



ULTRASONOGRAPHY IN INFLAMMATORY BOWEL DISEASES

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US TECHNIQUES IN IBD

- **Transabdominal**
- Transrectal
- Endoscopic
- Hydrocolonic
- Doppler
- Contrast media

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TRANSABDOMINAL US IN IBD

Method commonly employed
Doppler and Color-Doppler

Probes: 3.5 – 5 - 7 MHz linear-convex

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TRANSABDOMINAL US IN IBD

- **Patient preparation:** fasting conditions (8 hrs)
- **Examination technique:** to move the probe in relation to the anatomical configuration of the intestinal tract

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CROHN'S DISEASE (US FINDINGS)

- transmural wall thickening
- mesenteric thickening
- luminal narrowing, abscesses, fistulas
- dilated, fluid-filled, fixed and packed bowel loops



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CROHN'S DISEASE (US FINDINGS)



TERMINAL ILEUM

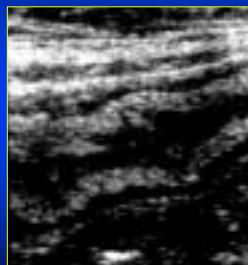
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CROHN'S DISEASE (US FINDINGS)



TARGET



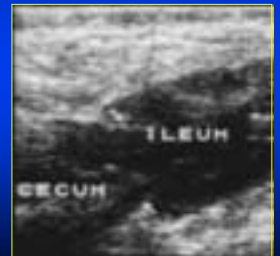
SANDWICH

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HIGH RESOLUTION ULTRASONOGRAPHY IN IBD

7 MHz
LINEAR - CONVEX
PROBES



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CROHN'S DISEASE (US FINDINGS CORRELATION)

- Natural History
- Disease Activity
- Complications

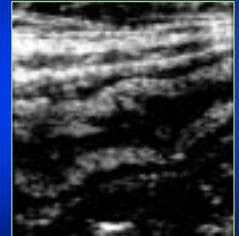
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CROHN'S DISEASE (NATURAL HISTORY - I)



INITIAL BWT

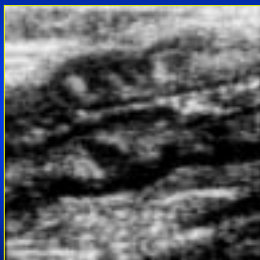


TRANSMURAL BWT

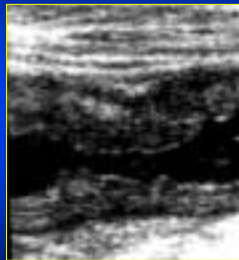
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CROHN'S DISEASE (NATURAL HISTORY - II)



DEEP ULCERS



FIBROSIS

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CROHN'S DISEASE (DISEASE ACTIVITY)

- ACTIVE IBD
↑ portal flow velocity and ↓ RI of SMA
(Bolondi et al, 1992)
- ACTIVE CROHN
↑ SMA flow
(Van Oostayen et al, 1994)



DOPPLER

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CROHN'S DISEASE (DISEASE ACTIVITY)



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US in Crohn's disease

DETECTION RATE OF SURGICALLY DRAINED ABSCESSSES

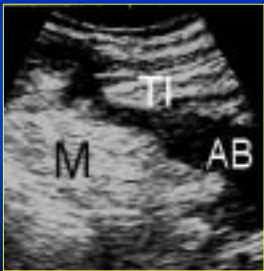
Site of abscess	(n)	US-true positive	US-false negative
Abdominal wall	3	3	-
Intra-abdominal	9	8	1
Retroperitoneal / perianal	9	6	3
Total	21	17	4

Schwerk et al., 1992

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CROHN'S DISEASE (COMPLICATIONS: ABSCESS)



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CROHN'S DISEASE (COMPLICATIONS: FISTULAS)

• **ENTERO-ENTERIC:** difficult to visualise

• **ENTERO-VESICAL:** easily recognisable

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CROHN'S DISEASE (COMPLICATIONS: FISTULAS)



ENTERO-ENTERIC



ENTERO-VESICAL

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CROHN'S DISEASE

US Diagnostic
accuracy

90 %

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Diagnostic role of US in Crohn's disease

- Identification of the affected tracts
- Assessment of the extent
- Detection of possible complications
- Follow-up of patients
 - Response to medical treatment
 - Detection of post-surgical recurrences

