

**Assessment of adenoidal obstruction of children: clinical signs
versus radiological findings**

Thesis Study

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Abstract

Hypertrophied adenoids is a common presentation among children, there are different methods to diagnose. This study included 40 children with suspected adenoid hypertrophy, we study and compare its diagnosis, both clinically & radiologically and using the nasal endoscope as a golden standard to judge. Using simple x-ray was found to be superior to clinical evaluation both in diagnosis and in estimating the degree of obstruction of the nasopharyngeal air column.

Key words

- Hypertrophied adenoids
- Diagnosis
- Clinical evaluation
- Radiology

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Introduction

The Nasopharyngeal tonsil, also called adenoid, is the upper extension of the lymphatic Waldeyer's Ring and is located on the upper posterior wall of the nasopharynx (**Gross CW, and Harrison SE; 2000**). It is found adjacent to the choanæ and the auditory tube ostium. Adenoid hypertrophy plays an important role in recurrent otitis as well as in secretory otitis media. Many times, this structure is associated with enlargement of palatine tonsil, which leads to obstruction of upper airway and may host chronic recurrent pharyngeal infection (**Paulussen C, et al, 2000**).

Adenoidectomy is a surgical approach frequently adopted in otolaryngology, and is among the oldest surgeries to which human beings have been submitted in the past years. Recently, emphasis over careful selection of prospects for this procedure emerged from a consensus on the immunological role played by pharyngeal tonsil, as well as the potential complications of this type of surgery, making the importance of precise and accurate diagnoses a must (**Fujioka M, et al, 1979**).

Clinical evaluation of adenoid size in young children although difficult is possible, through anterior rhinoscopy, oroscopy and posterior rhinoscopy, as will be discussed later. History reported by parents of nasal obstruction, mouth breathing, nocturnal drooling and speech disorders ground the relation with adenoid enlargement, not visible at direct inspection through clinical examination, but its value is controversial **(Jeans WD, et al, 1981)**.

Skull X-ray lateral view, soft tissue window, is an accessible procedure for the physician and relatively comfortable for the child **(Chami FAL. 1998)**, consisting of a simple way to determine adenoids' size, shape and position **(Fujioka M, et al, 1979)**.

Finally, rigid and flexible endoscopies are methods that allows direct visualization of the nasopharynx, including the auditory tube and fossa of Rosenmuller, action of the velopharyngeal sphincter and, consequently, functional evaluation of this region **(Castro JRNP, et al, 1993)**, suggested by most authors to be -the nasal endoscopies- the best method to evaluate the nasopharynx, over other methods **(D.Y. Wang et al 1995)**.

Aim Of work

There are many ways to diagnose adenoidal hypertrophy and its degree. In this work, with nasal obstruction and mouth breathing, we study the best way to reach a diagnosis of children with suspected adenoid hypertrophy, clinically and radiologically by using direct vision with nasal flexible and rigid endoscopy as a golden standard to judge.

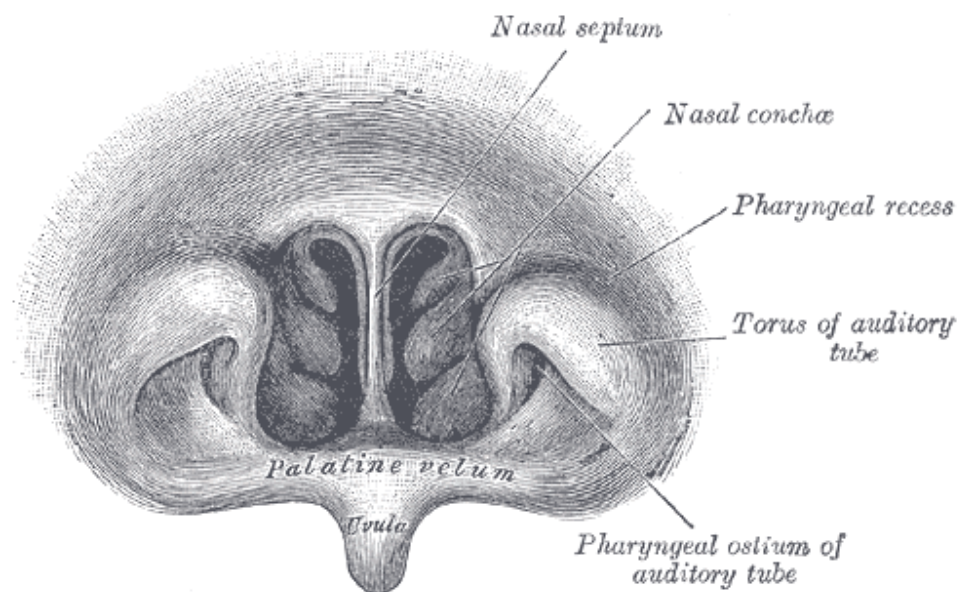
Our concern is not to discuss the decision of treatment of adenoid hypertrophy and whether it is preferable to rely on surgery or conservative management. It is merely to choose the easiest and yet most reliable way to diagnose adenoid hypertrophy, to tell if there is a problem and gives a respectable measure of its magnitude, with no much interest in solving that problem.

