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The Textbook of Laryngology (editor, Al Merati) is available in the 2nd floor library. It extensively describes (with illustrations) common OTO procedures. Please take advantage of this excellent resource.

Many thanks to the following for their help in the preparation of this primer:

Disclaimer: These notes are to help the anesthesia team be prepared for the nuances of OTO surgical procedures. Only common surgeries are described. Idiosyncrasies among surgeons are included, but no “cheatsheet” can ever be considered all inclusive. The anesthesia and surgical teams are encouraged to review the case with each other, hopefully far enough in advance to permit timely preparation. Discussion is particularly important if deviations from the cheatsheet are anticipated, or the proposed surgical procedure is not adequately covered by these notes. If you find inaccuracies or omissions, please notify rooke@u.washington.edu
Overview

There are several issues that should always be considered when preparing for an Otolaryngology case:

1. Fluid requirements. Some surgeries may have high blood loss.
2. Airway. Know what will be initially placed down the airway on induction, if anything, and if different devices will be used during the procedure. Be prepared for a difficult airway. There is no substitute for a careful, collaborative discussion between the Otolaryngologist and Anesthesiologist prior to the operation. Besides your own exam, CT or MRI scans may be helpful as will the office exam done by OTO, which typically includes a fiberoptic endoscopy via the nose and may even include pictures. Consult the departmental difficult airway website for techniques if necessary. Even if the surgeon will be securing the airway, be prepared to assist and back-up. If necessary, ask the surgeon to perform an endoscopy with their small scope via a topicalized nare prior to induction. This will give you a firsthand view and should help determine how best to secure the airway.
3. Bed positioning. OR table may be turned 90° or 180°, so organize the IV, patient monitoring cables and breathing circuit as you hook them up to the patient such that after the bed is rotated, they will come off the side turned toward you (if 90°) or down toward the feet (if 180°). Alternatively, especially for a 180° turn, disconnect all monitors and circuit and reconnect once the OR table has been turned.
4. Fire safety. If a laser will be used, know how fires might occur at the surgery and have a plan to prevent them and to extinguish them should one occur. Special endotracheal tubes, decreased FIO₂, avoidance of N₂O are some options to lower the risk of fire. Strong consideration should be to use wetted, cloth drapes over the face and chest if open oxygen is applied (nasal cannula, face mask, jet ventilation at high FIO₂) that could get trapped under the drapes.
5. Paralysis – May be needed, or may be not desired at all if nerve stimulation will be performed.
6. Flap creation
7. Dexamethasone – often used to reduce swelling, but not always
8. Intraop laboratory tests
9. Whenever possible, review the surgical procedure technique. This can be easily accomplished by looking it up in the text, *Textbook of Laryngology* (editor, Al Merati), which is available in the 2nd floor library. It extensively describes (with illustrations) common OTO procedures. Please take advantage of this excellent resource.
Microdirect Laryngoscopy
(eg. Small tumors from the epiglottis to the trachea)

Overview: Typically involves lasers and special airway devices (jet ventilation from a direct laryngoscope, jet ventilation from a Hunsaker tube, laser endotracheal tube, regular ETT (but small diameter) or a microlaryngeal tube (MLT) which is a small diameter but longer than normal polyurethane ETT). With laser use, fire risk is present, so control of FIO2 and other efforts to decrease fire risk is important. A difficult airway is common. Patient will need to be paralyzed. The OR bed will be turned, probably by 90°.

When choosing which airway device to use for a particular case, consultation with the surgeon is essential as they will have a better idea which options will work for the lesion in question, and oftentimes each surgeon has their own preference among the various options. In general, most any lesion can be ventilated with a Hunsaker tube. If the Hunsaker tube is not selected, then attention must be paid to the location of the lesion. If the lesion is below the cords, then a scope may be work well so long as the scope can be inserted far enough into the larynx/trachea to make a reasonable seal that will not permit the jet ventilated gas to escape too easily. Thus, for lesions near or above the cords, a small diameter tube (ETT, MLT, laser ETT) will likely be necessary. Remember, the both the ingress and egress of air must be assured for safe and effective jet ventilation, no matter if a Hunsaker tube is used or if the jet is administered along a channel in the laryngoscope.

Assess the airway via your exam, radiology procedures and the OTO exam. A direct discussion with the OTO surgeon should take place prior to induction to determine what airway management techniques will be used and when (e.g. direct laryngoscopy by OTO first, then an ETT; or any combination of the devices mentioned above. The OTO surgeon may wish to secure the airway initially. Various methods for securing the difficult airway are available elsewhere on the departmental website.

