

The Atypical Colitides:

Microscopic colitis, Diversion colitis, and Ischaemic colitis

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Microscopic Colitis



Definition

Microscopic colitis (MC) is an increasingly recognised inflammatory bowel disease that is associated with significant symptoms and an impaired quality of life burden

MC is defined as a **clinical-pathological entity** characterised by chronic watery (non-bloody) diarrhoea, a normal or almost normal endoscopic appearance of the colon, and a distinct histologic pattern

Epidemiology

10.5–25.8

cases per 100 000 person-years —
incidence of MC in Europe and select US
populations

197.9–246.2

per 100 000 persons — prevalence of
MC

11.4

pooled overall incidence per 100 000
person-years (95% CI 9.2–13.6) —
Statement 1.1

0.9% v 0.4%

lifetime risk of MC in Sweden: women v
men

Incidence by subtype

- Collagenous colitis: 0.6 to 16.4 cases per 100 000 person-years
- Lymphocytic colitis: 0.6 to 16.0 cases per 100 000 person-years

Trend over time

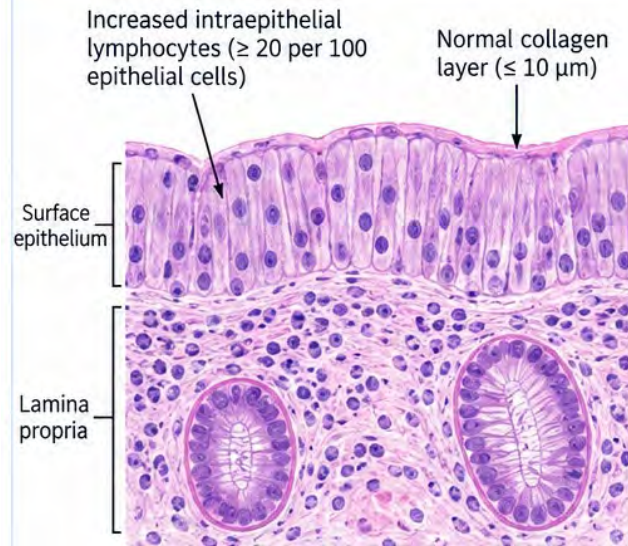
In the US, data from Olmsted county showed that the incidence of MC increased from 1985 to 2001 and stabilized between 2002 and 2019.

SOUTH AFRICA

Data in South Africa is lacking significantly

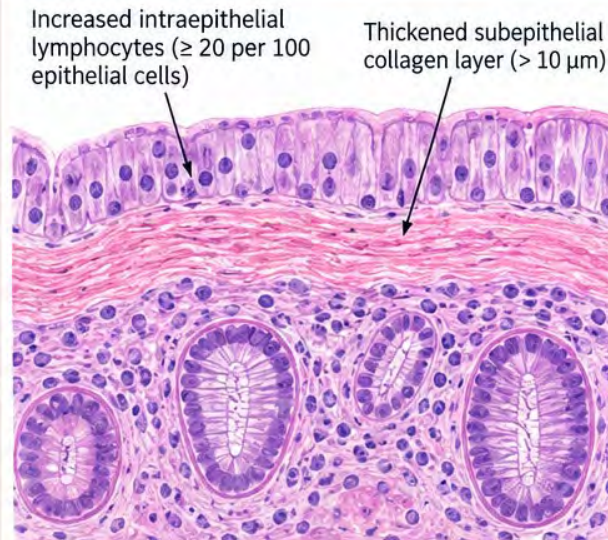
Types of microscopic colitis

Lymphocytic colitis



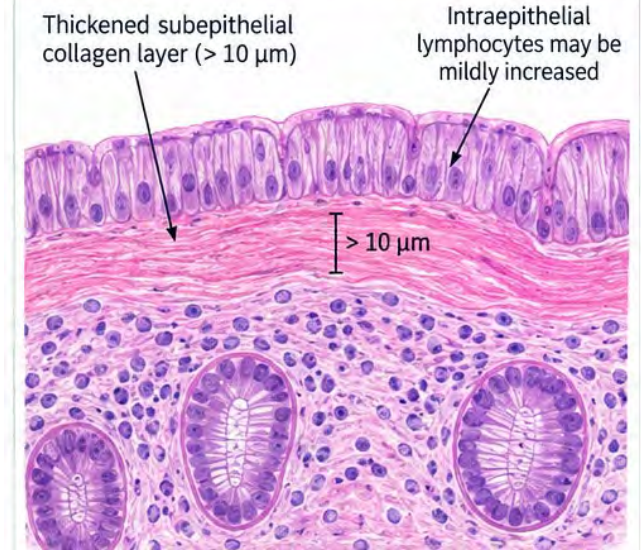
- Increased intraepithelial lymphocytes (≥ 20 per 100 epithelial cells)
- Normal subepithelial collagen layer ($\leq 10 \mu\text{m}$)
- Mild chronic inflammation in lamina propria
- Crypt architecture usually preserved

Mixed (overlap) microscopic colitis



- Features of both lymphocytic and collagenous colitis
- Increased intraepithelial lymphocytes (≥ 20 per 100 epithelial cells)
- Thickened subepithelial collagen layer ($> 10 \mu\text{m}$)
- Mild chronic inflammation in lamina propria

Collagenous colitis

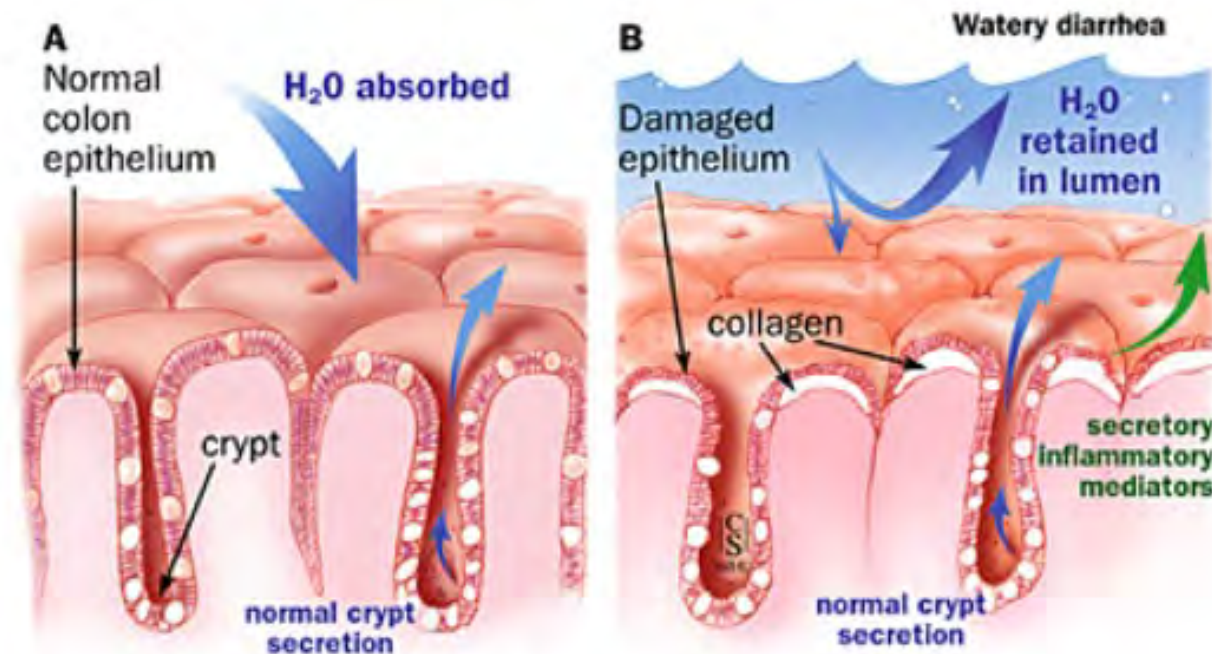


- Thickened subepithelial collagen layer ($> 10 \mu\text{m}$, eosinophilic)
- Intraepithelial lymphocytes may be normal or mildly increased
- Mild chronic inflammation in lamina propria
- Crypt architecture usually preserved

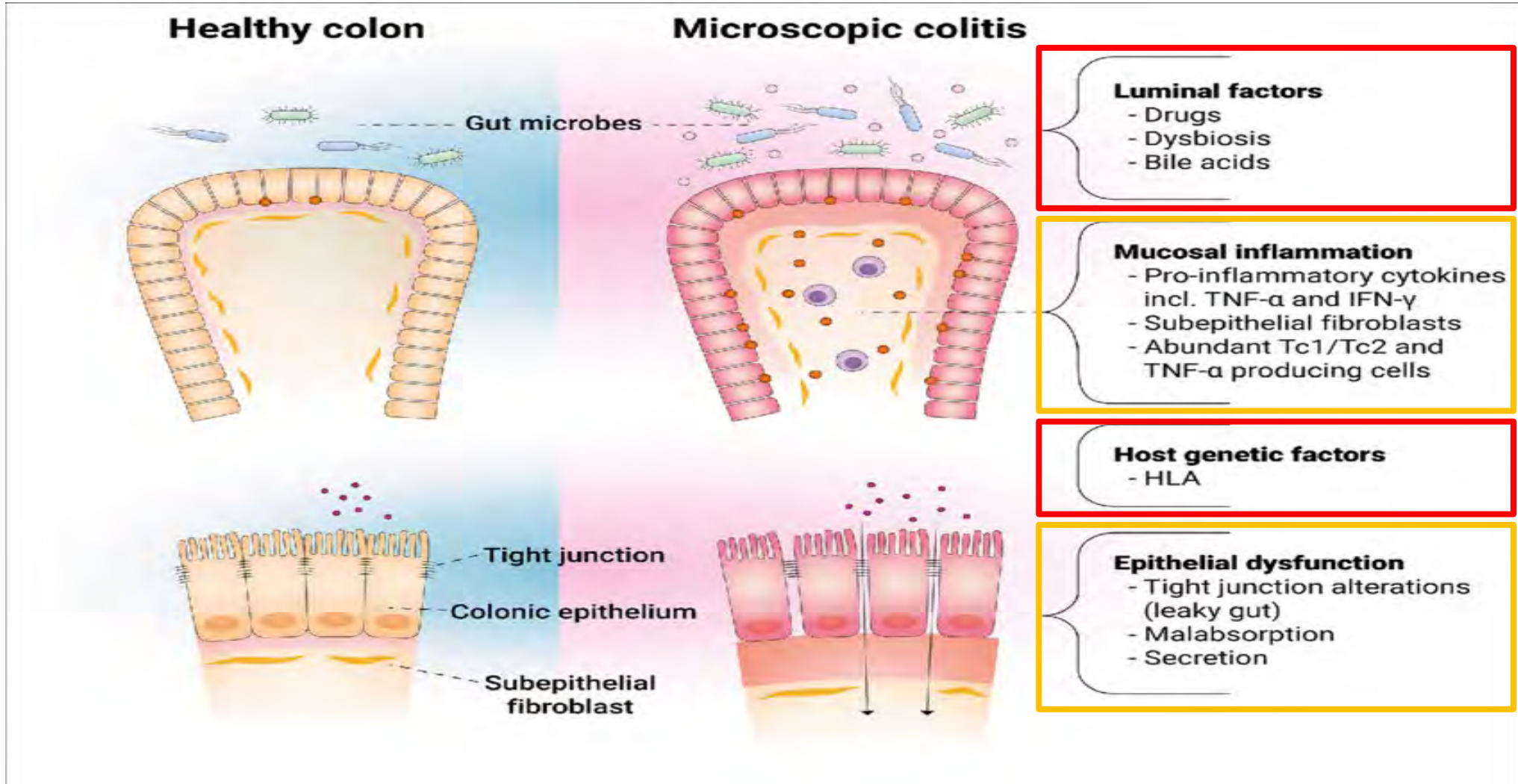
Diagnosis

The diagnosis of Microscopic colitis relies on:

- The histological examination of colonic biopsies
- Requires dedicated gastroenterologists and histopathologists.



