ENDOSCOPIC ASSISTED ADENOIDECTOMY
A COMPARATIVE STUDY OF ENDOSCOPIC ASSISTED CURETTAGE ADENOIDECTOMY WITH CONVENTIONAL CURETTAGE ADENOIDECTOMY

Dissertation submitted to

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

in partial fulfillment of the regulations
For the award of the degree of

M.S. BRANCH - IV
OTORHINO LARYNGOLOGY

GOVT. STANLEY MEDICAL COLLEGE & HOSPITAL
THE TAMIL NADU DR.M.G.R. MEDICAL UNIVERSITY
CHENNAI – 600 032.

MARCH 2009

CERTIFICATE

This is to certify that this dissertation entitled **"ENDOSCOPIC ASSISTED ADENOIDECTOMY A COMPARATIVE STUDY OF ENDOSCOPIC ASSISTED CURETTAGE ADENOIDECTOMY WITH CONVENTIONAL CURETTAGE ADENOIDECTOMY"** is a bonafide original work of **Dr. C. SUBASHINI** Post Graduate Student (2006-2009) in the department of Otorhinolaryngology, Government Stanley Medical College and Hospital, Chennai in partial fulfillment of the regulations laid down by the Tamil Nadu Dr. M.G.R. Medical University, Chennai for M.S. (Branch IV) Otorhinolaryngology examination held in March 2009.

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DECLARATION

I, **Dr. C. SUBASHINI**, Solemnly declare that this dissertation **"ENDOSCOPIC ASSISTED ADENOIDECTOMY A COMPARATIVE STUDY OF ENDOSCOPIC ASSISTED CURETTAGE ADENOIDECTOMY WITH CONVENTIONAL CURETTAGE ADENOIDECTOMY** is a bonafide record of work done by me in the Department of Otorhinolaryngology and Head and neck Surgery, Government Stanley Medical College and Hospital, Chennai under the guidance of **Prof. Dr. JACINTH CHELLIAH, M.S. D.L.O, HOD,** Department of Otorhinolaryngology and Head and Neck Surgery, Government Stanley Medical College and Hospital, Chennai – 600 001.

This dissertation is submitted to the Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the University regulations for the award of MS degree ENT (Branch – IV) Examination to be held in March 2009.

Place : Chennai

Date : **(Dr. C. SUBASHINI)**

ACKNOWLEDGEMENT

I am immensely grateful to ***Prof. Dr. J. Mohanasundharam, M.D., D.N.B., Ph.D.,*** *The Dean, Government Stanley Medical College and Hospital, Chennai for granting me permission to avail the facilities needed for this study.*

I have no words to express my sincere gratitude to my respected ***Prof. Dr.Jacinth Chellaiah M.S., D.L.O.,*** *H.O.D, Department of Otorhinolaryngology and Head and Neck surgery, Government Stanley Medical College and Hospital, Chennai for his excellent and valuable guidance, encouragement and support in conducting this study, without whom this could not have been possible.*

I have great pleasure in expressing my deep sense of gratitude and respect for ***Prof. Dr.A. Muraleedharan, M.S., D.L.O., FABMS.,*** *Additional professor of Otorhinolaryngology, Head and neck surgery and Chief of ENT Unit II, Government Stanley Medical College and Hospital for approving this study and giving his valuable suggestions and guidance in preparing this study.*

I extend my thanks to ***Prof. Dr. D. Balakrishnan, M.S. D.L.O.,*** *Additional Professor of Otorhinolaryngology and Head and Neck surgery Government Stanley Medical College and Hospital, for his support and suggestions in preparing this thesis.*

I owe my sincere thanks to ***Dr. P. Ilangovan, M.S., D.L.O, Dr. M.N. Shankar, M.S., D.L.O, Dr. M. Gowrishankar, M.S., D.N.B., D.L.O., Dr. R. Thalapathy Ramkumar, M.S., D.N.B.*** *and* ***Dr. T. Indra, M.S., E.NT.*** *for their valuable guidance and constant encouragement throughout the study since its inception.*

I thank all the staff members of ENT Department and my fellow post graduates for their valuable help and encouragement throughout this study.

Last but not the least, my indebtedness and gratitude to all the patients who are the quintessential pivot of my study, and who, for the sake of community at large, most willingly subjected themselves to this study.

CONTENTS

INTRODUCTION

The palatine tonsils, pharyngeal tonsil (or) Adenoids and lingual tonsils form the waldeyer's ring and are part of the mucosa associated lymphoid tissue (MALT) system.

Tonsils and adenoids are the body's first line of defense for protection of the lower airways and the gastrointestinal tract as well as for development of antigenic memory by the host.

An acute upper respiratory infection affects the adenoids and results in hyperplasia with multiplication of lymphoid follicles. Hypertrophied adenoid produces impairment of nasal respiration, mouth breathing, snoring and recurrent otitis media.

Nasal endoscopy allows easy assessment of the size of the adenoid. Endoscopic assisted adenoidectomy improves the accuracy of adenoidectomy.

AIMS OF THE STUDY

1. To study the advantages of endoscopic assisted curettage adenoidectomy in comparison with conventional curettage adenoidectomy.

2. Comparing the complete removal of adenoid tissue intraoperatively.

3. Comparing the blood loss in each surgical procedure.

REVIEW OF LITERATURE

Santorini described the nasophyayngeal lymphoid aggregate as Lushka's tonsil in 1724.

Wilhelm Meyer coined the term 'Adenoid' to describe what he described as 'nasophayngeal vegetations' in 1870.

History of Adenoidectomy & Tonsillectomy :

Adenoidectomy was first performed in late 1800s when Wilhelm Meyer of copenhagen, Denmark, proposed that adenoid vegetations were responsible for nasal symptoms and impaired hearing. Tonsillectomy has been performed for at least 2000 yrs. Celsus first described the procedure as early as 50BC. These 2 surgeries were routinely performed together beginning in the early part of the 1900s when the tonsils and adenoids were considered reservoirs of infection.

