

THE CHARACTERISTICS OF NARROW BAND IMAGING ENDOSCOPY IN DIAGNOSIS OF HYPOPHARYNGEAL AND LARYNGEAL CANCER AND FOLLOWING - UP POST TREATMENT

Le Chi Thong¹, Dang Thanh², Tran Phuong Nam¹,
Nguyen Quoc Dung¹, Phan Ngo Huy¹

ABSTRACT

Background: This paper aimed to explore the characteristics of narrow band imaging (NBI) endoscopy in diagnosis of hypopharyngeal and laryngeal cancer and following – up post treatment

Material and methods: A total of 75 patients included 36 patients with hypopharyngeal cancer and 39 patients with laryngeal cancer who had diagnosed at Department of Otolaryngology – Hue Central Hospital from 5/2017 to 7/2018. A descriptive study was conducted.

Results: The age group 51 - 60 years occurred most often, 33.3%. The UICC stage III was 65.3%. Tumor was in ulcerative and infiltrate form (89.4%), edema and inflammation of margin tumor (41.3%), invasive (58.7%). Intrapapillary capillary loops (IPCL) type V-n was 46.7%. The tumor with IPCL type V-n had strong enhancement (51.3%) and moderate enhancement (44.4%) after contrast medium injection on CT scan. One month after treatment, there were 33,3% of tumor – free, 53.7% of mucosal edema and 13% tumor size-decreasing on NBI image.

Conclusion: NBI endoscopy is a useful tool for diagnosing of hypopharyngeal and laryngeal cancer and following - up post treatment.

Keywords: narrow band imaging endoscopy, hypopharyngeal cancer, laryngeal cancer

I. INTRODUCTION

Hypopharyngeal and laryngeal cancer are malignant tumors which most commonly arise from the mucosal surfaces. Hypopharyngeal and laryngeal cancer is the third most common cancer of head and neck cancer[3]. These diseases are often associated with gender, smoking, alcohol. In 2012, Globocan estimated 142000 cases of oro – hypopharyngeal cancer, 1% of all new cancer and 157.000 cases of laryngeal cancer, 1.1% of all new cancer[2]. In Hanoi – Vietnam, from 2001 – 2005, following Tran Van Thuan et al, the rate of hypopharyngeal cancer was 1% and the rate of

laryngeal cancer was 0.8%[10].

Narrow band imaging (NBI) endoscopy in ENT is an imaging test that supports the diagnosis malignant lesion in hypopharynx and larynx based on the scattering and absorption characteristics of each light wavelength[1]. NBI helps distinguish between cancerous and non-cancerous lesion by the changes of intra-epithelial papillary capillary loops (IPCL). NBI endoscopy has proved to be a useful tool in screening, diagnosis, biopsy the suspect lesion in hypopharynx and larynx.

This paper aimed to explore the characteristics of narrow band imaging endoscopy in diagnosis of

1. ENT Department – Hue Central Hospital

2. ENT Department – Hue University of Medicine and Pharmacy

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- Corresponding author: Le Chi Thong
Email: thonglechi@gmail.com

Hue Central Hospital

hypopharyngeal and laryngeal cancer and following – up post treatment.

II. MATERIAL AND METHODS

2.1. Materials

A total of 75 patients included 36 patients with hypopharyngeal cancer and 39 patients with laryngeal cancer. All patients hospitalized at ENT Department – Hue Central hospital from 5/2017 to 5/2018.

All patients who presented with hypopharynx or larynx SCC were performed NBI endoscopy, CT scan with contrast. Patients were followed – up for

1 months after finishing treatment. Patients who had surgery or radiotherapy before were excluded.

2.2. Methods

All patient records were collected. A descriptive study was conducted on the data. This statistical analysis was done with IBM SPSS 20.0

We collected clinical records, classified tumor according UICC TNM classification system[3]. We classified morphology changes of intraepithelial papillary capillary loop (IPCL) features under NBI following the IPCL pattern classification modified by Inoue[5].

III. RESULTS

3.1. Clinical features and NBI endoscopic image of hypopharyngeal cancer and laryngeal cancer

3.1.1. Clinical features

Table 1: Distribution of age group

Age group	Hypopharyngeal cancer		Laryngeal cancer		Total	
	n	%	n	%	n	%
≤ 40	2	5.6	0	0	2	2.7
41 – 50	8	22.2	4	10.3	12	16.0
51 – 60	12	33.3	13	33.3	25	33.3
61 – 70	5	13.9	11	28.2	16	21.3
> 70	9	25.0	11	28.2	20	27.7
Total	36	100.0	39	100.0	75	100.0
Mean ± SD	60.3 ± 14.5		63.7 ± 12.2		62.1 ± 13.4	

Of 75 patients, the age group 51 – 60 was the highest rate, 33%. There was a significant difference between the age groups. The mean age was 62.1 ± 13.4.