Pathogenesis



Risk factors



Older age

- The MC incidence is higher in the elderly.
- A previous meta-analysis showed the median patients' age at the time of diagnosis was over 60 years old



Is smoking a risk factor for MC?

- Statement 1.4: Former, but especially current smoking is associated with an increased risk for both CC and LC.



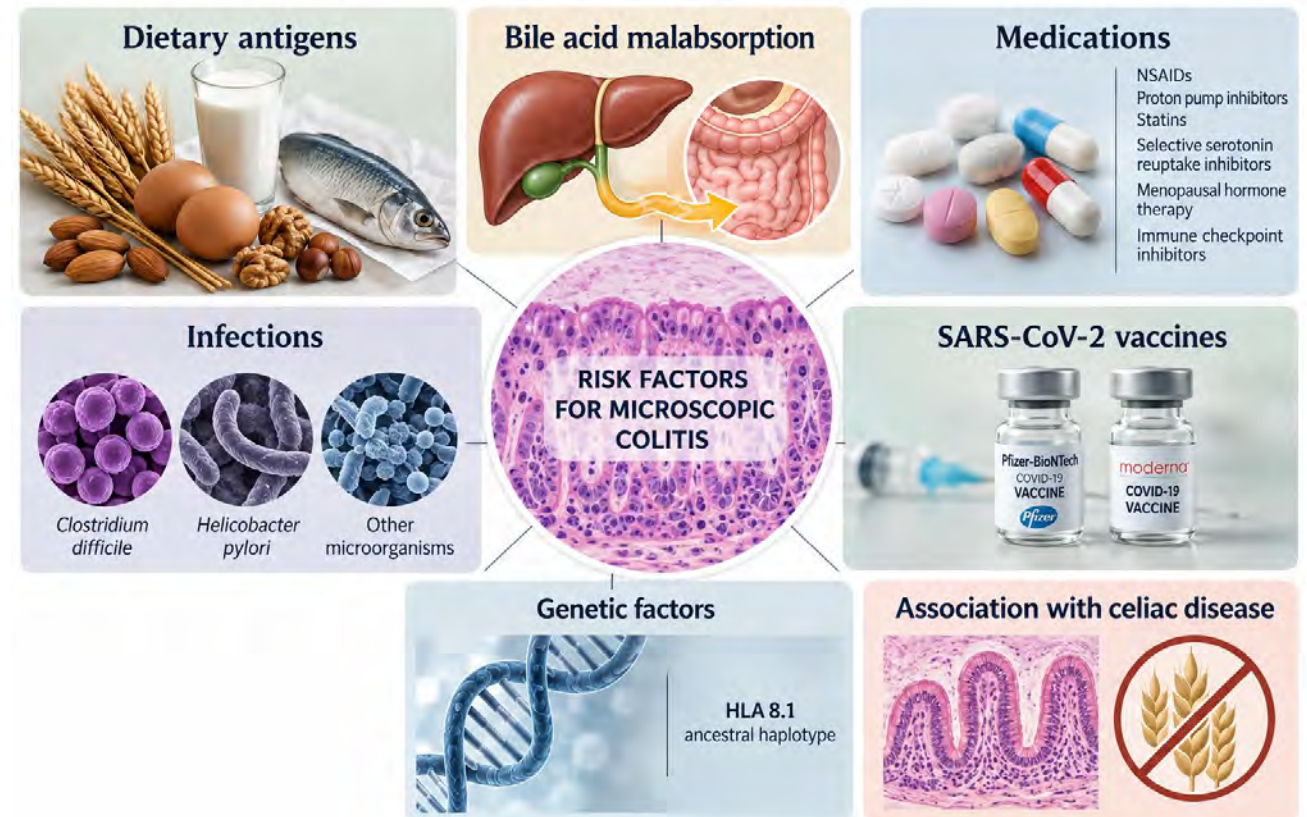
Is female gender a risk factor for MC?

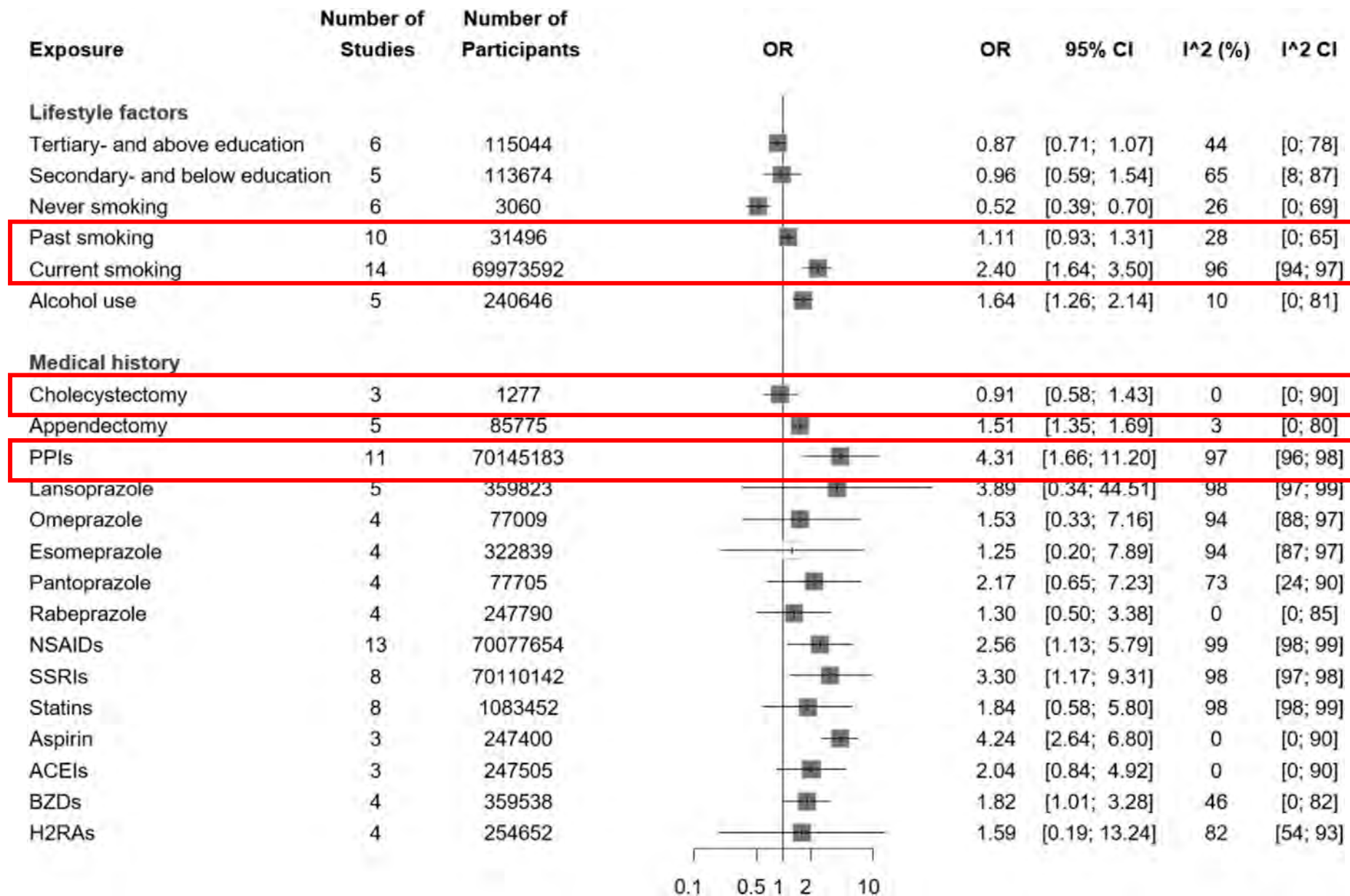
- Statement 1.5: The risk of developing CC or LC is higher in women than in men.

Well-documented risk factors: increasing age, current or former smoking, and female sex.

Other risk factors for development

- Epidemiologic factors
- Exposure to certain medications
- Infections
- Vaccinations
- Genetic risk
- Celiac disease





Symptoms

Presentation

- Chronic *non-bloody diarrhea* and may mimic diarrhea-predominant irritable bowel syndrome (IBS-D)
- The frequency of bowel movements typically ranges between 4 and 10 watery stools per day, although in severe cases, output may exceed 15 stools or up to 5 L of diarrhea daily.

93%

experience fecal urgency

68%

nocturnal diarrhea

65%

MC may lead to weight loss

62%

incontinence

up to 50%

abdominal pain in patients
with active disease

Associations

Autoimmune Diseases

Autoimmune diseases are a risk factor for developing MC. The most important is celiac disease.

- Ankylosing spondylitis

- Type 1 diabetes

- Graves disease

- Hashimoto thyroiditis

- Rheumatoid arthritis

- Multiple sclerosis

- IBD — Crohn's disease and ulcerative colitis

- Predominant Antibody Deficiency Disorders, Including Common Variable Immunodeficiency

- IBS

European guidelines on microscopic colitis: United European Gastroenterology and European Microscopic Colitis Group statements and recommendations

Should MC be ruled out in patients fulfilling the criteria for functional bowel disease with diarrhoea predominant subtype?

Statement 3.2: MC diagnosis should be ruled out in patients fulfilling the criteria for functional bowel disease, especially in presence of MC risk factors and/or in absence of irritable bowel syndrome (IBS)-therapy response.

LE: moderate; GR: NA; agreement: 93%, consensus.

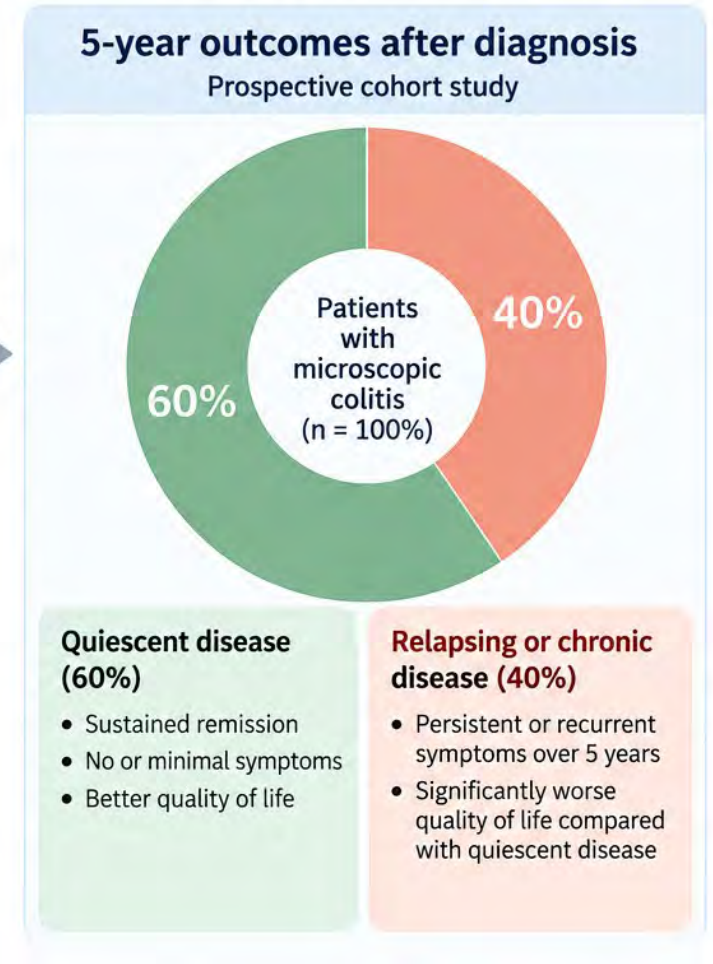
Natural history

Progression is poorly defined.

Some research suggests that long-term outcomes are promising, whereas other studies report significant chronicity of symptoms.

In a recent prospective cohort study, 40% of patients with MC had a relapsing or chronic disease course 5 years after diagnosis.

These patients had worse quality of life compared with those with a quiescent course.