The widely used conventional curette adenoidectomy was first described in 1885. [1]

The adenotonsillectomy began increasingly to be carried out together early in the 20th century, as the then popular "focus of infection" theory attributed various systemic disorders, most notably "rheumatism" to diseased tonsils and adenoids, and as enthusiasts proceeded even further to recommend adenotonsillectomy as a treatment for such diverse conditions as anorexia, mental retardation and enuresis (or) simply as a general measure to promote good health. Perhaps the ultimate in enthusiasm for adenotonsillectomy was manifested, in certain communities, in wholesale surgery on entire population of school children in public school buildings.

Skepticism regarding the propriety of subjecting such large numbers of children to adenotonsillectomy began to be voiced increasingly in the 1930s and 1940s.

The skepticism received powerful reinforcement as

i) Epidemiologic studies pointed to a natural decline in the incidence of upper respiratory infections in children after the first few years in school.

ii) Recognition spread, in the period preceding the development of an effective vaccine, that individuals who had recently undergone tonsillectomy were at increased risk of developing poliomyelitis, particularly of the bulbar types.

iii) A succession of effective antimicrobial agents became available for treating bacterial respiratory infections.

iv) A number of studies were published that purported to show that tonsil and adenoid surgery was after all ineffective.

As recently as 1976, the suggestion was made that tonsil and adenoid surgery be suspended entirely until such time as its efficacy could be established in properly conducted trials.

Notwithstanding this climate ranging from skepticism to outright condemnation, support for adenotonsillectomy

continued throughout many segments of the medical community.

This support derived variously from

i) Attitudes acquired during training.

ii) Judgements drawn from personal clinical experience.

iii) Later studies, embodying for the first time randomized, clinical trials, which despite their limitation suggested that the operations are in some degree efficacious.

iv) Contentions by orthodontists that sustained mouth breathing due to large adenoids may cause abnormalities in the growth and development of the facial skeleton and dentition.

v) Accumulating reports of instances of life-threatening airway obstruction attributable to enlarged tonsils and adenoids that was relieved by their removal.

Over the years, striking variability in tonsil and adenoid surgery rates has been noted between nations, and even between adjoining communities of similar population make-up. Underlying these differences in surgical rates have been wide differences of opinion concerning how extensive, severe and long standing various tonsil (or) adenoid related conditions should be to justify surgery. Opinions have also differed as to whether, under various clinical circumstances, surgery should consist of tonsillectomy only, or adenoidectomy only, or the combined procedure.

Tonsillectomy has generally been considered the component of tonsil and adenoid surgery that is efficacious with regard to recurrent throat infection and adenoidectomy the component efficacious with regard to disease of the middle ear.

Nonetheless, when either operation alone has appeared indicated for a specific category of illness, the other operation often has been added to the procedure to “take advantage” of the hospitalization and anesthesia, and in the belief that more was

to be gained than lost by performing maximal removal of pharyngeal lymphoid tissue.

In the mid 1970s American Academy of Pediatrics and AMA-PSRO criterion for tonsillectomy of “four or more episodes of tonsillitis with cervical adenitis within the preceding year” with this statement in a then relatively contemporaneous standard pediatric textbook: “since the frequency with which episodes of acute pharyngitis or tonsillitis occur is not decreased by tonsillectomy, ‘frequent sore throat’ is not a valid indication.

It lies simply that, until relatively recently, of convincing evidence that adenotonsillectomy in the conditions for which if has been commonly undertaken is more efficacious than conservative management. Such evidence can come only from properly designed and carefully conducted clinical trials. The first clinical trials of adenotonsillectomy were reported in 1963 by McKee.

The more recent children’s Hospital of Pittsburgh study, to was designed to avoid the various limitation of earlier studies. In

particular by employing stringent surgical criteria, it focused on children who were severely affected and who therefore should have been optimally positioned to show meaningful improvement if tonsil and / or adenoid surgery were indeed efficacious.

Mawson in 1979 [2] has attributed snoring, nasal obstruction, speech defects, cough, headache and recurrent earache to enlargement of the adenoids in Scott Brown's Disease of the Ear, Nose and Throat.

Hibbert and stell (1978) [3] related the symptoms of snoring to adenoid weight. The relationship of adenoid weight to the cross – sectional area of the adenoid shadow on the lateral X ray of the post nasal space has been demonstrated by Hibbert and whitehouse (1978) [4] and Maw et al (1981).

There is a significant relationship between the endoscopically determined size of obstructive adenoid tissue and symptomatic nasal obstruction in children.

Adenoidectomy with or without tonsillectomy is the most common major operation performed in children. [6]

Adenoidal size and obstruction of the postnasal airway can be assessed in several ways, Lateral skull radiography has traditionally been used for this. [7,8]

The flexible fibreoptic endoscope is being used now and is considered the gold standard of evaluation of adenoid [9,10,11]

Several methods of performing an adenoidectomy have been described. Traditionally the adenoids have been curetted with La force adenotome or the sharp Barnhill[12,13] curette, and also with St. Clair Thompson adenoidectomy curette.[14]

More recently endoscopic adenoidectomy with a microdebriders[15], suction electrocauterization, and laser – assisted adenoid vaporization[17] endoscopic guided curette adenoidectomy[21] is popularly practiced.

Incomplete adenoidectomy had been found where the adenoidal tissue in the pharyngeal recess. The other difficulty was adenoidal tissue bulging into the choanae, which was addressed by pearl and Manoukian[18]

Endoscopic partial adenoidectomy done for children with submucous cleft palate who suffer from chronic nasal obstruction because of hypertrophic adenoids.[19]

Adenoid size is assessed with comparing by palpation, nasoendoscopy and mirror examination[20]

Adenoid size has been graded based on fibreoptic endoscopic finding.[22] There has been correlation between adenoidal nasopharyngeal ratio and tympanogram in children. [23]

The belief of adenoidectomy in the management of otitis media with effusion has traditionally been ascribed to the relief of anatomical obstruction of the Eustachian tube[24].

