W30: The Neurogenic Bowel – Pathophysiology, Assessment and Management

Workshop Chair: Anton Emmanuel, United Kingdom
09 October 2015 09:00 - 10:30

Start	End	Topic	Speakers
09:00	09:05	Introduction	Anton Emmanuel
09:05	09:20	Pathophysiology and Presentation followed by questions	Andrei Krassioukov
09:20	09:35	Assessment and Diagnostics followed by questions	Gabriele Bazzocchi
09:35	09:50	Conservative Management followed by questions	Elizabeth Shelly
09:50	10:10	Clinical Management followed by questions	Klaus Krogh
10:10	10:25	Trans-Anal Irrigation followed by questions	Anton Emmanuel
10:25	10:30	Wrap up	All

Aims of course/workshop

The majority of patients with chronic neurological illnesses such as spinal cord injury, Multiple Sclerosis, Spina Bifida and Cauda Equina Syndrome experience bowel dysfunction. Such Neurogenic Bowel Dysfunction (NBD) is often the most socially limiting and quality-of-life impairing aspect of care. There is an emerging body of evidence from epidemiological reports, physiological studies, controlled and uncontrolled trials.

The objective of the workshop is to definitively review prevalence, physiological mechanisms and the therapeutic options (conservative, medications, trans-anal irrigation and neuromodulation). A practical approach to management will be presented, and the session will end by exploring the areas for future study.

Learning Objectives

1. Understand the pathophysiology of neurogenic bowel dysfunction.

2. Undertake a structured clinical assessment of the patient with NBD.

3. Formulate clinical management strategies defined by the type of neurological injury.

Neurogenic Bowel Dysfunction – Pathophysiology and Presentation

Andrei Krassioukov, MD, PhD, FRCPC

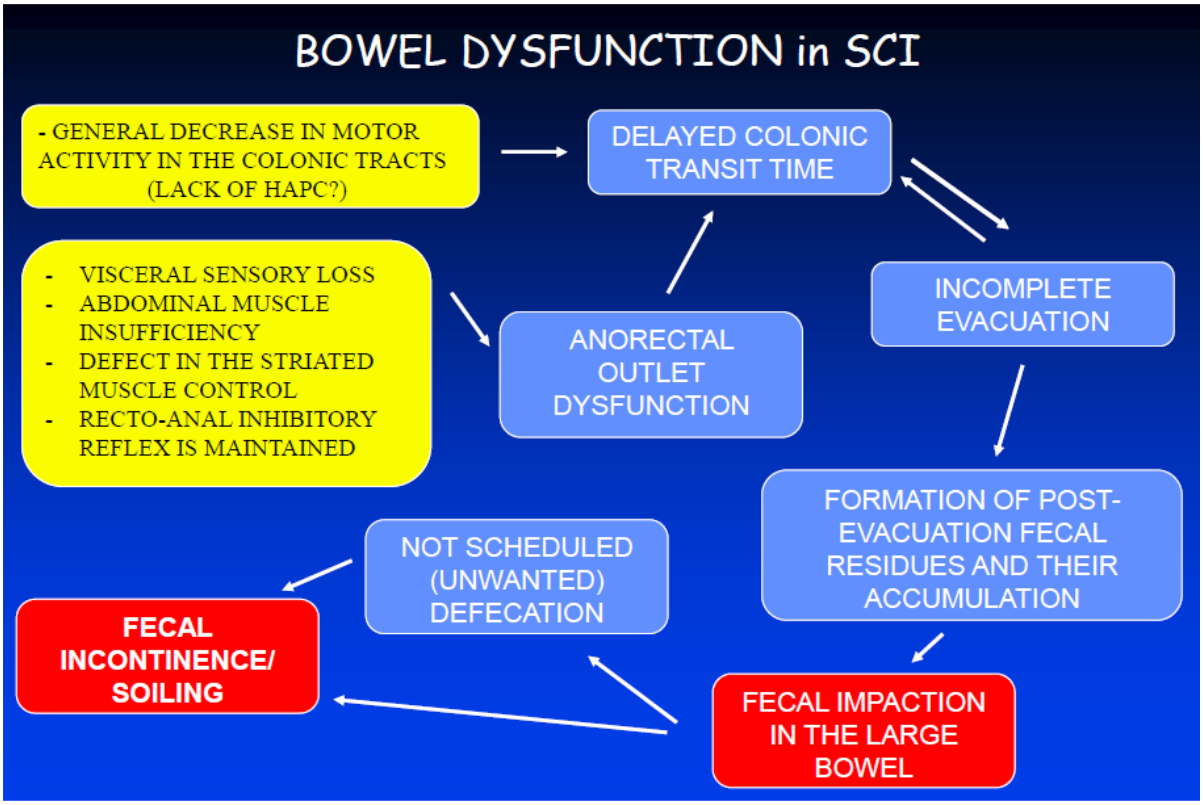
The primary functions of the bowel are storage, stool propulsion, and defecation. These functions are largely dependent on coordinated control of the autonomic nervous system (i.e.sympathetic and parasympathetic), intrinsic (enteric) nervous system and voluntary motor control of the external anal sphincter. The gastrointestinal tract is under parasympathetic control from two sources: (1) the vagal nerve (cranial parasympathetic fibers, CN X) and (2) inferior splanchnic nerve (pelvic parasympathetic fibers, within the sacral segments of the spinal cord (S2–S4) that supply the rest of the colon and rectum. The activation of the parasympathetic nervous system (acetylcholine acts as a neurotransmitter) results in an increase in gut motility and secretion, and relaxation of the sphincters. Sympathetic innervation of the bowel is provided via superior and inferior mesenteric nerves (T9-T12 spinal segments) and the hypogastric nerve (T12-L2 spinal segments). The activation of the sympathetic nervous system (noradrenalin acts as a neurotransmitter) results in decreased gut motility, inhibition of secretion and contraction of the sphincters. In addition to sympathetic and parasympathetic innervation, the gut is also controlled by the intrinsic (enteric) nervous system. The intrinsic nervous system includes the Auerbach's plexus (intramuscular myenteric), and Meissner's plexus (submucosal). The myenteric plexus is composed of unmyelinated fibers and postganglionic parasympathetic cell bodies that primarily coordinate motility. The submucosal plexus relays sensory responses and is involved in secretory control. Finally, the external anal sphincter and pelvic floor is supplied by the mixed motor and sensory somatic pudendal nerve (S2–4) which provides voluntary control for defecation.

