

Obstruction and pseudo-obstruction in inflammatory bowel disease

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SUMMARY

Intestinal obstruction and pseudo-obstruction represents a severe complication and a potential emergency in Crohn's disease and ulcerative colitis. Such intestinal complications are of great importance and may require urgent surgical management. This review discusses the clinical importance, the risk factors and the pathophysiological basis of this phenomenon. Diagnosis and imaging of obstruction together with common and rare causes of obstruction and pseudo-obstruction including toxic megacolon are extensively reviewed. Non-surgical treatment of obstruction in inflammatory bowel disease is reviewed including pharmacologic colonic decompression and infliximab use. Endoscopy in pseudo-obstruction, toxic megacolon, and in stenoses and strictures is reviewed and the setting of the optimal time for surgery in obstructing cases is provided. Strictureplasty or resection in stenoses, post-surgical obstructions as well as available prognostic markers of obstruction and pseudo-obstruction are critically revised.

Key words: Obstruction, Crohn's disease, pseudo-obstruction, ulcerative colitis, inflammatory bowel disease

1. Clinical importance of obstruction in IBD

Intestinal obstruction represents a severe complication and a potential emergency in inflammatory bowel disease. In particular, intestinal fibrostenosis in Crohn's disease

(CD) is a frequent and debilitating complication not only resulting in small bowel obstruction, but eventually in repeated bowel resection and short bowel syndrome.¹

The prevalence of small bowel stenosis has been reported to range from 20% to 40% and from 7% to 15% in patients with colonic Crohn's disease.² By contrast, in patients with ulcerative colitis (UC) intestinal stenosis and obstruction is rather infrequent.³

Intestinal pseudo-obstruction usually affects the colon but the small intestine may also be involved, and may present in acute, subacute or chronic form.⁴⁻⁵ Acute colonic pseudo-obstruction or Ogilvie's syndrome is the clinical syndrome of acute large bowel dilatation without mechanical obstruction that is an important cause of morbidity and mortality and, therefore, requires urgent evaluation.⁶⁻¹⁰ Physical and radiological findings are identical to those associated with mechanical obstruction of the large bowel.¹¹⁻¹²

Of note, cases of intestinal pseudo-obstruction,¹³ or obstruction,¹⁴ proved to be the presenting symptom of Crohn's disease, or a chronic complication in patients with extensive bowel resection.¹⁵ Furthermore, a coexistence of chronic idiopathic intestinal pseudo obstruction and inflammatory bowel disease (IBD) has also been reported.¹⁶

Particularly in children, such intestinal complications are of great importance and may require urgent surgical management.¹⁷ The presence of intestinal obstruction in children with IBD should be always considered during modification of therapeutic strategies. It is very important to stress that although the Crohn's disease process cannot be eradicated by surgery, the health of a child can be restored to normal for prolonged periods of time.¹⁸

2. Risk factors and pathophysiological basis of obstruction in IBD

Bowel obstruction or pseudo-obstruction in IBD can be the result of mechanical causes or motility disturbance-

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es as it also occurs in non-IBD patients.¹⁹ The syndrome of acute colonic pseudo-obstruction is well delineated but its aetiology remains poorly understood.²⁰⁻²¹

Small bowel obstruction in Crohn's disease is most frequently due to strictures, postoperative or inflammatory adhesions, or intestinal neoplasms. Intermittent small bowel obstruction from Crohn's disease may be secondary due to strictures or to chronic adhesive peritonitis.²²⁻²³

Ileus and colonic pseudo-obstruction are induced and/or perpetuated by numerous metabolic disorders, drugs that inhibit intestinal motility, severe co-morbidity, and surgery.²⁴ For example, patients taking anti-psychotic, anti-depressant and anti-parkinsonism drugs seem to be at a higher risk.²⁵ Exceptional cases of toxic megacolon caused by loperamide administered for Crohn's disease²⁶ and ileus caused by ferrum tablets with a non-soluble matrix, in the presence of an existing stenosis of the ileum due to Crohn's disease²⁷ have also been reported. One case of toxic megacolon after sigmoidoscopy for UC has also been reported.²⁸

Rarely, the not-congenital (Hirschsprung's disease) chronic megacolon may represent the end-stage of any form of refractory constipation or anal canal stenosis (slow transit constipation or pelvic floor dysfunction) in IBD patients. Chronic intestinal pseudo-obstruction secondary to primary visceral myopathy has never been reported in IBD.

