

A Primary Care Provider's Guide to Neurogenic Bowel Dysfunction in Spinal Cord Injury

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Abstract: Spinal cord injury (SCI) affects the gastrointestinal (GI) tract in several ways, most notably by causing impairment of colonic motility and sphincter dysfunction. Altered GI function in the setting of neurological injury—also known as “neurogenic bowel dysfunction” (NBD)—strongly impacts the quality of life (QOL) of individuals living with SCI. Characterizing the severity of NBD, its impact on an individual’s QOL, and which interventions have been successful or ineffective is integral to the routine care of people living with SCI. Treatment of NBD is generally multimodal and includes attention to diet, pharmacologic and mechanical stimulation, and possibly surgery. This article discusses the pathophysiology of NBD and specific approaches to its management. **Key words:** neurogenic bowel dysfunction, spinal cord injury

Health Maintenance Checklist

1. Assess all aspects of the client’s bowel program including oral medication, diet, rectal interventions, and frequency of bowel movement.
2. Ask about the amount of time required for bowel emptying.
3. Assess the impact of potential incontinence, autonomic dysreflexia due to constipation or rectal irritation, and other bowel complications on quality of life.

Episodic Care Key Points

1. Due to sensory deficits and impairment of anal sphincter control, people with SCI need scheduled bowel emptying for social continence.
2. Oral medications are used to modulate stool consistency. To avoid incontinence and diarrhea, avoid overuse of oral agents.
3. Options including ostomy or other surgical procedures are considerations that may improve quality of life, intractable incontinence, prolonged bowel emptying, severe autonomic dysreflexia, and other bowel care-related complications.

Case Report

You are asked to evaluate a 52-year old man with C6 motor complete spinal cord injury (SCI) for 28 years. He reports a chronic progressive increase in sweating and spasticity that prevents him from sleeping well; these symptoms culminate prior to his every-other-day bowel regimen. He notes that he moves his bowels with great difficulty, spending 3 hours on the commode and using a combination of oral bisacodyl, multiple enemas, and a suppository with digital stimulation. He has

tried large doses of oral polyethylene glycol in the past causing fecal incontinence, and he reports that his systolic blood pressure may reach 200 mg Hg just prior to his bowel regimen. He is not using opioids, anticholinergics, or other medications known to interfere with bowel function. He is seeking your advice.

Background

SCI may significantly impact the gastrointestinal (GI) tract, causing dysmotility and sphincter

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Top Spinal Cord Inj Rehabil 2020;26(3):172-176
© 2020 American Spinal Injury Association
www.asia-spinalinjury.org
doi: 10.46292/sci2603-172

dysfunction that may diminish the quality of life (QOL) and opportunities for social integration for individuals with SCI. Studies show that people with SCI consistently rank neurogenic bowel dysfunction (NBD) as an important health concern.¹⁻³ Glickman et al⁴ conducted a survey of 115 people with SCI in which 54% of respondents identified NBD as a source of distress in their lives. Levi et al¹ surveyed 371 individuals with SCI and found that nearly 40% of them rated bladder and bowel dysfunction as a moderate to severe life problem. Bowel incontinence can increase the risk for skin breakdown and lead to social isolation. Bowel emptying that is prolonged, sometimes requiring several hours, can also interfere with life activities. To provide holistic health care to people living with injuries, it is imperative to understand the basic pathophysiology of NBD and sensible approaches to its management.

Pathophysiology of Neurogenic Bowel Dysfunction

The pathophysiology of NBD is not completely understood, and its clinical severity is not necessarily predicted by level or completeness of SCI. The GI tract is supported by intrinsic and extrinsic nerve inputs, with significant control exerted by the sympathetic and parasympathetic systems. The small intestine and colon are capable of functioning without external stimulation, but the stomach and esophagus are reliant on it. The sympathetic nervous system provides an inhibitory effect on the gut by limiting mucosal secretion and blood flow. The parasympathetic system has a largely excitatory influence, supporting secretion and intestinal peristalsis. While sympathetic innervation of the upper GI tract is largely supplied by the first five thoracic segments, the small and large intestines are controlled by input from T6-T12. Parasympathetic stimulation of the GI tract proximal to the splenic flexure is derived from the vagus nerve, while the distal tract has input from the sacral plexus nerve roots S2-S4.

Most clinicians working with individuals with SCI divide neurogenic bowel into upper motor neuron (UMN) and lower motor neuron (LMN) patterns. UMN bowel, also known as “hyperreflexic bowel,” is seen in injuries above the distal conus medullaris (T12-L1). It is characterized by constipation and

stool retention, hence people with UMN dysfunction rely on a combination of pharmacologic and digital stimulation for evacuation. SCIs that affect S2-4 neuronal levels, which includes the distal conus medullaris as well as the cauda equina, result in lower motor neuron (LMN) or “areflexic bowel.” People with such injuries have slower bowel transit and loss of innervation to the external anal sphincter (EAS). Because the EAS is hypotonic or flaccid, there is a high likelihood of incontinence with Valsalva or transfers.

