

A comparative study of adenoid hypertrophy by lateral radiograph for nasopharynx [soft tissues] and by rigid nasal endoscopy

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Abstract

Background: Adenoid, also called as nasopharyngeal tonsil, Lushka's tonsil, is located at the junction of roof and posterior wall of the naso-pharynx. It is a vertical ridge of lymphoid tissue, separated by deep clefts and lined by ciliated columnar epithelium. It is seen at birth physiologically enlarged till 6 years of age, atrophied by puberty and disappear at 20 years. Infections like recurrent rhinitis, sinusitis, tonsillitis can cause chronic Adenoid infection and hypertrophy, which can be diagnosed by a post nasal mirror examination, rigid nasal endoscopic examination, Lateral Radiograph for soft tissues with neck in extension, all of them which reveal adenoid enlargement and air way compromise. There are many false negative reports with the radiological investigation. Hence this prospective study is undertaken to compare the two diagnostic modalities, i.e, x ray nasopharynx lateral view for soft tissues and diagnostic rigid nasal endoscopy[DNE]

Aims and Objective: To compare adenoid hypertrophy by performing x ray nasopharynx lateral view for soft tissues and diagnostic rigid nasal Endoscopy[DNE] and to evaluate the correlation between diagnostic ability of x-ray nasopharynx lateral view for soft tissues and diagnostic rigid nasal endoscopy. **Methodology:** Patients visiting Mamata General Hospital, khammam, Telangana, India, both pediatric and adult group [upper age limit taken below 20 years], both in in-patient and out-patient departments of ENT, Head and Neck surgery were selected as case material, with clinical features of Nasal obstruction, Nasal discharge, Sinusitis, Epistaxis, Voice change, Aural symptoms like Tubal obstruction, Recurrent Acute Otitis Media, Serous otitis media with fluctuating hearing loss, general features of adenoid facies are selected. A detailed clinical examination is done, relevant investigations are carried out and comparative study is made between x ray nasopharynx lateral view for soft tissues and diagnostic rigid nasal endoscopy is done. **Results:** 60 patients was the sample size, all of whom were subjected to both the modalities of investigation, after entering the results in a master chart, a statistical analysis was done. In this retrograde study, non parametric Kendall-Tau's correlation value was computed using SPSS -VERSION 21 SOFTWARE, value calculated showed a result of +0.795, which is approximating to +0.8, that is very much nearer to +1, showing very strong and positive relation between X-ray and Rigid endoscopic grade, which means that x-ray nasopharynx lateral view for soft tissues is nearly as reliable as Rigid endoscopy and thus can be used as reliable tool in diagnosing Adenoid hypertrophy. **Conclusion:** Even in this endoscopic era, x-ray nasopharynx lateral view for soft tissue can be useful and as reliable as a diagnostic tool for the diagnosis of adenoid hypertrophy, which may be the only available investigation in the absence of rigid nasal endoscopic equipment.

Key Word: adenoid hypertrophy.

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INTRODUCTION

Adenoid or Nasopharyngeal tonsil form the central part of the ring of lymphoid tissues surrounding the oropharyngeal isthmus, called Waldeyer's ring at the portal of upper respiratory tract. In early childhood it is the first site of contact for inhaled antigens. Historically adenoid has been associated with upper airway obstruction, as a focus of sepsis, more recently with the persistence of otitis media with effusion. Adenoid can be identified by

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MRI [magnetic resonance imaging] from the age of four months in 18 % of the children¹. By 5 months of age, the adenoid tissue could be identified in almost all children. Growth continues during infancy and plateaus between 2 and 14 years of age. Regression of the adenoids occurs rapidly after 15 years of age in most children. The adenoids appear to be at its largest size in 7 years old age group². However clinical symptoms are more common in an younger age group, due to relative small volume of the naso-pharynx and increased frequency of upper respiratory tract infections

OBJECTIVES OF THE STUDY

X-ray nasopharynx is used for diagnosing adenoid hypertrophy, which, even in the endoscopic era, one of the important modality for adenoid hypertrophy. With the advent of endoscopy, now a more commonly used as the diagnostic tool for adenoid hypertrophy. There are many false negative and false positive reports when x ray is solely used as a diagnostic tool. To establish a correlation about how far x ray is successful in diagnosing the adenoid hypertrophy, in comparison with DNE, this prospective study is planned for a period of nearly 2 years, i.e from october 2011 to october 2013, so that both can be correlated.

