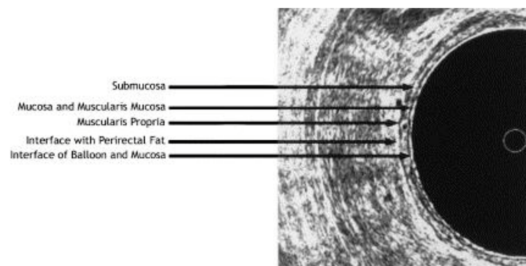
ENDORECTAL ULTRASOUND (ERUS)

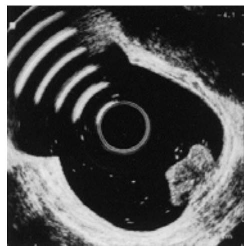
Useful in preoperative staging of anorectal cancers, the evaluation of anal incontinence, the assessment of extrarectal masses, and follow-up for recurrence of these diseases following treatment. It can also be used to assess benign lesions and benign disease processes such as fistula-in-ano or perirectal abscess.

*1. **Technique of** ERUS*

Prepped with two enemas to remove stool, and mucus which can cause artifacts. Digital rectal exam in the left lateral decubitus
For rectal cancer staging, rigid proctoscopy is performed using a 20-mm diameter proctoscope, which can accommodate the (ERUS) probe. Scope is then pulled back, balloon inflated.
A lower frequency transducer (5.0 or 7.0 MHz) may be used to look at deeper structures.
A balloon can accommodate up to 90 cc of water (30 to 60 cc used on average).
Make sure no air bubbles →artifacts. The amount of fluid is estimated based on the luminal diameter from proctoscopy, patient discomfort, and ability to pass the balloon beyond the lesion. key to the procedure is to keep the probe centered in the lumen of the rectum.
The basic anatomy of the rectal wall can be seen below (5 layers)
Inner white layer→ interface between the balloon and the mucosa.
Inner dark layer→mucosa and muscularis mucosa.
Middle white layer→ submucosa.
Outer dark layer→ muscularis propria. Outermost white layer→ perirectal fat.

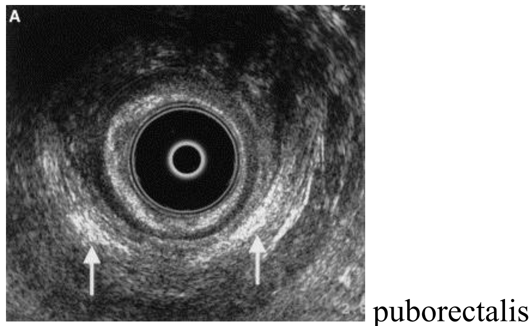


If further definition of the rectal wall and mesorectum is required→150 cc of water into the rectum, thus improving the conduction of sound waves through fluid medium.

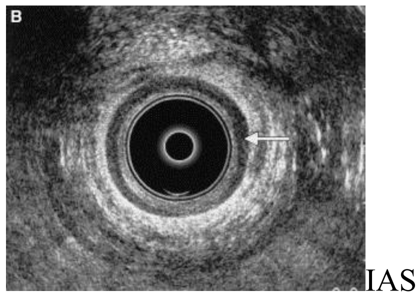


Technique uses the plastic cap rather than the balloon so that there is <u>no compression of the lesion.</u>

ERUS for anal canal→ plastic cap



puborectalis

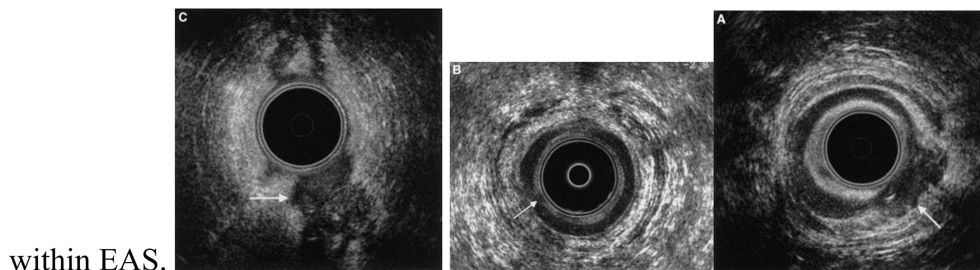


IAS

Abscess and fistula-in-ano

hypoechoic area just deep to the EAS. Useful (both in the office and intraoperatively)in negative exam but clinical history suggests an abscess

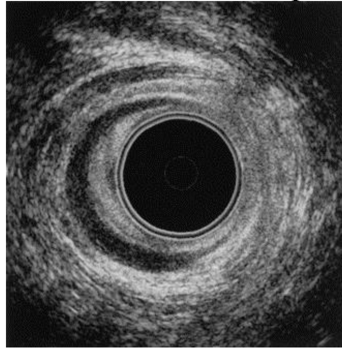
Seow-Choen et al identified criteria for identifying the internal opening of fistula in ano. These included a hypoechoic breach of the subepithelial layer, a defect in the circular smooth muscle of the IAS, and a hypoechoic lesion of the normally hyperechoic longitudinal smooth muscle abutting on the normally hypoechoic circular smooth muscle. The tracts were defined as follows: intersphincteric—hypoechoic line running through the normally hyperechoic longitudinal muscle. Transsphincteric—hypoechoic line extending outward through the EAS. Fig. 5A exemplifies a typical perianal abscess abutting the IAS. Fig. 5B exemplifies an internal opening (arrow). Fig. 5C shows abscess within EAS.



