

# Role of Narrow Band Imaging in Early Detection of Upper GI Malignancy

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**Abstract- Introduction:** Gastrointestinal cancer is the second most common cancer in Asia and second leading cause of death worldwide. It is a leading cause of cancer associated mortality. Hence, there is a need for early detection of GI cancer. Narrow band imaging (NBI) is a novel technology that enhances visualization of the vascular network and surface texture of mucosa, thereby assisting in tissue characterization, differentiation and diagnosis. NBI is used in early detection of inflammatory and neoplastic lesions of esophagus, stomach and large intestine.

**Material & method:** We conducted a prospective interventional type of hospital based study of 40 patients at Hitech medical college. All patients of any ethnicity presenting to Hitech medical college and hospital, Bhubaneswar, for upper GI endoscopy regardless of indication (screening, surveillance or symptoms) were included in this study.

**Result:** Fourty patients were included in this study with no macroscopic lesion on normal white light endoscopy. But, when subjected to narrow band imaging, significant findings were observed. In our study, it was observed that out of 40 cases suspected to be malignant, 13 cases reported positive for esophageal cancer, 9 cases reported positive for gastric cancer and 1 case reported to be positive for duodenal dysplasia. 1, 13 and 3 cases reported to be esophagitis, gastritis and duodenitis respectively

**Conclusion:** It is thus concluded that narrow band imaging is a good modality for early detection of upper GI malignancies and requires further expertisation. On the basis of the study result, the use of NBI technology is recommended for routine upper GI endoscopy.

**Index Terms-** Narrow band imaging [NBI], Early gastric cancer [EGC], Gastrointestinal [GI].

## I. INTRODUCTION

Gastrointestinal cancer is the second most common cancer in Asia and second leading cause of death worldwide. It is a leading cause of cancer associated mortality. Hence, there is a need for early detection of GI cancer. The incidence of GI cancer is high in Japan but the mortality due to it is significantly low. This all owes to the available boon of advanced scientific technology for early detection of GI cancer. Comparatively, there is low incidence but very high mortality in India. This is because of delay in detection of malignancies at an earlier stage.

Early gastric cancer (EGC) which is defined as a lesion confined to the mucosa or submucosa regardless of presence of lymph node metastasis and has a good prognosis with surgical treatment. Before 2005, patients were subjected to white light endoscopy and biopsies were taken from gross pathological abnormality. Thirty six percent of biopsy reports were suggestive of malignancy at an advanced stage, 58% required repeat biopsies. These patients were posted for repeat upper GI endoscopy and biopsy. These might be the cause for delay in diagnosis of malignancy<sup>1</sup>. Year 2005 has been a boon to endoscopic sciences with invent of narrow band imaging. Narrow band imaging (NBI) is a novel technology that enhances visualization of the vascular network and surface texture of mucosa, thereby assisting in tissue characterization, differentiation and diagnosis. This technology involves placement of narrow band filters in front of a conventional white light source to obtain tissue illumination at selected narrow wave length bands. NBI has primarily been applied for analysis of the surface architecture i.e. pits pattern and analysis of vascular network. Small capillary vessels on the mucosal surface can be seen most clearly at 415nm which is the wave length that corresponds to the hemoglobin absorption band, while large collecting vessels can be observed at 540nm<sup>2,3</sup>. NBI is used in early detection of inflammatory and neoplastic lesions of esophagus, stomach and large intestine. It is useful to distinguish between adenomatous and non-adenomatous polyps. NBI is also used for surveillance of Barrett's oesophagus and patients at high risk for squamous cancer of oropharynx, oesophagus and stomach<sup>1</sup>.

## II. AIMS AND OBJECTIVES

The aim of the study is to determine the efficacy of narrow band imaging in early detection of upper GI malignancy.

## III. MATERIALS AND METHODS

The study was conducted in the department of general surgery, Hitech medical college and hospital, Bhubaneswar during the period July 2013 to March 2015.

## INCLUSION CRITERIA

All patients of any ethnicity presenting to Hitech medical college and hospital, Bhubaneswar, for upper GI endoscopy regardless of indication (screening, surveillance or symptoms).

#### EXCLUSION CRITERIA

- 1) Macroscopic lesions
- 2) Pregnant patients
- 3) Inability to take biopsy due to anti-coagulation therapy, varices etc.

