SciTechnol

Adenoids and Its Management: A Review of Surgical Methods

--Manuscript Draft--

Manuscript Number:	SciTech-17-1496
Full Title:	Adenoids and Its Management: A Review of Surgical Methods
Short Title:	
Article Type:	Review
Section/Category:	Otology & Rhinology
Keywords:	Adenoids, adenoidectomy, pharyngeal tonsils
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Manuscript Region of Origin:	NIGERIA
Abstract:	Adenoids remained unrecognized because of their inaccessible location and the fact that most adenoidal pathology occurred in young children. Adenoidectomy is the surgical procedure in which the adenoids are removed. Removal of the adenoids is indicated when they are chronically infected or causing obstruction. Since the earliest descriptions of adenoidectomy, numerous techniques have been described and used successfully. All techniques are based on the principle of adequate visualization and removal of the adenoids without damage to the surrounding structures. The advent of endoscopic sinus surgery has popularized the use of endoscopes. The aim of this paper is to review various surgical techniques of adenoidectomy.
Suggested Reviewers:	
Opposed Reviewers:	

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SUMMARY

Adenoids remained unrecognized because of their inaccessible location and the fact that most adenoidal pathology occurred in young children. Adenoidectomy is the surgical procedure in which the adenoids are removed. Removal of the adenoids is indicated when they are chronically infected or causing obstruction. Since the earliest descriptions of adenoidectomy, numerous techniques have been described and used successfully. All techniques are based on the principle of adequate visualization and removal of the adenoids without damage to the surrounding structures. The advent of endoscopic sinus surgery has popularized the use of endoscopes. The aim of this paper is to review various surgical techniques of adenoidectomy.

INTRODUCTION

Adenoids are collection of lymphoid tissue called pharyngeal tonsils that are located in the sub mucosa at the junction of the roof and posterior wall of the nasopharynx. The arterial blood supply is from ascending pharyngeal artery, ascending palatine branch of facial artery and pharyngeal branch of the third part of maxillary artery. Lymphatic drainage is to the upper deep jugular nodes and the nerve supply is from maxillary nerve. It forms part of Waldeyer's ring. The lateral part of the ring is formed by the palatine tonsils and tubal tonsils. The pharyngeal tonsil in the roof of the nasopharynx forms the upper part and the lingual tonsil on the posterior third of the tongue forms the lower part. All the structures of the Waldeyer's ring have similar histologic features and presumably, similar function. The adenoid develops as a midline structure by fusion of two laterals primordial that become visible during early fetal life[2], the free surface exhibits about five vertical fissures. It has no crypts. The deep surface has no capsule. Adenoids occasionally extend laterally to lie in close relation to the opening of the Eustachian tube (tubal tonsil). The etiology of the adenoid hypertrophy is not clear; however frequent infection, allergy, rhinitis and chronic sinusitis play important role[3]. An untreated adenoid hypertrophy may lead to obstructive sleep apnoea, ear problems, failure to thrive, pulmonary hypertension and craniofacial anomalies[4,5].

BACKGROUND

The adenoid, or pharyngeal tonsil, forms the superior, central part of the ring of lymphoid tissue surrounding the oropharyngeal isthmus, described by Wilhelm von Waldeyer (1836-1921)[6]. The term adenoid was used to indicate enlargement of the pharyngeal tonsil. It is fully developed during the seventh month, and increases in size until the fifth to eighth years, often causing some degree of airway obstruction. Thereafter the adenoid gradually atrophies, the nasopharynx grows, and the airway improves[4,7,8]. The technique of adenoidectomy has undergone many refinements over the years [9]. The various surgical methods that are available to surgeons today include conventional cold surgical techniques using adenoid curette/adenoid punch, adenotome, electrocautery, microdebrider, laser, coblation and power-assisted

adenoidectomy[5,10]. The advent of endoscopic sinus surgery has popularized the use of endoscopes[11]. The aim of this paper is to review various surgical techniques of adenoidectomy.

DISEASES OF ADENOID

The chief clinical adenoid disorder in children is enlargement, and its principal symptom is nasal obstruction or mouth breathing. Both acute and chronic adenoiditis occur but little has been written about the clinical pathology of adenoid because of its relative inaccessibility to physical examination or clinical testing. The enlargement of adenoid and tonsil are better described as hyperplasia rather than hypertrophy. The principal stimulus for adenoid hyperplasia appears to be infections. Symptoms and signs may be due to simple enlargement, to inflammation, or to both. It is the size of the mass relative to that of the nasopharyngeal space that is of importance, not its absolute size.

