Guidance:

The Practical Management of the Gastrointestinal Symptoms of Pelvic Radiation Disease

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Introduction

This guide is designed mainly to aid clinical nurse specialists looking after patients with pelvic radiation disease (PRD) working in conjunction with a gastroenterologist. However, it might also help general practitioners and generalists in investigating and treating the gastrointestinal symptoms of patients following pelvic radiotherapy.

This guide defines best practice although not every investigation modality or treatment will be available in every trust.

Those using the guide, especially if non-medically qualified, should identify a senior gastroenterologist or other appropriately qualified and experienced professional whom they can approach easily for advice if they are practising in an unsupervised clinic.

Practitioners should not use this guide outside the scope of their competency and must identify from whom they will seek advice about abnormal test results which they do not fully understand before they start using the Guide.

Where it is stated that 'this is an emergency', the user of this guide must discuss the issue with a suitably qualified person for immediate action.

Managing patients with PRD requires a different approach to those with other forms of bowel pathology. The guide also identifies test findings that may indicate that the underlying situation is potentially serious and that advice needs to be sought urgently.

Specific therapies are usually not listed by name but as a 'class' of potential drugs as different clinicians may have local constraints or preferences as to the medications available.

Important principles to consider when using the algorithms are:

- Patients may have up to 22 gastrointestinal (GI) symptoms after pelvic radiotherapy simultaneously.
- Each symptom may have more than one cause.
- Symptoms must be investigated systematically otherwise causes may be missed.
- Arranging all investigations at the first consultation reduces follow-up and allows directed treatment at all causes for symptoms at the earliest opportunity.
- Patients who have had radiotherapy need a different approach to patients who have GI symptoms for other reasons.
- Specialist centres only very rarely reach a new diagnosis of 'irritable bowel syndrome' in this patient group.
- Endoscopic or surgical intervention in tissues exposed to radiotherapy carries increased risk of serious complications.

This guide has three parts:

1. Contents, introduction, how to use the algorithm, taking a history, abbreviations and guide to blood tests.
2. An algorithm detailing the individual investigation and treatment of each of the 22 symptoms identified as particularly relevant to this patient group.
3. A brief description of the diagnosis, treatment and management techniques of common conditions found in patients with PRD.

Contents

Abbreviations used in the algorithm

5-HIAA	5-Hydroxyindoleacetic Acid
APC	Argon Plasma Coagulation
BAM	Bile Acid Malabsorption
C4	7α-hydroxy-4-cholesten-3-one
CMV	Cytomegalovirus
CNS	Central Nervous System
CRP	C-Reactive Protein
CT	Computed Tomography
CXR	Chest X ray
EPI	Excocrine Pancreatic Insufficiency
ESR	Erythrocyte Sedimentation Rate
FE1	Faecal Elastase-1
FODMAPs	Fermentable Oligo-, Di- and Mono-saccharides and Polyols
GI	Gastrointestinal
GP	General Practitioner
GTN	Glyceril Trinitrate
Hb	Haemoglobin
HbA1c	Glycosylated Haemoglobin
HBO	Hyperbaric Oxygen
IBD	Inflammatory Bowel Disease
ICP	Intracranial Pressure
IgA	Immunoglobulin A
IgG	Immunoglobulin G
Igs	Immunoglobulins
INR	International Normalised Ratio
K	Potassium
MCT	Medium Chain Triglycerides
MDT	Multidisciplinary Team
Mg	Magnesium
MRI	Magnetic Resonance Imaging
Na	Sodium
NET	Neuroendocrine Tumour
OGD	Upper GI Endoscopy (Oesophago-gastroduodenoscopy)
PET	Position Emission Tomography
PPI	Proton Pump Inhibitor
PRD	Pelvic Radiation Disease
RBC	Red Blood Cell
RCT	Randomised Controlled Trial
RFA	Radio Frequency Ablation
SeHCAT	23- [75Se] Seleno-25-Homocholic Acid Taurocholoate
SIBO	Small Intestinal Bacterial Overgrowth
TSH	Thyroid Stimulating Hormone
TTG	Tissue Transglutaminase
VIP	Vasoactive Intestinal Polypeptide
Vit	Vitamin

Guidance for blood tests used within the Guide

Routine:
Full blood count, urea and electrolytes, liver function, glucose, calcium

Haemoglobin <80 g/l	– If Hb <80g/l: consider blood transfusion (checking ferritin, transferrin saturation, RBC folate and Vit B12 before transfusion). – If iron deficient: consider iron supplements. – If unexplained: consider OGD and colonoscopy.
Anaemic but Hb >80g/l	– Check ferritin, transferrin saturation, RBC folate and Vit B12. Replace if necessary, monitor response. If unexplained consider OGD and colonoscopy / CT pneumocolon.
Abnormal urea, electrolytes	– Discuss with supervising clinician within 24 hours. – Consider appropriate IV fluid therapy / oral replacement.
Abnormal liver function tests	– Discuss with supervising clinician within 24 hours. – Patient will need a liver ultrasound and liver screen including Hepatitis B and C serology, ferritin, alpha feta protein, alpha 1 antitrypsin, liver auto-antibodies, total Igs, cholesterol, triglycerides.
Abnormal glucose level	**If no history of diabetes:** – Between 7–11mmol/L: refer to GP. – >11mmol/L and ketones in urine: **this is an emergency**. – >11–20mmol and no ketones in urine: discuss with supervising clinician within 24 hours. – >20 mmol/L and no ketones in urine: **this is an emergency**. **If known diabetic:** – Do not check glucose levels. – Consider checking HbA1c.
Abnormal corrected calcium level	– If 2.6–2.9mmol/L: discuss with supervising clinician within 24 hours. – If >3.0mmol/L: **this is an emergency**.

Additional blood tests are indicated depending on the presenting GI symptoms and differential diagnoses as outlined in the algorithm. They potentially include:

ESR, CRP, red cell folate, iron studies, Vit B12, thyroid function test, coeliac serology (TTG IgA), magnesium

Elevated ESR / CRP	Consider the following possibilities: – Infection (incl SIBO). – Inflammation (incl IBD). – Recurrent malignancy. – Non-GI causes (e.g. rheumatoid arthritis, vasculitis, connective tissue disorders).
RBC folate deficiency	– Consider referral to dietitian for specialist dietetic advice / supplementation.
Iron deficiency: ferritin, % transferrin saturation, red cell indices	– If iron is low, discuss with supervising clinician and oncology team within 2 weeks. – If intolerant of oral iron: consider IV iron infusion.
If excess iron	– Consider haemochromatosis: Discuss with supervising clinician and consider genetic testing.
Low Vit B12	– Exclude possibility of inadequate dietary intake – if this is the probable cause, consider trial of oral Vit B12 supplements. – Consider possibility of pernicious anaemia – check parietal cell antibody. – Exclude SIBO (p34). Recheck result after treatment with antibiotics. – If confirmed on repeat testing and not treatable with oral replacement, ask GP to arrange lifelong intramuscular replacement.
Abnormal thyroid function tests	– If TSH suppressed (<0.5mIU/L), recheck result with thyroid auto antibodies. – If TSH suppression confirmed, request GP to organise / refer for radiological imaging and treatment. – If TSH elevated (>4.0mIU/L). Recheck result. Also check morning cortisol if Na ≤135mmol/l/ K >4mmol/l or raised urea or creatinine. – If TSH elevation confirmed: Start thyroid replacement medication. Request GP monitor long-term. Review bowel function after 6–8 weeks.
Abnormal coeliac serology	– If IgA deficient, request IgG coeliac screen. – If TTG elevated, confirm with duodenal biopsy. – Refer for specialist dietetic advice.
Serum Mg2+	– If <0.3mmol/l **this is an emergency**. – If 0.3–0.5, consider IV replacement if symptomatic or fall in Mg2 level has been acute. If oral replacement is given, check for response after 5–7 days with repeat blood tests. – If oral replacement is used, Mg Oxide or Mg aspartate provide better bio-availability and cause less diarrhoea than other Mg preparations.

