56.1 Introduction

They are part of the Waldeyer’s ring of lymphoid tissues which have no afferent lymphatic.

Their lymphoid follicles are similar to that of other lymph nodes but they also have specialised endothelium covered channels that facilitate antigen uptake directly into the tissues which in turn maximise the development of immunological memory.

They contain T, B lymphocyte and few mature plasma cells.

In addition to their role in antigen processing and immune surveillance, they play part in mucociliary clearance (adenoid).

Removal of either or both has not been found to be clinically or epidemiologically significant in reduction of immunity against polio or increase in incidence of Hodgkin’s disease.

56.2 Waldeyer’s Ring of Lymphoid Tissues (Fig. 56.1)

Waldeyer’s tonsillar ring (pharyngeal lymphoid ring) is a ringed arrangement of lymphoid tissue in the pharynx. Waldeyer’s ring surrounds the naso- and oropharynx, with some of its tissue located above and some below the soft palate.

The ring consists of: the adenoid, the tubal tonsils around the openings of Eustachian tubes, the palatine tonsils and the lingual tonsils.

Waldeyer’s ring grows throughout childhood until the age of 11 years and after that decreases spontaneously.

Waldeyer’s ring tissue serves as a defence against infection and plays an important role in the development of the immune system, comprising the first organs in the lymphatic system that analyse and react to airborne and alimentary antigenic stimulation.

56.3 Adenoids (Nasopharyngeal Tonsils)

They are situated at the junction of roof and posterior aspect of nasopharynx (exit of nose). This anatomic position is important to understand their effects on nasal obstruction and orofacial growth and development (Fig. 56.2).

The frequent question of whether the adenoids are too large for a normal size nasopharynx or the nasopharynx size is smaller in children who develop nasal obstruction remains unresolved.

They are present at birth and reach the maximum period of growth at the age between 3 and 5 years (usually), then they start to regress by the age of 9 years to the age of early adulthood.
**Fig. 56.1** Waldeyer’s ring of lymphoid tissues

**Fig. 56.2** Lateral naso-oropharyngeal airway
56.3.1 Clinical Features and Types

56.3.1.1 Acute Adenoiditis (Table 56.1)
Difficult to differentiate from upper respiratory tract infection (URTI) and are usually associated with it and with rhinosinusitis.

56.3.1.2 Recurrent Acute Adenoiditis (Table 56.2)
The occurrence of four or more episodes of acute adenoiditis in 6 months period, with complete resolution of symptoms in-between the attacks.

| Table 56.1 Acute adenoiditis |
|-----------------------------|
| **Clinical features** | **Symptoms** | **Signs** |
| Nose | Obstruction | + |
| | Discharge | + |
| | Mouth breathing | + |
| Fever | + | +/− |
| Snoring and sleep disturbance | + | +/− |
| | +/− Stop breathing (SDB) | |
| Ear | +/- Pulling | Fluid behind TM |
| | +/- Pain | Tuning Fork |
| | +/- Decrease hearing | Type B Tymp |
| Voice | +/- Change | Hyponasal |
| Feeding | +/- Interrupted | |
| Cough (irritable) | +/- | |
| Orofacial changes | − | − |

| Table 56.2 Recurrent acute adenoiditis |
|-----------------------------|
| **Clinical features** | **Symptoms** | **Signs** |
| Nose | Obstruction | ++ |
| | Discharge | ++ |
| Throat | Sore Throat | +/− |
| Snoring and sleep disturbance | + | +/− |
| | +/− Stop breathing (SDB) | |
| Ear | + Pulling | Fluid behind TM |
| | +/− Pain | Tuning fork |
| | +/− Decrease hearing | Type B Tymp |
| Voice | +/- Change | +/- Hyponasal |
| Feeding | +/- Interrupted | |
| Cough (irritable) | +/- | + |
| Orofacial changes | +/− | +/− |

56.3.1.3 Chronic Adenoiditis (Table 56.3)
The persistence of one or more symptoms (including nasal discharge, bad breath and ear symptoms) for a minimum of 3 months.

Chronic adenoiditis is based on chronic inflammation triggered by a persistent bacterial infection. These bacteria, mostly *Staphylococcus aureus*, *Haemophilus* sp. and *Streptococcus* sp., persist predominantly intracellular and within mucosal biofilms. The recurrent or chronic inflammation of the adenoids leads to chronic activation of the cell-mediated and humoral immune response, resulting in hypertrophy of the adenoid lymphoid tissue. This hypertrophic tissue is the cause for the prominent clinical symptoms: obstruction of the upper airways, snoring and sleep apnea.

