

Surgical Approach to an Adult with Altered Bowel Habit.

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Abstract: Altered bowel habit in the form of constipation or diarrhea is most common gastrointestinal disorders seen in clinical practice. Constipation is commonly defined using Rome II criteria and it can be a primary functional disorder or one of the manifestations of underlying serious organic disorder like bowel malignancy. Diagnostic workup of patient with constipation is aimed at ruling out systemic and functional causes of constipation and then identifies underlying structural disorder. While colonoscopy play an important role in identifying structural disorders colonic transit study help in identifying slow transit time constipation and pelvic outlet obstruction. Diarrhea is broadly defined as more than three watery stools in a day. It can be acute or chronic. Surgeons mostly encounter with chronic diarrhea caused by inflammatory bowel disease (IBD), right sided colonic malignancy and ischemic colitis. Again colonoscopy plays an important role in identifying these disorders. Surgical management of IBD depends upon extent of disease and indications for surgery (elective or emergency). Etiology of alteration in bowel habit is different in adulthood than those of childhood and these patients require orderly approach and judicious use of available resources to optimize functional outcome.

INTRODUCTION

Normal bowel habit is different for each person with variable stool consistency and frequency. It can range from three bowel movements in a day to three in a week. It's very difficult to find a definition or criteria which should be applicable to all but broadly constipation is defined as less than three bowel movements in a week and diarrhea is defined as more than three watery stools in a day. According to "Rome II criteria" two or more of the following conditions should be fulfilled to make the diagnosis of constipation- (i) straining on more than 25% of bowel movements; (ii) feeling of incomplete evacuation after more than 25% of bowel movements; (iii) hard stool on more than 25% of bowel movements; and (iv) infrequent defecation with three or fewer bowel actions weekly¹. Diarrhea is characterized by increased frequency of stools. Diarrhea can be acute (<4 weeks) or Chronic (>4 weeks); watery or fatty and secretory or osmotic. Most of the cases with constipation and diarrhea need medical treatment as a sole or initial treatment. Surgeons help is usually sought when they develop complication like treatment failure, side effects related to drugs, bleeding, malignancy etc. Timely referral, proper evaluation and adequate surgical procedure is important to optimize results. To achieve this goal we should proceed in stepwise manner.

BASIC APPROACH TO DIAGNOSIS

- 1.) Is he or she really having abnormal bowel habits?
- 2.) If yes, what is/are the most probable cause/causes?
- 3.) What are the investigations required to confirm the diagnosis?
- 4.) What is the treatment – medical, surgical or both?
- 5.) Cure is possible or not.
- 6.) Adjuvant treatment is required or not.
- 7.) What is the prognosis?
- 8.) What will be the follow up protocol?

CONSTIPATION

Causes

Causes of constipation can be broadly classified into extra colonic or colonic. Extra colonic causes include faulty dietary habits; endocrine dysfunctions (hypothyroidism, hyperparathyroidism, hypocalcaemia, diabetes); neurologic dysfunctions (diabetic autonomic neuropathy, spinal cord injury, head injury, cerebrovascular accident) and drug

related (narcotics, iron supplements, antidepressants, anti cholinergic agents, laxatives etc). Most of the extra colonic causes can be treated by non surgical means like adjustment of lifestyle, dietary modification, drugs etc, some may require surgical treatment but we will discuss only on colonic causes (including colon and rectum) important from a digestive surgeons perspective.

Colorectal causes can be broadly divided into three groups – mechanical colonic obstruction, visceral neuropathy or myopathy and pelvic outlet obstruction.