If a Hunsaker tube will be used (preferred by Dr. Hillel), review its operation and be aware of a few specific issues below and also reviewed elsewhere:
1. The surgeon will place the Hunsaker tube under direct laryngoscopy after induction.
2. TIVA will be necessary for anesthesia.
3. Ventilation can be adjusted to mimic normal minute ventilation by a) observing chest excursion to judge tidal volume, b) a normal respiratory frequency of 6-10 breaths per minute and c) if desired, connecting a stopcock to the Hunsaker pressure monitoring port so that airway gas can be aspirated by the gas monitor.
4. Beware kinking of the Hunsaker tubing. If this occurs, the ventilator will detect high inspiratory pressures and might SHUT DOWN. Find the kink and then restart the ventilator.
5. The FIO2 of the Hunsaker ventilator (Monsoon) can be adjusted. Lower the FIO2 down to 30% if possible. Consider atelectasis as a cause of hypoxia, not just a low FIO2 (i.e., consider bigger tidal volumes, which likely means you need to increase the driving pressure).
6. The surgeon may want to use a lidocaine LTA down the airway at the end of the surgery.
If the procedure will be performed under direct laryngoscopy (e.g. preferred by Dr. Merati when the lesion is far enough into the airway to permit a reasonable seal), respiration will be provided by jet ventilation via a port on the laryngoscope. Jet ventilation can be done by hand or the Monsoon. Because the laryngoscope will be above the lesion, and because there can be significant gas leak around the laryngoscope, it is important to observe the chest excursion as a measure of an adequate tidal volume, otherwise atelectasis can develop rapidly. The lower in the airway the operation is taking place, the higher the incidence of atelectasis. One advantage of the Monsoon is that the FIO₂ can be reduced unlike the handheld jet which is fixed at 100%. TIVA will be necessary for anesthesia.

If an endotracheal tube is to be used, and the tube will be placed beyond the surgical site, a laser tube should be chosen if a laser will be used. If no laser will be used then an MLT should be fine (cheaper). Ask the surgeon where and how the tube should be secured. When using a laser tube, be aware of the following:

1. With either a laser tube or MLT, a small diameter tube will be used (5.5 or 6.0 mm). With small tubes, a high minute ventilation cannot be achieved due to the high pressure gradient necessary to get flow through the tube (above 10 lpm may be problematic).

2. Laser tubes will have one or two cuffs, which will be inflated with methylene blue dyed crystalloid or water. During your setup, fill the cuff with the dyed liquid and get the air out of the cuff. The Medtronic Laser Shield tube has blue crystals in the pilot; in this case, only saline needs to be administered. Once inserted, slowly inflate the distal cuff to eliminate air leak. (Need to avoid cuff overinflation and tissue ischemia – remember, air compresses but water does not.) Then inflate the proximal cuff (if present) to the same or slightly lesser volume. During surgery, if a cuff is ruptured by the laser, the second cuff will still keep oxygen in the airways from reaching the surgical site (fire hazard). Also, the liquid may extinguish the fire, and the blue dye will help the surgeon recognize the rupture. The tube should then be replaced.

3. It is important that the FiO₂ be limited in laser laryngeal surgery. The seal cannot be assured in all cases. A goal of FiO₂ of 0.3 is reasonable for most cases. Slightly higher levels can be tolerated. Do not reduce the FiO₂ with N₂O because N₂O supports combustion.

Bed will be turned 90°, so run the IV, monitoring lines and circuit across the chest and to the side that will be turned toward you. If you are comfortable doing so, the bed could be turned prior to the patient entering the room.

Dr. Merati likes to do the “timeout” prior to induction.

Dexamethasone 10 mg should be given, except if the surgery is for papilloma. This is surgeon dependent, so ask.

Paralysis is necessary for the surgery, right up to the end of the surgery. Take care to maintain one or two twitches toward the end of the surgery, so that a good reversal can be obtained.

Be very careful to not bump the table during the surgical procedure as it will produce profound movement of the surgical field. Such movement is annoying to the surgeon and harmful to the patient if the surgeon is cutting tissue or operating the laser. Even a simple task such as checking the twitch monitor or adjusting the IV can lead to surgical disruption. The surgeons know that the anesthesiology team needs to attend to these issues; so simply announce your need to touch the bed or patient and the surgeon will stop to allow this in a safe manner.
Bronchoscopy and Dilation of Tracheal Stenosis

In many ways, this is the ultimate “share the airway” because your opportunity to ventilate the patient will be intermittent during the procedure. During actual dilation, the patient will be apneic. Between dilations, a bronchoscope will be in the trachea. The bronchoscope has a side connector for the circuit, allowing ventilation. However, there will not be an airway seal, so inspired gas will leak around the scope and out the mouth. Therefore, TIVA should be used instead of inhalational anesthesia. That having been said, many of the simple dilations are rather short in duration.

OR table will be turned 90° prior to induction. Route your monitor lines down the patient’s chest and off to the side next to you. When both anesthesia and surgery is ready, the patient is induced lightly. Once controlled mask ventilation is proven to be effective, then the patient can be deepened and paralyzed. OTO will perform direct laryngoscopy and place the bronchoscope. Paralysis is essential.

At the end of the surgery, lidocaine LTA can be applied to the airway. Mask ventilation should be used until the paralysis has reversed and spontaneous ventilation is established. If mask ventilation proves difficult, place a standard ETT and later extubate in the usual fashion.

