



Alison Douglass  
Gillian Lieberman, MD

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# Colon Cancer

Alison Douglass, Harvard Medical School Year III

Gillian Lieberman, MD



# Our Patient

Mr. K. is a 67 year old man with no prior medical problems other than hemorrhoids which have caused occasional rectal bleeding over the last 20 years. Over the last 6 months, he has noticed an increase in the frequency and amount of bleeding.



# Differential Diagnosis based on Patient History

- Hemorrhoids
- Diverticula
- Vascular anomalies
- Cancers or polyps
- Colitis (infectious, idiopathic, ischemic or radiation induced)
- Uncommon conditions include postpolypectomy bleeding, solitary rectal ulcer syndrome, cecal ulcer (especially in renal failure), NSAID-induced ulcers or colitis, neoplasms other than adenomas or adenocarcinomas, trauma, ectopic varices (most commonly rectal), lymphoid nodular hyperplasia, vasculitis, aortocolic fistulas, and amyloidosis

(Pfenninger)



## Mr. K. continued

- He presented to his PCP for his yearly physical
- At this time he admitted to having an older brother with colon cancer
- Upon digital rectal examination, a posterior rectal mass was palpated.
- Colonoscopy detected a rectal mass 6cm from the anal verge and biopsy revealed well-differentiated adenocarcinoma



# Clinical Presentation of Colon Cancer

- Hematochezia or melena: 40%
- Abdominal pain: 44%
- Change in bowel habit: 43%
- Weakness: 20%
- Anemia without gastrointestinal symptoms: 11%
- Weight loss: 6%



# Primary Diagnosis

- Digital rectal exam (DRE) and colonoscopy with biopsy
- Double contrast barium enema and CT also play a role
- Virtual CT colonoscopy is gaining popularity as a noninvasive screening option



# Plain Film With Double Contrast



Double contrast is best at diagnosing large obstructing masses as seen here.

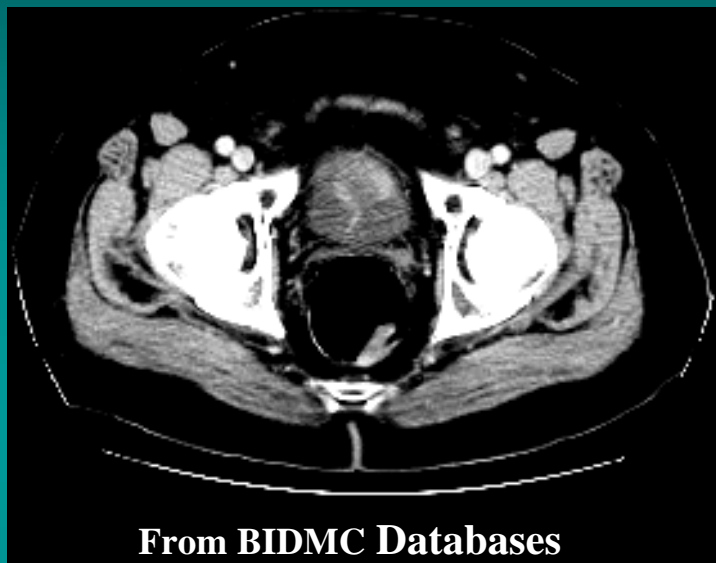
From <http://www.medinfo.ufl.edu/>

- The false-positive rate is less than 1 percent for cancers, 5 to 10 percent for large polyps and 50 percent for small polyps
- Misses about 25 percent of tumors and polyps in the rectosigmoid region

(Rudy and Zdon)



# CT



- Seen as intraluminal masses with focal or circumferential wall thickening
- Masses as small as 6mm can be detected
- Differential of CT finding is adenomatous polyps, villous adenoma, adenocarcinoma, malignant lymphoma, melanoma, metastases, carcinoid tumors, and sarcoma (Meyers)





# Importance of Radiology in Colon CA

- Staging
- Operative management decisions:
  - Relationship of the tumor to pelvic floor and anal sphincters determine abdominoperineal resection versus a sphincter-saving procedure
  - Assessment of tumor with relation to the prostate/seminal vesicles or uterus/vagina