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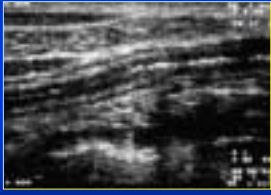
ULCERATIVE COLITIS (US FINDINGS)

- Superficial, continuous bowel wall thickening
- Moderate luminal narrowing
- Thin bowel wall, reduced haustra, meteorism (toxic megacolon)

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ULCERATIVE COLITIS (PATHOLOGICAL CORRELATION)



US FINDINGS

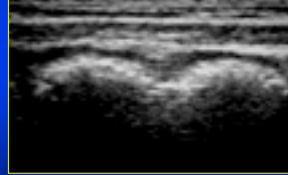


SPECIMEN

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ULCERATIVE COLITIS (TOXIC MEGACOLON)



US



PLAIN FILM

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Management of Severe Ulcerative Colitis with the Help of High Resolution Ultrasonography

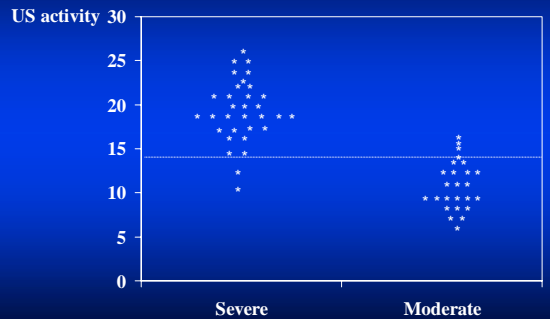
Vincenzo Arienti, M.D., Massimo Campieri, M.D., Luciana Boriani, M.D., Paolo Giunchetti, M.D.,
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High Resolution US in Ulcerative Colitis RELATIONSHIP WITH ACTIVITY SCORE



Arienti V. et al, Am J Gastroenterol 1996

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Diagnostic value of High Resolution US in Ulcerative Colitis

Sensitivity	93/104 (89%)
Specificity	24/24 (100%)
PV positive	93/93 (100%)
PV negative	24/35 (69%)
Overall accuracy	117/128 (91%)

PV = predictive value

Arienti V. et al, Am J Gastroenterol 1996
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High Resolution US in Ulcerative Colitis SENSITIVITY AND SITE OF INFLAMMATION

SITE Of UC	ULTRASONOGRAPHY		SCINTIGRAPHY		US SENSITIVITY %
	positive	negative	positive	negative	
Rectum-sigmoid	30	2	32	0	30/32 (94%)
Descending	28	4	31	1	28/31 (90%)
Transverse	21	11	24	8	21/24 (88%)
Ascending	14	18	17	15	14/17 (82%)
TOTAL	93	35	104	24	93/104 (89%)

Arienti V. et al, Am J Gastroenterol 1996
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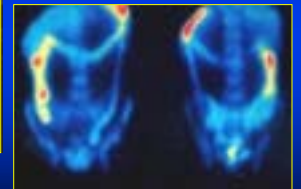
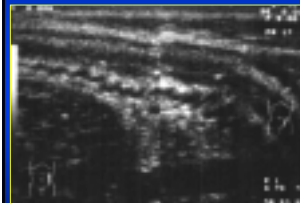
High Resolution US in Ulcerative Colitis SENSITIVITY AND EXTENT OF INFLAMMATION

EXTENT	SPECIMEN	TRUE POSITIVE DIAGNOSIS		
		X-RAY	US	SC
Left Colon	1	1	1	1
Transverse Colon	3	2	3	3
Right Colon	12	9	10	12
TOTAL	16	12/16 (75%)	14/16 (88%)	16/16 (100%)

Arienti V. et al, Am J Gastroenterol 1996
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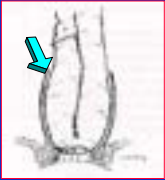
ULCERATIVE COLITIS (US-Sc CORRELATION)



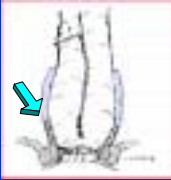
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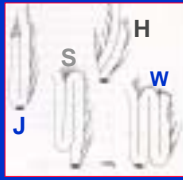
Ulcerative Colitis Surgical Procedures History - II



Endorectal ileal pouch-anal anastomosis following colectomy and mucosal proctectomy



Ileo-pouch anal anastomosis (IPAA) following proctocolectomy (mechanical suture: 3 cm)



Different ileal pouch configurations

(Becker JM, Parodi JE. Total colectomy with the preservation of the anal sphincter. Surg Annual, 1989)

