Crohn’s Disease on CT/MR Enterography: SAR/AGA/ASCRS/SSAT Consensus Statement on Nomenclature for Reporting
Sept 20, 2016, 8:30-8:45 AM
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Cleveland Clinic Lerner College of Medicine of CWRU
Staff Radiologist, Abdominal Imaging,
Imaging & Digestive Disease Institutes, Cleveland Clinic
CONFLICT OF INTEREST DISCLOSURE:

BRACCO:
Informal Consultations

SIEMENS HEALTHCARE:
Research Agreement
Radiation Dose Assessment & Reduction in MDCT
including Iterative Reconstruction
(Salary Support, Hardware & Software)
(Not Applicable to the Presentation)
SAR Crohn’s Disease Focused Panel

- Mahmoud Al-Hawary
- Sudha Anupindi
- Mark E. Baker
- David Bruining (Gastro)
- Jonathan Dillman
- Jeff Fidler
- JG Fletcher
- Michael Gee
- David Grand
- “Buddy” Guglielmo
- Amy Hara
- Tracy Jaffe
- Jim Huprich
- Dean Maglinte
- Alec Megibow
- Seong Ho Park
- Joel Platt
- Daniel Podberesky
- Jordi Romola
- Dushant Sahani
- Jorge Soto
- Stuart Taylor
Objectives

• Purpose of a Common/Standardized Nomenclature
• CTE/MRE Impressions of Crohn’s
  – Image Based Morphologic Phenotypes
    • Terms to Use in Dictation
    • Meaning of Terms
    • Examples
• CTE/MRE Findings of & Report Template for Crohn’s Disease
  – Insufficient Time for Presentation
  – CT enterography for Crohn’s disease: optimal technique & imaging issues.
    Baker ME, Hara AK, Platt JF, Maglinte DDT, Fletcher JG
    • Abdominal Imaging 2015; 40: 938-952.
Purpose of Standardized Nomenclature

• Imaging is Increasingly Used to “Stage” Degree of Inflammation & Intestinal Damage
  – Lémann Score

• Outcome Measures
  – If We are to Determine Whether CTE/MRE Findings Appropriately Direct &/or Alter Rx & Predict Outcomes, the Nomenclature Must be Standardized
Vienna/Montreal Classification/Phenotypes

- Nonstricturing/Nonpenetrating (B1)
  - Active Inflammatory
- Stricturing (B2)
  - Fibrostenotic
- Penetrating (B3)
  - Sinus Tracts
  - Fistulae
  - Abscess
- Perianal (p)
Active Inflammation & “Fibro”-Stenosis

• Compelling Evidence that Active Inflammation & “Fibro”-Stenosis Commonly Coexist

• Crohn’s Disease is a Dynamic, Often Progressive Process, Which Waxes & Wanes
  – Imaging Identifies This Dynamic Process
Relationship Between Fistulae & Strictures

Vircows Arch 2000; 437: 293
• 42 Patients
  – Strictures in 38
  – Fistulae in 27
    • Stricture Present 96%
    • Fistulae Within (41%) or at Proximal End (56%) of Stricture

• 236 Specimens
  – Fistulae in 60
    • Strictures Present in 93%
    • Fistulae in Proximal End of Stricture- 62%
    • Fistulae Within Stricture- 31%
  – No Stricture in 7%

Ian Lavery- “Penetrating Disease without Strictures is Rare”

Reed Rice Rule- “No Stricture-No Fistula”
Montreal/Vienna vs. Clinical, Pathologic & Imaging Findings

• Montreal/Vienna Phenotypes Cannot Be Reconciled with:
  – Clinical Findings
  – Pathologic Findings
  – Imaging Findings
• Does Not Account for Dynamic Disease Process
Nomenclature

Findings

- Wall
  - Wall Thickness & Enhancement
  - Mural Edema (T2-MRI)
    - Mural Fat (Fat Sat T2 & T1)
  - Restricted Diffusion
  - Luminal Diameter (Disease Site & Upstream)

- Mesenteric
  - Engorged Vasa Recta, Fibrofatty Proliferation, Perienteric Edema, Adenopathy, Inflammatory Mass & Abscess, Mesenteric Vein Thr/Occlus
  - Ulcer, Sinus Tract & Fistulae