# TNM Staging

- Necessary for evaluating prognosis and treatment options
- T addresses the extent of tumor invasion
- N addresses lymph node involvement
- M addresses distant metastasis



# “T” Staging

- Primary Tumor (T)

**TX** Primary tumor cannot be assessed

**T0** No evidence of primary tumor

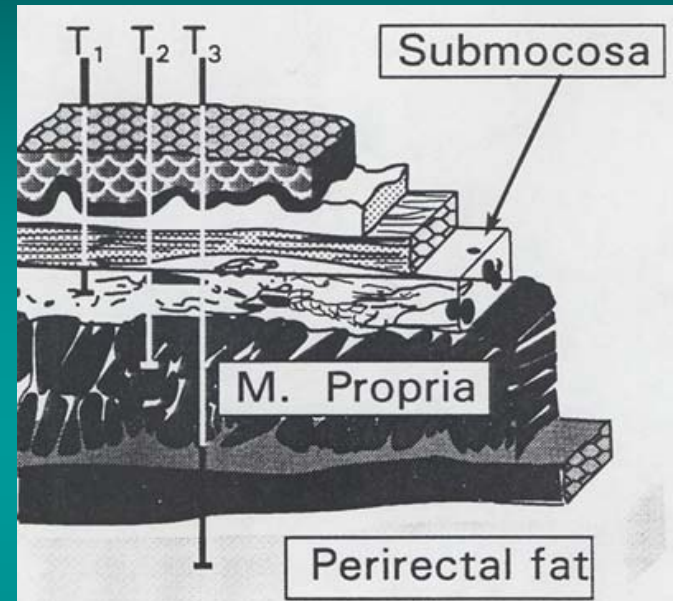
**Tis** Carcinoma in situ

**T1** Tumor invades submucosa

**T2** Tumor invades muscularis propria

**T3** Tumor invades through the muscularis propria into the subserosa, or into nonperitonealized pericolic or perirectal tissues

