RECENT ADVANCES IN DIAGNOSIS AND MANAGEMENT OF EARLY GASTRIC CANCER

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DEFINITION

- Early gastric cancer (EGC) is defined as tumour confined to mucosa & submucosa irrespective of lymph node involvement

- Due to wide variation in the survival of lymph node + and – cases, the definition of EGC should be modified to gastric malignancy confined to the mucosa & submucosa without the

- Gastric Cancer 2000; 3:219-225
- Br J Surg 1991; 78: 818-21.

INCIDENCE

- In Korea the incidence of EGC increased from 15% to 30% in 2 years from 1992 to 1994.
- The percentage of EGC varies from 6 to 16% in western countries
- This can be partly explained by the fact that Japanese include adenoma and dysplasia as a part of EGC

•World Journal of Surgery 1998; 22:1059

•Arch Surg 2000; 135:1213-23

PROGNOSTIC FACTORS

- The most important prognostic factor for EGC is the presence of lymph node metastasis.
- Lymph node involvement in EGC depends upon the following factors
  1. Tumour size
  2. Gross appearance
  3. Depth of invasion
  4. Histological pattern
  5. Lymphatic/vascular invasion

- Ann Surg Oncol 1999; 6(7): 664-70
- Ann Surg 1998;183(4):287-90.

PROGNOSTIC FACTORS
Tumour size

- Tumours smaller than 30mm. have a very low incidence of lymph node involvement.

- As the diameter increases, they tend to be more undifferentiated, with significantly higher incidence of lymph node involvement.

- Gastric Cancer 2000; 3:219-225.
- Br J Surg 1998; 85: 835-39.

PROGNOSTIC FACTORS
Gross Appearance

The following tend to have a high rate of lymph node metastasis:

- Type I and IIA lesions,
- depressed or mixed type lesions,
- lesions with ulceration

- World Journal of Surgery 1998; 22:1059

PROGNOSTIC FACTORS

Depth of invasion

- The submucosa can be divided into 3 equal parts Sm1, Sm2 and Sm3.
- incidence of lymph node metastasis varies from 2% to 12% and 20% according to the level of submucosa involved

- Br J Surg 1991; 78: 818-21.
- Br J Surg 1998; 85: 835-39.

PROGNOSTIC FACTORS

Histological pattern

The following have significantly higher rates of lymph node metastasis:

- Undifferentiated carcinoma,
- diffuse type of malignancy and
- tumour with histological ulceration

- Cancer 1999; 85(7): 1500-5

PROGNOSTIC FACTORS
Lymphatic invasion

The following are risk factors for lymph node involvement:

- Large tumour size (>/= 30mm.)
- Involvement of lymphatic vessels
- Invasion of submucosal layer
- Poorly differentiated type
- Macroscopic depressed type
- Histological ulceration of the tumour
- Microscopically diffuse type
- Antral lesions
- Depressed/mixed type

•Gastric Cancer 2001; 4: 34-38

Lymph node distribution

- Mainly group 1 location lymph nodes are involved in EGC and involvement of groups 2 and 3 is rare.

- Sentinel lymph node involvement concept in gastric cancer has not yet been established

- J Surg Oncol 1997; 64(1): 42-47
- Surg Today 1997; 27: 600-605.

DIAGNOSIS

To determine the depth of invasion and the

presence of lymph node metastasis, the

following investigations have been used:

- Virtual Endoscopy
- Magnifying Endoscopy

- Jr Comput Assist Tomogr 1998: 22: 709-713.
- Am J Roentol. 1997; 169: 787-789.

DIAGNOSIS
Virtual Endoscopy

- using Helical CT system for 3D reconstruction with the volume rendering technique
- Elevated lesions (EGC I and IIa) were better depicted rather than non-elevated lesions (EGC IIb and IIc).
- Fine mucosal details, colour changes, textures and hyperaemia evident by conventional gastroscopy are not well

Am J Roentol. 1997; 169: 787-789.

DIAGNOSIS

Magnifying Endoscopy

- Histopathological results were compared with findings of magnifying endoscopy regarding surface structures and microvessels.

- There was a definitive correlation between the small, regular mucosal pattern of sulci and ridges and differentiated carcinoma.

DIAGNOSIS

Fluorescence Endoscopy

- Exogenously applied sensitizers (5-aminolaevulanic acid) accumulate selectively in malignant lesions and induce fluorescence after illumination with light of adequate wavelength

- Better detection of non-visible malignant or premalignant lesions

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Dig Liver Dis 2002; 34(10): 754-761

DIAGNOSIS
Endoscopic Ultrasonography

- useful tool in differentiating early from late carcinoma of the stomach (accuracy of 91%)
- low accuracy rate in differentiating between mucosal & submucosal cancer (accuracy rate 63.7%).
- accuracy rates for detecting intramucosal cancer using endoscopy and endosonography were 84% and

Endoscopy 2002; 34(12): 973-978.

CLINICAL PRESENTATION

- **Asymptomatic:** The patient can be absolutely asymptomatic and malignancy picked up by mass screening or selective screening

- **Upper GI dyspepsia:** Every patient who presents with dyspepsia after 50 years of age should undergo Upper GI

- Surgical Oncology 2000; 9: 17-24.

Biochemical

- Tumor Markers
- CEA ▲ in 1/3 patients ≈ stage
- CEA + Ca 19-9 or CA 50

  ↑ sensitivity

CA Stomach : significance of tumor marker

- β HCG
- CA 125
- CEA
- alpha fetoprotein
- CA 19-9,
- tissue staining for C - erb B 2

CA 125, β HCG

- Pre-op indicator of
  - aggression
  - tumor burden
  - Prognostic

"Botet"

Diagnosis

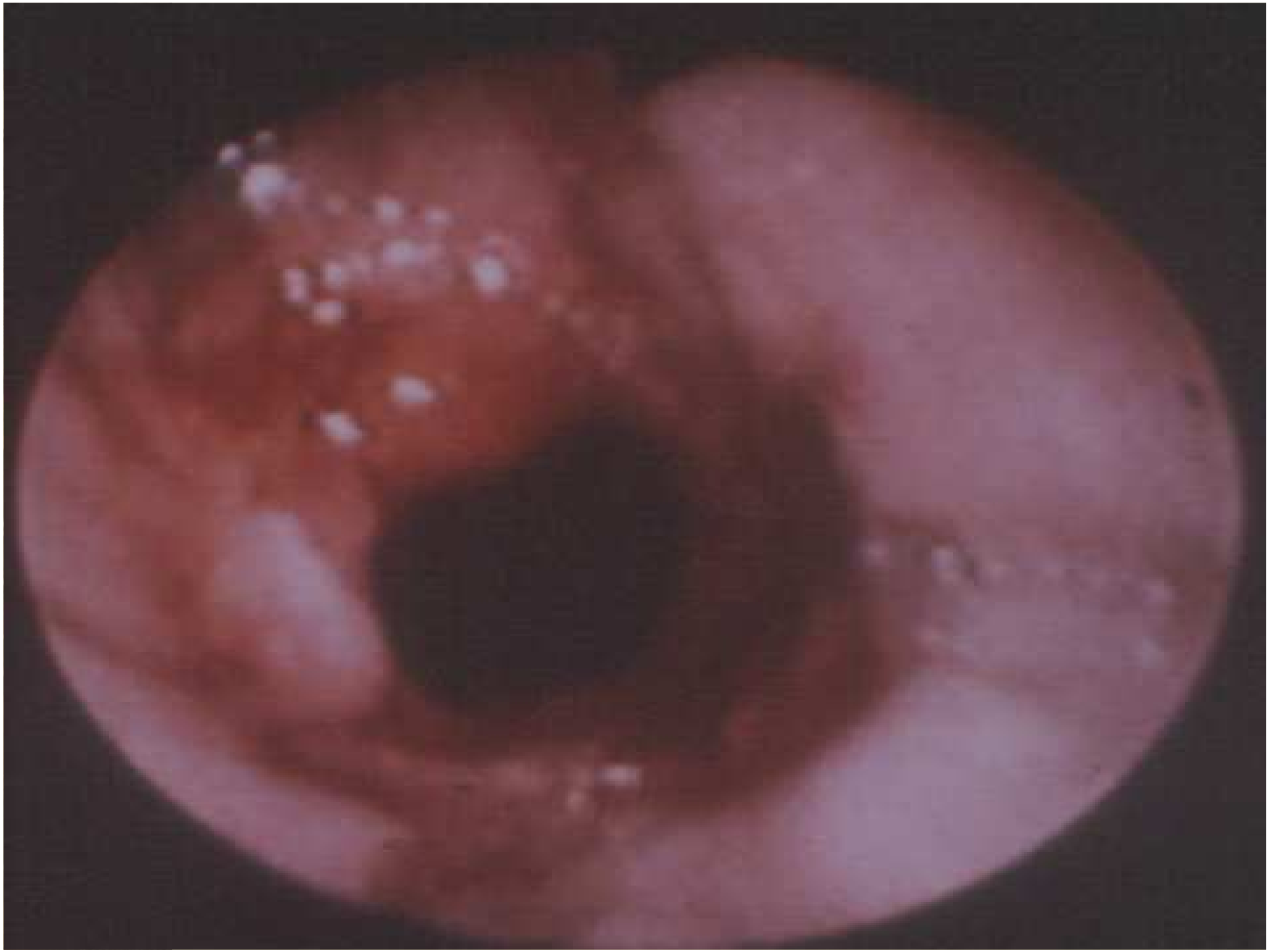
- **Auto-fluorescence**
- **Endoscopic Ultrasound**
- **Optical Coherence Tomography**
- **Virtual Biopsy**

