

## NASENOSCOPIC EVALUATION OF THE VELOPHARYNGEAL SPHINCTER IN CLEFT PALATE PATIENTS

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### SUMMARY

*Nasendoscope was used for evaluation of the function of the velopharyngeal sphincter in twenty-five cleft palate patients using 4% xylocaine as surface anaesthesia. The pattern of closure and the residual defect in velopharyngeal sphincter during speech is helpful in deciding the treatment plan for velopharyngeal insufficiency such as speech therapy or pharyngoplasty.*

The aim of cleft palate surgery is to give the patient good speech in addition to the aesthetic dentition and good facial growth. The acceptable speech is obtained in only 70-80% of the operated cleft palate patients. The remaining 20-30% of the patients have velopharyngeal insufficiency. The various methods of assessment of the velopharyngeal sphincter provide indirect information only in one or two planes. The nasendoscopy helps in directly assessing the velopharyngeal sphincter in three dimensions. The flexible fiberoptic nasendoscope is more advantageous than the rigid one.

The flexible fiberoptic nasendoscope has been used for studying normal velopharyngeal sphincter and also for diagnosing velopharyngeal insufficiency and assessing pharyngoplasties by Piggot, 1969 and Croft, 1981.

### Material and Methods

This study was carried out in the Department of Plastic and Maxillofacial Surgery, Government Medical College & Hospital, Nagpur.

A total of twenty-five individuals were included in the study, out of which two were controls, one was a case of unoperated submucous cleft palate and twenty-two were operated cleft palate patients with nasal escape during speech. The patients were ranging from five years to twenty years.

The Flexible Fiberoptic Nasendoscope (Machida) with cold light source and camera attachment was used. The length of the endoscope was 25 cm and the outer diameter was 3.5 mm. The visual angle of the endoscope was 70°. The tip of the endoscope could be

**Table 1. The nasendoscopic findings in 22 operated cleft palate patients with nasality of speech**

Number of Patients	Movements of			Closure pattern	Type of defect in sphincter
	Soft palate	Lat. Pharyng. walls	Post. Pharyng. walls		
5	Good	Good	Slight	Complete closure	Nil
7	Good	Poor	Slight	Partial closure	Lateral defect
5	Poor	Poor	Slight	Partial closure	Central defect
5	Poor	Poor	Slight	Partial closure	Large central defect

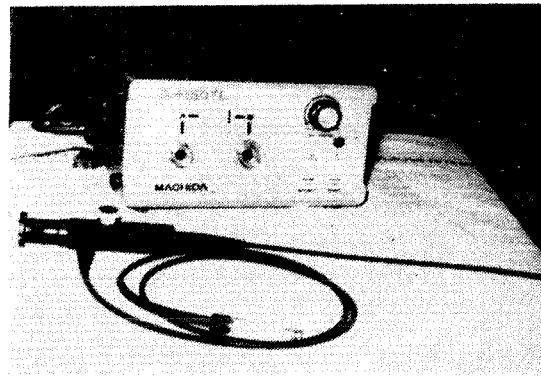


Fig. 1. Showing flexible fiberoptic nasendoscope with light source.

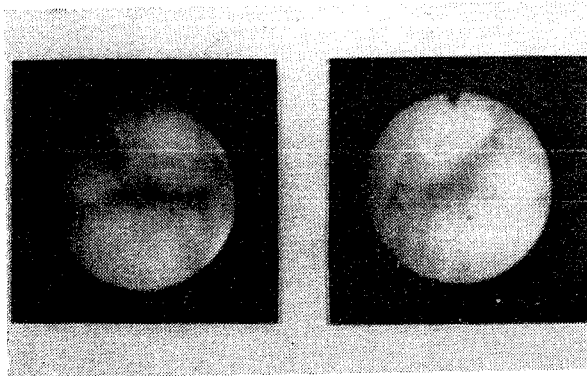


Fig. 2. Showing complete closure of normal velopharyngeal sphincter. Soft palate, Lat. pharyngeal walls and Post. pharyngeal wall can be seen.



Fig. 3. Showing submucous cleft palate with midline gap and muscle bulge on either side at rest (L), muscle bulges prominent during production of 'Eeh' (R).

