Mandala of Health
Vol.18, No.2, September 2025, Hal. 172-184
ISSN: 0216-3098
DOI: 10.20884/1.mandala.2025.18.2.17307

CURRENT DIAGNOSIS AND MANAGEMENT OF CROHN'S DISEASE: A LITERATURE-BASED REVIEW

Novanda Ayu Dila Putri Pambudi[1*], Chivan Agustinus Siregar[1], Arysatya Syandana Ararya Santoso[1], Padmi Kartika Sari[1], Amanda Azkiyah Rachman[1], Syalsa Hudhori[1], Nihal Ahmad Muharis[1]

[1]Medical Education Study Program, Faculty of Medicine and Health Science, Mataram University, Mataram, Indonesia

ABSTRACT

Crohn's disease is a chronic inflammatory disorder of the gastrointestinal tract with increasing global incidence, shifting from a predominantly Western condition to a rising burden in Asia and other developing regions. Diagnosis requires a multimodal approach, integrating history, laboratory testing, endoscopy with validated activity scores, histopathology, and imaging such as magnetic resonance enterography or intestinal ultrasound. The 2024 ECCO guidelines emphasize fecal biomarkers like calprotectin as non-invasive monitoring tools within a treat-to-target strategy. Management includes pharmacological therapy (corticosteroids, immunomodulators, biologics, and novel small molecules), non-pharmacological measures (exclusive enteral nutrition, micronutrient supplementation, and diet modification), and surgery for refractory strictures, perforations, or complex fistulas. Beyond physical symptoms, Crohn's disease carries a significant psychosocial burden, underscoring the need for nutritional and psychological support. Despite therapeutic advances, no curative treatment exists. Future research should focus on identifying more accurate biomarkers, improving accessibility to advanced therapies in low-resource settings, and exploring innovative approaches such as precision medicine, microbiota-targeted therapy, and genetic-based interventions.

Keywords: Digestive disorders, Crohn's disease, Diagnosis, Management

Corresponding Author:

Novanda Ayu Dila Putri Pambudi,
Medical Education Study Program, Faculty of Medicine and Health Science, University of Mataram
Jl. Majapahit No.62, Dasan Agung Baru, Kec. Selaparang, Kota Mataram, Nusa Tenggara Barat 83125.
Email: novandaayudpp@gmail.com

INTRODUCTION

Crohn's disease is a chronic digestive disorder characterized by inflammation along the gastrointestinal tract, which can occur from the mouth to the anus and often involves all

layers of the intestinal wall. If left untreated, this condition can lead to serious complications (Feuerstein and Cheifetz, 2017). It is classified as part of Inflammatory Bowel Disease (IBD) alongside ulcerative colitis, but differs in its distribution and morphology, with Crohn's disease most commonly affecting the terminal ileum and/or colon (Kumar et al., 2013).

Crohn's disease is a chronic health condition that affects approximately 3 to 20 individuals per 100,000 population annually. It typically presents around the age of 30, but onset can also occur in the 20s or 50s (Feuerstein and Cheifetz, 2017). In North America, the incidence ranges from 0 to 20.2 cases per 100,000 individuals, while in Europe it ranges from 0.3 to 12.7 cases per 100,000 individuals. The highest prevalence has been reported in Germany (322 cases per 100,000) and Canada (319 cases per 100,000) (Ng et al., 2017; Roda et al., 2020). These figures reflect a historically high disease burden in developed countries with robust IBD registries, whereas data in Indonesia remain limited. Based on endoscopy findings in 2008, the prevalence of Crohn's disease in Indonesian hospitals ranged from 1% to 3.3% (Siwy and Gosal, 2020). While these figures highlight the burden in high-income countries, recent global analysis reveal that the epidemiological landscape is shifting.

Although once regarded as a condition concentrated in high-income regions, Crohn's disease is now increasingly recognized as a global health concern. A large-scale synthesis of more than 500 population-based studies covering the years 1950 to 2022 demonstrated that while incidence in many early-industrialized countries has plateaued, prevalence there continues to climb because of improved survival and chronic accumulation of cases. In contrast, the steepest increases in incidence are now documented in newly industrialized and developing regions, particularly in Asia, Latin America, and the Middle East (Hracs et al., 2025). In Asia, for example, population-based cohorts from China and South Korea reported more than a two- to threefold rise in Crohn's disease incidence since the early 2000s, a trend that was statistically significant and much steeper than the stable curves observed in Western countries. This global analysis also proposed a four-stage model of inflammatory bowel disease evolution, beginning with emergence, followed by accelerating incidence, compounding prevalence, and eventually a projected prevalence equilibrium. Countries in Western Europe and North America are entering the compounding prevalence stage, whereas China, India, and parts of Southeast Asia, including Indonesia, are in the accelerating incidence stage. Taken together, these findings underscore the shifting epidemiology of Crohn's disease, highlighting its transition from a predominantly Western disease to a growing burden in developing regions (Hracs et al., 2025).

