Comparative Prospective Study - Currette vs Powered Instrument Microdebrider Assisted Adenoidectomy - A Study of 25 Cases

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Introduction
Infectious and inflammatory diseases involving the pharynx, tonsils, and adenoids account for a significant proportion of childhood illnesses and pediatric health care expenditure. They often result two of the most common surgical procedures of childhood - tonsillectomy & adenoidectomy. Recent clinical research has helped to illuminate this vast area of pediatric otorhinolaryngology including the effect of adenotonsillar hypertrophy on obstructive sleep apnea, the microbiologic flora of the tonsils and adenoids and their role in chronic adenotonsillar hypertrophy, the relationship between adenotonsillar hypertrophy and craniofacial growth and the new technique for adenotonsillectomy with improved management of perioperative morbidity.
This work review our current understanding of new technique for adenoidectomy via microdebrider and conventional currette method.

Development of Adenoids
The adenoids develops in close association with mucous glands¹. As early as the third month of development, glandular primordial are visible as solid buds surrounded by blood vessels and increasing number of discrete lymphoid cells in a louse parenchyma. During the fourth month, lymphatic vessels appear and glandular primordial increase in number. These folds are covered with a typical respiratory epithelium of pseudotstrified ciliated epithelium with goblet cells. Further evidence of function of these tissues was reported by slipka², who demonstrated that IgA, IgG and IgM were all present in epipharyngeal tissue taken from 5 to 16 week old human embryos.

Anatomy of Adenoids
The adenoids is visible in later fetal life and then increase in size until the sixth to seventh year of life, after which time it frequently atrophies. this adenoid consist of a single pyramidal shaped aggregation of lymphoid tissue with its apex
pointed towards the nasal septum and the base to the roof and posterior wall of the nasopharynx. The blood supply and drainage are from the ascending pharyngeal artery, the ascending palatine and tonsillar branch of the facial artery, the pharyngeal branch of maxillary artery, the artery of pterigoid canal and contributing branches from the tonsillar branch of the facial artery.

**Role of Adenoid as Defense System of the Body**
The adenoid and tonsils are predominantly B-cell organs, ample evidence shows that the adenoids and tonsils are involved in inducing secretory immunity and regulating secretory immunoglobulin production. Adenoids are designed for direct transport of foreign material from the exterior to the lymphoid cells. This is in contrast to lymph nodes which depends on antigenic delivery through afferent lymphatics. The tonsils and adenoids rank among the secondary lymphatic organs. Their defence mechanism eliminate weak, antigenic signals. Only when additional higher antigenic concentration are presented does proliferation of antigenic sensitive B cells occurs in the germinal centers. Low antigen does effect the differentiation of lymphocytes to plasma cells: whereas high antigen doses produce B cells proliferation. The generation of B cells in the germinal of the tonsil and adenoid is considered by siegels to be are of the most important function. T-cell function such as interferon -g production and presumably production of other important lymphokines have been shown to be present in adenoids and tonsils.

Recurrent tonsillitis and adenoid hyperplasia causes inflammation of the reticular crypts epithilium results in shedding of immunologically active cells and decreasing antigen transport function with subsequent replacement by stratified squamous epithelium.

These changes lead to reduced activation of the local B-cell system, decreased antibody production and an overall reduction in density of the B-cell and gemanal centers in extrafollicular areas.

Reports conflicts regarding the immunological consequences of tonsillectomy and adenoidectomy, yet it is clear that no major immunological deficiency results from these procedures. ogra showed a three to fourfold drop in titers in children previously immunised with live polio virus vaccine. Serum IgA levels in post tonsillectomy patients were lower than in age matched controls, but the immunological changes did not appear to be clinically significant.

Children who were previously immunised orally with live polio vaccine dropped their titers three to fourfold after adenoidectomy and tonsillectomy. Attempts to vaccinate seronegetive children subjected to tonsillectomy and adenoidectomy have resulted in delayed and lowered nasopharyngeal secretory immune response as measured by IgA antibodies to polio virus.

**Clinical Microbiology of Waldeyer S Ring**
Establishment of normal flora in the upper respiratory tract begins at birth. actinomyces, fusobacterium and nocardia are acquired by 6 to 8 months of age. Susequently bacteroides, leptotrichid, propionibacteriunt, and candida are also established as part of oral flora. Fusobacterum population reach high numbers after dentition and reach maximal numbers at one year of age.