**T4** Tumor perforates the visceral peritoneum or directly invades other organs or structures

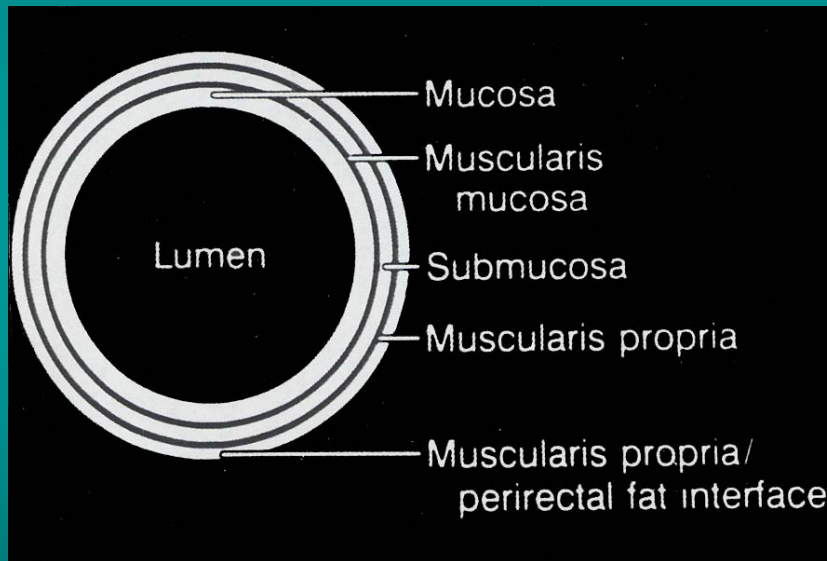


Hussain, S. Imaging of Anorectal Diseases

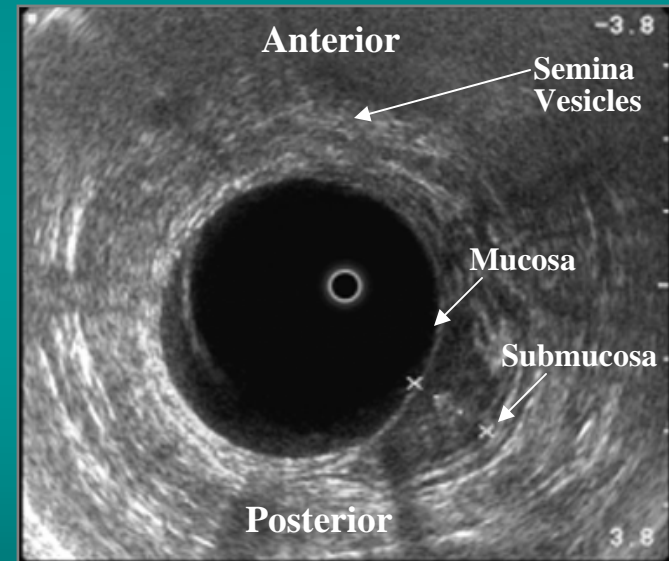


# Tumor Staging With US

Assessment of extent of tumor invasion into the bowel wall by US has an accuracy rate between 80 and 90% (Hussein)



Hussain, S. Imaging of Anorectal Diseases



From BIDMC Databases

Mr. K.'s tumor is confined to the mucosa and submucosa with a fat plane between the lesion and the muscularis propria.

Mr. K's lesion is therefore T2



# Tumor Staging With CT

- The accuracy of CT for early tumor staging (T1 and T2 tumor) is limited as the submucosa and muscularis are indistinguishable
- Tumors may be diagnosed as T3 when the colon is near mesenteric or extraperitoneal fat allowing extramural spread to be visualized



# “N” Staging

- Regional Lymph Nodes (N)

**NX** Regional lymph nodes cannot be assessed

**N0** No regional lymph node metastasis

**N1** Metastasis in 1 to 3 pericolic or perirectal lymph nodes

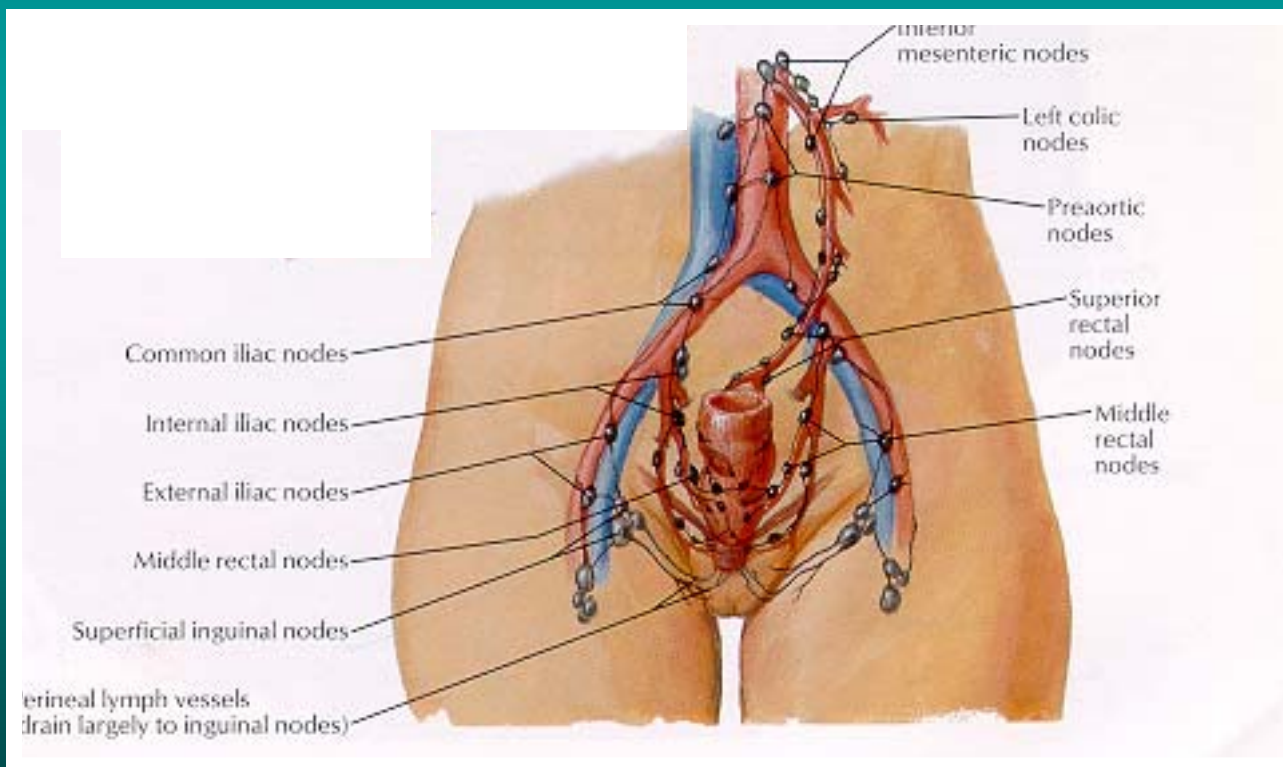
**N2** Metastasis in 4 or more pericolic or perirectal lymph nodes