Neurogenic bowel dysfunction commonly occurs together with urinary and sexual dysfunctions following spinal cord injuyr (SCI) or in other neurological disoder affecting the spinal cord (multiple sclerosis, spina bifida, etc.). Following the acute period following injury, a few patterns of bowel dysfunction will appear dependant the level and the severity of SCI and consequent autonomic impairment. The majority of individuals with SCI present with a loss of conscious control over defecation. Delayed colonic transit time is commonly observed in individuals with chronic SCI. For example, individuals with cervical and high thoracic SCI (supra conal lesion) are unable to increase intra-abdominal pressure during defecation. However, these individuals may be able to defecate reflexly by anorectal stimulation due to preservation of lumbar and sacral spinal circuits. Clinical evidence suggest that bowel dysfunction after SCI is a major cause of morbidity and it is not surprising that improving bowel function alone or bladder/bowel functions is rated among the highest priorities among individuals with SCI. A recent Canadian survey demonstrated that up to 60% of indiviudals living with chronic SCI report that bowel dysfunction adversely impacts day-to-day activities, lifestyle, and their quality of life.

In summary, understanding the pathophysiology of SCI and the diverse autonomic innervation of the bowel can help clinicians identify the clinical pathology and choose appropriate bowel management.

Assessment of the patient with Neurogenic Bowel

Gabriele Bazzocchi, University of Bologna



The pathophysiology of pelvic floor and colorectal dysfunction is broadly similar in patients with both SCI and MS. The extent of injury is the most important factor in determining bowel symptoms in both SCI and MS. However, whereas in chronic SCI patients the lesion is usually sharply defined and unchanging, in patients with MS the lesions typically occur at multiple levels within the CNS and tend to vary with time.

