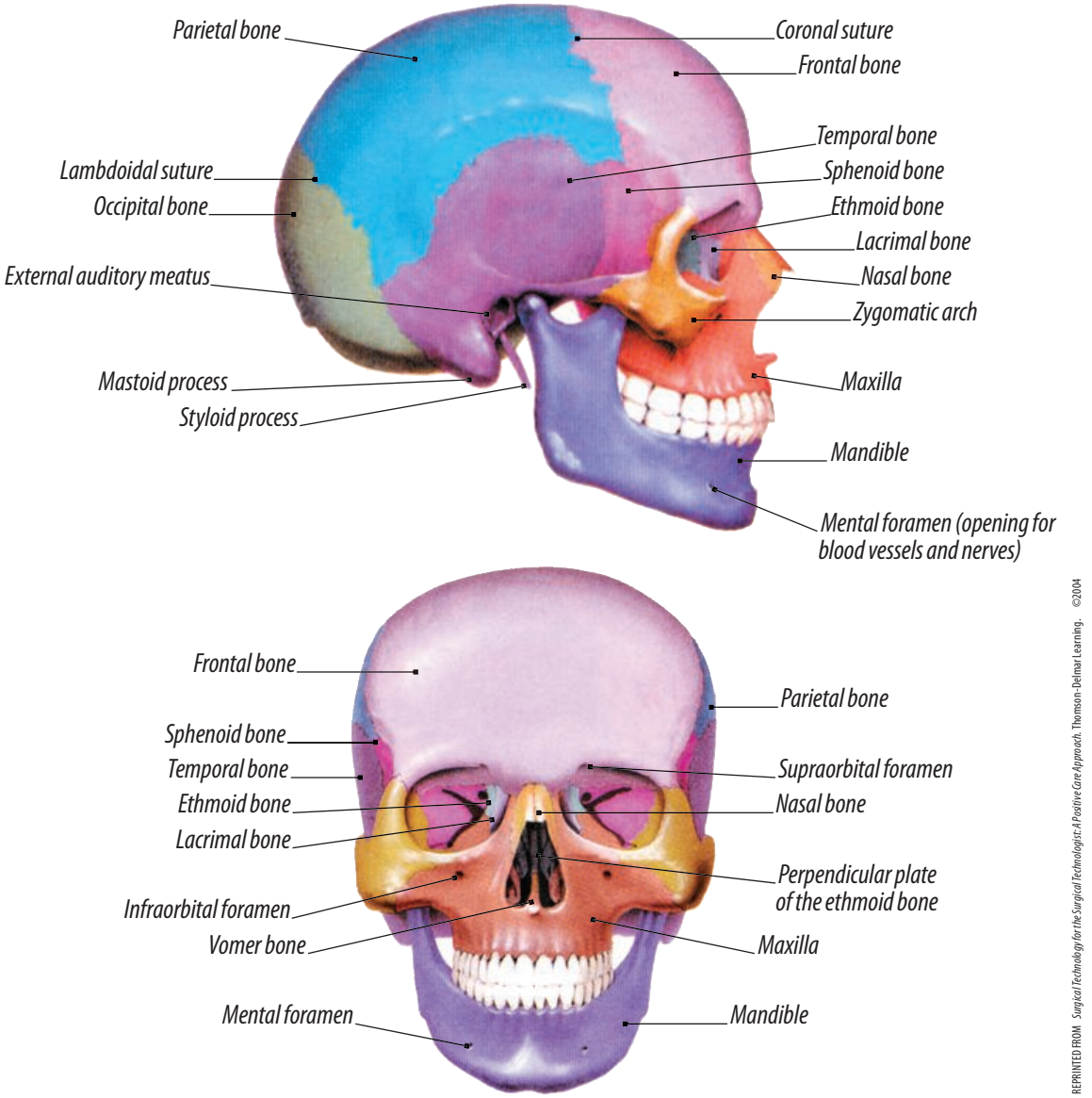


FIGURE 2

Bones of the skull.

obstruction, usually from a deviated septum. Large tonsils are another cause of OSA.

UPPP is not always successful in correcting OSA and, if it fails, the patient would have to use the nasal oxygen with positive pressure. Some surgeons perform a UPPP using a laser (ie LAUP or laser-assisted UPPP). The surgical technique, postoperative treatment, and risk of complications for both procedures are the same.

Instrumentation needed for an UPPP include a tonsillectomy set, as well as a needle holder and suture scissors, if those are not included in the set. An absorbable suture will be used to close the soft palate. Supplies needed are the same as that of a tonsillectomy, with the addition of an extension tip for the electrosurgical pencil.

