Narrow band imaging colonoscopy compared to standard white light colonoscopy in detection of different colonic lesions

Thesis
Submitted for partial fulfillment
of master degree in tropical medicine

BY
Ahmed Soliman Ahmed Mabrouk
(M.B.B.CH.)

Supervised By

Prof.Dr. Zakaria Abd El-latif Salama
Professor of Tropical Medicine
Faculty of Medicine
Cairo University

Prof.Dr. Ayman Rashad Amer
Assistant Professor of Tropical Medicine
Faculty of Medicine
Cairo University

General Dr. Medhat Hassan El Sahhar
Consultant of Hepatology and gastroenterology
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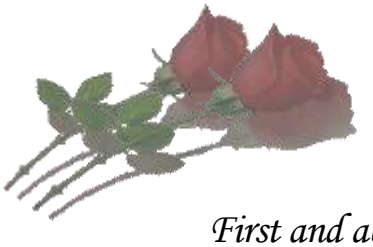
Abstract:

Key words : Narrow band imaging(NBI), White light imaging, colonoscopy,
colorectal lesions.

NBI is imaging technique for endoscopic diagnostic medical test which use
Light for specific blue and green wavelengths and usrd to enhance the details
Of certain aspect of surface of mucosa.NBI in GIT endoscopy used in identification
Of Barrett's oesophagues , classify colorectal polyps, tumours and identify
Atyical cells in chronic ulcerative colitis, aim of study to evaluate feasability
Of NBI compared to WLC , The study included four groups and reveal that
NBI is not superior to WLC in detection of different colorectal lesions



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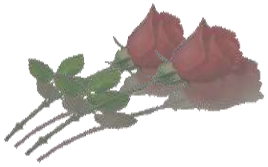
Finally, many thanks for my mother and mercy upon her in her final resting place , my wife and my family for their encouragement and support.



Ahmed Soilman Ahmed Mabrouk

List of figures and tables

List of appreviations

APC : argon plasma coagulation

ASCA : anti-saccharomycis cervisiae antibody

B.V : blood vessele

CCD : charge coupled device

CD : crohn's disease

C.P : capillary pattern

ERCP : endoscopic retrograde cholangiopancreaticograph

ESR : endoscopic submucosal resection

FAP : familial adenomatous polyposis

GAVE : gastric antral vascular ectasia

GEJ : gastro-esophageal junction

GERD : gastro esophageal reflux disease

HGIN : high grade intraepithelial neoplasia

HRE : high resolution endoscopy

IPCLs : intra-epithelial papillary capillary loops

LGIN : low grade intraepithelial neoplasia

MALT : mucosal associated lymphoid tissue

MCC : magnifing chromo colonoscopy

MVP : mucosal vascular pattern

NBI : narrow band imaging

NSAIDs : non sterodal anti inflamatory drugs

PAS : periodic acid schiff

PDT : photo dynamic therapy

RF : radi frequency

SCC : squamous cell carcinoma

SSBE : short segment Barret's esophagus

UC : ulcerative colitis

WLC : white light colonoscopy

Introduction

Introduction

Improvements in resolution of imaging in video endoscopy over the years have resulted in a tremendous increase in different lesion's detection rate in colon. (***Butterly., 2006)***

The distinction therefore between non-neoplastic and neoplastic colorectal polyps in vivo allows the differentiation between malignant and non malignant lesions that eliminating cost associated with unnecessary biopsies and risk with polypectomies. Narrow band imaging is a novel endoscopic imaging technique that has recently come to the forefront. (***Gono ., 2004***)

Narrow band imaging (N.B.I) is a new optical technology that modifies white light by using only certain wave lengths to enhance the image. The technology provide more visual details of the lining of the colon (including polyps) and of the small blood vessels near the surface of polyps.(***American society of gastro intestinal endoscopy.,2008***)

It relies on alternating the normal (red,green,blue) optical filters in the light source of video endoscopy system that are used to make up sequential colored frames of endoscopic images. The relative contribution of longer wave length and deep penetrating red light is negated and superficial penetrating narrowed spectral blue and green wave lengths used instead which lead to enhancement of surface mucosal morphology whereby the micro vascular and micro structural pit patterns are visualized in greater detail. NBI is relatively simple to use involve the activation of a switch thus enabling the endoscopist to obtain images. (***Rajvinder., 2009***)

