

Investigation and management of constipation

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The term 'constipation' is used to describe a reduction in frequency of bowel movements by only one-third of sufferers. The others use the term to explain the need to strain or the passage of a hard motion. A tighter consensus has been agreed, termed the Rome definition (Table 1)¹.

Most patients (90%) have 'simple constipation' and do not seek specialist

help in the investigation of their symptoms which respond to dietary adjustments, an increase in fluid intake or the use of laxatives. For the remainder, it is important to exclude secondary causes before considering referral for specialist investigation.

Secondary causes of constipation

A thorough and careful history will elucidate the likely contribution of any of the medical conditions known to be associated with constipation (Table 2). Attention to the drug history is also important as many compounds are implicated (Table 3). Clinical examination includes abdominal palpation to exclude a palpable mass and digital rectal examination and sigmoidoscopy to exclude a rectal tumour. If the history is acute or there is any other concern, a total colonic evaluation with colonoscopy or double contrast barium enema

(DCBE) is indicated. In the absence of a genetic predisposition, colorectal cancer is rare before the age of 40 and is more likely to be associated with a change of bowel habit towards looser motions than constipation. Current guidelines exist for the urgent referral of patients with symptoms suggestive of lower gastrointestinal malignancy².

Primary causes of constipation

Primary causes of constipation are divided into three main groups:

- **Constipation-predominant irritable bowel syndrome (IBS)** mainly affects young women, with abdominal pain as the most prominent feature. Colonic transit time is similar to that of healthy controls. A disorder of evacuation must be excluded as the two conditions are frequently present together.
- **Idiopathic slow transit constipation (ISTC)** is rare and usually affects young or middle-aged women who have failed to control their symptoms on bulking agents or other laxatives. These individuals

Key Points

Nine out of 10 patients will have simple constipation that responds to an increase in dietary fibre, oral fluid intake and/or laxatives

A change in bowel habit towards constipation is unlikely to indicate carcinoma, especially in an individual under 40 years of age

An increasing number of patients with constipation are found to have disorders of defaecation that require specialist investigation in a pelvic floor clinic

Idiopathic slow transit constipation (ISTC) is rare. It is diagnosed after normal total colonic evaluation and a delayed colonic transit study in the absence of a defaecatory disorder

Surgery may be utilised for patients with both defaecatory difficulty and ISTC

KEY WORDS: antegrade continence enema (ACE) procedure, constipation, defaecatory disorder, pelvic floor disorder, slow colonic transit

Table 1. The 'Rome' definition of constipation¹.

Two or more of the following symptoms lasting for at least 12 months whilst not taking laxatives and provided that irritable bowel syndrome has been excluded:

- Straining during >25% of bowel movements
- Sensation of incomplete evacuation on >25% of bowel movements
- Hard or pellety stools on >25% of bowel movements
- Less than 3 stools passed per week

Table 2. Common causes of constipation.

| | | |
|------------------------|--|---|
| Primary constipation | Irritable bowel syndrome Idiopathic slow transit Disorders of evacuation | |
| Secondary constipation | Metabolic/endocrine | Hypercalcaemia Hypothyroidism |
| | Gastrointestinal | Diverticular disease Cancer or polyp Ischaemia |
| | Neurological | Autonomic neuropathy Multiple sclerosis Parkinson's disease Spinal cord injury |
| | Psychiatric | Depression Anorexia nervosa |

rarely feel the urge to pass stool and their colonic transit times, as measured by scintigraphy or radio-opaque marker studies, are without exception slow.

- **Disorders of evacuation** are a heterogeneous group of conditions including both anatomical and physiological problems. Patients complain of prolonged, difficult or incomplete attempts at evacuation. There is commonly an associated vaginal childbirth or episode of pelvic surgery that predates the development of symptoms. Such problems are increasingly being recognised, and there is a growing availability of pelvic floor imaging designed to elucidate the precise cause for each case.

Pathophysiology

The complex enteric nervous system is under intense study. Intrinsic neurones

in the myenteric plexuses control smooth muscle function (motility) whilst the neurones of the submucosal plexuses regulate the process of absorption. Extrinsic modulation of this process is provided by the parasympathetic (promotility) nervous system. These nerves reach the right colon via the vagus and the rest of the colon and rectum via sacral nerve roots (S2–S4). Sympathetic nerves run with the arterial supply to the colon and provide basal tone as well as (in general) excitation to sphincter-related muscle and relaxation to non-sphincter related smooth muscle. Many interneurons containing a variety of neurotransmitters are also present.