The exact etiology of Crohn's disease remains unclear. However, both genetic and environmental factors are believed to play significant roles in its development. Individuals with a family history of Crohn's disease have a higher risk of developing the condition. Environmental exposures represent important modifiers, with cigarette smoking recognized as the strongest modifiable risk factor. Other contributors include dietary patterns high in refined carbohydrates and saturated fats but low in fiber, urbanization-related changes in hygiene and microbial exposure, sedentary lifestyle, and differences in healthcare access, which can delay diagnosis in low-resource settings (Ng et al., 2017; Torres et al., 2017). These factors are particularly relevant in Southeast Asia, where rapid

socioeconomic transition and westernization of diet may underlie the rising incidence of Crohn's disease. The immune system also plays a central role in disease pathogenesis; an exaggerated immune response to certain bacterial or viral infections may trigger inflammation, leading to Crohn's disease symptoms (Lichtenstein et al., 2018).

Genetic predisposition further contributes to susceptibility, with genes such as NOD2/CARD15 implicated in immune responses to intestinal microorganisms. Homozygous mutations in NOD2 increase the risk of Crohn's disease by 20–40 fold, while heterozygous mutations increase the risk by 2–4 fold (Feuerstein and Cheifetz, 2017). These mutations can disrupt immune recognition and regulation of gut bacteria, leading to chronic inflammation. The immune system, which normally protects against pathogens, instead attacks the body's own tissues—particularly the gastrointestinal tract—via the production of pro-inflammatory cytokines such as TNF-α, IFN-γ, and IL-12. Intestinal microbiota imbalance (dysbiosis) further amplifies the inflammatory response (Torres et al., 2017).

Clinically, Crohn's disease is characterized by transmural inflammation of the gastrointestinal tract that may involve any segment from the mouth to the perianal region (Gajendran et al., 2018). Common symptoms include chronic diarrhea, abdominal pain, weight loss, and extraintestinal manifestations such as arthritis, uveitis, and skin lesions (Yu and Rodriguez, 2017). A key distinction from ulcerative colitis is that Crohn's disease often presents with skip lesions, transmural involvement, strictures, and fistulas, whereas ulcerative colitis is limited to the colon and rectum with continuous mucosal inflammation (Gomollón et al., 2017). Nevertheless, early diagnosis remains challenging because symptoms are frequently nonspecific and may mimic infectious or functional gastrointestinal disorders, leading to delays in treatment (Feuerstein and Cheifetz, 2017). In addition to its clinical manifestations, Crohn's disease imposes a substantial disease burden: patients commonly require recurrent hospitalizations, surgical interventions for complications, and long-term use of immunomodulators or biologic therapies, all of which contribute to high healthcare costs and reduced productivity (Lichtenstein et al., 2018). The unpredictable course of the disease further impacts psychosocial well-being, with many patients experiencing anxiety, depression, and social isolation (Ramos et al., 2024). The prognosis for many patients remains uncertain, with frequent relapses and a generally reduced quality of life. Multidisciplinary collaboration among healthcare professionals is essential to improve treatment outcomes (Inokuchi et al., 2019).

The objective of this review is to present recent advances in the diagnosis and management of Crohn's disease, emphasizing developments that are reshaping clinical practice. In diagnostics, these include the incorporation of fecal biomarkers such as calprotectin, validated endoscopic activity scores, and advanced imaging modalities such as magnetic resonance enterography (MRE) and CT enterography (CTE). In therapeutics, emerging options such as biologics, biosimilars, and novel small molecules including JAK inhibitors complement conventional immunomodulators and surgical approaches within a treat-to-target strategy. At the same time, significant challenges remain in many developing countries, where limited access to advanced diagnostics and high-cost therapies constrains optimal care. By integrating evidence from recent literature, this review aims to provide practical guidance for clinicians, highlight innovations that may enhance diagnostic accuracy and treatment effectiveness, examine disparities in implementation

across healthcare settings, and outline future perspectives such as personalized medicine and microbiota-based therapies.

RESEARCH METHOD

This article is a narrative literature review conducted through a systematic search of data from PubMed, Google Scholar, and grey literature sources (including official guidelines and textbooks). The search used both Indonesian and English keywords, including *"tatalaksana"*, *"Penyakit Crohn"*, *"diagnosis"*, and *"gangguan pencernaan"* ("management", "Crohn's disease", "diagnosis", and "digestive disorders"), with publication years limited to 2015–2025. The inclusion criteria were articles from accredited journals or textbooks relevant to the topic that were available in full text at no cost, while articles not meeting these criteria were excluded. The initial search yielded 65 articles and 3 textbooks. After title and abstract screening, 26 articles remained, and full-text review resulted in 21 journal articles being selected for the synthesis of this literature review.

RESULTS AND DISCUSSION

Clinical Manifestations

Crohn's disease is typically characterized by transmural inflammation of the intestine, potentially affecting the entire gastrointestinal tract from the mouth to the perianal region. Nearly one-third of patients present with perianal involvement, and 5–15% exhibit gastroduodenal involvement (Gajendran et al., 2018). Common symptoms include chronic diarrhea and abdominal pain, often accompanied by weight loss and perianal disease. In some cases, patients may also experience rectal bleeding. Extraintestinal manifestations are frequently observed and can include arthritis, uveitis, iritis, episcleritis, erythema nodosum, and pyoderma gangrenosum (Gajendran et al., 2018; Yu and Rodriguez, 2017).

