

Surgical Treatment of Sleep Apnea

Surgical Information



ENT Bowling Green

Obstructive Sleep Apnea

General Information

Obstructive sleep apnea (OSA) is a disorder of breathing during sleep characterized by decreased or absence of airflow into the lungs from the nose and mouth resulting from obstruction in the upper airway, despite normal respiratory effort generated by the central nervous system and respiratory muscles. Airway obstruction can occur at multiple levels including the nose, throat, and larynx (voice box).

Apnea is a respiratory event characterized by complete cessation of airflow for longer than 10 seconds.

Hypopnea is a respiratory event characterized by a reduction of airflow by 50% with an associated decrease arterial blood oxygen saturation by 4%.

Symptoms of OSA include loud snoring with airway obstruction during sleep, frequent awakenings, excessive daytime sleepiness, frequent dozing or napping, and morning headaches. Patients with OSA have increased incidence of high blood pressure and acid reflux. Patients with untreated OSA have an increased risk of automobile accidents due to dozing while driving. Additional health risks of untreated OSA include increased risk of coronary artery disease, heart attack, congestive heart failure, abnormal heart rhythms, sudden death during sleep, COPD possibly leading to failure of the right side of the heart, called cor pulmonale.

Obstructive sleep apnea is typically diagnosed by **polysomnography** (sleep study). A sleep study is performed in a certified sleep lab by monitoring a number of parameters during sleep, including respiratory airflow, arterial oxygen saturation, chest wall movements, brain activity (EEG) indicating stages of sleep, heart function (telemetry), and leg movements. The most useful indicators of OSA severity include the **respiratory disturbance index** (apnea-hypopnea index) and **lowest oxygen saturation** (LSAT).

The respiratory disturbance index (RDI) is defined as the number of respiratory events per hour of sleep, including apneas and hypopneas. RDI less than 5 is considered within normal limits in adults. RDI between 5 and 10 represents borderline OSA and usually only requires treatment when patients are symptomatic. RDI between 10 and 30 indicates mild OSA, between 30 and 50 indicates moderate OSA, and greater than 50 indicates severe OSA.

Most healthy people should maintain arterial oxygen saturation (S_aO_2) of 95 to 100% when breathing normal room air during sleep. Patients with OSA will demonstrate decreases in S_aO_2 due to airway obstruction. Patients with moderate OSA will typically have LSAT less than 85% and those with severe OSA may have LSAT less than 60%.

Medical management of OSA includes weight loss and avoidance of sedating substances, including alcohol, sleeping pills, tranquilizers, and some antihistamines. Most patients will improve some with weight loss. However, fewer than 5% of patients with significant OSA are able to maintain adequate weight loss to control their symptoms.

The most effective non-surgical treatment for OSA is **CPAP** (continuous positive airway pressure). This form of treatment consists of positive air pressure that is delivered to the airway by a machine through a mask strapped over the nose during sleep. The pressure helps to prevent collapse and obstruction of the upper airway, making breathing during sleep easier and relieving or decreasing apnea. Most patients will have a dramatic reduction in RDI with the use of CPAP if they can tolerate it. However, many people find the mask and airway pressure intolerable. The long-term compliance with CPAP in patients who can tolerate it is probably less than 70%.

Surgical management of OSA

Surgical management of OSA is directed toward correction of airway obstruction at multiple levels.

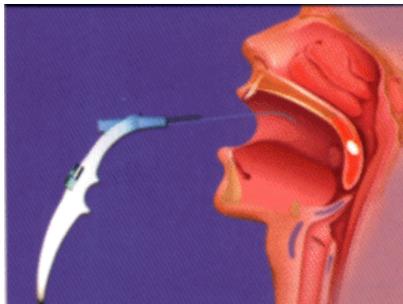
I. Uvulopalatopharyngoplasty (UP3)

UP3 is the most commonly performed surgical procedure for the treatment of OSA. This procedure includes tonsillectomy (removal of tonsils) in addition to removal of obstructing or redundant tissues from the uvula, soft palate, and side walls of the oropharynx (throat). Suturing techniques are then used to close the resulting wounds and tighten up the side walls of the oropharynx with resulting improvement in the oropharyngeal airway. The success rate of UP3 ranges from 30% to 80% and depends on multiple factors including tonsil size, severity of OSA, and anatomy of the throat. Surgical success is considered a reduction of RDI by at least 50%. Patients with severe OSA, morbid obesity, and large tongue base tend to have poorer surgical success rates. Surgical failures are generally the result of persistent airway obstruction from the tongue base during sleep.