The molecular mechanisms involved in this process of fibrogenesis and subsequent stenosis in the gut have not been identified. However, inflammatory mediators may have an effect on mesenchymal cells in the submucosa and the muscle layers. Transforming growth factor-beta (TGF-beta), has profound anti-inflammatory activity in the mucosa but at the same time it appears to be driving the process of fibrosis in the deeper layers of the gut.¹

Fibrosis-associated gene expression in the intestine of patients with Crohn's disease and correlation of expression levels with prior medical therapies has been demonstrated,²⁹ and a positive association was also found between the carriers of at least one CARD15 mutation and the acute intestinal obstruction at diagnosis in Crohn's disease patients.³⁰

In transgenic mice, hepatocyte growth factor/scatter factor (HGF/SF) plays an important role in the development of gastrointestinal paresis and chronic intestinal inflammation. Authors suggested that HGF/SF may represent a useful model for the study of molecular mechanisms associated with a subset of IBD and intestinal pseudo-obstruction.³¹

Various pathologic changes in Crohn's disease could be involved in the formation of strictures including obliterative muscularization of the submucosa that may be pathogenetically involved in the formation of strictures either directly by causing a sustained spasm, or indirectly by minimizing the vasoprotective role of the submucosa, impairing repair and enhancing scarring.³² In addition, histologic alterations of intramural nervous tissue may play a pivotal role³³ and according to a study acute colonic pseudo-obstruction is the result of excessive parasympathetic suppression rather than sympathetic overactivity.³⁴

3. Diagnosis and imaging of obstruction in IBD

In acute intestinal obstruction, the clinician must characterize the level of emergency of the case and distinguish between acute small bowel and acute colonic obstruction as in non-IBD patients.³⁵

Differential diagnosis must be made between, obstructive colitis which is an ulcero-inflammatory and necrotizing condition that occurs in the colon proximal to benign or malignant stenosing lesions and is the result of ischemia or other factors which impair adequate perfusion. The incidence of obstructive colitis among patients with colonic obstruction has been reported to range between 1 and 7%.³⁶ Differential diagnosis must also be made between other inflammatory conditions of the colon mimicking acute obstructive abdomen including epiploic appendagitis, diverticulitis, pseudomembranous colitis,³⁷ and eosinophilic enteritis.³⁸ In particular cases, other causes of toxic megacolon such as *Clostridium difficile* and cytomegalovirus infection as well as rare causes of large bowel obstruction such as pelvic actinomycosis also have to be excluded.³⁹

Gastrointestinal contrast studies play an important diagnostic role in partial obstruction.⁴⁰ Barium examinations of the large and small bowel seem to be of low value. In the majority of cases computed tomography (CT) is the method of preference for diagnosis and follow up.⁴²⁻⁴⁵ CT is sensitive for diagnosing complete obstruction of the small bowel and for determining the location and cause of obstruction. In addition, in many instances there is a possibility of differential diagnosis between inflammatory and fibrostenotic obstruction based on the presence of edema, thickness of the bowel wall and vascularisation. Although many CT findings in patients with colitis are nonspecific, some features are helpful in suggesting a specific diagnosis⁴⁶ and radiologists can frequently diagnose a CD-related obstruction in a patient with known CD and differentiate it from an obstruction due to adhesions.⁴⁷ A 'beak-like'

luminal narrowing seems the most common CT finding at the obstructed site.⁴⁸ CT enterography is a useful technique for bowel imaging and is complementary and often superior to conventional barium studies.⁴⁹⁻⁵⁰

Computed tomographic colonography ('virtual colonoscopy') has shown promising results⁵¹⁻⁵³ and CT colonography has a reasonable sensitivity and specificity for detecting large polyps.⁵⁴

Magnetic enteroclysis is a very valuable method for diagnosing bowel luminal and extraluminal abnormalities. However, it is performed only in specialized centers, with specialized radiologists and usually is not available on an emergency basis.

Digestive endoscopy is a mandatory method in the diagnosis of intestinal obstructions. Diagnostic endoscopy in the involvement of the large intestine or enteroscopy in the case of incomplete obstruction of the small intestine is the method indicated in the majority of obstructive intestinal lesions.⁵⁵ Fulminant colitis and toxic megacolon represent usual exceptions.

The risks of endoscopy during acute phases include perforation or obstruction worsening. Although the authors are not familiar with CT-guided endoscopy we presume that excessive radiation for both patient and endoscopist is added to the risks of endoscopy performed on emergency. In addition, this method is not always technically feasible.