Laryngeal Framework Surgery
(e.g., vocal cord medialization, thyroplasty)

These cases are done under MAC because the patient needs to phonate during the procedure. Generally, heavy sedation is not necessary because the nose and oropharynx will receive topical lidocaine. Dr. Hillel prefers dexmedetomidine by itself. Drs. Merati and Meyer are less fussy and agreeable to small doses of midazolam and fentanyl (but avoid confusion and disinhibition). No glycopyrrolate should be used because a dry mouth makes phonation more difficult (unless the surgeon requests it because the secretions are so bad). Similarly, a scopolamine patch is usually contraindicated because it also dries the mouth. Besides, with so little administration of emesis generating drugs, there is really no need for scopolamine anyway. If a patch was placed in Holding, remove it unless there is a compelling reason to leave it on (discuss with surgeon). Do give dexamethasone. Give nasal oxymetazoline (Afrin) in holding; the surgeons will usually give the lidocaine. The surgeon will place their special flexible nasal scope to view the surgical field. A description of typical surgeries and the complete anesthetic guideline is available on the departmental website. Oversedation is by far more common than under sedation, as these cases usually require very little sedation. Do not assume that the proverbial “general anesthesia, no airway” is required.
Cricotracheal or Tracheal Resection – Open Airway Surgery

In this surgery, a subglottic stenosis and/or tracheal stenosis is resected and the remaining trachea is reattached to the larynx. In the case of a simple tracheal resection, the trachea is re-anastomosed. Key points are:

1. The OR table will be turned 180° (Hillel) or not at all (Merati). Route your monitor lines and circuit accordingly. Non-sterile extensions will be needed.

2. Paralysis is desirable for the operation.

3. The patient will arrive with an ETT, a tracheostomy or nothing. If a tracheostomy is not already present, it will be established during the surgery. When it is established, it will be connected to a sterile circuit with a sterile gas sampling adaptor and sterile tubing to connect to the gas analyzer (so have these ready). The sterile circuitry can be connected to the non-sterile extensions.

4. If the patient’s airway is not already secured, then airway assessment must include the issue of glottic or tracheal mass or narrowing that compromises the ability to place an ETT. A small ETT may be needed to get past an obstruction. If the airway is very compromised, the surgery will likely begin with an awake tracheostomy.

5. If the patient has an ETT (whether before surgery or placed in the OR), at some point the ETT will be converted to a tracheostomy. When the surgeons are ready to insert a sterile, armored ETT into the tracheostomy, the ETT cuff will be deflated and the ETT will be pulled back slowly to get the tip just above the incision site. The surgeon then enters the trachea and may place a surgical tie on the ETT to facilitate later re-advancement. An armored ETT will then be placed in the distal trachea and connected to the sterile circuit with sterile gas sampling adaptor and tubing.

6. During the tracheostomy, a fire hazard exists when the airway is entered if a high FIO\textsubscript{2} is in use. If possible, decrease the FIO\textsubscript{2} well prior to entering the airway. If this is not possible, then remind the surgeon to not use electrocautery when entering the airway. See the section on fire safety in the overview.

7. Although the armored ETT will be sutured to the patient, it is still possible for a mainstem intubation to develop during the surgery. This possibility should be high on your differential should the \textit{S}_\textsubscript{A}O\textsubscript{2} start to decrease.

8. Toward the end of the tracheal re-anastomosis, the armored ETT will be removed and the oral ETT will be advanced past the anastomosis and used for the remainder of the case.

9. At the end of the surgery, the patient’s chin will be sutured to the chest so that the patient cannot extend their head.

10. Dr. Hillel wants patients extubated at the end of the case (under normal circumstances). Dr. Merati leaves the patient intubated overnight. Either way, the patient goes to the ICU.

11. If the patient is to be extubated in the OR, vocal cord function will usually be checked by OTO with a fiberoptic scope. With the patient breathing spontaneously through the ETT, the surgeon will place one of anesthesia’s fiberoptic scope down the ETT (have it ready!) and the ETT will be withdrawn slowly. If cord function is satisfactory, the scope is removed. If not, the scope will be placed through the cords and the ETT re-inserted. Note that during emergence, some coughing is okay, but avoid severe coughing and bucking as it could lead to disruption of the tracheal anastomosis.
Cricopharyngeal Myotomy and Zenker’s Diverticulum Resection Surgeries

Cricopharyngeal myotomy requires approximately 90 minutes and resection of a Zenker’s diverticulum takes approximately 2.5 hours. Neither is particularly bloody or has a high fluid requirement. Both surgeries will likely start with a non-sterile endoscopy by the surgeon, culminating with the placement of an esophageal bougie. Later in the surgery, anesthesia will be asked to remove the bougie carefully. When you do so, pay attention to the ETT so as not to cause accidental extubation. Similarly, packing is usually placed in a Zenker’s diverticulum, and during its removal (if transoral), the ETT can be dislodged.

With regards to airway, these patients should be treated as “full stomach”. A standard ETT can be used because the surgical incision is in the neck, UNLESS a transoral approach will be used for the Zenkers. In this case, a laser will be used and so a laser tube should be selected. When using a laser tube, be aware of the following:

1. If a small diameter tube is used (5.5 or 6.0 mm), a high minute ventilation cannot be achieved due to the high pressure gradient necessary to get flow through the tube (above 10 lpm may be problematic).
2. Laser tubes have two cuffs, both of which will be inflated with methylene blue dyed crystalloid or water. During your setup, fill the cuff with the dyed liquid and get the air out of the cuff. Once inserted, slowly inflate the distal cuff to eliminate air leak. (Need to avoid cuff overinflation and tissue ischemia – remember, air compresses but water does not.) Then inflate the proximal cuff to the same or slightly lesser volume. During surgery, if a cuff is ruptured by the laser, the second cuff will still keep oxygen in the airways from reaching the surgical site (fire hazard). Also, the liquid may extinguish the fire, and the blue dye will help the surgeon recognize the rupture. The tube should then be replaced.
3. Technically speaking, the FiO₂ does not have to be reduced when a laser tube is used since the airway is isolated from the surgical field. However, it will not hurt to do so long as SaO₂ is acceptable. Consider avoiding N₂O for the same reason.