II. Radiofrequency tissue ablation (RFTA) of the tongue base

RFTA of the tongue base is a procedure for the reduction in size of the base of tongue to reduce crowding in the pharynx. This technique is usually employed as an adjunct to UP3 to help improve surgical success. A needle electrode is inserted into the tongue base for delivery of radiofrequency energy to the tissues resulting in injury (lesions) to the deep tissues of the tongue base. The healing process in these areas of injury over time results in a reduction in tissue volume of the tongue base, thereby decreasing obstruction in the pharynx. Generally, four lesions are delivered to the tongue base during each treatment. One to three treatment sessions divided by a 6 week interval may be required to obtain maximum benefit. This procedure is usually performed under general anesthesia in conjunction with other surgical procedures but can be performed under local anesthesia in the clinic or surgical suite. This procedure may potentially provide an additional reduction in RDI when combined with UP3.



III. Genioglossal advancement (GGA)

This procedure is usually employed as a secondary procedure in patients who have residual OSA following UP3, but it can be used as a primary procedure in patients who are felt to be poor candidates for UP3. GGA is a procedure intended to advance the tongue base forward to improve the airway between the tongue base and posterior pharyngeal wall, thereby decreasing airway obstruction.

GGA can be performed in several ways. The simplest technique uses a REPOSE kit which involves placing a small screw into the inner wall of the mandible (jaw bone). A permanent suture attached to the screw is then advanced through the tissues of the tongue and across the tongue base in a triangular fashion with the suture tying back to itself at the sight of the screw. As the suture is tied, tension is applied across the tongue base pulling it forward. The permanent suture and resulting scar tissue that forms around it act as a sling that prevents the tongue from falling against the back of the throat during sleep.

GGA may also be performed by creating cuts in the chin region of the mandible, freeing up the portion of the mandible attached to the tongue muscles. This portion of the mandible is then advanced forward along with the attached tongue muscles. The advanced segment of bone is then secured using titanium plates and screws.

IV. Genio-hyoid advancement (GHA)

GHA is a procedure that advances the tissues of the lower tongue base and larynx (voice box) away from the back wall of the pharynx, decreasing airway obstruction in the hypopharynx (lower throat). This done through an incision in the upper neck below the chin. Two screws are placed in the lower edge of the mandible, one to each side of the midline near the chin. A permanent suture attached to each screw is passed around the hyoid bone and then ties back to itself. The hyoid bone is a midline bone in the neck that is attached to the muscles of the tongue and larynx. As the suture is tightened, tension advances the hyoid and attached structures upward and forward. This procedure is usually employed as a second or third procedure in patients who have failed to improve with other surgical interventions. It can be performed in conjunction with UP3 and GGA in selected patients.

V. Mandibular- maxillary advancement (MMA)

MMA is a procedure for advancement of the upper and lower jaw bones (maxilla and mandible), pulling the attached soft tissues of the palate and tongue base forward. This results in improvement of the airway in the oropharynx and hypopharynx. This procedure is usually performed by an oral surgeon in patients who have failed to improve with other simpler surgical procedures. Our physicians do not perform this procedure.

Potential Surgical Risks

All surgical procedures carry some degree of risk. Description of these risks is provided so that you can make an informed decision about proceeding with surgery. Your surgeon feels that the potential benefits of surgery outweigh the potential risks.

Infection

Infection is uncommon following surgery for OSA, occurring in less than 1% of patients.. However, there is the potential for infection in the pharynx following UP3 that could result in slow wound healing and scar tissue formation. GGA and GHA can potentially lead to infection within the tongue, mandible, or neck. This can lead to abcess formation (collection of pus in tongue or neck) with resulting airway obstruction. This type of infection is extremely rare, but represents a surgical emergency which may require surgical drainage and tracheostomy to secure a safe airway.

Bleeding

Bleeding is uncommon following surgery for OSA, occurring approximately 1-2% of patients. Bleeding from the pharynx following UP3 may occur anytime within the first 2 weeks. The highest incidence of bleeding is during the first 12 hours after surgery and 7-10 days after surgery. Bleeding is usually brief and resolves spontaneously. However, bleeding may sometimes be heavy and require emergency surgery to control the bleeding. Bleeding following GGA and GHA may lead to hematoma (blood clot) formation in the floor of

mouth or neck leading to airway obstruction. This may require surgical evacuation of the hematoma and tracheostomy to secure a safe airway.

Foreign body sensation in the throat or tongue

Because these procedures involve alteration of the anatomy of the pharynx and placement of sutures in the throat, tongue, and/or neck, some patients may experience a feeling of a lump or discomfort in the throat. This is uncommon and usually resolves within 1-2 months.

Dysphagia

Dysphagia means difficulty swallowing. Swallowing involves a complex series of coordinated muscle movements in the tongue, pharynx, and larynx. Surgery for OSA alters the anatomy and relationships between these structures which may cause some mild

dysphagia. This usually resolve within the first few postoperative weeks as muscle movements gradually change to compensate for the anatomical changes.