SYMPTOMS AND SIGN DUE TO HYPERTROPHY [12]

1. Nasal obstruction – mouth breathing , difficulty in eating especially in infants, noisy breathing, drooling , snoring, and toneless voice
2. Eustachian tube obstruction leads to secretory otitis media, deafness, intermittent ear ache

SYMPTOMS AND SIGNS DUE TO INFLAMMATION

1. Nasal discharge, post nasal drip, cough
2. Otitis media
3. Rhinitis and sinusitis
4. Cervical adenitis
5. Generalized disturbances. Mental dullness and apathy

ADENOID AND OTITIS MEDIA[13]:

The enlarged adenoid has long been implicated as a factor in the genesis of otitis media. Three mechanisms are generally postulated. The adenoid

1. Causes Eustachian tube obstruction
2. Promotes Eustachian tube reflux
3. Is a source of pathogenic bacteria?

   Because nearly all patients with otitis media has Eustachian tube dysfunction (ETD) from test performed [13] and the adenoid is situated very close to the mouth of eustachian tube hence a cause - and- effect relationship between the adenoid and ETD was presumed. An enlarged adenoid elevated by the soft palate during swallowing may obstruct the choana and may contribute directly to elevated nasopharyngeal pressure and indirectly to reflux. Children with patulous Eustachian tubes have been shown to be at high risk of developing otitis media [13]. The young children have shorter, straighter, and

more compliant Eustachian tubes than adults have been recognized as an important factor in the pathogenesis of otitis media in children [14].

ADENOID FACIES [15]

Children with adenoid facies tend to presents with some of the features

Open mouth/mouth breathing

Thick lips

Hitched-up upper lip

Protruding upper incisors

Receding chin

Malar hypoplasia

Dull 'idiotic' appearance

Inactive alae nasi

Reduced anterior nares/pinched nose

Absent nasolabial folds

High arched palate due to loss of contact between the tongue and palate

Constant mucoid discharge from the anterior nares

ADENOIDECTOMY

It is the surgical removal of nasopharyngeal lymphoid tissue (adenoids) in children. Adenoidectomy is the surgical procedure in which the adenoids are removed. The procedure was first performed using a ring forceps through the nasal cavity in 1867 by Williams Meyer[16]. They are often not understood by the lay public or by physicians who are not Otolaryngologists because they are not observed during routine physical examinations because of their location[17]. An adenoidectomy is often associated with other surgical procedures (e.g tonsillectomy, placement of tympanostomy tubes). Adenoidectomy and Tonsillectomy are two distinct procedures, each with its own indication but the two can be done together when the indication coexist[18].

PRE OPERATIVE EVALUATION/ASSESSMENT[19]

Apart from adequate history, physical and clinical examinations to arrive at preoperative diagnosis, adequate pre-operative work up are essential for successful surgical outcome in a patient going for adenoidectomy. Adenoids cannot be seen during routine physical examination, hence good history is essential. Radiological investigations – plain radiograph soft tissue of the neck (lateral view) will show soft tissue mass in the nasopharynx, narrowing the airway column. (Fig.1)

Fig. 1. X-Ray post nasal space showing soft tissue mass narrowing the airway column

Fig. 2. Rigid endoscope 70^0 (70 – degree)

Fig. 3. Rigid Endoscope 0^0 (0 – degree)

Hematological evaluation especially haemogram and clotting profile are essential. The latter is to screen for bleeding or coagulation abnormality. When complication is envisaged, Electro cardiogram and chest –X- ray may be required to assess the heart. Where facility is readily available Flexible Fiber optic nasopharyngoscopy or rigid nasopharyngoscopy (Fig. 2 & 3) will visualized nasopharynx directly by carrying out endoscopy.

Detailed history of patient's speech pattern should be asked. Inspect the palate for any evidence of occult or obivious submucous cleft palate and for an overt cleft palate. Signs of a submucous cleft palate include the presence of a bifid uvula, an attenuated medial raphe of the soft palate, which may appear as a blue line in the center of the palate, and a V shaped notching of the hard palate[17].

