NBI HDTV Magnifying Endoscopy in Laryngeal Papillomatosis and Laryngeal Spinocellular Cancer

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Introduction

NBI (Narrow Band Imaging) is a novel endoscopic method, which helps to visualize vascular changes due to neangiogenesis, which are typical for mucosal neoplastic diseases. This technique uses illumination of mucosa by special light filters, which is composed of two isolated wavelengths (430 and 540 nm). These wavelengths are highly absorbed by hemoglobin and amber pigments, which results in a capillary loop in the mucosal epithelium (IPCL - intrapapillary capillary loop). Light with longer wavelength penetrates deeper and better highlights small mucosal vessels (Figure 1). In the detection of superficial mucosal lesions characteristic for neoplastic disease (e.g. dysplasia, or involution to cystic changes) in the epithelium (skinning, changes of the surface layer) and changes in vascularization can be observed using NBI endoscopy. In developing neangiogenesis, IPCL changes occur (e.g. extension or changes of caliber and course of IPCL). These altered IPCL are recognizable in the NBI as the brown dots irregularly distributed in the demarcated area of altered epithelium. NBI endoscopy is a method with high sensitivity and specificity for detection of early stages of mucosal malignancies.

Combination of NBI with HDTV (high-definition television) and magnifying endoscopy is being used recently. This combination leads to increased sensitivity and specificity of endoscopic investigation. Changes of mucosal microvessels pattern may help to better discriminate malignant and benign disease during clinical investigation. Capillary zone changes are characteristic for malignant neoplasms, e.g. proliferation and aneurysm in early stage of malignant banlomas. The most frequent false positive results of conventional NBI endoscopy were reported in cases of laryngeal papillomatosis, when this microvascular pattern can be accidentally observed for the neangiogenesis. Discrimination of benign neoplasms from malignant spinocellular cancer (SSC) can be difficult when using conventional NBI endoscopy and can lead to false positive results. The question is whether the observation of microvascular IPCL pattern using magnifying HDTV NBI endoscopy can refine identification of papillomas and SSC.

Material and Methods

In our study we focused on evaluation of NBI HDTV magnifying endoscopy for proper discrimination of laryngeal cancer. Our HDTV system (OPTIKON OTS-3001HD 125) camera head was used with combination of rigid magnifying telescopes during microscopic examination. Conventional NBI endoscopy was performed using OPTIKON bi-vision system in an outpatient arrangement. Patients with papillomatosis and laryngeal SCC were investigated. Video and photography documentation were taken. The findings focused on mucosal intravascular changes were compared.

Results

Preliminary results show that increased neangiogenesis is present in both laryngeal papillomatosis and laryngeal SSC. The presence of proliferation and entanglement of IPCL was observed in both groups. In papillomas magnifying HDTV endoscopy shows multiple papillae with vessel along central axis. The pattern of the papillae is rather regular. On the other hand the vascular pattern of SCC shows many irregularities (Figure 3). Using NBI mode in combination with HDTV magnifying endoscopy improves the visualization of IPCL (Figure 4). Nevertheless IPCL irregularities could occur also in cases of laryngeal papillomatosis (Figure 5). In SSC irregularities of IPCL pattern are obvious (Figure 6).

Conclusions

Clinical discrimination of papillomatosis and early stage of laryngeal SSC could be difficult using conventional NBI endoscopy. More accurate diagnosis can be achieved using NBI HDTV magnifying endoscopy, which makes it possible to visualize IPCL changes. It is necessary to evaluate not only changes of IPCL structure, but also the regularity of their pattern. In laryngeal papillomas the arrangement of IPCL pattern is rather regular, while in the SCC partial or complete collapse of cervical microarchitecture can be frequently observed. In some cases, however, the distinction between papilloma and SCC can be difficult even in NBI HDTV magnifying endoscopy.

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References


Figure 1. NBI epicanalgoscopy in white light (A) and conventional endoscopy (B).

Figure 2. NBI HDTV magnifying endoscopy normal IPCL (A), irregular (B).

Figure 3. NBI HDTV magnifying endoscopy in white light (A) and SSC (B).

Figure 4. Spatial distribution of the vocal cord - conventional endoscopy in white light (A) and NBI (B).

Figure 5. NBI HDTV magnifying endoscopy in white light (A) and SSC (B).

Figure 6. Spatial distribution of the vocal cord - conventional endoscopy in white light (A) and SSC (B).