Bed will be turned 90°. Paralysis is desirable. Awake extubation is fine, but avoid severe coughing and bucking. It is also important to be certain the patient will breathe well on their own after extubation. The application of positive pressure ventilation by mask runs the risk of forcing gas into the surgical wound and down into the mediastinum, so do your best to avoid getting in a situation where you need positive pressure ventilation after extubation.
Thyroidectomy/Parathyroidectomy

These surgeries generally require 2-3 hours, and have minimal blood loss and low fluid requirements. Paralysis is not desired for the surgery. Nerve stimulation by the surgeon is not typically used, except occasionally for re-operations (in which case they will want the special “EMG-ETT” – ask the techs where to find it). Arms will likely be tucked.

All patients will require an oral endotracheal tube. Make sure any paralysis used for intubation will resolve quickly (typically sux or rocuronium). The intubation may be difficult if the tumor exhibits a mass effect with tracheal compression or deviation, such as can occur with a large goiter. If so, remember that the ETT may pass through the cords easily but then fail to advance adequately down the trachea. Information about the airway can be obtained from a CT scan and from the OTO clinic note or from the surgeon (almost always a nasal fiberoptic exam will have been performed). Be prepared with an ETT size that will fit past the narrowest portion of the airway.

The table will not be turned, so the ETT and temperature probe will be directed over the patient’s head.

Dexamethasone 10 mg is often given, but not always, so ask the surgeon if the drug does not appear in holding with the patient.

For parathyroidectomy, PTH levels will need to be drawn around the time of incision and 10-15 minutes after the tumor is removed. Prior to the start of the case you should check with the STAT lab (x88700) to make sure they are expecting the samples. They need to prepare ahead of time. The surgeon will likely let you know when draws are to be done, but be prepared and ask if unsure. An arterial catheter is not necessary, as an IV in a good, proximal arm vein will likely permit blood withdrawal, or the blood can be drawn from a leg/foot vein. The sample should be submitted in a large (7 ml) purple top tube, placed in ice.

There is definitely a risk of bleeding if the emergence results in significant coughing and bucking. Multiple options exist for gentle emergence, including deep extubation, awake extubation with a lot of opioid on board (consider lidocaine/bicarb mix in the ETT cuff during surgery), or placing an LMA behind the ETT and then removing the ETT while deep. Have a plan for gentle emergence and have a backup plan if Plan A results in unacceptable coughing (for example, re-deepen with propofol, then try some other emergence technique).

If the patient has had bilateral surgery (eg. total thyroidectomy), then consideration has to be given for bilateral recurrent laryngeal nerve injury and bilateral vocal cord paralysis. Such patients should be breathing spontaneously when extubated, be it awake or deep, so it can be immediately determined if the patient can breathe. If the patient cannot, the patient will need to be re-intubated and sent to the ICU.

If the patient was initially a difficult intubation, and the surgery does not relieve the situation, then consideration should be given to either an awake extubation or at least spontaneous ventilation prior to deep extubation. Either way, also consider removing the tube over a stylet.

If you are interested in using ketorolac for postop pain control, discuss with the surgeon prior to administration re the risk of bleeding.
Middle Ear (e.g. Tympanoplasty, Ossiculoplasty, Stapes) Surgery

