Waldeyer's Ring is the name for the lymphoid tissue that collectively functions as the first line of immune function in the upper aero-digestive tract. These three separate "tonsils" literally make a ring of lymphoid tissue, each to the other similar in function though different in anatomic location and appearance. At the entry to the pharynx sit the palatine tonsils, also known as "the tonsils." Posterior to the nasal cavity is a box-like space, the nasopharynx, which leads downward into the oropharynx. In the nasopharynx, sit the nasopharyngeal tonsils, also known as the "adenoids." And at the base of the tongue, above the vallecula, in the hypopharynx, sit the lingual tonsils.

Each of their anatomic locations, while critical to the development and maintenance of normal immunological function, create situations of disease that often require medical and/or surgical treatment. Thus, removal of the adenoids and tonsils, either separately or together, is the most common major surgery performed in children in the United States today. Tonsillectomy was first described by Celsus in the first century of the Common Era, adenoidectomy not until the second half of the 19th century, and lingual tonsillectomy in the 20th century. The long history of tonsillectomy still has not resulted in consistent indications for removal. No one technique has gained favor by surgeons performing this procedure. These ongoing discussions are among the most hotly debated by otolaryngologists. Sometimes the most common procedures can be of the greatest interest, as you will find in this chapter about the lymphoid tissue of Waldeyer's ring.

**Anatomic, Physiologic, and Clinical Correlates**

**Palatine Tonsils.** The palatine tonsils are located on the lateral walls of the oropharynx between the anterior and posterior tonsillar pillars. These pillars consist of mucosa, which envelop the tonsils to a more or less degree in each individual. Sometimes large tonsils sit deep in the fossae and are not visibly seen beyond the boundaries of the pillars. However, most often the tonsils can be visualized outside of the fossae and their size described using a 0 to 4+ classification system based on their lateral extension from the anterior pillar to the midline for each tonsil.

- 0= no visible tonsil outside the fossa,
- 1+=<25%
- 2+= 25-50%
- 3+=50-75%
- 4+=>75% ¹
The limitations of this system are readily apparent when the surgeon considers not only position but also tonsil shape, length, depth and density of the tonsillar tissue. Some tonsils are bi-lobed, with the inferior portion extending deep into the hypopharynx. The anterior-posterior volume is seldom taken into account and neither is their density. Lateral extension deep into the fossae is also commonly noted at surgery but not readily apparent on office examination.

Understanding the blood supply is critical for the management of the most dangerous and dreaded complication, post-tonsillectomy hemorrhage. The external carotid artery provides three major branches to the area—the ascending pharyngeal artery, the lingual artery and the facial artery (some sources also cite the lesser palatine artery). Keeping to the appropriate plane of dissection and meticulous attention to hemostasis is important but not always completely successful in preventing a post-tonsillectomy bleed. In certain syndromes, such as velo-cardiofacial syndrome, and even in 1% of the general population, the internal carotid arteries are found a mere 1 cm deep to the underlying constrictor muscles. They may be injured with careless dissection. In rare instances trans-cervical access to these arteries to control bleeding is required. Innervation is derived from the sphenopalatine ganglion from the lesser palatine and glossopharyngeal nerves.

Sitting atop of the tonsil, deep to the mucosa in the plica triangularis (superior aspect of the mucosal folds of intersection of the anterior and posterior tonsillar fossae) is often found Weber’s gland, a small salivary gland which, when infected, causes peritonsillar abscess formation. Infrequently (10%) other small salivary glands will be found medially or inferiorly, which roughly approximates the incidence of these less usual locations for peritonsillar abscesses.