Review of literature

1. Anatomical Consideration

• Anatomy of the nasopharynx:

The nasopharynx (pars nasalis pharynges) lies behind the nose and above the level of the soft palate its cavity always remains patent. In transverse section it is rhomboidal, as it is narrow anteriorly. (Anderson, J.E. 1983).



Front of nasal part of pharynx, as seen with the laryngoscope.

Fig 1. Gray Henry ,et al. 1974

Anteriorly it communicates through the choanæ with the nasal cavities. Attached to the floor of the nose and choanae is the soft palate. The soft palate is the anterior inferior wall of the nasopharynx. It is responsible for regulating the amount of airflow

into the nasal cavity and nasopharynx from the oral cavity and oropharynx by opening and closing the posterior and lateral nasopharyngeal wall, where the adenoid is placed. This sphincter of muscles is called the velopharynx. The amount of airflow into the nasal cavity regulates the resonance of the voice. Too much airflow through the nose results in hypernasal speech, and too little airflow results in hyponasal speech). An inability of the velopharyngeal muscles to accommodate results in velopharyngeal insufficiency **(Fujiyoshi T, et al, 1989)**.

During deglutition the soft palate and the contraction of the sphincteric fibers of the superior constrictor closes the opening between the nasopharynx and oropharynx, forming the Passavant sphincter or palato- pharyngeal muscular arches **(Davis et al, 1979)**

The posterior wall is limited, above, by the inferior surface of body of the sphenoid and basilar part of the occipital bone and anterior Atlanto- occipital membrane, the anterior arch of the Atlas and the body of the second or axis vertebra **(Davis et al, 1979)**

Above the adenoids, in the middle line, an irregular flask-shaped depression of the mucous membrane sometimes extends up as far as the basilar process of the occipital bone; it is known as the pharyngeal bursa. On its lateral wall is the pharyngeal ostium of

the auditory tube (Eustachian tube), triangular in shape and its lumen passes laterally through a defect just above the upper edge of the superior constrictor muscle, known as sinus of Morgagni. It is bounded behind by a firm prominence, the torus tubaris, caused by the medial end of the cartilage of the tube which elevates the mucous membrane. A vertical fold of mucous membrane, the salpingopharyngeal fold, stretches from the lower part of the torus; it contains the Salpingopharyngeus muscle. A second and smaller fold, the salpingopalatine fold, stretches from the upper part of the torus to the palate. Superior and posterior to the ostium of the auditory tube is a deep recess, the pharyngeal recess (fossa of Rosenmüller) situated behind the posterior end of the inferior concha. The inverted J configuration of the torus tubaris results in the fossa appearing posterior (on axial images) and superior (on coronal images) to the Eustachian tube orifice. This recess is formed by the mucosal reflection over the longus colli muscle **(Gray Henry, et al., 1974).**

The shape of the fossa shows wide variation. The size and configuration depends on the amount of adenoid tissue and the prevertebral muscle bulk. In the elderly, the loss of prevertebral muscle bulk results in a shallow and wide recess. In children, the

recess may be obliterated by adenoid tissue. The fossa of Rosenmuller may appear asymmetrical. This is due to unequal air distension or an unequal amount of lymphoid tissue. The opening of the Eustachian tube, however, is usually symmetrical both on endoscopy and on cross sectional imaging **(Davis et al, 1979)**.

