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A comparative study of adenoidectomy by microdebrider vs conventional method

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ABSTRACT

Background: Adenoidectomy is a commonly performed ENT surgery. This present article aims to evaluate endoscopic powered adenoidectomy as an alternative for conventional curettage method.

Methods: Sixty consecutive cases requiring adenoidectomy were randomized into two groups of thirty each. Group A underwent endoscopic assisted micro-debrider adenoidectomy and Group B underwent conventional adenoidectomy using the curettage method in study period from November 2015 to May 2017.

Results: The average time taken in Group A was 34.10 minutes and in Group B was 22.83 minutes (p<0.001). The average blood loss in Group A was 29.57 ml as compared to 16.67 ml in Group B (p<0.001). The resection was invariably complete in Group A whereas five (16.7%) cases had more than 50% residual adenoid tissue in Group B. Four cases in group B had collateral damage whereas in Group A, there were no added injuries. Post operative pain was studied only in cases undergoing adenoidectomy alone. Group A (n=8) demonstrated a pain score of 3.50 – 3.09 whereas Group B (n=11) demonstrated a pain score of 2.75-2.55. In group A, the mean recovery period was 2.80 days and 8.23 days in Group B (p<0.001).

Conclusions: Endoscopic powered adenoidectomy was found to be a safe and effective tool for adenoidectomy. The study parameters where endoscopic powered adenoidectomy fared better were completeness of resection, accurate resection under vision, lesser collateral damage and faster recovery time. On the other hand, conventional adenoidectomy scored in matter of lesser operative time and intra-operative bleeding.

Keywords: Adenoidectomy, Conventional, Microdebrider

INTRODUCTION

Adenoid, a nasopharyngeal lymphoid tissue forming a part of the Waldeyer's ring, was initially described in 1868 by Meyer. Adenoidectomy is one of the commonest operations done on children. It is done alone or along with tonsillectomy or with ventilation tube insertion for otitis media with effusion. This operation is indicated for adenoid hypertrophy with symptoms of nasal obstruction, mouth breathing, snoring and hearing loss due to otitis media with effusion or chronic otitis media. Adenoidectomy by curette is the commonest method followed worldwide. Complications like, nasopharyngeal stenosis, injury to eustachian tube opening though rare, can occur with this technique. Inadequate removal and recurrence of symptoms are also common with the conventional curette method of adenoidectomy. To overcome the above shortcomings, alternative methods of adenoidectomy have been reported. Recently, powered shavers with endoscopic visualization have evolved as safe, accurate and complete adenoid removal technique with less operative time and blood loss. But these microdebriders are not available in all centers because of their cost factor. However, nasal endoscopes are basic tools available in all centers. So, we undertook this prospective comparative study between conventional curettage adenoidectomy and endoscopic assisted adenoidectomy. Adenoid tissue undergoes hypertrophy till the child reaches the age of 4 after which the proportional increase of the size of nasopharyx makes it appear reduced in size which is followed by a reduction of symptoms. Adenoidectomy is the commonly performed surgery in children. As with any other surgical procedure there are complications associated with adenoidectomy. These complications are fortunately rare.

Various methods of performing adenoidectomy include:

- Conventional cold steel technique using curette
- Bipolar coagulation under endoscopic vision
- Adenoidectomy using microdebrider
- Coblation adenoidectomy

Adenoidectomy forms a valuable treatment option in management of sleep disordered breathing, middle ear pathologies, paediatric chronic rhino-sinusitis and recurrent adeno-tonsillitis. Canon et al popularized endoscopic assisted adenoidectomy (EAA) calling it "a natural progression of endoscopic technology to allow a more complete adenoidectomy".¹ They followed a conventional transoral adenoidectomy with endoscopic removal of residual adenoids. Microdebriders are powered instruments which provide an excellent, safe and thorough technique in endoscopic nasal surgery. They provide atraumatic dissection with minimal bleeding which enables decreased surgical time and faster postoperative healing.² Koltai et al have published the use of microdebrider for adenoidectomy using visualization by a laryngeal mirror.³ When both these methods are combined and endoscopic assisted powered adenoidectomy performed, advantages of both techniques should get pooled. Present study is designed to compare endoscopic powered adenoidectomy the versus conventional adenoidectomy and collect morbidity data regarding the same.