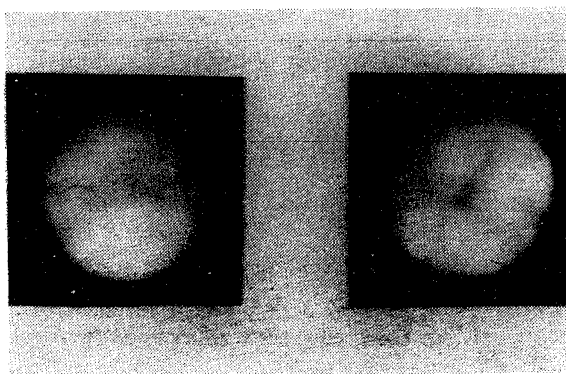


Fig. 4. Showing complete closure of velopharyngeal sphincter on production of 'Eeh' in an operated case of cleft palate.

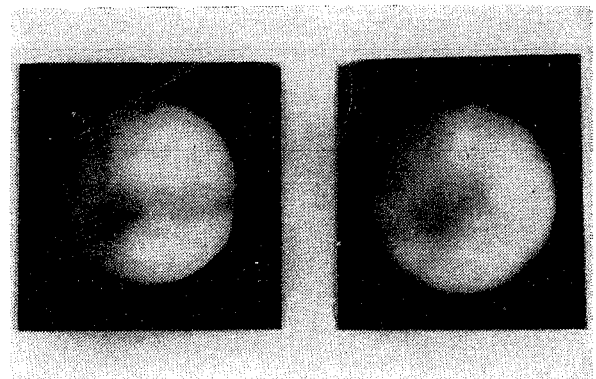


Fig. 5. Showing small lateral defects in velopharyngeal sphincter during production of 'Eeh' in an operated case of cleft palate with moderate hypernasality of speech.

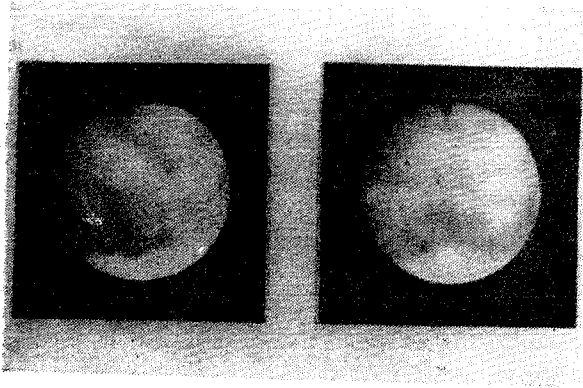


Fig. 6. Showing small central defect in velopharyngeal sphincter during production of 'Ech' in an operated case of cleft palate with moderate hypernasality of speech.

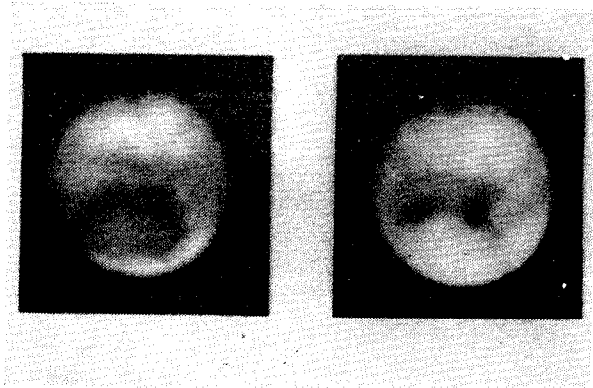


Fig. 7. Showing large central defect in velopharyngeal sphincter during production of 'Ech' in an operated case of cleft palate with severe hypernasality of speech.

moved up and down by a knob.

The endoscopy was performed with the patient sitting comfortably in a chair. Both the nostrils were packed 15 minutes before the procedure with cotton pledgets soaked in 4% xylocaine. The patient was asked to blow the nose several times so that there was no mucus left inside. The endoscopy was performed through right and left nostrils to get full view of the velopharynx. The velopharynx was examined at rest and when the patient was asked to say 'Ah' & 'Ech' and count from 1 to 20.

The endoscopy was used to reveal—

1. The status of velopharynx at rest.
2. The movements of the soft palate, lateral pharyngeal walls and posterior pharyngeal wall during production of 'Ah' & 'Ech' and counting the number from 1 to 20.
3. The pattern of closure of velopharyngeal sphincter, whether it closes completely or partially.
4. The defect in the velopharyngeal sphincter in cases with partial closure, whether it was central or lateral.
5. The treatment plan for velopharyngeal insufficiency whether speech therapy or pharyngoplasty.