The microanatomy of the tonsils is unique and provides understanding of their function. A secondary lymphatic organ, afferent lymphatic channels are absent. Efferent lymphatic channels drain into the deep cervical nodes. The antigen is processed in one of the more than 20 crypts where it encounters a specialized squamous epithelium. Excessive antigenic exposure and/or hyperactive lymphoid response can lead to cryptitis with obstruction of the tonsillar crypts resulting in a chronic state of antigenic exposure leading to recurrent infections and/or to continuous hyperplasia. The hyperplastic state is associated with certain bacteria (e.g. *Hemophilus influenzae*) and greater bacteria loads and less functional lymphocytes which proliferate in order to meet the increased processing demands, resulting in enlargement from a hyperplastic response. While establishing lifelong immunity for the individual is one of the major functions of lymphoid tissue in Waldeyer’s ring, at this time it is not believed that early removal alters immunologic function later on in life. However as a greater understanding of immune function is gained, this may not turn out to be the case, a situation which requires monitoring.

**Nasopharyngeal Tonsils.** The nasopharyngeal tonsils (adenoids) are comprised of a triangular mass of tissue which has deep furrows and sits on the posterior wall of the nasopharynx. No widely accepted classification system exists for description of their size. Lateral to the adenoids and intimately involved with them are the Eustachian tube orifices which sit in the fossa of Rosenmüller, cupped
in the lymphoid tissue of the torus tubarius (containing Gerlachtis tonsil). The torus tubarius should not be violated during adenoidectomy lest scarring to the Eustachian tube results. Occasionally the lymphoid tissue of the torus tubarius will undergo hypertrophy and occlude the posterior nasal choanae causing obstruction. Careful trimming in select cases will avoid injury to the Eustachian tube while relieving the obstruction.

The adenoids rest on the constrictor muscles which overlay the first and second cervical vertebrae. If dissection goes too deep into the musculature, spasm may cause torticollis with subluxation of and the C1-C2 vertebrae, requiring neurosurgical intervention. The adenoid blood supply comes from the more distal branches of the same arteries that supply the palatine tonsils; thus post-operative hemorrhage is a rare complication. The glossopharyngeal and vagus nerves provide innervation.

Three different types of surface epithelium line the surface of the adenoids, reflecting their multiple functions—antigen processing, serving as a reservoir for commensal bacteria, and facilitating mucociliary clearance. The surface is covered by ciliated columnar epithelium (respiratory epithelium) which is active in the posterior movement of sino-nasal mucous. Transitional and specialized antigen processing squamous epithelium are found deeper in the furrows and provide immune function. Similar to the tonsils, there are no afferent lymphatics. The efferents drain into the retropharyngeal and deep cervical lymph nodes.

**Lingual Tonsils.** The lingual tonsils are a disorganized, multi-nodular mass of lymphoid tissue which sits at the base of the tongue. Hypertrophy can result in their extension to the vallecula and be an unrecognized cause of airway obstruction or chronic throat pain. Their enlargement is regarded as a marker for extra-esophageal reflux. Little is written on the structure or function of the lingual tonsils. They are covered with squamous epithelium; each nodule has a single crypt leading down into the same specialized antigen processing squamous epithelium seen in the tonsils and adenoids.

**Immunologic Stimulants: Microorganisms and Other Stimulants of Lymphoid Tissue**

Normal tonsils and adenoids are colonized with commensal bacteria such as streptococcus viridians and diptheroids. Recurrently infected tonsils may be infected by group A Strep (*Streptococcus pyogenes*), however, other, less virulent bacteria, such as *Hemophilus influenzae*, *Streptococcus pneumonia*, *Moraxella catarrhalis* and *Staphylococcus aureus* may play a role in infection. The development of chronic or recurrent cryptitis with intermittent obstruction may result in trapped bacteria leading to micro-abscess formation and eventually, clinically significant disease. More than 40% of surface cultures fail to reveal deep crypt presence of pathogenic bacteria, and therefore reliance solely on these cultures to treat acute or chronically inflamed tonsils can result in antibiotic treatment failure. In cases refractory cases to penicillin, broad spectrum antibiotics or those that treat beta-lactamase producing *S. aureus* (such as clindamycin) should be used.
In the tonsils, increasing bacterial load and the presence of \textit{H. influenzae} \cite{2,3} has been correlated to increasing size, regardless of whether or not there is a history of acute infection. Thus, in about 15\% of patients a trial of broad spectrum antibiotics may be sufficient to reduce their size and avoid tonsillectomy.

