Interdisciplinary Updates in Crohn's Disease Reporting Nomenclature, and Cross-Sectional Disease Monitoring

Mark E. Baker, MD[a,*], Joel G. Fletcher, MD[b], Mahmoud Al-Hawary, MD[c], David Bruining, MD[d]

KEYWORDS

• Crohn's disease • Reporting nomenclature • Imaging-based morphologic phenotypes

KEY POINTS

- There is now interdisciplinary consensus on terms and nomenclature used for effective communication in describing small bowel Crohn's disease at computed tomography and magnetic resonance enterography.
- An imaging-based morphologic construct that focuses on the role of enteric inflammation can be used to describe active inflammatory Crohn's disease and its stricturing and penetrating complications.
- Active inflammatory Crohn's disease can be diagnosed when imaging findings of inflammation are asymmetric and preferentially involve the mesenteric border, or when mural hyperenhancement and wall thickening are present in a patient with known Crohn's disease.
- Disease monitoring with computed tomography and magnetic resonance enterography can define response to treatment, which predicts long-term outcomes.

Over the last decade, computed tomography enterography (CTE) and magnetic resonance enterography (MRE) have become essential methods of guiding the clinical management of patients with Crohn's disease.[1–6] Multiple investigations have shown that biologic inflammatory activity in Crohn's disease is unrelated to patient signs and symptoms, and penetrating and stricturing complications can be present in asymptomatic patients.[7,8] Cross-sectional enterography is important at the time of diagnosis and in monitoring patients with small bowel inflammation, because up to 50% of patients with small bowel Crohn's disease will have active small bowel inflammation on CTE or MRE, despite a negative endoscopy.[4,9,10]

Disclosure Statement: M.E. Baker has a grant from Siemens Healthineers in the form of salary support, hardware, and software for investigating computed tomography exposure reduction; J.G. Fletcher has a grant from Siemens Healthineers and consults with Medtronic; M. Al-Hawary has no disclosures; D. Bruining has no disclosures.

[a] Abdominal Imaging Section, Imaging Institute, Cleveland Clinic, 9500 Euclid Avenue - L10, Cleveland, OH 44195, USA; [b] Department of Radiology, Mayo Clinic, 200 First Street Southwest, Rochester, MN 55905, USA; [c] Department of Radiology, Michigan Medicine, University of Michigan, 1500 East Medical Center Drive, Ann Arbor, MI 489109, USA; [d] Division of Gastroenterology and Hepatology, Department of Internal Medicine, Mayo Clinic, 200 First Street Southwest, Rochester, MN 55905, USA

* Corresponding author.

E-mail address: bakerm@ccf.org

Radiol Clin N Am 56 (2018) 691–707

https://doi.org/10.1016/j.rcl.2018.04.010

Members of the Society of Abdominal Radiology Crohn's Disease-focused Panel have met yearly with gastroenterologists from the American Gastroenterological Association to discuss common issues.[11,12] Based on what has been observed with both CTE and MRE, it was apparent that distinct, imaging-based morphologic phenotypes seen in clinical practice are incompletely described using the Montreal and Paris classifications,[13,14] and that there are also distinct dynamic transitions between phenotypes, largely driven by progression and remission of enteric inflammation.

Over the years, the nomenclature used to describe these phenotypes has evolved with input from members of the group as well as adult and pediatric gastroenterologists and colorectal surgeons. The Society of Abdominal Radiology, the American Gastroenterological Association Institute Governing Council, and the Society for Pediatric Radiology Board have now approved the terms, in addition to recommendations for the use of CTE and MRE.[15] The purpose of this work is to review these consensus recommendations, terms, and interpretation of specific imaging findings at CTE and MRE in small bowel Crohn's disease, along with recommendations for reporting to maximize clinical benefit to the patient and referring gastroenterologist, and how to conceptualize implications for patient care in disease monitoring paradigms.

LIMITATIONS OF CURRENT CLASSIFICATION SYSTEMS

For years, physicians caring for patients with Crohn's disease have used a phenotypic classification that parses the disease state into discreet groups. These are (1) nonstricturing, nonpenetrating disease (active inflammatory), (2) stricturing disease, and (3) penetrating disease, with perianal disease added to any of these 3 phenotypes.[13,14] These classifications fail to recognize that Crohn's disease is dynamic and can wax and wane, but is often progressive. Second, strictures in Crohn's patients commonly have both radiographic and pathologic findings of active inflammation.[16,17] Third, penetrating disease is almost always associated with strictures with active inflammation.[18–21] In any particular patient, each of these processes may coexist in different anatomic locations and change over time.

Baker and associates[11] proposed that imaging portrayed distinct patterns of transition between morphologic phenotypes that paralleled observations in the pathologic literature. Imaging-based phenotypes (and the transitions between them), emphasize the coexisting and preeminent role of enteric inflammation in gut destruction and enteric complications, and are linked to specific anatomic locations. For example, in many cases, there is a progression from wall thickening with active inflammation, to luminal narrowing, to stricture formation, and eventual development of penetrating disease. Analogous patterns proceeding in the opposite direction of this pathway are seen as inflammation moves toward transmural healing with appropriate medical therapy. A standardized method of interpreting the meaning of imaging findings coupled with the use of these imaging-based phenotypes will assist in describing Crohn's disease burden and response to medical or surgical therapy.

STANDARD NOMENCLATURE FOR DESCRIBING THE IMAGING FINDINGS OF CROHN'S DISEASE

The following describes the agreed upon terms that should be used to describe the imaging findings of Crohn's disease, the patterns of enteric involvement, as well as the morphologic phenotypes, based on the recommendations of this interdisciplinary group.

MURAL FINDINGS OF ACTIVE INFLAMMATION

Mural findings of active inflammation can be separated into segmental mural hyperenhancement, wall thickening, intramural edema, stricture formation, ulceration, sacculations, and diminished motility[22–28] (**Box 1**). Most investigations have shown that mural hyperenhancement is a good indicator of active inflammation.[29,30] In Crohn's disease, segmental hyperenhancement is generally patchy or asymmetric. Although different patterns of bowel wall enhancement are observed (eg, stratified or homogeneous), no meaning should be inferred from the enhancement pattern in the enteric or portal phase of enhancement. In contradistinction, a recent investigation suggested that delayed homogeneous enhancement is related to the degree of fibrosis.[31] The use of the term mucosal hyperenhancement should not be used, because the mucosa is often totally absent in regions of severe inflammation.

Wall thickening in Crohn's disease can be seen even in cases without active inflammation.[22,23] Early in the disease, wall thickening is often asymmetric, affecting the mesenteric border preferentially. With disease progression, thickening often becomes symmetric. Wall thickening can be mild (3–5 mm) or moderate (>5–9 mm). Whenever the wall is greater than 9 mm, one should consider a complicating carcinoma or neuroendocrine tumor, especially when there is a poorly marginated,