An interruption in the extrinsic autonomic innervation via drugs, infection, neuropathy or trauma may result in constipation. Inadequate intrinsic supply may be inherited (eg Hirschsprung's disease) or acquired (eg Chagas' disease). The exact mechanism by which the postulated long-standing use of

anthraquinone laxatives causes a similar neuropathy has yet to be elucidated, although recent work has suggested a role for the interstitial cells of Cajal³.

Colonic transit

Scintigraphic evaluation using ¹¹¹indium-labelled charcoal has superseded radio-opaque marker studies in specialist centres. This has enabled clinicians to identify the point of hold-up within the colon by calculating the position of the 'geometric centre' at various time intervals after ingestion⁴. There is a significant range for 'normals': the mouth to caecum time is about 3–6 hours, and material passes through the right colon, left colon and sigmoid colon each for approximately 12 hours. Overall transit time is of the order of 36 hours.

Defaecation

At rest, the internal sphincter muscle maintains the resting anal tone. The anorectal angle, maintained by contraction of the puborectalis sling, holds the rectum in a horizontal orientation. Distension of the rectum causes relaxation of the internal sphincter (the recto-anal inhibitory reflex) and allows discrimination of intraluminal content via the 'sampling reflex'⁵. At a socially convenient time, flexing the hips during sitting or squatting facilitates opening of the anorectal angle. Coordinated relaxation of the sphincters and pelvic floor muscles, combined with an increase in intra-abdominal pressure via contraction of the rectus abdominis and diaphragm, facilitates expulsion of stool. Constipation will result if there is impairment to components of this process (Table 4).

Management

An algorithm showing a proposed plan of management for the patient with constipation is shown in Fig 1.

- In patients over the age of 40 with new onset symptoms a colonoscopy or DCBE should be performed to exclude a stricture or mass lesion.

Table 3. Drugs associated with constipation.

| Medication | Drug type |
|--|---|
| Analgesics | Opiates (eg morphine, codeine) Opioids (eg fentanyl, pethidine, tramadol) NSAIDs (eg diclofenac, naproxen) |
| Psychiatric | Antidepressants: tricyclics (eg amitriptyline, dothiepin) MAOIs (eg phenelzine) SSRIs (eg fluoxetine, paroxetine) anxiolytics antipsychotics |
| Endocrine | Pamidronate, alendronate, bromocriptine |
| Gastroenterological | Proton pump inhibitors (eg omeprazole) Others including pancreatin, 5-ASA compounds, octreotide |
| Cardiac | ACE inhibitors (eg captopril, lisinopril) Calcium-channel blockers (eg nifedipine, verapamil) Anti-arrhythmics (eg amiodarone, flecainide) Lipid-lowering agents (eg atorvastatin, cholestyramine) Antihypertensives (eg acebutolol, clonidine) |
| Haematological/ oncological | Erythropoietin, carboplatin, vinblastine |
| Neurological | Anti-epileptics (eg carbamazepine, sodium valproate) Muscle relaxants (eg baclofen) Pituitary suppression (eg bromocriptine) Parkinson's disease (eg pergolide) |
| Miscellaneous | Antimuscarinics (eg hyoscine, atropine) Nicotine Ondansetron |

ACE = angiotensin-converting enzyme; ASA = acetylsalicylic acid; MAOI = monoamine oxidase inhibitor; NSAID = non-steroidal anti-inflammatory drug; SSRI = selective serotonin reuptake inhibitor.

- In patients below the age of 40 a similar study should be performed for those with long-standing symptoms (>12 months) to exclude Hirschprung's disease, megarectum or megacolon. Calcium levels and thyroid function should be checked to exclude hypercalcaemia and hypothyroidism.
- If these studies are normal, a therapeutic trial of fibre (bran, ispaghula or methylcellulose) is indicated (15–30 g/day) as this will adequately control 85–90% of patients' symptoms⁶.
- Patients not responding to a trial of fibre warrant further specialist investigation.

Specialised investigations

Individuals who describe difficulty with defaecation (ie incomplete evacuation or a sensation of anal blockage) should be investigated with anorectal manometry, often coupled with endo-anal ultrasound, to quantify the pressures generated by the sphincter muscles at rest and during squeeze.