The bacteriology of the adenoids is less well studied than the tonsils, but in general, mimics that of the tonsils. Culture of adenoids during middle ear infections will often reveal the same pathogen found in the middle ear effusion and can sometimes serve as a guide for therapy \cite{9}. Group A strep is less common than in the tonsils. Mucostasis may result in sustained antigenic stimulation and enlargement. The mucous can be so thick that it actually gets stuck in the nasopharynx, sits atop the adenoids, and causes the obstruction of the nasopharynx, contributing to the clinical symptom of obstruction, \textit{even when the lateral neck x-ray does not show the adenoids themselves to be terribly enlarged}.

Other organisms can infect tonsils, including anaerobic bacteria, viruses, fungi, and parasites. Most viral infections are benign and self-limiting, except for the case of the Epstein-Barr virus (EBV). The EBV directly infects the lymphoid tissue of the head and neck, during the first few years of life in approximately 90\% of children. The infection is almost always mild and largely goes unnoticed. Infection in teenagers can be particularly virulent and even life threatening secondary to airway obstruction or systemic manifestation. Hospitalization and vigorous medical treatment may be needed. Little is known about the microbiology of the lingual tonsils.

Other stimulants to the lymphoid tissue of Waldeyer’s ring include food, inhaled allergens/irritants and refluxate from the stomach \cite{10,11}. The role these antigenic stimuli play has received little attention which is unfortunate since the most frequent indication for adenotonsillectomy (T&A) today is obstructive hyperplasia. Understanding the roles of other potential stimuli might ameliorate the untoward effects of lymphoid tissue enlargement in the airway.

\textbf{Clinical Evaluation}

Lymphoid tissue in Waldeyer’s ring responds to the environment as part of their normal function. Two abnormal responses account for the vast majority of the disease states encountered-recurrent/chronic inflammation and obstructive hyperplasia. The term hyperplasia is preferred since there is an absolute increase in the number of the cells rather than enlargement of each cell in the lymph gland\cite{2}.

\textbf{Recurrent Infection}. Acute infection of the adenoids is difficult to differentiate from infection arising in the nose and paranasal sinuses. Indeed, one is often the extension of the other. Nasal discharge and congestion when associated with otitis media is more often secondary to adenoid inflammation. The same strain of bacteria that cause otitis media are almost always found in the nasopharynx and therefore correlation between acute suppurative otitis media and acute nasopharyngitis is particularly notable \cite{9}. Direct visualization of the adenoids in a child with an acute infection is unadvisable (if one ever wants to examine the child at future visits), and is unnecessary if a precise history is taken and corroborated by the primary care physician’s records. The number of episodes of
nasopharyngitis which are sufficient to result in consideration of chronic medical or surgical management is not universally accepted. Thus, recurrent/chronic nasopharyngitis (inflammation of the adenoids) should be evaluated in the context of associated middle ear disease in most instances.

Recurrent acute tonsillitis is characterized by repeated infections of the tonsils characterized by sore throat, fever, halitosis, odynophagia and neck pain. The tonsils will often, but not always, become enlarged, erythematous and exudative; tender, enlarged cervical lymph nodes are commonly palpated. Group A Strep (*Streptococcus pyogenes*) also known as Group A beta-hemolytic strep (GABHS) is the most virulent bacteria that causes acute tonsillitis, not only for its locally invasive and destructive properties but also for its potential to cause serious complications of rheumatic fever and acute streptococcal glomerulonephritis. These two complications are rarely seen today because of the ubiquitous use of antibiotics, to which GABHS has yet to become resistant. GAS isolation is confirmed with Quick Strep A Test (QuickVue+® Strep A Test)* and culture. Even when the tonsils are “strep negative,” bear in mind that other bacteria may be playing a role in the infection. These include: *Streptococcus pneumonia, Hemophilus influenzae, Staphylococcus, aureus, and Moraxella catarrhalis.* Thus, recurrent acute tonsillitis should not be based on culture results alone.