Microscopic Colitis: Diagnostic Work-up

A macroscopically normal colon — the diagnosis is made under the microscope

Suspect when: chronic watery, non-bloody diarrhoea · older patients, F > M · autoimmune associations (coeliac, thyroid) · drug triggers —· smoking.

1 Exclude mimics

Rule out infective, inflammatory and coeliac causes of chronic diarrhoea

BLOODS

FBC, U&E, CRP/ESR (typically normal), TFTs, coeliac serology (tTG-IgA)

STOOL

MC&S, ova/cysts/parasites, C. difficile toxin

NOTE

Faecal calprotectin may be normal — does not exclude the diagnosis

2 Colonoscopy + biopsies

Mucosa usually looks normal or near-normal — biopsy regardless of appearance

APPROACH

Random biopsies from the right AND left colon

YIELD

≥ 2 biopsies per segment; right-sided biopsies increase sensitivity
Minimum 6, in labelled, separate containers

PITFALL

Rectosigmoid-only biopsies can miss the diagnosis

3 Histology confirms subtype

Diagnosis and classification are histological

COLLAGENOUS COLITIS

Subepithelial collagen band ≥ 10 µm

LYMPHOCYTIC COLITIS

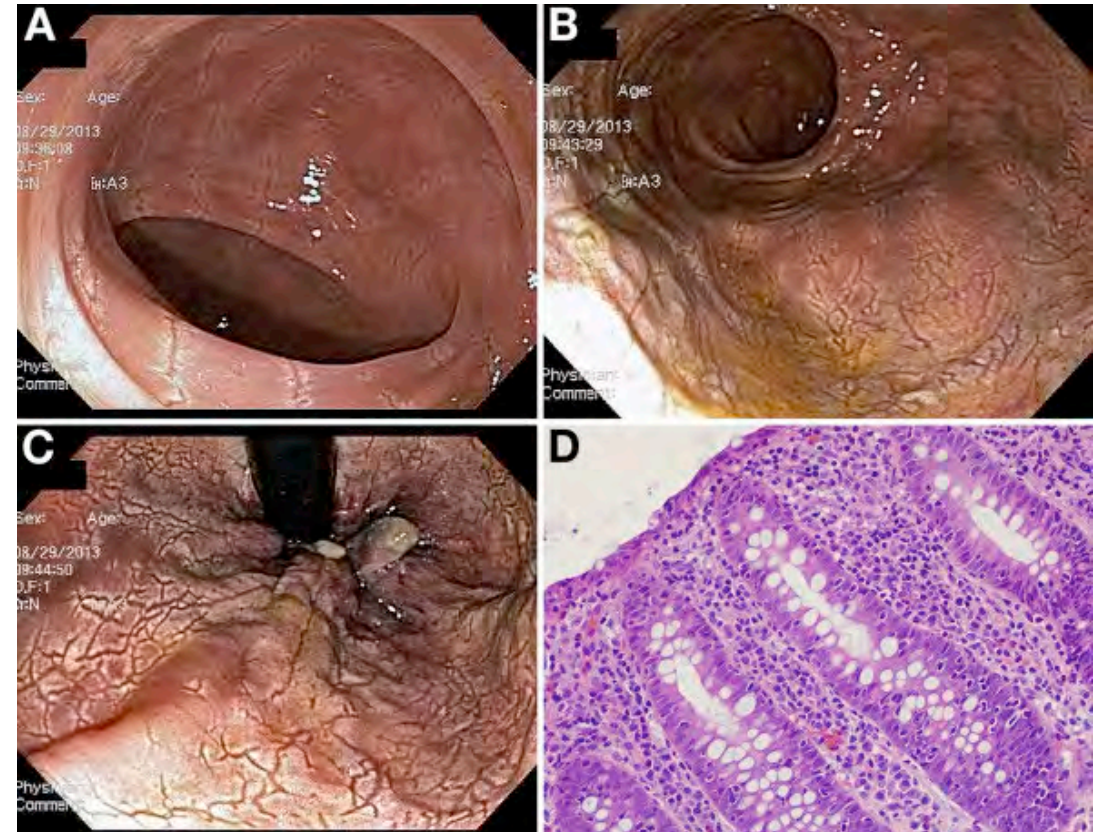
≥ 20 intraepithelial lymphocytes per 100 epithelial cells

BOTH

Increased lamina propria inflammatory infiltrate; preserved crypt architecture

Role of colonoscopy in diagnosis

- Macroscopically may be normal
- Non-specific features may be seen
- Macroscopically visible lesions were reported in 38.8% of patients in several parts of the colon, including isolated linear ulcerations, pseudomembranes, irregular vascularity, erythema, oedema, and nodularity
- Mucosal furrows noted more prominently in Collagenous colitis



What is the role of fecal calprotectin?

- Faecal calprotectin is not useful for excluding or monitoring MC.
- LE: moderate; GR: NA; agreement: 100%, strong consensus.

- Summary of evidence:

Small studies have demonstrated that faecal calprotectin was slightly, although not significantly, higher in those with MC as compared to patients without organic cause of diarrhoea

MICROSCOPIC COLITIS

Therapeutic options

Pharmacological therapy



Oral Budesonide for Induction of Remission in Collagenous Colitis

Recommendation 5.1.1

We recommend using oral budesonide to induce remission in patients with collagenous colitis (CC).

LEVEL OF EVIDENCE

Moderate

GRADE OF RECOMMENDATION

Strong in favour

CONSENSUS

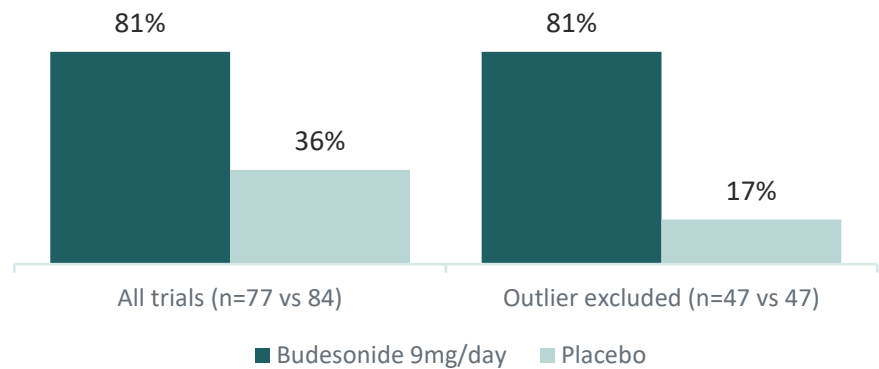
100% agreement

Summary of Evidence

2017 meta-analysis: 4 randomised placebo-controlled trials, 161 CC patients, 6–8 weeks of treatment.
Secondary endpoints included clinical remission at 8 weeks per Hjortswang criteria of disease activity.

Clinical Response Rate

Full pooled analysis (4 trials, n = 161)



Relative risk (outlier-excluded): 4.56, 95% CI 2.43–8.55

Other medical management options

Are bile acid binding agents effective in MC?

Recommendation 5.7

In patients with MC and bile acid diarrhoea

LEVEL OF EVIDENCE

Very low

GRADE

Weak in favour

CONSENSUS

100%, strong

Summary of evidence

A large, prospective cohort study

Methotrexate

16 / 19

(84%) showed complete or partial clinical response

0 / 9

patients achieved clinical remission when intolerant or refractory to budesonide

Methotrexate was evaluated in a retrospective analysis including 19 MC patients

- 16 (84%) showed complete or partial clinical response.
- Another series of 12 patients reported complete response in seven, partial response in two patients and no response in three patients
- One study has prospectively evaluated the effect of methotrexate in patients intolerant or refractory to budesonide.

Not enough evidence to support the efficacy for:



Bismuth agents



Loperamide

may be used in mild disease



**Antibiotic
therapy**



5-ASA's

Evidence is insufficient to support the efficacy of these agents in microscopic colitis.

Biologics in MC



Anti-TNF agents

- Anti-TNF agents in MC have been studied in small case series and single cases.
- In refractory to standard medical therapies, infliximab or adalimumab led to long-term clinical remission in three.



Vedolizumab

- Vedolizumab has been studied in an international case series of patients who failed to respond to other therapies, including anti-TNF agents.
- After three infusions, clinical remission was observed in five patients (two LC and three CC), of whom three remained well with maintenance therapy during a median duration of 13 months.
- Other case series reported successful use of vedolizumab to induce remission of MC.

EVIDENCE BASE

Small case series and single case reports only — biologics are reserved for disease refractory to standard therapy.

Hjortswang Criteria

UEG/EMCG Guideline Statement 3.4 — assessed over a 1-week symptom registration

Disease State	Mean Stool Frequency	Mean Watery Stools
Clinical Remission	< 3 stools / day	< 1 watery stool / day
Active Disease	≥ 3 stools / day	≥ 1 watery stool / day

Moderate
Level of Evidence

100%
Agreement — strong consensus

Summary of Evidence

In the absence of a formally validated metric of disease activity or a reliable biomarker, disease activity and clinical remission in microscopic colitis (MC) should be assessed by the Hjortswang criteria.

MICROSCOPIC COLITIS

Therapeutic options



Non-pharmacological therapy



Non-pharmacological: (nutrition)

Inflammatory Food Patterns to Reduce for Microscopic Colitis are:

- Red Meats & Processed Meats
- High Saturated Fats – Coconut oil, Palm Oil & Dairy Fats
- Gluten if you have Celiac Disease
- Certain Fillers – Carrageenan, Polysorbate 80, Carboxymethylcellulose
- Alcohol
- Artificial sweeteners

Role of the BRAT Diet

B

Banana

R

Rice

A

Applesauce

T

Toast

These foods slow down the intestines and decrease how often you have bowel movements. The BRAT Diet is not very nutritious and should not be used for a long period of time.

As a starting point, here are some extreme diet changes that are not recommended:

- Do not avoid all fiber,
- Do not limit your diet to only liquids,
- Do not cut out all liquids
- Do not exclude foods with sodium and potassium. These are important electrolytes that can become low when you have diarrhea.