Gastrointestinal transit is under the complex regulatory interplay of the enteric nervous system and extrinsic autonomic innervation. Parasympathetic innervation accelerates transit, proximally provided by the vagus and distally by the lower sacral roots (S2–S4). The vagus provides parasympathetic input up to the distal transverse; therefore, in SCI patients, the dysfunctional gut segment is the distal colon. The sympathetic innervation retards intestinal transit, originating from the ninth thoracic to the second lumbar (T9–L2) segments of the spinal cord. Standard clinical classification of SCI relates to this, in that lesions are classified as supraconal (above the conus medullaris, where inhibitory input is lost), within the conus or being located in the cauda equina (where excitatory sacral parasympathetic supply is lost).

In supraconal SCI, an ‘upper motor neurone’-type injury of the bowel results – there is slowed whole-gut transit and hypertonia and hyper-reflexia of the hindgut (i.e., distal to the splenic flexure). The slowing of transit is autonomic mediated, but also contributed to by reduced mobility and attenuation of the gastrocolic response. The rectal hypertonia results in reduced rectal compliance and predisposes to reflex defecation and incontinence. In cauda equina lesions the efferent limb of the reflex arc to the hindgut is interrupted, resulting in a ‘lower motor neurone’-type bowel dysfunction with hypotonia and hyporeflexia. Complete SCI has been shown to result in the most severe degree of bowel dysfunction. However, in incomplete injuries, the relationship is more variable. The American Spinal Injury Association classification of severity of the lesion has not been convincingly shown to relate to the magnitude of bowel dysfunction, which may relate to the influence of the enteric nervous system in moderating gut function following injury.

Anal continence rests on interplay between rectal musculo-sensory function and the internal and external anal sphincters. The internal anal sphincter is a condensation of the circular smooth muscle of the colon. As such, it is not subject to voluntary control but receives an autonomic (excitatory sympathetic and inhibitory parasympathetic input). Nevertheless, supraconal injury tends not to alter anal tone, while the reduced tone of cauda equina lesions may relate to fecal bilus impaction as much as loss of sympathetic input. The striated external anal sphincter is under voluntary control from Onof’s nucleus in the ventral horn of the sacral spinal cord via the pudendal nerves. Thus, in complete SCI, the voluntary control of the external anal sphincter is lost.

Fecal incontinence relates not only to motor factors affecting the sphincter but also to anorectal sensation. The anal mucosa has a dense network of sensory receptors, and loss of sensation can result in anal incontinence. Rectal hyposensation occurs in both supraconal and cauda equina lesions, and predisposes to fecal impaction (especially in the flaccid rectum of patients with cauda equina lesions).

The Neurogenic Bowel - Pathophysiology, Assessment and Management
Conservative management - lifestyle and rehabilitative treatments
Dr Beth Shelly PT, DPT, WCS, BCB PMD

Functional Physical Examination (NICE 2012, Drake 2013)

- ROM of lower body for positioning on the toilet
- Mobility for ambulation to the bathroom and transfers on and off toilet
- Finger dexterity for undressing, hygiene
- Length of the patient's arms and ROM - ability to reach rectal area
- Strength in the upper and lower extremities
- Sitting balance
- PFM function - Digital PFM examination for weakness or spasm per rectum
- Superficial EMG assessment of PFM for contraction and valsava test for paradoxical PFM contractions during bearing down

Evidence for conservative management of patient with neurogenic bowel dysfunction

- Little high level evidence for any one treatment
    - Krassioukov 2010 - systematic review
    - Coggrave 2014 - Cochrane
    - Paris 2011, Awad 2011 - literature review
    - Drake 2013 - ICI guidelines
- Treatment of neurogenic bowel "has remained essentially unchanged for several decades" (Krassioukov 2010)
- ICCS neurogenic bowel evaluation and management - "Paucity of level 1 or level 2 publications" (Bauer 2012)
- Cochrane 2014 "There is still remarkably little research on this common and very significant issue" (Coggrave 2014)

Overall conservative management of neurogenic bowel

- Individualized to the patient in cooperation with caregivers - consider the time it takes for bowel care
- Establishment of a "bowel program" = all-inclusive treatment plan aimed at fecal continence (avoiding FI) and efficient evacuation (avoiding constipation) and prevention of complications (Engkasan 2013) - Balance between FI and constipation
- Multifaceted bowel programs are the first line approach (level 4) (Krassioukov 2010)
- Work as a team - MD, PT, OT, RN, dietary, others