The number of infections per time interval is the most common measure for declaring the tonsils a liability. Use of this measure alone begs the important questions of the disease burden that is placed on that particular child and family. Days lost from school/work, the intensity of the illness, the presence of complications, and the effects on other members of the household or community should also be taken into account.

Recurrent or chronic infection of the lingual tonsils is difficult to diagnose in the primary care setting since it requires instrumentation not usually available to the primary care practitioner. When a patient presents with symptoms of recurrent sore throat absent other symptoms of acute tonsillitis, the responsibility to directly visualize these tonsils for erythema and purulent discharge rests with the otolaryngologist using preferably direct flexible or mirror laryngoscopy.

**Chronic infection.** Chronic infection in the adenoids is characterized by chronic nasal congestion, rhinorrhea and sometimes chronic cough. It is almost always inferred when middle ear inflammation becomes unacceptably recurrent or persistent. In some European countries, removal of the adenoids is the first line treatment for chronic ear problems, reflecting this point of view as to how to reverse middle ear pathology. The size of the adenoids is not a factor in regards to its effect on middle ear disease.

Chronic infection of the palatine tonsils is characterized by a constant sore throat, halitosis and cheesy exudates in the form of tonsilloliths (“white balls”). Peri-tonsillar erythema and tender cervical lymph nodes are not uncommon. The

* A commercial kit can be found - Quick Vue+® Strep A Test (Quidel Corporation, San Diego, California, USA)
tonsils may have a totally normal appearance, or they may become enlarged with
prominence of the mouth of the individual crypts and a decrease in the number
of crypts due to inflammatory obstruction from cryptitis. The descriptor “cryptic”
tonsils implies an increase in the number of crypts when, in reality, a decrease
exists. “Prominent crypts” would be a more accurate description.

When chronic sore throat is present, the lingual tonsils need visualization.
Unfortunately, there are no established signs to differentiate inflammation from
infected agents from those of irritative phenomena, such as extra-esophageal
reflux.

Obstruction. Upper airway obstruction is caused by the complex interac-
tion of the soft tissue, bone and lymphoid structures. The symptom complex is
determined by the anatomic area affected and its function. The most common
problem is sleep disordered breathing, ranging from snoring and restless sleep
to obstructive sleep apnea syndrome. An in-depth discussion of sleep apnea is
beyond the scope of this chapter, but a few words on this subject are necessary
to understand the context of the clinical evaluation of these structures when sleep
apnea is suspected.

Sleep disordered breathing encompasses the multiple manifestations of
obstruction of the upper aerodigestive tract which begins at the tip of the nose
and ends at the carina. While obstructive sleep apnea may be caused by obstruc-
tion at one or several levels of this anatomic construct, the lymphoid tissue of
Waldeyer’s ring are the most common contributors to this obstruction. While loud
snoring with frequent pauses and restless/fi tful sleep are the hallmark symptoms
for sleep apnea, it must be emphasized that snoring can be soft or even absent even
when severe, clinically significant obstruction from lymphoid tissue is present.
In a similar fashion, there is no one absolute size that will result in obstruction.
These two caveats must be kept in mind while the more common manifestations
of obstructed breathing are described.