Patients with obstructed defaecation should have defaecating proctography, with either barium contrast or scintigraphy (Fig 2 (a–c)). Those with a significant rectocele can be offered surgical correction, although a trial of glycerine suppositories will often be effective. Barium proctography with small bowel contrast or dynamic magnetic resonance imaging may be needed to demonstrate an enterocele or intrarectal intussusception (Fig 3), which may require an abdominal rectopexy. In the absence of an anatomical defect, biofeedback retraining can be offered.

Patients who do not have symptoms to suggest an outlet problem should have a combined transit assessment with both a colonic transit study and a rectal emptying study. Colonic transit studies are most simply performed using radio-opaque markers⁷ although specialised units may have access to a radioscintigraphic study (Table 5; Fig 4). Rectal emptying (transit) study results are available from isotopic defaecography (Fig 2 (a–c)).

Table 4. Causes of defaecatory difficulties.

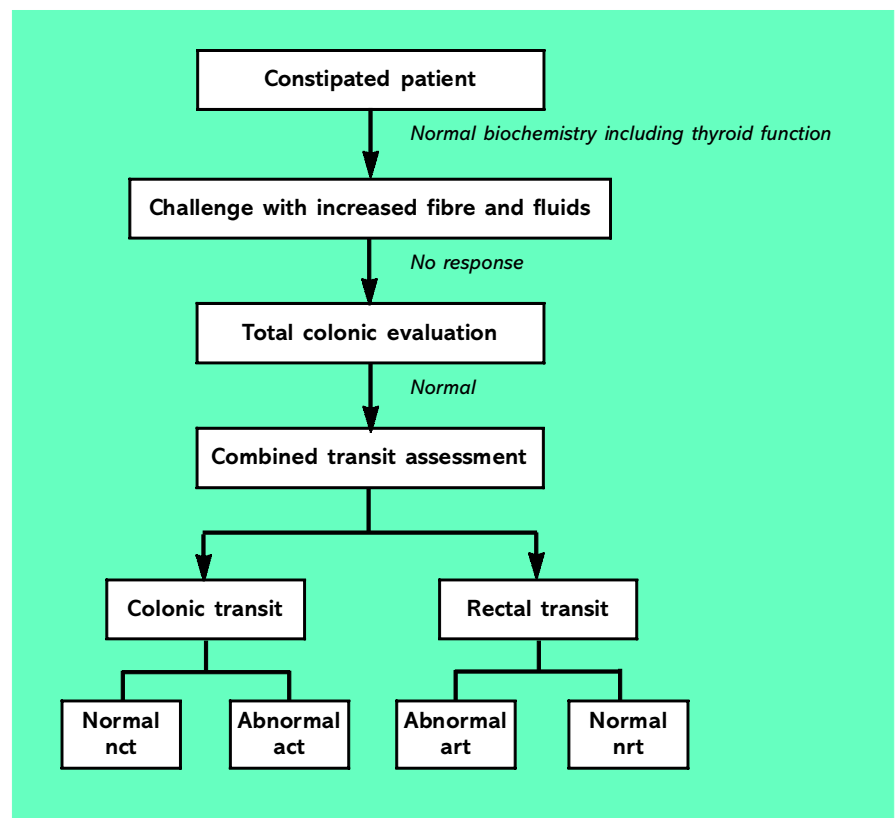
Rectocele

- Protrusion of anterior rectal wall into vaginal introitus on straining
- Digitation of the posterior vaginal wall may be used to complete defaecation
- Proctography demonstrates filling of the rectocele with retained material at the end of defaecation (Fig 2(b))

Descending perineum syndrome

- Weakness of pelvic floor muscles results in widening of the anorectal angle, weakening of the perineal body and more vertical orientation of the rectum, leading to intrarectal intussusception or rectal prolapse
- On examination, a weak pelvic floor can be demonstrated as excessive perineal descent on straining
- Contrast proctography or dynamic MRI will confirm intrarectal intussusception (Fig 3)
- Physiology studies will clarify a pudendal neuropathy, most commonly associated with parturition

MRI = magnetic resonance imaging.



