

# A Systematic Review Investigating Role of Intra-Operative Use of Narrow Band Imaging (NBI) In Management of Laryngeal Malignancy

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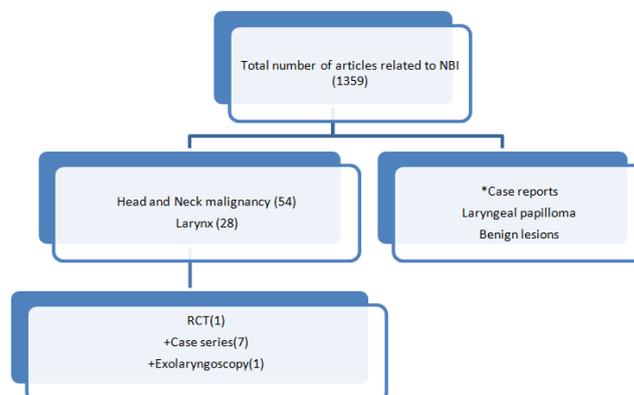
## I. Introduction

Narrow Band Imaging (NBI) Is Modified White Light with Narrow Band of 415nm and 540nm Frequencies, Producing Blue And Green Light Band Respectively. These Frequencies Are Strongly Absorbed By Haemoglobin. Narrow Band Blue Light (415nm) Penetrates Mucosal Layer And Displays Superficial Capillary Networks, While Narrow Band Green Light(540nm) Penetrates Deeper Submucosally And Displays Sub-Epithelial Vessels.(1)Changes In Capillary Papillary Network In Laryngeal Mucosa And Submucosa Due To Malignancy Are Detected Early By NBI Endoscopy. NBI Along With High Definition Television Camera (HDTV) Improves Its Efficacy Significantly

NBI Could Be Used To Excise Accurate Tumor Margins, Thus Would Prevent Recurrence And also Reduce Damage To Collateral Tissue.

## II. Method

Articles Were Searched From Pubmed, Using Key Words NBI, Head And Neck Malignancy And Larynx. Along With Statistically Significant Studies, Randomised Controlled Trial And Exolaryngoscopy Is Discussed. Duplicate Articles, Small Case Reports, Case Reports With Other Than Laryngeal Pathology, Laryngeal Papilloma Were Excluded.



\*Excluded Articles

## III. Results

The Case Studies With Significant Value Are Discussed.

**Muto Et Al** Is A Multicentre, Prospective, Randomised Controlled Trial(RCT). 320 Patients With Diagnosed Or Previously Treated Oesophageal Squamous Cell Carcinoma(ESCC) Were Included In This Study, Only Superficial Mucosal Lesions Were Evaluated.(2) Randomisation Was Done In Primary Endoscopic Examination, Either By WLI Or NBI. Diagnosis Of Lesions Was Confirmed With Histopathology Examination.

This Study Proved That NBI Endoscopy Significantly Improved Detection Rate For Squamous Cell Carcinoma. Due To Lack Of Comparative Studies Related To NBI, The Sample Size Was Calculated Assuming NBI Would Increase The Detection Rate By Threefold. Accurate Evaluation Of Specificity Was Not Mentioned.

**Piazza Et Al** Carried Out Prospective Study On 279 Patients Affected By Laryngeal Squamous Cell Carcinoma(LSCC).(3) NBI Was Used Pre And Intra-Operatively. Findings Of NBI Were Compared With Histological Examination Of Biopsied Lesions.

**Ni Et Al** Investigated Characteristics Of Laryngeal Mucosal Intraepithelial Papillary Capillary Loops Using NBI.(4) The Typical Appearance Of Lesions Was Co-Related With Its Histopathology. Lesions Were

Classified In 5 Types, Type I To IV As Non-Malignant And Type V As Malignant. Total 104 Lesions Were Detected In 85 Patients. It Was Recommended To Screen Synchronous And Metachronous Head And Neck Carcinomas To Check Post-Treatment Recurrence, As Scar Tissue Or Inflammation Did Not Influence NBI Image.

**Bertino Et Al** Studied 248 Lesions In 217 Patients From 2009 – 2011.(5) All Lesions Were Classified Based On Ni Classification. Accuracy Of Diagnosis Was Confirmed By Histopathology. As Retrospective Comparison Of Images Was Done With Histological Findings, The Risk Of Operator Bias Is More.

