



Comparative Prospective Study -Curette 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 curette 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 loose parenchyma. During the fourth month, lymphatic vessels appear and glandular primordial increase in number. These folds are covered with a typical respiratory epithelium of pseudostratified 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 pyramidally 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 cells³. 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 centers³. 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 function⁶. T-cell function such as interferon -g production and presumably production of other important lymphokines have been shown to be present in adenoids and tonsils⁷.

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 sqamous epithelium^{8,9}.

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 germanal centers in extrafollicular

areas¹⁰.

Reports conflicts regarding the immunological consequences of tonsillectomy and adenoidectomy, yet it is clear that no major immunological deficiency results from these procedures¹¹. ogra¹² 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^{13,14}.

Children who were previosly immunised orally with live polio vaccine dropped their titers three to fourfold after adenodectomy and tonsillectomy¹⁵. 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 virus³.

Clinical Microbiology of Waldeyer S Ring

Estblishment of normal flora in the upper respiratory tract begins at birth. actinomyces, fusobacterium and nocardia are acquired by 6 to 8 months of age¹⁶. Susequently bacteroides, leptotrichid, propionibacteriunt, and candida are also established as part of oral flora^{13,17}. Fusobacterum population reach high numbers after dentition and reach maximal numbers at one year of age¹³.

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 corpulmonale, 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 suggestive of significant sleep disturbance include witnessed apneic episodes, excessively loud snoring, chronic mouth breathing, hypersomnolence, enuresis, nightmares, poor school performance, hyponasal speech, failure to thrive caused by enlarged adenoids²².

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, Tomes²⁴ that children who were chronic mouth breathers secondary to adenoid hypertrophy displayed evidence of malocclusion and maxillofacial growth abnormalities.

Linder, Aronson, Woodside, Lundstrom²⁵ demonstrated the classical stigmata of adenoid 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 categorized the three grades based on the size of adenoid pad - grade 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. Adenoidectomy by Angled Blade of Microdebrider

Complications

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

D. Cervical Spine Complication- Grisel's 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, postoperative pain.

Materials and Methods

We compared the cases of adenoid hypertrophy prospectively by performing adenoidectomy via two approaches: 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 complaints, examination of nose, throat, ear, general physical examination, radiological assessment and coagulative profile.

Morbidity in peri and postoperative period and one year of postoperative 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 complaints 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 adenoidectomy.

The curette adenoidectomy was performed with laforce adenotome.

Microdebrider is a powered instrument and angled blade was used for adenoidectomy. 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 adenoidectomy³¹. koltai et al 1997 and stain law et al 2000 conducted studies comparing powered assisted and curette adenoidectomy³²⁻³⁵.

Observations

As already discussed we had done prospective 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

Table -1

Age of patient (years)	No of cases	Percentage
3-4	01	4%
4-5	05	20%
5-6	06	24%
6-7	04	16%
8-9	03	12%
9-10	02	8%
10-11	01	4%
11-12	01	4%
12-13	01	4%
17-18	01	4%

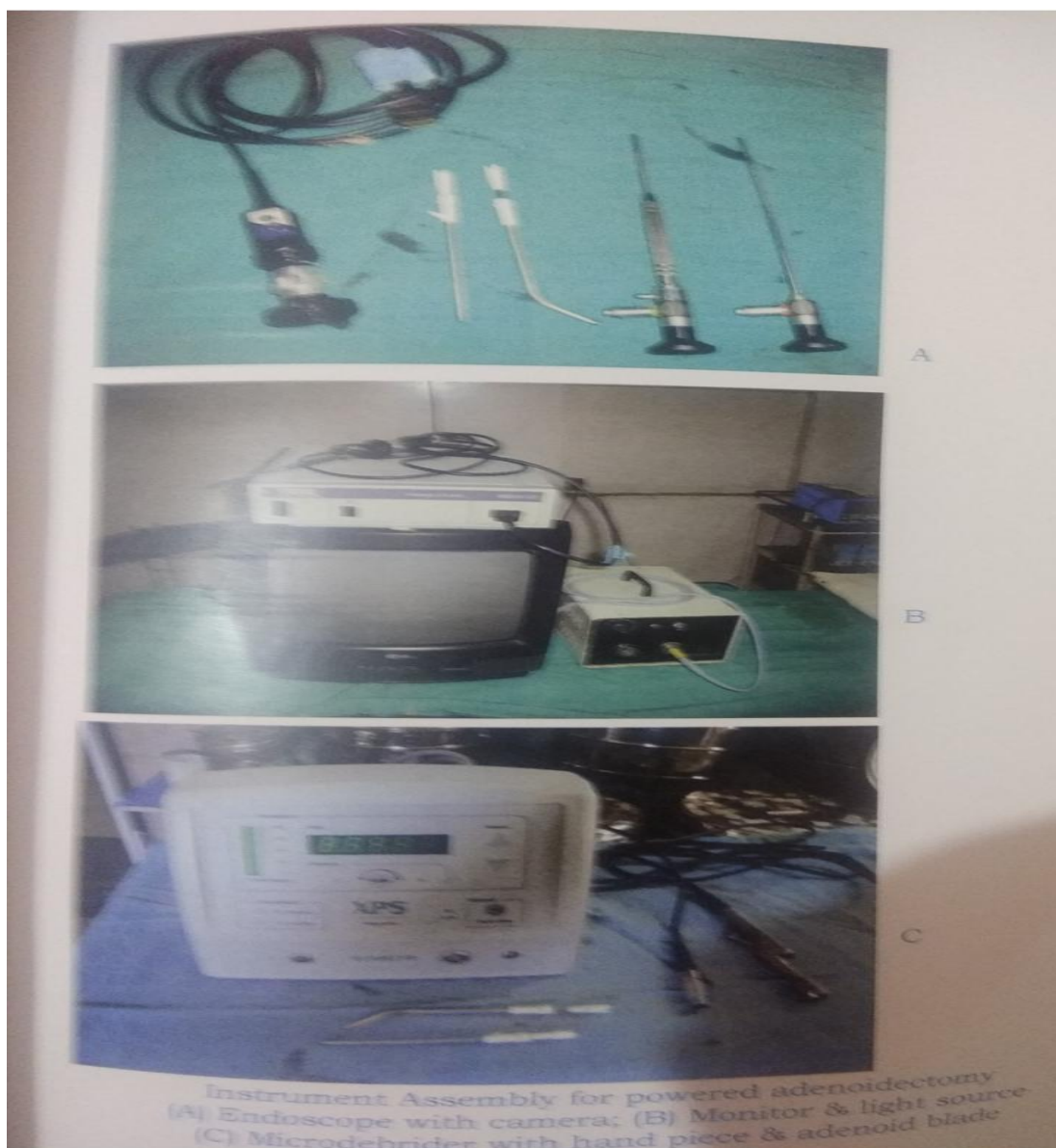
Table 2 Operative variable for adenoidectomy in both techniques**Variable**

