Abstract: Conventional blind curettage technique is frequently adopted for adenoidectomy either alone or in conjunction with tonsillectomy. Despite living in an endoscopic era, many E.N.T. surgeons continue to use blind curetting which may leave adenoid remnants along with persistence of symptoms. The aim of this study was to evaluate the completeness of removal of adenoid tissue following conventional blind curettage for adenoidectomy. The study design was single arm blinded prospective study with an intervention. Thirty consecutive children of the age 16 years and below, posted for adenoidectomy alone or along with tonsillectomy were included in the study. They underwent endoscopic grading of the adenoids prior to, and after conventional adenoidectomy (the surgeon being blinded to the endoscopic findings). Remnants, if any, were then removed under endoscopic guidance. The pre and post curettage gradings were then analyzed using statistical software SPSS Version 16. Evaluation of adenoids by endoscopy following blind curettage revealed remnant adenoid tissue mainly around the Eustachian tube orifice and in the choanae which was statistically significant. It appears that conventional adenoidectomy invariably results in significant adenoid remnant in the nasopharynx. Hence endoscopic assisted removal is to be considered as a superior and effective alternative technique for adenoidectomy.

Keyword: adenoids, endoscopic grading, conventional curettage, adenoidectomy

Introduction
Adenoidectomy is one of the oldest and the most common surgery performed by an otolaryngologist.1 The first adenoidectomy was performed by William Meyers around 1800.1 The procedure was done in the belief that adenoids were reservoirs of infection which explained the recurrent episodes of otitis media and nasal symptoms in children.2,3,4 Long term obstruction may lead to behavioral changes, failure to thrive and associated maxillary / mandibular abnormalities.5,6 The adenoid tissue forms a part of the inner ring of lymphoid tissue known as the Waldeyers ring. It is present from the early age of gestation to about six years of life. It has been implicated to cause sleep apnoea, mucopurulent rhinitis, sinusitis and otitis media and studies have shown symptoms to be proportionally related to the size of adenoid tissue and its degree of obstruction.4,6,7 There is a significant relation between the endoscopically assessed size and the symptoms of the child.8 Many grading systems have been proposed for adenoids including X-ray lateral skull and acoustic rhinomanometry. Wang had proposed an endoscopic grading based on the distance of adenoid from the vomer.9 Clemens and Mcmurray proposed the following grading system: Grade I with adenoid tissue filling 1/3rd the vertical height of the choana, Grade II up to 2/3rd the vertical height, Grade III from 2/3rd to nearly all but not complete filling of the choana and Grade IV with complete choanal obstruction.11 These grading systems were preferred to the radiographs because of the lack of radiation exposure, misinterpretation of the radiographs and the change in levels of the palate during respiration.11 Route of visualization and access to the adenoid maybe transoral, transnasal, or a combination of both. Removal of adenoid tissue can be achieved by blind curettage, which harbors the risk of injury to the Eustachian tube openings and may leave remnants.7 Pearl and Manoukian12 had reportedly removed adenoids viewing it indirectly with a laryngeal mirror. Canon popularized the use of rigid endoscopy in visualizing and removal of adenoid remnants after a blind curette. Endoscopic visualization and removal by the trans nasal route had drawbacks of difficult maneuvering of the instruments in the nasal cavity. Wan et al have introduced the transoral adenoidectomy under endoscopic guidance.13 Conventional adenoidectomy has a major drawback that it leaves behind remnants mostly in the superior aspect of the choanae and the pharyngeal aspect of the Eustachian tube. In India, the most followed method is the blind curettage technique and the risk of inadequate removal of adenoid tissue may pose recurrence of symptoms. Though endoscopic removal of adenoid tissue has a drawback that it is time consuming and requires expertise, it does not significantly increase the total time for surgery. Use of powered instruments during the procedure (microdebrider and coblator) takes more time for set up and carries chances of injury to the nearby structures in inexperienced hands.14
Materials and methods
This was a prospective study done in a tertiary centre from 15th July to 31st August 2011. The study protocol was presented and approved by the Institutional Research Board and Ethical Committee. All consecutive pediatric cases from the age 16 years and below posted for adenoidectomy/adenotonsillectomy were included. There were thus 30 children in this study ranging from 3 to 16 years of age. Endoscopic evaluation of the adenoids was done by one surgeon. The conventional adenoid curettage was done by a second surgeon who was blinded to the endoscopic findings.