Table 2: Patient's gender

Gender	Hypopharyngeal cancer		Laryngeal cancer		Total	
	n	%	n	%	n	%
Male	13	91.7	37	94.9	70	93.3
Female	3	8.3	2	5.1	5	6.7
Total	36	100.0	39	100.0	75	100.0

A total of 70 (93.3%) male and 5 (6.7%) female were included in this study. The ratio of male/female was 14/1.

Table 3: Distribution of clinical symptoms

Clinical symptoms	Hypopharyngeal cancer		Laryngeal cancer		Total	
	n = 36	%	n = 39	%	n = 75	%
Dysphagia						
Dysphagia	35	97.2	11	28.2	46	61.3
No –dysphagia	1	2.8	28	71.8	29	38.7
Dyspnea						
Dyspnea	4	11.1	4	10.3	8	10.7
No – dyspnea	32	88.9	35	89.7	67	89.3
Voice disorders						
Hoarseness	25	69.4	30	76.9	55	73.3
Normal voice	11	30.6	9	23.1	20	26.7

With hypopharyngeal cancer group, 35 patients (97.2%) had dysphagia; 30 patients (76.9%) with laryngeal cancer had hoarseness.

Table 4: Distribution of subsite of hypopharyngeal cancer and laryngeal cancer

Subsites of tumor		n	%	p - value
Hypopharyngeal cancer (n = 36)	Pyriform sinuses	28	77.8	p < 0,01
	Posterior wall	5	13.9	
	Post cricoid area	3	8.3	
Laryngeal cancer (n = 39)	Supraglottic	9	23.1	p < 0,01
	Glottic	30	76.9	

Hypopharyngeal cancer involved pyriform sinuses was (77.8%). Laryngeal cancer involved glottic was (76.9%). There was a significant difference between the subsites of hypopharyngeal cancer and laryngeal cancer, $p < 0.01$.

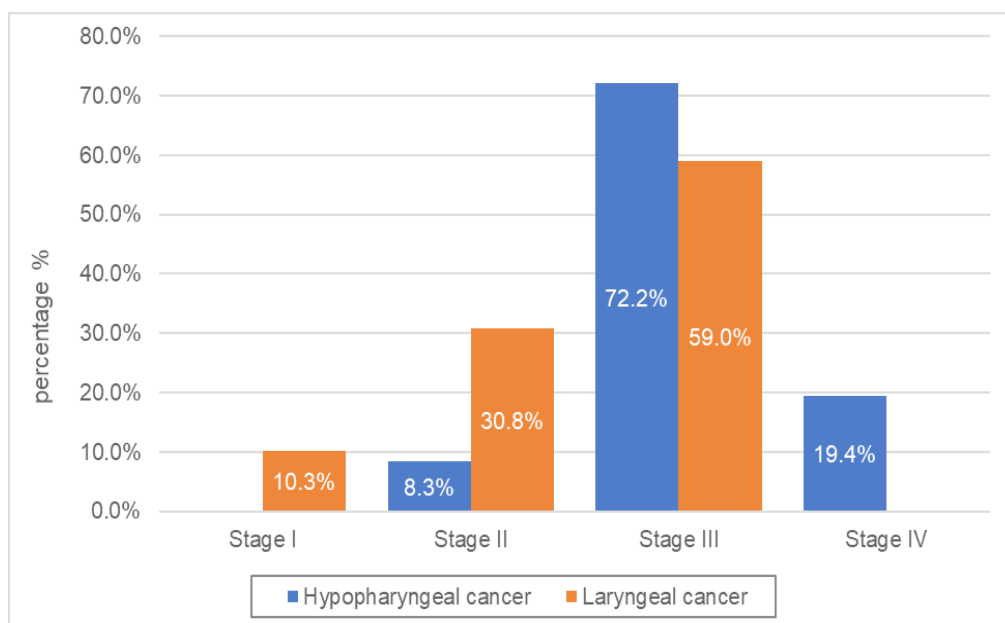


Chart 1: UICC staging classification

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There were 49 of 75 patients (65.3%) with staging cancer III. Of these patients with hypopharyngeal cancer, there was no case of stage I, 72.2% of stage III; patient with laryngeal cancer, there was no case of stage IV, 59% of stage III.