1. If possible, place BP cuff on arm opposite the surgery. The inflating cuff can push on the surgeon and be an annoyance during surgery under the microscope. Sometimes Dr. Rubinstein places a skin graft as part of tympanoplasty surgery. The graft is from the underside of the ipsilateral arm. In this case, the BP cuff must go on the contralateral arm.
2. The IV can go on the surgical side; but if a skin graft will be harvested, only use the hand.
3. If stapes surgery is done under MAC, patient must remain awake enough to cooperate or sufficiently sedated as to be still (i.e. no middle ground).
4. Facial nerve monitoring and stimulation will be used during the surgery to avoid nerve damage, so any paralysis should be gone/reversed before facial monitoring begins.
5. OR table will be turned 180°, so be prepared to disconnect monitoring lines and circuit to facilitate the turn. Route the lines accordingly (usually down the chest), and have extension tubing for the circuit. The surgeon may turn the head periodically, so make sure there is slack in the circuit, and use a gooseneck connector between the ETT/LMA and the circuit.
6. Dexamethasone 10 mg should be given for its anti-inflammatory properties.
7. For middle ear surgery, no special anti-emetic therapy is needed beyond what would ordinarily be done for that patient. However, any middle ear surgery carries some risk of inner ear damage, and the initial presentation of that damage is nausea beyond that encountered shortly after surgery. Consequently, some surgeons (Dr. Rubinstein) feel strongly that a scopolamine patch is contraindicated because it could mask the nausea indicative of inner ear damage and delay necessary re-operation, whereas some (Dr. Duckert) want nearly every patient to get a scopolamine patch. Therefore, the best plan is to ask the surgeon whether they do, do not or are indifferent to the use of a scopolamine patch.
8. During the surgery, patient movement must be prevented, so maintain a reasonable depth of anesthesia. Light anesthesia may be detected by the nerve monitor as spontaneous activity of the facial nerve even before hemodynamic or BIS changes. Similarly, make sure you do not bump or jiggle the OR table as it results in big movement under the microscope. Even just touching the patient’s legs produces movement observable under the microscope.
9. Although blood loss is rarely an issue, even small amounts of bleeding can easily obscure the surgical field. Bleeding can be minimized by a low blood pressure (e.g. systolic BP 90-100), provided the patient will adequately perfuse all vital organs at that pressure. Patients with chronically elevated blood pressure may have a shifted autoregulatory curve.
10. Since most patients will go home, the surgeon like to avoid a Foley catheter even if the surgery may take 3-4 hours. Consequently, consider conservative fluid administration.
11. If the combination of low fluids and high depth of anesthesia creates unacceptable hypotension, there are no surgical contraindications for pressors such as phenylephrine.
12. In some cases, the middle ear will be filled with blood to stabilize the stapes prosthesis during recovery. The surgeon will let you know when to draw the blood. Please don’t start moving the patient to look for a blood draw site until the surgeon is ready (see item 8).
13. Some surgeons strongly prefer the patient to be extubated deep (Rubinstein); others feel an awake extubation is acceptable. Either way, the patient should be breathing spontaneously so as to avoid the need for positive-pressure ventilation by mask. Increases in pressure in the nasal passage can be transmitted to the middle ear via the Eustachian tube and dislodge the implant or other surgical manipulations. Thus, although marked coughing and bucking on emergence with an ETT is never desirable, the ETT will prevent the airway pressure from reaching the nasal passages and middle ear.
Bone-Anchored Hearing Aids

These implants can be performed under local (surgeon’s preference) or under a GA (often the patient’s preference!). If done under local, sedation is usually helpful.

Please review the considerations for Middle Ear Surgery, but note the following differences:
1. The middle ear is not invaded, so there is no increased risk of nausea on that account.
2. Dexamethasone is not needed for the surgery.
3. No nerve monitoring will be performed by the surgeon.
4. Bleeding is less of an issue.
5. Positive-pressure after extubation is not a problem.
6. Table and patient movement is still an issue.

Tonsillectomy

Setup: The OR table will likely be turned 90° so you may need circuit extensions.
Dexamethasone: Likely desired by surgeon, but make sure before administering.
Intubation: Consider using an LTA to reduce patient response when the head is moved or at extubation (short case, so LTA may still be working at the end of surgery). ETT is needed (no LMA). Either a regular ETT or an oral RAE is fine. Tape the ETT to the lower jaw in the midline. OTO will further secure the ETT with their mouth retractor.
Paralysis: Needed by the surgeon, but remember the case is short so dose non-depolarizing agents carefully.
Throat pack: is not used.
Extubation: Surgeons prefer deep extubation to avoid coughing and/or straining that could reinitiate bleeding. When suctioning the mouth prior to extubation (or anytime), be very gentle and be sure to keep the suction tip midline to avoid contact with the fresh tonsillar wounds which could cause bleeding.
Mastoid/Cochlear Implant/Endolymphatic Shunt Surgery

1. If possible, place BP cuff on arm opposite the surgery. The inflating cuff can push on the surgeon and be an annoyance during surgery under the microscope. The IV can be placed on the surgical side but if a skin graft is to be obtained, only place in the hand.
2. Some surgeons (e.g. Dr. Rubinstein) will include the entire ipsilateral face in the prep and drape. If so, use tegaderm on the eyes, and tape the ETT/LMA to the contralateral side only.
3. Facial nerve monitoring and stimulation will be used during the surgery to avoid nerve damage, so any paralysis should be gone/reversed before facial monitoring begins.
4. OR table will be turned 180°, so be prepared to disconnect monitoring lines and circuit to facilitate the turn. Route the lines accordingly (usually down the chest), and have extension tubing for the circuit. The surgeon may turn the head periodically, so make sure there is slack in the circuit, and use a gooseneck connector between the ETT/LMA and the circuit.
5. Dexamethasone 10 mg should be given for its anti-inflammatory properties.
6. No special anti-emetic therapy is needed beyond what you would ordinarily do for that patient. However, inner ear surgery may result in inner ear damage, and its initial presentation is nausea beyond what can be attributed to the emergence from anesthesia. Some surgeons feel strongly (e.g. Rubinstein) that a scopolamine patch should not be used because it could mask the nausea indicative of inner ear damage and delay necessary re-operation. Therefore, use a scopolamine patch only after consultation with the surgeon.
7. During the surgery, patient movement must be prevented, so maintain a reasonable depth of anesthesia. Light anesthesia may be detected by the nerve monitor as spontaneous activity of the facial nerve even before hemodynamic or BIS changes. Similarly, make sure you do not bump or jiggle the OR table as it results in big movement under the microscope.
8. Although blood loss is rarely an issue, even small amounts of bleeding can easily obscure the surgical field. Bleeding can be minimized by a low blood pressure (e.g. systolic BP 90-100), provided the patient will adequately perfuse all vital organs at that pressure. Patient’s with chronically elevated blood pressure may have a shifted autoregulatory curve.
9. Since most patients will go home, in general the surgeon likes to avoid a Foley catheter even if the surgery may take 3-4 hours. Consequently, fluid administration may need to be conservative to avoid bladder distention.
10. If the combination of low fluids and high depth of anesthesia creates unacceptable hypotension, there are no surgical contraindications for pressors such as phenylephrine.
11. Assume extubation should be deep unless discussion with the surgeon leads to a different plan. At extubation, the patient should be breathing spontaneously so as to avoid the need for positive-pressure ventilation by mask. Increases in pressure in the nasal passage can be transmitted to the middle ear via the Eustachian tube and dislodge the implant or other surgical manipulations.
Labyrinthectomy/Translabyrinthine Surgery (eg. Acoustic Neuroma)