**N3** Metastasis in any lymph node along the course of a named vascular trunk



# Perirectal/Pericolic Drainage Areas

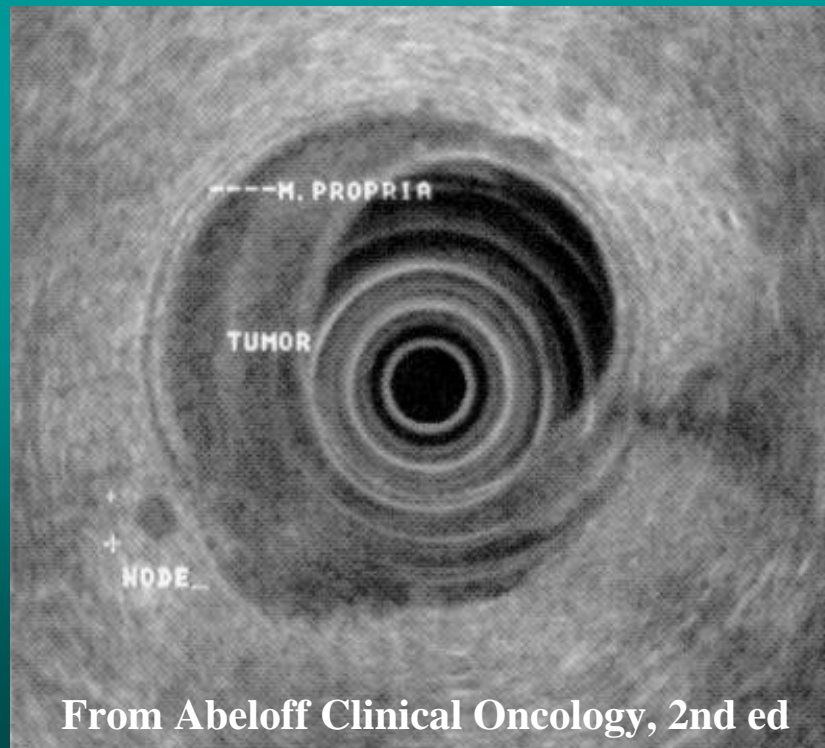
- Inguinal nodes
- Internal and external iliac nodes
- Mesenteric nodes





# Lymph Nodes and US

Identification of enlarged lymph nodes has a specificity 28% if 5mm is used as a cutoff, and 62% if 7mm is used as a cutoff (Abeloff)