In study populations, capsule endoscopy is superior to all other modalities for diagnosing small bowel Crohn's disease⁵⁶ and for revealing stenoses, which may not be depicted with radiology. The potential for complications when wireless capsule enteroscopy is performed in the presence of intestinal strictures is evident.⁵⁷ Retention of the capsule appears to be infrequent. In most cases, capsule retention is asymptomatic and capsule surgical removal is safe and also identifies and treats the underlying small-bowel condition.⁵⁸⁻⁵⁹

4. Causes of obstruction in IBD

Toxic megacolon

Toxic megacolon is a serious cause of obstruction in IBD⁶⁰ (Table 1) and in a review study from Mount Sinai Hospital toxic megacolon carried a 16% mortality rate.⁶¹ Toxic megacolon may occur in ulcerative colitis but also in Crohn's colitis.⁶²⁻⁶⁴ Megacolon refers to cecal dilatation above the dimension of 12 cm and above 6.5 cm of the sigmoid colon, measured at the pelvic brim. Dilatation of the cecum to greater than 12 cm diameter is a cause for grave concern.⁶⁵ Toxic megacolon is a radiology-proved meg-

Table 1. Specific causes of obstruction and pseudo-obstruction in IBD

Ulcerative colitis

Giant polyposis
 Strictures (exclude malignancy)
 Toxic megacolon
 Volvulus
 Cancer (adenocarcinoma)
 Ileal pouch-anal anastomosis (IPAA)
 Post-operative adhesions

Crohn's disease

Strictures
 Gallstone ileus
 Enteroliths
 Endometriosis
 Cystic fibrosis
 Cancer (adenocarcinoma, lymphoma, carcinoid, GIST)
 Capsule retention
 Loperamide or laldanum overdosing
 Acute steroid withdrawal (post-surgery)
 Post-resection stenosis
 Temporary 'diverting' loop ileostomy construction
 Ileostomy takedown
 Continent ileostomy stenosis
 Post-operative adhesions

acolon which is also accompanied by signs of systemic toxicity (fever, leucocytosis, tachycardia, tachypnea) and may result from or be complicated with *Clostridium difficile* infection⁶⁶, cytomegalovirus infection, or common acute gastroenteritis.⁶⁷⁻⁶⁹

Adult⁷⁰⁻⁷³ or pediatric⁷⁴⁻⁷⁵ cases with toxic megacolon reported in ulcerative colitis resulted either in uneventful or complicated⁷⁶⁻⁷⁸ or fatal outcome.⁷⁹ Surgery for toxic megacolon during pregnancy has also been reported.

Surgical therapy of toxic megacolon in ulcerative colitis patients is total colectomy, which actually permits an adequate control of the disease, as well as a satisfactory therapy of the rectal stump, with subsequent recanalization in the majority of cases. In Crohn's disease the frequency of recidive is higher (post-operative recurrence) and it seems more advisable to opt for a radical resection treatment (chiefly right colectomy), but with a conservative purpose as a new operation in the future is quite probable.⁸⁰

Acute obstructing malignancy

Adenocarcinoma of the small intestine is a rare complication of Crohn's disease. Diagnosis of early stages of adenocarcinoma of the small intestine is very difficult and thus might be impossible to differentiate from exacerbation or progressive stenosis of preexisting Crohn's disease.

Obstructing adenocarcinoma may be the presenting symptom of small bowel Crohn's disease.⁸¹⁻⁸⁴ Carcinoid tumor should be suspected in elderly patients with Crohn's disease presenting with intestinal obstruction and laparotomy should be considered to exclude malignancy.⁸⁵ A case of obstructing gastrointestinal stromal tumor in Crohn's has been also reported. In ulcerative colitis obstruction occurs only in advanced cancer cases.⁸⁶

Gallstone ileus

Gallstone ileus is an uncommon cause of small bowel obstruction, accounting for fewer than 3% of laparotomies for intestinal obstruction. Patients with long-standing Crohn's disease have an increased risk of developing gallstone disease.