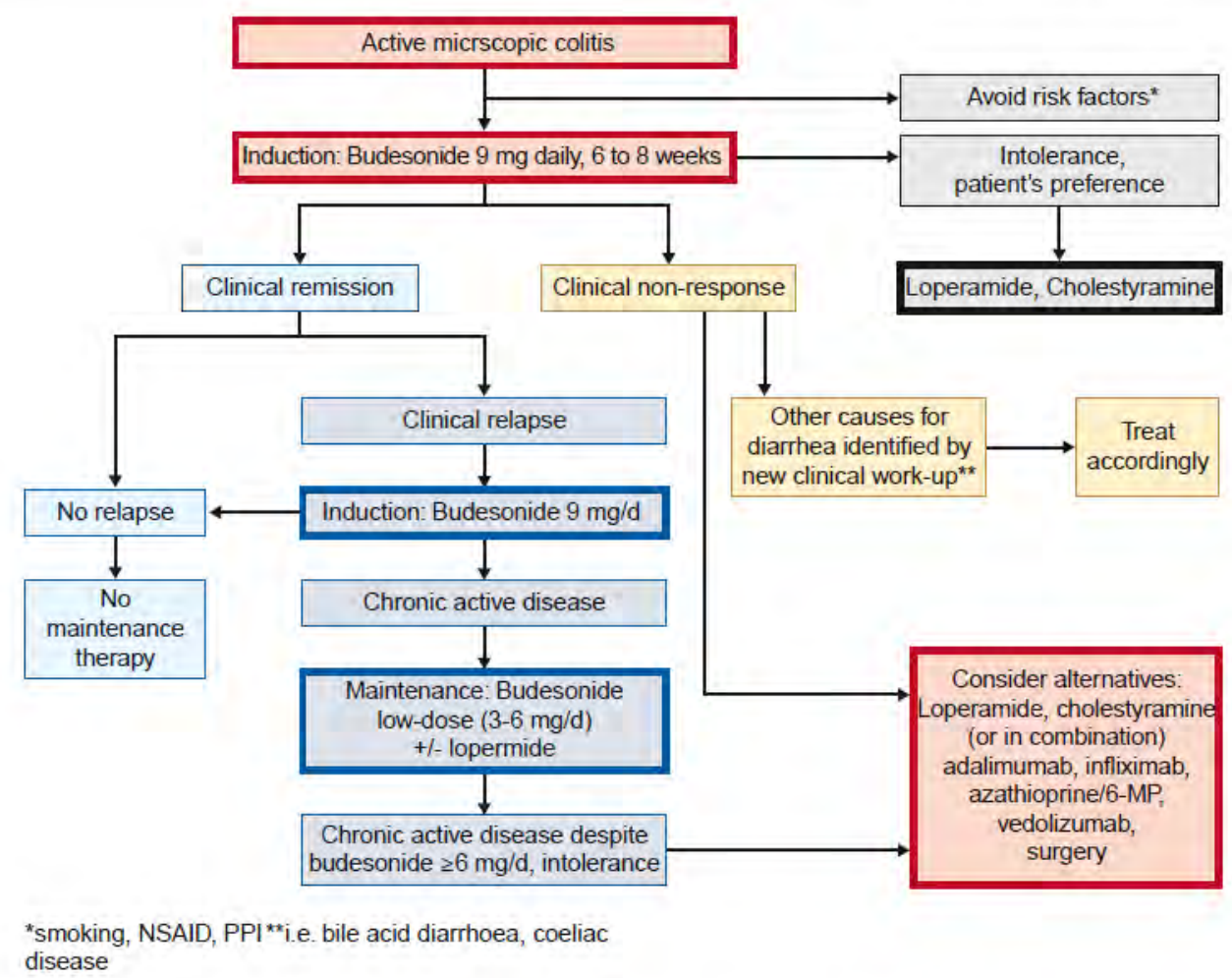


FIGURE 1 Therapeutic algorithm for microscopic colitis in clinical practice. *Smoking, NSAID, PPI; **for example bile acid diarrhoea, coeliac disease. NSAID, nonsteroidal anti-inflammatory drugs; PPI, proton pump inhibitor

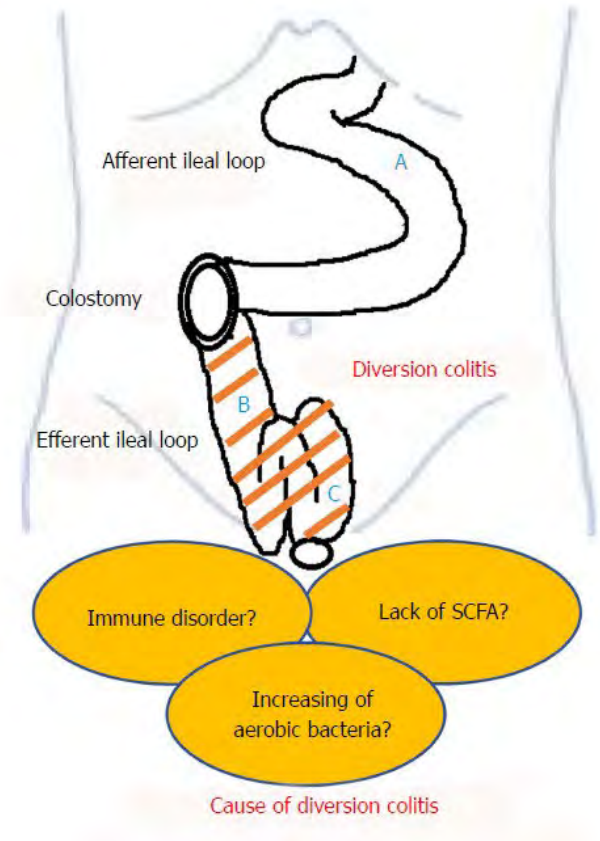
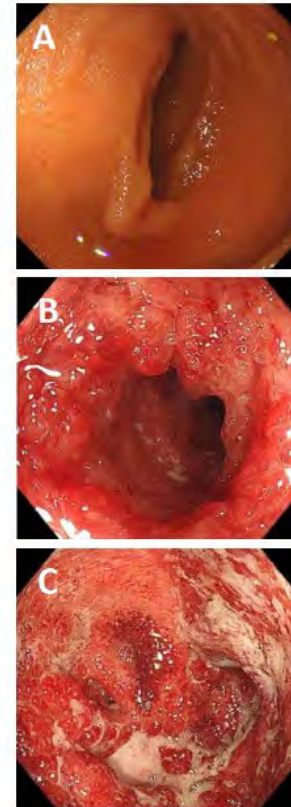
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Diversion Colitis



Definition

Diversion colitis is characterized by inflammation of the mucosa in the defunctioned segment of the colon after colostomy or ileostomy



Epidemiology

> 90%

of diversion colitis seen on endoscopy in a series of 145 patients (Szczepkowski et al)

70–74%

frequency of disease occurrence in patients without pre-existing IBD

91%

frequency of disease occurrence in patients with pre-existing IBD

NO ASSOCIATION WITH

The study further reported that there were no significant associations between diversion colitis and age, sex, type of stoma, or mode of surgery performed.

Background



1974 — first described

Diversion colitis (DC) was first described by Morson and Dawson in 1974 as a nonspecific inflammation in the diverted colon.



1981 — named

Glutzer et al. labeled this inflammation as “diversion colitis” in 1981.

Symptoms and history

● Abdominal discomfort

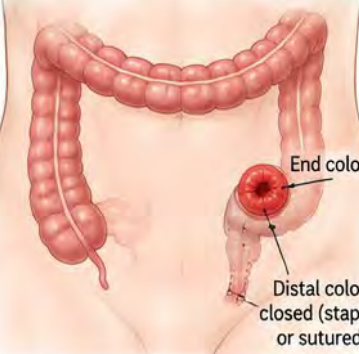
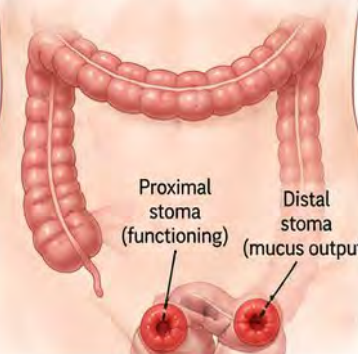
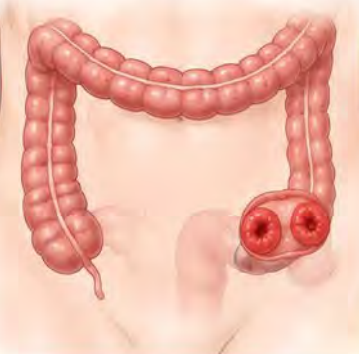
● Tenesmus

● Anorectal pain

● Mucous discharge

● Rectal bleeding

Types of diverting colostomy

Loop colostomy (most common for diversion)	End colostomy (e.g. Hartmann's procedure)	Double-barrel colostomy (two separate stomas)	Split/loop (Santulli) colostomy (modified loop)
			
			
• A loop of colon is delivered through the abdominal wall and opened (usually with a supporting rod initially). • Proximal limb is the functioning stoma. • Distal limb allows mucus drainage. • Commonly used for temporary diversion (e.g. low anterior resection).	• The colon is divided and the proximal end is brought out as a single stoma (end colostomy). • The distal segment is closed and left in situ (Hartmann's pouch). • Used in emergency settings (e.g. perforation, obstruction, severe inflammation). • May be permanent or later reversed depending on the underlying disease and patient factors.	• The colon is divided and both proximal and distal ends are brought out as separate stomas. • Proximal stoma drains faeces. • Distal stoma drains mucus. • Used for diversion, trauma, or when there is a need to exteriorise both ends (e.g. after resection with uncertain distal healing).	• A variation of the loop colostomy where the afferent and efferent limbs are separated (split) to create two stomas. • Allows the proximal limb to function while the distal limb drains mucus. • Useful when a loop colostomy is preferred but a supporting bridge is not desired, or when there is concern for retraction.

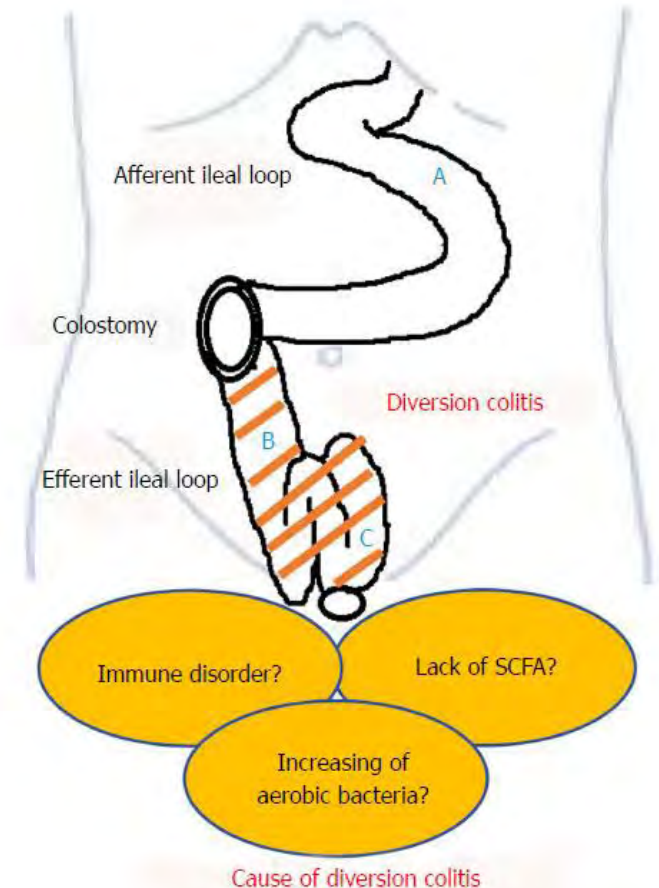
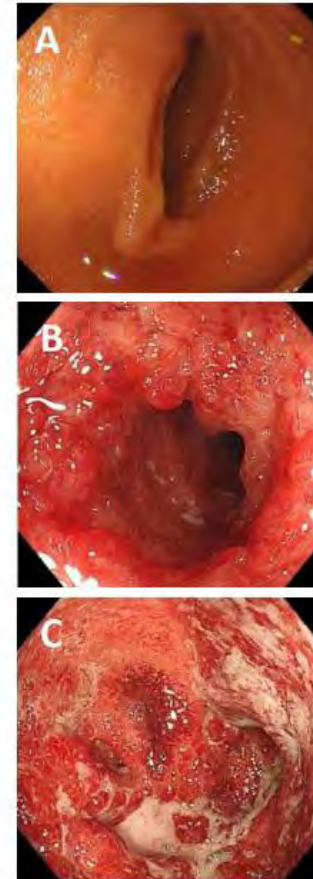
Pathogenesis postulations