AIMS OF THE STUDY

The study aims at comparing of grading of adenoid hypertrophy by two modalities of investigation i.e, X-ray nasopharynx lateral view for soft tissues and Diagnostic nasal endoscopy.

Inclusion criteria:

Patients visiting to Mamata General Hospital, khammam, Telangana, India of both paediatric and young adults till 20 years of age, both inpatient and outpatient department of ENT are selected as case material. Clinical features of nasal obstruction, nasal discharge, sinusitis, epistaxis, voice change are included. Aural symptoms of recurrent acute otitis media, serous otitis media, with fluctuating

X ray nasopharynx lateral view for soft tissues

hearing loss, general features of adenoid facies are also selected. X-ray nasopharynx lateral view for soft tissues and rigid nasal endoscopy were done.

Exclusion criteria

Nasal polyps, Growths, Deviated nasal septum. X ray neck lateral view for soft tissue to see Adenoid: Nasopharynx ratio: Graded as-1,2,3,4. Patient's neck kept in minimum extension. Adenoid Naso-pharynx ratio - A/N ratio is calculated by Fujioka method³. Endoscopy is done After application of local anaesthesia by nasal packs with 4% lignocaine and adrenaline (1:80000), 30 degree 4 mm storz Rigid nasal endoscope is passed with patient in supine position. The space between the posterior end of septum and roof of nasopharynx anteroposteriorly and between the two eustachian tube orifices laterally is taken into consideration to see the extent of adenoids hypertrophy in two dimensions and graded as 1,2,3,4 using Cleman etal⁴ grading system. A comparison is made for correlation between the tools. i.e Rigid Nasal endoscopy and x ray Naso pharynx lateral view for soft tissues.

MATERIALS AND METHODS

Patients visiting Mamata General Hospital, khammam, AP, India, both paediatric and young adult group [till 20 years], both in patient and out-patient Department of ENT, Head and Neck surgery were selected as case material, with clinical features of Nasal obstruction, Nasal discharge, Sinusitis, Epistaxis, Voice change, Aural symptoms like Tubal obstruction, Recurrent acute otitis media, Serous otitis media with fluctuating hearing loss, general features of Adenoid facies and Pulmonary hypertension are selected. Both paediatric and adult age [below 20 years] group patients are selected and, detailed clinical examination done, relevant investigations are carried out and correlation is made between X ray Naso-pharynx lateral view for soft tissues and Diagnostic rigid nasal endoscopy.

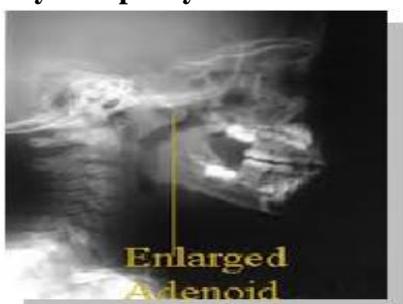


Figure 1

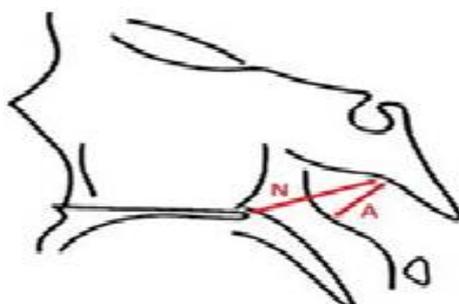


Figure 2



Figure 3

Figure 1: x-ray Nasopharynx lateral view for soft tissues; Figure 2: Line Diagram showing Fujioka etal method of estimation of nasopharynx; Figure 3: X ray nasopharynx lateral view –Methodology of measurement of adenoid hypertrophy

Technique of taking the X-ray nasopharynx

The radiograph taken is x- ray nasopharynx lateral view for soft tissues. It is taken with patient in supine position and neck slightly extended. SIEMEN'S MULTIX machine was used ,and x ray field was collimated to the nasopharynx,with a focus film distance of 40 inches ,using average exposure factors of 60 kv and 3.2 milli-ampere-seconds Too much extension or flexion has to be avoided as it can compromise or show a larger airway leading to false results.