Treatment plan:

- | | |
|-----------|--|
| nct & nrt | Constipation-dominant IBS, advise laxatives, perhaps biofeedback |
| nct & art | Suppositories and/or enemas |
| act & nrt | laxatives in increasing doses, subtotal colectomy for failures |
| act & art | combined laxatives and suppositories/enemas, ACE procedure |

Fig 1. Suggested plan of management for a constipated patient (ACE = antegrade continence enema; IBS = irritable bowel syndrome).

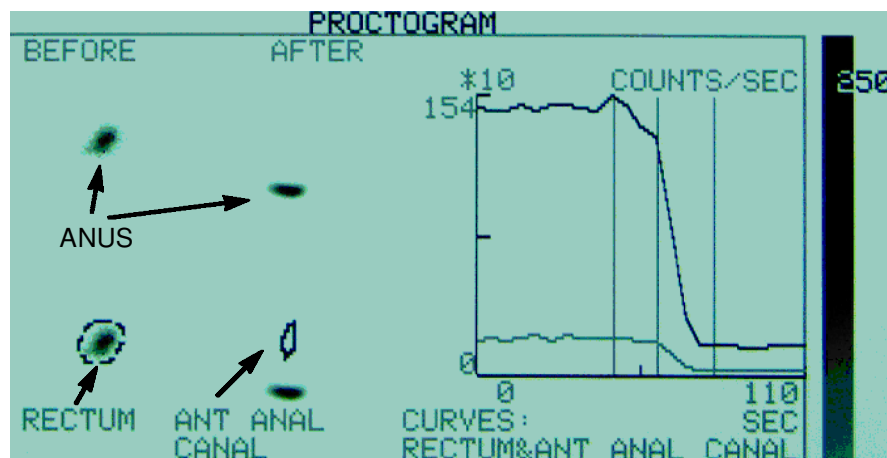
A normal combined transit assessment and other investigations pointing towards a diagnosis of constipation-predominant IBS is found in 20% of individuals. They should be counselled as to the reassuring nature of their investigations. Treatment can be difficult because fibre often exacerbates symptoms such as pain and bloating. The realisation that symptoms are reduced

with the avoidance of life stressors and appropriate nurse-led counselling can be invaluable in this setting.

A further 20% have an isolated rectal transit delay in the absence of a rectocele or other surgically correctable anatomical defect. This group benefits from treatment with stimulant and softening suppositories and/or enemas.

A normal appearing colon and normal

rectal transit but a slow colonic transit is found in 30% of patients. Autonomic dysfunction should be excluded; if present, a causal factor needs to be elucidated. In addition, coexisting upper gastrointestinal symptoms must be investigated, as appropriate, with oesophageal manometry, gastric emptying studies and small bowel transit or motility studies. This is important as



Defaecating scintigrams.

(black curves = rectal isotope; grey curves = rectocele isotope; vertical lines = onset and completion of defaecation).

Fig 2a. Normal study. Isotope is seen initially in the rectum. After defaecation, all isotope lies outside the patient in the bedpan. Emptying of rectum is complete, with no evidence of a rectocele.

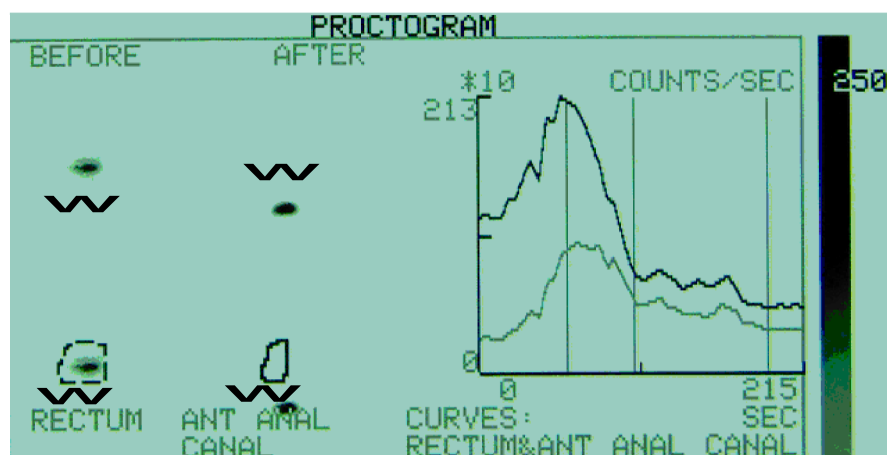


Fig 2b. Rectocele. An increase in isotope counts seen in the rectocele on straining and a significant amount remains after defaecation.