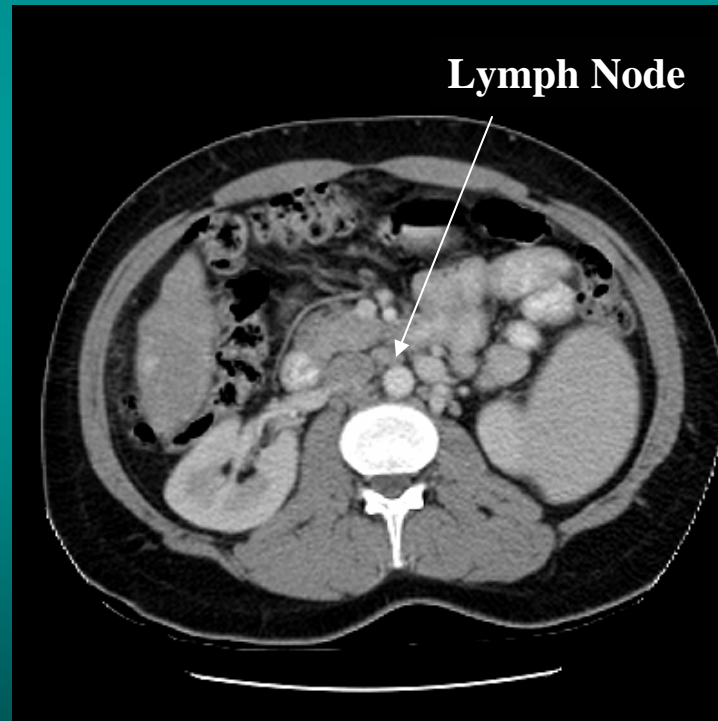
From Abeloff Clinical Oncology, 2nd ed





# Lymph Nodes and CT

- Specificity of 56%; Sensitivity of 34% (Meyers)



From BIDMC Databases



# Limitations of Radiology and Staging Node Involvement

- There is a poor correlation between nodal enlargement and metastatic involvement.

Lymph nodes also enlarge due to inflammatory response and conversely, metastatic disease can be present in LN with a diameter of less than 5mm.

- High-frequency US transducers provide detailed images of the bowel wall but compromise tissue penetration



# “M” Staging

- Distant Metastasis (M)

**MX** Presence of distant metastasis cannot be assessed

**M0** No distant metastasis

**M1** Distant metastasis

- Work-up includes:

CT of abdomen (to assess liver and adrenal glands)

CT or plain films of chest (to assess lungs)

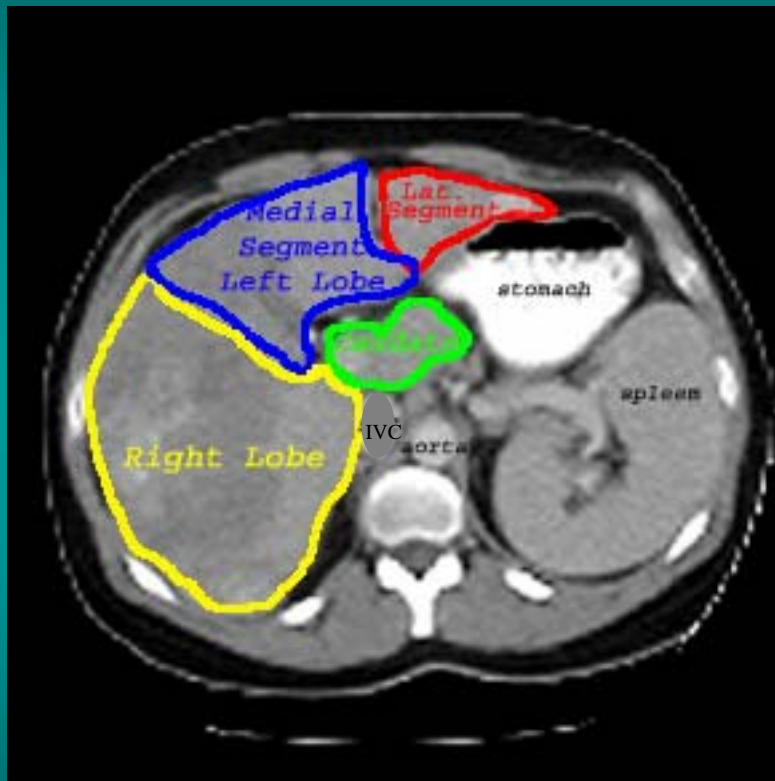


# Assessing Metastasis With CT

- CT scans have a sensitivity of 81% to 87% for detecting distant metastases (Abeloff)
- It is most important to detect small, single hepatic lesions as surgical resection of such lesions increases patient survival time