Specific blood tests are indicated depending on the symptoms /diagnosis as outlined in the algorithm: Fat soluble vitamins, trace elements, fasting gut hormones, INR, haematinics	
Any malabsorptive syndromes e.g. – BAM – Pancreatic insufficiency – Short bowel syndrome	→ – Check vitamin A–D–E, trace elements (selenium, copper and zinc) and INR. – If deficient: Start appropriate supplementation. – Request yearly monitoring via GP.
If bleeding	→ – Check full blood count and INR. – Discuss immediately with supervising clinician and gastroenterologist / GI surgeon.
When on a bile acid sequestrant	→ – Check triglyceride levels annually. – Check fat soluable vitamins A–D–E and INR (for Vit K) annually. – Check trace elements (selenium, zinc, copper) annually.
Coritsol level	→ – Morning level needed. If low, arrange synathen test. If abnormal needs immediate discussion with endocrinologist.

How to use the algorithm

1. Identify the symptoms by systematic history taking.
2. Examine the patient appropriately.
3. Use the algorithm to plan investigations for troublesome / severe symptoms.
4. Most patients have more than one symptom and so investigations need to be requested for each symptom.
5. Usually all investigations are ordered at the same time and the patient reviewed with all the results.
6. When investigations should be ordered sequentially, the algorithm indicates this by stating first line, second line etc.
7. Treatment options are generally offered sequentially but clinical judgement should be used.

Taking an appropriate history

Patients cannot be helped without an accurate history being taken.

- Taking a history of GI symptoms is a skill that must be learnt.
- Tools such as a Bristol Stool Chart can often clarify exactly what patients mean.
- Specialist units find that symptom questionnaires completed by the patient before the consultation often help clarify which issues are really troubling the patient.

Taking a history needs to elicit:

- What was bowel function like before the cancer emerged?
- How have the symptoms changed over time?
- Are key features indicative of reversible underlying pathology present, for example,
  - Steatorrhoea?
  - Nocturnal waking to defecate?
  - Rapid progressive worsening of symptoms?
  - Rapid weight loss?
  - Has the patient noticed any masses?

- Patients and clinicians alike often miss the presence of intermittent steatorrhoea – ask:
  - Is there an oily film in the lavatory water?
  - Is the stool ever pale / putty-like / foul smelling / difficult to flush/ floating?

- A very clear definition of what a patient means when they use specific terms – for example, ‘diarrhoea’ / ‘loose stool’ – what type on the Bristol Stool Chart?; ‘frequency’ – true bowel opening or tenesmus and incomplete evacuation?

- Is there a consistent impact of a specific component of diet on their symptoms, especially:
  - Fibre: how much are they eating – too much / too little?
  - Fat: does this promote type 6–7 stool / steatorrhoea?
  - Lactose-containing foods?
  - Gluten-containing foods?
  - Alcohol intake?

- Is there an association between the start of specific medication or increase in its dose and their symptoms – for example, metformin, lansoprazole, beta-blockers?

GI symptoms

Bleeding (rectal): bright red ± clots

Investigations	Potential results	Clinical management plan: abnormal results
Check haemoglobin, RBC indices and platelets Check clotting and haematinics if heavy bleeding has occurred	Abnormal	Follow treatment for abnormal blood results (p3–4).
Flexible sigmoidoscopy	Radiation proctopathy with bleeding from telangiectasia	1. **Do not biopsy** irradiated areas. 2. Optimise bowel function and stool consistency. 3. If bleeding is not affecting quality of life, reassure. 4. If bleeding affects quality of life, stop / reduce anti-coagulants if possible and consider sucralfate enemas (p43). 5. Discuss referral to a specialist centre for treatment to ablate telangiectasia (p40): a. hyperbaric oxygen therapy b. intra-rectal formalin c. thermal therapy e.g. APC. 6. Consider referral to a specialist centre for experimental therapy within the context of a clinical trial: thalidomide, Vit A, tranexamic acid, RFA.
	Haemorrhoidal bleeding	If not affecting quality of life, reassure. Consider local treatment of haemorrhoids (diet, topical creams). Consider surgical referral for 3rd degree haemorrhoids.
	Primary inflammatory bowel disease	1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
	Diverticular bleeding	**This is an emergency** Discuss immediately with a GI surgeon.
	Viral infection (e.g. CMV)	**This is an emergency** Discuss immediately with a gastroenterologist.
	Newly diagnosed neoplasia 2nd primary / tumour recurrence / advanced polyp	Refer urgently to the appropriate oncology team requesting an appointment within 2 weeks.
	If all tests are negative, but symptoms persist	1. Consider colonoscopy. 2. Optimise bowel function and stool consistency. 3. Reassure and request GP to check Hb as clinically indicated.

Bleeding (rectal): dark bleeding

Investigations	Potential results	Clinical management plan: abnormal results
Check haemoglobin and RBC indices Check clotting and haematinics if heavy bleeding has occurred	Abnormal	Follow treatment for abnormal blood results (p4).
OGD and colonoscopy	Radiation-induced telangiectasia in the colon or terminal ileum	1. **Do not biopsy** irradiated areas. 2. Optimise bowel function and stool consistency. 3. If bleeding is not affecting quality of life, reassure. 4. If bleeding affects quality of life, stop / reduce anti-coagulants if possible and consider oral sucralfate. 5. Discuss and refer to a specialist centre for treatment to ablate telangiectasia: a. hyperbaric oxygen therapy b. thermal therapy e.g. APC. 6. Consider referral to a specialist centre for experimental therapy within the context of a clinical trial: thalidomide, Vit A, tranexamic acid, RFA.
	Primary inflammatory bowel disease	1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
	Diverticular bleeding	**This is an emergency** Discuss immediately with a GI surgeon.
	Upper GI source for bleeding	**This is an emergency** Discuss immediately with a gastroenterologist.
	Newly diagnosed neoplasia 2nd primary / tumour recurrence / advanced polyp	Refer urgently to the appropriate oncology team requesting an appointment within 2 weeks.
	If all tests are negative, but symptoms persist	1. Discuss with supervising gastroenterologist. 2. Consider capsule endoscopy (following use of a patency capsule – high risk of strictures). 3. Consider angiography. 4. Ask GP to monitor Hb as clinically indicated.