Things it would be helpful for rehabilitation staff to know

- Motility of bowel and any treatments being used by patient for that reason
- Anorectal sensation - hypersensitivity or decrease
- EAS and or IAS defects
- Results of defecography or diagnosis of paradoxical sphincter contraction
- Physician plan of care - therapy can reinforce MD plan of care

Most researched treatments - all have level 3 evidence (Drake 2013)

- Multifaceted bowel programs
- Digital rectal stimulation
- Abdominal massage
- Electrical stimulation
- Patient and caregiver education

Optimize stool consistency (more info at www.bethshelly.com)

- Soft enough to pass easily, Solid enough to stay in rectum
- Reflexic evacuation = soft formed stool
- Areflexic evacuation (manual) = firm stool
- Fiber intake ? / Fuid intake ?
- Patients must understand factors that increase and decrease their own bowel transit

Characteristics of bowel management programs for patients with SCI (Engkasan 2013)
Bowel management in pts with SCI (Adriaansen 2015)
Common pattern of bowel training program (Benevento 2002)
Abdominal massage

- Method - make small circles starting at the right lower quadrant (appendix area) advancing clockwise to the right lower ribs, across to the left ribs and down to the left lower quadrant following the large intestine. gentle pressure, 10 times round
- Purpose - to increase or facilitate peristalsis and movement of fecal matter
- When - can be performed before / during defecation or at another time
- Evidence
    - Abdominal massage plus lifestyle advice was compared to lifestyle advice alone in patients with MS for the treatment of constipation. One outcome measure was significantly improved, one outcome measure did not change. Treatment effect stopped when treatment stopped. (McClurg 2011).
    - Bowel massage versus no massage in pts with CVA favors massage for increased BM per week. (Coggrave 2014)
    - Bowel massage in pts with SCI 15 min per days resulted in increased transit time (Ayas 2006)

Non implanted Electrical stimulation (ES) (summarized in Drake 2013, Paris 2011, Krassioukov 2010)

- Evidence that various ES techniques may increase transit time
- External abdomen ES (overnight) in pts with SCI favors treatment over no treatment for decreased bowel care time (Korsten 2004) level 1
- External abdominal ES, 25 min per day - level 2
- Functional sacral nerve root magnetic stimulation (3 studies) - SCI and Parkinson's: shorter transit times, improved bowel routine, increased rectal pressure, decreased hyperactive rectal contraction
    - Thoracic (level 4)

- Interferential electrical stimulation for constipation in children with myelomeningocele (Kajbafzadeh 2012) - 250us, 20 min, 3 times per week, over the abdomen
    - Results - frequency of defecation increased from 2.5 per week to 4.7 times per week, sphincter pressure and rectoanal inhibitory reflex significantly improved compared to sham
- Posterior tibial nerve ES - incomplete SCI (level 4)

Biofeedback for patient with neurogenic bowel dysfunction - many different types

- EMG for strength of weak PFM for FI, relaxation of spasm PFM with constipation
- EMG coordination training for paradoxical PFM contractions during bearing down
- Rectal balloon sensation training for FI, balloon expulsion retraining for constipation

Biofeedback (Paris 2011)

- 6 studies found including treatment for children with myelomengocele (best results), MS, diabetic neuropathy
- overall 33% to 66% of patients felt the biofeedback was helpful.
- Suggests best candidates have mild to moderate disability, persistent rectal sensation, and good motivation

Conservative management (toilet sitting, biofeedback, anal plug, enemas) resulted in fecal continence in 67% of pts with spina bifida (Velde 2013)
Biofeedback for bowel dysfunction in pts with MS (Wiesel 2000)

- 2 to 5 sessions over 4 to 6 months
- Bowel retraining, medication, rectal sensation training and PFM training
- Only predictor of success was mild to moderate disability and stable disease process
- 5 of 13 pts reported marked to moderate benefit with some able to decrease medications