Adenotonsillectomy is the treatment of choice for children suffering from sleep disordered breathing. The results of surgery are improvement in nocturnal hypoxia, behaviour and quality of life and growth rate. [25, 26, 27, 28, 29, 30.]

ANATOMY

EMBRYOLOGY

The adenoid (or) nasopharyngeal tonsil develops in the posterior midline of the nasopharynx at 4 to 6 weeks by focal proliferations of endoderm which become invaded by lymphoid tissue at 16 weeks. It can be visualised radiologically at 6 months of age.

ADENOID

It is a median mass of Mucosa Associated Lymphoid Tissue (MALT) situated at the junction of the roof and posterior wall of nasopharynx. It is a component of the waldeyer ring of lymphoid tissue which consists of nasopharyngeal tonsil, palatine tonsils, lingual tonsils and tubal tonsils.

It is shaped like a truncated pyramid often with a vertically oriented median cleft, so that its apex points towards the nasal septum and its base is at the basisphenoid and basiocciput.

The free surface of the nasopharyngeal tonsil is marked by folds that radiate forwards and laterally from a median blind recess, the pharyngeal bursa (bursa of Lushka) which extends backwards and up.

The Pharyngeal recess marks the rostral end of the embryological notochord. The number and position of the folds and of the deep tissues which separate them vary.

A median fold may pass forwards from the pharyngeal bursa, towards the nasal septum (or) instead a tissue may extend forwards from the bursa, dividing the nasopharyngeal tonsil into two distinct halves which reflect its paired developmental origin.

After birth adenoid initially grows rapidly but usually undergoes a degree of involution and atrophy from the age of 8-

10 years. The adenoid appear to be largest in the seven year old age group[31].

Relative to the volume of nasopharynx, the size of the adenoids is largest at 5 years, which may account for the frequency of nasal breathing problems in preschool children.

ARTERIAL SUPPLY

The adenoid receives blood supply from

(i) Ascending pharyngeal artery.

(ii) Ascending palatine artery.

(iii) The tonsillar branch of facial artery.

(iv) The pharyngeal branch of maxillary Artery and the artery of pterygoid canal.

In addition a nutrient artery to the neighbouring bone, the basisphenoid artery, which is a branch of the inferior hypophyseal arteries supply the bed of nasopharyngeal tonsil. It can cause persistant post adenoidectomy hemorrhage in some patients.

VENOUS DRAINAGE

Numerous communicating veins drain the nasopharyngeal tonsil into the internal submucous and external pharyngeal venous plexus. They unite to form a single vessel that enters the facial (or) internal jugular vein. They may also drain within the pterygoid venous plexus.

LYMPHATIC DRAINAGE :

Lymphatics from the adenoids drain into the retropharyngeal lymph nodes and upper deep cervical nodes.

NERVE SUPPLY :

It is from sensory branches of the glossopharyngeal and vagus nerve[32].

MICROSTRUCTURE OF THE ADENOID.

The adenoid is covered laterally and inferiorly mainly by ciliated pseudo stratified columnar epithelium which contains small patches of non keratinized stratified squamous epithelium.

It's superior surface is separated from the periosteum of the sphenoid and occipital bones by a connective tissue hemicapsule to which the fibrous framework of the adenoid is anchored.

The connective tissue consists of a mesh of type III collagen and reticular fibres which supports a lymphoid parenchyma similar to that of palatine tonsil.

The nasopharyngeal epithelium lines a series of mucosal folds around which the lymphoid parenchyma is organized into follicular and extra follicular areas.

Internally it is subdivided into 4-6 connective tissue septa which arises from the hemicapsule and penetrate the lymphoid parenchyma.

Seromucinous glands lie within the connective tissue and their ducts extend through the parenchyma to reach the nasopharyngeal surface.

IMMUNE FUNCTIONS OF THE ADENOID :

The function of the lymphoid tissue of waldeyer's ring is to produce antibodies. The adenoid produces B cells, which give rise to IgG and IgA plasma cells.

Exposure to antigens via the nasal route is an important part of natural acquired immunity in early childhood. The adenoid appears to have an important role in the development of an 'immunological memory' in younger children[32].

After adenotonsillectomy there is a slight decrease in IgG, IgA and IgM levels found 4-6 weeks after surgery[34]. This represents a compensatory response of the developing immune system following a reduction of chronic antigen stimulation. There appears to be no decrease in IgE after adenoidectomy[35, 36].

PATHOPHYSIOLOGY

PATHOPHYSIOLOGY OF ADENOID HYPERTROPHY :

The adenoid may be implicated in upper respiratory tract disease due to partial (or) complete obstruction of the nasal choanae (or) as a result of sepsis.

Normal flora found in adenoid consists of alpha – hemolytic streptococci, enterococcus, corynebacterium species, coagulase negative staphylococci, Neisseria species, haemophilus species, micrococcus species and stomatococcus species. The adenoids can become infected and harbour pathogenic bacteria which may lead to development of disease of the ear, nose and sinuses. Most common pathogenic bacteria includes haemophilus influenza, group A β haemolytic streptococci & streptococcal pneumoniae

Pathological manifestations include rhinitis, rhinosinusitis, otitis media and otitis media with effusion[37].

OTITIS MEDIA WITH EFFUSION (OME)

Recurrent acute or chronic inflammation of the adenoid and increased bacterial load, particularly of Haemophilus influenzae[38, 39], results in squamous cell metaplasia, reticular epithelium extension, fibrosis of the interfollicular interconnective tissue and reduced mucociliary clearance in children with OME compared to those without OME[40].

These changes increase bacterial adherance and contribute to the development of a 'biofilm' infection resulting in middle ear effusion.