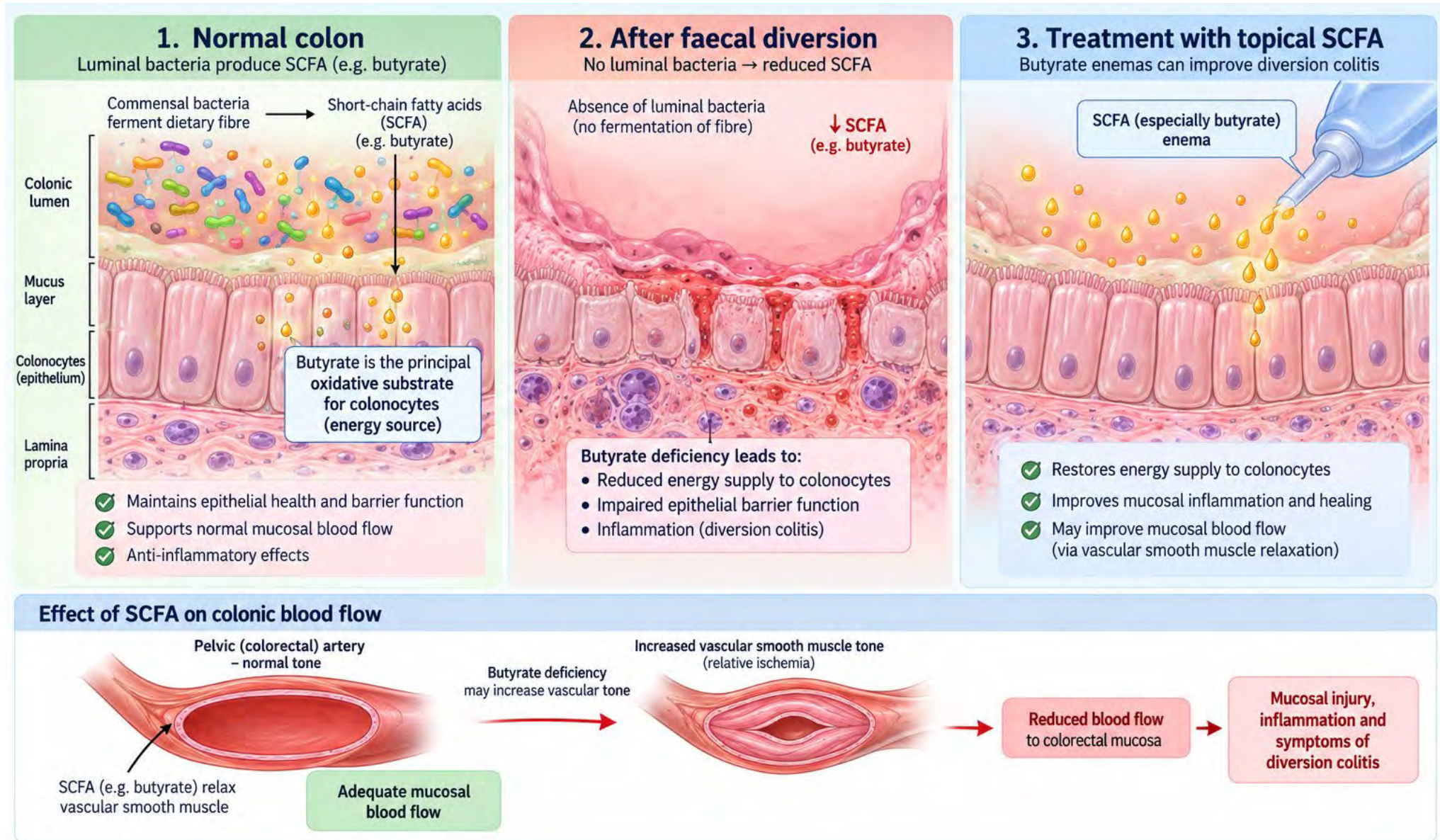
- The basic mechanisms underlying diversion colitis are still unclear.

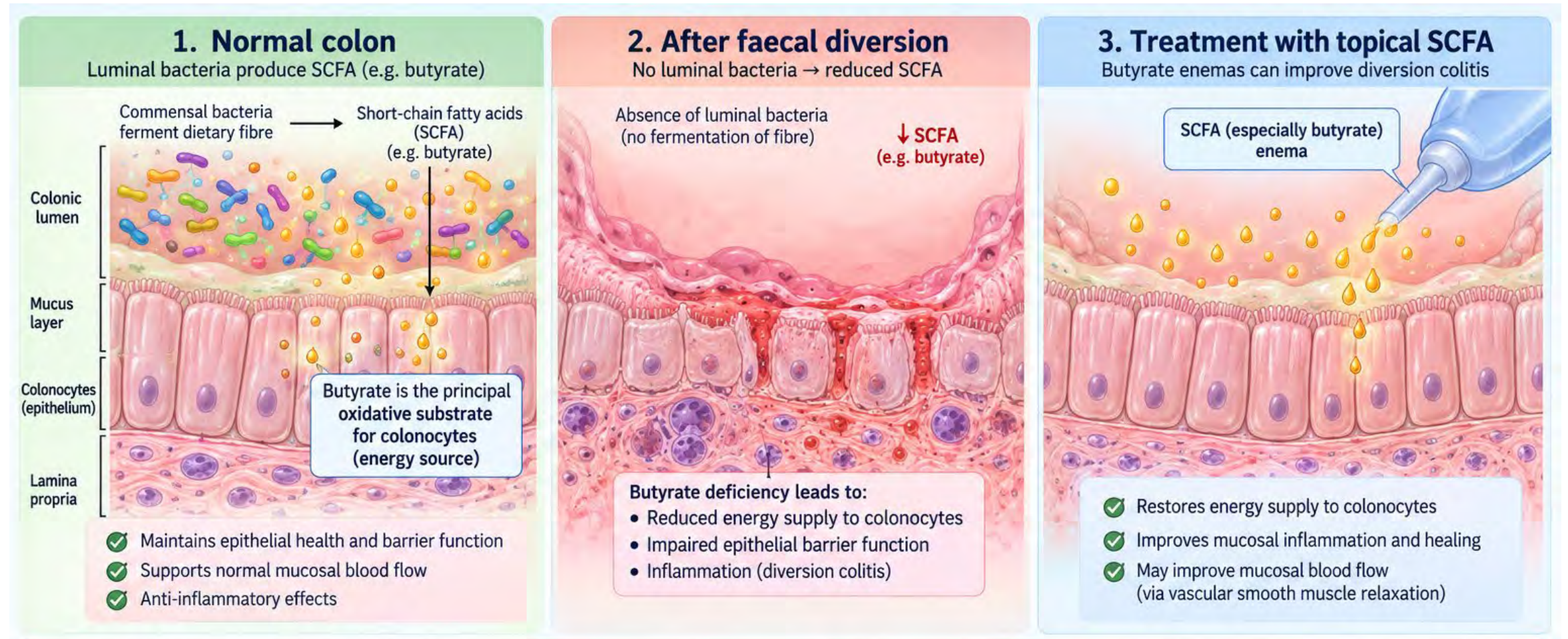
Glotzer hypothesized that it might be the result of

- bacterial overgrowth
- the presence of harmful bacteria
- nutritional deficiencies
- toxins, or disturbance in the symbiotic relationship between luminal bacteria and the mucosal layer

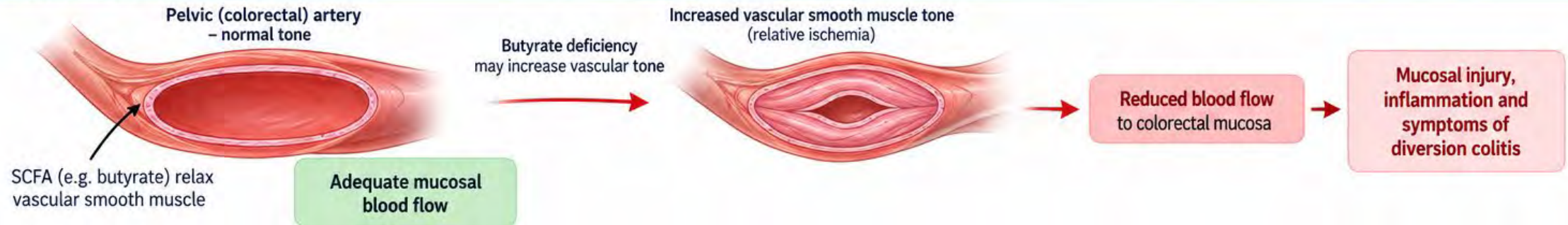
Concentrations of carbohydrate-fermenting anaerobic bacteria and pathogenic bacteria are reduced in de-functioned segment







Effect of SCFA on colonic blood flow



Investigations

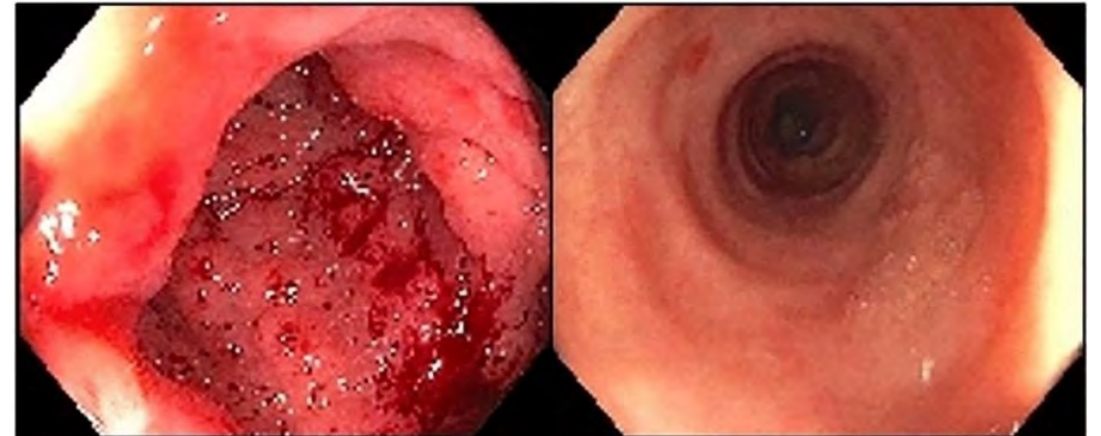
Diversion colitis is diagnosed on:

- clinical history
- Symptoms
- Endoscopic
- Histological findings.

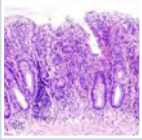
Macroscopic findings

These findings may include:

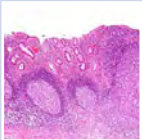
- Diffuse granularity
- Mucous plugs
- Erythema
- Blurring of vascular pattern
- Mucosal friability (80%)
- oedema (60%)
- Aphthous ulceration
- Bleeding to varying degrees



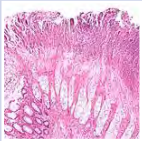
Microscopic findings



Crypt branching, atrophy, crypt distortion, mucin depletion, regenerative hyperplasia, Paneth cell, thickening of muscularis mucosa, diffuse active mucosal inflammation with crypt abscess, ulceration, vacuolar and epithelial degeneration along with features of chronic inflammation usually confined to mucosa are seen with varying degree of severity

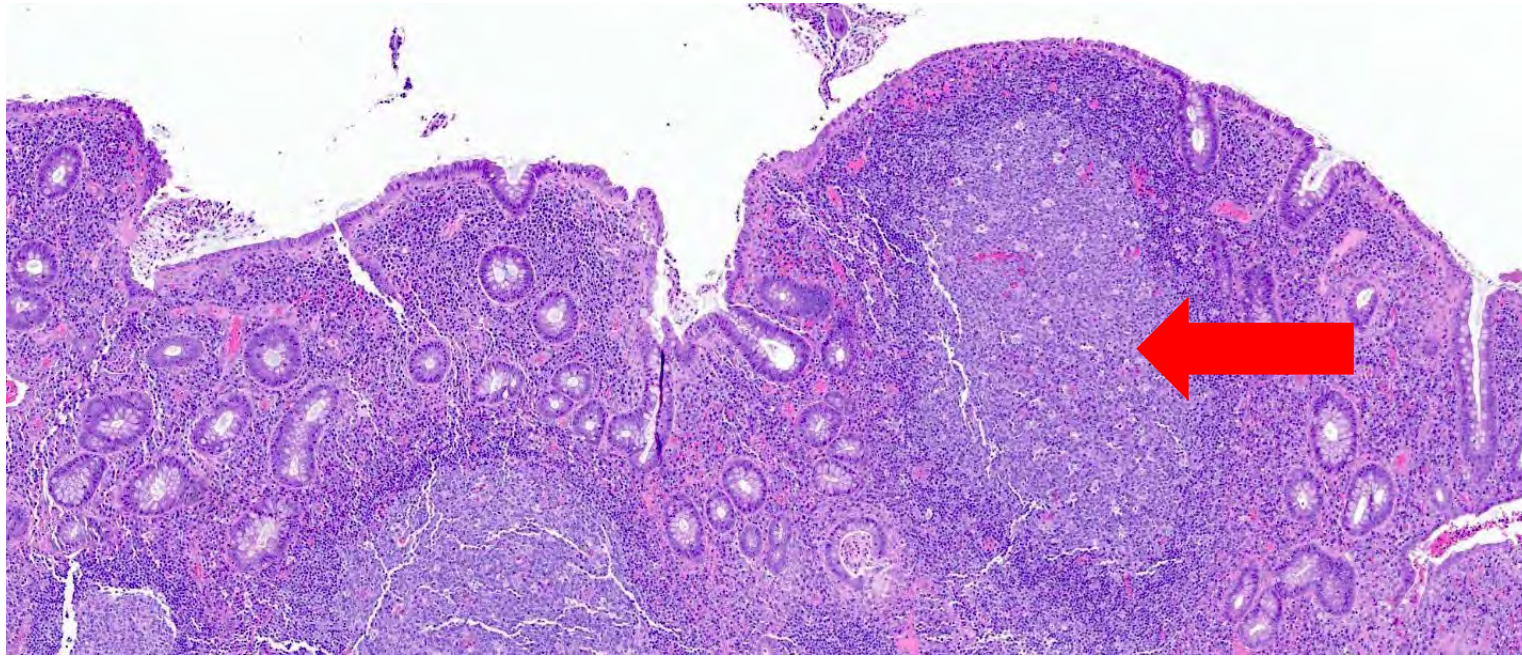


The most striking feature often seen in diversion colitis is lymphoid follicular hyperplasia



There are no pathognomonic features of diversion colitis that have been identified in any of the studies.