Other treatments

- Overall activity level - common suggestions include increasing activity level such as walking if able to increase peristalsis but there is little evidence this helps. (Paris 2011)
- Patient education and individual instruction in bowel care results in short term (less than 6 months) improvements in bowel function. (Harari 2004)
- Collection and containment (Cottenden 2013)
    - Absorbent pads - difficult to contain large FI, concern with odor
    - Cotton ball at the rectum - helps hold small FI in standing patients (not in w/c pts)
    - Anal plugs - level 3 evidence of success but may be uncomfortable in adults
    - Rectal trumpet - level 3
    - External anal pouch - level 3 but should not be used on broken or thinned skin
    - Rectal catheter

Patient suggestions - Have a cleanup kit with them at all times

- Change of cloths
- Wet wipes and plastic bag for dirty wipes and cloths
- Pads / diapers
- Over the counter anti - diarrheal or upset stomach medications

Clinical Management of Neurogenic Bowel Dysfunction

Klaus Krogh, Aarhus University Hospital, Denmark

Basic assessment:

- Neurogenic bowel dysfunction score
- Basic SCI Bowel Data Set
- Medication affecting GI function
- Physical examination
- Endoscopy?

Who should be treated?

- >30 minutes for bowel care
- Fecal incontinence each month
- Abdominal pain
- Motivated patient
- NBD score with severe or very severe NBD

Basic bowel care:

- Digital stimulation
- Suppositories
- Oral laxatives
- (Balanced diet?)

What if basic bowel care fails?

- Assessment of colorectal transit time?
- Transanal irrigation

What if transanal irrigation fails?

- Re-evaluation of NBD
- Malone appendicostimy
- Colostomy
- Electrical nerve stimulation?

Long-term follow-up?

- NBD changes with time
- Referral if bowel function gets worse

Transanal Irrigation

Anton Emmanuel, London

Introduction

Transanal irrigation of the colon (transanal irrigation, TAI) is designed to assist the evacuation of faeces from the bowel by introducing water into the colon and rectum via the anus. For the purposes of this review we are referring to the use of purpose-made device-assisted irrigation methods. By regularly emptying the bowel in this way, TAI is intended to help re-establish controlled bowel function and enable the user to choose the time and place of evacuation. In patients with faecal incontinence, efficient emptying of the distal colon and rectum means that new faeces do not reach the rectum for an average of two days, preventing leakage between irrigations. In patients with constipation, regular evacuation of the rectosigmoid region can accelerate transit through the entire colon[8]. There has, perhaps unsurprisingly, been a rapid uptake of irrigation methods in this highly symptomatic patient group.

A small number of high quality trials have been conducted and been the subject of systematic review[9]. The intention of this manuscript is not to repeat such an analysis, but rather to present practical advice for health services professionals who are using this technique on their patients. It is not intended as a substitute for hands-on training in the irrigation system being used, which is essential by way of safety training and inter-professional support. There is a limited evidence base on which to recommend one method of bowel care in preference to others. Accordingly the placement of TAI in treatment algorithms still mainly depends on local preference, expertise and economy. A consensus group of specialists from the range of disciplines who see patients using TAI have worked together to produce this practical adjunct to training, assimilating both the emerging literature and rapidly accruing clinical expertise.

When to consider TAI

The use of transanal irrigation as part of the treatment armamentarium in both traumatic and genetic spinal cord injured adults with neurogenic bowel dysfunction was established following a definitive randomized controlled trial in 2006. The same authors subsequently studied the technique in non-neurological patients with functional bowel disorders such as idiopathic constipation (both slow transit and rectal evacuation difficulties) and faecal incontinence.

Bowel dysfunction in patients with neurological diseases beyond those affecting the spinal cord has also been studied. In a group of thirty patients with multiple sclerosis who had failed to respond to maximal medical treatment for bowel dysfunction TAI subjectively improved over 50% of them.

Functional disorders may also result after surgery for rectal cancer especially after a low anterior resection for rectal cancer. Loss of control of defaecation is thought to relate to the loss of rectal capacity following resection, as well as possible impairment of the anorectal reflexes controlling continence. TAI can improve both fecal incontinence and defecation disorders in this group. Another procedure that can cause functional problems is ileo-anal pouch surgery. Some patients prefer the option of an ileo-anal pouch to an ileo-rectal anastomosis or ileostomy. However, a number of patients with a smaller volume pouch may suffer from soiling, whilst larger volume pouches may result in infrequent bowel movements or evacuation difficulties. The efficacy of TAI in this patient group has been shown too, with specifically enhanced ability to cope with the long-term consequences of surgery.