1. If possible, place BP cuff on arm opposite the surgery. The inflating cuff can push on the surgeon and be an annoyance during surgery under the microscope. The IV can be placed on the surgical side.
2. Typically, the entire ipsilateral face in the prep and drape. Use tegaderm on the eyes, place and tape the ETT/LMA to the contralateral side only.
3. Facial nerve monitoring and stimulation will be used during the surgery to avoid nerve damage, so any paralysis should be gone/reversed before facial monitoring begins.
4. OR table will be turned 180°, so be prepared to disconnect monitoring lines and circuit to facilitate the turn. Route the lines accordingly (usually down the chest), and have extension tubing for the circuit. The surgeon may turn the head periodically, so make sure there is slack in the circuit, and use a gooseneck connector between the ETT/LMA and the circuit.
5. Dexamethasone 10 mg should be given at the start of the case for its anti-inflammatory properties and for its antiemetic properties. These surgeries disrupt the inner ear and tend to produce vertigo and nausea. Ondansetron can be given but will not likely help much. Since translabyrinthine surgical patients (but not labyrinthectomy) will be going to the ICU, droperidol 0.625mg or 1.25mg can and should be given. A scopolamine patch should not be used due to its prolonged duration of action. Patients not going to the ICU can and should be given phenergan or reglan in lieu of droperidol.
6. During the surgery, patient movement must be prevented, so maintain a reasonable depth of anesthesia. Light anesthesia may be detected by the nerve monitor as spontaneous activity of the facial nerve even before hemodynamic or BIS changes. Similarly, make sure you do not bump or jiggle the OR table as it results in big movement under the microscope. Even small movements of the patients legs are detectable under the microscope.
7. Although blood loss is rarely an issue, even small amounts of bleeding can easily obscure the surgical field. Bleeding can be minimized by a low blood pressure (e.g. systolic BP 90-100), provided the patient will adequately perfuse all vital organs at that pressure. Patient’s with chronically elevated blood pressure may have a shifted autoregulatory curve.
8. If the combination of low fluids and high depth of anesthesia creates unacceptable hypotension, there are no surgical contraindications for pressors such as phenylephrine.
9. Assume extubation should be deep unless discussion with the surgeon leads to a different plan. At extubation, the patient should be breathing spontaneously so as to avoid the need for positive-pressure ventilation by mask. Increases in pressure in the nasal passage can be transmitted to the middle ear via the Eustachian tube and dislodge the implant or other surgical manipulations.
Middle Fossa Surgery
(e.g. Acoustic neuroma of the middle fossa (intracanalicular), Vestibular nerve sectioning, Facial nerve decompression, Repair of dehiscent superior semicircular canal)

1. If possible, place BP cuff on arm opposite the surgery. The inflating cuff can push on the surgeon and be an annoyance during surgery under the microscope. The IV can be placed on the surgical side.
2. Typically, the entire ipsilateral face in the prep and drape. Use tegaderm on the eyes, place and tape the ETT to the contralateral side only.
3. Facial nerve monitoring and stimulation will be used during the surgery to avoid nerve damage, so any paralysis should be gone/reversed before facial monitoring begins.
4. OR table will be turned 180°, so be prepared to disconnect monitoring lines and circuit to facilitate the turn. Route the lines accordingly (usually down the chest), and have extension tubing for the circuit. The surgeon may turn the head periodically, so make sure there is slack in the circuit, and use a gooseneck connector between the ETT and the circuit.
5. These surgeries constitute a craniotomy. Hyperventilation for an end-tidal CO₂ of 25 mmHg should be instituted on intubation. Mannitol 20%, 250 ml should be given with the onset of the craniotomy (the surgeon should tell you when to start the mannitol).
6. Dexamethasone 10 mg should be given for its anti-inflammatory properties and for its antiemetic properties. These surgeries disrupt the inner ear and tend to produce vertigo and nausea. Ondansetron can be given but will not likely help much. Since all of these patients will be going to the ICU, droperidol 0.625mg or 1.25mg can and should be given. A scopolamine patch should not be used due to its prolonged duration of action.
7. During the surgery, patient movement must be prevented, so maintain a reasonable depth of anesthesia. Light anesthesia may be detected by the nerve monitor as spontaneous activity of the facial nerve even before hemodynamic or BIS changes. Similarly, make sure you do not bump or jiggle the OR table as it results in big movement under the microscope.
8. Although blood loss is rarely an issue, even small amounts of bleeding can easily obscure the surgical field. Bleeding can be minimized by a low blood pressure (e.g. systolic BP 90-100), provided the patient will adequately perfuse all vital organs at that pressure. Patient’s with chronically elevated blood pressure may have a shifted autoregulatory curve. There are no surgical contraindications for pressors such as phenylephrine.
9. Assume extubation should be deep unless discussion with the surgeon leads to a different plan. At extubation, the patient should be breathing spontaneously so as to avoid the need for positive-pressure ventilation by mask. Increases in pressure in the nasal passage can be transmitted to the middle ear via the Eustachian tube and dislodge the implant or other surgical manipulations.
Rhinologic (Nose, Sinus) Surgery