The stiff pharyngobasilar fascia maintains the shape of the nasopharynx. This tough aponeurosis is the cranial extension of the superior constrictor muscle from the level of the hard palate to the skull base. This fascia separates pharyngeal mucosal space (PMS) from the deep spaces of the face. It decreases in volume with age but may persist into adulthood. Lymphoid tissues are located superficially and never penetrate the underlying muscle. The Parapharyngeal space (PPS) separates the PMS of the nasopharynx from the masticator space (MS). The PPS also separates the nasopharynx from the parotid space (PS) laterally and the carotid space (CS) posteriolaterally. Posterior to the nasopharynx is the retropharyngeal space (RPS). Within the RPS are the retropharyngeal nodes which form the first echelon nodes of the nasopharynx. They are usually not seen but may occasionally be identified as discrete 3–5-mm nodules **(Gray Henry, et al., 1974)**.

The length of nasopharynx is about 35 mm and the width is about 25 mm (from side to side and only 12mm from front to back) in normal adult. the nasopharyngeal area in children are smaller than in adult and the vault is lower and less well arched, However, nasopharynx increases in dimension more great than the development of the normal adenoids (**Groth K.,1983**).

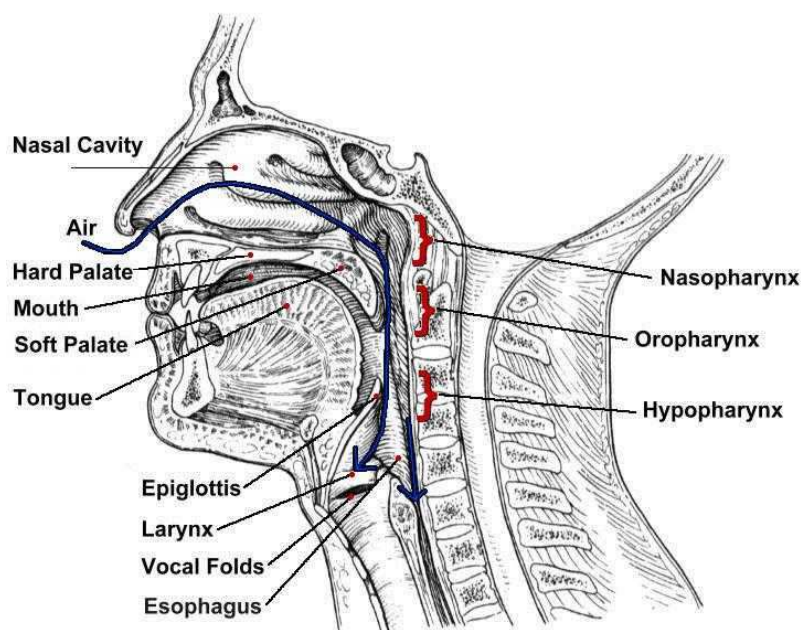


Fig 2. **Sleep Consultants, Inc. 2007.** Snoring and its connection to daytime sleepiness and cardiovascular diseases