Aim and objectives

- Assessment, evaluation and application of Microdebrider in adenoidectomy.
- Comparison of the same with the conventional procedures.
- Comparison of intraoperative and postoperative parameters like operative time, primary bleeding, residual tissue, collateral damage, post operative pain and recovery time.

METHODS

Study design and population

A prospective, randomized, single-blind trial of pediatric patients aged 3 to 14 years undergoing adenoidectomy was conducted. Patients were randomized to undergo either Microdebrider-assisted adenoidectomy (Group A) or Conventional adenoidectomy (Group B).

Sample size=60

Sampling technique and sample size

We used simple random sampling method and we included 30 patients for Microdebrider and conventional group each. Patients were included in the study in their chronological order of attending ENT OPD at Dr. B.R Ambedkar Medical College. The patients were numbered separately in the two groups. All the odd numbered patients underwent Microdebrider adenoidectomy and even numbered patients underwent Conventional adenoidectomy.

Inclusion criteria

Inclusion criteria were patients aged between 3 years and 14 years; patients with history of mouth breathing, snoring, drooling of saliva, adenoid facies, sleep apnoea syndrome or speech abnormalities; CSOM with adenoid hyperplasia; recurrent rhinosinusitis; dental malocclusion.

Exclusion criteria

Exclusion criteria were the patients with the following features were excluded from the study; known Bleeding disorders; immunocompromised status; unwilling for surgery; patients having URTI; children having Cleft palate, submucosal cleft & significant septal deviations.

The project is a prospective study which was conducted for two years (November 2015 to May 2017). The patients referred to or attending the OPD of ENT department. The microdebrider group of 30 patients underwent microdebrider assisted adenoidectomy, and the other group of 30 patients underwent conventional adenoidectomy. The selection of patients for the two groups was done by simple random sampling.

Preoperative assessment

All patients underwent clinical examination. Laboratory investigations like Blood routine- HB, TC, DC, ESR, BT, CT, RBS, UREA, CREATININE Urine routine-albumin, sugar, microscopy. Special investigations-HIV, HBsAg, imaging like X RAY soft tissue nasopharynx lateral view, X ray chest, X ray PNS[waters view, CT PNS when required. Baseline diagnostic nasal endoscopy was also done. The grade of adenoid hypertrophy was assessed using the scale described by Clemens and Mcmurray supported by Parikh et al:^{4,13}

Grade I has adenoid tissue filling 1:3 the vertical height of the choana; Grade II up to 2:3 the vertical height of the choana; Grade III from 2:3 to nearly all but not complete filling of the choana; Grade IV with complete choanal obstruction. Informed written consent for adenoidectomy and consent for inclusion into the study was obtained from the parents of the patients. Counseling of the patients and their parents was done.

Intervention

Once diagnosed, patients were randomly assigned to one of two groups viz microdebrider assisted or Conventional. All surgeries were performed under general anaesthesia in the operation theatre. Patients were admitted one day prior to surgery.

Statistical analysis

Statistical package for Social SciencesSPSS for Windows, Version 22.0. Released 2013. Armonk, NY: IBM Corp., was used to perform statistical analyses.

Descriptive statistics

Descriptive analysis of all the explanatory and outcome parameters will be done using mean and standard deviation for quantitative variables, frequency and proportions for categorical variables.

Inferential statistics

Independent Student t test was used to compare the mean duration of time taken for surgery (in mins), amount of blood loss (in ml), post-operative pain on day 1 and 7 and recovery period (in days) between 02 groups.

Chi Square test was used to compare the post operative complications between 02 groups.

The level of significance P value was set at p<0.01.