Patients undergoing UPPP will be given general anesthesia. They will be positioned on the operating table the same as for a tonsillectomy. The tonsillectomy mouth gag is placed, and the tonsils are removed. The soft palate is incised, and the incision is carried through to the nasopharynx. The uvula and a small portion of the soft palate are resected. Hemostasis is achieved with the use of the electrosurgical pencil, and the wound is closed with absorbable sutures (eg 3-0 or 4-0 chromic).

Postoperatively, the patient is observed overnight to ensure that adequate oxygen saturation

is maintained. The patient will have pain and discomfort due to the soft palate wound; however, the amount of narcotics given must be limited due to the respiratory depression they cause. A soft or liquid diet is ordered, similar to tonsillectomy patients.

Complications of UPPP include some swallowing difficulty, which is usually temporary. The patient is asked to drink slowly. A rare complication is nasopharyngeal stenosis due to a tight closure of the palate wound. UPPP may not work to correct OSA in some patients.

Facial fracture management

Facial fractures are most often associated with trauma. The location and severity of the fracture is related to the position and intensity of applied force and the amount of energy transferred. For example, a fist or a fall has low energy, which would mean less comminution of the bone. Higher levels of force, such as automobile accidents, cause greater comminution of the bone.

Facial fractures have predictable patterns described by Renee LeFort (see sidebar). The fractures don't always follow the patterns, but it is a good rule of thumb. If a high level of force comes straight at the face, the nasal bones, frontal sinus, and nasoethmoidal complex are most commonly fractured. If there is an isolated trauma to the orbit, such as a fist, the resultant fracture is likely to be an orbital blowout. A tripod fracture is a zygomatic fracture, which also involves fractures at the lateral and infraorbital rims, the orbital floor, the zygomatic arch, and the lateral maxilla (Figure 2).

In the repair of any facial fracture, the surgeon must reposition and fixate the bones to prevent malocclusion and shortening of the midface. Also, the surgeon must restore the functional properties of structures in the area of the fracture.

Instruments needed for the repair of facial fractures may vary based on the area fractured and the planned repair. For instance, if the fracture is around the eye or zygoma, an eye plastic set is used. One instrument used often for a depressed zygoma fracture, especially in a tripod fracture, is a urethral sound. The sound can be used through a brow incision and inserted under the depressed area of the zygoma to elevate the bone.

If repairing maxillary or mandibular fractures, a Caldwell Luc set is often used with an arch bar set. An arch bar set contains a Brophy retractor, two wire needle holders, wire cutters, wire pushers, a couple of hemostats, and arch bars. To secure the arch bars, usually 24- and/or 26-gauge wire is needed. When fixating fractures, use sets with plates and screws comparable for the type of bone—smaller plates and screws for smaller or thinner bones; larger plates and screws for larger bones. A drill is necessary to size the screw holes and to place the screws.

Supplies needed for repairing facial fractures are X-ray detectable 4″ x 4″ sponges, a suction apparatus, an electrosurgical unit, a control syringe, and a 25-gauge needle. Local injection is usually preferred and often consists of 1% lidocaine with epinephrine. The suture used is determined by the location of the incision and the type of tissue to be approximated.

Zygomatic fracture management

Zygomatic fractures are most often caused by motor vehicle accidents and physical altercations. These fractures also are associated with fractures around the eye, so the vision of the patient must be checked due to swelling in the area. Not all zygomatic and associated orbital fractures need to be corrected surgically. In the case of tripod fractures, if the zygoma is depressed, the bone may be lifted up by a urethral sound without the need for further intervention. If internal fixation is needed, then the surgery is more extensive.

The patient usually undergoes general anesthesia. He or she is placed on the operating table in the supine position, and after intubation, the table is turned with the affected side away from the anesthesia provider and equipment. The patient is prepped and draped. Lidocaine with epinephrine is injected along the lateral brow.

The incision is centered over the fracture but is started on the lateral aspect of the eyebrow and

follows the orbital rim. Double skin hooks are placed to retract soft tissue, which is dissected away to expose the fracture. A periosteal elevator, such as a Freer, is used to elevate the periosteum off the bone to be plated. A urethral sound may be used to push up the zygoma for proper fixation.

A plate is chosen and fitted for the bone to achieve proper anatomy. Screws are placed in the plate, and the fixation is checked for approximation of the bone—intraoperative X-rays may be needed. The wound is closed, usually with an absorbable suture.

