



Nasopharyngeal carcinoma detected by narrow-band imaging endoscopy

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SUMMARY

The aim of the study was to investigate the novel endoscopic findings in nasopharyngeal carcinoma (NPC) under narrow-band imaging (NBI) and to determine the reliability of screening NPC by NBI. A total of 79 adults underwent nasopharyngeal biopsy. We proposed five distinctly different findings that need to be examined by NBI: Type I: brownish spots, Type II: irregular microvascular pattern (IMVP), Type III: light crests, Type IV: side-difference, Type V: presence of either IMVP or side-difference, of which last three (Type III–V) were a new concept. The results of NPC diagnosis by detecting NBI Type V pattern, the false positive, false negative, sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 6.7%, 2.9%, 97.1%, 93.3%, 91.7%, 97.7%, and 94.9%, respectively. On the other hand, there was a higher prevalence of Type I and IV patterns in T1 category NPC. The nasopharyngeal endoscopy coupled with NBI was able to provide a rapid, convenient, and highly reliable screening for high-risk populations.

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Introduction

Nasopharyngeal carcinoma (NPC) is a common cancer in the Southeast of Asia.^{1,2} High-incidence regions are located mainly in Southern China (25 per 100,000 persons per year in the Guangzhou area) and Taiwan.³ It typically affects middle-aged people⁴ and is commonly diagnosed in the late stage because of its deep location and vague symptoms, and this late diagnosis leads to decreased survival.⁵ Unfortunately, most of the NPC patients we encountered had Stage III or IV disease. Therefore, it is of primary importance to establish a screening protocol for NPC diagnosis and to administer treatment in the early stages of disease.⁶

Narrow-band imaging (NBI) is a novel optical technique that enhances the diagnostic sensitivity of endoscopes for characterizing tissues by using narrow-bandwidth filters in a sequential red–green–blue illumination system. The central wavelengths of each band are 415 and 540 nm.⁷ The narrowband blue light, which has a short wavelength (415 nm), penetrates the mucosa and highlights the superficial vasculature. Furthermore, the blue filter is designed to correspond to the peak absorption spectrum of hemoglobin, and thus enhances the image of the capillary vessels on the surface mucosa. Thus, superficial mucosal lesions that

usually cannot be detected by regular white-light endoscopy can be identified on the basis of their neoangiogenetic vasculature pattern by using blue light in NBI.⁸

The literature review showed that the effectiveness of NBI in the early detection of head and neck squamous cell carcinoma (SCC) over the mouth floor,⁹ larynx,¹⁰ oropharynx, and hypopharynx^{11,12} have been documented through the years. It is now generally accepted that NBI is of great benefit in detecting superficial mucosal lesions over the pharyngeal mucosa.¹³ Except for one case that we reported previously of irradiated NPC with early recurrence successfully detected by NBI coupled with conventional endoscopy,¹⁴ there has been still no documentation of its application to primary NPC and the screening performance of NBI for high-risk populations.

In this study, we proposed five distinctly different findings that need to be examined by NBI: Type I: brownish spots, Type II: irregular microvascular pattern (IMVP), Type III: light crests, Type IV: side-difference, Type V: presence of either IMVP or side-difference, of which last three (Type III–V) were a new concept. Previous studies showed that Type I pattern is ordinarily observed in superficial cancers of the oropharynx and hypopharynx.^{11,12} Even Type II pattern is encountered in carcinoma of the oropharynx, hypopharynx, esophagus and stomach.^{15–17}

The main objective of this study was to investigate the novel endoscopic patterns of NPC under endoscopy with and without NBI and to determine the reliability of screening NPC by NBI.

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Table 1

Clinical and Endoscopic Characteristics of 79 subjects divided into three groups based on histopathology of nasopharyngeal biopsies.

Group	Control	LH	NPC
Number	7	38	34
Age, mean (SD), y	51.1 (22.5)	49.2 (18.5)	57.9 (24.3)
Gender			
Male	5	24	29
Female	2	14	5
AJCC T-category			
T1			9 (26.5%)
T2			11 (32.4%)
T3			8 (23.5%)
T4			6 (17.6%)
AJCC stage			
I	–	–	4 (11.8%)
II	–	–	6 (17.6%)
III	–	–	12 (35.3%)
IV	–	–	12 (35.3%)
Histopathology			
Negative for malignancy	7		
Lymphoid hyperplasia		38	
Non-keratinizing carcinoma			13 (38.2%)
Undifferentiated carcinoma			21 (61.8%)
NBI pattern			
I	0	0	3 (8.8%)
II	1 (14.3%)	2 (5.3%)	23 (67.6%)
III	2 (28.6%)	35 (92.1%)	0
IV	0	0	25 (73.5%)
V	1 (14.3%)	2 (5.3%)	33 (97.1%)

AJCC: American Joint Committee on Cancer.