INDICATIONS FOR ADENOIDECTOMY

1. Enlarged adenoids with mouth breathing
2. Snoring
3. Recurrent rhinosinusitis
4. Chronic adenoiditis
5. Secretory otitis media
6. Chronic suppurative otitis media
7. Sleep apnoea syndrome

CONTRADICATION TO ADENOIDECTOMY

1. Cleft palate
2. Normal adenoids
3. Acute infections
4. Bleeding disorders
5. Epidemic of poliomyelitis

METHODS / TECHNIQUES OF ADENOIDECTOMY

Since the earliest description of adenoidectomy, numerous techniques have been described and used successfully[10]. Hence many new and creative means were developed for the removal of adenoids; most of them are based on transorally approach: namely nail curette, which is essentially a steel scraper worn on the index finger, a variety of punches, and the adenotome. The instrument that has the best stood the test of time, the adenoid curette, was introduced by Jacob Gottenstein in 188 [20].

STEPS OF ADENOIDECTOMY CURETTAGE [15,19]

*Under general anaesthesia with orotracheal intubation and pharyngeal /throat pack to prevent blood and secretions entering esophagus and aspiration of laryngeal clot and leakage of air, oxygen and anaesthetic agent.

*Patient is put in Rose position i.e Supine position with extension of neck and atlantoaxial joint (pillow or sand bag under the shoulders), a rubber ring under the head stablilizes head and prevents its hyperextension.

*With the aid of a mouth gag e.g Boyle-Davis (Fig.4) the oropharynx is exposed by opening the gag gradually. It is suspended from Draffin's bipods and extends the neck and head. The lower ends of the pods are placed in one of the several depressions of the magauran's plate. *The soft palate is retracted with a catheter or pillar retractor. The teeth is protected by the plastic or rubber already attached to the mouth gag or by a piece of gauze.

Fig. 4. Boyle's Davis mouth gag with blade

Fig.5. Adenoids curettes

*The nasopharynx is palpated to confirm the size of adenoid with respect to the choana and the septum. A post nasal mirror may be used for the same purpose.

*St. Clair Thomson's adenoid curette with / without cage (Fig. 5) is inserted behind the soft palate till the posterior end of the septum is felt.

* Push curette backwards to trap adenoids inside the curette. Curette with sweeping motion – downwards and forwards

*A swab/pack is inserted into the postnasal space and left for a few minutes to secure haemostasis.

*The swab is removed. Bleeding usually stops spontaneously

POST OPERATIVE CARE [19]

-Patient is kept in tonsillar position, where head is kept low and the patient lies in lateral position to prevent aspiration of blood [21]

-Nil orally until patient is fully recovered from anaesthesia

-Monitor vital signs are monitored – temperature, pulse, respiration

-Watch for bleeding from the nose and mouth, vomiting, excessive swallowing, pain, and respiratory distress

-Plenty of cold fluids such as cold milk or ice cream to be followed by liquid and soft diet

-Analgesics and Broad spectrum antibiotics are given post operatively

COMPLICATIONS OF ADENOIDECTOMY [19]

1. Haemorrhage – primary and reactionary
2. Aspiration
3. Eustachian tube orifice injury – otitis media with effusion, suppurative otitis media
4. Injury to soft palate, uvula, posterior pharyngeal wall, tongue, teeth, and lips may occur
5. Injury to anterior longitudinal ligament causing subluxation of atlanto-occipital joint
6. Nasopharyngeal stenosis – it occurs due to scarring after excessive damage to nasopharyngeal mucosa (roof, posterior and lateral walls) and resection of the posterior tonsillar pillar
7. Velopharyngeal incompetence (VPI)
8. Stenosis result from excessive tissue destruction such as might occur from excessive use of cautery, excessive curettage of the fossae of rosenmuller and removal of lateral pharyngeal bands
8. Pulmonary complications- aspiration of blood, mucus or tissue fragment may lead to atelectasis or abscess of the lung

Transient VPI may occur after removal of large adenoid but resolves in many cases.

Persistent VPI may require prosthesis or pharyngeal flap, majority of such cases are due to an undetected submucous cleft palate.

9. Rhinolalia aperta
10. Recurrence: remaining adenoids may grow again
11. Atlantoaxial subluxation from infection (Grisel syndrome)

ENDOSCOPIC ADENOIDECTOMY[16]

This is the recent development in the surgical management of adenoid hypertrophy. It was first described by Nayak et al in 1998 for a case in which traditional adenoidectomy is contraindicated. Comparative study between the conventional versus endoscopic technique showed less blood loss and better post-operative airway improvement as there is direct visualization and clearance of the airway without injuring the Eustachian tube orifice.