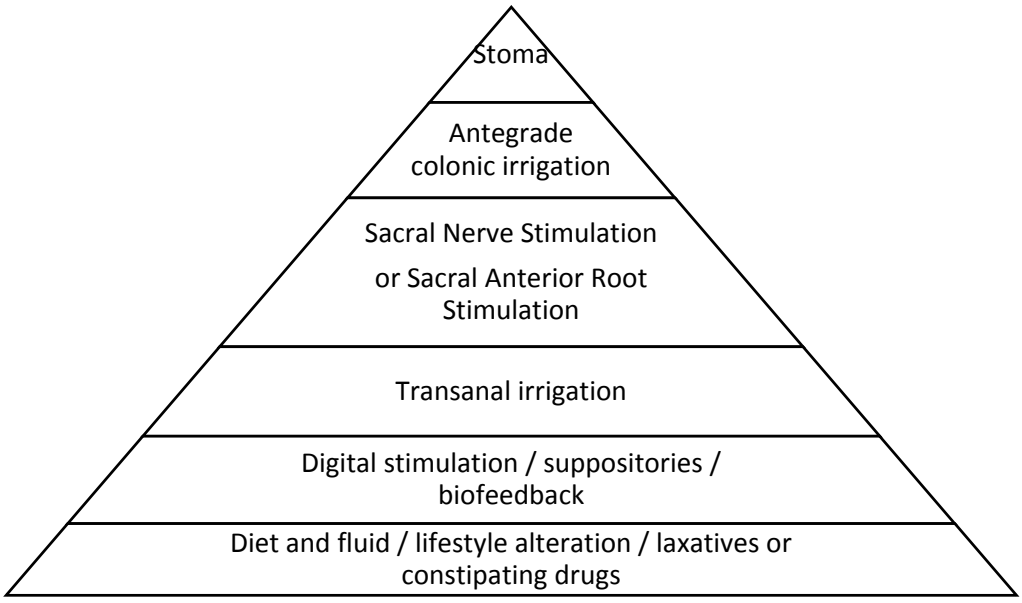
Table 1 summarises the situations in which TAI has been shown to improve bowel function in published studies. In all these groups it is important for the health care professional to be alert to the clinical features that suggest

a need for referral to a specialist service or to move up the therapeutic ladder and consider TAI. The basis for focusing on these clinical features is to facilitate the patient progress through the empiric algorithm of care developed for NBD patients, summarized in Figure 1.

Table 1: Conditions for which published data on TAI is available

Neurogenic bowel dysfunction	Functional disorders	Post surgical situations
Spinal cord injury **supraconal** **cauda equina**	Fecalincontinence - idiopathic - post-traumatic	Low anterior rectal resection syndrome
Spina bifida	Constipation - slow transit - rectal evacuation difficulty	Ileo-anal pouch dysfunction
Multiple sclerosis		

Figure 1: A proposed step-wise approach to treatment of bowel dysfunction



Pre-treatment work-up

The effect of transanal irrigation varies considerably between patients: some report full satisfaction and great improvements in quality of life, while others have poor efficacy and hence abandon treatment. The reasons for these differences are poorly understood. Response to treatment depends not only on chosing the correct

indications (as above), but also on aspects of the patient's psyche and motivation. The psychological profile and demonstrated compliance of the patient with regard to other hospital follow-up is highly likely to influence their safe and long-term use of TAI, and these factors should be included as part of baseline assessment. The individual's degree of manual dexterity is also important. It is unclear whether, as for clean intermittent bladder catheterisation, a predictive factor for adherence is independence from carers.

A digital rectal examiniation is mandatory to excluded localized anal disorders, to assess faecal impaction, anal sphincter function and coordination. If diarrhoea is a prominent symptom, the cause should be sought.