Beyond physical symptoms, Crohn's disease exerts a significant psychosocial impact. Chronic symptoms such as pain, diarrhea, and fatigue limit daily activities, impair quality of life, and contribute to persistent anxiety and stress. The unpredictability of symptom flare-ups and disease progression often leads to mood disorders such as depression, which in turn can worsen clinical outcomes. Social isolation is also common, as patients may avoid social interactions for fear of sudden symptom onset (Ramos et al., 2024).

Diagnostics

Although no specific laboratory test can definitively diagnose Crohn's disease, stool and serum examinations play a crucial role in the diagnostic process. Stool analysis is used to identify the underlying cause of gastrointestinal symptoms, such as diarrhea, and to distinguish between infectious and chronic inflammatory etiologies. Abnormal laboratory findings are generally more common in severe disease or in cases with a prolonged clinical course (Feuerstein and Cheifetz, 2017).

According to the 2024 ECCO guidelines, fecal biomarkers such as calprotectin and lactoferrin are recommended as initial non-invasive tests to assess the likelihood of inflammatory bowel disease (IBD) and to monitor disease activity. Fecal calprotectin has

high sensitivity for detecting mucosal inflammation and can predict relapse, but it is not entirely specific since elevated levels can also be seen in intestinal infections, colorectal neoplasms, or non-IBD inflammatory conditions (Feuerstein and Cheifetz, 2017; Gordon et al., 2024). Within the treat-to-target framework, normalization of calprotectin levels is considered a therapeutic target alongside mucosal healing as assessed by endoscopy (Turner et al., 2021).

A definitive diagnosis of Crohn's disease requires the integration of clinical symptoms with endoscopic, histologic, radiologic, and biochemical findings. Colonoscopy with intubation of the terminal ileum is the preferred initial evaluation, often revealing discontinuous (skip) inflammatory lesions, ulcerations, cobblestoning, luminal narrowing, or fistula formation. Histopathological features may include lymphocytic and plasmacytic infiltration, basal lymphoplasmacytosis, crypt distortion, crypt atrophy, crypt abscesses, and crypt branching; Paneth cell metaplasia in abnormal locations can further support the diagnosis. While capsule endoscopy offers high sensitivity for detecting small bowel mucosal lesions, its specificity for Crohn's disease is limited, and there is a risk of capsule retention in patients with strictures (Feuerstein and Cheifetz, 2017; Veauthier and Hornecker, 2018). Additional imaging modalities such as magnetic resonance enterography, computed tomography enterography, and intestinal ultrasound can be used to assess disease extent and detect complications.

a. Histology

Histological examination of endoscopic biopsy or resection specimens remains the gold standard for confirming Crohn's disease and distinguishing it from ulcerative colitis (UC) or other forms of non-IBD colitis, particularly infectious etiologies. Although no single histopathological feature is pathognomonic, microscopic findings that support a diagnosis of Crohn's disease include focal (discontinuous) chronic inflammation, focal crypt architectural distortion, non–crypt-associated granulomas, and villous structural abnormalities at the terminal ileum (Roda et al., 2020).

Granulomas in Crohn's disease are composed of epithelioid histiocytes derived from monocytes or macrophages, typically without multinucleated giant cells and without necrosis. Only granulomas located in the lamina propria that are not associated with crypt injury are considered characteristic of Crohn's disease (Gomollón et al., 2017). The 2024 ECCO guidelines recommend obtaining multiple site biopsies from both inflamed and macroscopically normal mucosa to increase diagnostic sensitivity. Furthermore, granulomas are found in fewer than 30% of patients, so their presence should not be the sole diagnostic criterion. Additional histological clues, such as Paneth cell metaplasia in abnormal locations, may indicate chronic inflammation (Gordon et al., 2024).

b. Endoscopy

Endoscopic findings in Crohn's disease are typically characterized by discontinuous areas of inflammation (skip lesions), with normal mucosa interspersed between actively inflamed regions that may progress to ulceration and a cobblestoning appearance. The extent and pattern of inflammation observed endoscopically depend on the disease onset and the patient's clinical presentation (Bane et al., 2021; Feuerstein and Cheifetz, 2017). Endoscopy serves as an objective measure to assess mucosal activity, functioning both as a disease biomarker and as a tool to monitor therapeutic response (Lichtenstein et al., 2018).

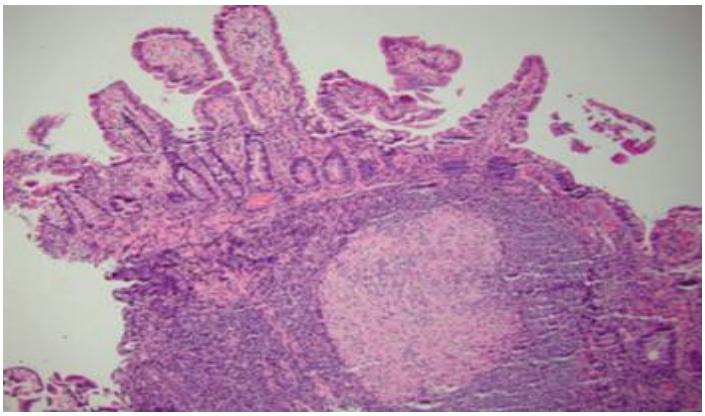

Figure 1. Crohn's Granuloma (Feuerstein and Cheifetz, 2017)