Healthy children up to 5 years of age can harbor known aerobic pathogens. ingvarsson,lundgren and irving revealed that streptococcus pneumoniae was recovered in 19% of healthy children, hemophyllus influenzae in 13%, group A streptococcus in 5% and M.catarrhalis in 36%.

**Effects of Enlarge Adenoids**
**A. Upper Airway Obstruction**
Chronic adenoid hypertrophy is a common cause of upper air way obstruction in children and in severe cases may result in cor pulmonale, pulmonary vascular hypertention and alveolar hypoventilation all of which may be reversed by
adenoidectomy. It is important to elicit the severity of symptomatology by obtaining a thorough history from the patient's primary care giver. Findings that suggest significant sleep disturbance include witnessed apneic episodes, excessively loud snoring, chronic mouth breathing, hypoxemia, enuresis, nightmares, poor school performance, hyponasal speech, failure to thrive caused by enlarged adenoids.22.

B. Affect Over Craniofacial Growth
Chronic mouth breathing secondary to adenoid hypertrophy has shown to affect craniofacial growth patterns in children. As early as 1872, Tomes 24 that children who were chronic mouth breathers secondary to adenoid hypertrophy displayed evidence of malocclusion and maxillofacial growth abnormalities. Linder Aronson Woodside, Lundstrom 25 demonstrated the classical stigmata of adenoids facies in children with chronic nasopharyngeal obstruction from adenoid hypertrophy.

C. Otitis Media with Effusion
Diagnostic Assessment of Adenoid Hypertrophy
Lateral neck radiograph may be helpful in assessing adenoid hypertrophy. Fujika, Young, Girdomy determined that adenoid nasopharyngeal ratio measured by lateral neck radiograph. They categorize the three grades based on the side of adenoid pad - grad I, II, III.
Flexible endoscopic nasopharyngoscopy may also be valuable in assessment of adenoids.

Techniques For Adenoidectomy
I. Adenoid Curettes Using Laforce Adenotome,
II. Adenoidectomy by Coblation Device
III. Denoidectomy by Angled Blade of Microdebrider

Complications
A. Postoperative Hemorrhage
B. Velopharyngeal Insufficiency
C. Nasopharyngeal Stenosis

D. Cervical Spine Complication- Grisel Syndrome

Aims and Objectives
A. Study Design: Comparative Prospective Study
B. Objectives: In the following study our aim is to compare curette versus powered assisted microdebrider adenoidectomy in terms of different outcomes variables like operational efficacy of procedure, operating time, blood loss, hemostasis time, post operative pain.

Materials and Methods
We compared the cases of adenoid hypertrophy prospectively by performing adenoidectomy via two approach one curette adenoidectomy and the other microdebrider assisted adenoidectomy. We compared the both procedures in terms of operational efficacy, operating time, blood loss, complication and relief from preoperative symptoms in follow up period.
Before undergoing for surgery every case was studied in details about history of complains, examination of nose, throat, ear, general physical examination, radiological assessment and coagulative profile.
Morbidity in peri and post operative period and one year of post operative follow up was assessed in both the categories.

Surgical indication of adenoidectomy
Infection- purulent adenoiditis, adenoid hypertrophy associated with otitis media with effusion, chronic recurrent otitis media,
Obstruction - adenoid hypertrophy associated with excessive snoring and mouth breathing, craniofacial growth abnormalities,
Other- suspected neoplasia, adenoid hypertrophy with sinusitis

History- Detailed history of all the patient was taken on following basis
Upper airway obstruction: snoring, apneic spells, enuresis, failure to thrive, day time somnolence, hyponasality whether the above complain are present or not and if present the frequency, duration etc were asked,
Poor dentition, problem related to ear, nose

Examination- Detailed examination of ear, nose throat was performed on every patient before taking for surgery. All the positive points of history was confirmed by examination and if needed further investigation was done. Every patient was looked for adenoid faces, high arch palate, protusive maxilla, dental malocclusion, pinched nostrils. Both the ears were examined for wax, status of tympanic membrane whether retracted or bulged, presence of effusion in middle ear, tuning fork test showing conductive deafness etc. Anterior rhinoscopy was done in each patient. In systemic examination cardiopulmonary examination was done.

Investigations
X-ray lateral neck was done to every patient, x ray pns, pure tone audiogram and impedance tympanometry, x-ray chest and ECG was done as required. Routine blood investigation CBC, BT, CT, PT were done to all patients. Child below 3 years was not considered for surgery as of low blood volume. All the cases were done under general anesthesia. All the work was done under general anesthesia between 2005 to 2007 in ENT department RNT medical college udaipur. We performed adenoidectomy via two procedure one curette and other microdebrider assisted adenoidecтомy.