Mechanical colonic obstruction

- Neoplasm
- Volvulus
- Diverticular disease
- Infections (Ameboma, Tuberculosis)
- Anastomotic stricture

Visceral neuropathy or myopathy

- Hirschsprung's disease (Congenital aganglionosis)
- Chagas' disease (Acquired aganglionosis)
- Slow-transit constipation (colonic inertia)
- Acute (Ogilvie's Syndrome) and Chronic intestinal pseudo-obstruction
- Irritable bowel syndrome (constipation type)

Pelvic outlet obstruction

- Paradoxical puborectalis contraction
- Rectal prolapse
- Rectocele
- Anal stenosis/fissure

History

First step is to confirm the diagnosis of constipation, which is considered if the patient fulfills Rome II criteria. Specific questions about dietary habits, laxative ingestion, other associated systemic symptoms will help in identifying extra colonic causes for constipation. Next, the onset of symptoms is determined because onset in childhood may point to a congenital cause such as Hirschsprung's disease, whereas a more recent onset in an adult, especially with blood loss and mucus, suggest significant colorectal pathology like malignancy. Pelvic outlet obstruction is considered

when patient has characteristic symptoms such as prolonged and repeated straining at stool, rectal fullness, sense of incomplete evacuation, and necessity for manual assistance.

Examination

In addition to the complete physical examination to rule out systemic causes of constipation, abdominal and perineal examination should be performed. In most cases with constipation, abdominal examination is unremarkable but in some visible palpable bowel loops, intra abdominal lump, hepatomegaly etc can be suggestive of diagnosis.

Perineal and/or rectal examination should be done in all cases with constipation. It is vital to diagnose following conditions-

- Anal fissure – individual postpone act of defecation to avoid pain which may result in intestinal obstruction. Per rectal examination should be avoided in acute conditions.
- Anal stricture
- Carcinoma anal canal and rectum
- Rectal prolapse. Prolapse should be examined both at rest and during a Valsalva maneuver. Care should be taken to distinguish a true full-thickness rectal prolapse from a mucosal prolapse, which is unlikely to cause constipation. Internal prolapse is diagnosed by asking the patient to perform a Valsalva with the examining finger in the rectum.

Pelvic examinations in women should specifically address the posterior vaginal wall, with attention to any evidence of Internal prolapse or Rectocele. This region should be palpated at rest as well as while straining to defecate. Anal sensitivity and reflexes should be checked since deficient sensation and absent cutaneousphincteric reflexes may represent a neurogenic disorder. In patients with Hirschsprung's disease, profuse fecal discharge after rectal examination is a characteristic feature.

INVESTIGATIONS

Blood investigations

Measurement of serum electrolytes, calcium, phosphate, urea, creatinine, triiodothyronine, and thyroxine, is necessary to exclude endocrine and metabolic disorders. Recently gastrointestinal neuropeptides affecting motility like motilin, gastrin and vasoactive intestinal polypeptide are being measured by radioimmunoassay, especially in slow transit constipation². However exact role of these hormones in this group of patients is still not clear. ESR and Montoux can be soft pointers towards the diagnosis of colonic tuberculosis.

Stool examination

Routine and microscopic examination of stool should be done. Fecal occult blood should always be investigated to rule out or prove serious causes which is usually possible with colonoscopy and/or barium enema.

Proctosigmoidoscopy /colonoscopy

Endoscopic examination is mandatory to rule out or confirm the presence of a neoplasm, synchronous lesion, polyposis and ulcerative colitis. Colonoscopy can also help in diagnosis of colonic tuberculosis. The colonoscopic features of colonic tuberculosis include erythema, mucosal nodules, ulcers, strictures, deformed ileocaecal valve and biopsy can help in differentiating tuberculosis from crohn's disease. However in the vast majority of patients with

constipation proctosigmoidoscopy/colonoscopy will not reveal any abnormality.

Barium enema examination

In constipation of recent origin, a barium enema study is an alternative to colonoscopy to rule out structural disorder. Barium enema done without bowel preparation is useful in patients suspected to have Hirschsprung's disease and it will show dilated ganglionic bowel, a transition zone and collapsed distal aganglionic bowel although these zones may be difficult to make out if only short segment of rectum is affected. Proper precautions should be taken while performing barium enema in cases with Hirschsprung's disease. Barium enema can also suggest the diagnosis of carcinoma of colon and rectum but colonoscopy is preferable as biopsy can be taken to confirm the diagnosis.