- Ancillary
  - Perianal Fistulae, PSC, Stones, Venous Thrombi, Sacroilitis, Hip AVN

Impressions

(Morphologic Phenotypes)

- Active Inflammatory CD without Luminal Narrowing
- Active Inflammatory CD with Luminal Narrowing
- CD without Active Inflammation
- Stricture with Active Inflammation
- Penetrating (Added to Above)
- Stricture without Active Inflammation
- No Active Inflammatory Crohn’s
- Non-Specific Inflammation
Imaging Based Morphologic Phenotypes
To Reflect What We Identify with Imaging, Pathology & Clinically
No luminal narrowing

Stricture development (unequivocal upstream dilation)

Lumen narrows without upstream dilation

Active Inflammatory Small Bowel Crohn’s Disease

No Active Inflammatory Small Bowel Crohn’s Disease

Crohn’s without Active Inflammation
(Evidence of prior disease required)

Stricture without active inflammation
(with or without upstream dilation)

Nonspecific Small Bowel Inflammation

Penetrating Disease
Active Inflammatory Small Bowel Crohn’s Disease

No luminal Narrowing
Impressions

- **Active Inflammatory Small Bowel C.D.**
  - No Luminal Narrowing
  - No Upstream Dilation
  - Wall Hyperenhancement
    - Generally Stratified *(NOT NECESSARILY MUCOSAL!)*
  - T2 Bright/Restricted Diffusion on MRE
  - Wall Thickening
  - Mesenteric Changes Variably Present

- **Active**
  - Not Acute or Chronic
ACTIVE INFLAMMATORY SMALL BOWEL CROHN’S DISEASE WITHOUT LUMINAL NARROWING
ACTIVE INFLAMMATORY SMALL BOWEL CROHN’S DISEASE WITHOUT LUMINAL NARROWING
Active Inflammatory Small Bowel Crohn’s Disease

- No luminal Narrowing
- Lumen narrows without Upstream dilation
Impressions

- Active Inflammatory Crohn’s Disease
  - With Luminal Narrowing
  - Without Upstream Dilation
  - Wall Hyperenhancement
  - T2 Bright/Restricted Diffusion on MRE
  - Wall Thickening
  - Mesenteric Changes Present
ACTIVE INFLAMMATORY SMALL BOWEL CROHN’S DISEASE WITH LUMINAL NARROWING WITHOUT UPSTREAM DILATION NEO-TI
ACTIVE INFLAMMATORY SMALL BOWEL CROHN’S DISEASE WITH LUMINAL NARROWING WITHOUT UPSTREAM DILATION NEO-TI
ACTIVE INFLAMMATORY
SMALL BOWEL CROHN’S DISEASE
SUBTLE T2 BRIGHT, RESTRICTED DIFFUSION
HYPERENHANCING
ACTIVE INFLAMMATORY SMALL BOWEL CROHN’S DISEASE
SUBTLE T2 BRIGHT, RESTRICTED DIFFUSION HYPERENHANCING
No luminal Narrowing

Active Inflammatory Small Bowel Crohn’s Disease

Crohn’s without Active Inflammation
(Evidence of prior disease required)
Impressions

• Small Bowel C.D. without Active Inflammation
  – No Active Inflammation
  • Requires Prior Findings of Active Disease
  – No or Minimal Wall Enhancement
  – Not T2 Bright/No Restricted Diffusion on MRE
  – Wall Thickening Variably Present
  – Normal Lumen
  – No Mesenteric Changes Except Fatty Proliferation
Active Inflammatory Small Bowel Crohn’s Disease

- No luminal Narrowing

- Lumen narrows without Upstream dilation

- Stricture Development (unequivocal upstream dilation)
Impressions

• Stricture Development; Crohn’s Disease with Stricture and Active Inflammation
  – Luminal Narrowing
  – Upstream Dilation (> 3 cm)
    • Stricture Formation
    – Wall Thickening
    – Wall Hyperenhancement
    – T2 Bright/Restricted Diffusion on MRE
    – Mesenteric Changes Present