Narrow band imaging colonoscopy had a benefit for identification of flat lesions less than (10mm) in size, detection rate of flat lesions using narrow band imaging approximately 20% higher than that using standard fibro optic colonoscopy.(***Jonathan., 2007***)

Narrow band imaging without optical magnification was more accurate in predicting colon polyp histology compared with standard colonoscopies. (***Sikkas., 2008***)

Aim of the work

This study will evaluate clinical feasibility of the narrow band imaging System for evaluating colorectal lesions compared to standard white light colonoscopy.

Biopsies will be taken to confirm macroscopic picture of certain lesions or polyp.

Review

Narrow band imaging:

historical background and basis for its development

In Japan where the incidence of gastric cancer is very much higher than the rest of the world , greater attention has been paid to early diagnosis since the beginning of 1950s when the "gastro camera" was first introduced. In those days, the finding of early gastric cancer (EGC) was not frequent and most of these lesions were identified from the differential diagnosis of deeply ulcerated (type III) or polypoid (type I) lesions, which can be easily detected. In 1970s, early diagnosis progressed and it became possible to detect those cancers showing the appearance of ulcer scar (type IIc) and plateau-like elevation (type IIa). In the beginning of 1980s, furthermore, early diagnosis of gastritis-like malignancy (IIb-like type) became more readily possible following the results of retrospective studies of rapidly growing advanced cancer. (Youshida ,1981.)

With this increased appreciation of the appearance of early superficial lesions, widespread use of biopsy together with careful scrutiny of the mucosa using dye spraying techniques, EGCs which appear just as a faint mucosal irregularity or discoloration came to be the most frequent EGC that were being diagnosed by late in the 1980s (Youshida ,1984.).

NBI is an optical image enhancement technology that enhances vessels in the surface of mucosa and patterns of the surface of mucosa by employing the characteristics of light spectrum The development of NBI goes back to the study of spectroscopy in 10 years ago. (shigeaki, 2007.)

The development of NBI (narrowband imaging) started in May 1999. To confirm the idea of NBI, a study using a multi spectrum camera capable of producing spectroscopic images and high-power light source was conducted. The study revealed that the use of 415nm narrow band light can improve the contrast of capillary images which are difficult to observe under conventional white light. On December 14, 1999,

based on a study using the NBI prototype, they confirmed that the technology was promising for endoscopies of colon, stomach and esophagus. Since this time, they have developed products in cooperation not only with Japanese, but also endoscopists from around the world in an effort to expand the capacity of the prototype. EXERA II, the next generation system equipped with both HDTV and NBI, was introduced in December 2005. At present, Olympus has two types of video endoscopy systems in use worldwide. The difference between both systems is based on how a color image is produced. One is based on a color CCD chip which has several tiny color filters in each pixel. This system is the 100 series and is branded as EVIS EXERA II. The second system is based on a black and white CCD, in which color separation is achieved through the use of an RGB color filter wheel equipped within the light source unit. This system is the 200 series and is branded as EVIS LUCERA SPECTRUM. Both systems possess NBI technology. Research and development for NBI was first attempted with the EVIS LUCERA SPECTRUM system, the system predominant in Japan, UK, and Asian countries. Once success was achieved with that system, research and development was focused on the use of NBI with the color CCD system or EVIS EXERA II. Both systems possess the same optical filter in the light source, which enables the illumination of two narrow bands within the visible spectrum of light for NBI. As such, both systems are "optically" identical. However, since both technologies are fundamentally different, there are actually some minor differences in image reproduction. But for NBI, both systems are the same, as they both provide improved image contrast when viewing micro-vessel patterns within the superficial mucosa. If both systems images were compared simultaneously without magnification, some observers may notice slight differences. However, these differences are quite minor and have not been shown to be clinically significant. Apart from these optical features, the two systems do differ in the method of magnification incorporated into the endoscopes and the resulting capability to magnify the images observed. In the EXERA II system, the endoscope currently has