Two primary scoring systems are commonly used for endoscopic evaluation of Crohn's disease: the Crohn's Disease Endoscopic Index of Severity (CDEIS) and the Simple Endoscopic Score for Crohn's Disease (SES-CD). CDEIS assesses six variables—deep ulcers, superficial ulcers, non-ulcerated stenosis, stenosis with ulceration, proportion of ulcerated mucosal surface, and proportion of diseased mucosal surface—across five ileocolonic segments (rectum, sigmoid/left colon, transverse colon, right colon, and terminal ileum), with a total score range of 0–44; higher scores indicate more severe disease (Koutroumpakis and Katsanos, 2016). SES-CD, on the other hand, evaluates ulcer size (0.1–0.5 cm, 0.5–2 cm, >2 cm), proportion of ulcerated surface (<10%, 10–30%, >30%), proportion of affected mucosal surface (<50%, 50–75%, >75%), and presence of stenosis (single or multiple, passable or non-passable), assigning a score of 0–3 for each segment (Vuitton et al., 2016).

The 2024 ECCO guidelines emphasize that serial endoscopic evaluation is an integral part of the treat-to-target strategy, ensuring that mucosal healing is achieved. Video capsule endoscopy (VCE) may be considered in patients with suspected small bowel Crohn's disease when colonoscopy findings are negative, but should only be performed after excluding strictures, for example by using a patency capsule (Gordon et al., 2024).

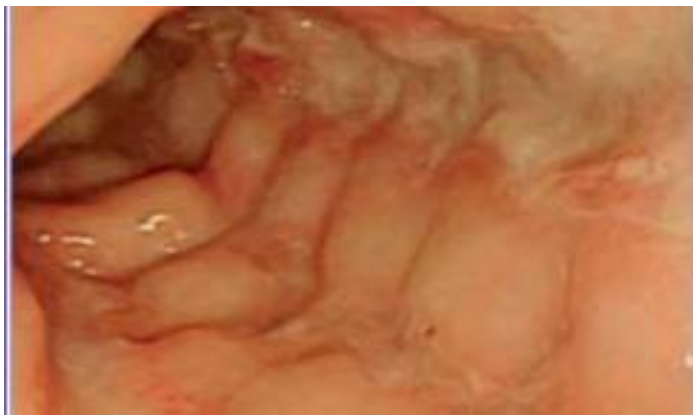

Figure 2. Endoscopic view of Crohn's disease showing longitudinal ulcerations and characteristic cobblestoning pattern (Lee and Lee, 2016)

c. Radiology

Radiological imaging plays a pivotal role in supporting the diagnosis of Crohn's disease, establishing the initial diagnosis, assessing disease extent, monitoring activity, and detecting complications (Gajendran et al., 2018). CT enterography offers high accuracy in identifying bowel wall thickening, ulcerations, fistulas, and abscesses, with characteristic findings such as the *comb sign*—indicative of increased mesenteric vascularity—and mesenteric lymphadenopathy. On axial CT images of the abdomen, active inflammation may appear as homogeneous thickening of the terminal ileum accompanied by increased mesenteric density, whereas severe complications may present as an inflammatory mass (*phlegmon*) involving adjacent bowel loops and surrounding tissues, or marked wall thickening with perienteric fat stranding (Feuerstein and Cheifetz, 2017). Optimal visualization of the small and large intestines on abdominal and pelvic CT requires adequate luminal distension and intravenous contrast administration (Gajendran et al., 2018). However, a major limitation of CT is significant radiation exposure, particularly in younger patients (Veauthier and Hornecker, 2018).

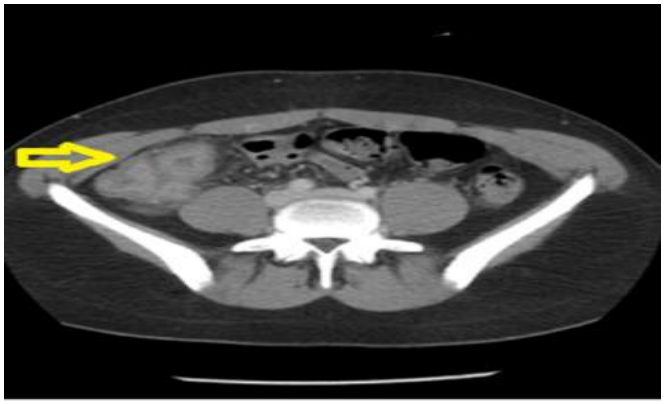

Figure 3. Axial CT scan in a patient with Crohn's disease. Yellow arrow indicates thickening of the terminal ileum (*comb sign*) in Crohn's disease (Gajendran et al., 2018).