Colonic transit time

In patients with chronic constipation where no structural disorder can be found this study should be done to rule out slow transit constipation. Although various techniques are described, a simplified method involves ingestion of a single capsule containing 24 identical radio opaque markers followed by single x-ray abdomen taken on the fifth day following capsule ingestion. All laxatives, enemas, and suppositories must be discontinued prior to the examination. The diagnosis of colonic inertia is made if 20% or more of the markers are found to be diffusely scattered throughout the colon by the 5th day³. Pelvic retention of the markers is consistent with the diagnosis of pelvic outlet obstruction and requires further evaluation. Analysis of segmental colonic transit using ingestion of radiopaque markers with different shapes does not offer any advantage since segmental colonic resection is not an appropriate treatment option in patients with colonic inertia. Scintigraphic techniques can also be used to assess colonic transit but it has poor image resolution and its interpretation is difficult.

Small bowel transit time

In patients with prolonged colonic transit time it is *must* to rule out panenteric inertia which is done by calculating small bowel transit time using breath hydrogen test or Scintigraphic techniques .

Defecography

Defecography or evacuation proctography is an established radiologic technique to image the dynamic changes in rectal anatomy during attempted expulsion of barium paste and is performed in patients suspected to have pelvic outlet obstruction. Radiographs and videos are taken during four distinct activities: at rest, during squeeze, while pushing, and after evacuation. Anorectal angle, perineal descent, and puborectalis length are measured using this technique. Normally anorectal angle becomes obtuse during attempted defecation due to relaxation of puborectalis muscle. Failure to increase the anorectal angle on straining, sometimes associated with accentuation of the puborectalis impression, is considered a radiologic sign of paradoxical puborectalis contraction. It also helps in visualizing abnormalities such as anterior rectal wall prolapse, rectal intussusception, rectocele, and enterocele⁴.

ANORECTAL MANOMETRY

Anorectal manometry performed by means of a transanally inserted

catheter to measure resting and squeeze pressures; rectal capacity volume to first sensation and most importantly to elicit the rectoanal inhibitory reflex (RAIR). Rectoanal inhibitory reflex is relaxation of internal sphincter during the act of defecation which is absent in patients with Hirschsprung's disease and Chaga's disease. Although manometry is clearly useful in discriminating Hirschsprung's disease from other forms of constipation, its role in the evaluation and management of non-Hirschsprung's constipation remains unclear^{5,6}

ELECTROMYOGRAPHY

Electromyography (EMG) is a reliable method for the evaluation of electrical activity in the external anal sphincter and puborectalis muscles and is a useful investigation for the diagnosis of paradoxical puborectalis contraction syndrome or anismus in which there is abnormal increased electrical activity in puborectalis muscle during attempted defecation⁷.

BALLOON EXPULSION TEST

The balloon expulsion test is another method used to diagnose anismus. Normal rectal evacuation requires adequate intrarectal pressure, which can be raised by increasing intrapelvic pressure, achieved by voluntary contraction of the diaphragm and abdominal wall muscles. It has been found that constipated patients with both prolonged evacuation and reduced pelvic floor descent on proctography are not able to void a small nondeformable rectal balloon because they fail to raise intrarectal pressure⁸.

DIAGNOSTIC TESTS FOR HIRSCHSPRUNG'S DISEASE

Hirschsprung's disease can diagnosed by classical appearance on barium enema, absence of RAIR and absence of ganglion cells in rectal biopsy specimen. Histological examination of full thickness rectal tissue is gold standard to diagnose this entity in an adult⁹.

Table 1 – Diagnostic investigations and surgical procedure performed for common colorectal causes of constipation

S.no.	Diagnosis	Investigations	Treatment
1	Carcinoma left colon	Colonoscopy, CT, Carcinoembryonic antigen (CEA) & Biopsy (Bx)	Left hemicolectomy
2	Carcinoma rectosigmoid	Same as above	Anterior resection
3	Carcinoma rectum	Same as above	Low anterior resection
4	Carcinoma anal canal	Bx, colonoscopy & CT	Abdominoperineal resection (APR) and/or chemoradiotherapy (CRTT)
5	Diverticular disease	Ba enema, colonoscopy, CT, Bx	Sigmoidectomy
6	Colonic tuberculosis	Colonoscopy, biopsy & CT	Segmental colectomy + ATT
7	Diffuse colonic inertia	Colonic transit study	Subtotal colectomy (if medical management fails)
8	Hirschsprung's disease	Ba enema, Anorectal manometry & Bx	Duhamel/Soave's/Swenson's procedure