The adenoids reside in the box-like nasopharynx. When the adenoids
become too large for the size of the nasopharynx, nasal obstruction occurs, char-
acterized by the triad of mouth breathing, snoring and hyponasality. Children may
have difficulty eating and breathing simultaneously. Snorting and nasal stuffiness
can also be indicators of obstructive adenoids. The intranasal examination may be
normal, but sometimes reveals thick mucous that is unable to drain posteriorly.
The turbinates are usually normal in size and color, unless there is concomitant
hypertrophy. On occasion the adenoids themselves are not very large, but a func-
tional obstruction may exist with thick mucous sitting atop of the adenoids and
creating the obstruction. This is one of the reasons that reliance of a lateral neck
soft tissue x-ray can be misleading. Other reasons include the difficulty of getting
a standardized examination so that the relationship of the adenoids to the soft
palate and posterior nasal choanae is demonstrated. Use of this diagnostic image
should be reserved for situations in which it is difficult to establish the adenoids
as problematic and a flexible direct laryngoscopy cannot be performed.

Obstruction from tonsils manifests clinically as difficulty breathing, swal-
lowing or speaking. As with the adenoids, sleep disturbances are present. The
patient may have a feeling of “something stuck in the throat” and may have difficulty swallowing. In older children, they may articulate that meat, in particular, is bothersome. Garbled, difficult to understand speech is a not infrequent complaint.

Attention to vocal, particularly nasal, resonance is critical to evaluation of the tonsils and adenoids, especially when surgery is considered. Differentiating between an obstructed nasopharynx from adenoids (“hyponasality”) and a patent one from a palate which is anatomically compromised (“hypernasality”—resulting from an occult or overt submucous cleft palate or muscular hypotonia) is essential. Failure to recognize the latter may lead to severe velopharyngeal insufficiency after adenoidectomy. For both the palatine and the lingual tonsils, hypopharyngeal obstruction may lead to the “hot potato” voice.

The physical examination of the palatine tonsils is accessible by direct visualization. Tongue size/position, palatal contour and length, and muscle tone can all impact on the perceived tonsil size and position. Depth laterally and inferiorly, and their AP diameter is rarely described but may be clinically important. Three scoring systems are presently applied to the tonsils in relation to the anatomy of the oral cavity.

The Brodsky Classification 1, described above, is universally used, but has significant limitations that are readily apparent to the surgeon. The first assessment should be done with the mouth open and the tongue in the neutral position without the use of a tongue depressor. An overview is thus obtained. Depression or extrusion of the tongue can result in medial movement of the tonsils, making them look “bigger” than they are. Next, careful tongue depression with the tongue in the oral cavity, trying not to gag the child, will give the most reliable assessment of size/volume ration. Depression of the tongue, made easier with two tongue depressors, can often reveal the depth of the inferior poles, which in bi-lobed tonsils, can cause hypopharyngeal obstruction, particularly in the sleep state.

Other attempts at characterization of the entire oral cavity have been put forth. The Mallampati score is used to determine ease of intubation in adults. Specifically, the visibility of the entire uvula, the tonsillar pillars and the soft palate are scored with or without phonation. Higher scores are associated with difficult intubations and the presence of sleep apnea. Scoring is as follows:

- **Class 1:** Full visibility of tonsils, uvula and soft palate
- **Class 2:** Visibility of hard and soft palate, upper portion of tonsils and uvula
- **Class 3:** Soft and hard palate and base of the uvula are visible
- **Class 4:** Only Hard Palate visible

Friedman’s classification system, described for adult patients with obstructive sleep apnea, relies on palatal position, tonsil size and body mass index. Derived from his emphasis on palatal surgery, it has limited applicability to children and tonsillectomy at the present time.
Adenoidectomy, Tonsillectomy and Lingual Tonsillectomy

These surgeries are aimed at reducing the size of the lymphoid tissue in Waldeyer’s ring. Medical management should precede surgery, but is unpredictable and often not helpful. Nonetheless, many strategies have been used and include: antibiotics with coverage for beta-lactamase producing bacteria (e.g. amoxicillin-clavulanate) or exquisite coverage for anaerobic bacteria and S. aureus (e.g. clindamycin), often given for 10-20 days. Prophylaxis for recurrent acute tonsillitis may help to “break the cycle” of infection. A short course of oral steroids or intra-nasal steroids may reduce their size. In an unknown number of especially younger patients, identification and treatment of extra-esophageal reflux (EERD) may yield benefits that mitigate the need for surgery. Unfortunately there is little evidence to provide the clinician with detailed guidelines for medical therapy for chronic disease.