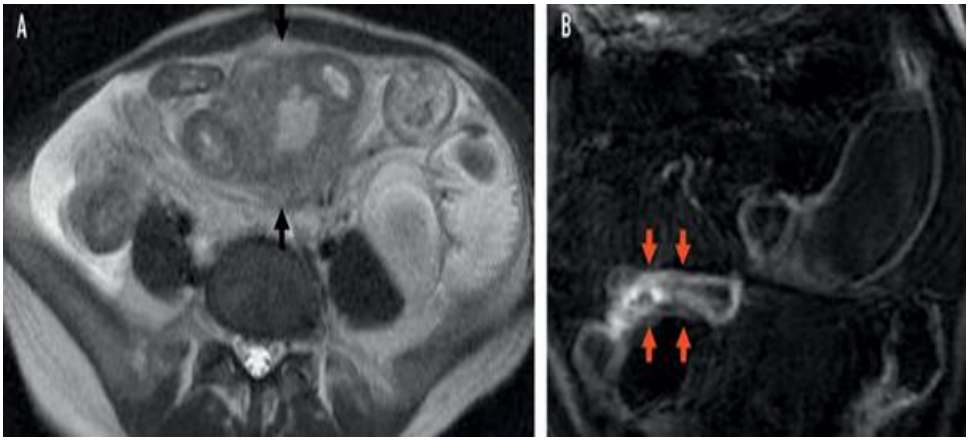

Figure 4. (A) *Phlegmon* appearance (black arrow) on abdominal CT in severe Crohn's disease. (B) Bowel wall thickening (orange arrow) with changes in perienteric fat density in Crohn's disease (Feuerstein and Cheifetz, 2017).

MRI enterography is recommended by the 2024 ECCO guidelines as the preferred imaging modality for evaluating small bowel Crohn's disease due to its lack of ionizing radiation and high accuracy in detecting active inflammation, strictures, fistulas, and abscesses (Gordon et al., 2024). Intravenous contrast administration enhances the assessment of bowel wall thickening and mesenteric vasculature (Gajendran et al., 2018). Pelvic MRI with high-resolution T2-weighted sequences and T1-weighted sequences with gadolinium contrast is the gold standard for evaluating perianal fistulas and associated abscesses (Gajendran et al., 2018).

Abdominal ultrasound (US) is a widely accessible, cost-effective, and radiation-free modality (Roda et al., 2020). It demonstrates high sensitivity and specificity for detecting bowel wall thickening (>3 mm) and extra-luminal complications such as fistulas, strictures, and abscesses (Roda et al., 2020). Intestinal ultrasound (IUS) is increasingly recommended in experienced centers as a point-of-care diagnostic and monitoring tool for longitudinal assessment of disease activity (Gordon et al., 2024).

In Indonesia, CT remains the most commonly used modality due to limited availability and high costs associated with MRI enterography (Veauthier and Hornecker, 2018). IUS has the potential to serve as a safe and cost-effective alternative but requires specialized operator training (Roda et al., 2020). The choice of imaging modality should consider patient age, pregnancy status, clinical condition, facility availability, and local expertise (Veauthier and Hornecker, 2018).

Management

The management of Crohn's disease aims to control inflammation, alleviate symptoms, and prevent long-term complications, following the principles of the modern *treat-to-target* strategy. This approach emphasizes adjusting therapy until clearly defined targets—such as clinical remission, mucosal healing, and normalization of biomarkers (e.g., fecal calprotectin, serum C-reactive protein)—are achieved, with regular monitoring through endoscopy or imaging (Gordon et al., 2024). Therapeutic strategies are determined based on disease severity and include pharmacological interventions, non-pharmacological measures, and surgical procedures when indicated.

a. Pharmacological Therapy

Pharmacological therapy for Crohn's disease is tailored according to disease severity, prior treatment responses, anatomical site of gastrointestinal involvement, and the presence of complications such as perianal disease. The therapeutic options are summarized in Table I and are broadly categorized into induction and maintenance phases, with the primary goal of achieving and sustaining clinical remission while minimizing adverse effects.

Table 1. Recommended pharmacological and dietary therapy for Crohn's disease based on clinical condition (Gordon et al., 2024; Lichtenstein et al., 2018)

Clinical Condition / Indication	Induction Therapy	Maintenance Therapy	Key Notes
Mild–Moderate (Ileocecal/Colonic)	Enteric-release budesonide; sulfasalazine (for colonic disease)	Thiopurines (azathioprine, 6-mercaptopurine) or	Avoid long-term corticosteroid use

		methotrexate	
Moderate–Severe (Biologic-naïve)	Anti-TNF (infliximab, adalimumab, certolizumab) ± immunomodulator	Continue effective anti-TNF; switch class if ineffective	Assess response every 8–12 weeks (*treat-to-target*)
Refractory / Biologic Failure	Ustekinumab, vedolizumab, risankizumab, upadacitinib	Continue if effective	Monitor for opportunistic infections and thromboembolic events (especially with JAK inhibitors)
Perianal Disease	Anti-TNF + antibiotics (metronidazole/ciprofloxacin)	Ongoing anti-TNF ± immunomodulator	Pelvic MRI before surgical intervention
Peripheral Spondyloarthropathy	Systemic or enteric-release corticosteroids	—	Symptom-based musculoskeletal therapy
Axial Spondyloarthropathy	Anti-TNF or JAK inhibitor	—	Adjust based on musculoskeletal disease activity
Pregnancy	Continue safe, effective therapy (anti-TNF, ustekinumab, vedolizumab)	Same as induction	Avoid methotrexate and JAK inhibitors
Elderly (>65 years)	Vedolizumab, ustekinumab	Same as induction	Better systemic safety profile for comorbid patients
Non-Pharmacological	Exclusive enteral nutrition (EEN) in children; low-FODMAP diet	Nutritional supplements (iron, vitamin D, calcium, vitamin B12, folic acid)	Selective EEN use in adults with malnutrition
Surgical Treatment	—	—	Indications: refractory stricture, perforation, abscess, complex fistula