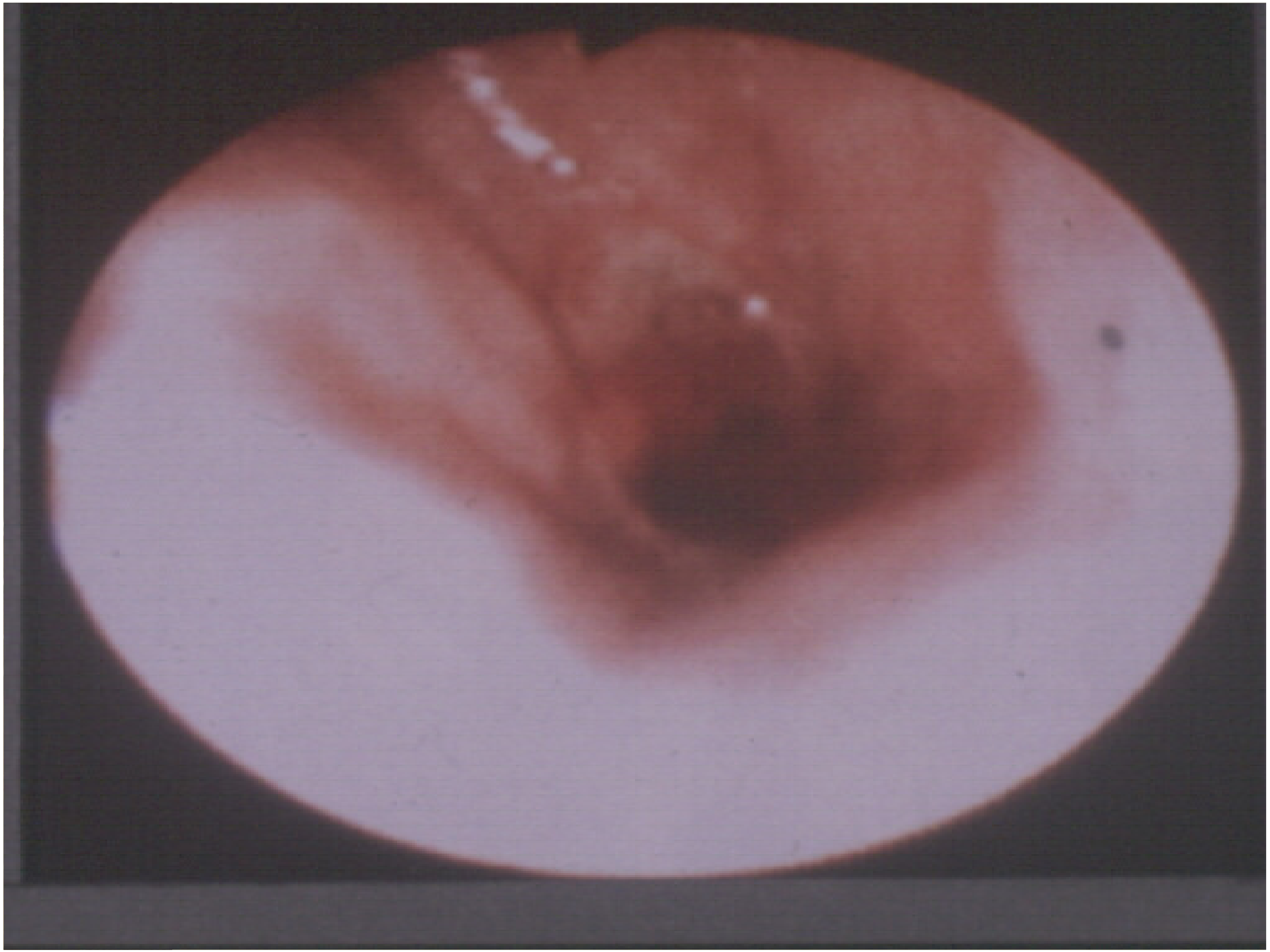
Endoscopy

- Size, location, morphology of lesion
- Mucosal abnormality, bleeding
- Proximal and distal spread of tumor
- Distensibility

Endoscopy

- Abnormal motility ► SM infiltration, extramural extension – vagal infiltration
- Bx
  - **–6 – 10**
  - **– 90% accuracy**
- Early Ca → 0.1% indigocarmine dye test