Fujioka method³

It is the method selected for estimating the nasopharyngeal air way obstruction by adenoid hypertrophy.Adenoid thickness as described by Johannesn ,is defined as the distance along a perpendicular line from the pharyngeal tubercle on the base of skull to the adenoid convexity.

Fujioka *et al*³ method for measurement of adenoid hypertrophy by x- ray nasopharynx lateral view for soft tissues: This is the method followed for estimation of Adenoid hypertrophy on an X – ray lateral view of the nasopharynx for soft tissues.X –ray is taken in deep inspiration and the neck is kept in partially extended ,with beam of X – ray being focused on the nasopharynx region .Estimation of A/N ratio[Adenoid Nasopharynx Ratio] is done schematically by Fujioka method. The distance between the outermost point of the convexity of Adenoid shadow and Spheno-basiociput, [A], is divided to distance between spheno-basiociput and posterior end of the Hard palate,[N].When synchondrosis is not clearly visualized ,the point where posteroinferior margin of lateral pterygoid plates crosses the floor of bony nasopharynx can be used.

Adenoid hypertrophy grading Fujioka method³

Grade	A/N ratio
1	¼ to 1/3
2	1/3 to 2/3
3	2/3 to near complete occlusion
4	Complete occlusion

Diagnostic nasal endoscopy: -ADENOID-HYPERTROPHY- CLEMAN'S *etal*⁴ GRADING:

Grade	Description
1.	Adenoid tissue filling 1/3 rd of the vertical portion of the choana
2.	Adenoid tissue filling 1/3 rd to 2/3 rd of the choana
3.	Adenoid tissue filling 2/3 rd to nearly complete obstruction
4.	Complete choanal obstruction

Comparing adenoid hypertrophy grades by x ray nasopharynx lateral view for soft tissues and Diagnostic

nasal endoscopy. X-ray Naso-pharynx lateral view for soft tissues is an older modality investigation which is still being done, but with many false negative and false positive results. Its credibility in the diagnosis of adenoid hypertrophy, my comparative study of diagnostic nasal endoscopy for adenoid hypertrophy helps. Fujioka *et al* method for X-ray for measurement of A/N ratio and Cleman *et al*⁴ grading of adenoid hypertrophy are compared. Meticulous endoscopy was done for all the patients with the symptom profile mentioned and every patient is subjected to x ray nasopharynx lateral view for soft tissues

Statistics and Observation Charts

Table 1: age distribution of adenoid hypertrophy

Age	No .of patients	Percentage
0-5yrs	5	8.33%
6-10 yrs	11	18.33%
11-15 yrs	31	51.66%
16-20 yrs	13	21.66%

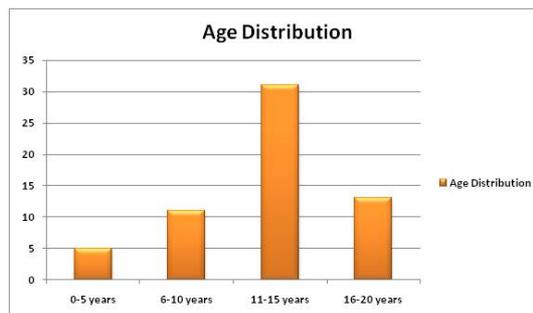


Figure 5: Age Distribution Of Adenoid Hypertrophy

Table 2: sex distribution

Sex	Number of patients	Percentage
Male	35	58.33%
Female	25	41.66%

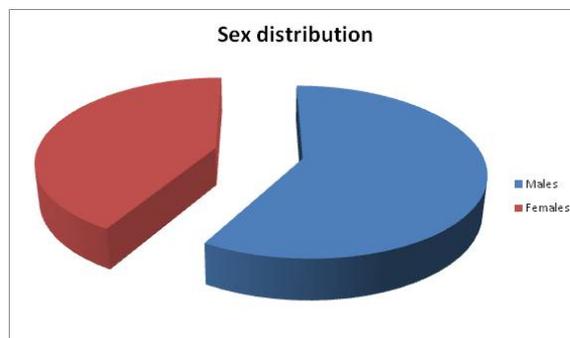


Figure 6: Sex Distribution

Pie diagram of sex distribution of cases, Blue color---Males-35 Pink color—Females-25