Velopharyngeal Insufficiency (VPI)

The soft palate and uvula are responsible for closing the nasopharynx (back of the nose) to prevent food and liquids from coming up into the nose during swallowing. UP3 involves surgical removal of the uvula and a part of the palate which can lead to incomplete closure of the nasopharynx (VPI) with resulting regurgitation of food and liquids into the nose during swallowing. This is a rare complication following UP3. VPI may occur during the first 2-4 weeks following UP3 but almost always resolves as the palatal muscles compensate and tissue swelling resolves. This could potentially be a long term problem requiring speech therapy or surgical correction.

Numbness of tongue

Surgical procedures for OSA often require retraction of the tongue to provide exposure to the structures of the throat. This can potentially cause some numbness of the surface of the tongue. The numbness usually resolves within 2 weeks.

Airway obstruction

Surgical procedures in the mouth, throat, and neck can potentially lead to soft tissue swelling and airway obstruction during the first 24 hours postoperatively. The swelling can usually be managed with medical treatment and CPAP. However, on rare occasions, patients with severe airway obstruction may require placement of an endotracheal tube or tracheostomy to secure a safe airway.

Failure to improve OSA

Surgical treatment for airway obstruction is not a guaranteed cure for OSA. Success rates vary, ranging from 20-80%, and depend on multiple factors including body mass index, airway anatomy, other coexisting medical problems, and severity of OSA. Additional treatments for OSA may be required following surgery, including CPAP, weight loss, or additional surgery. Some studies show rates of recidivism of up to 60% when following patients over 2 years after surgery.

Tracheotomy:

A tracheotomy is an operation in which a hole is made in the neck and a breathing tube is placed directly into the windpipe. Since airflow completely bypass the upper airway, a tracheotomy is almost always effective in eliminating sleep apnea. However, a tracheotomy tube requires quite a bit of care and can be associated with various complications.

Summary of Surgical Options:

The key to surgical treatment is choosing the right operation (if any) for the right person. In turn, this means trying to determine what part the anatomy is causing the problem. Even in the best situation, however, surgery is seldom as effective as treatment with [CPAP](#). Most studies have shown that UPPP and tonsillectomy have a 50-60% success rate for OSA, compared with over 95% if CPAP is used.

Postoperative Instructions

1. Significant throat pain is expected following surgery for OSA. The pain usually persists for approximately 2 weeks before improving. Pain medication prescribed by your physician will “take the edge off” but will most likely not completely relieve the pain. Pain medication can be taken every 4 to 6 hours as needed. Staying well hydrated will diminish pain.

2. Drink plenty of liquids to prevent dehydration. The goal should be 64 ounces of liquids each day. Bland liquids such as water, Kool-aid, and mild juices are generally well tolerated. Sodas are generally well tolerated if allowed to “flatten” to decrease carbonation prior to drinking. Caffeine should be avoided.

3. Follow a strict soft diet. Soups, soft noodles, mashed potatoes, broiled chicken without skin, ice cream, puddings, and yogurt are examples of acceptable food. For 2 weeks, foods with sharp edges (potato chips, tortilla chips, crackers, etc.) and foods that are rough and dry (bagels, pizza crust, raw vegetables, etc.) should be avoided. These foods can cause damage suture lines and cause bleeding.

4. Fever is fairly common following throat surgery. Temperatures can occasionally rise to 101-102° F. This is usually a result of inadequate hydration. Increased fluid intake and Tylenol will usually relieve the fever. Persistent fever over 101° F should be reported to your physician.

5. Bleeding is most likely to occur during the first 6 – 12 hours after surgery or at 7 - 10 days after surgery. However, bleeding can occur at any time within 2 weeks from the time of surgery. The best prevention is adequate liquid intake for hydration. A humidifier in the bedroom at night is also helpful to decrease drying of the throat during sleep. If bleeding occurs, gargling ice water may help to constrict the vessel and stop the bleeding. If bleeding is heavy (more than ½ cup) and persistent, the patient should be taken immediately to the nearest hospital emergency room.

6. Swelling of the tongue that progresses after the day of surgery should be reported to your physician.

7. It is very common for patients to have nausea and vomiting following a general anesthetic. This usually resolves within a few hours after the surgery but may persist for 12 – 18 hours. Keeping the stomach empty for 2 hours following an episode of vomiting followed by a clear liquid diet for 6 – 12 hours is usually adequate to control the symptoms. Phenergan may be used at your surgeon’s discretion to help alleviate symptoms.

Narcotic pain medications can also commonly cause nausea and vomiting. Eating some food before taking the medicine may help. Alternatively, Tylenol can be used for pain, which should not cause nausea.

8. Who should I call with any problems?

Office: 782-7768 270.791.1006

These numbers can be called anytime 24 hours-a-day. If you call at nighttime or on the weekend, you will get an answering machine. The first option on the machine is to leave a message for the physician on call. Just leave your name and number and a brief description of your problem or question. The on-call physician will return your call as soon as possible. If you think you have an emergency, please go straight to the emergency room at your hospital and ask them to contact your surgeon.

Greenview Hospital: 793-1000

Medical Center: 745-1000