56.3.2 Adenoidal Facies
Persistence of nasal obstruction during early childhood (from obstructing adenoid and/or tonsils) results in abnormal development of characteristic facial appearance.
Characteristic Facial Appearance:

- Open mouth and dry lips.
- Underdeveloped thin nostrils.
- Short upper lip.
- Prominent upper teeth (incisors).
- Crowded teeth.
- High arched palate.
- Hypoplastic maxilla.

56.3.3 Diagnosis

Is usually based on clinical symptoms (most important), nasopharyngeal endoscopy and radiology (nasopharyngeal X-ray) may be used in addition.

CT or MRI may be useful if other diagnoses are expected or to be excluded (meningoencephalocele).

56.3.4 Treatment of Adenoiditis

(Table 56.4)

56.3.5 Guidelines and Recommendation for Treatment

Treatment strategies should target the persisting bacteria within their biofilm. Surgical removal of the hypertrophic tissue eliminates not only a mechanical obstacle of the airways, it removes also the basis for the aetiologic cause, the “biofilm carrier”.

No good evidence to support curative medical treatment for chronic adenoiditis but surgical removal (Recommendation).

Recommendations are against long-term antibiotic treatment.

The use of local nasal steroid for the treatment to reduce inflammatory changes and the size of the adenoid are optional.

The use of symptomatic treatment is an important tool in the management.

56.4 Tonsils

Multiple descriptions have been used to describe the tonsil size, the commonly used is the Brodsky grading.

56.4.1 Brodsky Grading Tonsil Size

(Fig. 56.3)

Ratio of the tonsils to the oropharynx in the medial to lateral plane as measured between the anterior pillars (Table 56.5).

56.4.2 Definitions

Tonsillitis is a term used to describe an acute inflammation of the palatine tonsils.

Sore Throat is used to describe any causes of inflammation of the throat.

1. Acute pharyngitis.
2. Laryngitis.
3. Tonsillitis or acute exudative tonsillitis.

56.4.3 Aetiology of Tonsillitis

56.4.3.1 Infectious

- Bacterial infection: The most common bacterial cause is Group A beta-haemolytic streptococcus (GABHS) also known as Streptococcus pyo-
genes (S. pyogenes) which affect 15–30% of sore throats in children and 10% in adults.

- **Viral infection**: Common viral infectious causes for tonsillitis include: Rhinovirus, Coronavirus, Parainfluenza virus, Influenza types A and B, Adenovirus, Herpes simplex virus type 1 and Epstein–Barr virus.

### 56.4.3.2 Non-infectious

- Extra-oesophageal or laryngopharyngeal reflux disease.
- Physical or chemical irritation, e.g. from a nasogastric tube, chronic irritation from smoking.
- Others causes like Stevens–Johnson syndrome. Kawasaki disease and oral mucositis secondary to radiotherapy or chemotherapy, which may become secondarily infected.
- Haematological disorders, such as leukaemia and aplastic anaemia.
- Medication side effects, e.g. cytotoxic drugs, carbimazole and sulfasalazine.
- Tonsillar cancer.

### 56.4.4 Prognosis

For the majority of patients, the following apply:

If caused by a viral or bacterial infection, symptoms resolve within 3 days in 40% of patients and in 1 week in 85% of patients.

Infectious mononucleosis (glandular fever) symptoms usually resolve within 1–2 weeks although mild causes may resolve within days; however, lethargy may continue for months or years in rare cases.

### 56.4.5 Complications of Tonsillitis

**Are Either**

- **Suppurative** (Table 56.6).
  - **Non-suppurative**.
    - Rheumatic fever
    - Post-streptococcal glomerulonephritis
56.4.6 Recurrent Acute Tonsillitis Is Defined as

- 7 or more episodes in the preceding 1 year.
- 5 or more episodes in each of the preceding 2 years (consecutive).
- 3 or more episodes in each of the preceding 3 years (consecutive).

56.4.6.1 Clinical Episode of Tonsillitis
Sore Throat plus one or more of

1. Temperature >38.3 °C.
2. Cervical lymphadenopathy (tender lymph nodes or >2 cm).
3. Tonsillar exudates.

Others including:
- Positive culture for group A beta-hemolytic streptococcus or treatment with antibiotics (conventional dosage for proved or suspected streptococcal episodes).