Table 3: chief presenting complaint

Chief complaint	Number of patients	Percentage
B/I nasal block	30	50%
Recurrent sore throat	13	21.66%
Nasal discharge	5	8.33%
Ear discharge	5	8.33%
Snoring,mouthbreath	3	5%
Recurrent sneezing	2	3.33%
Decreased hearing	1	1.6%
Fullness in the ears	1	1.6%
Total	60 cases	100%

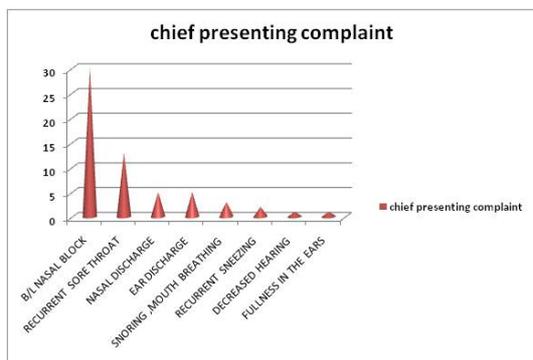


Figure 7: Chief Presenting Complaint

X axis-chief presenting complaint
Y axis-number of patients

Table 4: Tonsillar Hypertrophy With Adenoid Hypertrophy

Grade	No. Of patients	Percentage
1+	3	5%
2+	34	56.66%
3+	21	35%
4+	2	3.3%

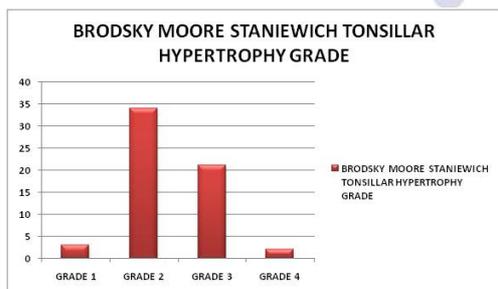


Figure 8: Tonsillar Hypertrophy With Adenoid Hypertrophy

X-axis –tonsil hypertrophy grade
Y – axis –number of patients

Table 5: X Ray Grading Of Adenoid Hypertrophy

Grade	No Of patients	Percentage
I	24	40%
II	24	40%
III	10	16.66%
IV	2	3.33%

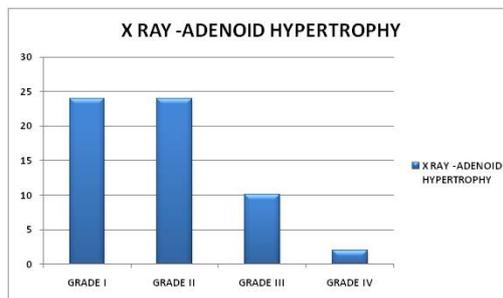


Figure 9: X Ray Grading Of Adenoid Hypertrophy

X axis-grade of adenoid hypertrophy in x-ray
Y- axis- number of patients

Table 6: Dne Wrt Adenoid Hypertrophy

Grade	No of patients	PERCENTAGE
I	17	28.33%
II	28	46.66%
III	13	21.66%
IV	2	3.3%

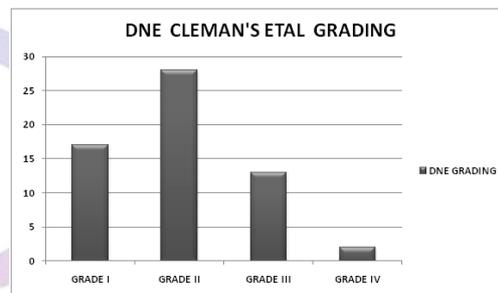


Figure 10: Dne Wrt Adenoid Hypertrophy

X-axis-dne grading
Y-axis-number of patients

Comparison of x-ray neck lateral view for soft tissues {nasopharynx} with diagnostic rigid nasal endoscopy