3.1.2. NBI endoscopic image features

Table 5: NBI endoscopic image features

NBI endoscopic image features	Hypopharyngeal cancer		Laryngeal cancer		Total	
	n = 36	%	n = 39	%	n = 75	%
Macroscopic of tumor						
Ulcerative	33	91.7	34	87.1	67	89.4
Infiltrated	3	8.3	4	10.3	7	9.3
Smooth	0	0	1	2.6	1	1.3
Lesion adjacent tumor						
Inflammation	16	44.4	15	38.5	31	41.3
Edema	12	33.4	3	7.7	15	20.0
Infiltrated	4	11.1	4	10.3	8	10.7
No adjacent lesion	4	11.1	17	43.5	21	28.0
Invasive of tumor						
Localize	4	11.1	27	69.2	31	41.3
Invasive	32	88.9	12	30.8	44	58.7

Of all patients, the ulcerative tumor occupied for 89.4%. The adjacent tumor lesion of patient with hypopharyngeal cancer was inflammation (44.4%), invasive (88.9%). 17 patients (43.5%) with laryngeal cancer had no adjacent lesion, tumor localizing (69.2%).

Table 6: Classification of IPCL pattern

Type IPCL	Hypopharyngeal cancer		Laryngeal cancer		Total	
	n = 36	%	n = 39	%	n = 75	%
Type V - 1	6	16,7	11	28,2	17	22,6
Type V - 2	5	13,9	6	15,4	3	4,0
Type V - 3	6	16,7	6	15,4	12	16,0
Type V - n	19	52,7	16	41,0	35	46,7
Total	36	100,0	39	100,0	75	100,0

The rate of IPCL type V-n was the most (46.7%).

3.2. The correlation between the clinical features and NBI endoscopic image

3.2.1. Correlation between the clinical features and IPCL pattern on NBI endoscopic image

Table 7: Correlation between tumor stage and IPCL type

T - stage	Type V – 1		Type V – 2		Type V – 3		Type V – n		Total	
	n	%	n	%	n	%	n	%	n	%
T1	3	17.6	0	0	0	0	1	2.9	4	5.3
T2	10	58.8	6	54.5	5	41.7	8	22.9	29	38.7
T3	4	23.6	5	45.5	7	58.3	24	68.6	40	53.3
T4	0	0	0	0	0	0	2	5.7	2	2.7
Total	17	100.0	11	100.0	12	100.0	35	100.0	75	100.0

There was an increasing T stage with the rate of IPCL type V-n, T1 (2.9%), T2 (22.9%), T3 (68.6%) and T4 (2/2 of cases).

Table 8: Correlation between contrast enhancement on CT scan imaging and type IPCL pattern

Contrast enhancement	Type V – 1		Type V – 2		Type V – 3		Type V – n		Total	
	n	%	n	%	n	%	n	%	n	%
Strong	8	47.1	4	36.4	7	58.3	20	57.1	39	52.0
Moderate	6	35.2	5	45.4	4	33.3	12	34.3	27	36.0
Weak	3	17.7	2	18.2	1	8.3	3	8.6	9	12.0
Total	17	100.0	11	100.0	12	100.0	35	100.0	75	100.0

57.1% of tumor with IPCL pattern type V – n had strong contrast enhancement on CT scan image.

Table 9: Correlation between pathology and type IPCL pattern

SCC	Type V – 1		Type V – 2		Type V – 3		Type V – n		Total	
	n	%	n	%	n	%	n	%	n	%
Well-differentiated	11	64,7	5	45,5	4	33,3	18	51,4	38	50,7
Moderately differentiated	4	23,5	5	45,5	5	41,7	12	34,3	26	34,7
Poorly differentiated	2	11,8	1	9,0	3	25,0	5	14,3	11	14,6
Total	17	100,0	11	100,0	12	100,0	35	100,0	75	100,0

There were changes of grading of squamous cell carcinoma which involved to IPCL pattern, but the difference was no significant statistic.

3.2.2. NBI endoscopic image after treatment 1 month

Table 10: NBI endoscopic image after treatment 1 month (n = 54)

NBI endoscopic image	n	%
No new suspect lesion	18	33.3
Inflammation, edema	29	53.7
Tumor -size decreasing	7	13.0
Total	54	100.0

Of 54 patients following - up 1 month, there were no new suspect lesion (33.3%), tumor - size decreasing (13%)

IV. DISCUSSION

4.1. Clinical features and NBI endoscopy features of hypopharyngeal cancer and laryngeal cancer

4.1. Clinical features

Table 1 showed the age group 51 – 60 was the highest rate, 33%. There was a significant difference in the age groups. The mean age was 62.1 ± 13.4 . Pham Huu Nhan found that the mean age of patients with hypopharyngeal cancer was 54.8 ± 11.4 , the highest rate (32.4%) of age group was 51 - 60[9].

In this study, male was predominant rate, 93.9% (70/75). The male to female ratio was 14/1. This result was likely the other research, hypopharyngeal

cancer and laryngeal cancer occurred most common in male.

Of all patients with hypopharyngeal cancer, the rate of clinical symptoms was dysphagia (97.2%), hoarseness (69.4%) while the rate of hoarseness of patients with laryngeal cancer was 76.9% (table 3). Ngo Thanh Tung et al. found that the rate of clinical symptoms of hypopharyngo – laryngeal cancer was dysphagia (63.3%), odynophagia (60%), hoarseness (46.7%)[6]. The rate of these symptoms changed upon the subsite of tumor.