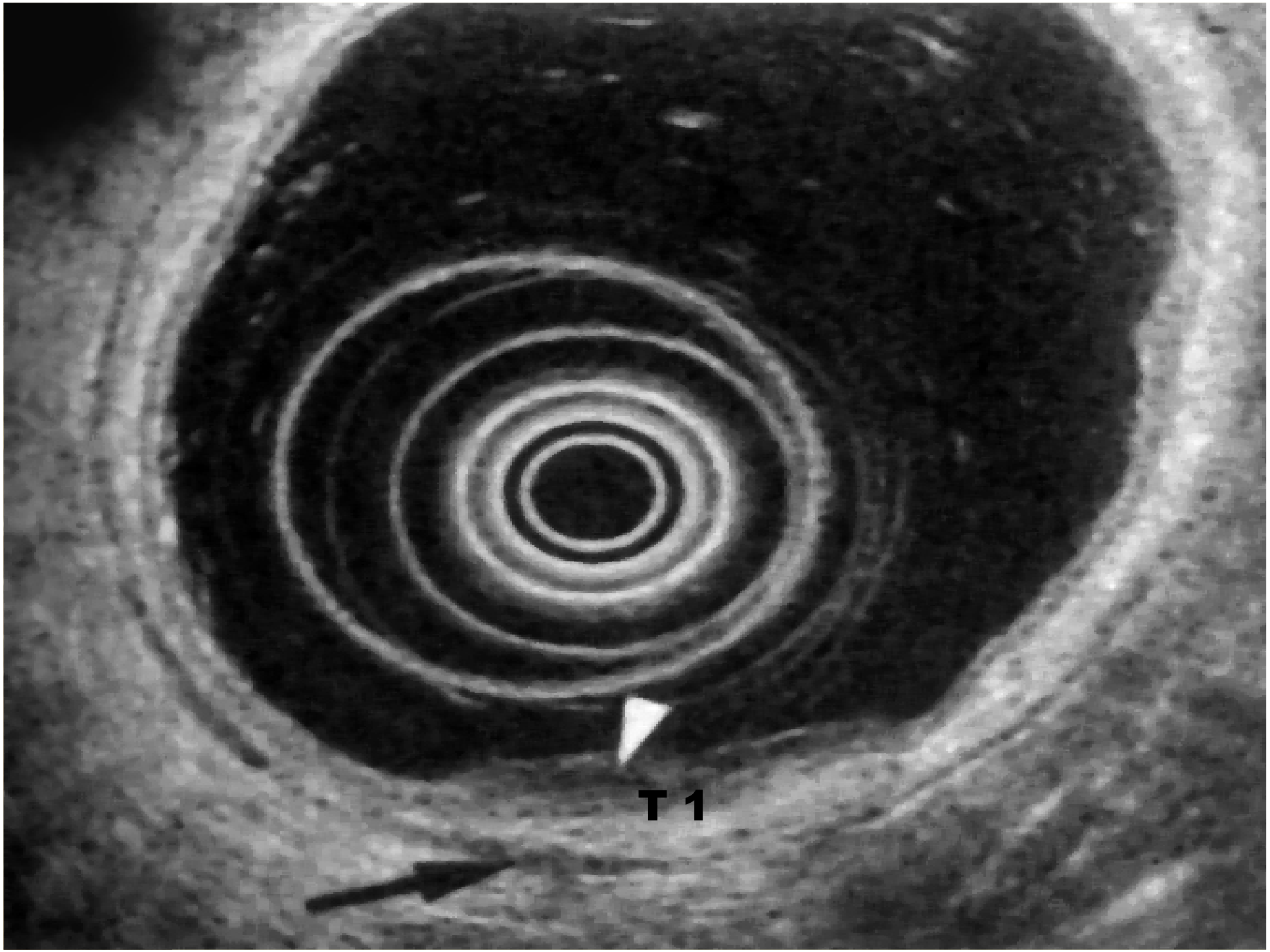




EUS

- Good for T & N
- Not good for M

- Radial probes –7.5 or 12MHz better for Biopsy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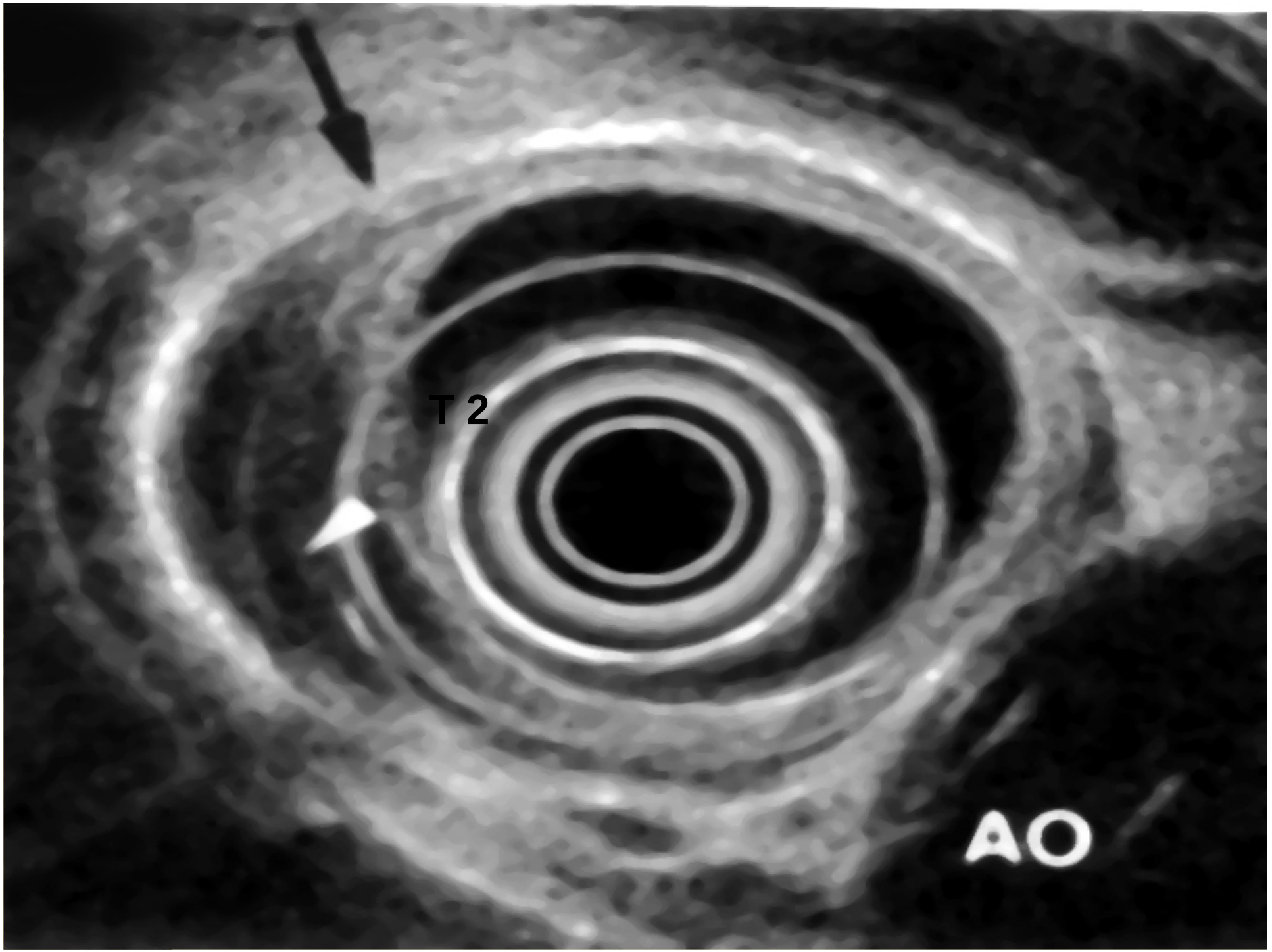
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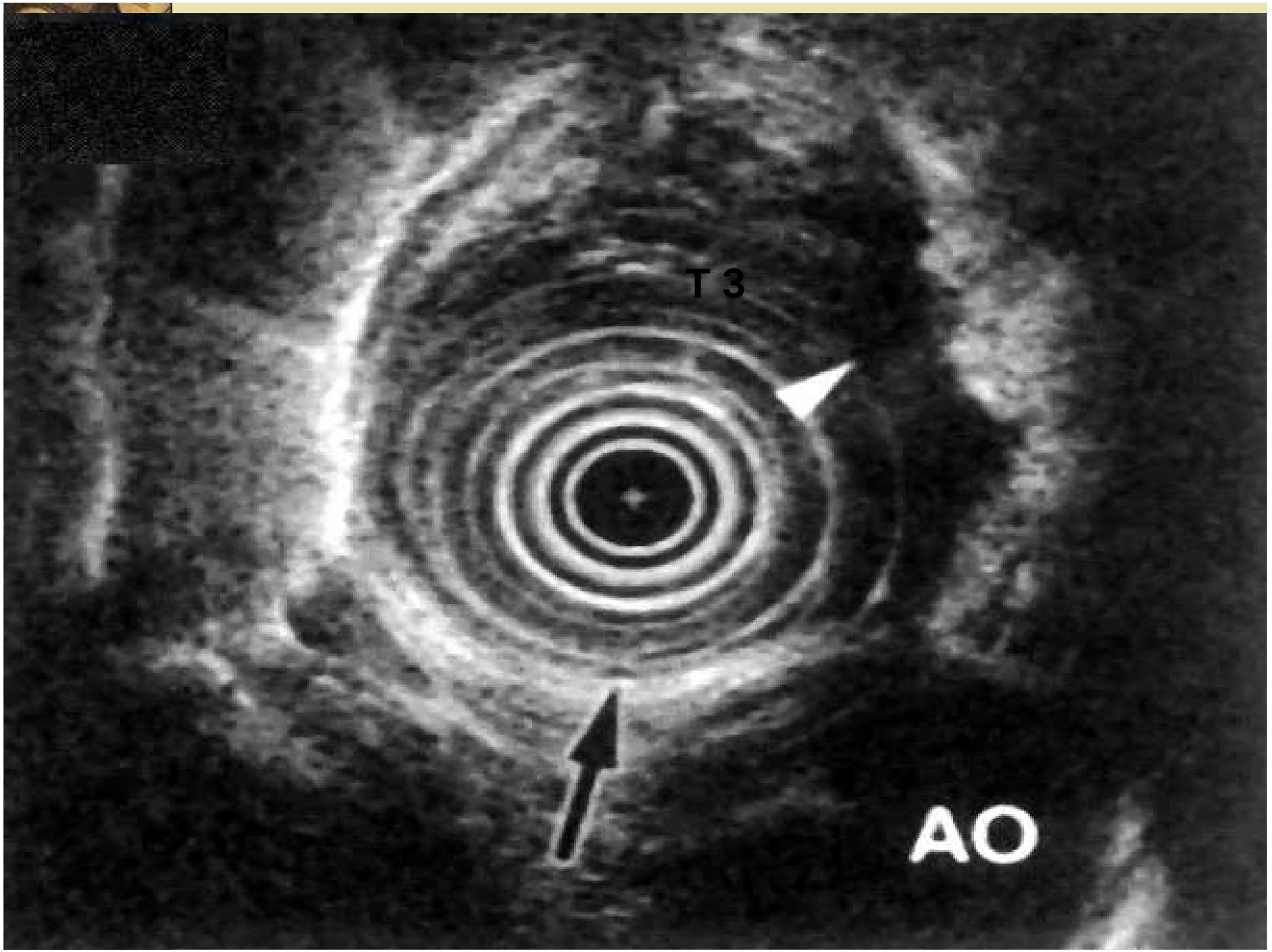
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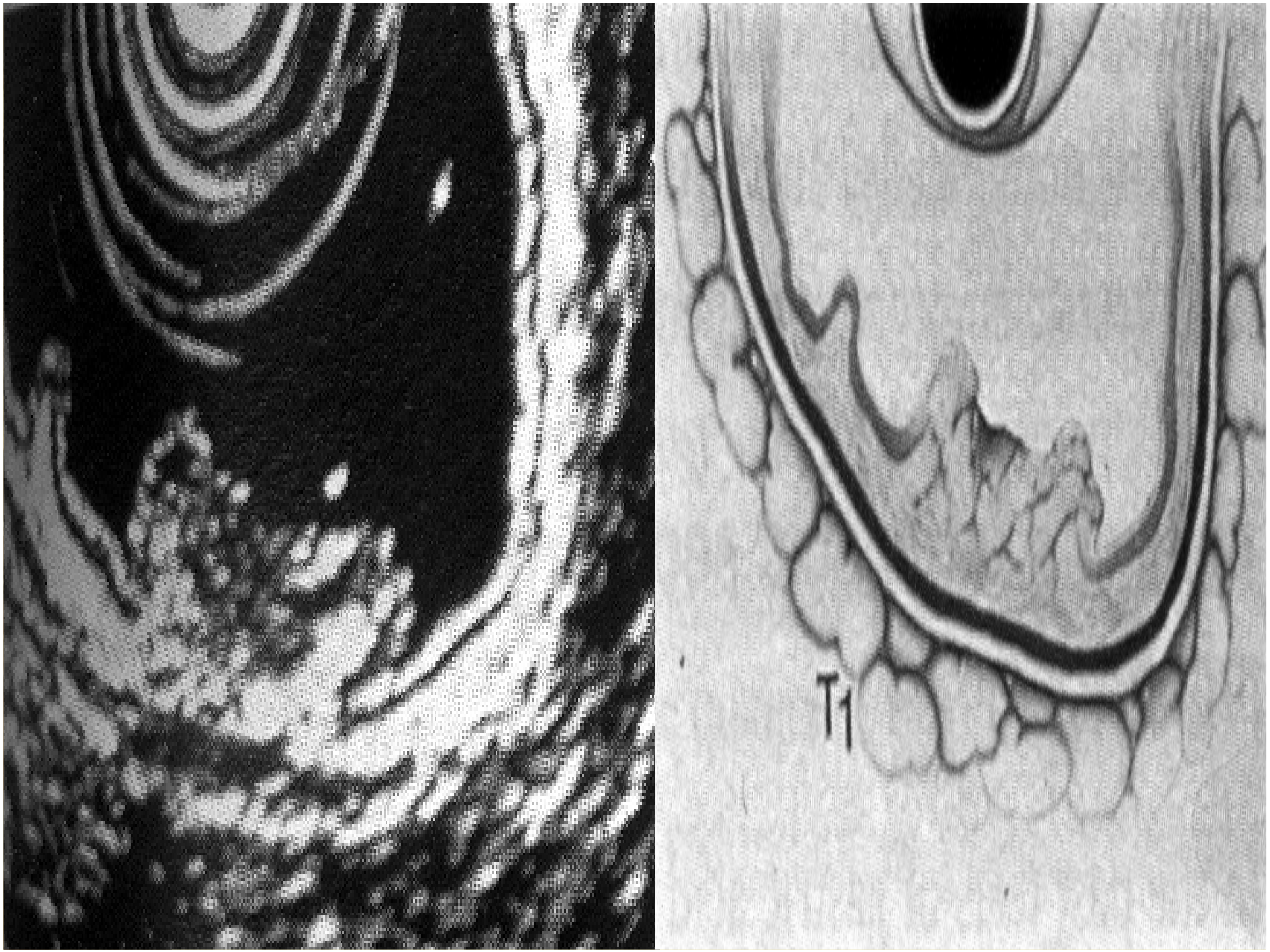
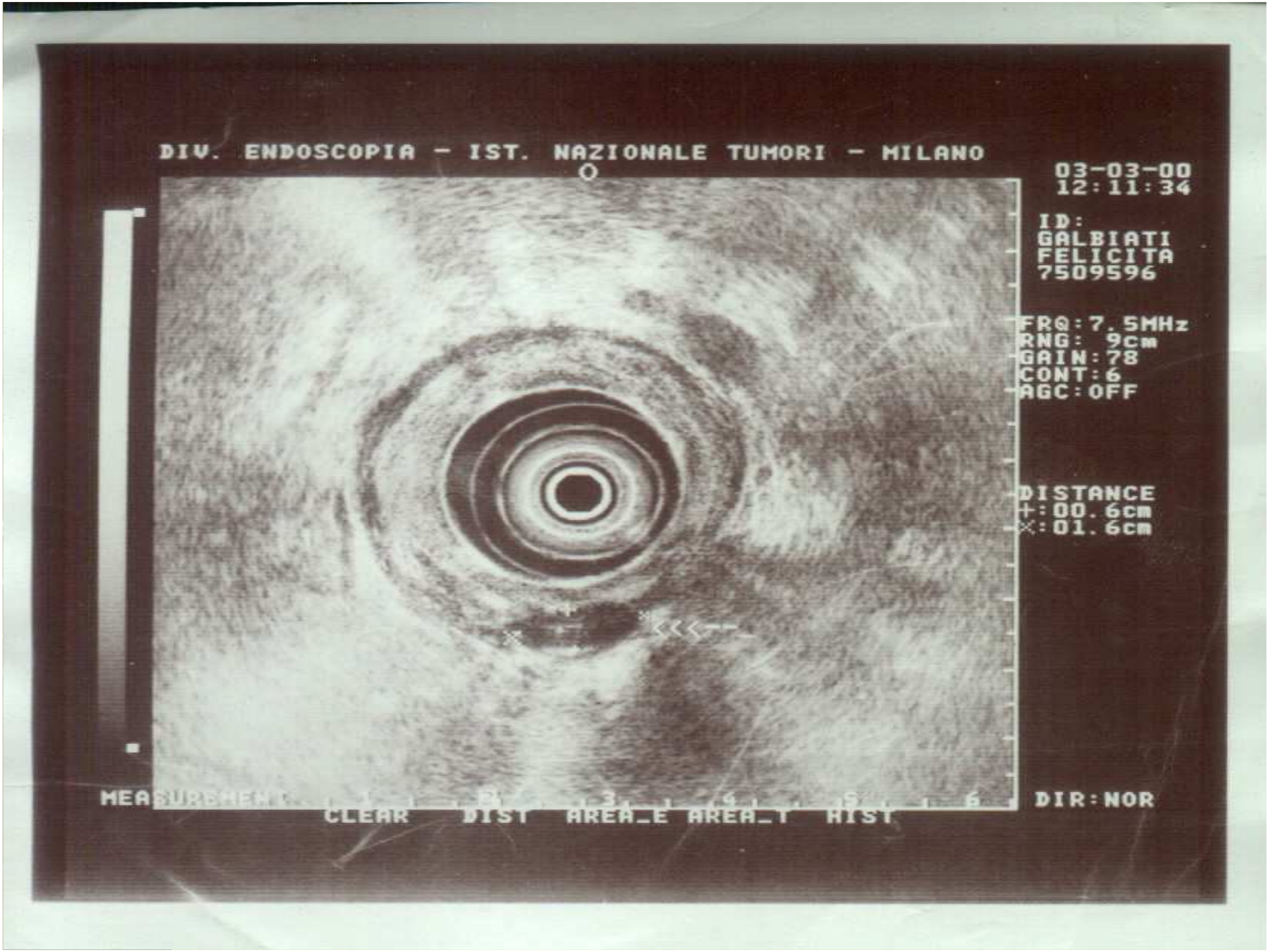