# Assessing Metastasis With CT



From BIDMC Databases

Focal parenchymal lesions with decreased attenuation

Mucinous carcinoma (such as this) may have areas of calcification

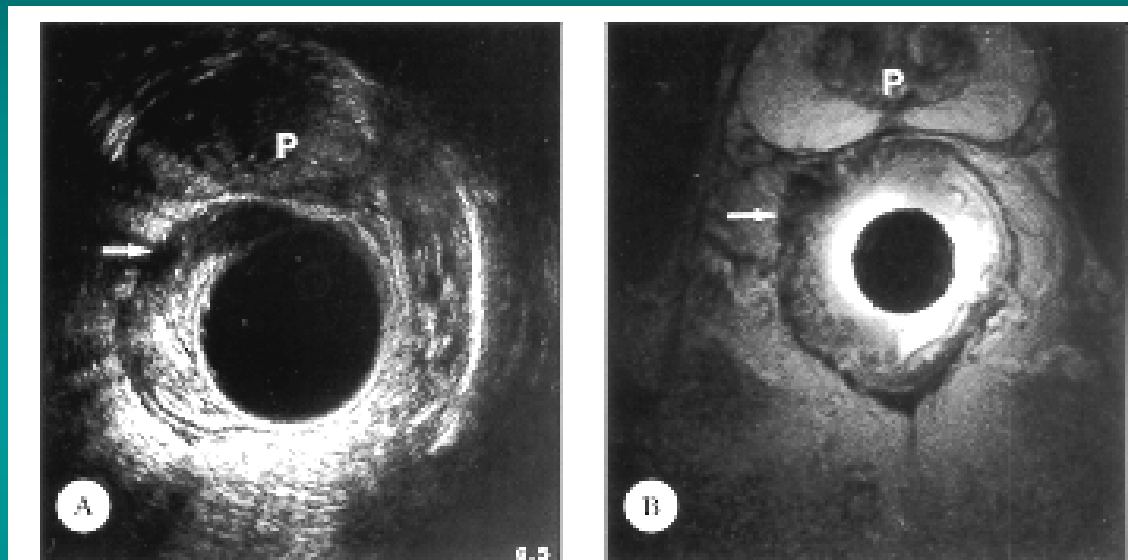


# Colorectal Cancer and Standard MRI

- Comparable resolution to CT without radiation.  
Accuracy of bowel wall penetration is 64% for MRI vs. 62% for CT
- Sensitivity for lymph node metastasis is 15% to 40% vs. 34% for CT