Lymphoid follicular Hyperplasia



Management strategy

Based on a study of 145 patients, Szczepkowski proposed a management strategy for patients with de-functioned distal stoma. He divided patients with faecal diversion into three groups:

1**Group 1**

- No clinical, morphological or endoscopic evidence of diversion colitis
- Can be treated conservatively

2**Group 2**

- Mild or moderate signs of diversion colitis
- Can have a trial of conservative management prior to restoration of bowel continuity

3**Group 3**

- Severe diversion colitis
- Should ideally undergo restoration of bowel continuity

If surgery is not an option

Other treatment options should be tried to resolve the inflammation.

Pre-existing IBD

Re-anastomosis of diverted segments in patients with pre-existing inflammatory bowel disease is a more difficult decision because inflammation in the diverted segment could represent inflammatory bowel disease or diversion colitis, dictating different courses of action

Treatments for Diversion Colitis & Pouchitis

Summary of surgical and pharmacologic options · Part 1 of 2

Treatment	Complications / Main Side Effects	Special Points at Issue
Surgical anastomosis	Bleeding, infection, anastomotic leak or stricture, anesthetic risks.	Differential diagnosis can be difficult; IBD may be reactivated, requiring further treatment.

Treatments for Diversion Colitis & Pouchitis

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Short-chain fatty acids (SCFAs)	None.	One of the more expensive pharmacologic treatment options.

SCFAs

Short-chain-fatty acids (SCFAs), primarily butyrate, are the major fuel sources for the epithelium.

The absence of the diverted tract may lead to mucosal atrophy and inflammation.

Bacteria produce SCFAs as by-products of carbohydrate fermentation in the colonic lumen, and SCFAs provide the primary energy source for colonic mucosal cells

In human neutrophils, SCFAs have been shown to reduce the production of reactive oxygen species, which are the agents of oxidative tissue damage



TABLE 3 Different formulations of SCFAs employed in the included studies

Reference	SCFAs formulation	Intervention	Outcome
Harig et al. ²⁶	Enema of sodium acetate (60 mM), sodium propionate (30 mM), sodium n-butyrate (40 mM), plus sodium chloride (about 22 mM)	60 ml twice daily for two to four weeks (n = 1)	The endoscopic response and microscopic resolution of DP
Guillemot F et al. ³⁰	Enema of sodium acetate (60 mM), sodium propionate (30 mM), sodium n-butyrate (40 mM), plus sodium chloride (about 22 mM)	60 ml twice daily for 14 days (n = 2)	Endoscopic and histologic response
Neut C et al. ³⁴	Enema containing acetate (60 mmol/L), propionate (30 mmol/L) and n-butyrate (40 mmol/L)	60 ml twice daily for 14 days (n = 4)	SCFAs enemas do not induce significant changes in the microbial flora of patients with DP
Schauber J et al. ³⁸	Enema of sodium acetate (80 mM), sodium propionate (30 mM), sodium n-butyrate (40 mM)	60 ml twice daily for 3 weeks (n = 9)	No significant difference between SCFAs and saline as concerns clinical, endoscopic, and histologic response
Luceri et al. ⁴⁶	Enema (Naburen®, Promefarm, Italy), containing sodium butyrate (2 g/30 ml; 600 mmol/L)	Twice daily (36 mM totally) for 30 days (n = 10)	The endoscopic grading score was significantly reduced, no adverse effects.
Zundler S et al. ⁴⁹	100 ml of coconut oil (abundant in SCFAs) as a rectal enema	Daily coconut oil rectal application (n = 1) continuously for 6 months	Clinical remission, endoscopic and histologic improvement after 6–8 weeks Decrease of epithelial cell necrosis <i>in vitro</i> .

Note: Reported n refers exclusively to IBD patients included.
Abbreviations: DP, diversion proctocolitis; IBD, inflammatory bowel disease; SCFAs, short chain fatty acids.

Treatments for Diversion Colitis & Pouchitis

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5-ASA enemas	Occasional acute intolerance: cramping, acute abdominal pain, bloody diarrhea, fever, headache, rash.	For mild-to-moderate proctitis, proctosigmoiditis, or distal colitis.

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Infliximab	Common side effects, plus serious risks including infections.	Case report only; IV prednisolone was co-administered, so the effect of infliximab alone is difficult to estimate.

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Leukocytapheresis	Nausea, vomiting, fever, chills, nasal obstruction.	Case report only; few serious side effects but expensive. A good option for elderly patients.

Treatments for Diversion Colitis & Pouchitis

Treatment	Complications / Main Side Effects	Special Points at Issue
Autologous fecal transplantation	None; patient tolerance is required.	Safe and inexpensive; patient motivation is needed.
Dextrose (hypertonic glucose) spray	Very low risk of transient hyperglycemia — no direct injection into blood vessels.	Case report only; safe and inexpensive, with a potential side effect of bleeding.
Irrigation with fibers	Probably none.	Only one study, showing a role in the preoperative management of colostomy.
Elemental diet	None.	Onset of effect was relatively slow.
Probiotics	None.	Supported by a prospective, randomized, double-blind, controlled study; safe and effective.
Coconut oil	No adverse events.	Case report only; safe and inexpensive.

Diagnostic and management algorithm of DC

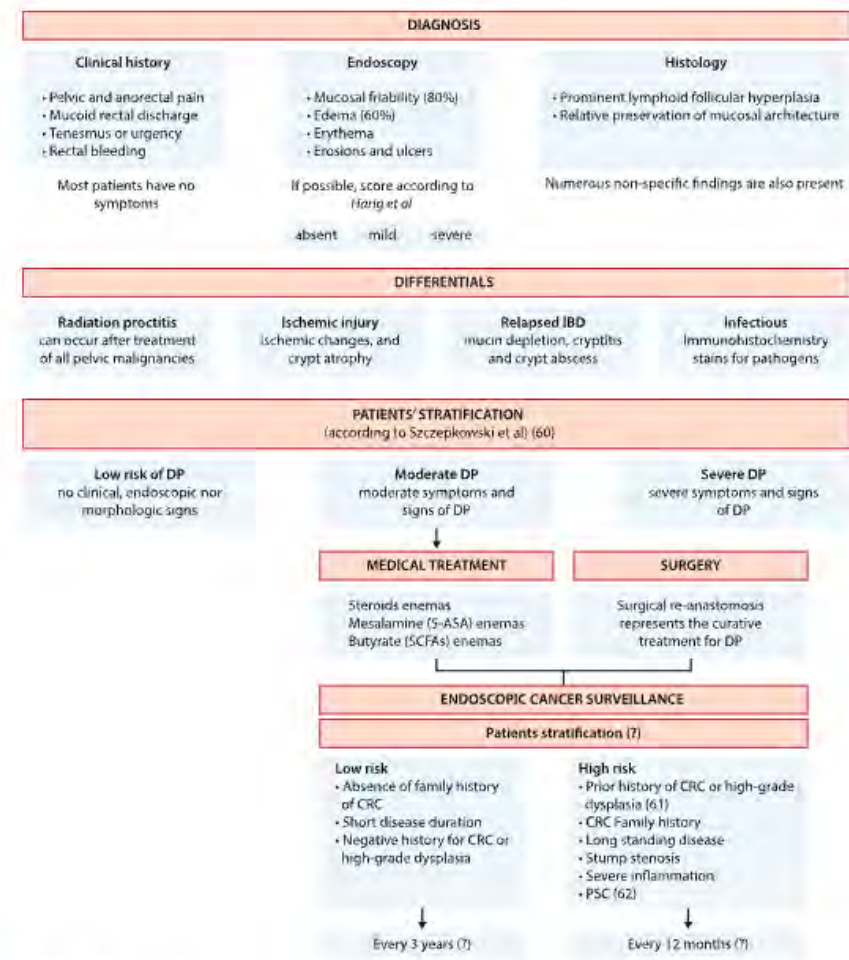


FIGURE 2 Proposed algorithm for diversion proctocolitis/pouchitis: from diagnosis to treatment and surveillance. Question marks indicate discussed issues due to literature controversy or scarcity of data

DIAGNOSIS			
Clinical history - Pelvic and anorectal pain - Mucoïd rectal discharge - Tenesmus or urgency - Rectal bleeding Most patients have no symptoms	Endoscopy - Mucosal friability (80%) - Edema (60%) - Erythema - Erosions and ulcers If possible, score according to <i>Narig et al</i> absent mild severe	Histology - Prominent lymphoid follicular hyperplasia - Relative preservation of mucosal architecture Numerous non-specific findings are also present	
DIFFERENTIALS			
Radiation proctitis can occur after treatment of all pelvic malignancies	Ischemic injury ischemic changes, and crypt atrophy	Relapsed IBD mucin depletion, cryptitis and crypt abscess	Infectious Immunohistochemistry stains for pathogens