Adenoidectomy. Removal of the adenoids is a technically demanding procedure due to the location of the adenoids in the nasopharynx. The use of mirror visualization palatal retraction using a red rubber catheter, has replaced digital palpation for the assessment of adenoid size and location. The goals of the surgery are:

1) removal of as much of the lymphoid tissue as possible without damaging the lateral torus tubarii and the Eustachian tube (ET) orifices;
2) complete removal at the posterior choanae;
3) avoidance of damage to surrounding soft tissues such as the soft palate or underlying musculature.

Stenosis of the ET tube can result in unremitting middle ear disease, injury to the soft palate can lead to scarring and obstructive nasopharyngeal stenosis, and invasion of the underlying muscles can result in muscle spasm with C1-C2 vertebral subluxation and neurologic sequelae.

The classically described methodology is by use of a sharp curette to slice the base of the adenoids from the underlying muscles. Difficulty in assessing the depth of the dissection led to some of the above noted complications. The use of loupe magnification and the binocular operating microscope have improved visualization and are used by many. The resulting wound is cauterized using a monopolar suction electro-cautery by most, although packing and in some instances the use of a topical astringent may obviate the need for thermal damage to the tissues. The precision, and often the sharpness of the reusable curette blades, are unpredictable, and other techniques have replaced their use.

Several other techniques and tools offer more precise dissection: suction cautery, microdebrider and coblation. Using suction cautery, the tissue is ablated and cauterized simultaneously. Thermal injury and the excessive time it takes to removed particularly large adenoids have prevented widespread adoption. However, it is less expensive than these other tools which have been developed in the last decade. The microdebrider is a partially ensheathed, rotating knife which cuts through the adenoid tissue. During dissection a clear view is provided as to depth so that muscle injury can be avoided. Most operators then pack the
adenoid bed and use suction mono-polar electrocautery to provide hemostasis. Its limitations include the cost of the instrumentation and the need for hemostasis.

The coblation method uses a form of energy like radio waves, but with a higher frequency called radio-frequency ablation. Its claims are that radiofrequency energy is precise and controlled and results in tissue removal while causing very little harm to healthy tissue. In the adenoid bed, its advantages include simultaneous removal and hemostasis in less time than with suction electrocautery. High cost and not-infrequent plugging of the wand can be problematic.

**Tonsillectomy.** Removal of the tonsils is perhaps, the singly most discussed and controversial surgery the otolaryngologist performs. Discussion includes variations in indications, surgical techniques, and pre- and post-operative management. Although the most common major surgical procedure performed in the US today, its performance carries substantial risk, thus driving newer innovations and concepts to reduce risk and minimize both morbidity and eliminate mortality.

Bleeding into the airway of a child can result in aspiration. Children also have less blood volume. The risk from bleeding must be minimized. Pre-operative evaluation for the presence of an as yet unrecognized coagulopathy has received much attention. A detailed family and personal history of bleeding and bruising is most helpful. Some medications, herbal supplements and even certain foods can reduce coagulation, particularly platelet function. A pre-operative hemoglobin (finger stick on day of surgery) is useful to rule out anemia and also to establish severity of a bleed if it occurs. Other tests should be ordered on a case by case basis, and a basic screen includes: complete blood count, von Willebrandís panel, PT, PTT, and a platelet function test (PFA-100). Avoidance of non-steroidal anti-inflammatories for two weeks prior to surgery is advisable. These include aspirin, ibuprofen, Motrin, and Aleve.