These surgeries do not have significant blood loss or fluid requirements, but do involve turning the patient, TIVA, BP control and avoidance of coughing and bucking on emergence.

1. Avoid the right arm for the BP cuff as it is pushes on the surgeon when it inflates (Dr. Weymuller STRONG preference; less important to Dr. Davis). Consider left arm, either leg or potentially the right forearm for BP cuff placement.

2. Patient should receive nasal decongestant (e.g. oxymetazoline - Afrin), 2 or 3 time separated squirts in holding. Steroids may be requested by the surgeon (Weymuller usually uses hydrocortisone instead of dexamethasone). Give around time of incision.

3. ETT or flexible LMA is acceptable. The tube of the ETT or LMA cannot be rigid and must be able to somewhat flatten down onto the chin. Tape the ETT or LMA to the lower jaw only, add a gooseneck to help route the circuit down the neck.

4. Eyes should be closed and covered with Tegaderm (not the purple kind).

5. Anesthesia should be provided by TIVA given that two studies demonstrate less blood in the field with TIVA in comparison to the use of volatile anesthetics. Propofol/remifentanil is commonly used, but is not the only option. One exception to the need for TIVA is when the surgery is frontal sinus obliteration, in which case inhalational anesthesia is okay.

6. Patient will be turned 90° (Dr. Weymuller, left arm next to you) or 180° (Dr. Davis). Be prepared to disconnect your monitors and circuit for the turn, and organize the lines so that they are routed down the chest to the feet (180° turn), or down and to the side toward you (90° turn). Extension tubing will be needed for at least the 180° turn. Also, Dr. Weymuller likes the head elevated 25° via reverse Trendelenburg.

7. Ideally, mean arterial pressure should be in the mid-60 mmHg range, although some adjustment upwards may be necessary for patients with chronic hypertension.

8. Dr. Davis often uses an image guidance system (Stealth). Since the machine attaches at the forehead, the ability to use BIS monitoring will be dependent on the residual amount of forehead after the guidance system is placed. If you want to use BIS, talk to Dr. Davis.

9. A throat pack is infrequently used as it may make postop pain worse and does not improve outcome. But, if it is placed, then the tail is typically tied to the ETT/LMA to prevent losing it. Doing so means that accidental extubation would also remove the pack. The pack will be removed by the surgeon at the end of the case (you should confirm prior to extubation). OTO will also likely suction the throat but you may wish to repeat this just before extubation. If so, suction gently if any of the surgery was in the mouth/pharynx.

10. Occasionally an Nd:YAG laser is used in the nose (e.g. for Hereditary Hemorrhagic Telangiectasis). Since the laser should never end up accidentally aimed at the ETT/LMA, a laser tube is probably not necessary. However, fire safety dictates lowering the FIO2 to 30% or less during laser operation, if the patient tolerates it.

11. If the nose is packed at the end of the case, the surgeon may also place a nasal trumpet.

12. Ideally, the patient should be extubated deep in order to avoid coughing and bucking during emergence that may cause bleeding at the surgical site. If, for some reason (e.g. severe reflux), an awake extubation is necessary, consider ways to minimize coughing such as 1) place an LMA/Proseal behind the ETT and remove the ETT with the patient deep yet breathing spontaneously (then waken), 2) use a combination of lidocaine and bicarbonate to inflate the ETT cuff (just to eliminate leak), 3) use significant opioid to suppress the cough and help smooth out the emergence.
Major Head and Neck Cancer Surgery

These surgeries are typically extensive and lengthy. It is common for some sort of flap to be created, so it is desirable to not fluid overload the patient (normovolemia to slightly dry is best). The flap will most often be a free flap harvested from the arm or leg. The surgical booking should tell you which limb will donate the flap. Key points:

1. Two IV lines are desired, as the ICU will want two for their care needs. If the donor site is an arm, IVs should go in the non-donor arm. Ditto for the arterial line which you will likely want for blood draws if nothing else. If a central line is needed (very, very rarely), then consider subclavian (not on donor arm side), groin or EKG directed long-arm CVP.

2. A nasal tube is almost always desired. Make sure you assess the airway for tumor encroachment or other altered anatomy. The intubation may be difficult if the tumor blocks the view of the glottis or in some way compresses or deviates the glottis. Also, tumor could cause tracheal compression of deviation and make advancement of the NTT beyond the cords problematic. See the difficult airway algorithm if needed. Spray both nares with nasal decongestant (Afrin – oxymetazoline) in holding.