BIOFILM

Biofilm infection may be defined as a structured community of bacterial cells enclosed in a self – produced polymeric matrix and adherant to an inert or living surface.

Chronic gastro – esophageal reflux has also been implicated in the development of OME as a result of inflammation of the nasopharynx and adenoid[41].

RECURRENT ACUTE OTITIS MEDIA

It is likely that a partial maturational selective IgA deficiency is a causative factor of recurrent otits media in these children. Low dose prophylactic antibiotic treatment is preferred than adenoidectomy to prevent recurrent otitis media and the sequelae of infection, until maturation of the immune system occurs naturally.

UPPER AIRWAY OBSTRUCTION AND OBSTRUCTIVE SLEEP APNOEA

Airway obstruction due to adenoidal hypertrophy may produce depressed arterial PaO_2 and elevated $PaCO_2$ levels which return to normal after adenoidectomy[42]. The respiratory improvement following adenotonsillectomy also results in a significant increase in serum insulin – like growth factor – I (IGF-I) and clinically observed growth spurt following surgery[43].

RHINOSINUSITIS :

Hypertrophic adenoids block the choanae interfering with nasal airflow and the drainage of secretions. They harbour pathogenic bacteria which proliferate rapidly after viral infection. There has been significant reduction in the number of episodes of infective rhinosinusitis per year following adenoidectomy.

OLFACTION :

Olfactory sensitivity is improved after adenoidectomy and is this may, in part, account for the poor appetite reported in children with adenoidal hypertrophy.

MATERIALS AND METHODS

The analysis is based on patient attending the department of Otorhinolaryngology at Stanley Medical College Hospital. This study is conducted on 50 patients who have adenoidal symptoms in the age group of 5-13 years.

Patients are evaluated by history taking, clinical examination radiological examination and diagnostic nasal endoscopy to assess the hypertrophy of the adenoid.

ASSESSMENT

CLINICAL ASSESSMENT – HISTORY TAKING.

Accurate history taking is essential. History of nasal obstruction, mouth breathing, snoring, sleep disturbance, middle ear disease, recurrent upper respiratory tract infection and family history of atopy and bleeding disorders should be taken.

CLINICAL EXAMINATION

Patients are examined clinically.

Classical appearance of 'Adenoid facies'

- Dull looking child with elongated face
- Open lip posture with prominent upper teeth.
- Short upper lip.
- Crowded teeth and hyperplasia of gums.
- Thin nose and hypoplastic maxilla.
- Narrow upper alveolus
- High arched palate.
- Hyponasal speech

Anterior rhinoscopy is done using otoscope with a large speculum which is better tolerated in children.

ASSESSMENT OF NASAL AIRWAY

It is done with a cold Lack's tongue depressor (or) by a cotton wool test.

POST NASAL EXAMINATION

It is usually not tolerated by the children and they are prepared for nasoendoscopy.

ENDOSCOPIC ASSESSMENT OF ADENOID.

Before nasoendoscopy nose is packed with 4% xylocaine with 1 in 1000 adrenaline soaked cotton patties.

Nasal endoscopy is done with 2.7mm Hopkins Karl storz endoscope. The size of the adenoid has been graded using **Clemens grading** system.

CLEMENS CLINICAL GRADING OF ADENOID SIZE

Grade	Description
Grade I	Adenoid tissue filling one-third of the vertical portion of the choanae.
Grade II	Adenoid tissue filling from one-third to two-thirds of the choanae
Grade III	From two-thirds to nearly complete obstruction of the choanae.
Grade IV	Complete Choanal Obstruction

RADIOLOGICAL ASSESSMENT

X ray skull lateral view soft tissue is taken in children to see the extent of adenoid hypertrophy.

ASSESSMENT OF NASAL OBSTRUCTION INDEX

It is a clinical index based on mouth breathing and nasality of speech which correlates with the degree of obstruction seen on X-ray.

Parameters used to indicate nasal obstruction index.[44]

MOUTH BREATHING

- No mouth breathing
- Slightly apart with mild mouth breathing.
- Moderately apart with mouth breathing.
- Widely separated with marked mouth breathing.

HYPONASALITY IN SPEECH

During alternative opening and closing the nares with normal speech, nasal resonance is heard when phrases are spoken with the nares open. This is markedly reduced when the nares are pinched close.

- Marked Change of voice when the nares are pinched close.
- Moderate change of voice when the nares are pinched close.
- Mild change of voice when the nares are pinched close.
- No change of voice when the nares are pinched close.

With the hyponasal speech resonance is poor when the nares are open. Little change is noted when the nares are pinched close.

PARAMETER	FINDING	POINTS
Mouth breathing	None Mild Moderate Marked	1 2 3 4
Hyponasal Speech	None Mild Moderate Marked	1 2 3 4

$$\text{Nasal Obstruction Index} = \frac{\text{Point for Mouth breathing} + \text{Points for Hyponasal speech}}{2}$$

Nasal obstruction index	**Degree of Obstruction Seen on X-rays**
1 and 1.5	Low
2 to 2.5	Intermediate

3, 3.5 and 4 High

Results :

Minimum nasal obstruction index 1.0

Maximum nasal obstruction index 4.0

The higher the nasal obstruction index, the greater the degree of adenoidal obstruction.

INCLUSION CRITERIA

Following are the Indications for adenoidectomy.

- Patients with adenoid hypertrophy in the age group between 5-13 years.
- Adenoid enlargement causing obstructive sleep apnoea.
- Adenoid enlargement causing otitis media with effusion.
- Patients with nasal obstruction, snoring and 4 (or) more episodes of recurrent upper respiratory tract infection.
- Patients with adenoid enlargement causing recurrent rhinosinusitis.

- Adenoid hypertrophy causing adenoid facies, hyponasal speech, growth & orofacial disturbances, and cardiopulmonary complications.