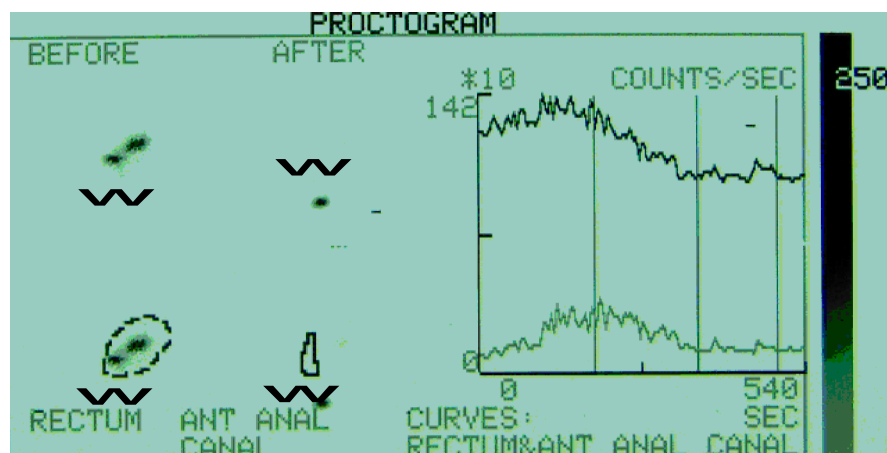


Fig 2c. Slow rectal transit. No evidence of a rectocele, but poor rectal emptying.

patients with panenteric dysmotility have a poor outcome following colectomy⁹. This group has ISTC; a therapeutic trial of laxatives is indicated, introduced in a stepwise fashion (Table 6). Those who fail such treatment can be considered for surgery.

The remaining 30% of patients have a combined transit delay for both colon and rectum. A combination of sufficient doses of laxatives and suppositories/enemas is recommended. If this cannot control symptoms, surgery in the form of an antegrade continence enema (ACE) conduit may be performed.

Surgery

Some patients will fail conservative management. In the absence of autonomic dysfunction or generalised gut dysmotility, the patient should be referred to an experienced colorectal surgeon. Current treatment for ISTC is subtotal colectomy and ileorectal anastomosis. Provided psychiatric morbidity and the above conditions are excluded, the results of surgery are good with 90% of patients treated satisfied following the procedure¹³. The ACE procedure can be performed in a number of ways. We

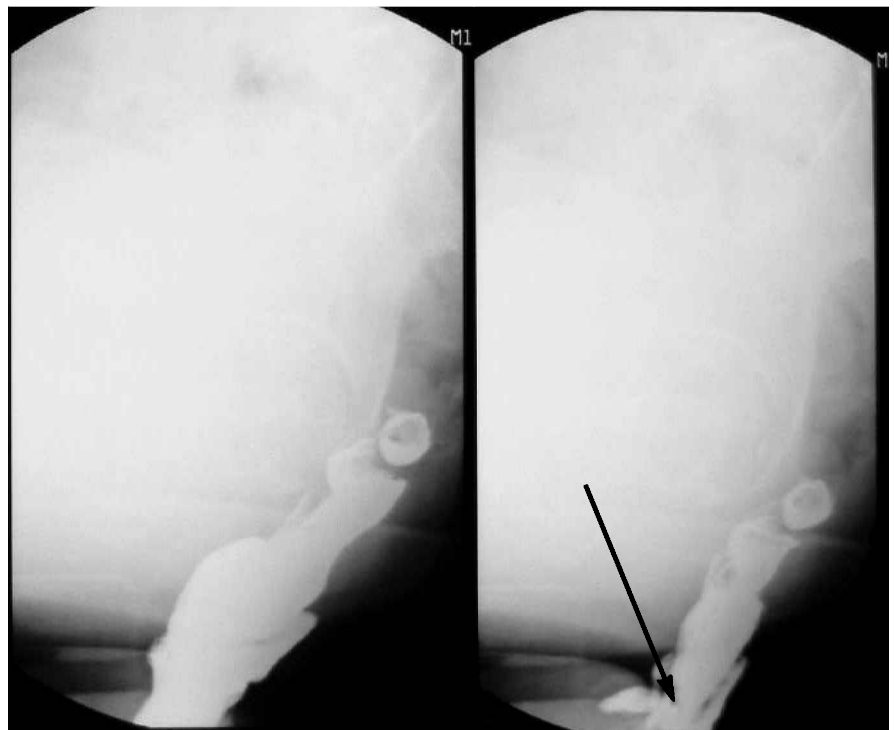


Fig 3 Barium proctogram demonstrating intrarectal intussusception (arrow) on straining.