Bloating / abdominal cramps

Investigations	Potential results	Clinical management plan: abnormal results
1st line: Routine AND additional blood screen (p3–4)	Abnormal results	Follow treatment of abnormal blood results (p4).
Abdominal x-ray	Severe faecal loading	1. Full bowel clearance i.e. Picolax, Klean-Prep, Moviprep. 2. Maintenance bulk laxative. 3. Correct positioning on lavatory and pelvic floor exercises (p38–39).
Dietary history	Inadequate fluid Inadequate / Excessive fibre intake Excessive sorbitol Excessive caffeine	1. Dietary advice. 2. Referral to dietitian and ask patient to complete 7 day dietary diary.
Drug history		Consider stopping opiate drugs / metformin / statins / non steroidal anti-inflammatory drugs.
2nd line: OGD and duodenal aspirate and / or glucose hydrogen methane breath test	SIBO	Treatment for SIBO (p34).
Stool for faecal elastase	EPI	Treatment for EPI (p31).
Dietary history ± challenge test for carbohydrate malabsorption	Carbohydrate intolerance	Treatment for carbohydrate malabsorption (p32).
Ultrasound of biliary tree and abdomen and pelvis (and small bowel if no CT scan of abdomen and pelvis in the time symptoms have been present / last three months)	Suggestive of gallstones, inflammatory bowel disease, tumour recurrence, other	Discuss with supervising clinician and refer as clinically appropriate to a GI surgeon / gastroenterologist / oncology team.
MRI small bowel	Small bowel stenosis	Discuss with supervising clinician and refer as clinically appropriate to a GI surgeon / gastroenterologist / oncology team.
	If all tests are negative, but symptoms persist	1. Reassure. 2. Antispasmodics. 3. Low dose anti-depressants. 4. Consider referral for low FODMAPs diet. 5. Agent for neuropathic pain if pain severe. 6. Refer to pain clinic if pain severe. 7. Consider a referral for acupuncture. 8. Consider a referral for hypnotherapy.

Borborygmi

(A rumbling / gurgling noise produced by the movement of fluid or gas through the intestine)

Investigations	Potential results	Clinical management plan: abnormal results
1st line: Routine AND additional blood screen (p3–4)	Abnormal results	Follow treatment of abnormal blood results (p4).
OGD and duodenal aspirate and biopsies and / or glucose hydrogen methane breath tests	SIBO	Treatment for SIBO (p34).
	Enteric infection	Treat as recommended by microbiologist.
Carbohydrate challenge	Carbohydrate malabsorption	Treatment for carbohydrate malabsorption (p32).
If borgorygmi are present in combination with other symptoms: flushing, abdominal pain, diarrhoea, wheezing, tachycardia or fluctuation in BP		
2nd line: Fasting gut hormones + Urinary 5-HIAA + CT scan chest, abdomen and pelvis	Functioning NET e.g. carcinoid syndrome or pancreatic NET	Discuss and refer urgently to the appropriate neuroendocrine tumour team requesting an appointment within 2 weeks.
	If all tests are negative, but symptoms persist	Reassure.

Constipation / difficulty evacuating rectum

Investigations	Potential results	Clinical management plan: abnormal results
Dietary / lifestyle / medications assessment	Inadequate fibre intake	1. Dietary advice about healthy fibre and fluid intake. 2. Lifestyle advice about daily exercise 3. Making time to have a toileting routine, correct positioning on the lavatory. 4. Medications advice. 5. Rectal evacuant (e.g. glycerine suppositories). 6. Bulk laxative ± rectal evacuant. 7. Consider referral for biofeedback therapy (p37). 8. Consider use of probiotics.
	Reduced general exercise	
	Drug induced e.g. – opioid – ondansetron – anti-muscarinic – loperamide – iron supplement	
	Chronic constipation / evacuation disorder	
Abdominal / rectal examination	Anal fissure	1. Topical healing agent e.g. GTN or diltiazem gel (for 8 weeks). 2. Stool bulking / softening agent ± short term topical local anaesthetic. 3. If recurrent, consider referral for botulinum toxin treatment. 4. If fissure not healed after 2 months, refer for surgical opinion.
Routine blood screen and additional blood screen	Dehydration	Encourage oral fluid intake.
	Hypothyroidism	1. Repeat thyroid function test. 2. Inform GP and follow management (p4).
	Elevated calcium	Follow management (p4).
Abdominal x-ray	Faecal loading / faecal impaction	1. Full bowel clearance e.g. Picolax, Klean-Prep. 2. Maintenance bulk laxative. 3. Correct positioning on lavatory and pelvic floor exercises (p38–39).
Transit study	Slow GI transit	Discuss and refer to a gastroenterologist routinely.
Colonoscopy / CT pneumocolon *if new onset* Flexible sigmoidoscopy for long standing problems	Newly diagnosed neoplasm	Discuss and refer to oncology team, requesting appointment within 2 weeks.
	Newly diagnosed IBD	If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
	Anastomotic stricturing	Discuss with supervising clinician.
	Anterior resection syndrome	1. Pelvic floor exercises (p38). 2. Bulking agent. 3. Antidiarrhoeal medication. 4. Low dose tricyclic / SSRI anti-depressant. 5. Consider referral for sacral nerve / tibial nerve stimulation. 6. Consider referral to a GI surgeon for stoma formation.

Diarrhoea (stool type 6–7 Bristol Stool Chart)

Also use this section if patient has 'frequency of defecation', 'nocturnal defecation', or 'urgency of defecation'

Investigations	Potential results	Clinical management plan: abnormal results
Dietary / lifestyle / medications assessment	High dietary fat intake Low / high fibre intake High fizzy drink intake High use of sorbitol – containing sugar chewing gum or sweets High caffeine intake High alcohol intake	1. Dietary advice about healthy fibre and dietary fat intake. 2. Referral to dietitian and ask patient to complete 7 day dietary diary beforehand. 3. Lifestyle advice about smoking cessation. 4. Consider referral for psychological support. 5. Medications advice. 6. Anti-diarrhoeal ± bulk laxative.
	Anxiety	
	Drug induced: e.g. – PPIs – Laxatives – Beta blockers – Metformin	
Routine AND additional blood screen (p3–4)	Abnormal results	Follow treatment of abnormal blood results (p4).
	Mg2+ low	Follow treatment of abnormal blood results (p4).
	Coeliac disease	1. If IgA deficient, request IgG coeliac screen. 2. Confirm with duodenal biopsy. 3. Refer to dietitian for gluten free diet. 4. Liaise with GP regarding long term monitoring of bone densitometry and referral to a coeliac clinic.
Stool sample: for microscopy, culture and Clostridium Difficile toxin	Stool contains pathogen	Treat as recommended by the microbiologist and local protocols.
Stool sample: for faecal elastase	EPI	See EPI (p31)
OGD with duodenal aspirate and biopsies and / or glucose hydrogen (methane) breath test	SIBO	Treatment for SIBO (p34).
Carbohydrate challenge	Specific disacharride intolerance	Appropriate treatment (p32).
SeHCAT scan	BAM	Treatment for BAM (p30).