EXCLUSION CRITERIA

- Patients greater than 13 years of age (or) less than 5 years of age.
- Patients with cleft palate (or) submucosal cleft palate.
- Patients with coagulation disorders.
- Patients with sinonasal polyposis, choanal atresia, tumours of nose and nasopharynx, thornwald's cyst.
- Patients with cervical instability (e.g.) Down's syndrome.

INVESTIGATIONS

Following investigations are done and the patient is assessed before surgery.

Blood : Hb%

Total Count

Differential count

Erythrocyte sedimentation rate

Bleeding time

Clotting time

Platelet count

Prothrombin time

Absolute partial thromboplastin time

Blood grouping and Rh typing

Urine: Albumin

Sugar

Deposits

X ray chest PA view

X ray skull soft tissue nasopharynx lateral view

Diagnostic Nasal Endoscopy

SURGICAL PROCEDURE

Anesthesia :

General anesthesia is administered via cuffed endotracheal tube which is placed in the midline of the lower lip and taped securely.

SURGICAL EXPOSURE :

A headlight is mandatory for adequate visualization.

The table is positioned so that the surgeon has non-obstructed access to the patient's head, while the anesthetist has access to the intravenous line and anesthesia tubing.

A sand bag is placed under the shoulder between the scapulae, and the head is placed on a head ring and draping is done. Patient is placed in Rose's position.

An appropriate sized Boyle – Davis mouth gag is carefully inserted and then suspended on a bipod – stand.

SURGICAL PROCEDURE :

Conventional adenoidectomy

The hard palate is palpated digitally to rule out submucous cleft palate. Then nasopharynx is palpated and the adenoid mass is brought into midline.

Appropriate sized St. Clair Thompson adenoidectomy curette is selected and introduced into the nasopharynx.

Then it is hitched against the vomer then pressed inferiorly to fit snuggly into the adenoid mass.

The curette is swept inferiorly with a side to side rocking motion to completely remove all the adenoid tissue.

Gauze packs are kept in the nasopharynx to achieve haemostasis.

Then tonsillectomy is done by dissection and snare method.

Endoscopic assisted curettage adenoidectomy :

Anesthesia : General anesthesia with orotracheal intubation

Position : Rose's Position

Procedure : The nasal cavities and nasophanynx are examined with 0 degree 2.7 mm karl storz endoscope.

Appropriate sized adenoid curette is selected and is placed transorally into the nasopharynx.

Under nasal endoscopic guidance the blade of the adenoid curette is placed just above the superior border of the adenoid mass. The lateral ends of the blade should just be away from the eustachian tube area on both sides.

With the help of nasal endoscopic visualization the adenoid mass is curetted with a sustained force as in conventional curettage. Nasopharynx is packed to achieve hemostasis. After that packs are removed and the nasopharynx visualized if any remnant of adenoid seen it is curetted and again the nasophynx is packed.

Both tonsils are removed by dissection and snare method. After completion of surgery, all gauze packs are removed and

nasopharynx is visualized using the endoscope. If still bleeding occurs the bleeding points are cauterized under endoscopic guidance.

RESULTS

Total No of Cases

Group	Number of Patients	Mean Age group
1	25	10.04
2	25	9.2

Group 1 - Endoscopic assisted adenoidectomy

Group 2 – Conventional adenoidectomy.

Sex Ratio

Sex	Group		Total
	1	2	
Male Child	13 52%	10 40%	23 46%
Female Child	12 48%	15 60%	27 54%

Female preponderance of 54%

Adenoid Grade

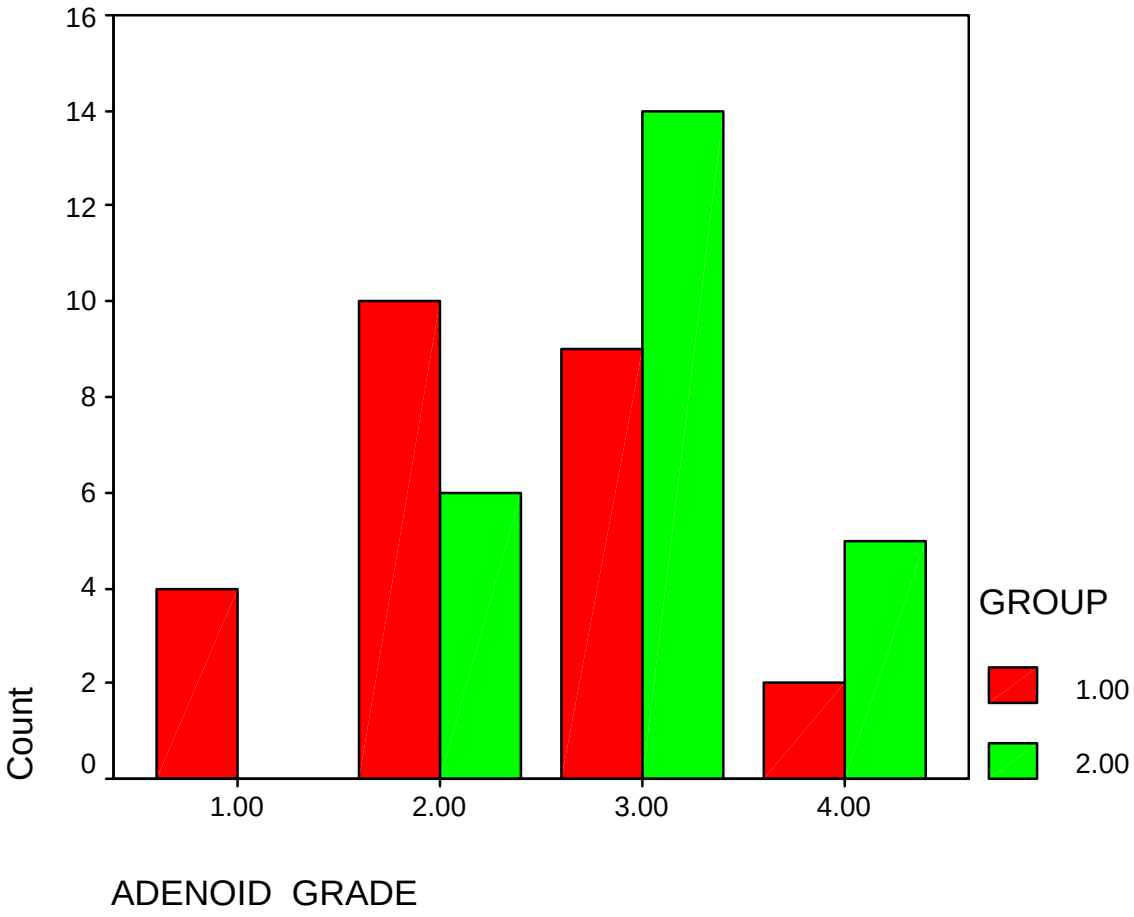
Adenoid Grade	Group		Total
	1	2	
1	4 16%	0 0%	4 8%
2	10 40%	6 24%	16 32%
3	9 36%	14 56%	23 46%
4	2 8%	5 20%	7 14%