T1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FELICITA
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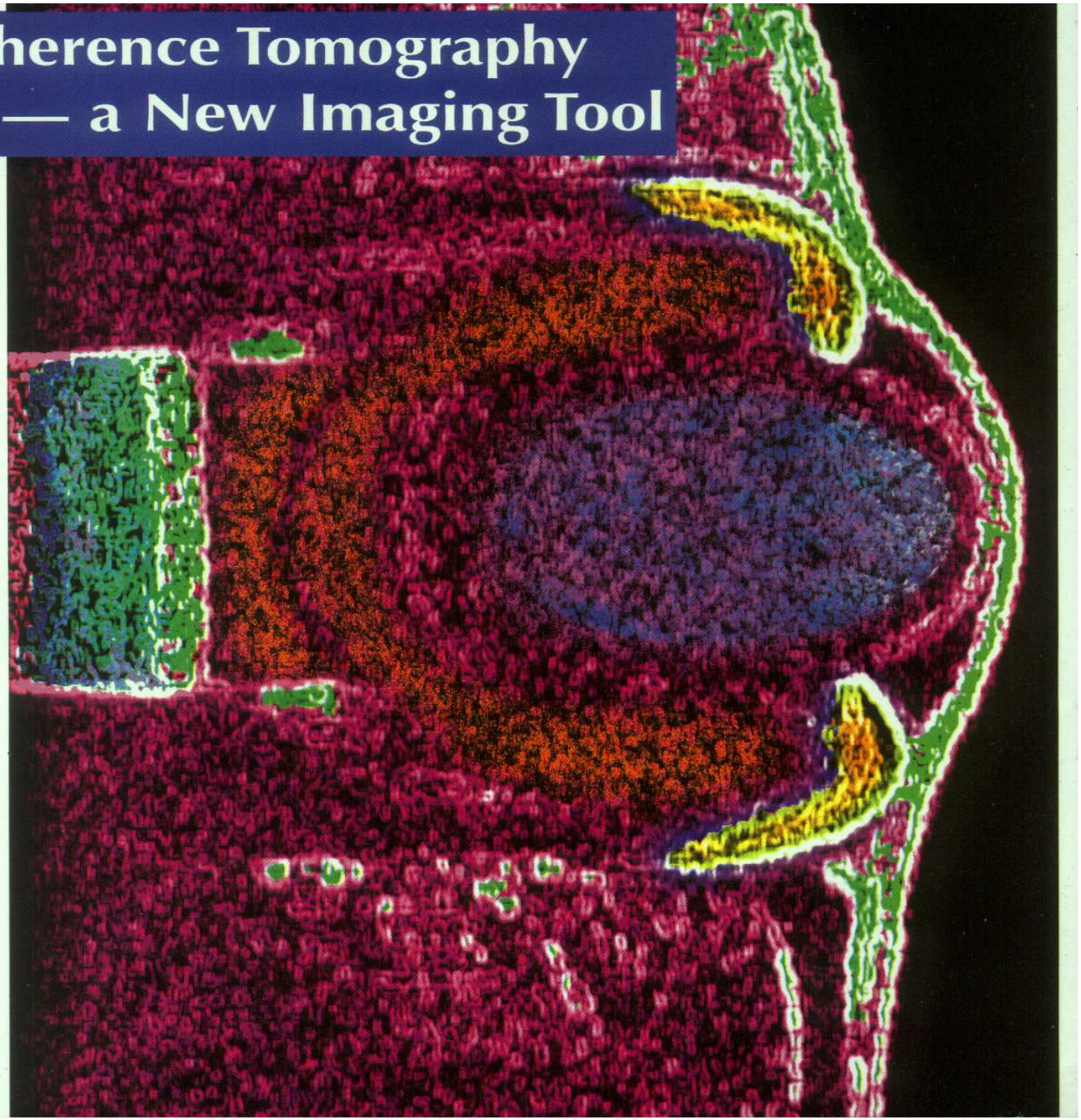
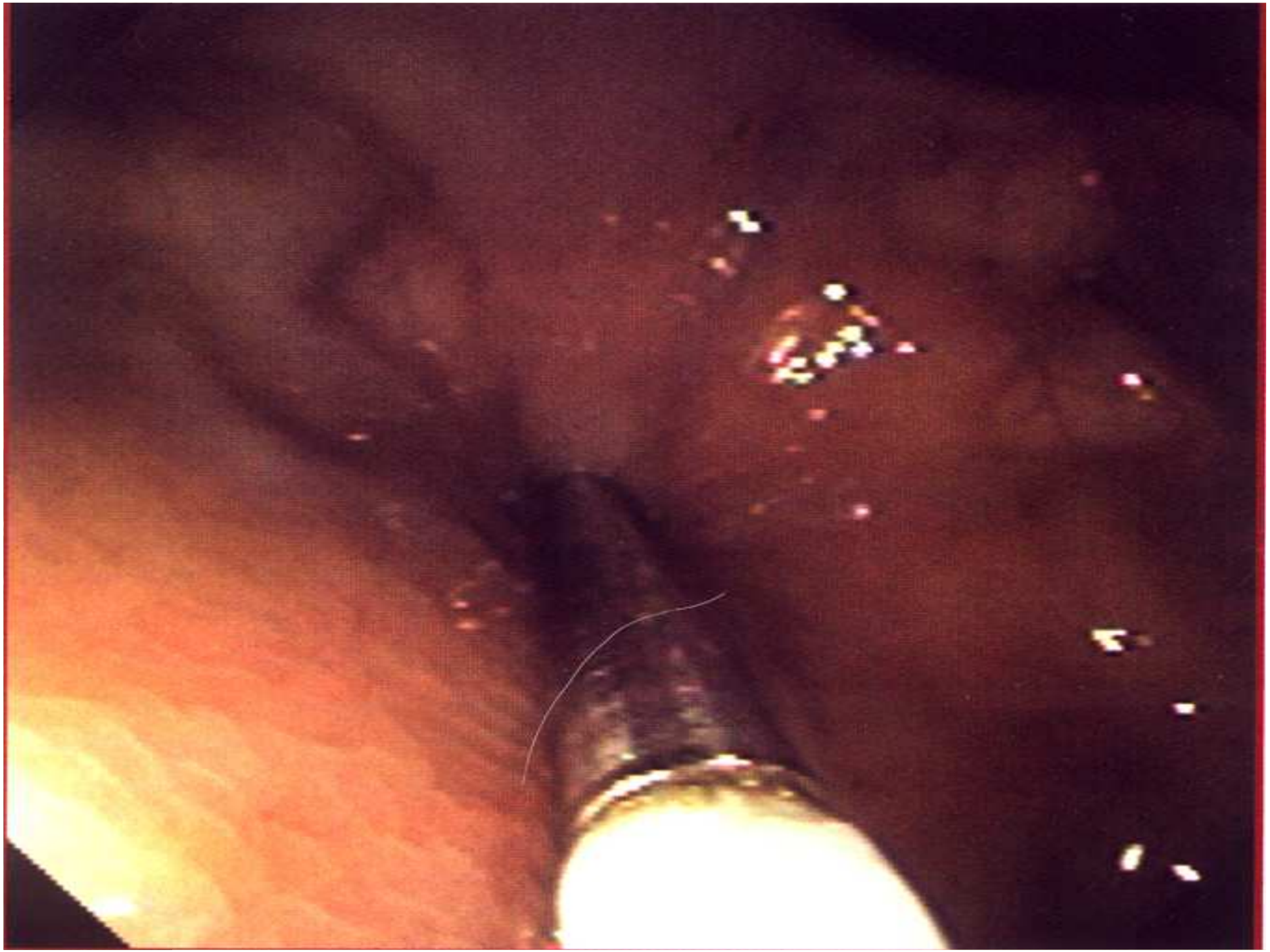
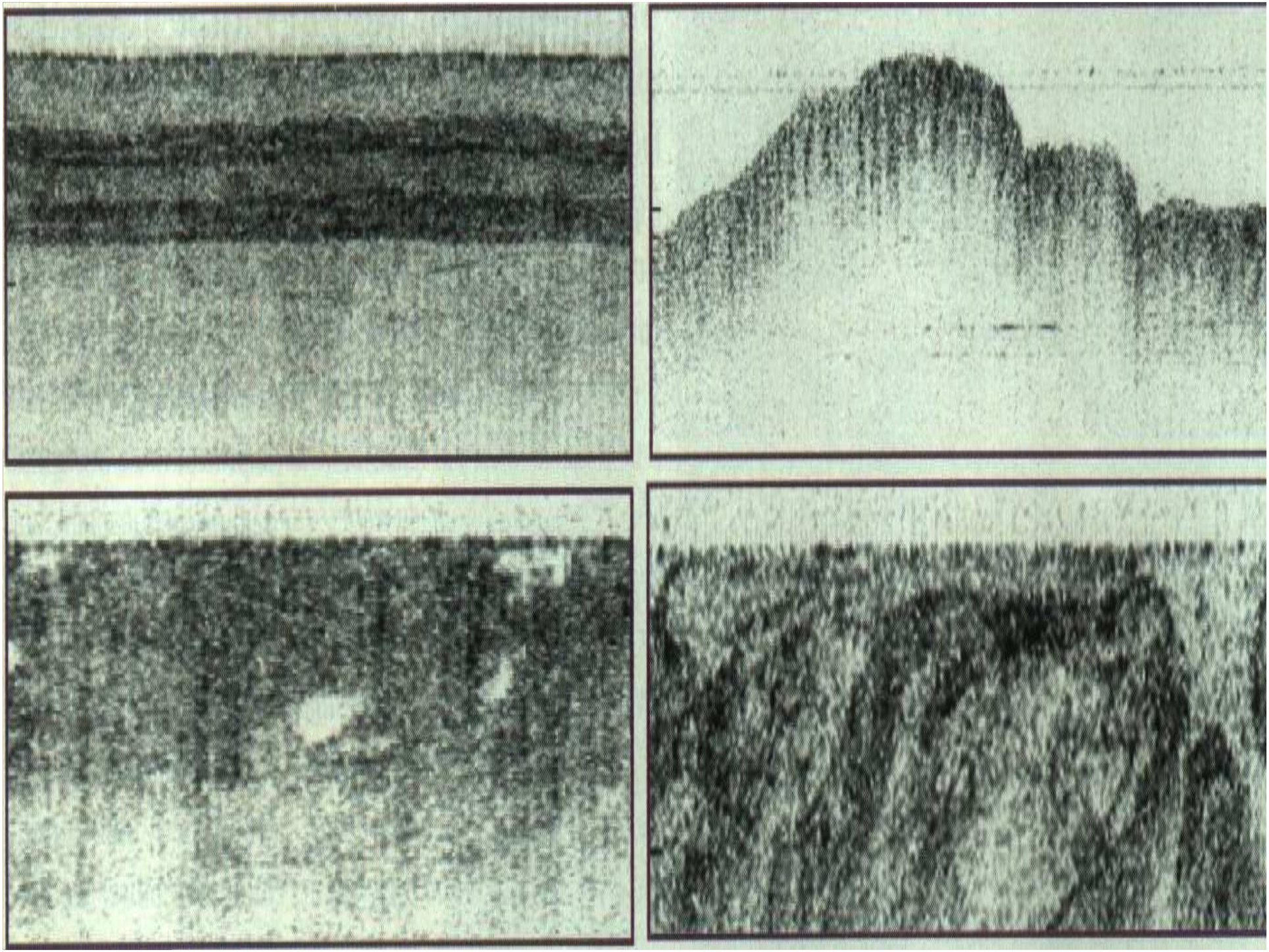
Optical Coherence Tomography — a New Imaging Tool