Diarrhoea (continued)

Investigations	Potential results	Clinical management plan: abnormal results
1st line: Flexible sigmoidoscopy with biopsies from non-irradiated bowel (avoid biopsies from areas obviously irradiated in sigmoid and rectum)	Radiation proctopathy and frequency of defaecation	1. Pelvic floor and toileting exercises (p38–39) – min. 6 weeks. 2. Add stool bulking agent to pelvic floor exercise regimen. 3. Anti-diarrhoeal ± stool bulking agent.
	Radiation proctopathy / colopathy and pelvic floor dysfunction (p33)	1. Anti-diarrhoeal. 2. ± stool bulking agent. 3. ± pelvic floor and toileting exercises (p38–39).
	Macroscopic colitis	1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
	Microscopic colitis	Discuss with supervising clinician and refer to a gastroenterologist.
2nd line: Colonoscopy with biopsies	Macroscopic or microscopic colitis	As above.
	Organic cause (e.g. infection, inflammation, neoplastic)	Discuss with the appropriate clinical team within 24 hours.
If diarrhoea is present in combination with other symptoms: flushing, abdominal pain, borborygmi, wheezing, tachycardia or fluctuation in BP		
3rd line: Gut hormones (Chromogranin A&B, gastrin, substance P, VIP, calcitonin, somatostatin, pancreatic polypeptide) and Urinary 5-HIAA and CT chest, abdomen and pelvis	Functioning NET e.g. carcinoid syndrome or pancreatic NET	Discuss and refer to the appropriate neuroendocrine tumour team requesting an appointment within 2 weeks.
	If all tests are negative, but symptoms persist	Reassure and suggest symptomatic treatment with anti-diarrhoeal drugs. Trial of low dose tricyclic antidepressants. Biofeedback.

Note: faecal calprotectin as a marker for bowel inflammation is too non-specific and hence not recommended in this population

Faecal incontinence
(Soiling / leakage / using pads)

Investigations	Potential results	Clinical management plan: abnormal results
1st line: Routine AND additional blood screen (p3–4)	Abnormal results	Follow treatment of abnormal blood results (p4).
Rectal examination Anoscopy Flexible sigmoidoscopy	Pelvic floor dysfunction (p33) with radiation proctopathy and faecal incontinence / leakage OR Anal sphincter defect	1. Pelvic floor and toileting exercises (p38–39). 2. Stool bulking ± anti-diarrhoeal agent 3. Anti-diarrhoeal agent ± stimulant laxative suppositories / enemas 4. Topical sympathomimetic agent (e.g. phenylephrine). 5. Perianal skin care (p44). 6. Referral for biofeedback. 7. Consider referral to a specialist centre for sacral nerve stimulation. 8. Consider referral to a specialist centre for defunctioning surgery / sphincter repair.
	Stool consistency: type 6–7	See 'Diarrhoea' (p15).
	Constipation with overflow diarrhoea	See 'Constipation' (p14).
	Mucus leakage	See 'Mucus discharge' (p20).
	Mucosal prolapse	Routine referral to a GI surgeon.
	Unrelated to radiotherapy (e.g. childbirth, previous sphincter surgery, haemorrhoidectomy, idiopathic)	Refer to a specialist team for management of faecal incontinence.
2nd line: Endo anal ultrasound AND Anorectal physiology	Muscular incoordination or inadequate function Significant sphincter defect	Pelvic floor and toileting exercises (p38–39). Bulking agent (Normacol or loperamide). Biofeedback (p37). Discuss with supervising clinician and routine referral to GI surgeon for consideration of sacral nerve stimulation.

Flatulence (oral – burping)

Investigations	Potential results	Clinical management plan: abnormal results
Dietary assessment	High intake of fizzy drinks	Reduce intake of fizzy drinks and discuss alternatives.
1st line: OGD and D2 aspirate and / or glucose hydrogen (methane) breath test	SIBO	Treatment for SIBO (p34).
2nd line: Abdominal x-ray	Faecal loading	See 'Constipation' (p14).
	If all tests are negative, but symptoms persist	Discuss 'aerophagia' with patient.

Flatulence (rectal)

Investigations	Potential results	Clinical management plan: abnormal results
Dietary assessment	Excess / deficient fibre intake / resistant starch Inadequate fluids	Referral to dietitian and ask patient to complete 7 day dietary diary in advance. Dietitian to assess food diary to determine dietary fibre intake. Give appropriate advice.
1st line: OGD and D2 aspirate and / or glucose hydrogen (methane) breath test	SIBO	Treatment for SIBO (p34).
2nd line: Abdominal x-ray	Constipation	See 'Constipation' (p14).
	Faecal loading	1. Full bowel clearance e.g. Picolax, Klean-Prep, Moviprep. 2. Maintenance bulk laxative. 3. Correct positioning on lavatory and pelvic floor exercises (p38–39).
Flexible sigmoidoscopy	Newly diagnosed neoplasm	Refer urgently to the appropriate oncology team requesting an appointment within 2 weeks.
	Newly diagnosed IBD	1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
Rectal examination	Pelvic floor dysfunction (p33) Lax sphincter muscle	1. Pelvic floor and toileting exercises (p38–39). 2. Stool bulking ± anti-diarrhoeal agent. 3. Anti-diarrhoeal agent. ± stimulant laxative suppositories / enemas. 4. Referral for biofeedback (p37).

Loss of sensation
(Unable to discriminate between need to defecate and pass urine)

Investigations	Potential results	Clinical management plan: abnormal results
Neurological examination (including perianal sensation)	Abnormal examination (e.g. suspected spinal cord compression, cauda equina syndrome, neurogenic bladder)	**This is an emergency** Discuss immediately with an oncology or neurology team.
Routine blood screen and ESR, Vit B12, red cell folate	Abnormal results	Follow treatment of abnormal blood results (p4).
Consider MRI pelvis	Tumour recurrence or other cause for neurological dysfunction	Discuss immediately with supervising clinician.
	Related to radiotherapy or surgery	1. Pelvic floor and toileting exercises (p38–39). 2. Bulking agent ± anti diarrhoeal. 3. Consider referral for biofeedback (p37).

Mucus discharge

Investigations	Potential results		Clinical management plan: abnormal results
Dietary assessment	Excessive dietary fibre intake		1. Refer to dietitian for detailed dietary review and advice. 2. Pelvic floor and toileting exercises (p38–39).
Rectal examination	Haemorrhoids		Stool bulking / softening agent. ± short term topical local anaesthetic.
	Lesion	Anal	Refer urgently to a GI surgeon.
		Rectal	Refer for a flexible sigmoidoscopy within 2 weeks.
Flexible sigmoidoscopy	Anorectal ulcer		Determine patient is not on nicorandil for angina.
	Neoplastic		Refer urgently to the appropriate oncology team requesting an appointment within 2 weeks.
	Rectal mucosal prolapse		Refer to a GI surgeon.
	Traumatic ulceration / solitary rectal ulcer syndrome		Refer to a gastroenterologist.
	If radiation ulceration related		**Do not biopsy** 1. Sucralfate enemas. 2. Consider stool bulking / softening agent. 3. Antibiotics. 4. Consider hyperbaric oxygen therapy. 5. Refer to a specialist.
	Carpet villous adenoma		Refer for endoscopic removal.
	Newly diagnosed neoplasm		Refer to the appropriate oncology team requesting an appointment within 2 weeks.
	IBD		1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
OGD and D2 aspirate and / or glucose hydrogen (methane) breath test	SIBO		Treatment for SIBO (p34).

