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Case Report

At-home Disease Monitoring by Patient-performed Intestinal Ultrasound in Severe Ulcerative Colitis

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Lay Summary

We describe the first reported case of a nonmedically trained patient using a handheld ultrasound device to monitor his ulcerative colitis in real time at home during induction therapy for severe colitis.

Key Words: ulcerative colitis, inflammatory bowel disease, intestinal ultrasound

Ulcerative colitis (UC) is a chronic inflammatory bowel disease that significantly affects a patient's quality of life.[1] With no cure available, lifelong treatment and monitoring are necessary. The STRIDE-II consensus statement identifies objective targets of treatment in UC including endoscopic improvement and emphasizes tight disease monitoring to improve outcomes.[2] Objective markers like C-reactive protein, fecal calprotectin, and colonoscopy, along with subjective patient information, aid in managing UC.

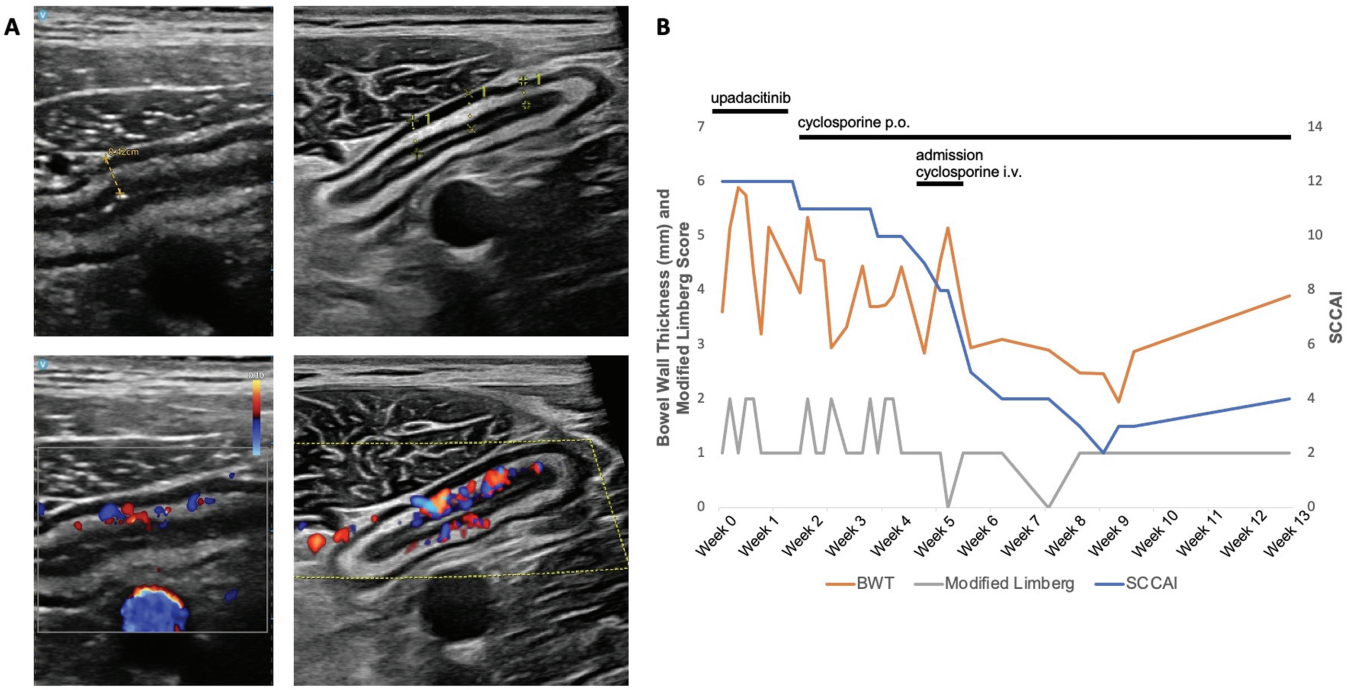

Figure 1. A, Intestinal ultrasound images of the sigmoid colon with measurements of bowel wall thickness and color Doppler signal self-performed by the patient (left) using a handheld ultrasound and by the physician (N.K.C., right) using a stationary ultrasound machine. B, Longitudinal measurements of disease activity by the patient's self-measured bowel wall thickness and color Doppler of the sigmoid colon using a handheld ultrasound, self-reported SCCAI score, and the corresponding treatment.

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Key Messages

1. **What is already known?** Intestinal ultrasound is an emergent cost-effective, noninvasive serial monitoring tool that demonstrates high diagnostic accuracy for disease activity assessment in inflammatory bowel disease.
2. **What is new here?** We describe the first use of handheld ultrasound by a patient with ulcerative colitis for at-home monitoring during change of therapy.
3. **How can this study help patient care?** The utility of handheld ultrasound for disease management is novel and paradigm-shifting in multiple ways, for its patient-directed nature and contribution to shortening time of assessment and decision-making.

While colonoscopy is the gold standard for assessment of UC activity, it is limited by its invasive nature, patient burden, and healthcare costs and is not practical for frequent serial monitoring. An alternative and emerging noninvasive monitoring tool is intestinal ultrasound (IUS), which has demonstrated high diagnostic accuracy for disease activity assessment based on bowel wall thickness (BWT) and color Doppler signal (CDS); most recently, it has demonstrated sensitivity in hospitalized patients for measuring change in response to corticosteroids within a few days.[3-5]

We describe the first reported case of a nonmedically trained patient using a handheld ultrasound device to monitor his UC in real time at home during induction therapy for severe colitis. The 27-year-old patient had a history of ulcerative pancolitis and had not achieved sustained benefit with mesalamine, adalimumab, vedolizumab, and ustekinumab. After clinical remission was achieved in the hospital with cyclosporine, the patient's UC relapsed during transition to azathioprine maintenance. Subsequently, upadacitinib was initiated.

The patient was instructed on using a handheld portable ultrasound device (Vscan Air™, GE HealthCare) to visualize the sigmoid colon and measure BWT and vascularization using CDS. Training occurred during a single clinic visit in which he repeated the self-scans until proficiency was demonstrated with 3 repeated exams. The patient subsequently performed the self-scans daily and transmitted the images securely to the medical team, who provided ongoing feedback on the quality and measures of the obtained images (Figure 1A). Despite stable symptoms, worsening BWT measurements prompted the need for a more definitive strategy, leading to the decision for surgery (Figure 1B).

The case suggests that self-administered handheld IUS could be a novel self-monitoring tool in UC, providing real-time information on treatment response and helping patients and their healthcare team to make more informed decisions about their treatments.

This feasibility case study highlights the potential benefits of self-administered handheld ultrasound for monitoring UC, particularly in severe or refractory cases, in which timing of responsiveness is quite important. Further research and development are needed to fully explore and implement this innovative monitoring strategy for motivated and appropriately trained patients. A larger prospective trial of this approach is underway.

Author Contributions

N.K.C.: conceptualization, equal; investigation, lead; writing-original draft, lead; writing-review and editing, equal

Y.M.: investigation, equal; writing-original draft, supporting; writing-review and editing, equal

E.A.P.: investigation, equal; writing-review and editing, equal

D.T.R.: conceptualization, lead; investigation, equal; supervision, lead; writing-review and editing, equal

Conflicts of Interest

N.K.C. serves as a consultant for NeuroLogica, a subsidiary of Samsung Electronics. Y.M. and E.A.P. have no relevant conflicts of interest to disclose. D.T.R. has received grant support from Takeda and serves as a consultant for AbbVie, Janssen Pharmaceuticals, Samsung NeuroLogica, and Takeda.

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