In mild-to-moderate disease, particularly with ileocecal or colonic involvement, induction therapy may involve enteric-release budesonide or sulfasalazine for colonic disease (Coward et al., 2017). Aminosalicylates such as 5-ASA may be considered, though their benefits are limited in Crohn's colitis (Feuerstein and Cheifetz, 2017). Budesonide is more effective in ileocecal disease due to targeted release in this region, whereas sulfasalazine is better suited for colonic involvement. Maintenance therapy typically involves thiopurines (azathioprine, 6-mercaptopurine) or methotrexate, with long-term corticosteroid use avoided due to systemic adverse effects (Gordon et al., 2024).

For moderate-to-severe disease in biologic-naïve patients, first-line therapy often consists of anti-TNF agents such as infliximab, adalimumab, or certolizumab, potentially in combination with immunomodulators to enhance efficacy and reduce anti-drug antibody formation (Lichtenstein et al., 2018). Alternatives include ustekinumab or vedolizumab (Gordon et al., 2024). Systemic corticosteroids, such as prednisone or methylprednisolone, may be used for induction but are not recommended for maintenance.

In severe or fulminant cases, hospitalization and high-dose intravenous corticosteroids are indicated (Lichtenstein et al., 2018), with reassessment after 3–7 days (Gordon et al., 2024). Non-responders require escalation to biologics or surgical intervention. Patients with prior biologic failure may receive newer agents such as risankizumab or upadacitinib, with careful monitoring for opportunistic infections and thromboembolic events (Gordon et al., 2024).

For fistulizing Crohn's disease, particularly perianal involvement, combination therapy with anti-TNF agents and antibiotics (e.g., metronidazole or ciprofloxacin) is often employed, with pelvic MRI recommended before surgical intervention. In pregnant patients, safe and effective therapies such as anti-TNF agents, ustekinumab, and vedolizumab may be continued, while methotrexate and JAK inhibitors should be avoided (Gordon et al., 2024; Lichtenstein et al., 2018). In elderly patients, vedolizumab and ustekinumab are preferred due to better systemic safety profiles (Gordon et al., 2024).

b. Non-Pharmacological Therapy

Non-pharmacological interventions play an important role in optimizing nutritional status, reducing inflammatory burden, and supporting overall patient well-being (Gordon et al., 2024). Exclusive Enteral Nutrition (EEN) is the primary dietary therapy recommended for inducing remission in children with Crohn's disease, typically involving exclusive consumption of specialized liquid formulas for 6–8 weeks. In adults, EEN is selectively applied, such as in cases of malnutrition or preoperative nutritional optimization (Gordon et al., 2024). Elemental or semi-elemental formulas are preferred in patients with malabsorption due to their improved digestibility (Feuerstein and Cheifetz, 2017).

A low-FODMAP diet may help alleviate functional gastrointestinal symptoms such as bloating and diarrhea (Gordon et al., 2024). Regular nutritional monitoring is essential to detect deficiencies in iron, vitamin D, calcium, vitamin B12, and folic acid, which should be corrected through supplementation as needed (Feuerstein and Cheifetz, 2017). In severe clinical deterioration, bowel rest combined with total parenteral nutrition via a central venous catheter may be indicated to maintain nutritional status while minimizing intestinal stress (Gordon et al., 2024).

c. Surgical Treatment

Surgery plays a crucial role in the management of Crohn's disease, particularly in cases with indications such as refractory strictures, perforation, abscesses unresponsive to medical therapy, and complex perianal disease that has failed previous treatment (Lichtenstein et al., 2018). Surgical options may include segmental resection of the affected bowel or abscess drainage (Gordon et al., 2024). Surgical decisions should involve a multidisciplinary team consisting of gastroenterologists, colorectal surgeons, and radiologists to ensure optimal timing and technique (Gordon et al., 2024), minimize the

risk of complications, and preserve bowel function to the greatest extent possible (Feuerstein and Cheifetz, 2017).

In the context of Indonesia, limited access to biologic agents and JAK inhibitors means that immunomodulators such as azathioprine and methotrexate remain the cornerstone of maintenance therapy in many healthcare facilities. Therefore, improving the availability of diagnostic modalities, training of healthcare personnel, and access to medications is essential for enhancing the quality of care for Crohn's disease patients at the national level.