OCT / Virtual Biopsy

- Optical coherence tomography
- Beyond routine endoscopy
- Differentiates - benign and malignant, mucosal dysplasias





LIFE

- Light Induced Fluorescence Endoscopy
- Early detection of dysplasias and superficial malignant lesions, in situ Ca


xillix
xillix LIFE - LUNG


Select Camera
RGB
LIFE
NTSC
Patient Information
ID: test
Name: test, test
Date of Exam: 01/01/1996
Enter new record
LIFE Camera Sensitivity
0
Reset
Image Acquisition
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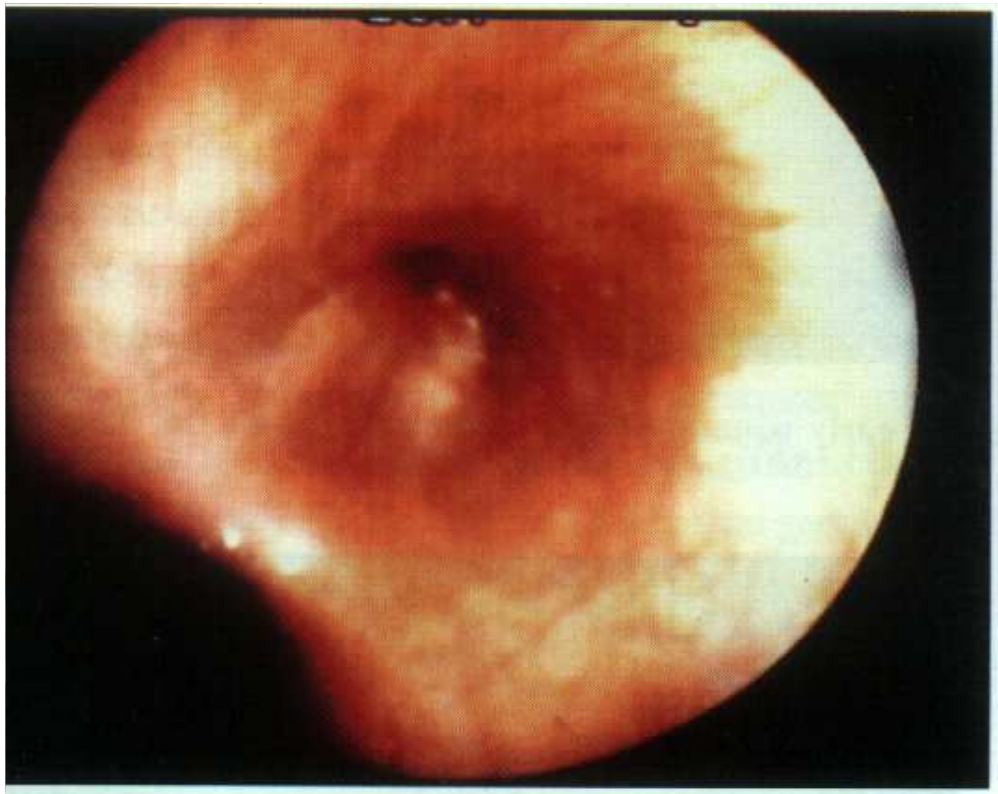
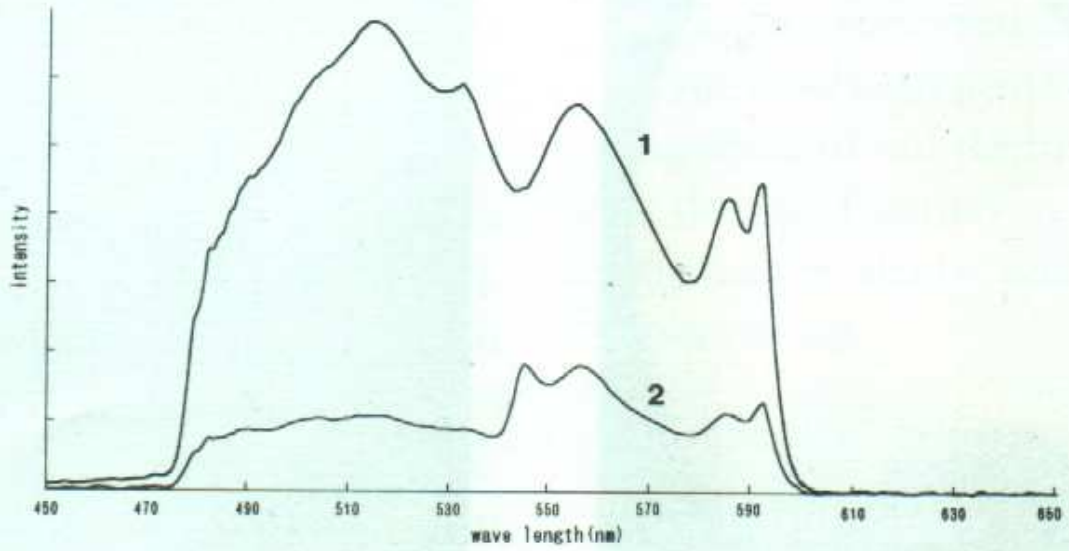



Intensity
1
2
450
470
490
510
530
550
570
590
610
630
650
wave length(nm)

Contrast Radiography

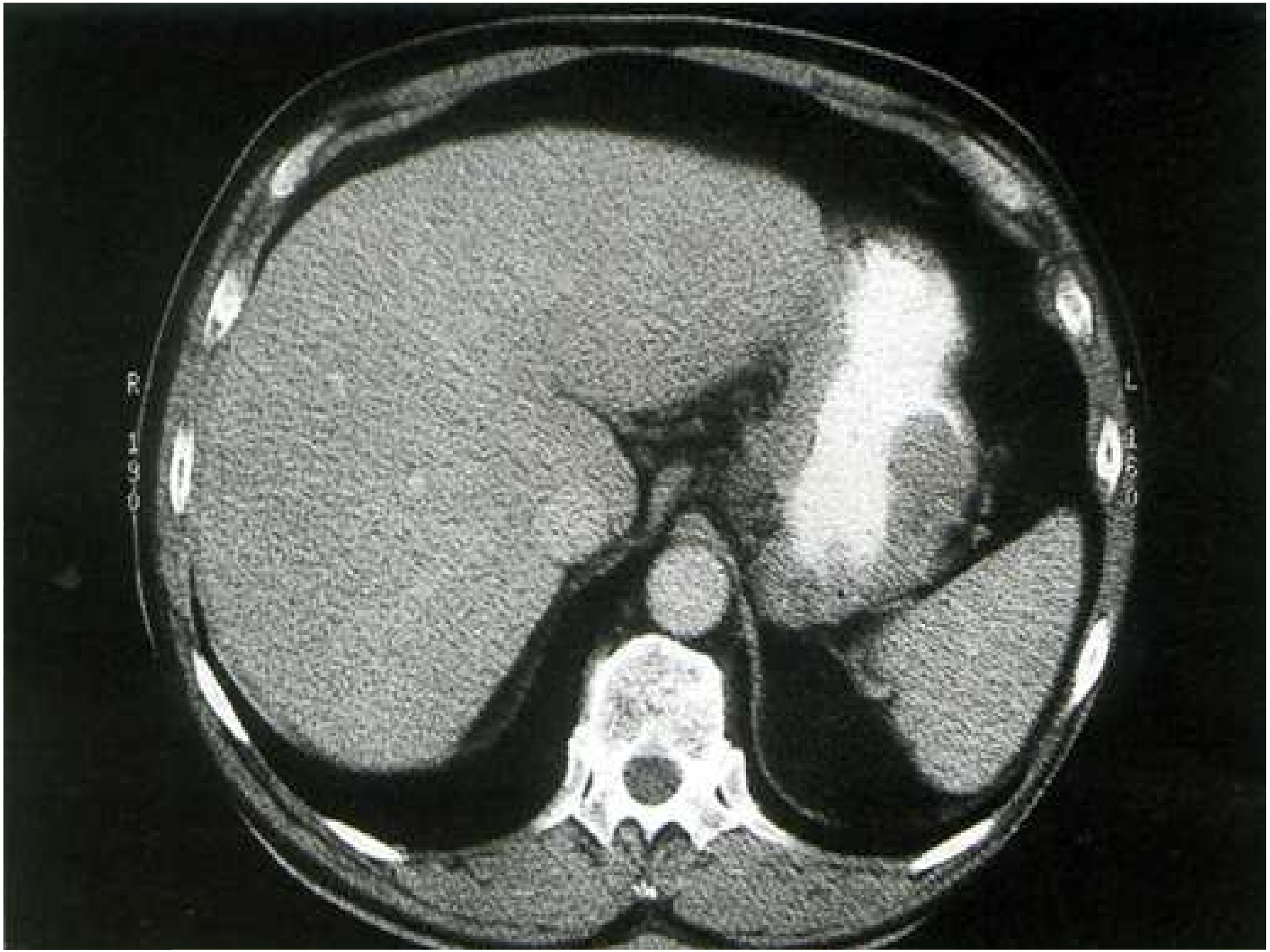
- Motility – Ba meal, hypotonic duodenography
- Structural changes
- Diagnostic accuracy:
  - Single – 80%
  - Double – 90%