Nausea and vomiting

Investigations	Potential results	Clinical management plan: abnormal results
Fundoscopy	Raised ICP	**This is an emergency** Discuss immediately with supervising clinician and the oncology or neurology team.
Trial of proton pump inhibitor	Inflammatory (acid related)	Reassess after 2–4 weeks as clinically indicated.
Blood screen + morning coritsol level	Metabolic abnormality	Discuss with supervising clinician and consider referral to endocrinology within 24 hours.
	Liver / biliary abnormality	Discuss with supervising clinician within 24 hours.
	Suggestive of infection	Treat with antibiotics within level of confidence or discuss with microbiologists and supervising clinician.
Urine analysis	Metabolic abnormality e.g. glucosuria, ketonuria	Discuss immediately with supervising clinician.
	Infection	Treat with antibiotics within level of confidence or discuss with microbiologists and supervising clinician within 24 hours.
OGD ± asssessment for helicobacter pylori	Inflammatory / ulcerative disease	1. PPI and helicobacter eradication therapy. 2. Sucralfate. 3. Promotility agents. 4. Discuss with supervising clinician need for future repeat endoscopy.
	Gastric dysmotility	Consider a prokinetic medication (p45). (e.g. domperidone, metoclopramide, erythromycin).
Glucose hydrogen (methane) breath test	SIBO	Treatment for SIBO (p34).
Hepatic and pancreatic ultrasound	Biliary / hepatic/ pancreatic aetiology	Discuss with gastroenterologist or hepatology team. If acute jaundice / cholangitis: **This is an emergency**.
CXR / CT / MRI (including CNS)	Local or distal infection	Treat with antibiotics within level of confidence or discuss with microbiologists and supervising clinician.
	Central nervous system pathology	**This is an emergency** Discuss immediately with supervising clinician and the oncology or neurology team.
	Bowel obstruction	**This is an emergency** Discuss immediately with a GI surgeon.
	If all tests are negative, but symptoms persist	1. Consider contributing psychological factors. 2. Consider referral for psychological support if there is a possible underlying eating disorder. 3. Consider a routine referral to a gastroenterologist for further management.

Pain (abdominal)

Investigations	Potential results	Clinical management plan: abnormal results
1st line: Dietary assessment	Inappropriate fluid and fibre intake Excessive sorbitol Excessive caffeine	Dietary advice about healthy fibre and general dietary intake.
Medication assessment	Drug induced e.g. – opioid – ondansetron – anti-muscarinics – loperamide – iron supplement – statin – metformin	Medications advice.
Routine blood tests and calcium, ESR, CRP	Abnormal results	Follow treatment of abnormal blood results (p4).
Abdominal x-ray	Faecal loading / faecal impaction	1. Full bowel clearance e.g. Picolax, Klean-Prep. 2. Maintenance bulk laxative. 3. Correct positioning on lavatory (toileting exercises) (p39).
2nd line: OGD and duodenal aspirate ± glucose hydrogen (methane) breath tests	SIBO	Treatment for SIBO (p34).
Flexible sigmoidoscopy	Newly diagnosed IBD	1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.
Ultrasound of biliary tree and small bowel (if no recent CT scan of abdomen and pelvis)	Suggestive of gallstones, inflammatory bowel disease, tumour recurrence, other	Discuss with supervising clinician within 24 hours and refer as clinically appropriate to a GI surgeon / gastroenterologist / oncology team.
	If all tests are negative, but symptoms persist	1. Consider CT abdomen and pelvis. 2. Consider lower GI endoscopic assessment. 3. Refer to a specialist pain team for further assessment. 4. Consider antispasmodics. 5. Consider low dose anti-depressants. 6. Consider agent for neuropathic pain. 7. Consider referral for acupuncture.

Pain (back – new onset)

Investigations	Potential results	Clinical management plan: abnormal results
Neurological examination (including perianal sensation)	Abnormal examination (e.g. suspected spinal cord compression)	**This is an emergency** Discuss immediately with an oncology or neurology team.
Symptom assessment	Pain over the renal angle	1. Consider pyelonephritis kidney infection / stone / urinary tract infection. 2. Urine dip stick and urine sample for culture and sensitivity. 3. Consider renal ultrasound.
	Pain in the lower flank	Consider constipation, faecal loading and faecal impaction (p14).
	Pain in the lower back	1. Consider lower back fracture. 2. Request a spinal (thoracic / lumbar) x-ray. 3. Consider MRI.
	Bone pain	Consider a bone scan and myeloma screen.
Routine blood screen and additional blood screen	Abnormal results suggesting cancer relapse	Discuss immediately with supervising clinician.
CT / MRI / PET scan abdomen and pelvis	Colonic faecal loading	See 'Constipation' (p14).
	Acute bowel obstruction	**This is an emergency** Discuss immediately with a GI surgeon.
	Spinal fracture	Discuss immediately with supervising clinician.

Pain (anal / perianal / rectal): typical proctalgia fugax

(A sudden, severe pain in the anorectal region lasting less than 20 minutes, resolving spontaneously)

Investigations	Potential results	Clinical management plan: abnormal results
Symptom assessment	Spasm of the levator ani muscles	**Treatment for rectal spasm** 1. Pelvic floor and toileting exercises (p38–39). 2. Consider a low dose anti-depressant. 3. Consider a trial of an inhaled beta 2 agonist. 4. Consider referral to a specialist centre for biofeedback (p37). 5. Consider referral for acupuncture.

Pain (anal / perianal / rectal): related to defecation

Investigations	Potential results	Clinical management plan: abnormal results
Medication assessment	On nicorandil	Liaise with cardiology team and GP to offer alternative medication.
Visual assessment 1st line: Anoscopy and flexible sigmoidoscopy 2nd line: MRI	Haemorrhoids	1. Stool bulking / softening agent ± short term topical local anaesthetic. 2. Consider referral for surgical review for grade 3 or 4 haemorrhoids.
	Anal fissure	1. Topical healing agent e.g. GTN or diltiazem gel (for 8 weeks). 2. Stool bulking / softening agent ± short term topical local anaesthetic. 3. If fissure not healed after 2 months, refer for surgical opinion.
	Anorectal fistula	1. Pelvic MRI. 2. Refer to a colorectal surgeon.
	Anorectal abscess	**This is an emergency** Discuss immediately with a colorectal surgeon regarding treatment with antibiotics and/ or drainage.
	Anorectal ulcer	Check patient is not on nicorandil.
	Mucosal prolapse / solitary rectal ulcer	Refer to GI surgeon / gastroenterologist.
	Neoplastic ulcer	Refer urgently to appropriate oncology team requesting an appointment within 2 weeks.
	If radiation–ulceration related	**Do not biopsy** 1. Sucralfate enemas. 2. Consider stool bulking / softening agent. 3. Antibiotics. 4. Consider hyperbaric oxygen therapy. 5. Refer to a specialist centre.
	If all tests are negative, but symptoms persist	1. Consider investigation under anaesthesia. 2. Pelvic floor and toileting exercises (p38–39). 3. Stool bulking agent ± laxative. 4. Consider a referral for acupuncture. 5. Consider referral to a specialist pain team. 6. Consider a low dose anti-depressant. 7. Consider an agent for neuropathic pain. 8. Consider referral for a urological / gynaecological opinion.

