Manoeuvres to Improve Endoscopic Visualization of Hypopharynx

Pooja Thakur¹ · V. K. Poorey¹

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Abstract The more progress achieved in endoscopy, the more superficial cancers in head and neck region have been diagnosed. There are, however, some areas difficult to observe, particularly the hypopharynx, due to closure of this space. Examination of hypopharynx form an essential part of head and neck examination especially in the suspected malignancies as well as in the cases with unknown primary. As the flexible fiber-optic nasopharyngolaryngoscopy forms an essential part of examination of hypopharynx, the present study aims to evaluate the effectiveness of various manoeuvres devised to aid in better visualization of the hypopharynx. The present prospective study is an observation carried out on 30 patients, which had been followed up for hypopharyngeal or laryngeal disease, in the OPD of the department of Otorhinolaryngology and head and neck surgery in Gandhi Medical College and associated hospital, Bhopal, M.P. In the present study, authors compared the visibility of sub-sites of hypopharynx in 30 patients undergoing trans nasal flexible fibre optic endoscopy in normal seated position and with head torsion, valsalva manoeuvre and the Killian position. The authors concluded that the above mentioned manoeuvres facilitated the visualization of the entire circumference of the hypopharynx during endoscopic examination, are non invasive and easy to perform and so should be included as a part of routine examination while performing flexible fibre optic endoscopy.

Keywords Hypopharynx · Flexible fiber-optic nasopharyngolaryngoscopy · Head torsion · Valsalva manoeuvre · Killian position

Introduction

Hypopharynx, which consist of the pyriform fossa, the post cricoid space and the posterior pharyngeal wall, is difficult to examine as the view is limited due to closure of the space. Head and neck cancer particularly Hypopharyngeal carcinoma typically are thus diagnosed at an advanced stage, and the prognosis for patients with this type of malignancy is poor.

The flexible fiber-optic nasopharyngolaryngoscope has become an invaluable tool for the examination of Hypopharynx. It is safe, practical and an indispensable method to evaluate hypopharyngeal area. However, despite of the marked innovations in the endoscopic technology, including a narrow band imaging (NBI) system, which have enabled the detection of superficial hypopharyngeal cancers [1, 2], it is useless without a wide view of the hypopharynx. The accurate determination of the primary tumour site and its extent is essential for the surgical management and planning of the adjuvant therapies as well [3].

The circumferential observation of the hypopharyngeal mucosa is difficult during conventional endoscopy because of its anatomical constraints, pharyngeal reflex and saliva accumulation. Several techniques for improving the visualization of hypopharynx during endoscopic examination have been reported in the literature. These include head torsion [4], the modified valsalva manoeuvre [5], trumpet manoeuvre [6], anterior neck skin traction [7], combination of these techniques [8, 9], the Killian position [10], and the modified killian's method [10].

✉ Pooja Thakur
dr.poojathakur11@gmail.com

V. K. Poorey
drvkporey@gmail.com

¹ Department of E.N.T, G.M.C, Bhopal, Bhopal, India

The present study is a prospective observation aimed to compare various techniques which aid in improving the visualization of the hypopharynx while carrying out the endoscopic examination. Various techniques used in the present study include head torsion/rotation, valsalva manoeuvre and Killian position.

Methods

Among outpatients attending the Otorhinolaryngology department, who had been followed up for hypopharyngeal or laryngeal diseases, a total of 30 patients were randomly selected between February 2016 and July 2016, and enrolled in the present study. Post Chemotherapy/ Radiotherapy patients of hypopharyngeal or laryngeal cancer were excluded because of non feasibility to carry out various manoeuvres pertaining to their general condition.

In the present study, examination using flexible fiberoptic nasopharyngolaryngoscope is performed in a seated position. The observation of hypopharynx is attempted carrying out following manoeuvres.