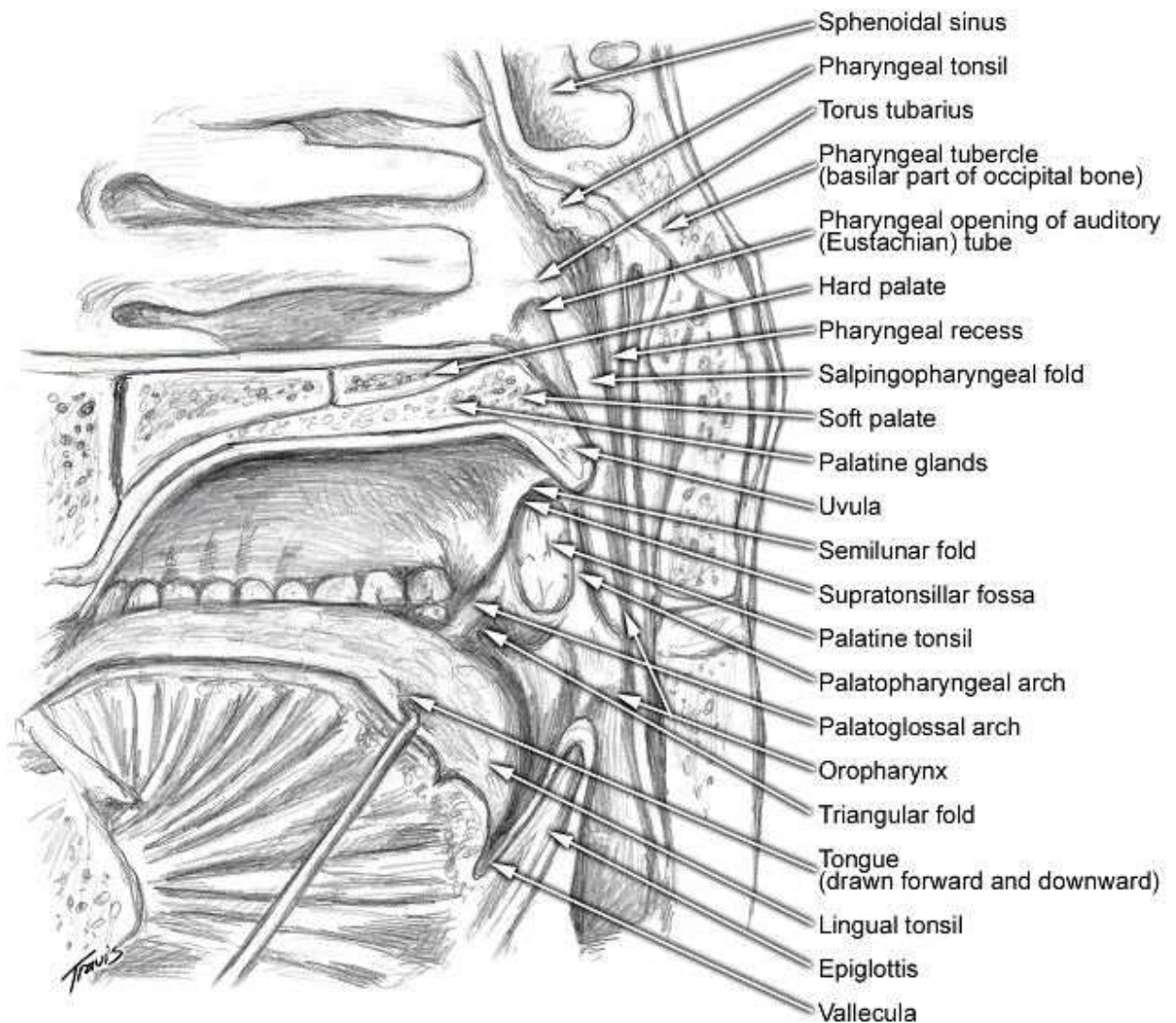


Fig 3. eMedicine specialties, pediatric otolaryngology, Adenoidectomy by **McClay J.E. 2000**

- **Blood supply:**

It is provided by the ascending palatine branch of the facial artery, ascending pharyngeal artery, pharyngeal branch of the internal maxillary artery, and ascending cervical branch of the

thyrocervical trunk. Venous drainage is to the pharyngeal plexus, to the pterygoid plexus, and ultimately into the internal jugular and facial veins (**Williams PL and Warwick R, 1980**).

- **Lymphatic drainage:**

The nasopharynx is very rich in lymphoid tissue the lymphatic vessels draining these follicles pierce the pharyngeal fascia and muscles to retropharyngeal lymph nodes. These retro-pharyngeal lymph nodes include one median and two lateral. Efferent lymphatic drainage flows from the retropharyngeal to the upper deep cervical lymph nodes, present along the internal jugular vein under cover of the sternomastoid muscle, especially the posterior triangle nodes (**Jr. Ronald Deskin et al, 1996**).

- **Sensory innervations:**

Sensory innervations are derived from nasopharyngeal branches of the glossopharyngeal and vagus nerves. It derives from the lesser palatine nerves which transmits afferent fibers to the sphenopalatine ganglion. And the lingual branch of the glossopharyngeal nerve which provides the pathway for referred otalgia. The inferior ganglion of CN IX has cell bodies of the tympanic nerve which provides general sensation to the medial surface of the TM and middle ear mucosa. Both of these cell