# Endorectal MRI

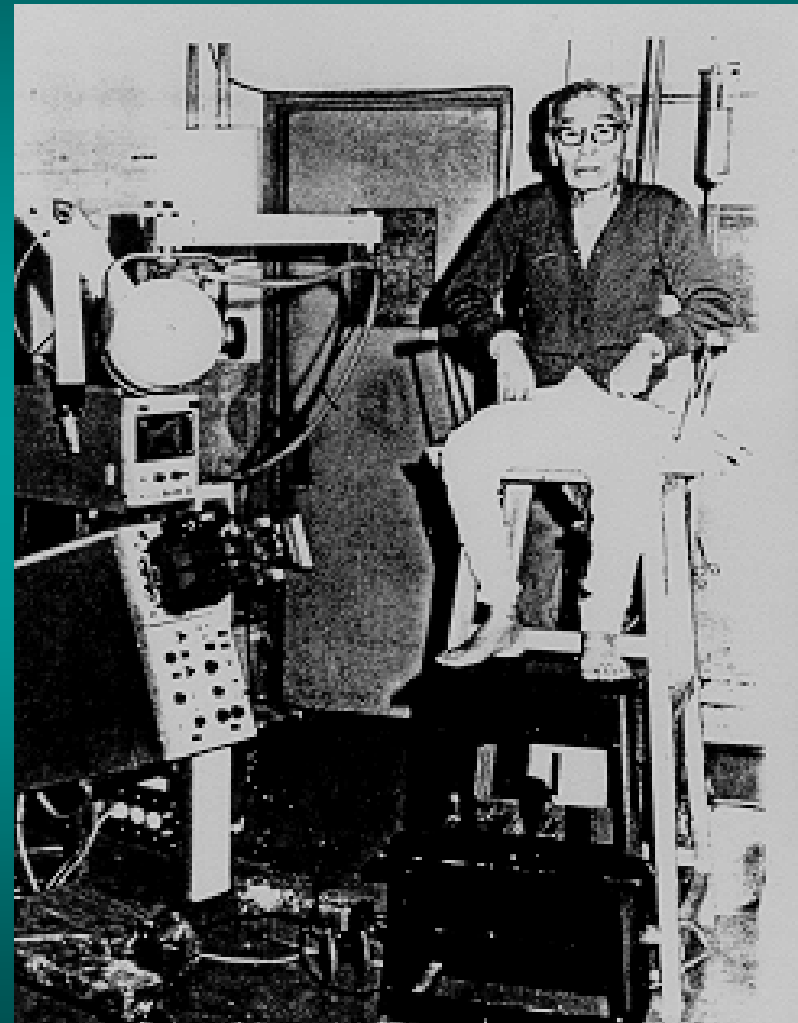
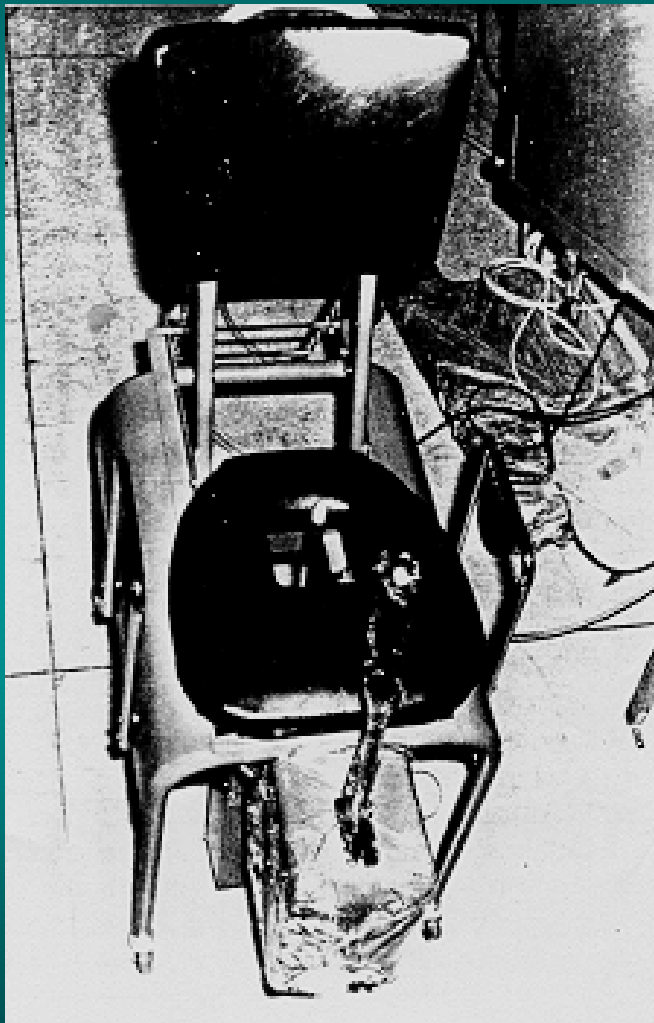


From Hussain, S. Imaging of Anorectal Diseases.

- Accuracy rate for bowel wall invasion has been found to be between 70% and 90% (compared to 80% - 90% for TRUS)
- Specificity for nodal involvement has been found to be 72% (compared to 28% to 62% for TRUS)



## We've Come A Long Way Baby...







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# Acknowledgements

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