CONCLUSION

Crohn's disease is a chronic inflammatory disorder of the gastrointestinal tract with variable clinical manifestations and unclear etiology, necessitating a multimodal diagnostic approach involving laboratory markers, endoscopy, histology, and advanced imaging. Recent literature highlights significant advances such as the use of fecal biomarkers like calprotectin, the adoption of validated endoscopic scoring systems, and the increasing role of MRI and CT enterography in disease assessment, alongside the expansion of biologic and small-molecule therapies within a treat-to-target framework. These innovations provide clinicians with more precise tools to evaluate disease activity, tailor therapy, and improve long-term outcomes. However, substantial research gaps remain, particularly the need for more accurate and accessible biomarkers, safer and affordable therapies, and large-scale multicenter studies in low- and middle-income countries where access to advanced diagnostics and biologics is limited. Looking ahead, future directions include the integration of precision medicine strategies, development of microbiota-based interventions, and exploration of gene-targeted therapies, which together hold the potential to transform Crohn's disease management from symptomatic control toward individualized, disease-modifying treatment.

REFERENCES

Bane, O., Gee, M.S., Menys, A., Dillman, J.R., Taouli, B., 2021. Emerging Imaging Biomarkers in Crohn Disease. Top. Magn. Reson. Imaging 30, 31–41. https://doi.org/10.1097/RMR.0000000000000264

Coward, S., Kuenzig, M.E., Hazlewood, G., Clement, F., McBrien, K., Holmes, R., Panaccione, R., Ghosh, S., Seow, C.H., Rezaie, A., Kaplan, G.G., 2017. Comparative Effectiveness of Mesalamine, Sulfasalazine, Corticosteroids, and Budesonide for the Induction of Remission in Crohn's Disease. Inflamm. Bowel Dis. 23, 461–472. https://doi.org/10.1097/MIB.0000000000001023

Feuerstein, J.D., Cheifetz, A.S., 2017. Crohn Disease: Epidemiology, Diagnosis, and Management. Mayo Clin. Proc. 92, 1088–1103. https://doi.org/10.1016/j.mayocp.2017.04.010

Gajendran, M., Loganathan, P., Catinella, A.P., Hashash, J.G., 2018. A comprehensive review and update on Crohn's disease. Disease-a-Month 64, 20–57. https://doi.org/10.1016/j.disamonth.2017.07.001

Gomollón, F., Dignass, A., Annese, V., Tilg, H., Van Assche, G., Lindsay, J.O., Peyrin-Biroulet, L., Cullen, G.J., Daperno, M., Kucharzik, T., Rieder, F., Almer, S., Armuzzi, A., Harbord, M., Langhorst, J., Sans, M., Chowers, Y., Fiorino, G.,

Juillerat, P., Mantzaris, G.J., Rizzello, F., Vavricka, S., Gionchetti, P., 2017. 3rd European Evidence-based Consensus on the Diagnosis and Management of Crohn's Disease 2016: Part 1: Diagnosis and Medical Management. J. Crohn's Colitis 11, 3–25. https://doi.org/10.1093/ecco-jcc/jjw168

Gordon, H., Minozzi, S., Kopylov, U., Verstockt, B., Chaparro, M., Buskens, C., Warusavitarne, J., Agrawal, M., Allocca, M., Atreya, R., Battat, R., Bettenworth, D., Bislenghi, G., Brown, S.R., Burisch, J., Casanova, M.J., Czuber-Dochan, W., de Groof, J., El-Hussuna, A., Ellul, P., Fidalgo, C., Fiorino, G., Gisbert, J.P., Sabino, J.G., Hanzel, J., Holubar, S., Iacucci, M., Iqbal, N., Kapizioni, C., Karmiris, K., Kobayashi, T., Kotze, P.G., Luglio, G., Maaser, C., Moran, G., Noor, N., Papamichael, K., Peros, G., Reenaers, C., Sica, G., Sigall-Boneh, R., Vavricka, S.R., Yanai, H., Myrelid, P., Adamina, M., Raine, T., 2024. ECCO Guidelines on Therapeutics in Crohn's Disease: Medical Treatment. J. Crohn's Colitis 18, 1531–1555. https://doi.org/10.1093/ecco-jcc/jjae091

Hracs, L., Windsor, J.W., Gorospe, J., Cummings, M., Coward, S., Buie, M.J., Quan, J., Goddard, Q., Caplan, L., Markovinović, A., Williamson, T., Abbey, Y., Abdullah, M., Abreu, M.T., Ahuja, V., Raja Ali, R.A., Altuwaijri, M., Balderramo, D., Banerjee, R., Benchimol, E.I., Bernstein, C.N., Brunet-Mas, E., Burisch, J., Chong, V.H., Dotan, I., Dutta, U., El Ouali, S., Forbes, A., Forss, A., Gearry, R., Dao, V.H., Hartono, J.L., Hilmi, I., Hodges, P., Jones, G.-R., Juliao-Baños, F., Kaibullayeva, J., Kelly, P., Kobayashi, T., Kotze, P.G., Lakatos, P.L., Lees, C.W., Limsrivilai, J., Lo, B., Loftus, E. V., Ludvigsson, J.F., Mak, J.W.Y., Miao, Y., Ng, K.K., Okabayashi, S., Olén, O., Panaccione, R., Paudel, M.S., Quaresma, A.B., Rubin, D.T., Simadibrata, M., Sun, Y., Suzuki, H., Toro, M., Turner, D., Iade, B., Wei, S.C., Yamamoto-Furusho, J.K., Yang, S.-K., Ng, S.C., Kaplan, G.G., 2025. Global evolution of inflammatory bowel disease across epidemiologic stages. Nature 642, 458–466. https://doi.org/10.1038/s41586-025-08940-0