3. Dexamethasone 10mg is almost always administered, but check with the surgeon just before giving it. Repeat dose q6h.

4. The table will be turned 180° (major dissections) or 90° (limited dissections). Be prepared to disconnect your monitors and circle for the turn, and organize the lines so that they are routed down the chest to the feet (180° turn) or the side toward you (90° turn). Keep the donor site unobstructed (easy with 90° turn since the donor site will be away from you). Circle extensions will be needed for at least the 180° turn.

5. Paralysis is NOT wanted during the dissection (may monitor with nerve stimulator), but once the flap harvest begins, paralysis is desirable for the surgeon.

6. For some but not all cases the NTT will be converted to a tracheostomy, either at the beginning (usual) or at the end of surgery. If a trach is done, make sure you have a sterile circuit and sterile gas analyzer tubing ready for the tracheostomy. (Paralysis is optional, but if used, may need to be gone shortly thereafter if followed by the dissection.) When the surgeons request it, you will deflate the NTT cuff just before the surgeons enter the trachea. If the electrocautery will be used to enter the trachea, be sure that an FIO₂ of no more than 30% is established beforehand to lower the risk of fire. If no electrocautery on opening the trachea, an FIO₂ of 100% is desirable. Then, under direct vision of the surgeon, the NTT should be slowly withdrawn until the tip is just above the tracheotomy site. This is a safety precaution. In the event of difficulty with tracheostomy insertion, the NTT can be re-advanced into the trachea. Once the trachea is in place and CO₂ is confirmed, the NTT can be removed.

7. Bleeding can be extensive during the surgery. It is reasonable to have at least a type and screen performed prior to surgery. Expect the highest rate of blood loss during the tumor resection. Healthy patients should easily tolerate hematocrits in the 25-30 range.

8. Since the patient should not be flooded with fluid, hypotension may prove problematic. Pressors are acceptable, but once flap harvest begins, the surgical preference for a pressor infusion is dopamine over phenylephrine.

9. At the conclusion of surgery, patients will remain intubated (NTT or trach) and be taken directly to the ICU.
Robotic Assisted Intra-Oral Surgery

The primary utility of robotic OTO surgery is to provide more precise removal of tumors located at or in the vicinity of the base of the tongue. This permits less radical surgery, yet provides complete enough tumor resection to permit the patient to safely undergo lesser degrees of chemo/rad therapy after their surgery.

Key points are:
1. The OR table will be turned 180° (or less often, 90°). Be prepared to route your monitor lines and circuit accordingly. Circuit and possibly IV extensions will be needed.
2. Review CT scans, OTO notes and discuss with the surgeon about the location and size of the tumor, with special attention paid to how it may make the intubation difficult. During the intubation, try to avoid contact with the tumor which may be friable and bleed easily.
3. A nasotracheal tube rather than an oral ETT is almost essential. The nare on the side opposite the tumor is preferred. Spray both nares with Afrin (oxymetazoline) in holding.
4. Tape should be placed on the NTT near the nose and extended onto the cheeks. The surgeons will wrap the head and then tape the NTT to the forehead. Adding a gooseneck may facilitate this process. They will use the doughnut hole (so don’t toss the hole) as padding under the NTT/gooseneck. Make sure the eyes are not being compressed. Tape the NTT cuff somewhere you can easily find it under the drape.
5. Arms will be tucked, so have any critical infusions ready to go and plugged into the desired port before tucking. Make sure the BP cuff and the IV work after tucking.
6. A laser may be used during the surgery. Placing a laser tube nasally is problematic. First, it is stiff. Second, it is short (bigger tubes are longer but harder to pass through the nare). Third, the connector end of the laser tube is soft silastic and will kink and obstruct if bent much at all. One option that seems to work is to place a large nasal trumpet, then insert a long stylet (blue bougie – insert the straight end) through the trumpet into the oropharynx. Then remove the trumpet and advance the laser tube over the bougie, through the nare and into the oropharynx (spinning the tube during advancement may help get past obstructions). Under direct laryngoscopy, guide the bougie into the trachea with the Magill forceps. Under direct vision, advance the laser tube over the bougie into the trachea.
7. A 6.5 ID laser tube is probably the best choice for most patients. Smaller will likely not be long enough. A 7.0 ID tube is awfully big for a nare. Great care will be necessary for the surgeons to route the tube with the right angle and gooseneck over the forehead without kinking the laser tube. A little inventiveness is necessary. The tube/right angle/gooseneck must lay pretty flat against the patient because of the position of the DaVinci.
8. Remember to reduce FIO₂ to 30% prior to commencement of the laser.
9. Paralysis is necessary throughout the surgery. Place the twitch monitor at the ankle.
10. Decadron 10 mg should be given by the start of the case. Repeat every six hours.
11. When the surgeons insert the device into the mouth, it is huge (hence the desire for a nasal tube) and very stimulating. Be prepared to deepen the anesthetic at that time. In general, this is a fairly painful procedure both during and after the surgery.
12. It is strongly desirable to avoid coughing and bucking on emergence to minimize the risk of stimulating bleeding at the surgical site. Options for this goal include a) deep extubation, b) the use of an LTA at intubation, plus lidocaine/bicarbonate mixture in the NTT cuff and a well narcotized, spontaneously ventilating patient at extubation, or c) any other clever plan with which you have experience.