So far seven cases with Crohn's disease have presented with gallstone ileus. The correct diagnosis is difficult before surgery. Therapy includes ileal resection and cholecystectomy.⁸⁷⁻⁹²

Cystic fibrosis, enteroliths, giant polyposis and endometriosis

A single case of cystic fibrosis, Crohn's colitis and adult meconium ileus equivalent has been reported.⁹³

Enteroliths associated with Crohn's disease is an extremely rare condition with fewer than 25 cases reported in the literature²² treated by segmental ileal resection⁹⁴ or laparoscopically.⁹⁵

Giant polyposis may present with acute colitic attacks,⁹⁶ colonic obstruction,⁹⁷⁻⁹⁸ toxic megacolon,⁹⁹ or colocolonic intussusception.¹⁰⁰

Endometriosis is a rare disease in women of the reproductive age, but should be considered in the differential diagnosis of stenotic Crohn's disease of the terminal ileum.¹⁰¹

Upper GI obstruction

The presence of gastrointestinal motility abnormalities in children affected by Crohn's disease has been demonstrated by means of electrogastrography.¹⁰² Clinicians should consider impaired gastric emptying when evaluating patients with Crohn's disease and severe symptoms of upper gut dysmotility, which cannot be attributed to active inflammation or organic obstruction of the digestive tract. Symptoms in these patients are refractory to various therapeutic interventions including tube feeding and gastric surgery.¹⁰³

Volvulus

Colonic volvulus accounts for 1-7% of cases of large bowel obstruction in the United States and Western Eu-

rope and is commoner in tropical and subtropical areas. The sigmoid colon is involved in 65-80% of the cases reported, followed by right colon in 15-30% of cases while transverse colon and splenic flexure volvulus are rare.¹⁰⁴

Intestinal volvulus in patients with inflammatory bowel disease is extremely rare. There are six reports¹⁰⁵⁻¹¹⁰ of volvulus occurring in Crohn's disease patients; three of which were detected in the sigmoid.¹⁰⁵⁻¹⁰⁷ Only one case of volvulus of the cecum has been reported in ulcerative colitis.¹¹¹ Double volvulus of the transverse and the sigmoid colon has been reported only once in patients with inflammatory bowel disease.¹¹²

High-risk groups among inflammatory bowel disease patients seem to include those with reactivation of the ileal Crohn's disease contributing to the development of volvulus by causing fixation, torsion and dilatation of the distal bowel. Patients diagnosed with dolichocolon should also be included in the high-risk group. Preoperative colonoscopic derotation is beneficial in acute sigmoid volvulus. Correct identification of transverse colon volvulus is necessary in order to reduce high mortality rates. While a conservative treatment of sigmoid volvulus is recommended, it is inadequate in case of transverse colon volvulus.

In the absence of clinical, laboratory or radiological signs of bowel necrosis or perforation, colonoscopic volvulus derotation is recommended in all cases, followed by semi-elective single stage colonic resection. Emergency endoscopic decompression of the sigmoid volvulus is safe and effective as an initial treatment but has a high early recurrence rate.¹¹³

5. Non-surgical treatment of obstruction in IBD

For small bowel obstruction there is an increasing tendency for initial conservative management rather than immediate operative intervention, as a proportion of cases will resolve spontaneously.¹¹⁴ Early postoperative small-bowel obstruction can be safely and effectively managed by nasogastric decompression in the majority of cases. In general, reexploration should be reserved for those patients whose symptoms do not resolve within six days of nasogastric decompression.¹¹⁵⁻¹¹⁶

For large bowel obstruction emergent surgery is indicated if there are signs of impending or frank perforation. Scheduled surgery is indicated when non-operative measures fail (Table 2).¹¹⁷

Pharmacologic colonic decompression

General measures include intravenous rehydration, correction of electrolyte abnormalities, discontinuation

Table 2. Non-surgical therapy for obstruction and pseudo-obstruction in IBD

| |
|------------------------------------------------------------------------------------|
| Pharmacological |
| Prokinetics (pseudo-obstruction) |
| Polyethylene glycol solution (after decompression) |
| Endoscopic |
| Ballon dilatation (anastomotic or frank strictures) |
| Decompression rectal tube (possible steroid infusion via tube) |
| Intrastricture injections via sclerotherapy catheter (Infliximab or triamcinolone) |
| Stenting |
| Needle knife cutting |
| Laser stricture cutting or recanalization |
| Polypectomy (giant polyps) |
| Volvulus derotation |
| Toxic megacolon |
| Infliximab |
| Cyclosporin? |
| Tacrolimus? |
| Endoscopic decompression? |
| Surgery |

of antikinetic drugs, and treatment of other co-morbidities as in non-IBD patients.