40% of the patients who underwent endoscopic assisted adenoidectomy are having Grade II adenoids

56% of the patients who underwent conventional adenoidectomy are having Grade III adenoids.

Totally 46% of patients who underwent adenoidectomy having Grade III adenoids.

The p value is 0.061


16
14
12
10
8
6
4
2
0
Count
1.00
2.00
3.00
4.00
ADENOID GRADE
GROUP
1.00
2.00

Nasal Obstruction Index

Nasal obstruction index	Group		Total
	1	2	
1	4 16%	1 5%	5 10%
1.5	5 20%	1 4%	6 12%
2	9 36%	6 24%	15 30%
2.5	5 20%	7 28%	12 24%
3	1 4%	10 40%	11 22%
3.5	1 4%	0 0%	1 2%

30% of patients have nasal obstruction index of 2

24% of patients have nasal obstruction index greater than 3

The p value is 0.017

Degree of Obstruction seen in X-rays

Obstruction seen in Xrays	Group		Total
	1	2	
Low	9 36%	2 8%	11 22%
Intermediate	14 56%	13 52%	27 54%
High	2 8%	10 40%	12 24%

The p value is 0.007

54% of the patients have intermediate degree of obstruction in x rays

Time taken for surgery

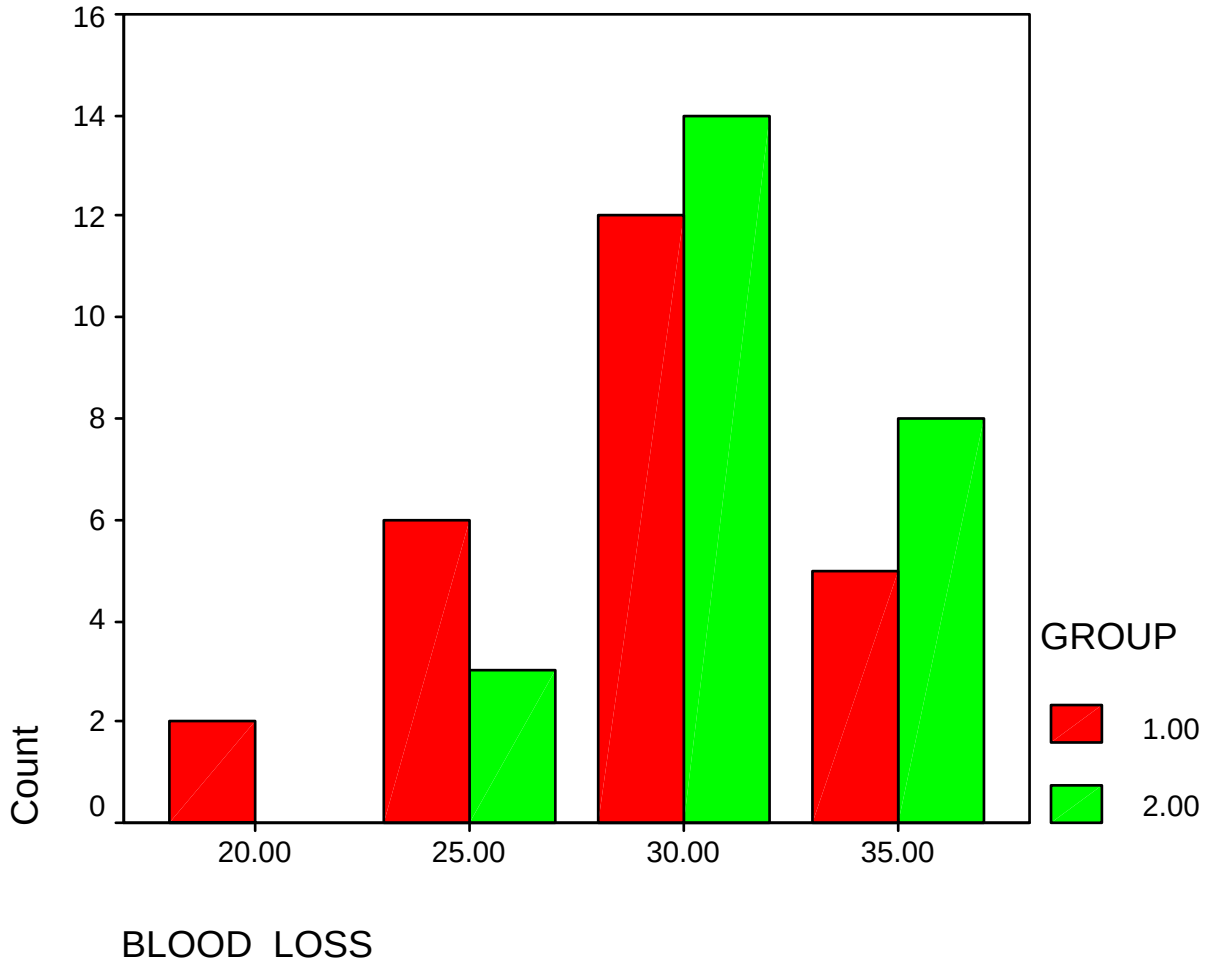
	Group	No. of patients	Mean time min
Time taken for surgery	1	25	12.68
	2	25	5.28