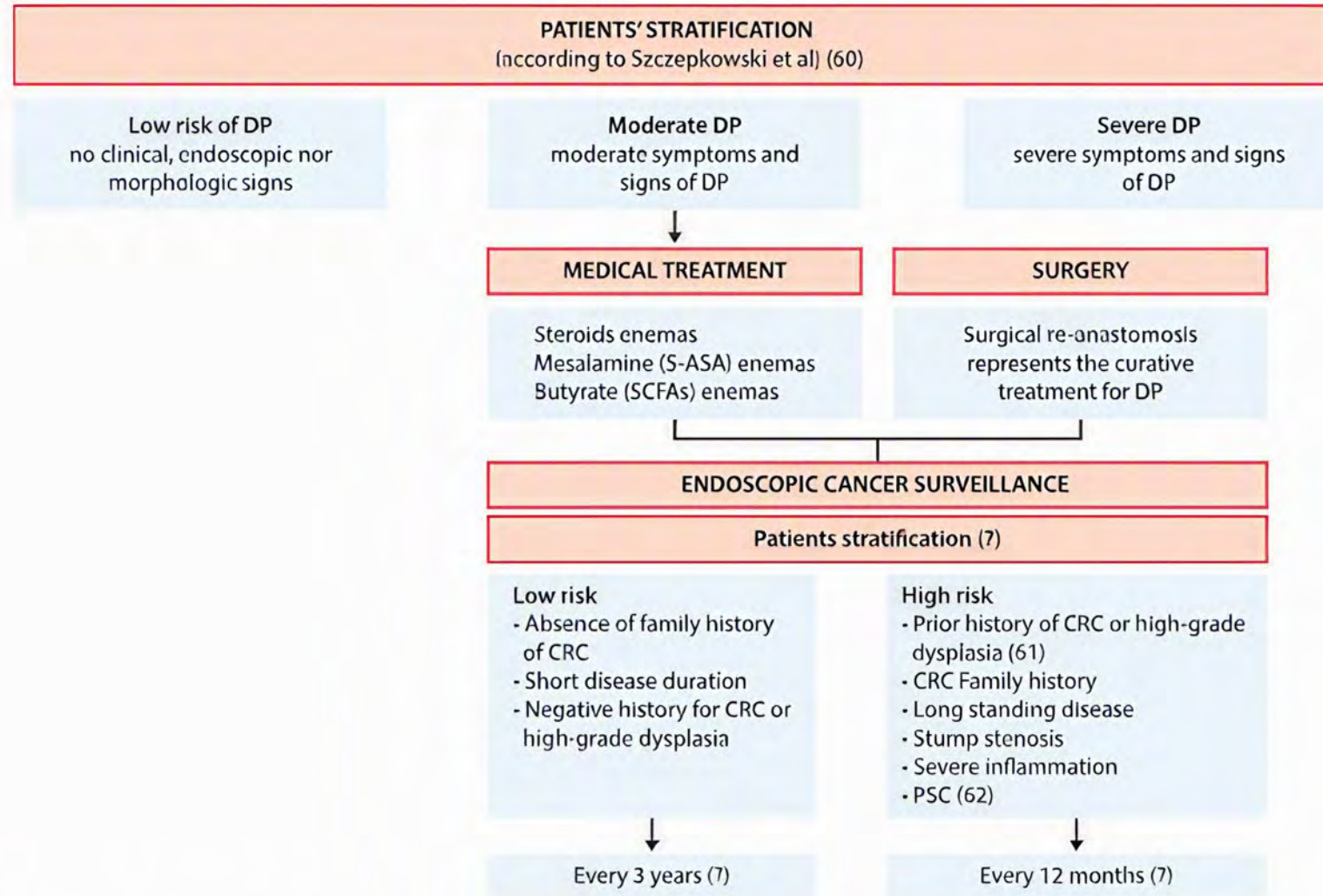


FIGURE 2 Proposed algorithm for diversion proctocolitis/pouchitis: from diagnosis to treatment and surveillance. Question marks indicate discussed issues due to literature controversy or scarcity of data

Complications if left untreated



Stricture



Malignancy

low incidence of colorectal cancer in the diverted segment



Diverted rectum

Complications and sequelae of the diverted rectum; shrinkage of the rectal stump was detected



Local complications

Fistulae, perianal irritation, sexual difficulty and perforation.

13 (2.6%)

cases of rectal and anal cancer

11 (2.2%)

cases of dysplasia occurred

Risk factors for cancer / dysplasia of the rectal stump

- Colorectal neoplasia in the removed colon was associated with advanced rectal stump cancer (RSC).
- A further study indicated that microscopically active inflammation of the diverted colon and a long disease duration (>10 years) were possible risk factors for cancer/dysplasia of the rectal stump.

03

Ischaemic Colitis



Background

1966

ischemic colitis as a disease entity was first referenced in the medical literature, by Marston et al.

50–60%

of all cases of gastrointestinal ischemia — it remains the most common form

Current classification — two groups

- Gangrenous
- Partial thickness

Historical classification — three groups

- Transient
- Stricturing
- Gangrenous

Despite different nomenclature, it remains the most common form of gastrointestinal ischemia.

Epidemiology



The elderly (age > 60 years)

Ischemic bowel is typically a disease of the elderly (age >60 years) where atherosclerotic disease or low-flow states are usually the cause.



Younger individuals

It is rare in younger individuals, where it is more likely to be related to vasculitis or hypercoagulable states.

Distribution

Location of the ischemia relates to the anatomy of the mesenteric vessels:

Superior mesenteric artery (SMA)

supplies the right colon from the cecum to the splenic flexure

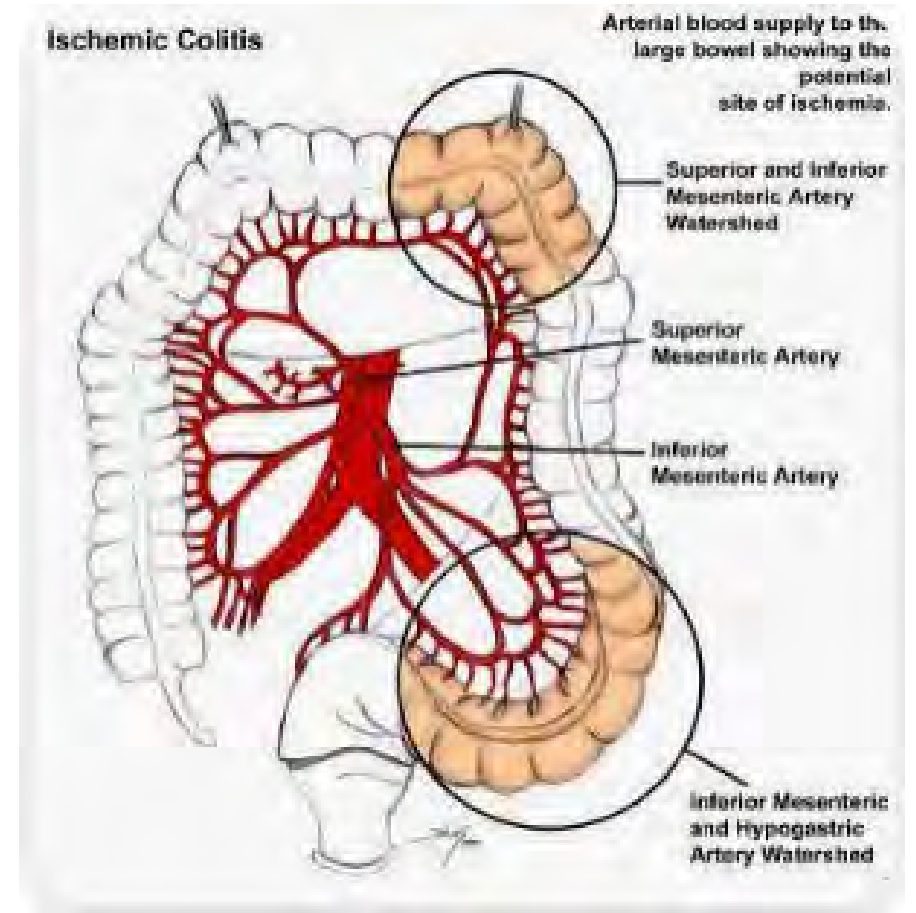
Inferior mesenteric artery (IMA)

supplies the left colon from the splenic flexure to the rectum

Watershed areas

● Splenic flexure (Griffiths point)

● Rectosigmoid junction (Sudeck point)



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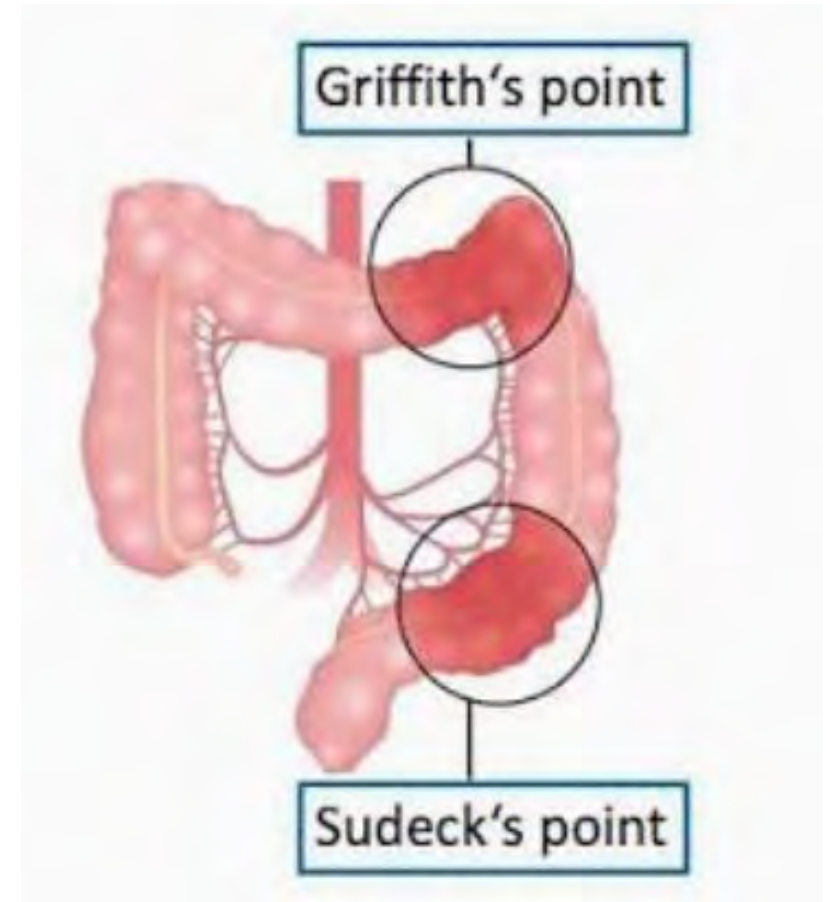
Inferior mesenteric artery (IMA)

supplies the left colon from the splenic flexure to the rectum

Watershed areas

● Splenic flexure (Griffiths point)

● Rectosigmoid junction (Sudeck point)



Ischaemic Colitis: Types & Phases of Ischaemia

Non-occlusive (hypoperfusion) → transient / partial thickness. May involve any part of the gut; usually patchy and segmental.

Occlusive (SMA thrombosis / embolism) → full thickness. Long segments, watershed territories.

1 Transient ischaemia

Mucosal infarction — ischaemic damage confined to the mucosa

MECHANISM

Hypoperfusion rather than occlusive disease

DISTRIBUTION

Any part of the gut; patchy, segmental

OUTCOME

Heals with minimal residual mucosal scar

2 Partial thickness ischaemia

Mural infarction — injury extends from the mucosa into the muscularis mucosa

MECHANISM

Hypoperfusion rather than occlusive disease

DISTRIBUTION

Any part of the gut; patchy, segmental

OUTCOME

Stricture and luminal narrowing; loss of normal anatomy

3 Full thickness infarction

Transmural infarction — full-thickness bowel wall involvement

MECHANISM

Thrombosis or embolism of the SMA; more common in small bowel (mesenteric supply)

DISTRIBUTION

Long segments; the two watershed territories

OUTCOME

Tissue loss

Etiology

1 Arterial occlusion

- Arteriosclerosis
- Vasculitides
- Arterial emboli

2 Venous thrombosis

- Hypercoagulable states
- Primary mesenteric thrombosis

3 Low-flow states

- Hypotension
- Congestive cardiac failure
- Cardiac arrhythmias

4 Others

- Sickle cell disease
- Radiation therapy

Table 1. Drugs potentially associated with ischemic colitis.

- Digoxin
- Aspirin
- Naratriptan
- Ma huang (herbal food supplement)
- Phentermine (weight loss medication)
- Oral contraceptives
- Pseudoephedrine
- Phenobarbital
- Nasal decongestants
- Dextroamphetamine
- Type I interferons (IFN- α and IFN- β)
- Tumor necrosis factor α
- Antipsychotics
 - Clozapine
- Serotonergic medications
 - Alosetron
 - Tegaserod
- Vasopressors
- Cocaine
- Methamphetamine

ISCHAEMIC COLITIS

Diagnosis & work up



Investigations

Laboratory, radiological and endoscopic assessment of colonic ischaemia



Laboratory Tests

- Mild **leukocytosis** with a left shift.
- **Electrolyte and renal** impairment
- The **lactate** level may be elevated



Radiologic Studies

- **Plain radiographs**
- Computed tomography (**CT**) imaging is now widely available and typically used as the first study in assessing the patient with abdominal pain
- Findings on **barium contrast** enemas can be predictive of ischemic colitis
- **Color Doppler and duplex ultrasound** studies have also helped and colonic ischemia.