The curette adenoidecтомy was performed with laforce adenotome. Microdebrider is a powered instument and angled blade was used for adenoidecтомy. 3000 to 6000 rpm speed was used.

Following parameter were looked during the operative procedure-adenoid removal time, total operative time, amount of blood loss. On every post op visit child & parents were inquired as per questionnaire.

Review of Literature
the adenoids were first described by danish physician, in 1885 gottstein described the first curette adenoidecтомy31. koltai et al 1997 and stain law et al 2000 conducted studies comparing powered assisted and curette adenoidecтомy32-35.

Observations
As already discussed we had done prospctive analysis of 25 cases of adenoid hyper trophy

A. Age: most of the cases in our study was between 4 to 7 years

B. Sex: male to female ratio was 4:1 (19 male and 6 female child)

C. Urban vs Rural: 23 cases were of urban population

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<th>Age of patient (years)</th>
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<th>Table 2</th>
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<td>Variable</td>
<td>powered assisted adenoidecтомy</td>
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<tr>
<td>1. adenoid removal time</td>
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<td>2. estimated blood loss</td>
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PAA: Power Assisted Adenoidectomy  CA: Curetta Adenoidectomy

Instrument Assembly for powered adenoidectomy
(A) Endoscope with camera; (B) Monitor & light source
(C) Microdebrider with hand piece & adenoid blade
Discussion
Koltai et al (1997) 32-33 in their first study of powered assisted adenoidectomy, retrospectively compared operating time, amount of blood loss and length of postoperative stay. They found the mean operative time was significantly faster with powered assisted adenoidectomy (11 vs 19 min. for curette adenoidectomy) whereas neither mean blood loss nor mean operative stay was significantly different from that in curette adenoidectomy group (22 vs 32 ml and 2.95 hrs vs 2.8 hrs).
Stainlaw (2000) et al35 also conducted PAA and compared results with curette adenoidectomy. He found PAA was 20% faster, 27% less blood loss and provided a more complete resection and better control of depth perception.
Rodriguez et ai (2002)38 conducted a prospective study and found that adenoid removal time was significantly shorter with PAA than with curette
In the present study we compared the PAA with curette adenoidectomy. The newer aspect of our study was use of nasal endoscope in place of mirror. We observed that mean operative time was 28 min (21 to 32 min) for PAA compared to 18 min (12 to 22 min) for curette adenoidectomy which was contrary to the finding of earlier workers. We found that PAA to have longer operative time than curette adenoidectomy.

In our study mean estimated blood loss for PAA was 39 ml (30 to 46 ml) compared to 58 ml for curette adenoidectomy, this is similar to other studies as koltai et al found that mean estimated blood loss for PAA was 22 ml compared to 32 ml for curette adenoidectomy.

In this way results of our study for estimated blood loss are comparable to previous studies and statistically significant. less bleeding and better hemostasis with paa was best explained by the greater ability of the microdebrider to provide a precise dissection down to the less vascular plane of the tissue.

In our study long term benefits were of higher percentage with PAA. Use of nasal endoscope with camera in our study dramatically helped us for precise adenoidectomy. Hence it may be concluded from the present study that paa is a safe efficient and better method of adenoidectomy than conventional curette adenoidectomy and gives better and long lasting results.

Summary
- 60% cases of adenoid hypertrophy was found between 4 to 7 years of age.
- Snoring was the chief complain among the children comprising 54% next was otitis media with effusion in 36%, sinusitis 8% and epistaxis 4%.
- Craniofacial mismatched in 64%, enuresis in 28%, hyponasal speech in 76%.
- Use of transnasal endoscope showed that superior most portion of the adenoid was the chief contributor in obstructing the posterior choana which is not seen by lateral neck radiography.
- Mean operating time was 28 min for paa in contrast to 18 min for curette adenoidectomy thus paa took long operating time by 59%.
- Mean estimated blood loss for paa was 39 ml compared to 58 ml for curette adenoidectomy thus 67% less in comparison to curette adenoidectomy.
- There was not much difference in the course of immediate post operative period between the two techniques.
- 16% cases showed partial relief from previous symptoms in curette adenoidectomy at long term follow up while in the paa.

Conclusions
In the present study paa proved to be a more efficacious procedure in relation to precise adenoid removal, less blood loss, greater surgeon satisfaction, safety, good long term benefits. thus we conclude that powered assisted adenoidectomy is method of choice for adenoidectomy.

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