Various techniques of adenoidectomy had been described from the reviewed done by Christopher et al [6]

Apart from the curette adenoidectomy and adenotome , the following endoscopic methods are hereby disscussed

COBLATION ADENOIDECTOMY This is one form of adenoidectomy performed by Thiagaranjah et al [22]. It was carried out by putting a patient in head up position. The soft palate is retracted by passing a soft rubber catheter via a nasal cavity. O degree 2.7mm nasal endoscope is used to visualize the adenoid tissue. Coblation of adenoid tissue is then performed under visualization. Adenoid is ablated till the prevertebral fascia becomes visible. The advantages recorded are lesser bleeding and residual adenoid tissue left was minimal compared to conventional adenoidectomy. However operating time of coblation adenoidectomy was significantly high.

VIDEOENDOSCOPIC ADENOIDECTOMY
WITH MICRODEBRIDER

Describe by Constantini et al [23]. The procedure is carried out under general anaesthesia with oro tracheal intubation. The patient is placed in a supine position with surgeon in front of and the right of the patient. A McIvor-type mouth gag is positioned, with two soft catheters introduced through nasal cavity to apply upward traction to the soft palate. A 70^{0} endoscope with a video attachment is introduced through the mouth to visualize the nasopharynx. A microdebrider with a 40^{0} curved blade is also introduced though the mouth. The instrument is connected to an aspirator and is programmed to alternate rotations, with a rotational speed of 1200 rpm. Removal of the adenoid tissue starts from the choanal vegetations and proceeds backwards along the vault towards the posterior wall of the nasopharynx. The advantage of this procedure is that the adenoid tissue is handled with precision. The disadvantage is the slightly increase in operation, preparation and organization time.

POWERED – SHAVER ADENOIDECTOMY

Described by Havas et al[24], a transnasal powered – shaver adenoidectomy technique guided by transnasal videoendoscopy was used. The theater setup and positioning is as for a standard functional endoscopic sinus surgery (FESS) with adequate nasal preparation with oxymetazoline hydrochloride. A sponge soaked in oxymetazoline is also placed per orally into the nasopharynx. This is to assist in hemostasis. Using the 0 degree 2.7-mm rigid telescope (4mm in older children), the posterior choanae and nasopharynx are assessed. Under endoscopic vision the shaver cannula is passed into the nose with the suction switched off to allow passage through to the adenoid without traumatizing the turbinates or septum. The suction is then turned on and obstructive tissue removed

under constant endoscopic vision with care not to lacerate the torus tubarius. Working from proximal to distal, intranasal adenoid and hypertrophic nasopharyngeal adenoid are removed until the surgeon is satisfied with the clearance. The nasopharyngeal sponge is removed. The advantage of the procedure is the assurance of complete clearance of the nasal airway in every patient. No bleeding or prolonged hospital stay was noticed.

ELECROCAUTERY WITH A SUCTION BOVIE

This method is also used to remove or shrink adenoids [17]. The suction Bovie has a hollow center tosuction blood or secretions and a rim of metal contact for coagulation. The instrument can be set for pure coagulation or for coagulation and cutting. The pure coagulation setting seemed to consume time since the chard adenoid tissue can obstruct the suction, requiring repeated cleaning. However the coagulation/cutting combination methods appear to be quicker .The cutting methods usually transfer greater energy to the surrounding tissue, which can potentially cause more neck stiffness following the procedure.

LASER ADENOIDECTOMY

The Nd-YAG laser has been used for the resection of adenoids. This technique has caused nasopharyngeal scarring and is best avoided [17].

POST OPERATIVE CARE

Most of the children that had adenoidectomy done can be safely discharge home on the same day of surgery, as day case adenoidectomy has been reported by various authors with good satisfaction[25, 26,27.] However children who live far from a hospital or their parents or neighbour are not mobile should be kept overnight for observation. Feeding post operatively has been described earlier. Cold ice cream and subsequently liquid and soft diet are usually recommended.

FOLLOW UP

Usually the patient is seen in the clinic one week after discharge.

FUTURE AND CONTROVERSIES

One of the controversy related to adenoidectomy is the age at which is safe, based on the immunological benefit of the adenoids. However, no study has shown that immunity is impaired in a child following adenoidectomy[17]. Despite the numerous techniques available for removing the adenoids, the standard and generally most successful method of using the curette for removal (conventional curettage) appears to be the most widely performed procedure especially in a limited resources setting[5, 17.]

CONCLUSION

Adenoidectomy is one of the most common surgical procedures performed by Otolaryngologist in the pediatric patients. Techniques and instruments have considerably changed over the years. The aim of the new technology is to ensure better visualization, complete removal of adenoids, minimize bleeding and to reduced hospital stay.

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