MANAGEMENT

Management plan of constipation is dependent upon its cause, most of the extracolonic causes can managed with medical treatment although some may require surgery (e.g thyroidectomy, parathyroidectomy etc). Most of the colonic (colon and rectum) causes can be treated surgically and its may also possible to achieve cure. Surgical procedure performed for various diseases of colon and rectum

causing constipation is given below in tabular form (Table1) and algorithmic approach to patient with constipation is depicted in Fig.1.

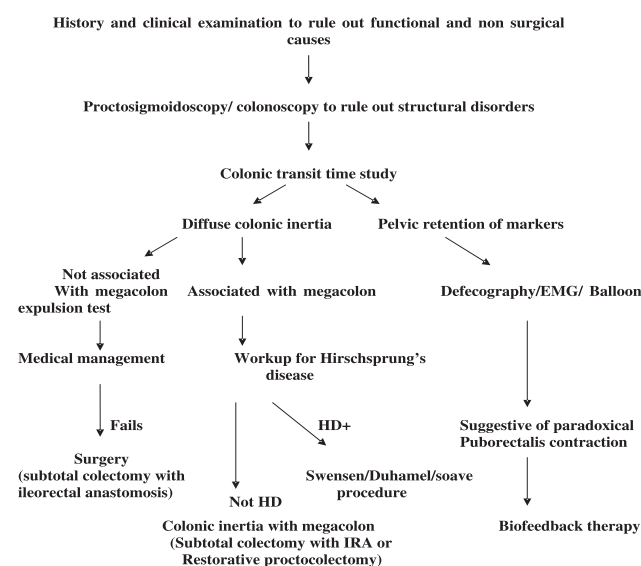


Fig 1 – Algorithm for management of constipation

DIARRHEA

Causes

Diarrhea is increased frequency of bowel movements i.e. more than three stools per day. It may be acute or chronic, infective or non infective and secretory or osmotic. Infective diarrhea is usually acute and diarrhea due to surgical causes is usually chronic .

ACUTE DIARRHEA

- Infections (bacterial, viral, protozoal or parasitic etiology)
- Food poisoning and food allergies

CHRONIC DIARRHEA

- Inflammatory bowel disease (Ulcerative colitis, Crohn's disease)
- Diverticulitis
- Ischemic colitis
- Malignancy (Villous adenoma, colon carcinoma)
- Endocrinopathies (VIPoma, gastrinoma, carcinoid syndrome, hyperthyroidism)
- Infections (clostridium difficile colitis, tuberculosis, amebiasis)
- Radiation enteritis
- Malabsorption (pancreatic insufficiency, bacterial overgrowth syndrome)
- Irritable bowel syndrome (IBS)

HISTORY

First step is to differentiate diarrhea from urgency and fecal incontinence. Urgency of stool is a sensation of impending defecation which occurs as a result of increased sensitivity of the rectal mucosa due to inflammation or an increased pressure of stool. Fecal incontinence is as an inability to defer passage of stool to a socially acceptable time and place. Next step is to evaluate for etiology. A history of a trip abroad or the ingestion of questionable food suggests

infectious diarrhea. Blood in the stool suggests the possibility of malignancy or inflammatory bowel disease (IBD). Watery stools suggest an osmotic or secretory process, and the presence of oil or food particles suggests malabsorption. Nocturnal diarrhea that awakens the patient from sleep strongly suggests an organic cause. Features suggestive of irritable bowel syndrome (IBS) are presence of abdominal pain associated with defecation, long history usually extending back to adolescence or young adulthood, passage of mucus in the stools, and exacerbation of symptoms by stress¹³. Features, which are against the diagnosis of IBS, are recent onset of diarrhea, especially in older patients, diarrhea that awakens the patient from sleep, weight loss and the presence of blood in the stool.