In non-IBD patients specific therapies include prokinetics such as erythromycin, metoclopramide, cisapride, tegaserod, motilin receptor agonists and, diatrizoate meglumine (gastrografin) enema.¹¹⁸⁻¹¹⁹ The most effective of all seems to be intravenous neostigmine (2-2.5 mg), which leads to quick decompression in a significant proportion of patients after a single infusion.⁶⁵ Administration of polyethylene glycol solution in patients with Ogilvie's syndrome after initial resolution of colonic dilation may increase the sustained response rate but this has not been yet tested in IBD patients.¹²⁰ In conservative therapy of toxic megacolon or fulminant colitis, infliximab seems superior to cyclosporin or tacrolimus as described in the next paragraph.

Infliximab

Tumor necrosis factor, has antifibrotic bioactivity and pharmacologic inhibition of this cytokine carries a theoretical risk of enhanced stricture formation. In addition, a theoretical concern exists that rapid luminal healing in Crohn's disease with infliximab may increase the risk of stenosis, stricture or obstruction.¹ In fact, there have been studies favouring and unfavouring Infliximab use in stenotic or stricturing disease phenotype.

On experimental level infliximab did not ameliorate the degree of fibrosis in alkali burns of the oesophagus in the rat¹²¹ and early obstructive colon after treatment of ac-

tive refractory Crohn's disease with infliximab has been reported.¹²² According to a post-marketing survey exploring adverse event signals with infliximab a signal for bowel obstruction was identified.¹²³

Among studies favouring Infliximab use there have been those reporting regression of strictures and overall benefit in a subset of patients with subocclusive small bowel stricturing disease¹²⁴⁻¹²⁷ It has been also suggested that in patients with symptomatic strictures from CD, infliximab should be tested before considering surgery.¹²⁸

Of interest, infliximab prior to abdominal surgery for Crohn's disease is not associated with an increased rate of early postoperative complications.¹²⁹⁻¹³⁰

Development of strictures, stenosis and obstruction was related to disease duration, severity, ileal location and corticosteroid use.¹³¹ This was confirmed by subsequent studies on the effect of Infliximab on small bowel stenoses,¹³² on fibroblasts,¹³³ and on profibrotic transcriptional response.²⁹

Data on the use and efficacy of Infliximab before and after surgery is largely empirical and anecdotal as large controlled trials are lacking. It seems that Infliximab is safe and does not increase postoperative complications. After one week of surgery Infliximab can be administered again with safety. Therapy of toxic megacolon with infliximab has proved to be an important option with a group of UC patients improving and avoiding surgery.¹³⁴⁻¹³⁶ In the most important pioneer study, forty-five patients with severe to moderately severe ulcerative colitis not responding to conventional treatment were included (24 infliximab and 21 placebo). No patient died. Seven patients in the infliximab group and 14 in the placebo group had a colectomy (P = .017; odds ratio, 4.9; 95% confidence interval, 1.4-17) within 3 months after randomization. No serious side effects occurred. Three patients in the placebo group required operation for septic complications.

Finally, a study combining information from the TREAT and the ACCENT I studies demonstrated that infliximab was not related to such events.

Endoscopic treatment in pseudo-obstruction

Besides diagnostic importance, colonoscopy enables an effective therapeutic approach, which may immediately follow the diagnostic intervention as it also occurs in non-IBD patients.¹³⁷⁻¹³⁸ Plain abdominal roentgenogram is a useful diagnostic test. If the cecal diameter is 12 cm or greater, or conservative management is unsuccessful, colonoscopic or operative decompression is needed. Operative colonoscopic endoscopy tends to be increasing by time in referral centers.¹³⁹

In patients failing or having contraindications to prokinetics, colonoscopic decompression is the active intervention of choice.¹⁴⁰ There are no reports on enteroscopic decompression. In pseudo-obstruction, colonoscopy is indicated,⁷⁸ with the exception of toxic megacolon.¹³⁶

Endoscopy in toxic megacolon

We do not advocate endoscopic treatment of toxic megacolon because of the heightened risk of perforation. Of note, there are reports of toxic megacolon treated with colonoscopic decompression¹⁴¹ and of decompression placement of an indwelling colonic tube through which steroid solution was administered.¹⁴²

In non-IBD patients, average cecal diameter more than 13.3 cm is prognostic for more than one colonoscopies needed for decompression and 13.4 cm is prognostic for failing colonoscopic therapy.¹⁴³ Decompressing percutaneous endoscopic cecostomy has been described.¹⁴⁴ In such difficult cases, the use of colonoscopy should be extremely selective after radiology examination, and it should be performed by experts and accompanied generally by tube placement.¹⁴⁵⁻¹⁴⁶

Endoscopy in stenoses or strictures

Balloon dilatation of strictures with a variety of techniques ranging from divulsion with through-the-scope balloon dilators to laser recanalization¹⁴⁷ palliative treatment of colonic carcinoma by laser procedures or pre-operative endoscopic laser relief of tumor obstruction,⁵⁵ self-expanding stents,^{118,148} colonoscopic decompression with tube placement,¹⁴⁹⁻¹⁵¹ reduction of colonic volvulus are the principal indications of therapeutic colonoscopy in the non-surgical treatment of the dilated colon.

