

# Novel Use of the Crohn's Disease Exclusion Diet Plus Partial Enteral Nutrition for the Treatment of Crohn's Disease During Pregnancy

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## ABSTRACT

The Crohn's Disease Exclusion Diet (CDED) with partial enteral nutrition (PEN) is an emerging treatment option for Crohn's disease (CD). A 35-year-old pregnant woman presented with newly diagnosed ileal CD. At 14/40 gestation, CDED + PEN was prescribed without drug therapy. Outcomes included Harvey-Bradshaw Index, weight, and bowel wall thickness/Limberg score measured on intestinal ultrasound (IUS). In this patient, CDED + PEN achieved clinical and biochemical remission, improvements on IUS, gestational weight gain, and healthy birth weight without drug therapy. Sustained remission was achieved postpartum. Our case highlights the potential effectiveness of CDED + PEN to induce remission for active CD during pregnancy.

**KEYWORDS:** dietary intervention; inflammatory bowel disease; nutrition; pregnancy

## INTRODUCTION

Active Crohn's disease (CD) during pregnancy is often treated with corticosteroids or tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) inhibitors (anti-TNF), which have potential adverse side effects.<sup>1</sup> Although such drugs are generally considered safe during pregnancy, patients often express concerns about the side effects of inflammatory bowel disease (IBD) medications despite IBD specialist counseling.<sup>2</sup>

Recent studies have explored the manipulation of diet<sup>3,4</sup>; however, pregnant women are generally excluded from clinical trials. The Crohn's Disease Exclusion Diet (CDED) with partial enteral nutrition (PEN) is a structured 3-phase high-protein and low-fat diet, based on whole foods to improve gut integrity while eliminating specific components of food found to have negative effects on intestinal barrier function.<sup>3,4</sup> We examine the outcomes of CDED with PEN as monotherapy for active CD during pregnancy.

## CASE REPORT

A 35-year-old woman with a history of iron deficiency presented with a new diagnosis of moderately severe ileal CD. Symptoms at diagnosis included fatigue, abdominal pain, diarrhea, and a 4-kg weight loss (7% total body weight) to 51.8 kg (body mass index 19.7 kg/m<sup>2</sup>). At diagnosis, colonoscopy showed isolated terminal ileal disease with large serpiginous superficial ulcers, an SES-CD score of 7 (Figure 1), and a Harvey-Bradshaw Index (HBI) score of 7. During evaluation and before therapy, the patient was unexpectedly pregnant (8/40 weeks of gestation) and medical treatment naive and held safety concerns regarding commencement of drug therapy during pregnancy. Her fecal calprotectin (FC) was 92  $\mu$ g/g, and an intestinal ultrasound (IUS) at 10/40 weeks of gestation showed an inflamed terminal ileum with a maximal bowel wall thickness (BWT) of 5 mm (normal <3 mm) and hyperemia on Doppler ultrasound (Limberg 2) (Figure 2). Malnutrition was also diagnosed as per Global Leadership Initiative on Malnutrition criteria (phenotypic [weight loss >5%–10% within the past 6 months] and etiologic [acute inflammation]).<sup>5</sup>