RESULTS

Study design

A prospective, randomized, single-blind trial of pediatric patients aged 3 to 14 years undergoing adenoidectomy was conducted. Patients were randomized to undergo either microdebrider-assisted adenoidectomy (group a) or conventional adenoidectomy (Group B). We used simple random sampling method and we included 30 patients for microdebrider and conventional group each. Patients were included in the study in their chronological order of attending ENT OPD. The patients were numbered separately in the two groups. All the odd numbered patients underwent microdebrider adenoidectomy and even numbered patients underwent Conventional adenoidectomy. The baseline characteristics of study participants like age and gender profile, Indications of surgery are studied and compared between the two groups. These are explained in the following and their significance is also measured. The intra-operative parameters studied were operative time, primary bleeding, completeness of removal of adenoid and collateral damage. Post-operative parameters included assessment of post-operative pain and recovery time are also compared between the two groups.

Age and gender

The mean age of the patients was 7.27 years in Group A and 7.43 years in Group B. The gender ratio was nearly equal in both the groups.

Variables	Categories	Group A		Group B	Drobo	
		n	%	Ν	%	r value
CEV	Males	20	66.7%	14	46.7%	0.128
SEA	Females	10	33.3%	16	53.3%	0.12
		Mean	SD	Mean	SD	
Age	Mean & SD	7.27	2.36	7.43	2.87	0.91 ^b
-	Range	03 - 14		05 - 14		0.81

Table 1: Age and gender distribution between 02 study groups.

a) Chi Square test; b) Independent Student t test.

Table 2: Indications of surgery in 2 groups.

Indication	Number of cases	
	Group A	Group B
Recurrent adenotonsillitis	9	10
Sleep disordered breathing	12	10
Middle ear pathology (OME & CSOM)	9	10

Table 3: Type of surgical procedure.

Туре	Number of cases				
	Group A	Group B			
Adenoidectomy	8	11			
Adenotonsillectomy	22	19			

Table 4: Comparison of mean duration of time taken for surgery (in mins).

Variables	Group	Ν	Mean	SD	Mean Diff	t	P value
Duration	Group A	30	34.10	8.44	11.07	7 1 4 2	-0.001*
Duration	Group B	30	22.83	1.86	11.2/ /.142	<0.001*	

Table 5: Comparison of amount of blood loss (in ml) between 02 groups using Independent Student t test.

Variables	Group	Ν	Mean	SD	Mean Diff	t	P value
Plaading	Group A	30	29.57	2.25	12.00	12.255	<0.001*
bleeding	Group B	30	16.67	5.31	12.90 12.255	<0.001*	

Table 6: Comparison of residual adenoid tissue between 02 groups using Chi Square test.

Variables	Cotogoniog	Group A		Group B		- D voluo	
v ai lables	Categories	n	%	n	%	r value	
	Grade 1	30	100.0	7	23.3		
Residual tissue	Grade 2	0	0.0	18	60.0	< 0.001*	
	Grade 3	0	0.0	5	16.7		

Table 7: Comparison of damage during procedures between 02 groups using Chi Square test

Variables	Cotogoniog	Group A		Group B		Dyoluo
variables	Categories		%	n	%	r value
Collateral damage	None	28	93.3	26	86.7	
	Injury_ET	0	0.0	2	6.7	0.11
	Injury_Torus	0	0.0	2	6.7	0.11
	NMI	2	6.7	0	0.0	

Table 8: Comparison of mean post operative pain on day 1 and 7 between 02 groups using Mann Whitney U Test.

Variables	Group	Ν	Mean	SD	Mean Diff	t	P value
Dain day 1	Group A	8	3.50	1.77	0.41	0 456	0.65
Falli day 1	Group B	11	3.09	1.38	0.41	-0.430	0.05
Dain dan 7	Group A	8	2.75	1.49	0.20	0.270	0.70
Pain day /	Group B	11	2.55	1.57	0.20	-0.270	0.79

Table 9: Comparison of recovery periodin days between 02 groups using Independent Student t test.