Pruritus (perianal)

Investigations	Potential results	Clinical management plan: abnormal results
Symptom assessment	Perianal pruritus mainly present during the night	1. Consider enterobiosis (eggs are not visible with the naked eye and stool samples are only positive in 5–15%). 2. Send a sample of transparent adhesive tape (e.g. Scotch Tape) applied on the anal area for microscopic analysis.
	Due to excess pancreatic enzyme replacement	Alter dose.
Visual assessment	Changes due to radiotherapy	1. If soiling see guidance for faecal incontinence (p17). 2. If loose stool / diarrhoea present investigate for possible causes (p15). 3. Perianal skin care (p44). 4. Topical barrier agent. 5. Topical corticosteroids (Trimovate). 6. Consider referral to dermatologist.
	No changes due to radiotherapy	1. Perianal skin care (p44). 2. Consider referral to dermatologist.
Proctoscopy / flexible sigmoidoscopy	Haemorrhoids	1. Stool bulking / softening agent ± short term topical local anaesthetic. 2. Consider referral for surgical review for grade 3 or 4 haemorrhoids.
	Anal fissure	1. Topical agent e.g. GTN or diltiazem gel (for 8 weeks). 2. Stool bulking / softening agent. ± short term topical local anaesthetic. 3. If fissure not healed after 2 months, refer for surgical opinion.
	Anorectal fistula	1. Pelvic MRI. 2. Refer to a colorectal surgeon.
	Anorectal abscess	**This is an emergency** Discuss immediately with a GI surgeon regarding treatment with antibiotics and drainage.
	Anorectal ulcer	Check patient is not on nicorandil.
	If radiation related:	**Do not biopsy** 1. Sucralfate enemas. 2. Consider stool bulking / softening agent. 3. Antibiotics. 4. Consider of hyperbaric oxygen therapy. 5. Refer to a specialist centre.
	Mucosal prolapse / solitary rectal ulcer	Refer to colorectal surgeon / gastroenterologist.
	Neoplastic ulcer	Refer urgently to appropriate oncology team requesting an appointment within 2 weeks.

Steatorrhoea
(the presence of excess fat in the stool)

Investigations	Potential results	Clinical management plan: abnormal results
1st line: Stool sample for faecal elastase	EPI	See EPI (p31).
Routine blood screen and additional blood screen	Addison's disease Coeliac disease Thyroid dysfunction	Follow treatment abnormal blood results (p4).
SeHCAT scan	BAM	Treatment for BAM (p30).
Glucose hydrogen (methane) breath test for bacterial overgrowth and / or OGD and D2 asp and biopsies	SIBO	Treatment for SIBO (p34).
	Intestinal parasites	Treat with antibiotics within level of confidence or discuss with microbiologists and supervising clinician.
2nd line: Gut hormones (Chromogranin A&B, gastrin, substance P, VIP, calcitonin, somatostatin, pancreatic polypeptide) and Urinary 5-HIAA and CT / MR liver and abdomen	Pancreatic neuroendocrine tumour	Discuss and refer urgently to the appropriate neuroendocrine tumour team requesting an appointment within 2 weeks.
CT abdo pelvis / capsule endoscopy / MRI enteroclysis	Small intestinal disease other than radiotherapy induced (e.g. lymphoma)	Discuss immediately and refer urgently to the appropriate team requesting an appointment within 2 weeks.
	If all tests are negative, but symptoms persist	1. Trial of empirical antibiotics to exclude test negative SIBO (p34). 2. Trial of low fat diet.

Tenesmus

(A feeling of constantly needing to pass stools, despite an empty rectum)

Investigations	Potential results	Clinical management plan: abnormal results
Flexible sigmoidoscopy	Radiation proctopathy Anterior resection syndrome	1. Pelvic floor and toileting exercises (p38–39). 2. Stool bulking agent. 3. Low dose anti-depressants. 4. Consider referral to a specialist centre for biofeedback (p37). 5. Consider referral for acupuncture.
	Polyp	Arrange endoscopic / surgical removal.
	Newly diagnosed neoplasm	Refer urgently to the appropriate oncology team requesting an appointment within 2 weeks.
	Newly diagnosed IBD / infection	1. Send stool culture. 2. If mild or moderate, refer within 2 weeks to a gastroenterologist. If severe, **this is an emergency** – discuss immediately with a gastroenterologist.

Weight loss (unexplained)

Investigations	Potential results	Clinical management plan: abnormal results
Dietary assessment	Inadequate dietary intake	1. Dietary advice and consider nutritional supplement. 2. Refer for specialist dietetic assessment and advice.
Symptom assessment	No other GI symptoms present	1. Discuss with supervising clinician or 2. Request OGD, colonoscopy, CT chest, abdomen and pelvis.
	If GI symptoms present	Follow algorithm.
Routine and additional blood screen (p3–4) and myeloma screen	Abnormal results e.g. thyrotoxicosis, new onset diabetes mellitus, Addison's disease	Follow treatment of abnormal results (p4).
OGD Colonoscopy CT chest abdomen and pelvis	Organic cause (e.g. infection, inflammation, neoplastic)	Discuss with supervising clinician within 24 hours.
	No organic cause identified	Refer to dietitian and review regularly. Consider psychological causes e.g. depression / eating disorder. Refer to appropriate cancer MDT for consideration of PET scan.

Appendix: Common conditions in this group

Bile acid malabsorption (BAM)
Exocrine pancreatic insufficiency (EPI)
Carbohydrate malabsorption – for example, lactose or other disaccharide intolerance
Pelvic floor dysfunction
Small intestinal bacterial overgrowth (SIBO)

Bile acid malabsorption (BAM)

Definition:

BAM is a defect in the enterohepatic circulation of bile acids. Two types of BAM exist: ileal dysfunction whereby the ability to absorb bile acids in the terminal ileum is impaired and secondly, hepatic overproduction that overwhelms terminal ileal absorption capacity.[1] Bile is secreted by the liver in direct response to the amount of ingested dietary fat.

Common causes:

- High dose chemotherapy
- Ileal disease / resection
- Upper GI resectional surgery including cholecystectomy
- Pancreatic disease
- Pelvic radiotherapy
- Idiopathic

Diagnosis:

- SeHCAT scan
- C4 blood test
- Trial of bile acid sequestrant

Severity scores of bile acid malabsorption

7 day SeHCAT retention	BAM status
10–15%	Mild BAM
5–10%	Moderate BAM
<5%	Severe BAM

Treatment:

Options include:
1. dietary fat reduction
2. antidiarrhoeal medication
3. bile acid sequestrant

Options 1 and 2 may be useful in mild BAM. Generally bile acid sequestrants are required for moderate BAM. For severe BAM developing after radiotherapy, most patients need a bile acid sequestrant and advice about long-term reduction in dietary fat intake.[2]

Drugs that may be helpful include aluminium hydroxide, budesonide, colesevelam, colestipol and colestyramine.

Patients with steatorrhoea usually require colesevelam.

If dietary intervention is required, advice to reduce dietary fat intake to 20% of total calories can be useful but requires dietetic expertise, patient education and supportive literature.

Many patients with moderate / severe BAM will be deficient in trace elements and fat soluble vitamins. These should be checked periodically and supplemented as appropriate.

Exocrine pancreatic insufficiency (EPI)

Definition:
EPI is the inadequate production and secretion of pancreatic enzymes and may occur after pelvic radiotherapy with para-aortic lymph node irradiation.[3,4]

Diagnosis:
Non-liquid stool sample for faecal elastase measurement (<200µg FE1 per 1g stool) – N.B. Falsely low readings may be present in patients with small bowel bacterial overgrowth.

Clinical response to pancreatic replacement.

Treatment:
- Pancreatic enzyme replacement therapy: requires equivalent of 150,000 international units Creon per day.
- Optimal 30–50,000 units with each meal, 10–30,000 units with drinks and snacks, depending on size of snack.
- Consider long-term multi vitamin and trace element supplementation.
- Occasionally dietary advice is also required to optimise bowel function.
- Occasionally addition of proton pump inhibitor is required to reduce loss of replacement enzymes by gastric acid.

Long-term management:
Ongoing treatment with pancreatic enzyme replacement medication.