Blood Loss during Surgery

Blood Loss (ml)	Group		Total
	1	2	
20	2 8%	0 0%	2 4%
25	6 24%	3 12%	9 18%
30	12 48%	14 56%	26 52%
35	5 20%	8 32%	13 26%

52% of the patients have blood loss of 30 ml

The p value is 0.279


16
14
12
10
8
6
4
2
0
Count
20.00
25.00
30.00
35.00
BLOOD LOSS
GROUP
1.00
2.00

Mean Blood Loss

	Group	No. of patients	Mean Blood loss ml
Blood loss	1	25	29
	2	25	31

Compared to endoscopic assisted adenoidectomy there is more blood loss in conventional adenoidectomy

Complication

Complication	Group		Total
	1	2	
Primary haemorrhage	1 4%	3 12%	4 8%

8% of the patients developed primary haemorrhage which is more in conventional adenoidectomy.

ANALYSIS OF RESULTS

This study is conducted on 50 patients who attended ENT department at Stanley Medical College Hospital in the period from June 2007 - June 2008 in the age group between 5-13 years. The mean age group is 9.62 years

25 patients underwent endoscopic assisted curettage adenoidectomy and 25 patients underwent conventional curettage adenoidectomy.

All 50 patients are assessed preoperatively by history, clinical examination, radiological assessment and diagnostic nasal endoscopy to know the degree of obstruction to the airway caused by adenoids.

Parameters studied are those of actual length of each of the surgical procedures, complete curettage and estimated blood loss for both conventional adenoidectomy and endoscopic assisted adenoidectomy.

The operative time is kept independently by the nurses in the operation theatre. The blood loss during the separate portions of the procedure are independantly measured in suction traps and recorded separately. Also, the method of achieving haemostasis are kept.

8% of patients have grade I adenoids, 32% of patients have grade II adenoids, 46% of patients have grade III adenoids and 14% of patients have grade IV adenoids.

Only 6 patients who have grade II adenoids after conventional curettage have no residual adenoid tissue and thus did not require removal by endoscopic assisted curettage to remove a small amount of adenoid tissue in the posterior superior choanae.

Patients with grade IV adenoids have complications like bleeding and residual adenoids after curettage.

The mean blood loss for the conventional adenoidectomy is 31cc. The mean blood loss for the endoscopic assisted technique is 29cc.

The mean time required to complete the conventional adenoidectomy is 5.28 min. The mean time required to complete the endoscopic assisted adeneoidectomy is 12.68 min.

Complications like primary haemorrhage occurred in 3 patients who underwent conventional curettage and 1 patient who underwent endoscopic assisted technique. Bleeding is controlled with postnasal packing (or) diathermy coagulation under endoscopic guidance. None of the patients required blood transfusion.

Longer times are required to complete the endoscopic assisted technique compared to the conventional technique. The blood loss on comparison is more or less equal in both of the procedures.

In none of the patients there is no evidence of residual adenoid tissue after the endoscopic assisted curettage technique.

DISCUSSION

Many methods of endoscopic assisted adenoidectomy have come which includes endoscopic assisted curettage adenoidectomy, endoscopic assisted power shaver (microdebrider) adenoidectomy, endoscopic assisted suction coagulation (liquefaction) adenoidectomy and endoscopic assisted blakesley adenoidectomy.

POWER SHAVER (MICRODEBRIDER) ADENOIDECTOMY :

With the help of 0 degree nasal endoscope adenoidectomy is performed using a powered shaver device.

Adenoid tissue is removed precisely taking care not to injure the adjacent structures particularly the torus tubarius, lateral nasopharnx and Eustachian tube orifice.If necessary haemostasis is obtained using bipolar cautery.

130 pediatric patients with obstructive adenoid tissue underwent powered shaver adenoidectomy at Sydney Children's hospital in the department of Otorhinolaryngology at 2002.

complete airway patency was achieved with powered shaver adenoidectomy.

SUCTION COAGULATOR ADENOIDECTOMY :

A 10 Fr suction coagulator is used at a power setting of 30-34 watts depending upon child's age. The electrocautery unit is set to monopolar coagulation and is used in spray mode with foot control.

With the help of O^{o} endoscope suction tip is inserted within the central bulk of the adenoid pad. Current is applied for a few seconds and the tip is gradually withdrawn as the tissue liquefies.

The adenoidectomy is complete when the choanae are completely visible and the nasopharynx has a smooth level contour. There should be no burns on the vomer, nasal turbinate, soft palate (or) lateral nasopharyngeal wall.

118 children in the mean age group of 6.5 years underwent suction coagulation adenoidectomy in the department of

Otorhinolaryngology at State University of Newyork at 2003. This method proved safe and rapid removal of adenoids regardless of the size of the adenoids.

ENDOSCOPIC ASSISTED CURETTAGE ADENOIDECTOMY:

Endoscopic guided adenoidectomy using a classic adenoid curette was performed on 13 pediatric patients at 2005, reported in Hong Kong Med Journal 2005. All 13 patients showed considerably decreased snoring and improvements in the quality of sleep.

In our study also, patients who underwent endoscopic assisted curettage revealed improved nasal breathing and decreased snoring after surgery.

BLAKESLEY ADENOIDECTOMY :

Under the nasal endoscopic guidance adenoid tissue is removed using straight blakesley forceps and bleeding points visualized which can be cauterized.