Table 4 showed that the most common subsite of hypopharyngeal cancer and laryngeal cancer was pyriform sinuses (77.8%) and glottic (76.9%). Pham Huu Nhan quoted pyriform sinus cancer

(73.5%) [3], Vo Nguyen Hoang Khoi quoted glottic cancer (71.1%)[9].

In our series, more than a half of patients (65.3%) were in stage III. We had no case of stage I of hypopharyngeal cancer, stage IV of laryngeal cancer. Our findings suggested that most of patients with hypopharyngeal cancer presented in advanced stage. Of these patients, they had mistaken diagnosis cause of the mimics of sore throat in early stage. The hypopharynx is a rich lymphatic and vascular area so that spreading of malignant cells are deeply and widely.

4.1.2. NBI endoscopic image features

Of all patients, the ulcerative tumor occupied for 89.4%. The adjacent tumor lesion of patient with hypopharyngeal cancer was inflammation (44.4%), invasive (88.9%). 17 patients (43.5%) with laryngeal cancer had no adjacent lesion, tumor localizing (69.2%). The most common of macroscopic morphology of tumor was ulcerative. The ulcerative was a typical lesion of mucosal surface.

The advantages of NBI endoscopy were flexible, small size and able to close-up surface of lesion which support us right determination the adjacent lesion, surface lesion.

Basing on the changes of IPCL pattern of adjacent under NBI endoscopy, a localized lesion was in one subsite anatomy, invasive lesion was in more than one subsite anatomy whatever presentation of symptoms or not. It was a meaningful indication site for us to take biopsy, well - prepared for dissection the tumor.

As the result in table 6, there was no case of IPCL type I, II, III and IV. Most of IPCL pattern was type V-n (46.7%). We found that in advanced stage of hypopharyngeal cancer, tumor had rich neo-vascular which were seen easily under NBI endoscopy.

4.2. The correlation between clinical features and NBI endoscopic image of hypopharyngeal cancer and laryngeal cancer

4.2.1. Correlation between the clinical features and IPCL pattern on NBI endoscopic image

There was an increasing T stage with the rate of IPCL type V-n, T1 (2.9%), T2 (22.9%), T3 (68.6%) and T4 (2/2 of cases) in table 7. Ni et al. found that the intraepithelial papillary capillary loop featured of laryngeal lesions, viewed by narrow band imaging, could be evaluated in most cases. Of the type V lesions, 15.9% comprised dysplasia and carcinoma in situ, 84.1% invasive carcinoma [7], [8]. We could have got false negative for some cases which related to necrotic tissue or a thick white patch on the lesions, masking the mucosal microvasculature. For this circumstance, we should find the changes IPCL at the border of tumor or nearby tumor.

Table 8 showed that tumor with IPCL type V-n had strong and moderate enhancement (51.3%, 34.4%). This result indicated that there was a correspondence between neo-vascular showing under NBI endoscopy and contrast enhancement on CT scan.

In our series, we did not find any correlation between the change of IPCL pattern and the grading of SCC. Like the many other researches, the change of IPCL valid in case of non-invasive base membrane. Satoshi Fujii et al found that the dense microvascular proliferation caused by irregular branching of IPCLs, the upward shift and thickening of IPCLs, which reflect microvascular irregularities detected by NBI endoscopy were observed pathologically in squamous epithelial lesions of the pharynx[4]. The alterations of microvascular structures represented by IPCL irregularities occurred with architectural or cytological abnormalities in squamous epithelial lesions [11].

4.2.2. NBI endoscopic image after treatment 1 month

We followed – up 54 patients and performed NBI endoscopy after 1 month since finishing treatment. There were 33.3% of no new suspect lesion, 53.7% of inflammation or edema in hypopharynx and larynx may related to radio-chemotherapy toxicity. The inflammation or edema of mucosal hypopharynx and larynx During the time of applying NBI endoscopy we found that NBI was useful tool for following – up. It is easy to detect new lesion

or secondary lesion. Patient felt more comfortable while performed endoscopy.

V. CONCLUSION

Hypopharyngeal cancer and laryngeal cancer was most popular in age group 51 – 60. The disease occurred in both gender but male was predominant. Most of patient were in advanced stage. The

ulcerative was typical lesion (84.9%), inflammation of adjacent tumor (41.3%) and invasive (58.7%). There was an increasing T stage with IPCL type V-n. There was a correspondence between neovascular showed under NBI endoscopy and contrast enhancement on CT scan. NBI endoscopy is a valuable tool for diagnosing and follow-up hypopharyngeal cancer and laryngeal cancer.

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