Some colonic strictures in Crohn's disease can be dilated using endoscopes of graded caliber or with through-the-scope balloons, with or without stent placement. Endoscopy is most useful in dilating anastomotic strictures and less useful for long strictures in active inflammatory disease. Strictures in ulcerative colitis are suspicious for neoplasia and, if dilated at all, should be biopsied extensively and followed closely. In obstructed continent ileostomies, endoscopy can be employed effectively to both determine the cause of the obstruction and re-establish patency.¹⁵²

Endoscopy in re-stricturing

The dilation of benign stenoses of the lower gastrointestinal tract with a balloon catheter is an effective and safe method, which in most cases results in long-term elimination of the obstructive symptoms, so that surgery can

be avoided or postponed.¹⁵³⁻¹⁵⁴ Repeated dilatations often are required. Treatment with intrastricture triamcinolone injection¹⁵⁵ or intralesional injection of infliximab via the sclerotherapy technique in Crohn's colitis² did not demonstrate remarkable efficacy. Careful patient selection is of paramount importance to ensure favorable long-term outcomes when dilating benign stenoses.¹

6. Setting the optimal time for surgery in obstructing IBD

Inflammatory bowel disease can present in numerous ways as an acute surgical emergency.¹⁵⁶⁻¹⁵⁸ Emergency complications of IBD are rare, but may be life threatening and include toxic colitis, hemorrhage, perforation, intra-abdominal masses or abscesses with sepsis, and intestinal obstruction. Acute surgical emergencies in patients with inflammatory bowel disease may carry a substantial morbidity, but fortunately today, a low mortality.¹⁵⁹ The successful management of such complications depends on early diagnosis and the judicious and timely use of both medical and surgical therapies. With a multidisciplinary approach, morbidity can be reduced and patients can have a rapid return and improved quality of life.¹⁶⁰

The most common complications associated with UC are fulminant colitis, toxic megacolon, and bleeding.¹⁶¹ Some cases can be managed conservatively and may recover completely without any surgical intervention.¹⁶²⁻¹⁶³ However surgery should be performed immediately if there is no improvement within 5 days of medical management in case of acute colitis, within 24-72 hours in case of toxic megacolon, intestinal obstruction or severe bleeding, or if the patient deteriorates during this period.¹⁶⁴⁻¹⁶⁵

When urgent operation is necessary subtotal colectomy with ileostomy and preservation of the rectum is generally indicated (Table 3).¹⁶⁶⁻¹⁶⁷ This will allow subsequent mucosal proctectomy and ileoanal anastomosis.

Subtotal colectomy with ileostomy and mucous fistula of distal sigmoid colon is the operation of choice for patients with fulminant colitis. Restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA) is preferred for patients who undergo scheduled elective surgery for ulcerative colitis.¹⁶⁸

The most common complications associated with CD are abscesses and intestinal obstruction. Although initial treatment includes medical treatment, these complications usually require surgical intervention and conservative intestinal resection.¹⁶⁹ Resection should be minimal but terminated in a macroscopically disease-free area. When urgent colectomy is indicated for Crohn's colitis without

Table 3. Surgical therapy in obstruction and pseudo-obstruction in IBD**Ulcerative colitis***On emergency* [toxic megacolon, fulminant disease]

Subtotal colectomy with ileostomy

[preservation of rectum and mucous fistula of distal sigmoid for future ileo-rectal anastomosis]

Scheduled

Restorative proctocolectomy with ileal-pouch anal anastomosis [IPAA]

Permanent ileostomy

Resection preferred to strictureplasty (suspicion of neoplastic stenosis)

Crohn's disease

Bowel resection (minimal resections)

Strictureplasty (short or long, single or multiple)

Multiple bowel bypass (special cases?)

rectal involvement, ileorectal anastomosis can be considered either as a primary or secondary procedure.¹⁶⁶