According to general recommandations, patients with any alarm symptoms (blood in faeces, weight loss, abdominal pain, or recent and persistant changes in bowel habits), familial history of colorectal cancer or inflammatory bowel disease, should have a flexible sigmoidoscopy or colonoscopy as part of their health screening. It is controversial whether every patient should have endoscopic evaluation prior to irrigation treatment. Endoscopic evaluation is costly, and not uniformly available. Bowel preparation and the endoscopy are unpleasant, and the risk of perforation during colonoscopy itself is 1 in 1000. Flexible sigmoidoscopy is much better tolerated and regarded as a low risk procedure with perforation in 1 in 40 000 procedures. A decision of a pre-treatment endoscopic evaluation should balance the risk of TAI-induced perforation with the risk, cost and the availability of endoscopy.

Though several factors have been associated with positive outcome, no consistent and readily explainable predictors of outcome have been identified. Neurogenic bowel dysfunction patients seem to do better than those with functional disorder. It is the opinion of the authors that a trial-and-error strategy for the introduction of transanal irrigation should be applied, individualized to each patient with specific attention towards initial faecal impaction and stool consistency.

Training: by who, where and how?

Comprehensive training of the patient is absolutely central to safe long-term use of TAI. The hands-on training process should be supported by locally produced written information in an accessible form, and may be supplemented by commercial information in DVD and written format. Providing information, particularly audiovisual resources, prior to training is helpful in preparing the patient and retention of such resources by the patient for later reference is also beneficial. Information should include explanation of risks as well as benefits; informed consent to TAI should be obtained prior to hands-on use of the irrigation system.

To optimise outcomes from TAI, training is required in its use. Where an individual is able to undertake irrigation independently that individual should be taught how to self-administer the treatment. Where an individual cannot undertake the procedure independently, a carer can be trained to undertake all or part of the irrigation procedure for them. The key point is that whoever is performing TAI should be experienced in, and willing to, perform the procedure.

Most patients will be taught how to conduct irrigation as outpatients, either in the outpatient clinic or in their own home. Teaching in the patient's own home has the advantage of allowing issues arising out of the home setting to be identified and addressed during training, and teaching of local carers can be facilitated. However, such an approach may challenge available resources. Infrequently, a patient's medical history may demand extra caution and teaching may be undertaken in the inpatient setting.

The first irrigation should be undertaken under supervision as part of the training. This allows the trainer to evaluate the patient/carer's understanding and abilities and to reinforce the salient safety aspects, and for the patient/carer to ask the questions which inevitably arise when first using a new procedure. In individuals with impaired or absent anorectal sensation, or when there is a risk of autonomic dysreflexia or other

pathophysiological response to irrigation, supervised first use is mandatory. All patients using irrigation should be taught to recognise the symptoms of colonic perforation and what actions to take.

Treatment: practical aspects

Instruction should be provided regarding the speed and volume to which the catheter balloon is inflated, if using the Peristeen system for TAI 2-3 pumps of air are gently instilled initially, increasing to a maximum of 5 pumps of air if required. The patient needs to be aware of the number of pumps of air that have been used; while excessive inflation is most likely to cause the balloon to burst, there is potential for anorectal trauma due to overstretching. The speed of introduction of the water should also be discussed. If it is infused too rapidly abdominal cramps, pain or strong reflex rectal contractions may limit the volume of water instilled; too slow and the stimulation provided by stretching the colon may be lost and the duration of the irrigation needlessly extended. Where a pumped system is used, one pump of water every 2-3 seconds or for a gravity-fed system 150-200mls/minute is an acceptable rate. The volume of water reportedly used for irrigation varies considerably but 500mls is a suitable starting point for adults.

Treatment: individualising the process

Many individuals will empty the irrigation fluid and stool from their rectum without further intervention and this is the goal. However, some individuals will need to use adjunctive interventions such as abdominal massage, raising intra abdominal pressure (through leaning back, forward or to the side, or through bracing of the abdominal muscles), digital rectal stimulation and digital evacuation of stool. The need for these interventions may reduce as an effective routine is established. If the patient is using laxatives when starting TAI, these should be continued until TAI is well established; gradual reduction can then be attempted whilst monitoring for continued effectiveness.