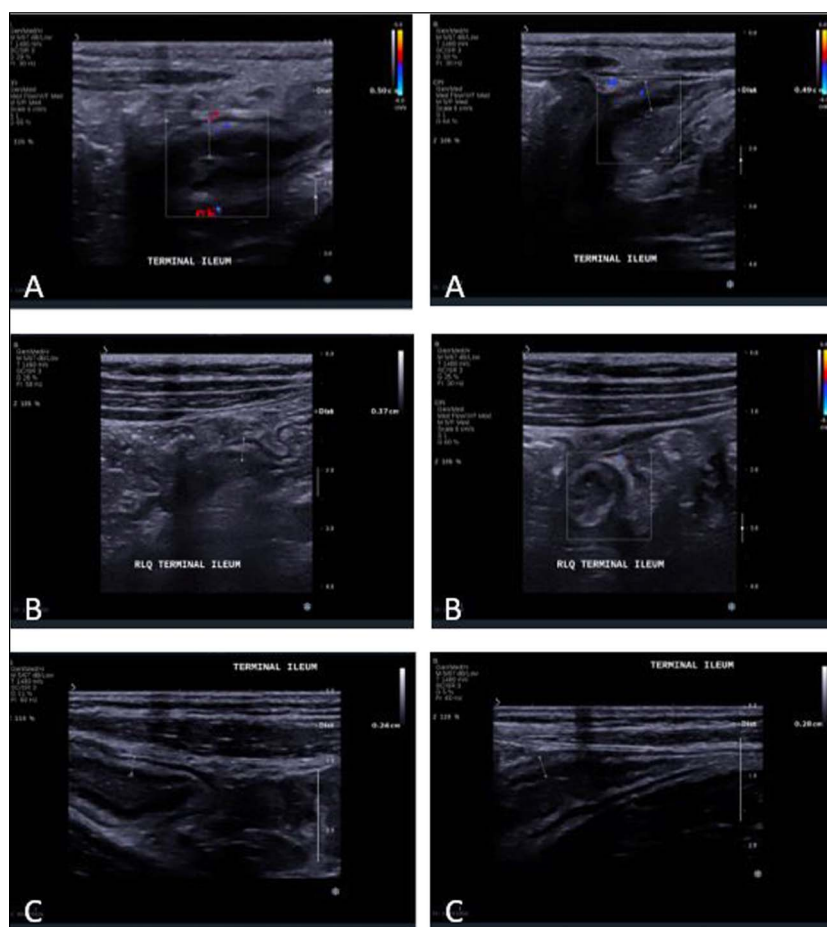


**Figure 1.** Terminal ileum at baseline colonoscopy.

After exploring treatment options, dietary therapy was prescribed at 14/40 weeks of gestation as the primary treatment with close medical and dietetic supervision. The CDED with

PEN (using a polymeric liquid formula) was prescribed each phase for a period of 6 weeks each; modified to pescatarian for dietary preference. The patient also continued with maintenance phase ongoing postpartum. No drug treatment was prescribed apart from a pregnancy suitable daily multivitamin and a calcium supplement to ensure that micronutrients of concern were adequate.

Outcomes were recorded at regular intervals after each phase of CDED until 12 weeks of postpartum (Table 1). The HBI was used to determine clinical response, with HBI <5 points identifying remission. Disease activity outcomes were measured through FC and BWT/Limberg score on IUS (Table 1). Nutrition status was measured by weight (kg). Fetal growth and neonatal birth weight (kg) was measured by an obstetrician.<sup>5</sup> Self-reported adherence to dietary therapy was documented after each phase of dietary therapy to monitor compliance. The follow-up period for this case study was until 3 months of postpartum. A repeat endoscopy was planned for 12 months of postpartum after cessation of breastfeeding. No further imaging was planned postpartum.



**Figure 2.** (A) Intestinal ultrasound at 10/40 gestation, increased bowel wall thickness of 5 mm, and hyperemia on color Doppler (Limberg score 2). (B) Intestinal ultrasound at 20/40 gestation, bowel wall thickness of 3.7 mm, and no hyperemia on color Doppler (Limberg score 1). (C) Intestinal ultrasound at 3 months of postpartum, normal bowel wall thickness, and no hyperemia on color Doppler (Limberg score 0). We acknowledge Dr Emma Flanagan for performing the initial intestinal ultrasound examinations and providing images for (A) and (B).

**Table 1.** Outcome measures from prepartum assessment to 3 months of postpartum in a 35-year-old pregnant woman with Crohn's disease

|                                 | Prepartum visit | CDED commencement (14/40) | CDED week 6 (20/40) | CDED week 12 (26/40) | CDED week 18 (32/40) | Delivery 40/40 | 3 mo of postpartum (12 wk) |
|---------------------------------|-----------------|---------------------------|---------------------|----------------------|----------------------|----------------|----------------------------|
| HBI                             | 7               | 5                         | 1                   | 1                    | 1                    |                | 0                          |
| FC ( $\mu\text{g/g}$ )          | N/A             | 92                        | 25.1                | 6.5                  | 6.8                  |                | 16.9                       |
| IUS: Limberg score              | N/A             | 2                         | 1                   | N/A <sup>a</sup>     | N/A <sup>a</sup>     |                | 0                          |
| IUS: Ileal bowel wall thickness | N/A             | 5 mm                      | 3.7 mm              | N/A <sup>a</sup>     | N/A <sup>a</sup>     |                | <3 mm                      |
| Weight (kg)                     | 51              | 51.8                      | 55.6                | 58                   | 60.3                 | 61.3           | 52                         |

CDED; HBI for Crohn's; FC; IUS; X/40 weeks of gestation.