7. Strictureplasty or resection?*Strictureplasty in Crohn's colitis*

In Crohn's disease surgery does not provide cure with radical resection of inflamed bowel. Therefore strictureplasty has become a useful bowel-preserving surgical technique in the treatment of small-bowel stenosis. In a retrospective study defining the efficacy of strictureplasty and resection in patients with obstructive Crohn's disease of the colon the incidence of postoperative surgical recurrence was 36% in those treated by strictureplasty and 24% in those treated by resection (ns). The authors concluded that strictureplasty in Crohn's colitis is a valuable surgical technique which results in low recurrence rates and in surgical outcome comparable to that in resection without sacrificing functional large bowel length.¹⁷⁰

Strictureplasty in Crohn's small bowel disease

Strictureplasty is a good surgical option for stenosing small-bowel Crohn's disease, particularly in patients with multiple obstructions and in those vulnerable to short-bowel syndrome.¹⁷¹

In a retrospective study defining the efficacy of strictureplasty and resection in patients with obstructive Crohn's disease of the small bowel postoperative morbidity was 14.8% after strictureplasty and 17% after resection while 50% of the patients treated by strictureplasty and 37% treated by resection developed recurrent disease. The authors concluded that results after strictureplasty are comparable to those after resection in terms of complications, recurrence and quality of life in the treatment of

small bowel strictures in Crohn's disease. In the long run there might be an advantage for strictureplasty because it prevents complications caused by resectional therapy such as short bowel syndrome.¹⁷⁰

Of interest one multiple small bowel bypass (latero-lateral bowel anastomoses in multiple sites to overcome strictures) case has also been reported.⁸⁰ Data on the efficacy of long or short strictureplasty is still conflicting.

Colorectal strictures are not uncommon in ulcerative colitis and approximately a quarter of them are malignant. According to a retrospective single centre study three principal features distinguished the malignant from the benign strictures: appearance late in the course of ulcerative colitis, location proximal to the splenic flexure and symptomatic large bowel obstruction. Moreover, cancer associated with strictures tended to be more advanced than that which does not produce strictures.¹⁷²

To conclude, in short fibrous stenosis of the small bowel or ileocecal anastomosis without acute inflammation strictureplasty should be performed. In all other cases, especially in colonic strictures and patients with long term disease with their increased risk of malignancy, resection is the treatment of choice. For the same reason resection is the treatment of choice in insistent colonic stenoses of patients with ulcerative colitis.¹⁷³

8. Post-surgical obstruction in IBD

Early postoperative small-bowel obstruction in general population was observed in 9.5 percent of cases.¹¹⁵ No independent risk factors predisposing to early postoperative small-bowel obstruction were identified. The predisposing factors for postoperative ileus have not been clearly identified.¹¹⁵ Resident intestinal muscularis macrophages initially involved in inflammatory responses may be of importance.¹⁷⁴ Susceptibility to postoperative ileus following abdominal surgery increases with advancing age. There is both an age-dependent increase in the proinflammatory mediator expression and an age-dependent decrease in anti-inflammatory mediator expressions following minor insult to the bowel. Such imbalances between pro- and anti-inflammatory mechanisms may form the basis for increased susceptibility to ileus and for the increased severity and duration of ileus observed in the elderly.¹⁷⁵

Early post-surgery small intestinal obstruction is not an uncommon complication following excisional operation for Crohn's disease.¹⁷⁶ Late restructing after ileocolonic resection for Crohn's disease is not infrequent¹⁵⁵ and the need for intestinal repeat resection for recurrence of obstructing Crohn's disease is considerable.¹⁷⁷ Loop

ileostomy construction and takedown is associated with risk of obstruction. However, no differences exist between technique used for closure or the baseline pathology of the patient.¹⁷⁸

Small bowel obstruction is common following pouch surgery for ulcerative colitis and is the dominating cause of hospitalisation postoperatively. In such a study about 25% of patients developed small bowel obstruction and half of them needed surgery. The use of a diverting loop-ileostomy was related to an increased risk of surgery for small bowel obstruction.¹⁷⁹ The obstruction may occur either before or after closure of the temporary ileostomy and according to a study patients who had a temporary Brooke ileostomy were more likely to develop obstruction than those who had a loop ileostomy. Also, patients who had had previous operations were at greater risk of obstruction than those who had not.¹⁸⁰

Acute ileus due to steroid withdrawal caused symptoms of intestinal obstruction. Since ileus from acute steroid withdrawal occurred four times as frequently as mechanical small-bowel obstruction, prompt recognition and treatment may reduce postoperative morbidity in IBD patients.¹⁸¹