### Observations

In two controls, the endoscopy at rest shows the convex border of the soft palate along with a central bulge of musculus uvulae. In the lateral pharyngeal walls, the salpingopharyngeal fold and the eustachian tube can be seen. The posterior pharyngeal wall shows a pad of adenoids. The endoscopy during production of 'Ah' and 'Ech' showed complete closure of the velopharyngeal sphincter. During closure, the soft palate moves superiorly and posteriorly touching the posterior pharyngeal wall. The exact point of contact of the soft palate with the posterior pharyngeal wall was also seen. The lateral pharyngeal walls move medially thereby occluding the lateral recesses in the velopharyngeal sphincter. It was seen that the movement of posterior pharyngeal wall was almost negligible.

A deep groove in the midline of the soft palate with small muscle bulges on either side of it were seen in a case of submucous cleft palate. The endoscopy on the production of 'Ah' revealed that the two muscle bulges became more prominent, the lateral pharyngeal walls move medially but the soft palate does not touch the posterior pharyngeal wall. Hence there was incomplete closure of velopharyngeal sphincter with a big central defect.

Out of the 22 operated cleft palate patients 5 patients showed complete closure and 17 patients showed partial closure on production of 'Ah' and 'Eeh'.

The 5 patients who showed complete closure of velopharyngeal sphincter on production of 'Ah' and 'Eeh' had mild hypernasality of voice. The interesting finding which was noted was that these patients showed incomplete attempt at closure if they were asked to count from 1 to 20.

The 17 patients who had partial closure of velopharyngeal sphincter showed either a central or a lateral defect in the sphincter. 5 amongst these had good movements of the soft palate but there was poor movement of the lateral pharyngeal walls leaving behind lateral defects in the velopharynx. 7 patients had fair movements of soft palate and good movements of lateral pharyngeal walls, hence these patients had small central defect in the velopharynx. In 2 patients endoscopy could not be performed through both the nostrils as one patient had severe deviated nasal septum and the other patient had stenosis of external nares.

In 3 patients who had severe nasality of voice, the endoscopy revealed that the soft palate movements were very poor and also the lateral pharyngeal wall movements were poor. These three patients had large central defect in velopharyngeal sphincter.

### Discussion

The nasendoscope provides a good view of the velopharynx directly in all three dimensions under local anaesthesia.

The normal velopharynx closes completely during production of 'Ah' and 'Eeh' by the superior and posterior movements of the soft palate and by the medial movements of the lateral pharyngeal walls. The posterior pharyngeal wall does not seem to take active part in closure of velopharynx. The movements of the soft palate and lateral pharyngeal walls can be seen clearly without any hindrance during speech.

In unoperated submucous cleft palate patient there is no attempt at closure of the velopharynx during production of 'Ah', only the muscle bulge on either side of submucous cleft become prominent.

All the twenty-two cases of operated cleft palate with nasal escape of varying degrees had velopharyngeal insufficiency.

Few patients who had mild nasal escape were found to have complete closure of velopharynx while pronouncing words like 'Ah' and 'Eeh', but the same patients showed incomplete closure of velopharynx when they were asked to count from 1 to 20. This shows that these patients probably develop fatigue of the velopharyngeal muscles. Such patients might be helped by speech therapy alone.

Rest of the patients had partial closure of the velopharynx even while saying 'Ah' and 'Eeh'. They had central or lateral defects, small or large depending on the amount of soft palate and/or lateral pharyngeal movements. These patients are unlikely to be helped by speech therapy alone. Depending on the site of defect, the pharyngoplasties might be planned e.g. in the patient who has lateral defects on either side might be a candidate for two lateral pharyngeal flap (Hyne's pharyngoplasty), in the patient who has large central defect, a large midline pharyngeal flap might be an answer.

### Conclusions

Nasendoscopy has greatly enhanced the clinician's ability to accurately study the functioning of the velopharyngeal sphincter. Patterns of closure as well as the degree and consistency of the closure can be determined. The degree of lateral and posterior wall movements and character of active elevation of the soft palate can be documented.

Endoscopy with fiberoptic flexible nasendoscope is easy, and it can be done on outdoor basis. The main advantage is that, it can be very well utilised as a diagnostic tool in co-operative children as young as five years.

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