#### IV. OBSERVATIONS

The study was conducted in department of surgery, Hitech medical college and hospital, Bhubaneswar. 40 patients were included in this study. These patients had no macroscopic lesion on normal white light endoscopy. But, when subjected to narrow band imaging, significant findings were observed. Biopsy were taken from suspected lesions and sent for histopathological reporting. 23 cases were suggestive of malignancy, while 17 cases suggestive of inflammatory pathology (Table-1). In our study the mean age for upper GI malignancy in males is 57.3 years and in females it is 52.4 years. The overall mean age for upper GI malignancy observed is 54.8 years (Table-2). In our study, it was observed that out of 40 cases suspected to be malignant, 13 cases reported positive for esophageal cancer, 9 cases reported positive for gastric cancer and 1 case reported to be positive for duodenal dysplasia. 1, 13 and 3 cases reported to be esophagitis, gastritis and duodenitis respectively (Table-3)

#### V. DISCUSSION

Gastric cancer is the second most common cancer among men and third most common among females in Asia and Worldwide. Gastric cancer is the fifth most common cancer among males and seventh most common among females in India. The aggressiveness of the disease and need for improvement in therapeutic options is discerned by the fact that gastric cancer is the second most common cause of cancer death globally<sup>4</sup>. Cancer is a word which has become a night mare for relatives of the patients. There are different modalities for treatment of advanced cancer but none has been able to significantly improve the 5 year survival rates. Hence there is a need for early detection of upper GI malignancy. White light endoscopy has been observed to be helpful in cases with macroscopic lesion. There is a need to identify and cure the cancer at an earlier stage i.e. before appearance of macroscopic lesion. Thanks to advent of narrow band imaging, NBI describes the microvasculature and microstructure of the GI tissue. There is no requirement for introduction of additional dye or stain in NBI.

In this study, 40 cases have been observed. These 40 cases were missed for their significant lesion on white light endoscopy. Significant vascular and surface architecture changes were observed in these cases on NBI. We have been able to diagnose 23 cases at an earlier stage. These cases thus would be treated with proper surgical resection, while only palliative procedure would have been possible if they were diagnosed at an advanced stage. Remaining 17 cases have been diagnosed at chronic inflammatory stage. These 17 cases have been thus diagnosed at

pre-cancerous stage. This has proved to be useful for starting necessary prophylactic treatment for the patients. Follow up endoscopy every year has been advised to these 17 cases. Equal number of cases of both genders have been included in this study. In our study, it has been observed that most of the cases have presented in 50-70 years of age group. The vascular and cellular changes in these study cases were detected by this novel technology of narrow band imaging and not by routine white light endoscopy. This proves sensitivity of narrow band imaging to be 100% as compared to white light endoscopy on basis of our study observations. This finding is consistent with study conducted by Yasuo Hamamoto et al, Mannath et al and Raghunath for higher sensitivity of narrow band imaging in comparison to white light endoscopy<sup>5,6</sup>.

#### VI. CONCLUSION

The present study of 40 patients was conducted at Hitech medical college and hospital, Bhubaneswar and patients were subjected to upper GI endoscopy with white light imaging followed by Narrow Band Imaging. These patients had no macroscopic lesion like ulcer, polyp, mass etc but significant finding on narrow band imaging. Biopsies were taken from lesion suspected to be malignant in these 40 cases and sent for histopathological confirmation. In 57.5% cases malignancy has been proved on histopathological reporting. NBI has proved to be a fruitful technology for all the case study patients. Thus, it is concluded that narrow band imaging is a good modality for early detection of upper GI malignancies and requires further expertisation. On the basis of the study result, the use of NBI technology is recommended for routine upper GI endoscopy.

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**TABLE-1**  
**Findings of narrow band imaging**

CANCER	NUMBER	PERCENTAGE
Positive	23	57.5%
Negative	17	42.5%
Total	40	100%

Narrow band imaging detected 57.5% malignancy with normal white light endoscopic finding

**TABLE -2**  
**The overall mean age for upper GI malignancy**

SEX	MEAN	SD	MINIMUM	MAXIMUM
MALE	57.3	13.98	32	80
FEMALE	52.4	17.24	15	75
OVERALL	54.85	15.69	15	80

GI malignancy are more common in age group 50-60 years

**TABLE -3**  
**Malignancy detected in narrow band imaging**

Sr. No	HISTOPATHOLOGY	MALE CASES	FEMALE CASES	TOTAL
1	OESOPHAGITIS	1	0	1
2	OESOPHAGEAL CANCER	4	9	13
3	GASTRITIS	7	6	13
4	GASTRIC CANCER	6	3	9
5	DUODENITIS	1	2	3
6	DUODENAL DYSPLASIA	1	0	1
	TOTAL	20	20	40

Table shows early detection of carcinoma in 23 cases and inflammatory lesion in rest.