EXAMINATION

General examination for evidence of dehydration, anemia, lymphadenopathy, extraintestinal manifestations of IBD like arthritis, ankylosing spondylitis, erythema nodosum, pyoderma gangrenosum. Signs of peripheral vascular disease with or without an abdominal bruit may suggest mesenteric vascular insufficiency and ischemic colitis as cause for diarrhea. Abdominal examination might reveal palpable lump/ hepatomegaly suggestive of malignancy. A careful rectal examination to assess defective anal sphincter or pelvic floor muscle function (to rule out fecal incontinence), presence of perianal fistulas suggestive of Crohn's disease, perianal excoriation due to fat malabsorption, presence of polyp or mass suggestive of malignancy.

INVESTIGATIONS

Blood investigations

Complete hemogram with total and differential counts to rule out infectious etiology. Specific hormonal assays can be performed when endocrinopathy is suspected as cause. Although detection of ANCA (antineutrophilic cytoplasmic antibodies) and ASCA (anti-*Saccharomyces cerevisiae* mannan antibodies) can help in diagnosis of inflammatory bowel disease, they are not routinely performed

Stool examination

Presence of blood in stools suggests inflammatory or malignant etiology. Fecal fat estimation is performed if malabsorption is suspected as cause. Fecal pH < 6 suggest carbohydrate malabsorption.

Sigmoidoscopy/colonoscopy

Most important investigation in patients with chronic diarrhea to rule out structural disorder of colon like Crohn's disease, ulcerative colitis and malignancy of right colon. Since ulcerative colitis involves the rectum in 90–95% of cases, flexible sigmoidoscopy is the first step in diagnosis; Mild cases may only show a loss of normal vascular pattern, a granular texture, and microhemorrhages seen on wiping or touching the mucosa. When the disease is moderately active, the mucosa becomes more grossly pitted, and spontaneous bleeding is often present. In severe cases, there is macroulceration and profuse bleeding usually accompanied by a purulent exudate. Chronic ulcerative colitis is frequently associated with the appearance of small pseudopolyps, which represent areas of regenerating mucosa in the midst of diffuse mucosal destruction¹⁴. Colonoscopy is useful in determining the extent and activity of the disease, particularly in patients where diagnosis is unclear or cancer is suspected. Findings more in favour of ulcerative colitis are continuous involvement,

mucosal friability and distorted vascular pattern while linear ulcers, cobblestoning, skip lesions and rectal sparing are more in favor of Crohn's disease. Acute segmental ischemic colitis presenting with diarrhea is characterized by hemorrhagic, dusky mucosa involving mainly sigmoid and splenic flexure. Sometimes carcinoma of left colon can present with diarrhea (spurious diarrhea due to stercoral ulcer) which can be diagnosed on colonoscopy.

Barium enema

It is an alternative to sigmoidoscopy/colonoscopy for evaluation of structural disorders of colon. Mild cases of acute ulcerative colitis may be manifested by a diffusely granular appearance, which can also be seen in more detail on air-contrast barium enema. In more advanced cases, the colon develops irregular margins with spiculated and undermining collar-button ulcers that can be observed on full-column barium enema. End-stage or "burned-out" ulcerative colitis is characterized by shortening of the colon, loss of normal redundancy in the sigmoid region and at the splenic and hepatic flexures, disappearance of the haustral pattern, a featureless mucosa, absence of discrete ulceration, and narrowed caliber of the bowel. Thumb printing appearance due to submucosal hemorrhage is a characteristic feature of ischemic colitis¹⁵.

Management

Initial step resuscitation to correct dehydration, electrolyte imbalance and anemia if present. Next step is look for cause of diarrhea and establish the diagnosis with appropriate investigations. Once diagnosis is confirmed, management strategy to be decided accordingly.