Advantages of Endoscopic assisted adenoidectomy :

Nasal endoscopy allows easy assessment of the size of the adenoid mass and improves the accuracy of the adenoidectomy via a transoral curette.

Under endoscopic guidance the curette can be accurately placed at the superior border of the adenoids. This positioning allows the complete transoral removal of the main bulk of the adenoid. The adenoid mass which extended to the choanae can also be completely removed.

Injury to the eustachian tube orifice can be avoided by using the endoscope.

Bleeding points can be visualized directly and can be cauterized under endoscopic guidance.

Disadvantage :

The disadvantage is it is a time consuming procedure.

Complications during Adenoidectomy.

Complications following adenoidectomy are rare.

(i) Bleeding :

Bleeding following adenoidectomy can be primary, reactionary (or) secondary haemorrhage. Primary haemorrhage is the most common complication which can be controlled by either post nasal packing (or) endoscopic cauterization.

Reactionary haemorrhage occurs within 6-20 hours of surgery and is rare and if it occurs, patient should be shifted to theatre and postnasal packing is necessary. The packing can be removed after 24 hours.

Secondary haemorrhage after adenoidectomy is rare. It may be due to bleeding from an aberrant ascending pharyngeal artery. Unusual secondary (or) reactionary bleeding should raise the possibility of coagulation defect. This will require specialist haematological advice to confirm (or) exclude it.

(ii) Injury to the teeth tongue & palate

Damage to the teeth during adenoidectomy may be accidental due to slippage of the gag. Great care is needed if the secondary incisors have errupted. Where there are loose deciduous teeth, consent should be taken pre-operatively to remove these under anesthesia to avoid the possibility of inhalation by the child during the surgery (or) while recovering from anesthesia.

(iii) Nasopharyngeal Blood clot / Coroner's clot

Blood may pool and clot in the nasopharynx during adenoidectomy. The nasopharynx should be gently suctioned to clear any clot before removing the gag. Failure to do so may lead to the clot falling on to the larynx during recovery and causing potentially fatal acute airway obstruction.

(iv) Velophanyngeal insufficiency : (VPI)

It is due to incomplete closure of the palate to the posterior and lateral nasopharyngeal wall. VPI is observed transiently after adenoidectomy and usually resolves in 2-4 wks. Persistant VPI occurs more often in patients who has palatal abnormality.

(v) Torticollis :

Children can have a stiff neck (or) spasm of the neck after adenoidectomy. warm compresses, a neck brace with anti-inflammatory medications may be helpful to relieve the spasm.

(vi) Nasopharyngeal Stenosis :

Nasopharyngeal stenosis which rarely occurs consists of circumferential contracture of the phaynx in the region of waldeyer ring.

(vii) Atlantoaxial subluxation (Grisel Syndrome)

Infection and inflammation in the nasopharynx following adenoidectomy is an extremely rare complication. It can cause vertebral body decalcification and laxity of the anterior transverse ligament between the axis and atlas.

CONCLUSION

Adenoidectomy is a commonly performed procedure. The advent of endoscopic sinus surgery popularized the use of endoscopes. Endoscopic assisted adenoidectomy is a natural progression of this technology to allow a more complete adenoidectomy.

Using the nasal endoscope, the curette can be accurately inserted at the superior border of the adenoid, allowing the complete transoral removal of the main bulk of the adenoid tissue, without injury to the eustachian tube orifice. Bleeding points are endoscopically visualized and controlled.

From this we conclude that endoscopic assisted adenoidectomy is minimally invasive and is not associated with excessive bleeding. Furthermore sophisticated instruments are not required which can increase the cost – effectiveness.

Patients who underwent endoscopic assisted adenoidectomy have decreased chance of remnants.

Endoscopic assisted adenoidectomy is a time consuming procedure with less morbidity.

Thus endoscopic assisted adenoidectomy technique is advocated for use as an adjuvant to a more complete adenoidectomy.

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PROFORMA

ENDOSCOPIC ASSISTED CURETTAGE ADENOIDECTOMY VERSUS CONVENTIONAL CURETTAGE ADENOIDECTOMY

1. Serial No. :
2. Patient Name :
3. Patient Age & Sex :
4. Hospital No. :
5. Address :

6. Date of Admission :
7. Date of Surgery :
8. Symptoms and signs :

Nasal block	Yes /No
Nasal discharge	Yes /No
Post Nasal discharge	Yes /No
Cough	Yes /No
Snoring	Yes /No
Mouth breathing	None / Mild / Moderate / Marked
Hyponasal Voice	None / Mild / Moderate / Marked
Sneezing	Yes /No
Headache	Yes /No
Epistaxis	Yes /No

Disturbances of smell	Yes /No
Aural symptoms	Ear ache Ear discharge Hard of hearing
Recurrent sore throat	Yes /No
H/o GERD	Present / Absent
Previous oral surgeries	Yes /No
Allergy	Yes /No

9. Clinical Examination :

Anterior rhinoscopy:

	R	L
External nasal pyramid		
Septum		
Columella		
Vestibule		

Floor of the nasal cavity

Inferior meatus		
Inferior turbinate		
Middle meatus		
Middle turbinate		

Post nasal examination :

Tests for airway :

Cold Spatula test

Cotton wool test

Examination of Ear :

R L

Preauricular area

Pinna

Post auricular area

External auditory canal

Tympanic membrance

Examination of Throat :

Lips

Tongue

Teeth

Hard Palate

Soft Palate

Anterior pillar

Tonsil

Posterior pillar

Posterior wall of oropharynx

10. Pre-operative diagnositic Nasal Endoscopy

Grade I / Grade II / Grade III / Grade IV

11. Nasal Obstruction Index = $\frac{\text{Point for Mouth breathing} + \text{Points for Hyponasal speech}}{2}$

12. Degree of obstruction seen on X-rays Low / intermediate / High

13. Surgical Procedure :

14. Blood loss during surgery

15. Complications