Table 7: X Ray Grade Wrt Adenoid Hypertrophy

Grade	No. Of patients	Percentage
I	24	40%
II	24	40%
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Table 8: Dne Wrt Adenoid Hypertrophy

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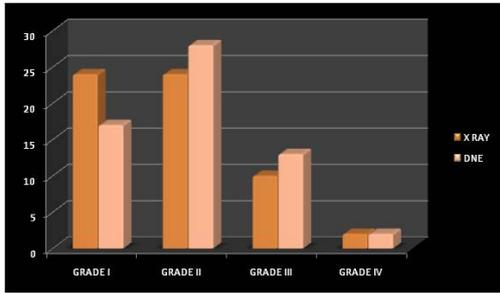


Figure 11: X Ray Grade Wrt Adenoid Hypertrophy

Table 9: Absolute Eosinophil count with Adenoid Hypertrophy

Aec	No.of patients	Percentage
<440 cells /cumm	16	26.66%
>440 cells/cumm	44	73.33%

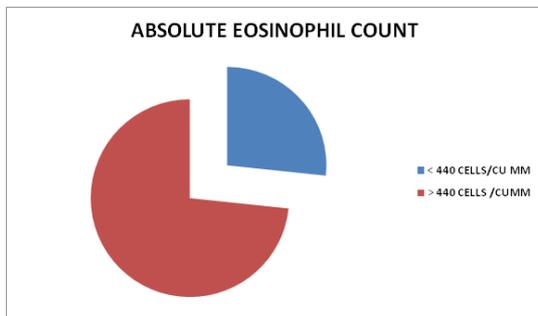


Figure 12: Absolute Eosinophil count with Adenoid Hypertrophy

Table 10: Impedence Audiometry With Respect To Adenoid Hypertrophy

Type	Number of patients	Percentage
B/l -a -type	32	53.33%
B/l -b -type	21	35%
B/l -c -type	3	5%
A,b-type -in single patient	4	6%