Setting realistic expectations for patients commencing TAI is important; otherwise the sometimes slow process of establishing a routine can result in frustration, a sense of failure and early discontinuation. The patient should understand that it may take 4- 12 weeks to establish a reliable and effective routine and during this time they should expect to undergo a process of trial and error to establish their optimal individualised parameters for irrigation.

Parameters which can be individualised to optimise the effectiveness of irrigation include adjustments to laxatives and the trial of adjuncts as described above. In addition, alterations to the frequency of irrigation can be made: whilst it is initially daily, it should be reduced to alternate days where possible after approximately 10-14 days. Furthermore, maintaining a regular routine of irrigation is beneficial, and undertaking irrigation 20-30 minute after a meal will take advantage of the gastrocolic reflex. The time of day should be chosen to fit with the lifestyle of the patient. The volume of irrigant will usually begin at 500mls but can be gradually increased to a maximum of 1000mls. The volume of the rectal balloon if used can vary between 2 and 5 pumps of air, balancing risk of reflex expulsion with water leakage. Finally, while water is generally the recommended irrigant, there are reports of the use of phosphate or senna syrup. Such additions of to the irrigating fluid have never been formally investigated. Where tap water is not drinkable, bottled water is recommended. Approaches to ‘trouble-shooting’ will be discussed in the session.

Enhancing adherence with TAI

The emerging literature shows that about 25% of patients have a poor initial response to TAI. At two years, 50% of patients are continuing to irrigate. Reasons for poor adherence need to be considered at each contact. Although primary education and training is central to long-term adherence with TAI, this needs to be supplemented by ongoing support. To maintain safe long-term use of TAI it is essential that a designated

health care professional provides structured follow up of the patient, even when the patient is managing well. This may be by telephone, email, postal questionnaires or in person, according to local services. This follow up needs to be frequent in the early months, and can be gradually reduced thereafter.

If success has not been achieved by 8 weeks, a re-evaluation of the starting period needs to be undertaken. This needs to incorporate the views of the user and carer to identify problems and practical issues for failure.

Once bowel management is established satisfactorily it needs follow up to keep a user motivated and /or to follow possible changes in bowel function and response to TAI use over time. This follow-up need not be frequent or in-person, but should ideally be with the same professional for each individual patient. Alarm features should be highlighted to the patient to allow them to seek help urgently. Regular contact with the health care team should be offered: the prime aim of these reviews is to assess satisfaction with TAI. When it is unsuccessful, factors which may be beneficially modified should be considered: the bowel routine as a whole, key bowel symptoms, dietary and fluid ingestion patterns, any changes in concomitant medication, carer opinions.

Alternatives to TAI

In patients who fail to respond, or who stop experiencing benefit from TAI, the results of stopping treatment, and the alternative options for bowel management need to be considered.

Transanal irrigation is one among a number of treatment methods for faecal incontinence and constipation not responding to standard treatment. Empiric medical practice usually dictates that one apply less invasive therapies prior to invasive ones when there are no clinical trials comparing one form of intervention over another. The authors have proposed a stepped programme of treatment (Figure 1) which progresses along an escalating burden of invasiveness.

The Malone Antegrade Continence Enema is used at many institutions, especially for selected patients with NBD. A stoma is created by bringing the tip of the appendix to the abdominal wall, thereby creating a catheterisable fistula through which enema can be administered. Creation of the appendicostomy is a minor surgical procedure and in expert centres long-term rates of success may be as high as 80%. If patients do not have the appendix equally good results can be obtained by creating a “neoappendix” from the terminal ileum or the caecum.

Colostomy or even ileostomy have several advantages mainly because faecal incontinence is avoided and bowel care can be performed on the abdomen. The latter is an advantage in patients with very poor mobility and hand function. There is no evidence to recommend any location of the stoma in favour of others.The somato-autonomic reflex arch, paraspinal magnetic stimulation and sacral nerve stimulation/modulation are still considered experimental in NBD. Sacral anterior root stimulation is an invasive procedure that has limited availability but can be of some benefit in selected patients with NBD.

In summary TAI should be considered early in patients with moderate to severe NBD if conservative treatment modalities fail, and before considering more invasive options. However, selected patients could be offered the appendicostomy or stoma formation instead. In neurologically intact patients sacral nerve stimulation is an alternative.

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