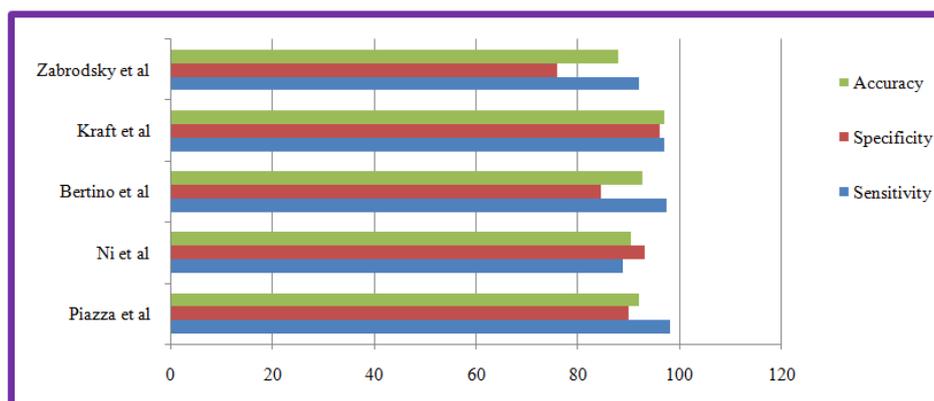
**Kraft Et Al** Carried Out A Prospective Study Of 205 Patients With Laryngeal Lesions Scheduled For Microlaryngoscopy(MLS).(6) Preoperative WLI And NBI Was Done And Lesions Were Classified. Histological Verification Diagnosis Concluded That NBI Qualifies For Rapid Detection And Delineation Of Suspicious Malignant As Well As Benign Lesions.

In This Study The Results Produced Were Of Combined WLI + NBI.

**Zabrodsky Et Al** Examined 66 Patients Previously Treated With Radiotherapy(RT) Or Chemoradiotherapy(CRT), To Detect Recurrent Or Secondary Tumours Of Upper Aerodigestive Tract.(7) Average Duration Of Follow Up Was 31.3 Months. This Study Suggested That There Was A Need For A New Classification Suitable For Irradiated Patients That Would Include The Auxiliary Criteria Like Ulceration, Dilated Vessels Along Margins.

**Qi Et Al** Recruited 3675 Patients With Abnormal Laryngeal Symptoms Between Jan. 2012 And Oct.2013, For Endoscopic Examination Primarily WLI Followed By NBI.(8) 1153 Lesions Were Biopsied And Classified As Per Histopathological Results. It Stated That NBI Was More Helpful To Decide Resection Margins During Surgery. No Statistical Calculation Mentioned.

**Carlucci Et Al** Assessed Use Of Exoscope For Excision Of Laryngeal Lesions.(9) With This Economic Technique, Phonosurgical Micro-Instruments As Well As NBI Can Be Easily Used Allowing Accurate Laryngeal Surgery With Ease.



#### IV. Discussion

These Studies Prove NBI To Be Better Diagnostic Tool And Also Mention About Its Potential Use Intra-Operatively.

Limitations Of These Studies Include, Potential Risk Of Operator Bias, Lack Of Explanation Regarding Calculation Of Sample Size, Shorter Duration Of Follow Up. Operators' Learning Curve Could Increase Number Of False Positives. This Expensive Instrument Is Not Easily Available, Is Also One Of The Limitations For Lack Of Statistically Significant Studies With Good Quality Evidence.

Due To Scant Lymphatic Drainage Early Laryngeal Malignant Lesions Can Be Treated By Complete Excision. Intra-Operative Use Of NBI Would Help Us To Excise The Lesion Accurately With Minimal Damage To Healthy Collateral Tissue.

Intra-Operative Use Of NBI Is Limited; As During Microlaryngoscopy (MLS), Microscope Light Can Not Be Modified To NBI Unless Rigid Endoscope Light Is Used For The Same Purpose, This Makes Procedure More Cumbersome. Modification Of Microlaryngoscope Which Would Hold The Endoscope Via A Different Port Or Exoscope Would Be More Helpful To Use NBI Intra-Operatively For Complete Resection Of Laryngeal Malignant Lesions, Preventing The Recurrence.

#### Proposed Study

#### V. Methodology

Patient With Suspicion Of Malignancy Would Be Booked For Surgery,

Procedure Would Be Explained In Detail. Patients Would Be Pre Assessed For Surgery To Confirm The Fitness. Consent For The Procedure As Well As For Use Of NBI Would Be Obtained. Patients Divided Randomly In 2 Groups: Excision Using NBI For Group A And WLI For Group B. Under General Anaesthesia - Excision Of Tumour Would Be Carried Out. Complete Excision Of Tumor Would Be Confirmed By NBI And WLI In Both Groups. All Images And Biopsies From Resection Margins Would Be Taken And Noted. Result: We Aim To Get The Biopsies Free Of The Disease In Group A. Remnant Of Tumor Seen In Group B Would Be Removed Using NBI To Obtain Disease Free Margins. Very Minimal Loss Of Function Of Larynx After Operation. Better Co-Relation Between Images And Histopathology Results.

## **VI. Conclusion**

As A Good Quality Evidence To Prove Role Of NBI In Management Of Laryngeal Malignancy, There Is A Need For Randomised Controlled Trial And Proper Calculation Of True Negatives As Well As Reliable Power Calculation.

There Are Limitations To Use NBI And To Conduct Studies To Prove Its Efficacy. We May Overcome Limitations By Multi-Centred Trial For Significant Sample Size, Combined Opinion Of Experts To Reduce Operator Bias, Modification Of Instrumentation To Make It Less Cumbersome And More Effective Intra-Operatively Which Is More Useful In Management Of Laryngeal Malignancy.

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