Figure 13: Impedence Audiometry With Respect To Adenoid Hypertrophy

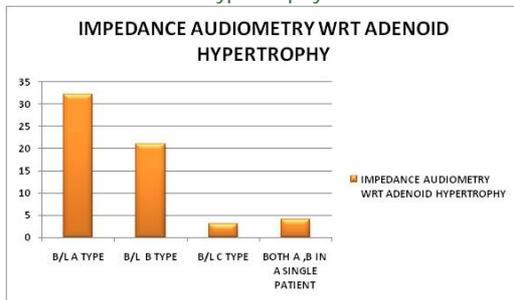


Table 11: Adenoid Facies Wrt To Adenoid Hypertrophy

Adenoid facies	No. Of cases	Percentage
YES	24	40%
NO	36	60%

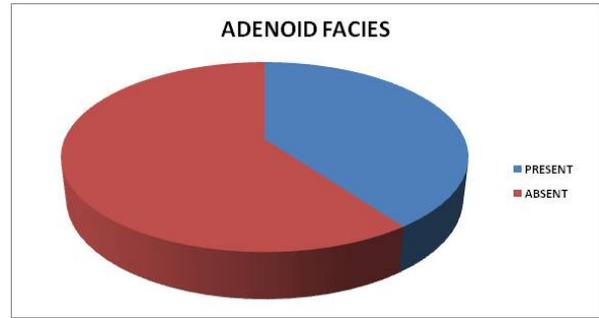


Figure 14: Adenoid Facies Wrt To Adenoid Hypertrophy

Table 12: Adenoidectomy Wrt To Adenoid Hypertrophy

Adenoidectomy	No. Of cases	Percentage
Done	35	58.33%
Not done	25	41.66%

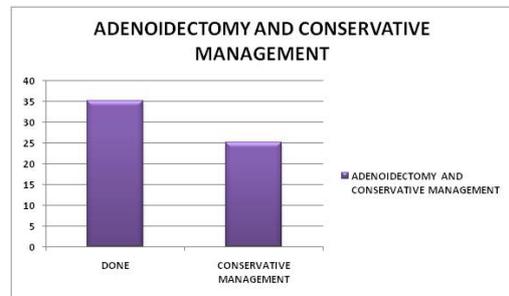
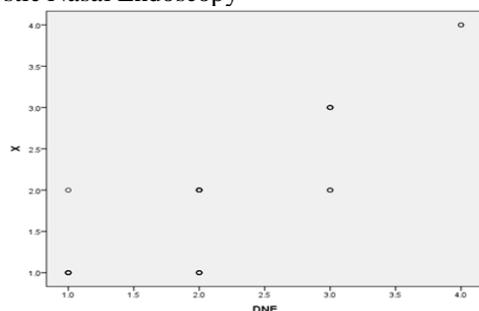


Figure 15: Adenoidectomy Wrt To Adenoid Hypertrophy

Statistical analysis

The above data are compared using a scientific approach, as to how much an x-ray Nasopharynx is reliable when compared to the other diagnostic modality, viz., Rigid endoscopy. For this evaluation, the master excel chart details of patients, community medicine Bio statistics department was consulted and a method was formulated. To relate how far X-ray Nasopharynx lateral view for soft tissues is on par with Diagnostic Rigid Nasal Endoscopy, Non parametric correlation method was chosen. Kendall - Tau 's' correlation method after analysis gives a value which is in between -1 to +1, and if the result is nearer to +1, it suggests that a positive, i.e., reasonably good correlation exists between two modalities to be compared, and a poor correlation is said to exist, if the result is nearer to -1. In my study, Kendall - Tau's correlation value was computed using SPSS -VERSION 21 SOFTWARE, by the Bio statistics expert, and value calculated showed a result of +0.795, which is approximating to +0.8, that is very much nearer to +1, showing very strong and positive relation between X-ray and Rigid endoscopic grading, which means that X-ray and Rigid endoscopy both can be used as reliable tool in diagnosing Adenoid hypertrophy. Scatter plot¹⁴ Showing a good correlation between x-ray

nasopharynx lateral view for soft tissues and Rigid Diagnostic Nasal Endoscopy



X-axis – Diagnostic Nasal Endoscopy

Y-axis – X ray naso-pharynx lateral view for soft tissue[adenoid]

Analysis of the observations

On analysis of this retrograde study, most of the cases with adenoid hypertrophy belonged to 11- 15 years age group [31 patients out of 60], accounting to 51.66%. Males were accounting to be 58% [35 out of 60] among the total cases. The most common chief presenting complaint was nasal obstruction [30 cases] accounting to 50%, followed by recurrent sore throat [13 cases] accounting to 21%. Tonsil hypertrophy of grade ii was present in 34 patients accounting to 56%. Most of the X-ray naso-pharynx were showing grade i and grade ii accounting for nearly 24 and 24 cases respectively, i.e., 40% each. Most of the patients were having grade ii on DNE, 28 patients accounting for 46%. 44 patients out of 60, accounting to 73% had the history of allergy, confirming allergy association with adenoid hypertrophy. 36 patients out of 60 accounting to 60% had adenoid facies during presentation. 35 cases out of 60 accounting to 58% had to undergo surgery as a part of treatment and rest of the patients were conservatively managed.

DISCUSSION

P.J. Wormald and C.A.J. prescott⁵, demonstrated the efficacy of flexible naso-pharyngoscopy compared with lateral neck radiography and clinical symptoms in the assessment of adenoid hypertrophy in children. S.B.V. Chandrasekhar et al studies correlates with the study. Babak Saedi, Mohammed Sagedhi, et al⁶ study was designed for better understanding of the role of different methods of nasal endoscopy in the assessment of adenoid hypertrophy and comparing them with lateral neck radiography and patients' symptoms. From August 2007 until January 2009, in the otolaryngology ward of a tertiary referral center, 89 patients who had symptoms related to chronic mouth breathing participated in this study. The results of the study indicated that both radiography and nasal endoscopy could define the relationship between adenoid hypertrophy and associated