Carbohydrate malabsorption – for example lactose or other disaccharide intolerance

Definition:
Intolerance occurs from the inability to digest carbohydrates. Lactose, a component of milk and some other dairy products, is the intolerance most frequently recognised. It is due to lack of the enzyme lactase in the small intestine. Primary hypolactasia affects 70% of the world's population. Lactose or other disaccharide or monosaccharide (eg, fructose) malabsorption may occur de novo during cancer therapies (such as 5-FU chemotherapy or radiotherapy), due to damage to brush border enzymes and in some patients persists long-term.[5,6]

Diagnosis of carbohydrate intolerance:
- Trial of exclusion of products containing that specific carbohydrate in diet for 1 week. Patient to keep a record of symptoms before and during the exclusion.
- Specific carbohydrate breath test. Duodenal biopsies and assessment for the specific disaccharide or monosaccharide activity.

Treatment:
- Long-term exclusion of products containing the carbohydrate in diet.
- Dietitian assessment to ensure diet remains balanced. With lactose intolerance special attention should be paid to calcium intake. Other bone health risk factors should also be considered and vitamin and mineral supplementation started as appropriate.[5]

Pelvic floor dysfunction

Definition:
Symptoms of pelvic floor dysfunction include urinary incontinence, bladder storage problems, altered bladder sensation, voiding and post micturition problems, anorectal symptoms, pelvic pain, sexual difficulties and pelvic organ prolapse (in females). Anorectal symptoms can include faecal incontinence, flatal incontinence, faecal urgency, straining to defecate, tenesmus, diminished rectal sensation, constipation, rectal prolapse, rectal bleeding and mucus discharge.[7]

Diagnosis:
- rectal examination (sphincter tone and squeeze).
- endo-anal ultrasound.
- anorectal physiology investigations:
  - anal resting pressure.
  - sphincter muscle squeeze.
  - 15 seconds squeeze.
  - rectal sensitivity to rectal distension.

Treatment:
- pelvic floor exercises (p38).
- toileting posture exercises (p39).
- biofeedback (p37).

A contributing factor is often constipation and a non-fermentable stool bulking agent such as Normacol can be helpful to restore rectal volume and is less likely to cause flatulence than other fibre supplements.

Small intestinal bacterial overgrowth (SIBO)

Definition:
SIBO is the presence of excessive bacteria in the small intestine. Small bowel bacterial overgrowth occurs in 25% of patients during the acute phase of radiotherapy and is a cause of diarrhoea in up to 15% of patients after radiotherapy.[8,9,10]

Diagnosis:[11]
- There is no gold standard for diagnosing SIBO.[12]
- Glucose hydrogen / methane breath testing ± duodenal (D2) aspirate via upper GI endoscopy.
- RBC folate and total serum bile acid levels may be elevated and vitamin B12 levels and faecal elastase may be low.
- 10–15% patients with negative tests still have SIBO.

Suggested antibiotic treatment options if no growth on culture to direct treatment
7–10 days treatment with:
- Ciprofloxacin 500mg bd
- Doxycycline 200mg day 1, 100mg days 2–7 / 10
- Clarithromycin 500mg bd
- Metronidazole 400mg tds
- Rifaximin 550mg bd.

Symptoms can recur any time after antibiotics are stopped because the underlying cause of bacterial overgrowth can not always be addressed. If symptoms return, repeat treatment with antibiotics for a few days every month or continually at the lowest effective dose may be helpful in managing symptoms long-term. Some clinicians recommend rotating antibiotics but this may not be effective if the organisms involved are not sensitive to the antibiotics used.

Treatment decisions should be individualised and consider the risks of long term antibiotic therapy such as Clostridium difficile infection, cumulative irreversible neuropathy with metronidazole, Achilles tendon rupture with ciprofloxacin, intolerance, side-effects, bacterial resistance and costs.[8,9,10,11,12]

Appendix: Management techniques

Written information is often helpful to supplement the management of specific diagnoses. If information sheets are not available locally, information sheets on the following can be obtained from Dr. Andreyev's office at The Royal Marsden (020 7811 8216):

1. advice for those with constipation or who often need to strain
2. having a SeHCAT scan
3. having a glucose hydrogen / methane breath test
4. pancreatic insufficiency.

Specific leaflets are also available on the following treatments:

1. lactose free diet
2. managing fibre in your diet
3. taking anti-diarrhoeal medication
4. taking colesevelam
5. taking loperamide
5. taking Normacol
6. treatment of radiation-induced gastrointestinal bleeding.

Dietary fibre manipulation

The mean UK average consumption of non-starch polysaccharides for healthy adults (aged 19–64 years) is 14.9g / day for men and 12.8g /day for women.[13] The current dietary recommended daily intake for fibre – 18g non-starch polysaccharides per day – is based on the effect that total dietary fibre has on stool weight. The rationale for this is that daily stool output of <100g / day is associated with a non-starch polysaccharides intake of below 12g /day and with an increased risk of bowel disease. In healthy populations, increasing non-starch polysaccharides intake from 13 to 18g /day is associated with a 25% increase in stool weight. Some patients after pelvic radiotherapy cannot tolerate as much fibre as this.

Reduction in dietary fibre intake can be helpful when patients complain of any of the following symptoms: bloating, constipation, bowel obstruction, diarrhoea, rectal flatulence, mucus discharge and abdominal pain and may require help from a dietitian.[13,14,15]

Biofeedback

Biofeedback is widely regarded as a useful, non-invasive treatment in constipation, evacuatory disorders and faecal incontinence. Biofeedback is a behavioural approach to which there are no side effects and offers a non-surgical approach for patients with bowel dysfunction. It includes toileting exercises and pelvic floor exercises.[16,17]

Biofeedback services are available locally around the UK.

Pelvic floor exercises

The pelvic floor muscles include the levator ani, the coccygeus and associated connective tissue and, if weakened, can cause several symptoms associated with pelvic floor dysfunction (p33). Exercises can strengthen the pelvic muscles so that they give support and are better coordinated. Pelvic floor exercises can improve problems with urinary incontinence, faecal incontinence or leakage and sexual function.[18,19]

Technique:

1. Sit, stand or lie with your knees slightly apart. Tighten and pull up your bottom muscles as tightly as you can. Hold for at least 5 seconds and then relax for at least 10 seconds. Repeat at least five times. This will work on the strength of your muscles.

2. Next, pull the muscles up to about half of their maximum squeeze. See how long you can hold this for. Then relax for at least 10 seconds. Repeat at least five times. This will work on the endurance or staying power of your muscles and will improve their coordination.

3. Pull up the muscles as quickly and tightly as you can and then relax and then pull up again, and see how many times you can do this before you get tired. Try for at least five quick pull-ups.

4. Repeat exercises 1, 2 and 3 at least 10 times every day.

5. As the muscles get stronger, you will find that you can hold for longer than 5 seconds, and that you can do more pull-ups each time without the muscle getting tired.

Patient information:
www.yourpelvicfloor.co.uk

Toileting exercises

Adopting the correct position on the lavatory can improve constipation and ease evacuation difficulties together with pelvic floor exercises.[20]

The brace position

1. Knees higher than hips
2. Lean forward and put elbows on your knees
3. Relax shoulders
4. Bulge out your abdomen

Technique:

1. Sitting on the toilet, lean forward with the forearms resting on your thighs and raise your feet 8–10 inches off the floor.