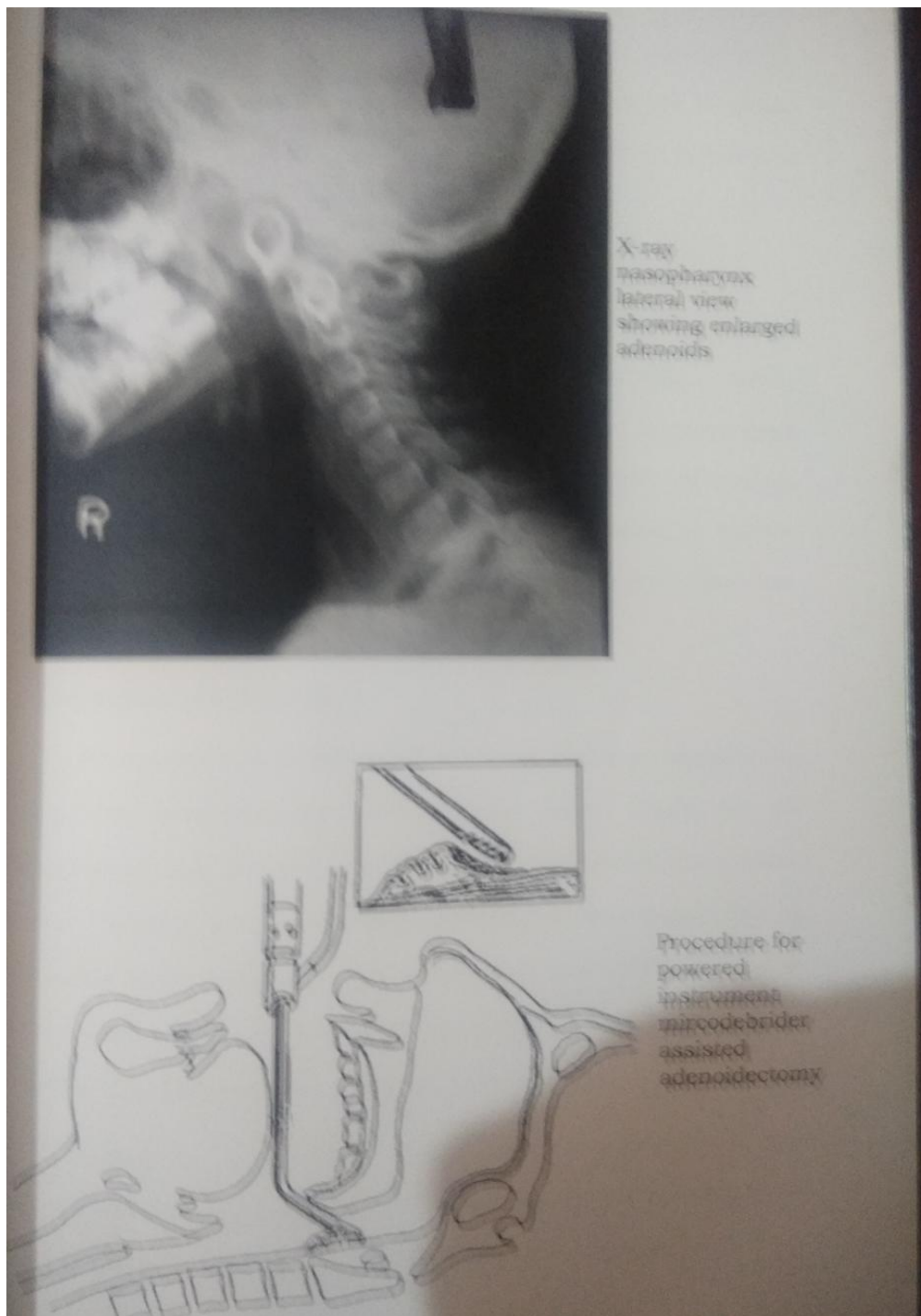
powered asited adenoidectomy	Curette Adenoidectomy
1.adenoid removal time	
18 min(12 to 22)	28 min(21 to 32 min)
2. estimated blood loss	
58 (46 to 65ml)	39 (30 to 46ml)