Inokuchi, T., Takahashi, S., Hiraoka, S., Toyokawa, T., Takagi, S., Takemoto, K., Miyaike, J., Fujimoto, T., Higashi, R., Morito, Y., Nawa, T., Suzuki, S., Nishimura, M., Inoue, M., Kato, J., Okada, H., 2019. Long-term outcomes of patients with Crohn's disease who received infliximab or adalimumab as the first-line biologics. J. Gastroenterol. Hepatol. 34, 1329–1336. https://doi.org/10.1111/jgh.14624

Koutroumpakis, E., Katsanos, K., 2016. Implementation of the simple endoscopic activity score in crohn's disease. Saudi J. Gastroenterol. 22, 183. https://doi.org/10.4103/1319-3767.182455

Kumar, V., Abbas, A.K., Aster, J.C., Robbins, S.L., 2013. Robbins Basic Pathology, 9th ed, ClinicalKey 2012. Elsevier/Saunders.

Lee, J.M., Lee, K.-M., 2016. Endoscopic Diagnosis and Differentiation of Inflammatory Bowel Disease. Clin. Endosc. 49, 370–375. https://doi.org/10.5946/ce.2016.090

Lichtenstein, G.R., Loftus, E. V, Isaacs, K.L., Regueiro, M.D., Gerson, L.B., Sands, B.E., 2018. ACG Clinical Guideline: Management of Crohn's Disease in Adults. Am. J. Gastroenterol. 113, 481–517. https://doi.org/10.1038/ajg.2018.27

Ng, S.C., Shi, H.Y., Hamidi, N., Underwood, F.E., Tang, W., Benchimol, E.I., Panaccione, R., Ghosh, S., Wu, J.C.Y., Chan, F.K.L., Sung, J.J.Y., Kaplan, G.G., 2017. Worldwide incidence and prevalence of inflammatory bowel disease in the 21st

century: a systematic review of population-based studies. Lancet 390, 2769–2778. https://doi.org/10.1016/S0140-6736(17)32448-0

Ramos, J.C. de S., Rezende, E.H.M., Filho, M.D.E.C., Silva, D.O., Schimin, Mayra Algeri, Araújo, L.T. de, Alves, N.C., Pinheiro, B.B., Lemos, P.H.K., 2024. Crohn's Disease and Gastrointestinal Repercussions: A Detailed Study of Comorbidities and Clinical Implications. Brazilian J. Implantol. Heal. Sci. 6, 90–103. https://doi.org/10.36557/2674-8169.2024v6n4p90-103

Roda, G., Chien Ng, S., Kotze, P.G., Argollo, M., Panaccione, R., Spinelli, A., Kaser, A., Peyrin-Biroulet, L., Danese, S., 2020. Crohn's disease. Nat. Rev. Dis. Prim. 6, 22. https://doi.org/10.1038/s41572-020-0156-2

Siwy, P. V., Gosal, F., 2020. Penyakit Crohn: Laporan Kasus. Med. Scope J. 2. https://doi.org/10.35790/msj.2.1.2020.29630

Torres, J., Mehandru, S., Colombel, J.-F., Peyrin-Biroulet, L., 2017. Crohn's disease. Lancet 389, 1741–1755. https://doi.org/10.1016/S0140-6736(16)31711-1

Turner, D., Ricciuto, A., Lewis, A., D'Amico, F., Dhaliwal, J., Griffiths, A.M., Bettenworth, D., Sandborn, W.J., Sands, B.E., Reinisch, W., Schölmerich, J., Bemelman, W., Danese, S., Mary, J.Y., Rubin, D., Colombel, J.-F., Peyrin-Biroulet, L., Dotan, I., Abreu, M.T., Dignass, A., 2021. STRIDE-II: An Update on the Selecting Therapeutic Targets in Inflammatory Bowel Disease (STRIDE) Initiative of the International Organization for the Study of IBD (IOIBD): Determining Therapeutic Goals for Treat-to-Target strategies in IBD. Gastroenterology 160, 1570–1583. https://doi.org/10.1053/j.gastro.2020.12.031

Veauthier, B., Hornecker, J.R., 2018. Crohn's Disease: Diagnosis and Management. Am. Fam. Physician 98, 661–669.

Vuitton, L., Marteau, P., Sandborn, W.J., Levesque, B.G., Feagan, B., Vermeire, S., Danese, S., D'Haens, G., Lowenberg, M., Khanna, R., Fiorino, G., Travis, S., Mary, J.Y., Peyrin-Biroulet, L., 2016. IOIBD technical review on endoscopic indices for Crohn's disease clinical trials. Gut 65, 1447–1455. https://doi.org/10.1136/gutjnl-2015-309903

Yu, Y.R., Rodriguez, J.R., 2017. Clinical presentation of Crohn's, ulcerative colitis, and indeterminate colitis: Symptoms, extraintestinal manifestations, and disease phenotypes. Semin. Pediatr. Surg. 26, 349–355. https://doi.org/10.1053/j.sempedsurg.2017.10.003