9. Prognosis of obstruction in IBD

Acute colonic pseudo-obstruction remains a serious medical disorder, carrying a considerable mortality rate of 15% while assessment of predictors of response is important.¹⁸²⁻¹⁸⁴

For toxic megacolon, dismal prognostic factors affecting mortality include very young age¹⁸⁵ or age over 40 years old,⁶¹ female sex,¹⁸⁶ increased cecal diameter,⁶⁻⁹ and especially the occurrence of small bowel distension,¹⁸⁷ any type of colonic perforation¹⁸⁸ and multiple organ dysfunction syndrome.¹⁸⁹

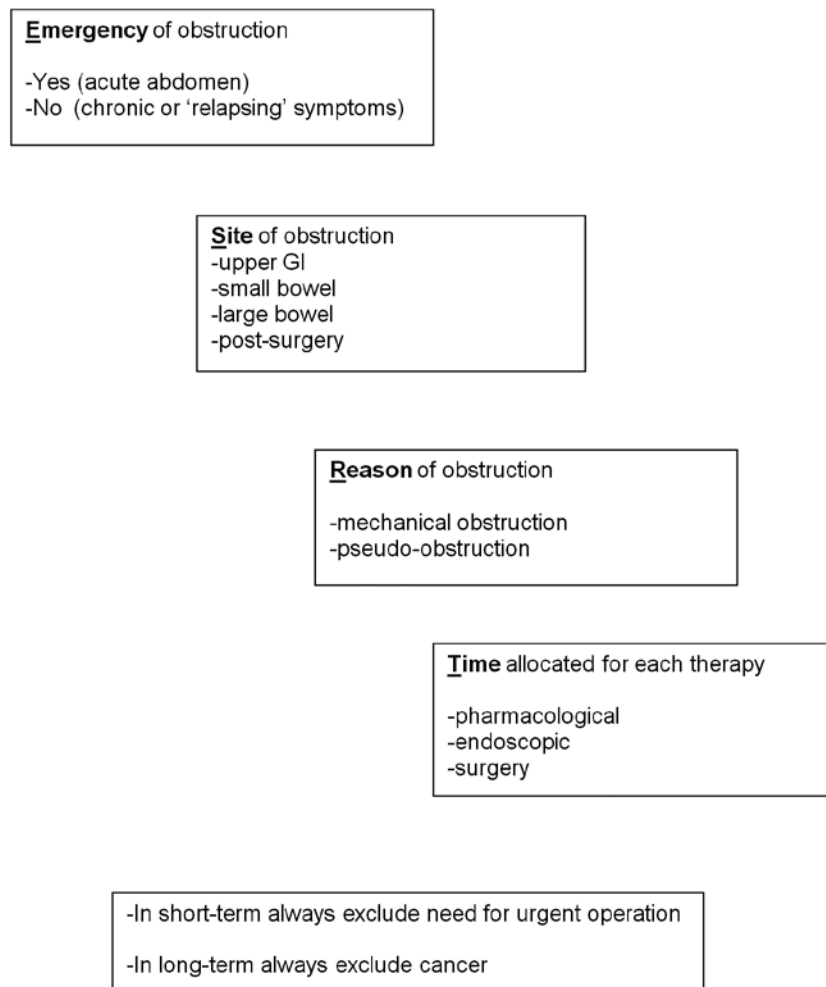


Figure. The ESRT scheme (Emergency, Site, Reason, Time) in the management of obstruction symptoms in inflammatory bowel disease.

Prognosis of the operated obstruction is related to underlying cause and type of disease. In UC patients, operation usually results in symptom relief. In Crohn's disease, relapses may occur and the best strategy is to postpone next intervention when possible. In most cases a short-bowel syndrome is the consequence of extensive bowel resection.¹⁹⁰

To conclude, the most important factors influencing outcome are physician experience, careful patient follow up, the choice of the appropriate therapy, the timing for surgery and the quality of the procedures performed. We suggest the ESRT (Emergency, Site, Reason, Time) scheme [Figure] for assessment and management of obstruction and pseudo-obstruction cases. Following this scheme we can increase our confidence and avoid unnecessary manipulations during management of patients with inflammatory bowel disease presenting with symptoms of obstruction. In addition, this scheme provides time limits for each therapy and can be used as an algorithm of collaboration among surgeons, radiologists and gastroenterologists in order to provide optimal care and efficient solutions to patients with bowel obstruction.

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