Anal incontinence

Other than H&P, anorectal manometry, pudendal nerve terminal motor latency exams (PNTML), electromyography (EMG), the use of EAUS has been invaluable in

identifying causative factors related to incontinence and potential operative repair. A typical sphincter defect on EAUS



Identification of a sphincter defect on EAUS does not necessarily correlate with incontinence.

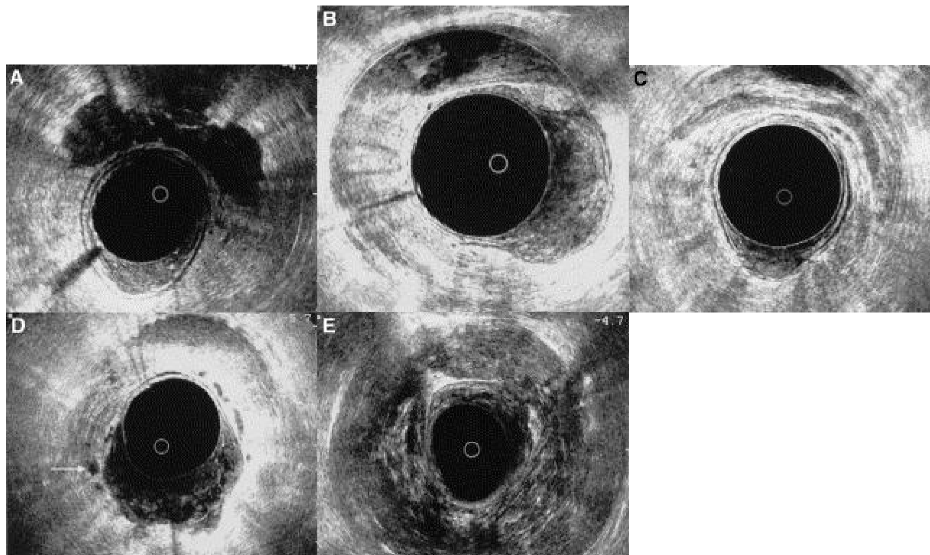
Rectal cancer

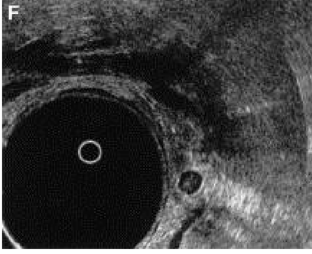
Operator dependent but highly accurate. Treatment based on findings.

Table 1. ERUS staging system

uT0	Confined to mucosa
uT1	To but not through submucosa
uT2	Into but not through muscularis propria
uT3	Through bowel wall into perirectal fat
uT4	Involving adjacent structures
uN0	No definable lymph nodes by ultrasound
uN1	Ultrasonographically apparent lymph nodes

Deep T2 lesion may give the appearance of a superficial T3 lesion due to scalloping of the perirectal fat rather than actual invasion. Degree of irregularity and thickening of the submucosa without a clear break, which may indicate a superficial T2 rather than T1





Anal cancer

Serial follow-up examinations of these cancers with ERUS and EAUS allow for accurate determination of recurrence. Serial EAUS is used to assess changes in the size of residual scar, or for recurrence of the lesion locally.

Table 3. Data from Kwok et al meta-analysis [36]

[a] All stages.

Abbrevations: Acc, accuracy; Sens, sensitivity; Spec, specificity; PPV, positive predictive value; NPV, negative predictive value; OS, overstaging; US, understaging.

Modality		Acc (%)	Sens (%)	Spec (%)	PPV (%)	NPV (%)	OS (%)	US (%)
CT	Depth penetration	80[a]	78	63	82	58	13[a]	7[a]
	Nodes	66	52	78	68	64		
MRI	Depth penetration	74[a]	82	86	77	83	13[a]	13[a]
	Nodes	74	65	80	72	75		
MRI-ERC	Depth penetration	81[a]	89	79	82	86	12[a]	6[a]
	Nodes	82	82	83	76	87		
ERUS	Depth penetration	84[a]	93	78	63	87	11[a]	5[a]
	Nodes	74	71	76	69	78		

Table 4. MSKCC modification of ERUS staging system

uTw:	uT0/uT1	Amenable to local excision
uTy:	uT2/superficial uT3	Recommend radical surgery over local excision. May require neoadjuvant therapy. Pathologic features and nodal status helpful in determining need for neoadjuvant therapy.
uTz:	deep uT3/any uT4	Recommend neoadjuvant therapy
uN1:	probable or definite	Recommend neoadjuvant therapy
uN1:	equivocal	Base treatment on T stage and pathologic features

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February 28, 2005