Variables	Group	Ν	Mean	SD	Mean Diff	t	P-Value
Recovery periodin	Group A	30	2.80	1.58	5.42	10.000	<0.001*
days	Group B	30	8.23	2.22	-3.43	-10.900	<0.001*

Indications of surgery

Sleep disordered breathing was the predominant indication for which adenoidectomy was done.

Type of surgical procedure

The type of surgical procedure (adenoidectomy / adeno-tonsillectomy) done.

Duration of surgery

The time taken in Group A subjects varied from 22 to 70 minutes with a mean of 34.10 minutes. In contrast in Group B the time taken varied from 20 to 28 minutes with a mean of 22.83 minutes.

Intra- operative blood loss

The average blood loss in Group A was 29.57 ml (range 26-35 ml) compared to an average blood loss of 16.67 ml (range 10-25 ml) in Group B. This difference in intraoperative blood loss was statistically significant (p<0.05)

Post operative complications

Residual tissue

Post procedure endoscopy to look for residual adenoid tissue showed that resection was invariably complete by the endoscopic method. Contrary to this, in 5 (16.7%) cases of Group B, more than 50% adenoid tissue was left behind and in additional 18 cases (60%) between 20-50% of adenoid tissue was left.

Collateral damage

The post operative endoscopy was also used to look for inadvertent trauma / collateral damage after the procedure. There were 2 cases in group B where the adenoid curette had abraded the mucosa near Eustachian tube. Also in 2 cases the mucosa over the torus tubaris was injured. In Group A, there were no other injuries / damage in the nasopharynx. However 2 cases had mild trauma to the nasal mucosa over the septum.

Post operative pain

Post operatively, the patient was assessed for post operative pain where isolated adenoidectomy was done. Cases where tonsillectomy was combined were excluded as tonsillectomy would cause pain post-operatively which might not be differentiated from post adenoidectomy pain. This left 8 subjects in Group A and 11 subjects in Group B. The two groups were compared and statistical analysis showed a pain score of 3.50-3.09 and Group B demonstrated a pain score of 2.75-2.55.

Recovery time

In Group A, the mean recovery period was 2.80 days and in Group B, it was 8.23 days (p<0.001).

DISCUSSION

Adenoidectomy is one of the commonest procedures performed by otorhinolaryngologists worldwide. The indications of surgery were varied and patients in the study had a mixture of indications. The present study attempts to compare the conventional curettage method with a newer endoscopic powered technique. There is an increasing trend however worldwide to perform adenoidectomy in isolation rather than combine it with adeno-tonsillectomy.⁶ This trend was somewhat seen in our series where 31% of the cases were operated for adenoids alone. Perhaps with greater awareness and evolution of clear cut indications, the two surgeries would be considered as having separate indications in their own right. The role of adenotonsillectomy for sleep disordered breathing in children has been established and often is a common indication for surgery.⁷ In the present series sleep disordered breathing formed the predominant indication in both our groups (in 32 cases - 53%) thus depicting the increasing trend to diagnose and surgically treat this condition. The time taken in the present series may seem longer than other studies as the operative time included all steps including preparing and setting up of instruments, packing and securing the bleeding and checking for haemostasis. Also endoscopy was performed pre-operatively and post procedure for the purpose of the study. The increase in the operative time in the newer technique is probably due to increased setup time for instrumentation, endoscopic visualization, bit by bit removal of the adenoid tissue and time consuming haemostasis. The increase in time though statistically significant, adds only approximately ten minutes to the surgery. In our opinion, the micro-debrider is potentially a dangerous instrument which should be used under direct and close vision as that provided through an endoscope. Since the parameters used to define operative time differ, the operative times are not comparable. In the present study however, we feel that the endoscopic powered adenoidectomy consumes more time.