Table 5. Colonic transit studies.

Radio-opaque marker study

- 24 markers ingested as a capsule at the same time on 3 consecutive days
- Abdominal X-ray on day 4 (again on day 7 if all 72 markers still present)
- If normal, 36 markers are expelled by day 4
- Whole gut transit time of ca 72 hours considered abnormal

Isotope colonic transit study (Fig 4)

- ¹¹¹Indium labelled charcoal ingested
- Serial gamma camera images used to track the marker around the colon
- Differing transit times of colonic regions can be estimated by tracking the geometric centre of the isotope mass⁸

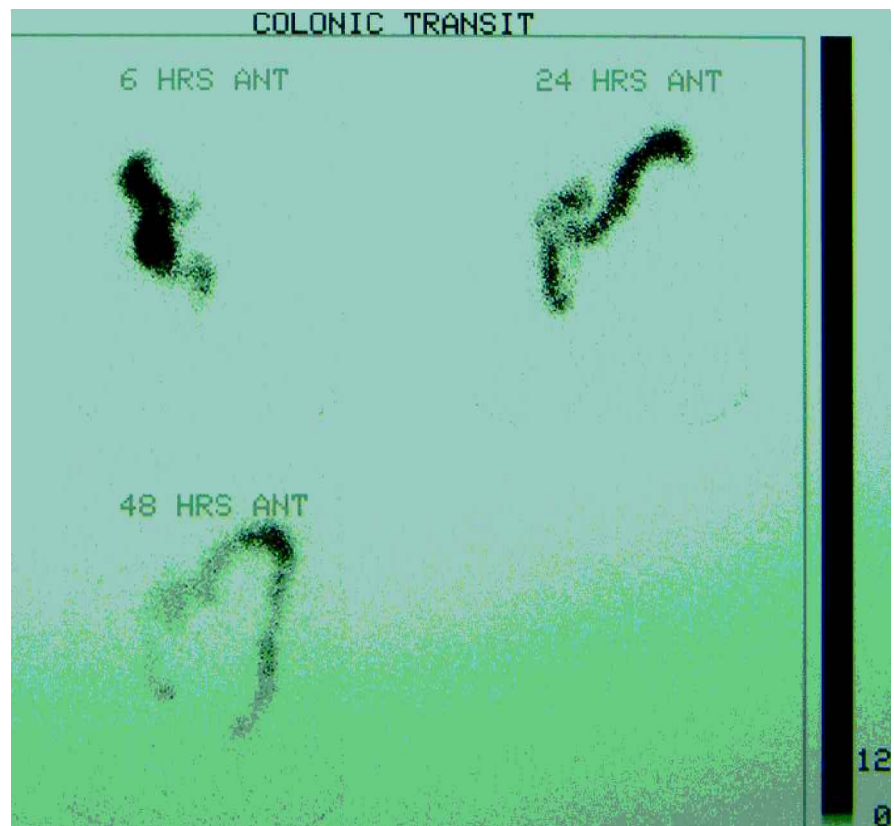


Fig 4. Normal isotope colonic transit study. Isotope has reached right colon by six hours and little remains at 48 hours (therefore no 72-hour film necessary).

Table 6. Stepwise therapy for idiopathic slow transit constipation (ISTC).