CDED, Crohn's Disease Exclusion Diet; FC, fecal calprotectin; HBI, Harvey-Bradshaw Index; IUS, intestinal ultrasound.

<sup>a</sup> Visual limitations precluded repeat IUS in the third trimester.

After 6 weeks of CDED (20/40), the patient achieved clinical remission, body weight increased (55.6 kg), and FC decreased (25.1  $\mu\text{g/g}$ ). Active inflammation had considerably improved on IUS, BWT (3.7 m), and Limberg 1 (Figure 2). After 18 weeks of CDED, clinical and biochemical remission was sustained. During pregnancy, she experienced gestational weight gain (GWG) of 10.3 kg, and the neonate was born at (40/40) with a birth weight of 3.4 kg (50th centile). Sustained clinical, biochemical, and sonographic remission was achieved at 12 weeks of postpartum (Figure 2). Self-reported strict adherence to dietary therapy was maintained.

## DISCUSSION

This case reports on the successful management of active CD in pregnancy with dietary therapy. In this patient with moderately severe ileal CD, clinical, biochemical, and sonographic remission was achieved with CDED and PEN without compromising maternal nutrition status and fetal growth during pregnancy. Remission was sustained postpartum.

Dietary therapies in CD are highly attractive because they offer a nondrug approach to treating inflammation and may improve nutritional outcomes. In our case, GWG was achieved by week 6 of the CDED and continued to increase out to week 18. Active IBD during pregnancy increases the risk of inadequate GWG.<sup>6</sup> In our patient, GWG throughout pregnancy was measured at 10.3 kg, which is considered adequate for women with a pre-pregnancy body mass index between 18 and 24.9 kg/m<sup>2</sup>.

It should be noted that exclusive dietary management of CD flares in pregnancy is highly experimental and with a limited evidence base.<sup>7</sup> Acute flares of IBD are generally treated with corticosteroids or anti-TNF,<sup>1</sup> and although the literature does support the safety of such drug therapies during pregnancy,<sup>1,2</sup> they are not without risk. In particular, corticosteroid therapy in pregnancy is associated with an increased risk of low birth weight, preterm delivery, and gestational diabetes.<sup>1</sup> In addition, despite the safety data of biologicals and immunomodulators, treatment-related

concerns in pregnancy are commonly expressed by patients with IBD.<sup>2</sup>

Several dietary strategies have now been investigated to treat active luminal CD. Exclusive enteral nutrition has been shown to be equivalent to corticosteroids in inducing remission for active pediatric luminal CD.<sup>8</sup> Although there are no head-to-head studies with whole food diets such as CDED vs steroids, CDED with PEN is as effective and better tolerated when compared with exclusive enteral nutrition.<sup>3</sup> A more recent study comparing the CDED with PEN versus CDED alone in adults with mild/moderate CD, naive to biologic therapies, found similar induction rates at week 6 and sustained response.<sup>4</sup> These data demonstrate the potential benefit of CDED in achieving prompt induction and sustained clinical remission of CD. We used the CDED with PEN strategy in this case because elimination of the PEN component may provide lower daily nutrient provision, therefore increasing the risk of possible nutritional deficiencies during pregnancy.<sup>4</sup>

Multidisciplinary care is important for patients with concurrent IBD and pregnancy, and in this case, patient care was coordinated between the obstetrician, dietitian, IBD nurse specialists, and gastroenterologists. Regular noninvasive assessments of inflammatory activity are crucial for monitoring disease status and to guide decision making. IUS is feasible and accurate in pregnancy before 20 weeks of gestation and correlates well with calprotectin<sup>9</sup> and endoscopy.

CDED with PEN may be considered in pregnancy after a multidisciplinary and patient-centered consultation with careful monitoring. Further research is required to evaluate the safety of dietary modulation in pregnancy against conventional medical therapy in IBD.

## DISCLOSURES

Author contributions: B. Ukovic, M.C. Choy, and P. De Cruz were involved in the conception and design of the study. J. Schulberg

performed the intestinal ultrasound examination. All authors were involved in data acquisition, analysis, interpretation of the data, drafting, revising the article, and final approval of manuscript version to be submitted. B. Ukovic is the article guarantor.

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Informed consent was obtained for this case report.

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