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Results PDAI-US correlation

PDAI score	US score			Total
	0	1	2 3	
0	13	1	- -	14
1	4	10	2 -	16
2	-	1	3 -	4
3	-	-	1 2	1
Total	17	12	6 2	37

$T = 0.86, p < 0.001$
Females: $T = 0.93, p < 0.001$

* Kendall T correlation test

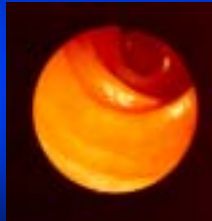
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Pouch normal findings



US



Endoscopy

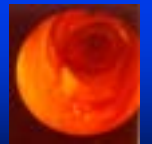
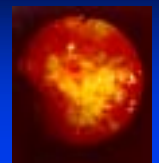
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Pouchitis



US



Endoscopy

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Diagnostic value of US detection of bowel wall thickening in IBD (232 patients)

- Sensitivity 90.3%
 - positive PV 95.5%
 - Specificity 88.4%
 - negative PV 92%
- Accuracy 90.5%**

Schwerk et al, 1992

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US BOWEL WALL THICKENING (DIFFERENTIAL DIAGNOSIS)

- Crohn's disease
- Ulcerative colitis
- Colitis (non IBD)
 - Tuberculosis
 - Actinomycosis
 - Amyloidosis
 - Diverticulitis
- Vasculitis
- Tumour
 - primary/metastatic
 - lymphoma/sarcoma
 - carcinoid
- Bowel wall oedema
- Bowel wall bleeding

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BENIGN / MALIGNANT DIFFERENTIAL DIAGNOSIS

(“Target” analysis)

BENIGN

- gradual thickening
- symmetric layers
- central lumen

MALIGNANT

- abrupt thickening
- asymmetric layers
- eccentric lumen

EXCEPTION: lymphoma

Di Candio et al AJR, 1981

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DIFFERENTIAL US DIAGNOSIS BENIGN vs MALIGNANT LESIONS

(“TARGET” ANALYSIS)

BENIGN



MALIGNANT



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DIFFERENTIAL DIAGNOSIS

CROHN'S DISEASE

- Wall thickening (++)
- Transmural thickening
- **Ileum, segmental lesions**
- **Fistulas, abscess, mesenteric fibro-fatty proliferation**

ULCERATIVE COLITIS

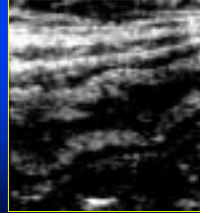
- Wall thickening (+ -)
- Superficial thickening
- **Rectum, continuous lesions**

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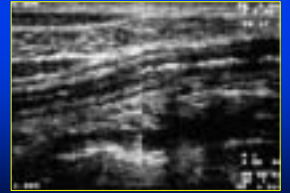


DIFFERENTIAL DIAGNOSIS

CROHN'S DISEASE



ULCERATIVE COLITIS



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CROHN'S DISEASE

IMAGING TECHNIQUES



Digestive Diseases and Sciences, 1993

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BWT in Crohn's disease



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Duodenal bulb stenosis in Crohn's disease



ENDOSONOGRAPHY

- Detection of perianorectal abscesses and fistulas
- Evaluation of anal sphincters
- Differential diagnosis: Crohn's disease vs UC?
- Assessment of severity ?

HYDROCOLONIC SONOGRAPHY (HCS) vs COLONOSCOPY AND TRANSABDOMINAL US IN THE DIAGNOSIS OF IBD

	Crohn's Disease	Ulcerative Colitis
HCS	39/41 (95%)	33/36 (91%)
Colonoscopy	41/41 (100%)	36/36 (100%)
Abdominal US	29/41 (71%)	22/36 (62%)

Limberg et al, Am J Gastroenterol 1994

CONCLUSIONS

- TRANSABDOMINAL US
 - Established diagnostic role in CD
 - Useful in management of moderate/severe UC
- ENDOSONOGRAPHY
 - Important role in detection of perianorectal complications in CD



CONCLUSIONS

- Doppler and color-doppler US
 - Seem to offer a non-invasive means of assessing disease activity
 - Need further investigations
- Hydrocolonic US
 - Promising but rather complicated

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US in IBD: www.arianti-v.com (Didattica e Formazione)

AIME:

www.aime.it



Scuola SIUMB:

www.arianti-v.com/ecografia

IV° Corso di Ecografia Clinica:

www.unimediasrl.com/ecografia

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