Surgical methods
Under general anesthesia with orotracheal intubation, patient was placed in Rose’s position. The nasal mucosa was decongested with 0.025 per cent oxymetazoline nasal drops. A Boyle Davis mouth gag was used for adequate oropharyngeal exposure. A 0-degree rigid endoscope was passed trans nasally and the adenoid hypertrophy was graded as Airway A(0-4), Choanae C (0-2), Eustachian tube E (0-1) (Table 1). Grading was done separately for the right and left side (Fig 1). The adenoid tissue was then palpated digitally by the second surgeon and conventional adenoidectomy by curettage was performed. Adequate removal was confirmed by digital palpation. Hemostasis was achieved by packing the post nasal space with saline gauze packs. After removal of the pack, the nasal endoscope was passed into the nasal cavity and the adenoid remnants were graded again in the same manner as mentioned previously (by the first surgeon; fig.2). Under endoscopic guidance the remnant adenoid tissue was then removed with the curette or angled forceps. Complete hemostasis was achieved by packing the post nasal space with saline soaked gauze.

Results
Thirty children were included in the study. Twenty nine patients were analyzed considering that the pre-operative adenoid grading of one patient was A1 C0 E0. Among the 29 patients, 40% were females and 60% males, 50% being six years old and younger. The pre and post conventional adenoidectomy gradings of adenoid tissue were noted and analyzed. Effective adenoidectomy was labeled when the score came down to A1/0, C0 and E0. Percentage of remnant adenoid after curetting with a 95% confidence interval was then calculated. With regard to airway, 48.3% and 45% had inadequate clearance on the right and left side respectively. The confidence interval of remnants on the right side was 30.6 to 66.4 percent and on the left was 26.8 to 63.4 percent (fig. 3). Considering the degree of choanal obstruction, 89.7% and 86.2% had inadequate clearance on the right and left side respectively. The confidence interval was 78.6 % to 100 % on the right side and 76.3 to 98.7 % on the left side(fig. 4). The Eustachian tube had remnants in 65.4% on the right side and 62.1% on the left side with confidence interval of 48.0 % to 82.7% and 44.4 to 79.7% on the right and left side respectively (fig 5).

Discussion
Adenoidectomy, a common surgery done in every otolaryngology setting, has posed challenges as the traditional methods used have resulted in persistence of ear infections, nasal symptoms and snoring. The aim of the present study was to identify the possibility of remnant adenoid tissue in conventional curettage and advocate use of endoscope to overcome this. Methods to assess adenoid enlargement include symptom-questionnaires, X-rays and endoscopy. Various endoscopic grading methods for adenoid size have been described. However, most of these do not completely assess the extent of adenoid tissue. Josephson et al has described grading of adenoids in relation to the airway, the choana and the eustachian tube. The grading used in the present study is a modified Josephson grading. Adenoid tissue was graded intraoperatively using a 0-degree endoscopy instead of posterior rhinoscopy mirror. The advantage of the endoscope is a better field of vision and the ability to remove the remnants, when present, under vision. Remnant adenoid tissue after conventional adenoidectomy has been reported. Our study has shown significant remnants following traditional curettage in the three parameters assessed during the surgery. Airway clearance was inadequate, leaving remnants in 48.3 % on the right side and 45 percent on the left side. Choanae showed remnants in 89.7 % on the right side and 86.2 % on the left side. The Eustachian tube had remnants in 65.4% on the right side and 62.1 % on the left side. Hence this study shows inadequate clearance with 95% / CI in regard to airway in approximately one to two third; choana in more than 75% to 100% and Eustachian tube in approximately half to three fourth of patients.
The adenoid remnants were removed under endoscopic guidance and adequate clearance was achieved. This study was under taken as a "proof of concept" study. Hence there were few limitations. The study did not have a subjective assessment of symptomatic improvement. Also, there was no long term follow up.

**Conclusion:**
Being a blind procedure, conventional adenoidectomy has inherent limitations. Our study shows inadequate clearance with 95% / CI in regard to airway in approximately one to two third; choana in more than 75% to 100% and eustachan tube area in approximately half to three fourth of patients. In this endoscopic era, endoscopic assisted adenoidectomy should be considered the gold standard.

**References**
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