Medical management

Treatment of IBS is medical and starts with dietary modification and reassurance, if it fails antimotility agents like Loperamide or Tricyclic antidepressants, probiotics may be tried. Ulcerative colitis and Crohn's disease should initially be treated with medical agents like sulfasalazine, corticosteroids, immunomodulators (azathioprine), antitumor necrosis factor alpha analogues (infliximab). Current therapeutic strategies can be classified broadly based on disease activity into those that treat active disease (induction therapy) and those that prevent recurrence of disease once remission is achieved (maintenance therapy). The choice of medications depends upon extent of disease (left sided or pancolitis) and severity (mild/moderate/severe). Enema preparations may be used alone or in combination with systemic therapy for patients with left-sided disease (distal to splenic flexure). Proctitis (disease limited to the rectum) may be treated with suppositories or foam preparations. Mild disease can be treated with oral or topical aminosalicylates depending upon extent of disease to induce remission. Induction therapy for mild disease requires addition of oral steroids and for severe disease parenteral steroids/cyclosporine/infliximab will be required. Maintenance therapy is usually with aminosalicylates and azathioprine. Medical treatment can not cure both ulcerative colitis and Crohn's disease. Surgical treatment can be curative for ulcerative colitis but it cannot cure Crohn's disease.

Surgical management

Common indications for surgical therapy for UC are-

- Disease refractory to medical treatment

Table 2 – Surgical procedure performed for common colorectal causes of diarrhea

S.No.	Diagnosis	Treatment
1	Ulcerative colitis – refractory to medical therapy	Restorative proctocolectomy (ileal pouch anal anastomosis –IPAA) Total proctocolectomy with permanent ileostomy (if fecal incontinence present)
2	Ulcerative colitis – presence of cancer/dysplasia	IPAA can be performed unless there is tumor in middle or lower rectum
3	Ulcerative colitis with emergency indications for surgery (fulminant colitis, toxic megacolon, bleeding)	Subtotal colectomy with ileostomy and closure of rectal stump/rectal mucus fistula followed by IPAA at later stage. Emergency proctocolectomy might be required if bleeding is indication for surgery.
4	Extensive colonic crohn's disease without rectal involvement	Total colectomy with ileorectal anastomosis
5	Limited colonic crohn's disease without rectal involvement	Segmental resection and anastomosis
6	Extensive colonic crohn's disease with rectal involvement	Total colectomy with intersphincteric proctectomy with permanent ileostomy
7	Extensive colonic crohn's disease with rectal involvement in a poor risk patient	Total colectomy with low hartmann's closure of rectum with permanent ileostomy
8	Ischemic colitis – segmental colitis with protein losing enteropathy	Segmental resection with primary anastomosis/ stoma formation

- Unacceptable side effects of medical treatment
- Complication like uncontrolled bleeding, toxic megacolon, perforation etc
- Presence of dysplasia or carcinoma

Most commonly performed and preferred surgical procedure for ulcerative colitis is restorative proctocolectomy with or without fecal diversion. Other procedure performed are subtotal colectomy with ileorectal anastomosis in patients with rectal sparing ; proctocolectomy with Brooke ileostomy in patients with anal incontinence or dysplasia/carcinoma involving lower third of rectum; proctocolectomy with continent ileostomy (Table 2).

Indications for surgery in colonic Crohn's disease are-

- Intra-abdominal abscess,
- Medically intractable fistula,
- Fibrotic stricture with obstructive symptoms,
- Complications like toxic megacolon, hemorrhage, Carcinoma

Treatment of Crohn's disease is essentially palliative and recurrence is frequent so aim of surgery is to alleviate symptoms and conserve bowel. Taking wide margins does not reduce the likelihood of recurrence and repeated resection will result in small bowel syndrome. Colonic Crohn's disease should be treated with segmental colonic resection if disease is limited ; total proctocolectomy with end ileostomy for extensive disease involving colon and rectum. Restorative proctocolectomy (IPAA) is contraindicated in Crohn's disease (Table 2).

Patients with segmental ischemic colitis who remain symptomatic with pain, bleeding, diarrhea (protein losing enteropathy) or recurrent bouts of sepsis for 2 to 3 weeks after presentation with no improvement in conservative treatment may require operation. Segmental bowel resection with primary anastomosis or construction of stoma is performed depending upon the nature of bowel ¹⁵.

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