Patients and methods

A total of 79 adults (58 males, 21 females; mean age, 52.9 ± 21.8 years) underwent nasopharyngeal biopsy due to nasopharyngeal tumor, asymmetric nasopharyngeal wall, elevated serum Epstein-Barr Virus (EBV) titer, NPC family history and/or neck mass of unknown primary tumor. The subjects also underwent detailed endoscopy examinations beforehand, performed using

both the conventional white-light and NBI systems. The demographic data and endoscopic characteristics are shown in Table 1. This study was approved by the ethics committee of the hospital, and written informed consents were obtained from every patient before proceeding with endoscopic examinations and nasopharyngeal biopsy.

Preparation and equipment

The NBI system used was equipped with an ENF-V2 or VQ rhinolarynx videoendoscope (Olympus Medical Systems, Tokyo, Japan), a light source (CLV-160B; Olympus Medical Systems, Tokyo, Japan), and a central video system (CV-160B, Olympus Medical Systems). A button on the control section of the videoendoscope enabled switching between the conventional and NBI views.

Endoscopic screening procedures

All endoscopic examinations were performed by 1 of the 2 experienced otolaryngologists (Y.C. Lin or W.H. Wang) in the outpatient clinic. The patients were examined in the seated position. Prior to the endoscopic procedure, the nasal cavity of each patient was anesthetized with a 4% lidocaine hydrochloride spray. Trans-nasal endoscopy was performed first in the white-light mode (Fig. 1A) and later by the NBI system. Under NBI view, we were able to find abundant microvessels and reticular subepithelial capillary network with collecting venules over normal nasopharyngeal mucosa (Fig. 1B).

We proposed five possible abnormal endoscopic findings to be searched by NBI of the nasopharynx as follows:

- (1) Brownish spots indicate irregularly high density and thicker vessels. (Type I pattern, Fig. 1C).
- (2) Irregular microvascular pattern (IMVP) indicates tortuous microvessels with abnormal dilatation, abrupt alteration in caliber and heterogeneity in shape. (Type II pattern, Fig. 1D and E).
- (3) Light crests (LC) sign indicates a fine, white line on the crests of the surface. (Type III pattern, Fig. 1F).

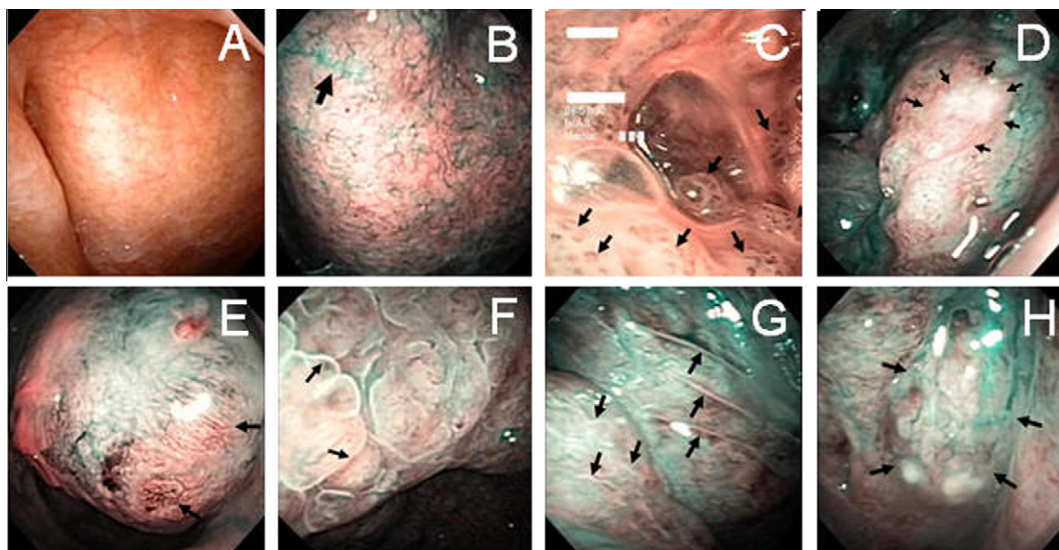


Figure 1 Patterns of endoscopy by white-light or NBI view for normal and abnormal mucosa over nasopharynx. (A) Under standard white-light endoscopy, the microvascular pattern was unclear. (B) The reticular subepithelial capillary network pattern with collecting venules (arrow) was well visualized by NBI endoscopy. (C) Type I brownish spots pattern detected over right Rosenmuller's fossa. (D) and (E) Type II irregular microvascular pattern (IMVP) observed over left Rosenmuller's fossa in two patients. (F) Type III light crests (LC) sign represented a fine, white line (arrow) on the crests of the epithelial surface. (G) and (H) Type IV side-difference, LC sign (arrow) was seen over the right side, but not over the left side (arrow) for the same patient. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

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