Initially, the patient is asked to phonate “e” in the normal head position (Normal). Then, in the same normal position, patient is asked to perform valsalva manoeuvre and to phonate “e”(Normal-V). Then, the patient’s head is rotated laterally and the patient is again asked to phonate “e” (Torsion). Next, in the position with head rotation, the patient is asked to perform valsalva manoeuvre and to phonate “e” (Torsion-V). Then, the patient is placed in the Killian position, in which the neck is bent forward and the chin is depressed far enough so that the patient is able to look down at the umbilicus. In the Killian position, the patient is asked to phonate “e” (Killian) and then the valsalva manoeuvre is performed and again the patient is asked to phonate “e” (Killian-V).

The visibility of subsites of the hypopharynx and esophageal inlet is evaluated based on a 3 grade scale (Table 1). The images recorded during examination are blindly reviewed and graded by two otolaryngologists and the average is calculated for further analysis.

Table 1 Grade of visualization of Hypopharynx

Grade	Description
1	Only pyriform fossa visualized
2	Post cricoid region visualized
3	Upper esophageal sphincter visualized

Table 2 Mean score with respect to individual position/ manoeuvre

S. no.	Manoeuvre/position	Mean score $\pm$ SD
1	Normal	1.25 ($\pm$ 0.50)
2	Normal-V	1.30 ($\pm$ 0.56)
3	Torsion	1.53 ($\pm$ 0.64)
4	Torsion-V	1.86 ($\pm$ 0.62)
5	Killian	2.12 ($\pm$ 0.73)
6	Killian-V	2.76 ($\pm$ 0.88)

Results

In the present study, among 30 patients, 24 i.e. 80% are males and 06 i.e. 20% are females. The mean and median age of the enrolled patients is 58.6 and 60 years, respectively, ranging from 44 to 76 years.

Mean scores ($\pm$ SD) with various positions or manoeuvres are shown in Table 2.

Among these 6 positions or manoeuvres, significant difference, i.e. $p < 0.01$, in the mean scores are observed between Normal and Torsion, Normal and Killian, Normal and Torsion-V, Normal and Killian-V, Torsion and Torsion-V, Torsion and Killian, Torsion and Killian-V, Killian and Killian-V, Normal-V and Torsion-V, Normal-V and Killian, Normal-V and Killian-V, Torsion-V and Killian-V.

There is no significant difference between Normal and Normal-V ($p = 0.62$), Normal-V and Torsion ($p = 0.58$), Torsion-V and Killian ($p = 0.63$).

Representative endoscopic images of the hypopharynx with the different positions and manoeuvres are shown in Fig. 1.

Discussion

Recent remarkable progress in endoscopic technology has enabled the detection of superficial hypopharyngeal cancers that were undetectable in the past. However, even though advanced endoscopic technology can detect early lesions, it is useless unless it can provide wide exposure of an area. By applying manoeuvres to expand the hypopharyngeal area during endoscopic examination, it is possible to observe a wider range of the hypopharyngeal space than is possible with conventional method alone.

In the present study, with Head Torsion, patient’s head was rotated laterally to open the contralateral pyriform fossa. By performing the valsalva manoeuvre, pressure was applied to the hypopharyngeal area by holding breath to open the pyriform fossa bilaterally. Lastly with the Killian position, the patient’s neck was bent forward and the chin

Fig. 1 Endoscopic images in Normal position, with Head torsion and in Killian position respectively

was depressed far enough to look down at the umbilicus so that the postcricoid region was visible.

In the present study, statistical analysis indicated the superiorities of head torsion, valsalva and killian position when compared with normal seated position. Several previous studies have suggested techniques or manoeuvres for improving the visualization of hypopharynx.

Tsunoda et al. [4] have suggested significant improvement in visualization of hypopharyngeal area using head torsion technique during fibre-optic endoscopic examination. Spraggs et al. [5] performed valsalva manoeuvre to aid in the endoscopic hypopharyngeal examination and concluded superiority of this procedure compared to normal seated position. Various other techniques have been advised from time to time to aid in the endoscopic visualization of the hypopharynx [6, 8, 11, 12]

Conclusion

The present study demonstrated that head torsion, valsalva manoeuvre and killian position, alone or in combination, provide an effective view of the entire circumference of the hypopharyngeal space in patients undergoing endoscopic examination. These useful manoeuvres can be performed easily and hence should be a part of flexible laryngoscopy for outpatients as a routine.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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