2. Relax and lower the shoulders. Breathe slowly, regularly and gently – do not hold your breath as this will encourage straining. Try and stay as relaxed as possible

3. Try and brace your abdominal muscles. This is best done by putting your hands on your waist. Expand your waist and feel your hands being pushed out sideways. Concentrate on relaxing your anus to allow the stool to pass. Only push down from above once your anus is relaxed.

4. Relax very slightly for 1 second maintaining pressure but without the push.

5. Then brace outwards and push down again.

6. Repeat steps 1–5.

Advise the patient to be careful to relax and use the correct technique, not to spend endless time in the toilet and not to strain – try again the next day. Excessive straining uses the wrong muscles and does not help the evacuating process.

Treating bleeding telangiectasia

Radiation-induced bleeding typically starts 6–12 months after radiotherapy, is at its worse 4 years after the end of radiotherapy and has disappeared by 8–10 years.

1. Investigate with flexible endoscopy to determine the cause of the bleeding.

2. Optimise bowel function and stool consistency.

3. If bleeding is not staining clothes, causing anaemia or interfering with daily activities, reassure and do nothing.

4. If bleeding affects quality of life, stop anticoagulants if possible and consider sucralfate enemas ± metronidazole 400mg tds for 4 weeks.

5. Discuss definitive treatment to ablate the telangiectasia:

   A. **Hyperbaric oxygen therapy**: Advantages: supported by RCT evidence, may improve other symptoms, for example, urinary; disadvantages: time consuming (8 weeks of daily treatment), expensive and patients may need to travel long distances to their nearest unit.

   B. **Any thermal therapy (eg APC)**: Advantages: easily available and simple; disadvantages: significant risk of non-healing ulceration / perforation as the tissue is ischaemic and unproven efficacy in heavy bleeding. Absolutely contraindicated in patients treated with brachytherapy. If used, the bowel must be fully prepared (as for colonoscopy).

   C. **Formalin therapy**: Advantages: simple to perform; disadvantages: long-term outcomes poorly known, small risks of serum sickness, severe proctitis or chemical burn to the skin if there is spillage.

Using intra-rectal formalin for radiation induced telangiectasia

Formalin chemically cauterises by hydrolysing protein and superficially coagulating the tissue. In general, the procedure seems to be effective, safe, well tolerated by the patient, inexpensive and technically simple.[21,22,23,24,25]

The use of intrarectal formalin for radiation-induced bleeding is contraindicated if the rectal mucosa is ulcerated.

Preparation:

- Prepare the bowel as for colonoscopy with full bowel preparation.
- Use a gastroscope not a colonoscope.
- 30–35mL of 5% formalin is usually sufficient to cover the telangiectasia.
- Initial instillation of saline can help assess how much formalin will be required.

Technique:

- Patient position: prone.
- Instil the formalin through a catheter passed through the gastroscope channel into the rectum.
- Apply with wet cloths and continued pressure to the perianal area to prevent leakage of formalin during the procedure (by endoscopy nurse).
- Keep the gastroscope in place during the procedure.
- Leave the formalin in the rectum for 3 minutes exactly.
- Then remove the formalin with copious washes of water.
- Continue the perianal pressure / pads until all of the rectal formalin removed.

Considerations after treatment:

- Advise patients they may not notice any improvement in bleeding for 1–2 weeks.
- Consider the use sucralfate enemas for 2–3 weeks twice daily to help healing.
- Consider retreating if necessary 6–8 weeks later and repeat if necessary a third time after a further 6–8 weeks.

How to refer for hyperbaric oxygen therapy

Hyperbaric oxygen for radiation-induced damage requires a funding application to the Specialised Commissioning Group. The local hyperbaric oxygen unit and the referring clinician need to fill in the application jointly.[26]

Hyperbaric units that provide medically supervised hyperbaric oxygen therapy with the correct pressures believed to be useful for treating radiation injury are only found at the following centres:

- DDRC Hyperbaric Medical Centre, Tamar Science Park, Plymouth
- James Paget Hospital, Great Yarmouth
- Midlands Diving Chamber, Hospital of St Cross, Rugby
- Spire Hospital, Cardiff
- Spire Hull and East Riding Hospital, Hull
- Spire Murrayfield Hospital, Wirral
- St John and Elizabeth Hospital, North London
- St Richards Hospital, Chichester
- Whipps Cross Hospital, East London

There is no evidence at all that non-medically supervised hyperbaric oxygen therapy as provided by MS treatment centres is of any benefit for treating radiation-induced toxicity.

For further information on managing GI bleeding, please see the BSG / ASCPGBI / AUGIS / Royal College of Radiology Guidance published: Gut 2012;61:179–192: *Practice guidance on the management of acute and chronic gastrointestinal problems arising as a result of treatment for cancer* (open access publication).

Sucralfate enemas

Sucralfate forms a mechanical protective layer over radiation-induced telangiectasia and improves healing.

1. Use 2g (10mL) sucralfate suspension (1g in 5mL) made up to 50mL using warm tap water in a bladder syringe.
2. Attach a soft, lubricated Foley catheter to the syringe.
3. The patient should insert the catheter gently into their rectum and instil the enema twice a day until the bleeding has stopped.
4. The enema should be held in the rectum as long as possible.
5. The patient should roll over at least once to coat the entire rectum but spend the majority of the time lying prone so the solution treats the anterior rectal wall.
6. Long-term once-daily enemas may help prevent the bleeding recurring.
7. If bleeding starts again go back to using sucralfate enemas twice a day.

Perianal skin care

Radiotherapy skin reactions may present as skin irritation, erythema and ulceration and atrophy of the skin within the radiotherapy field that may be worsened by enzymes present in faecal fluid when incontinent or leaking (p17).

Key principles:[27,28]

- Keep skin dry
- Keep skin free of faeces
- Prevent the development of perianal dermatitis by:

1. Use 'simple' soap or 'Dove Sensitive' soap that will not affect the pH of the skin (normally 5.5). Regular soap has a pH of nine and can disrupt the skin pH which inhibits the growth of bacteria and thus increases dermatitis.

2. Treating the underlying cause:

- Use a skin barrier: cream or film.
  - Please note whether the patient has any allergies to any of the constituents.
  - If the skin is damaged, Cavilon No Sting Barrier Film or Epaderm can be very useful.
- Consider the use of antifungal creams or corticosteroids (for a short period only).
- Consider referral for specialist dermatology assessment and advice.

Patient information:
www.stmarkshospital.org.uk/patient-information-leaflets

Using prokinetics

Effects on stomach:[29,30]

- Erythromycin: largely ineffective after 4–8 weeks through tachyphylaxis. Recommended dose 250mg bd as a syrup 30 min before food.
- Domperidone: no tachyphylaxis for 8 weeks, may occur after longer use. Recommended dose 10mg qds 30 min before food as a syrup orally or 30mg qds as a rectal suppository. Increased risk of cardiac arrhythmia (NB MHRA advice issued 2014).
- Metoclopramide: risk of tardive dyskinesia with use >3 months.
- Naloxone by subcutaneous infusion
- Paroxetine that stimulates small intestinal motility only.

How to perform a duodenal aspirate

Treatment:

1. Flush 100mL of sterile saline into the duodenum via the endoscope channel

2. Follow this by 20mL of air to ensure no saline remains in the endoscope channel

3. Turn down the suction

4. Leave the fluid to equilibrate with the duodenal contents for 10–20 s

5. Aspirate 20mL of fluid into a sterile trap

6. Send the duodenal aspirate sample directly to microbiology.

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