Computed Tomography

- Abdomen and chest
- Lateral extension, Systemic mets- 75%
- Triphasic spiral CT – T stage, stomach filled with water
  Tako et al 1998 – Adv gastric Ca – 82% Early Ca – 15%

CT – T Staging

- Gastric distension
- Does not differentiate T1 and T2
- T3 stranding in perigastric fat
- Does not differentiate transmural and perigastric lymphadenopathy
- Accuracy 80 – 88% in Advanced disease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CT – N Staging

- Size – no predictor of involvement
- > 8mm sensitivity – 48%, specificity 93%
- Identifies distal nodes (not seen on EUS)
- No of involved nodes N1 1 -6 RLN according to current TNM classification

CT – M Staging

- Liver mets – thin collimation, overlapping slides, dual phase imaging
- 75 – 80 % mets detected
- Small volume ascites – EUS and CT

Conventional US

- Good clinical evidence of liver mets
- When treatment options are limited – before palliation
- Used in conjunction with or, alternative to MRI – indeterminate lesions on CT

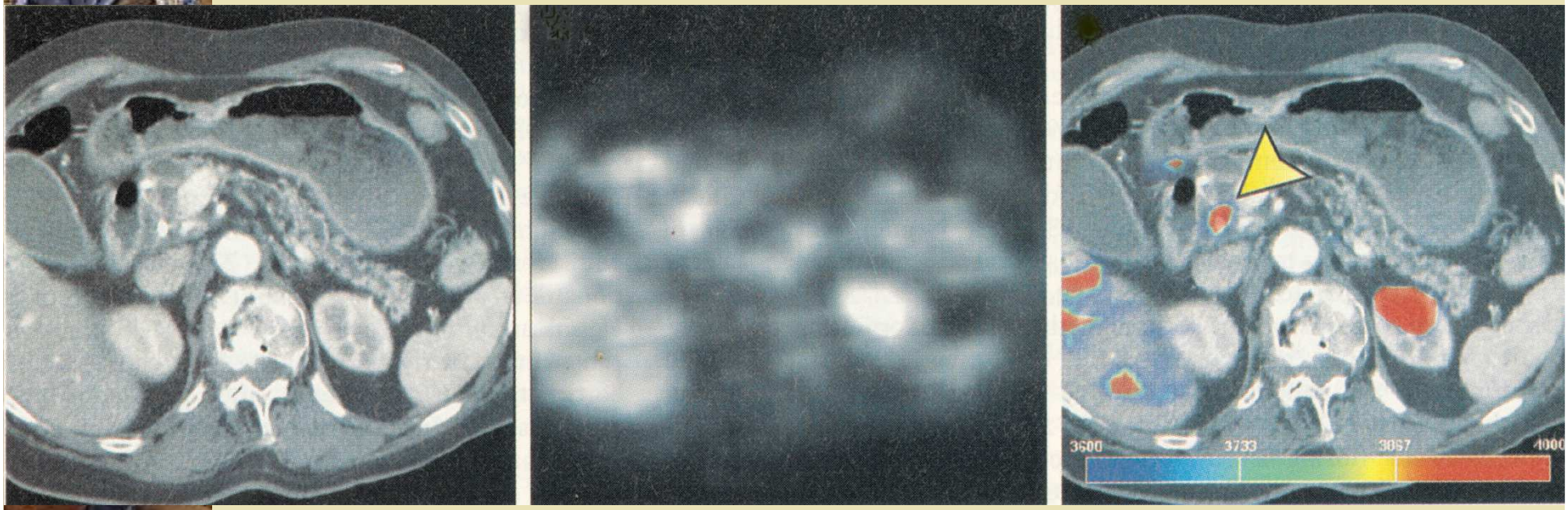
MRI

- T assessment – No evidence that MRI better than CT
- For identification of indeterminate lesions
- IV contrast allergy
- Endoluminal MR – experimental only and no advantage over EUS

PET

- FDG (fluorodeoxyglucose) 18 F
- Preferrential accumulation of PEG in tumour
- Sensitivity 60%, specificity 100%, Accuracy 94%
- Detects 20% missed mets on CT
- Differentiates: malignancy from inflammation

PET+CT Combo



Laparoscopy

- Peritoneal Disease M1 – CT, EUS, Small volume ascites
- Routine use after CT / EUS before radical surgery
- Additional information than CT
- Complementary to CT / EUS
- Accuracy 84%