symptoms and therefore are complementary. Between them, despite the popularity of nasal endoscopy, radiography can serve as a better planning tool. S.B.V. Chandrasekhar et al study got similar result. Mary Kurien et al⁷ used X-Rays in the evaluation of adenoid hypertrophy. Lateral radiograph of the neck and a flexible nasopharyngeal endoscopy was done to evaluate adenoid enlargement in children aged 3–12 years who were included in a 5 week randomized double-blind placebo controlled study for the effect of beclomethasone in adenoid hypertrophy. These were graded independently by both the co-investigator and investigator. X-ray and nasal endoscopy for re evaluation of adenoid size was done at the completion of the study. Variables of both the procedures were scored at the beginning and end of the study. The agreement between the two groups was assessed using weighted kappa statistic. There were 26 patients in the study, 17 of them had complete correlation between the X-ray and endoscopy findings. The agreement between these findings was statistically significant ($p < 0.01$) with the weighted kappa 0.51. This study showed that lateral X-rays of the neck, besides being a non-invasive procedure, still remains a very reliable and valid diagnostic test in the evaluation of hypertrophied adenoids. Navin kondapati et al⁸ in their study, 13 cases of adenoid hypertrophy were seen between the age group of 18 to 39 years. Patients came with complaints of nasal obstruction, snoring and mouth breathing. Diagnostic nasal endoscopy showed enlarged soft tissue in the nasopharynx, probably hypertrophied adenoids. Computerised tomography was done to rule out other differential diagnosis. After surgical excision the tissue was sent for histopathological examination that confirmed diagnosis. For complete removal transnasal endoscopes were used in assistance. Patients were regularly followed up for any recurrence. At the end of the study they came to the conclusion that instead of regressing in a natural physiological way with age, adenoids can remain in the nasopharynx, sometimes getting enlarged due to infection. One should keep enlarged adenoids as differential diagnosis in adults while dealing with a nasopharyngeal lesion. Our study goes in favour of their findings. Feres et al⁹ Many studies have been developed aiming to reveal the usefulness of cavum X-rays and tele radiographies as diagnostic tools for the detection of upper airway obstruction due to adenoid hypertrophy. However, the scientific literature is diverse and controversial. Therefore, a systematic review is proposed; with the objective to determine the diagnosis value of lateral X-ray view of the skull regarding adenoid hypertrophy. Despite limitations, the majority of the resultant data indicates that lateral X-rays might be considered somewhat useful, even though it could not be

clearly demonstrated. Future research should then adhere to greater methodological rigor, in order to investigate the significance of radiographies as a screening test. In a Comparison between radiological and nasopharyngolaryngoscopic assessment of adenoid tissue volume in mouth breathing children-Edmir Américo Lourenço etal¹¹ study came to the conclusion that nasopharyngolaryngoscopy is a much more accurate diagnostic procedure than radiological evaluation of the nasopharynx. This study is in near favour of our study. Gangadhara Somayaji K. S., etal¹²-In a study of Significance of Adenoid Nasopharyngeal Ratio in the Assessment of Adenoid Hypertrophy in Children. The aims of this study are to find out the significance of adenoid nasopharyngeal ratio obtained from lateral X-Ray of nasopharynx to decide on the option of surgical treatment of adenoid and to correlate the symptoms with the relative size of adenoid in the nasopharynx. This prospective study was done on 100 children who presented with bilateral nasal obstruction from 4- 12years of age. Radiological assessment of lateral radiograph of nasopharynx was done. on analysis of the results ,x-ray nasopharynx lateral view for soft tissues can be helpful as a diagnostic tool in patients having adenoid hypertrophy even in the endoscopic era ,and it can be used as an aid for preoperative investigation when endoscopic equipment is not available.our study shows the similar opinion.

CONCLUSION

On analysis, the results, x-ray nasopharynx lateral view for soft tissues can be helpful as a diagnostic tool in patients having adenoid hypertrophy even in the endoscopic era, and it can be used as an aid for preoperative investigation when endoscopic equipment is not available.

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12. Kandall tau's correlation measurement –SPSS software ,version 21
13. Scatter plot drawing - by using SPSS software, version 21

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