MASTER CHART

S.No.	Name	Age (yrs)	Sex	Chief complaints	Associated features				Technique of Adenoidectomy	Associated procedure			Adenoid removal time (min)		Estimated blood loss (ml)		Postop. Complications	Satisfaction of parents	
					Ehuresis	Hyponasal speech	Cranio fascial mismatch	Failure to thrive		Grommet insertion	Tonsillectomy	+Grommet insertion	P.A.A	C.A	P.A.A	C.A			
1	Divyanshu	6	M	Obstructive	+	+	-	-	PAA	+	+	-	32	-	30	-	-	Good	
2	Chetana	7	F	Otitis media effusion	-	+	+	-	PAA	+	-	-	30	-	32	-	-	Good	
3	Mohit	6	M	Obstructive	-	+	+	-	PAA	-	+	-	32	-	35	-	-	Good	
4	Ashutosh	7	M	Obstructive	+	+	-	-	CA	-	-	-	-	-	-	-	-	Good	
5	Ashish	5	M	Otitis media effusion	-	-	+	+	CA	+	-	-	-	14	-	81	-	-	Good
6	Laxmi	5	F	Obstructive	+	+	+	+	CA	-	-	-	-	15	-	49	-	-	Good
7	Jayant	8	M	Obstructive	+	+	-	-	PAA	-	+	-	30	-	38	-	-	Good	
8	Meenakshi	5	F	Obstructive	-	-	-	-	CA	-	-	-	-	12	-	54	-	-	Good
9	Ratan	7	M	Otitis media effusion	+	+	+	+	PAA	+	-	-	30	-	44	-	-	Good	
10	Yogesh	8	M	Otitis media effusion	+	+	-	-	CA	+	-	-	-	13	-	58	-	-	Average
11	Surendra	5	M	Obstructive	-	-	+	+	CA	+	-	-	-	18	-	59	-	-	Good
12	Deepak	7	M	Obstructive	-	+	-	-	CA	+	-	-	-	20	-	82	-	-	Good
13	Rishi	6	M	Otitis media effusion	+	-	+	+	CA	+	-	-	-	21	-	65	-	-	Good
14	Kinshu	9	M	Otitis media effusion	-	+	-	-	CA	+	-	-	-	19	-	83	-	-	Good
15	Suresh	17	M	Epistaxis	-	+	-	-	PAA	-	-	-	29	-	42	-	-	Good	
16	Prakash	13	M	Sinusitis	-	+	-	-	PAA	-	-	-	30	-	39	-	-	Good	
17	Sneha	6	F	Obstructive	-	-	+	+	CA	+	-	-	-	20	-	54	-	-	Good
18	Darshan	6	M	Otitis media effusion	-	-	+	+	CA	+	-	-	-	19	-	55	-	-	Average
19	Chetan	12	M	Obstructive	-	+	-	-	CA	-	+	-	-	20	-	83	-	-	Good
20	Divya	4	F	Obstructive	+	+	+	+	PAA	+	-	-	29	-	38	-	-	Good	
21	Parvat	10	M	Obstructive	-	+	-	-	PAA	-	-	-	25	-	45	-	-	Good	
22	Rohit	9	M	Obstructive	-	+	-	-	PAA	-	-	-	25	-	43	-	-	Good	
23	Amita	8	F	Otitis media effusion	-	+	+	-	PAA	+	-	-	21	-	40	-	-	Good	
24	Manav	6	M	Otitis media effusion	-	-	+	-	PAA	-	-	-	22	-	41	-	-	Good	
25	Pratik	5	M	Obstructive	-	+	+	+	CA	+	-	-	-	22	-	65	-	-	Good

PAA - Power Assisted Adenoidectomy, CA - Curette Adenoidectomy





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 al (2002)³⁸ conducted a prospective study and found that adenoid removal time was significantly shorter with PAA than with curette

adenoidectomy.

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 18min (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 22ml 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% cases, 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 58ml 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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