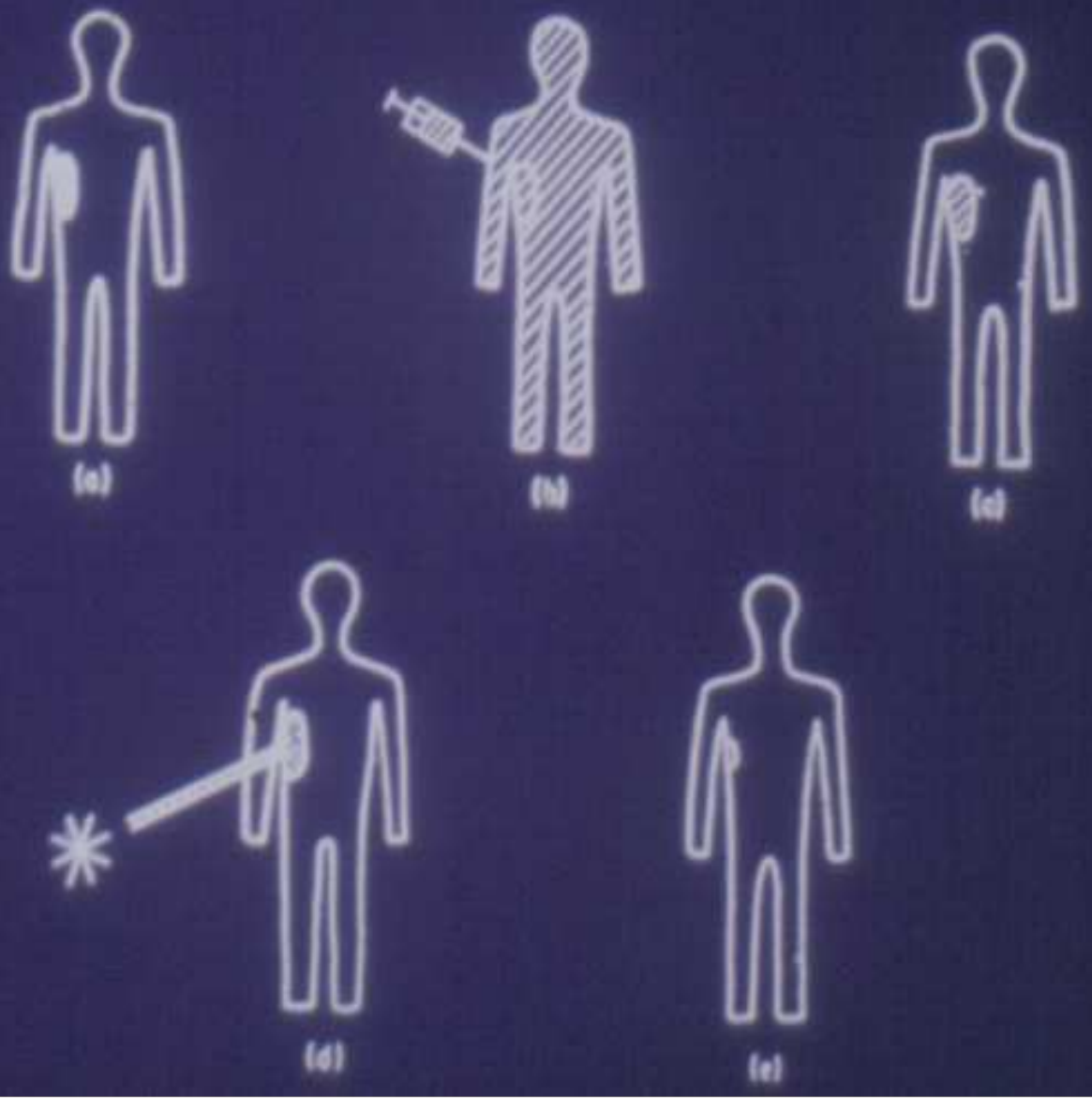
Laparoscopy US Probes

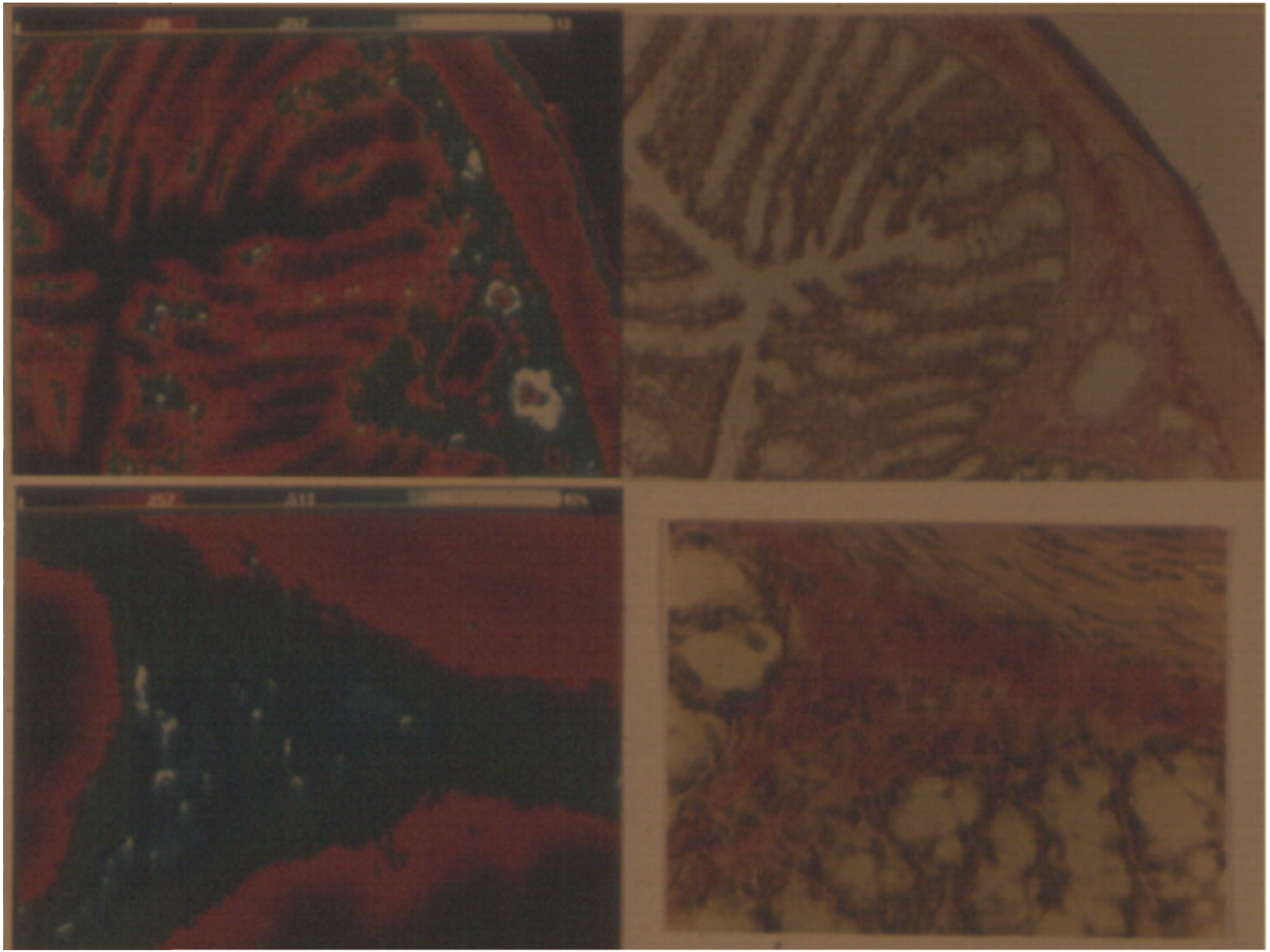
- III dimension in US – detects unsuspected liver and lymphnode metastases
- Eliminates need for laparotomy

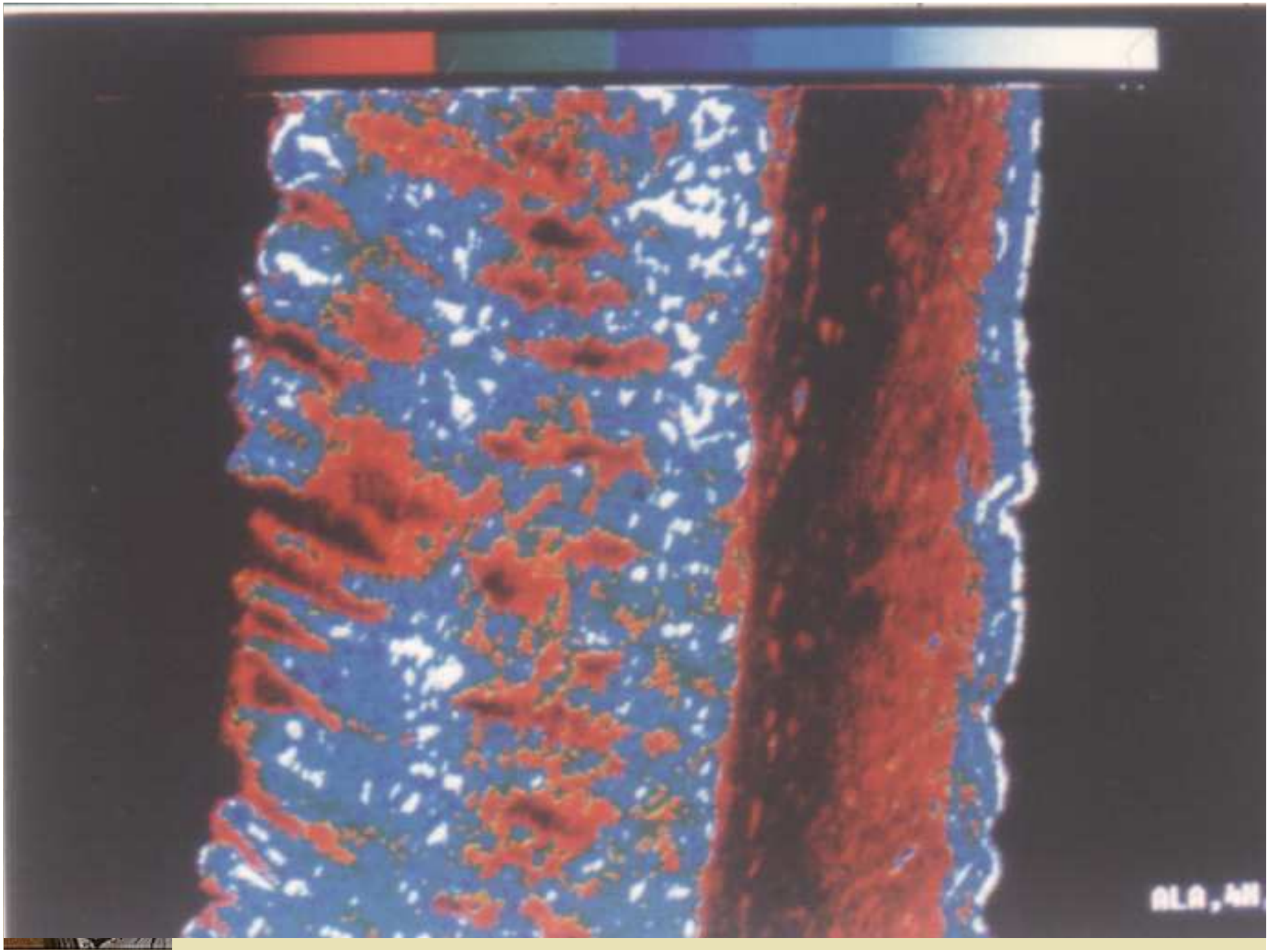
Mechanism of Photo-toxicity

- Release of singlet oxygen
- S phase cells more vulnerable than G phase cells

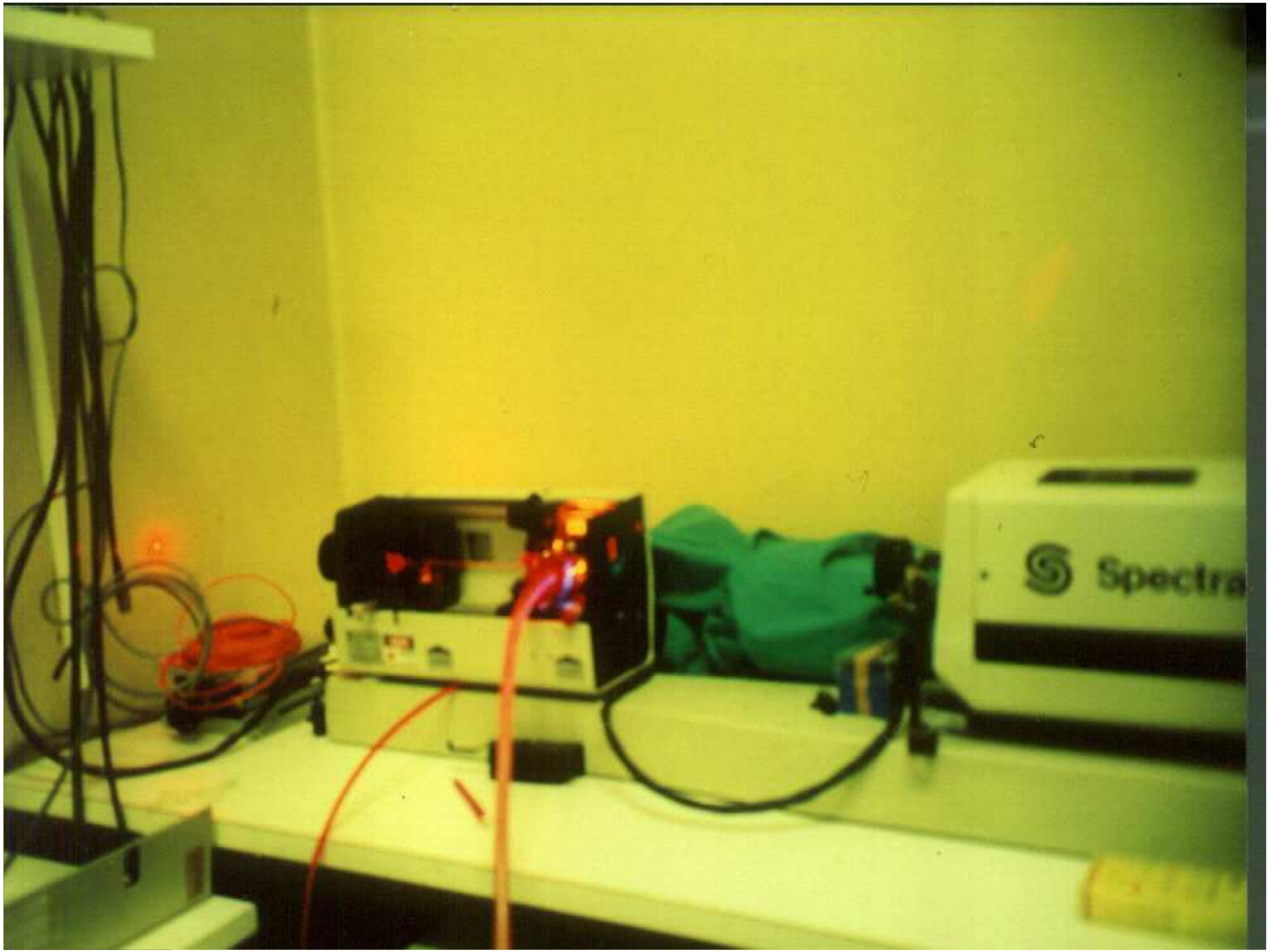
DIAGRAMMATIC ILLUSTRATION OF PDT.