• Mixed Fibrostenotic Changed to Stenotic
DELAYED ENHANCEMENT-
PROBABLE FIBROSIS
Active Inflammatory Small Bowel Crohn’s Disease

- No luminal Narrowing
- Lumen narrows without Upstream dilation
- Stricture Development (unequivocal upstream dilation)

Penetrating Disease
Impressions

• Penetrating Crohn’s Disease
  – Can Be Added to Active or Mixed CD
    • Mixed Disease Overwhelmingly the Most Likely Phenotype
    • ? As to Whether Penetrating Disease Exists with Fibrostenotic Disease When There is No Active Inflammatory Disease
      – I Have Never Seen This
  – Sinus Tract &/or Fistulae
  – Inflammatory Mass
  – Abscess
  – Free Perforation
ENTERO-ENTERO
ENTERO-CECAL
ENTERO-SIGMOID
ENTERO-VESICULAR
No luminal Narrowing

Lumen narrows without Upstream dilation

Stricture Development (unequivocal upstream dilation)

Stricture without active inflammation (with or without upstream dilation)

Penetrating Disease

Active Inflammatory Small Bowel Crohn’s Disease
Impressions

• Stricture Development without Active Inflammation
  – “Burned Out Crohn’s”
  – No Wall Thickening
  – Luminal Narrowing
  – Without or With Upstream Dilation
  – No or Minimal Wall Hyperenhancement
  – Not T2 Bright/Restricted Diffusion on MRE
  – No Mesenteric Changes
  – May Need to Eliminate “Fibro” & Just Call It Stenotic
    • “F” Word Anathema to Gastroenterologists
STRUCTURED, D3 CHRON’S
Active Inflammatory Small Bowel Crohn’s Disease

No Active Inflammatory Small Bowel Crohn’s Disease

Nonspecific Small Bowel Inflammation
Impressions

• No Active Inflammatory Small Bowel CD
  – No Mural Findings of Active Inflammation
  – Normal Study overall
  – Often Used for Patients with a Colitis

• Nonspecific Inflammation
RADIATION STRicture
BACKWASH ILEITIS
POST PROCTOCOLECTOMY FOR
U.C.
GVHD
CELIAC DISEASE
ULCERATIVE JEJUNOLIEITIS
Crohn’s without Active Inflammation (Evidence of prior disease required)
No Active Inflammatory Small Bowel Crohn’s Disease

Active Inflammatory Small Bowel Crohn’s Disease
- No luminal Narrowing
- Lumen narrows without Upstream dilation
- Stricture Development (unequivocal upstream dilation)

Nonspecific Small Bowel Inflammation

Stricture without active inflammation (with or without upstream dilation)

90+% Cases

Penetrating Disease
Imaging Approach to Small Bowel Findings

- Montreal/Vienna Phenotype Classification
  - Current Gastroenterology/Colorectal Surgery Morphologic Construct

- SAR/AGA/ASCRS/SSAT Image Based Morphologic Phenotypes
  - CTE & MRE Imaging Findings & Impressions
    - Based on Imaging Morphology
    - Easily Applied to Lémann Score
### Proposed Imaging Based Morphologic Phenotypes & Lémann Score

<table>
<thead>
<tr>
<th>SAR Impressions</th>
<th>Lehmann Stricturing Lesion Grade</th>
<th>Penetrating Lesion Grade</th>
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<tbody>
<tr>
<td>Crohn’s without Active Inflammation</td>
<td>0</td>
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<tr>
<td>Active Inflammatory without Luminal Narrowing</td>
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<tr>
<td>Active Inflammatory with Luminal Narrowing</td>
<td>2</td>
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<tr>
<td>Stricture with Active Inflammation (Upstream Dilation)</td>
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<tr>
<td>Penetrating</td>
<td></td>
<td>3</td>
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</table>

*Inflamm Bowel Dis 2011; 17: 1415*
SAR Nomenclature

- Final ACG Approval
  - Input from:
    - David Bruining, MD
    - Ellen Zimmermann, MD
    - Edward Loftus, MD
    - William Sandborn, MD
    - Cary Sauer, MD
    - Scott Strong, MD
  - Joint Publication