56.4.7 Chronic Tonsillitis
Persistence of symptoms in-between the attacks of tonsillitis or presence of tonsillolith.

56.4.8 Investigations

56.4.8.1 Full Blood Count
Throat cultures or rapid antigen testing, neither is able to differentiate between carrier states and an invasive infection.

The asymptomatic carrier rate for GABHS is up to 40%, and they have low infectivity and are not at risk of developing complications.

Monospot testing is not routinely recommended.

56.4.9 Viral vs Bacterial
Features indicative of a viral sore throat include malaise, cough, pharynx looks normal or mild erythema and oedema and presence of nasal symptoms or signs.

Features indicative of a streptococcal sore throat include: Odynophagia, nausea, vomiting, abdominal pain (common in children), exudates present on the tonsils, cervical lymph nodes are enlarged and tender and rash characteristic of scarlet fever.

56.4.10 Differential Diagnosis of Sore Throat

Scarlet fever: Caused by streptococcal infection, associated with characteristic erythematous rash which later desquamates with the tongue initially covered with a white coat and enlarged red papillae (strawberry tongue) may be seen.

Acute herpetic pharyngitis: Primary infection with herpes simplex virus may present as acute sore throat. Pain is moderate to severe with possible cervical lymphadenopathy, fever, and exudates and vesicles and shallow ulcers on the palate with gingivostomatitis may be seen.

56.4.11 Treatment of Acute Tonsillitis
The natural history of the illness is self-limiting and most cases last for an average of one week. During this period, patients should be managed through symptom control. Antibiotics should only be used in severe cases.

56.4.11.1 Centor Scoring System
Categorise a patient’s risk for Group A beta-haemolytic streptococcus (GABHS) to prescribe antibiotics.

One point is awarded for each of the following:

1. Tonsillar exudates.
2. Tender anterior cervical lymph nodes.
3. Fever.
4. Absence of cough.

Interpretation of scores:

- Score of 3–4 suggests a 40–60% likelihood of GABHS.
- Score <3 indicates infection with GABHS is unlikely.
It is not a diagnostic tool, not valid for children younger than age 3 years with low specificity for bacterial infection.

Antibiotic treatment:
Antibiotics should only be used in severe cases. Antibiotics should not be used for:

1. Patients with a Centor score of <3.
2. Symptomatic relief of sore throat.
3. To prevent suppurative complications.
4. Prophylaxis for recurrent sore throat.
5. Treatment of sore throat specifically to prevent the development of rheumatic fever and acute glomerulonephritis.
6. To prevent cross infection with Group A beta-haemolytic streptococcus (GABHS) in the general community.

56.4.11.2 Choice of Antibiotic
First-line treatment:

- Phenoxymethylpenicillin (penicillin V) for 10 days.
- Ampicillin-based antibiotics, including co-amoxiclav, can be used for 10 days, as alternatives to penicillin V as first line; however, there is a risk of rash when used in the presence of glandular fever.

Second-line treatment:

- Cephalosporin as second-line treatment.

Alternatives to penicillin use:
Clarithromycin for 10 days is recommended.
Close contacts of patients with invasive Group A streptococcal disease should be treated with antibiotics if they have symptoms of localised infection which may include sore throat, fever and skin infection.

56.5 Key Recommendations of the Guideline

- Significant complications of sore throat or serious systemic illness should be managed in secondary care.
- Throat swabs and rapid antigen testing are of limited benefit in the diagnosis and management of sore throat.
- Routine treatment of tonsillitis should be symptomatic, with antibiotic use reserved for those most likely to have either:
  - Bacterial infection
  - Complication of tonsillitis
  - Significant risk factors for developing a complication
- Watchful waiting rather than tonsillectomy is a reasonable management approach where the severity of symptoms or frequency of episodes is unclear.
- Recurrent acute tonsillitis and chronic tonsillitis are an indication for tonsillectomy.

Take Home Messages

- Waldeyer’s ring grows throughout childhood until the age of 11 years and after that decreases spontaneously.
- Waldeyer’s ring tissue serves as a defence against infection and plays an important role in the development of the immune system.
- Removal of either or both doesn’t reduce immunity or increase incidence of Hodgkin’s disease.
- Treatment of chronic adenoiditis is surgical removal.
- Acute tonsillitis in children is most commonly viral and self-limiting.
- Acute bacterial tonsillitis is most commonly the result of beta-haemolytic streptococcus and is best treated with oral penicillin V.

Further Reading

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