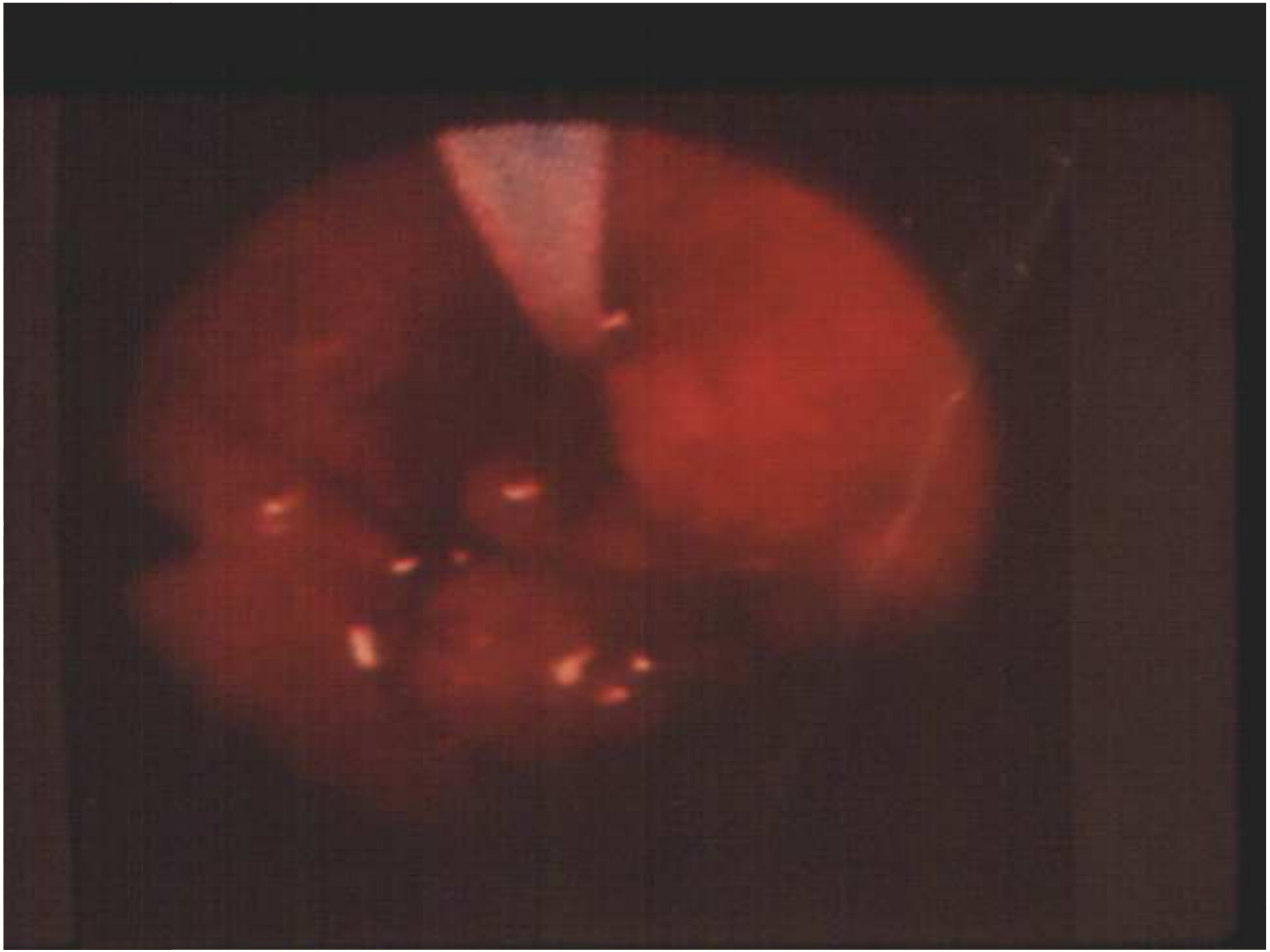





Spectra-Physics


Spectra


GI Endo



Inside Story – Wonder Pill

- Pill with a camera – M2 A
- Pictures taken at 2 frames per second
- Microchip in camera with 8 hour battery
- Receiver in the belt
- Ambulatory endoscopic monitoring

Camera Pill

Rx EGC

1. **Endoscopic**
2. **Laparoscopic**
3. **Conventional**

•Surgical Oncology 2000; 9: 17-22.

Endoscopic Rx

1. ***Strip Biopsy*** – using the grasp & pull technique with a double channel endoscope.
2. ***Aspiration Mucosectomy*** – using the cup & suction technique.
3. ***Resection using a double polypectomy snare***
4. ***Resection with the combined use of highly concentrated saline & epinephrine***

•Gut 2001; 33: 709 – 718.

Lap Rx

1. ***Laparoscopic wedge resection using lesion lifting method*** for tumours along the greater curvature or on the anterior wall of the stomach.
2. ***Laparoscopic intragastric mucosal resection***: For lesions of the posterior wall of the stomach and for lesions near the cardia or the pylorus.

- World J Surg 1999; 23: 187-192.

Conventional Rx

- Since 1881 Billroth I gastrectomy has been the gold standard for the treatment of gastric cancer.

- EGC has been safely and successfully managed by this conventional gastrectomy because perigastric lymph nodes are completely harvested by this technique.

•Gastric Cancer 1999; 2:230-234.

TREATMENT

Newer surgical management

1. Segmental gastrectomy
2. Proximal gastrectomy
3. Wedge resection
4. Pylorus-preserving distal gastrectomy

- Br J Surg 1999; 86: 526-528.

< 4 cm Tumor =
Segmental gastrectomy

- intra-operative endoscopy and frozen section analysis of the dissected perigastric lymph nodes is carried out.
- If nodes are +, then the procedure is converted to a conventional gastrectomy with an extended lymphadenectomy.
- If nodes are -, segmental gastrectomy with a tumour free resection margin of 2 cm is adequate

- Br J Surg 1999; 86: 526-528.

Newer surgical management

Proximal gastrectomy

Proximal Gastrectomy (with jejunal interposition) was described by Takeshita et al for proximal 1/3 of the stomach

•Surgery 1997; 121: 278-286

Newer surgical management

Pylorus-preserving gastrectomy

- for EGC in the middle stomach
- In this technique a pyloric cuff of 2 cm. is preserved while the distal 2/3 of the stomach is removed
- Advantages are decreased incidence of post-gastrectomy dumping syndrome and gall bladder stone formation. Weight recovery is better.
- Sometimes emptying disturbances can be present which can be relieved by Cisapride

•Surgery 1998; 123: 165-170

•World J Surg 1998; 22: 35-41.

Newer surgical management
Lymph node management

- No lymph node dissection is recommended for mucosal tumours
- (the lymph node metastasis in mucosal gastric cancer only **2.4 %** and preservation of regional lymph nodes may enhance post-operative **immunocompetence**.

- Cancer 2000; 89: 1425-1430.
- Am J Surg 2000; 180: 127-132.

Newer surgical management
Lymph node management

- In patients with submucosal tumours, **extended lymphadenectomy** has been shown to prolong survival, especially when these tumours are located in the distal 1/3 of the stomach.

- Cancer 2000; 89: 1425-1430.
- Am J Surg 2000; 180: 127-132.

PLANNING OF TREATMENT

- **Endoscopic Mucosal Resection (EMR) should be used initially for all patients with EGC**
- **If histology reveals complete resection, the treatment is complete & only regular F/U reqd.**

Incomplete resection

- For mucosal tumours, Laparoscopic Local Resection

Incomplete resection

- for mucosal tumours with ulceration or Sm 1a, **Laparoscopy-Assisted Gastrectomy** with D_1 lymph node dissection .

Incomplete resection

- for **Sm 1b**, **Gastrectomy with D_2 lymph node dissection is** indicated.

Extent of lymph node dissection

1. Mucosal tumour < 30 mm: **No lymph node dissection required.**

Extent of lymph node dissection

Mucosal tumour > 30 mm: Dissection of local perigastric lymph nodes (D_1) only.

Extent of lymph node dissection

Submucosal tumour: **D_1** dissection along with dissection of lymph nodes along the left gastric artery, antero-superior common hepatic artery, celiac artery and proximal portion of the splenic artery.

Survival rate for endoscopic mucosal resection(EMR)

- 98 patients who had successful EMR there was no tumor related deaths during a median follow up of period of 38 months.(Gut2001:48;225-9)

Survival rate for Laparoscopic wedge resection

- 57 patients who had successful LAPAROSCOPIC WEDGE RESECTION , no patient died of disease during median follow up period of 65 months (World Journal of Surgery1999:23;187-92)

SUMMARY

- The incidence of EGC is on the rise because of aggressive screening by upper GI endoscopy.
- Lymph node metastasis is the most important prognostic factor (has a higher recurrence rate and a significantly lower survival rate).

SUMMARY

- Incidence of lymph node metastasis is much higher in submucosal lesions.

SUMMARY

- **Endoscopic ultrasonography** has an important role in preoperative evaluation of lymph node metastasis and for differentiation between mucosal and submucosal lesions.

SUMMARY

- **Endoscopic mucosal resection** and **Laparoscopic gastrectomy** are two minimally invasive procedures which are becoming the standard of care for management of EGC.

THANK YOU

R1

- **R** & **L** cardiac LN
- LN along lessor and greater curvature
- supra and infra pyloric LN

R2=R1+ LNs

- along / at / around
- L gastric A
- common hepatic A
- coeliac A
- splenic hilum
- splenic A.

R3 = R1 + R2 +LN

- hepato-duodenal ligament
- retropancreatico-duodenal
- root of mesentrium
- Middle colic A.
- Around abdominal aorta