Mink and Brodsky 14 reviewed the tonsillectomy literature over the past 20 years in order to describe the vast array of tonsillectomy techniques. They found nine different dissection techniques, three described planes of dissection, eight different methods of hemostasis, and 41 different outcome measures to assess the efficacy and safety of this procedure. Electrocautery is still used by many surgeons, however, new techniques, such as radiofrequency ablation (coblation), intracapsular microdebrider dissection, and micro-bipolar dissection have all found their proponents. Each one attempts to balance reduced morbidity, surgical duration, cost and clinical outcomes. Two methodologies, hemostatic (cautery) scissors and CO₂ laser, have been found to have unacceptably high and serious complication rates and therefore their use avoided. Long term clinical outcomes for all tonsillectomy techniques are scarce, especially for patients undergoing tonsillectomy for obstructive sleep apnea.

**Partial tonsillectomy** has gained favor by some surgeons. Its short term benefits of reduced pain and bleeding are compelling; the long term effects of leaving even a small amount of lymphoid tissue are unknown and troubling at a time when only about 65% of children undergoing tonsillectomy and adenoidectomy completely resolve their obstructive symptoms, even in children with normal BMI. Thus with the increasing rate of adult obstructive sleep apnea the surgeon
should be wary of any procedure that does not completely remove the tonsils and adenoids in children.

**Basic surgical principles** include creating the correct plane of dissection, meticulous attention to hemostasis, and avoidance of maneuvers/instruments that increase tissue trauma and concomitant edema. Palatal retraction, placement of mouth gag, and level of “heat production” all require the surgeon’s utmost attention.

Post-operative instructions should be clear about the serious nature of any bleeding post-operatively so that the family is strongly encouraged to contact the operating surgeon if such should occur. Post-operative rate of return to diet or regular activities as tolerated do not seem to reduce the risk of bleeding and seem to propel the child to a faster recovery. Speech therapy helps to improve healing times and strengthen palatal musculature. Airway complications are unusual in the otherwise healthy child, but in those with Down syndrome, craniofacial anomalies, children less than three years of age, severe obstructive sleep apnea, or with any neuromuscular disease should be monitored by trained personnel in a hospital or observation unit setting overnight. Parental anxiety and long-distance travel are also reasons to observe patients overnight after surgery.

**Lingual tonsillectomy.** Obstruction from lingual tonsils, often in conjunction with glossoptosis, is more commonly being recognized as a contributing factor to OSA. Their removal, therefore, is becoming more common. The use of angled telescopes to visualize the base of tongue and coblation of the lingual tonsillar tissue is the most direct way to complete a lingual tonsillectomy. Some use the supraglottic laryngoscope to expose the tissue and may use CO₂ laser or electrocautery to ablate. Complications are rare although the post-operative throat pain may be severe.

**Summary**

The lymphoid tissue of Waldeyer’s ring, which includes the palatine, nasopharyngeal and lingual tonsils, provides a never ending source of interest and study for the otolaryngologist. The lay public perception that surgery on these immunologic organs is “minor surgery.” Although T&A are common, this is not true, and therefore, it is incumbent upon the otolaryngologist to educate families and patients (when appropriate), that the decision to recommend surgery is a complex one. Undertaking T&A surgery has potential risks as well as significant benefits.

The future of research in this field is fertile. More work needs to be done to identify the mechanisms that lead to obstruction, be it hyperplasia from stimulation and/or anatomic/physiologic factors. Long term clinical outcome studies that follow children into adulthood will be necessary to assess the advisability of partial tonsillectomy. Understanding the untoward cognitive, behavioral and cardiovascular effects may make tonsillectomy a more commonly prescribed procedure, as our “best practices” today will need to be even better tomorrow. However, prevention, effective medical management and perhaps, immunotherapy are all understudied. Much needs to be learned beyond the best way to do a tonsillectomy.
References