Endoscopy

- **Colonoscopy** remains the most sensitive and specific study available for diagnosis of ischemic colitis.
- In early ischemia, the mucosa appears pale and edematous with interspersed areas of hyperemia.
- As the ischemic process progresses, evidence of submucosal edema and hemorrhage can be seen as bluish-black blebs or nodules protruding into the lumen of the bowel.

IMAGING OF CI

Recommendations

1. CT with intravenous and oral contrast should be ordered as the imaging modality of choice for patients with suspected CI, to assess the distribution and phase of colitis (strong recommendation, moderate level of evidence) (111, 112, 113).
2. The diagnosis of CI can be suggested based on CT findings (e.g., bowel wall thickening, edema, and thumbprinting) (strong recommendation, moderate evidence) (111, 112, 113).
3. Multiphasic CT angiography (CTA) should be performed on any patient with suspected IRCI or in any patient in whom the possibility of AMI cannot be excluded (strong recommendation, moderate level of evidence) (113, 114).
4. CT or magnetic resonance imaging (MRI) findings of colonic pneumatosis and portomesenteric venous gas can be used to predict the presence of transmural colonic infarction (strong recommendation, moderate level of evidence) (115).
5. In a patient in whom the presentation of CI may be a heralding sign of acute mesenteric ischemia (AMI; e.g., IRCI, severe pain without bleeding, and atrial fibrillation), and the multiphasic CT is negative for vascular occlusive disease, traditional splanchnic angiography should be considered for further assessment (conditional recommendation, low level of evidence) (114).

Imaging



Radiographs & fluoroscopy

PLAIN RADIOGRAPH

Abdominal radiographs are often normal, but signs include:

- dilatation due to ileus
- Thumbprinting due to mucosal edema or hemorrhage
- localized intramural gas (pneumatosis coli)
- Free air if a perforation is present

FLUOROSCOPY

Contrast enema is abnormal in 90% but is rarely used for diagnostic purposes:

- segmental region of abnormality
- stricture from fibrosis as a late complication of ischemia



Ultrasound, angiography & nuclear medicine

ULTRASOUND

- Ultrasound may be of limited use due to bowel gas
- Doppler imaging may be useful in assessing for stenoses

ANGIOGRAPHY (DSA)

- This may show arterial occlusion
- In venous occlusion, a collateral filling defect may be seen

NUCLEAR MEDICINE

Increased uptake of Tc^{99m} (V) DMSA tracer may be picked up in ischaemic bowel, however unreliable



CT — modality of choice

Contrast-enhanced is the modality of choice. Features include:

- bowel wall thickening
- Target sign: low-density ring of submucosal edema between enhancing mucosa and serosa
- bowel dilatation
- Localised intramural gas (Pneumatosis coli)
- peritoneal/retroperitoneal cavity findings
 - pericolic fluid or fat stranding (common)
 - peritoneal free fluid and mesenteric oedema
 - pneumoperitoneum / pneumoretroperitoneum
- vascular findings
 - vascular occlusion (superior or inferior mesenteric artery or vein)

Disease severity	Criteria	Treatment
Mild	Typical symptoms of CI with a segmental colitis not isolated to the right colon and with none of the commonly associated risk factors for poorer outcome that are seen in moderate disease	Observation Supportive care
Moderate	Any patient with CI and up to three of the following factors:	Correction of cardiovascular abnormalities (e.g., volume replacement) Broad-spectrum antibiotic therapy Surgical consultation
	Male gender	
	Hypotension (systolic blood pressure <90 mmHg)	
	Tachycardia (heart rate >100 beats/min)	
	Abdominal pain without rectal bleeding	
	BUN >20 mg/dl	
	Hgb <12 g/dl	
	LDH >350 U/l	
	Serum sodium <136 mEq/l (mmol/l)	
	WBC >15 cells/cmm ($\times 10^9/l$)	
	Colonic mucosal ulceration identified colonoscopically	
Severe	Any patient with CI and more than three of the criteria for moderate disease or any of the following:	Emergent surgical consultation (treatment is likely to be surgical) Transfer to intensive care unit Correction of cardiovascular abnormalities (e.g., volume replacement) Broad-spectrum antibiotic therapy
	Peritoneal signs on physical examination	
	Pneumatosis or portal venous gas on radiologic imaging	
	Gangrene on colonoscopic examination	
	Pancolonic distribution or IRCI on imaging or colonoscopy	

BUN, blood urea nitrogen; CI, colon ischemia; Hgb, hemoglobin; IRCI, isolated right-colon ischemia; LDH, lactate dehydrogenase; WBC, white blood cell count.

Disease severity	Criteria	Treatment
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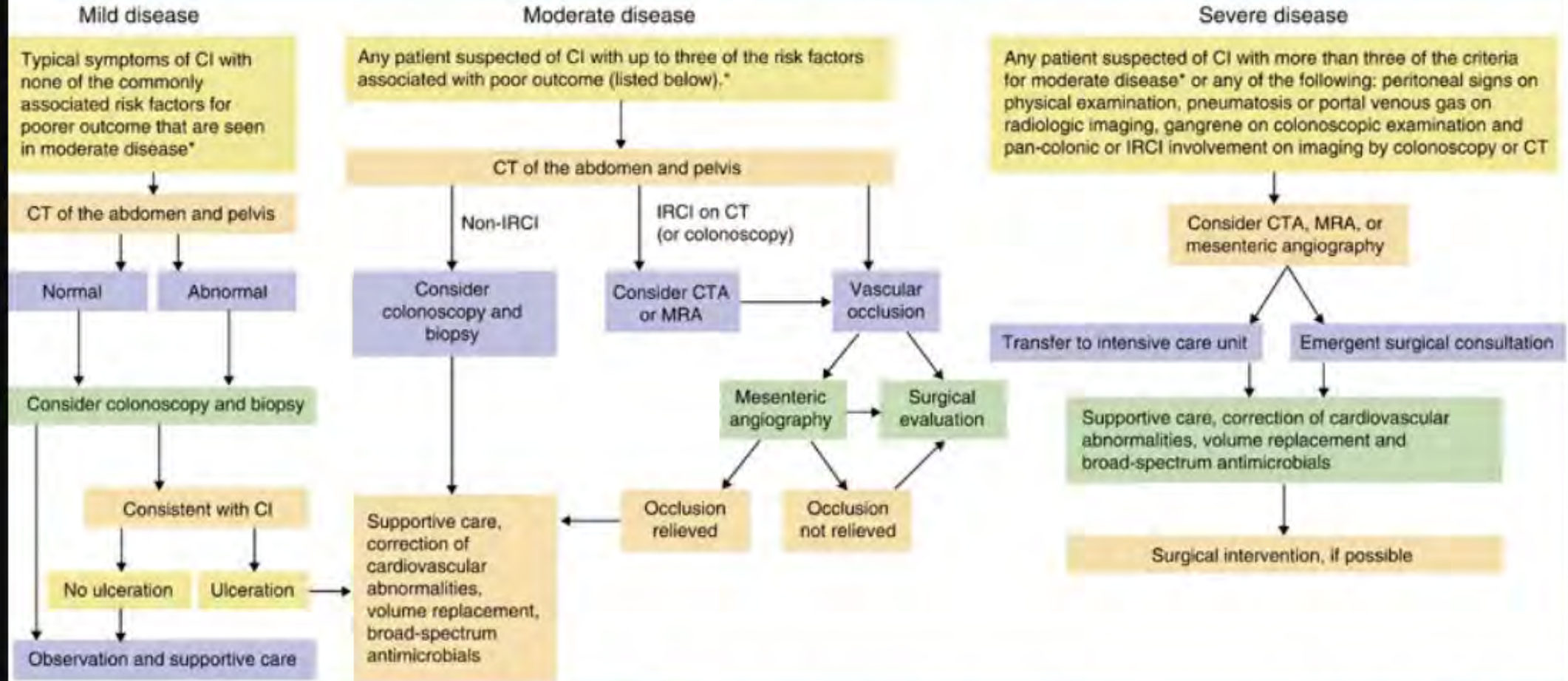
COLONOSCOPY IN THE DIAGNOSIS OF CI

Recommendations

1. Early colonoscopy (within 48 h of presentation) should be performed in suspected CI cases to confirm the diagnosis (strong recommendation, low level of evidence) (17).
2. When performing colonoscopy on a patient with suspected CI, the colon should be insufflated minimally (conditional recommendation, very low level of evidence) (69, 135).
3. In patients with severe CI, CT should be used to evaluate the distribution of disease. Limited colonoscopy is appropriate to confirm the nature of the CT abnormality. The endoscopic procedure should be stopped at the distal-most extent of the disease (strong recommendation, low level of evidence).
4. Biopsies of the colonic mucosa should be obtained except in cases of gangrene (strong recommendation, very low level of evidence).
5. Colonoscopy should not be performed in patients who have signs of acute peritonitis or evidence of irreversible ischemic damage (i.e., gangrene and pneumatosis) (strong recommendation, very low level of evidence).

Algorithm for the management of patients suspected of having colon ischemia

Clinical assessment, vital signs, serology (WBC, Hgb, BUN, LDH, electrolytes)



* Risk factors associated with poor outcome: male gender, hypotension (SBP < 90 mm Hg), tachycardia (HR > 100 beats per min), abdominal pain without rectal bleeding, BUN > 20 mg/dl, Hgb < 12 g/dl, LDH > 350 U/l, serum sodium < 136 mEq/l (mmol/l), WBC > $15 \times 10^9/\text{cmm}$

Indications for surgery

<i>Acute indications</i>
Peritoneal signs
Massive bleeding
Universal fulminant colitis with or without toxic megacolon
Portal venous gas and/or pneumatosis intestinalis on imaging
Deteriorating clinical condition
<i>Subacute indications</i>
Failure of an acute segmental ischemic colitis to respond to treatment within 2–3 weeks with continued symptoms or a protein-losing colopathy
Apparent healing but with recurrent bouts of sepsis
<i>Chronic indications</i>
Symptomatic colon stricture
Symptomatic segmental ischemic colitis

Table 9. Indications for surgery in colonic ischemia

Low output heart failure (e.g., cardiac ejection fraction <20% on echocardiogram)	
Acute kidney injury	
Subtotal or total colectomy	
Lactate >2.5 mmol/l	
Pre- and intraoperative catecholamine administration	
Risk factors	Mortality
0	10.5%
1	28.9%
2	37.1%
3	50.0%
4	76.7%
5	100.0%
For each risk factor, one point is given (142).	

Table 11. Risk factors for perioperative mortality

Learning points for each Colitis mentioned



Microscopic colitis

- Chronic watery, non-bloody diarrhoea with a normal or near-normal colonoscopy
- Typically, older patients, women more than men, smokers
- Diagnosis is histological: take random biopsies from the right and left colon even when the mucosa looks normal
- Faecal calprotectin cannot exclude or monitor MC.
- Screen for coeliac disease (50–70-fold increased risk) and other autoimmune associations; review and stop culprit drugs.
- Oral budesonide is first-line for induction



Diversion colitis

- Non-specific inflammation of the defunctioned segment after colostomy or ileostomy:
- Key mechanism is loss of luminal short-chain fatty acids (butyrate)
- Histology shows crypt distortion, mucin depletion and lymphoid follicular hyperplasia
- Manage by severity
- Do not forget the rectal stump: long-standing disease risks stricture, dysplasia, and cancer, so the diverted segment needs surveillance.



Ischaemic colitis

- The most common form of GI ischaemia
- A disease of patients > 60 years with atherosclerosis or low-flow states; think vasculitis or a hypercoagulable state in the young.
- Injury localises to the watershed zones
- Laboratory tests are non-specific (leukocytosis, raised lactate).
- Contrast-enhanced CT is the imaging modality of choice;
- Early colonoscopy (within 48 h) with biopsy confirms the diagnosis and its extent.
- Stratify severity (ACG mild/moderate/severe)



Thank you