Maxillary fracture management

Maxillary fractures are uncommon but are most often caused by motor vehicle accidents. All of the LeFort fractures have a maxillary fracture component, but repair of these will not be discussed. Often, the only treatment for a maxillary fracture is arch bars. The arch bars ensure that the teeth are set in their proper position, and keeping the patient in arch bars can result in fracture healing by rest. If a maxillary fracture needs internal fixation, the fracture is commonly fixed through a Caldwell Luc incision. Care is taken to identify and not to injure the infraorbital nerve. Small plates and screws are placed, and the wound is closed with an absorbable suture.

Arch bar application

Arch bars are used to keep the teeth and jaws in their proper position by wiring them together following a fracture. This prevents malocclusion after the fracture has healed. If the patient is to have arch bars placed, the anesthesia provider will insert a nasotracheal tube. Because the jaws will be wired shut, it would be impossible to remove an orotracheal tube. If a nasotracheal tube cannot be placed, it is necessary to perform a tracheotomy. The surgical team should be ready at all times to perform a tracheostomy when placing arch bars.

Placement of arch bars is a clean procedure and may be done separately or in conjunction with reduction and fixation of a fracture. A Brophy retractor is placed to allow access to the teeth. The arch bar is measured for both jaws and cut to the appropriate length.

Prestretched 24- or 26-gauge wire, which is cut in half and loaded onto a wire twister or heavy needle holder, is used to secure the wires. The wire is passed between two teeth around the back of one tooth and brought out between that tooth and the next tooth. The wire is wrapped around an arch bar and tightened by twisting it. The wire is cut above the twisted end, and the cut end is pushed under the arch bar to protect the lips and buccal mucosa. The wire placement process is repeated until both arch bars are placed. Loops of wire, called "Ivy" loops, are created to wire the two arch bars together. Several loops are used. The patient either has their fractures fixed or is awakened.

Tech hint: It is very important to make sure that the patient is sent to the post anesthesia care unit with a wire cutter. Postoperatively, the patient should keep the wire cutter with them at all times while the arch bars are in place. If there is a problem with the airway, the wires may have to be cut to help correct the problem.

Mandibular fractures

Mandibular fractures can occur anywhere on the body of the mandible. The type of repair is usually selected according to the type of trauma, the location of the fracture, and the extent of the damage. Mandibular fractures can be open into the oral cavity, and should be repaired as soon as possible. Timing of the repair also depends on other trauma to the body and the stability of the patient.

Because the pull of the masseter muscle, which is attached to the mandible, is so great, arch bars are almost always placed for mandibular fractures. An exception would be when there is a mandibular split for the resection of a tumor. The surgeon makes the fracture and, therefore, the occlusion of the jaw would be approximated before plating the split.

The choice of plates and screws varies depending on the part of the mandible that is fractured. The bone above the angle of the mandible is very thin and could use the same plates as uti-

lized on the maxilla. The body of the mandible is thick and would require a larger plate or possibly a compression plate. It is important to find out what type of plates and screws the surgeon plans to use prior to the start of the procedure.

The patient is placed in the supine position on the operating table and placed under general anesthetic with a nasotracheal tube. The table may be turned so the affected side is away from the anesthesia provider and equipment.

Arch bars are placed before or after draping, depending on the surgeon's wishes. Most often, mandibular fractures are repaired orally, so little or no prep may be required. The oral mucosa is incised over the fracture site, and the tissue is elevated and dissected away to expose the fracture. The appropriate plate is selected and fitted to the bone. Screws are placed in the plate to fixate the fracture. The wound is closed with an absorbable suture (eg 3-0 or 4-0 chromic).

Postoperatively, the patient's airway is monitored for patency, especially for patients with large fractures or those who are very edematous. Prophylactic antibiotics are given for about 48 hours. If there is swelling around the eye from any trauma, the vision is checked. Complications of mandibular fracture fixation include infection, hematoma, and nonunion of the fracture.

Conclusion

Being part of a head and neck surgery team can be a very difficult task. One must realize that the surgery being performed on a cancer patient is the best possible way to treat that cancer no matter how bad the results appear. A thorough knowledge of the anatomy, tumor staging, the surgical procedures being performed, and the surgeon's preferences makes the surgical technologist a viable team member.

About the author

Mary Sutton, CST, CFA, is currently an instructor at Concorde Career Institute in Jacksonville, Florida, and was recently a speaker at AST's 36th Annual National Conference in Orlando. She has been active in the Florida State Assembly, the AST national Board of Directors, and continues to serve the profession on the LCC-ST Board of Directors.

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