| | |
|----------------------------|---|
| Bulk laxatives | <ul style="list-style-type: none"> • Increase stool weight both by their water holding capacity and by providing material for bacteria to consume • Side effects include production of excessive flatus and sensation of bloating |
| Osmotic laxatives | <ul style="list-style-type: none"> • The effectiveness of these substances seems to be equivalent, although lactulose is also metabolised by bacterial flora and lowers the colonic pH, which may result in an increase in colonic peristalsis¹⁰ |
| Lubricants | <ul style="list-style-type: none"> • Used infrequently because of problems with fat-soluble vitamin absorption and, rarely, pneumonitis due to aspiration in the elderly |
| Stimulant laxatives | <ul style="list-style-type: none"> • Polyphenolic compounds (eg bisacodyl): <ul style="list-style-type: none"> – multiple effects, including increased motor activity, production of a net influx of intraluminal fluid and stimulation of mucosal PGE release – patients with left-sided colonic dysmotility can be prescribed this medication as a suppository • Anthranoid compounds (eg senna): <ul style="list-style-type: none"> – naturally occurring – require hydrolysis by colonic flora, and therefore have local action – precise mode of action includes net secretion of intraluminal fluid, possibly acting via stimulation of PG secretion¹¹ • Both these classes of laxatives seem safe and can be used in escalating quantities until an adequate effect is achieved. They can be used for long periods whilst they remain effective |
| Prokinetic drugs | <ul style="list-style-type: none"> • Cisapride was researched with interest in the area of ISTC until its role in fatal arrhythmia was realised • Erythromycin has effects in upper GI motility and, in pilot studies, has demonstrated effects on colonic motility¹² • Exact mode of action is unclear • Not suitable for long-term use because of antibacterial activity and other side effects |

GI = gastrointestinal; PG = prostaglandin.

prefer to use an appendicostomy¹⁴, although a number of alternative surgical procedures are described¹⁵.

References

- 1 Drossman DA, Thompson WG, Talley NJ. Identification of sub-groups of functional gastrointestinal disorders. *Gastroenterol Int* 1990;**3**:159–72.
- 2 NHS Executive. *Referral guidelines for suspected cancers*. London: HMSO, April 2000.
- 3 Hagger R, Gharaie S, Finlayson C, Kumar D. Regional and transmural density of interstitial cells of Cajal in human colon and rectum. *Am J Physiol* 1998;**275**:G1309–16.
- 4 Von der Ohe MR, Camilleri M. Measurement of small bowel and colonic transit: indications and methods. Review. *Mayo Clin Proc* 1992;**67**:1169–79.
- 5 Miller R, Lewis GT, Bartolo DC, Cervero F, Mortensen NJ. Sensory discrimination and dynamic activity in the anorectum: evidence using a new ambulatory technique. *Br J Surg* 1988;**75**:1003–7.
- 6 Voderholzer WA, Schatke W, Muhldorfer BE, Klausner AG *et al*. Clinical response to dietary fiber treatment of chronic constipation. *Am J Gastroenterol* 1997;**92**:95–8.
- 7 Metcalf AM, Phillips SF, Zinsmeister AR, MacCarty RL *et al*. Simplified assessment of segmental colonic transit. *Gastroenterology* 1987;**92**:40–7.
- 8 Proano M, Camilleri M, Phillips SF, Brown ML, Thomforde GM. Transit of solids through the human colon: regional quantification in the unprepared bowel. *Am J Physiol* 1990;**258**:G856–62.
- 9 Redmond JM, Smith GW, Barofsky I, Ratych RE *et al*. Physiological tests to predict long-term outcome of total abdominal colectomy for intractable constipation. *Am J Gastroenterol* 1995;**90**:748–53.
- 10 Devroede G. Constipation. In: Sleisenger MH, Fordtran JS (eds.) *Gastrointestinal disease: pathophysiology, diagnosis and management*, 5th edn. Philadelphia: WB Saunders, 1993:837–64.
- 11 Kumar D, Bartolo DC, Devroede G, Kamm MA *et al*. Symposium on constipation. *Int J Colorectal Dis* 1992;**7**:47–67.
- 12 Sharma SS, Bhargava N, Mathur SC. Effect of oral erythromycin on colonic transit in patients with idiopathic constipation. A pilot study. *Dig Dis Sci* 1995;**40**:2446–9.
- 13 Lubowski DZ, Chen FC, Kennedy ML, King DW. Results of colectomy for severe slow transit constipation. Review. *Dis Colon Rectum* 1996;**39**:23–9.
- 14 Koyle MA, Kaji DM, Duque M, Wild J, Galansky SH. The Malone antegrade continence enema for neurogenic and structural fecal incontinence and constipation. *J Urol* 1995;**154**:759–61.
- 15 Hughes SF, Williams NS. Continent colonic conduit for the treatment of faecal incontinence associated with disordered evacuation. *Br J Surg* 1995;**82**:1318–20.