Similarly, intra-operative blood loss was higher in Group A patients. In endoscopic surgery the raw bleeding surface is exposed for a longer time. An increased operative time would also lead to increased bleeding per se. Bipolar cautery is effective in stopping the bleeding from the adenoid bed but tends to stick to the coagulated tissue. When withdrawn, the cautery tip often tears the tissue afresh leading to bleeding from the raw surface. The blood loss in the series by Feng et al was more in the conventional adenoidectomy group though it was not statistically significant.⁹ Stanislaw et al however reported a significant reduction in blood loss following endoscopic adenoidectomy.⁸

Results show that resection was invariably complete by the endoscopic method in contrast to curettage method where in 5 (16.7%) cases more than 50% tissue was remaining and an additional 60% where between 20-50% of adenoid tissue was left. This was the reason for persistence of symptoms in 1/3rd of patients in conventional curettage group. This also shows the effectiveness of using endoscopic assistance for complete removal of adenoid tissue It has often been noted by authors that the extent of resection following conventional adenoidectomy has been incomplete. It was felt therefore that an endoscopic assessment be used to determine the extent of residual tissue. This is comparable to 39% cases reported as residual obstructive adenoids by Havas et al.¹⁰ In endoscopic assisted adenoidectomies, the nasopharynx can be seen properly and remnant bits of adenoid tissue removed accurately under vision. This makes endoscopic powered adenoidectomy more complete.

Collateral damage following adenoidectomy is uncommon. However there is always a fear of trauma to the eustachian tube opening leading to subsequent scarring and eustachian tube dysfunction. The torus tubaris region was partially injured in two cases of curettage adenoidectomy. In microdebrider group, however there was an increased incidence of nasal mucosal injuries.

The post-operative pain in the powered adenoidectomy group was lesser than the conventional method though this was not statistically significant. The simple six point faces pain scale which has shown it to be a simple and reliable pain scale was used.¹¹ The present study does not show such a significant reduction in post-operative pain, probably due to small number of cases and the fact that adenoidectomy done in isolation causes lesser postoperative pain per se.

The recovery time after any surgery is difficult to define as different parameters are used by different studies The question was asked about "return to normal activity" following the surgery in the post operative follow up. The recovery period in the debrider assisted adenoidectomy was shorter than conventional adenoidectomy and this difference was statistically significant. The use of debrider resulted in faster recovery by an average of 5 days, which may not merit an adaptation of current practices to the newer technique. Cases of submucous cleft palate and other craniofacial anomalies may require adenoidectomy.¹² However for fear of causing velopharyngeal insufficiency, adenoidectomy is avoided. The newer procedure still has some contra-indications and should not be used for biopsy purposes and in cases where tissue diagnosis is in doubt. The Indian scenario presents a situation where availability of the equipment is also a factor in choosing the method of surgery. Though nasal endoscopes are fast becoming basic tools, powered instrumentation like micro-debriders are not common.

To conclude, endoscope assisted powered adenoidectomy needs to be acknowledged as a safe alternate to conventional adenoidectomy. However, in light of certain drawbacks, its routine use cannot be recommended. It also fails to demonstrate any significant benefit over conventional adenoidectomy. The need for special equipment and cost of procedure has to be kept in mind. The use of powered adenoidectomy is technically demanding in the paediatric age group due to relative difficulty in passing both the scope and debrider blade through the nose.

CONCLUSION

This study found that the intraoperative blood loss was significantly less in conventional adenoidectomy than in the microdebrider-assissted adenoidectomy. The duration of surgery in microdebrider assisted adenoidectomy is significantly greater than the duration of surgery in conventional adenoidectomy.

While the mean post-operative pain scores are similar with microdebrider-assisted and conventional adenoidectomy in the early post-operative period, it is significantly more with microdebrider-assisted in the late post-operative period. The completeness of resection was better with microdebrider-assisted adenoidectomy as compared to conventional adenoidectomy. Lesser collateral injury and recovery time was noted in microdebriderassisted adenoidectomy as compared to conventional adenoidectomy as compared to conventional adenoidectomy.

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