Evaluation of Neurogenic Bowel

When assessing people with NBD, it is important to discuss where and how they move their bowels (in bed, on a commode, with or without caregiver support), how long their bowel regimen takes, and where they see opportunity for improvement. It is equally important to outline their NBD treatment history and their level of satisfaction with their current management strategy. The Bristol Stool Scale⁵ is widely used to assess whether stool is of the appropriate consistency, and it has been validated in several languages. The Neurogenic Bowel Dysfunction Score can also be rapidly calculated and is used in assessing severity of NBD and response to treatment.⁶ The physical examination is essential to the evaluation of NBD. Most notably, the rectal examination is critical in persons with SCI. A tight or spastic EAS indicates UMN bowel, while a flaccid EAS indicates LMN bowel.

Treatment of Neurogenic Bowel

Successful treatment of NBD requires a multimodal approach that may include dietary modifications, pharmacological agents, mechanical or electrical stimulation, and possibly surgery. However, many factors may impact bowel function in SCI including age, dietary habits, fluid intake, access to appropriate medical care, and use of certain prescription medications.^{7,8} Although most bowel regimens hinge on medications and mechanical stimulation, it is important to consider these other factors in optimizing evacuation strategies.

Certain nonpharmacologic interventions may improve management of NBD. There is general

consensus that consuming a largely plant-based diet and ensuring adequate fluid intake promotes colonic movement. A diet containing at least 15 grams of fiber is recommended initially, with additional fiber as needed from a variety of sources.⁹ Several over-the-counter fibers are available, including psyllium, calcium polycarbophil, methylcellulose, wheat dextrin, and others. Upright bowel care on a toilet or commode chair may facilitate emptying in some persons due to the addition of gravity and should be done when possible.

Most NBD management strategies are built on foundations of modulation of stool consistency with oral medication and timed interventions to trigger bowel movements, most notably digital stimulation. Stool softeners, such as docusate, function by permitting passage of water into the stool, softening fecal material, and facilitating its movement. Stimulant laxatives such as senna or bisacodyl are irritants that stimulate the myenteric plexus, promoting motility and bowel emptying. Polyethylene glycol (PEG) osmotically pulls fluid into the colon and increases gut motility. It can be used in small doses (17-g increments) to reduce stool transit time. Dose-dependent side effects of oral medications include cramping, diarrhea, and less frequently, electrolyte imbalances. Overuse of oral stimulants can lead to excessively soft stool, urgent bowel movements, and incontinence. The goal for people with UMN bowel dysfunction is a soft but formed stool⁹ or Bristol Stool Scale of 3 to 4.

People with UMN NBD frequently use bisacodyl suppositories in combination with digital rectal stimulation to trigger a bowel movement on a scheduled basis. A polyethylene-based bisacodyl suppository has been demonstrated to cause more rapid bowel emptying versus standard vegetable oil-based bisacodyl suppositories.¹⁰ Another commonly used rectal medication to trigger bowel emptying in UMN dysfunction is the docusate mini-enema (Enemeez). It is a 4- to 5-mL liquid preparation containing docusate and glycerin. For people who develop autonomic dysreflexia (AD) during bowel care, a preparation containing benzocaine is available.

For many people with SCI—particularly those with UMN bowel—digital stimulation is central to effective management of NBD. Digital stimulation

is thought to relax the internal anal sphincter through activation of neurons in the rectal wall, ultimately helping to propel stool from the rectal vault. Many people with UMN NBD use digital stimulation alone, repeated every 5 to 10 minutes, to initiate reflex bowel emptying. They may not require delivery of rectal medications. While digital stimulation is an important component of bowel management in SCI, it may lead to anal trauma, hemorrhoid formation, rectal bleeding, and AD. Gentle technique with gloved digit and lubrication is necessary, and lidocaine jelly per rectum, administered several minutes in advance of digital stimulation, may be needed to prevent AD.

There is an emerging literature investigating the effects of neuromodulation and electrical stimulation of sacral and pudendal nerves on NBD. Several studies have yielded promising results,¹¹⁻¹³ but these treatments are not yet widely accepted.

It is notable that people with LMN bowel may also require manual assistance with evacuation, but due to lack of reflex colonic contraction, they cannot achieve repeated emptying with digital stimulation. Rather, they should digitally empty their rectal vault of stool—daily or more often and scheduled to follow meals—in order to maintain social continence. The goal for persons with LMN bowel should be a firm formed stool⁹ or Bristol Stool Scale of 2 to 3.

Several studies have shown that a vast majority of elderly individuals develop constipation due to a combination of age-related lifestyle changes, dietary adjustments, and possibly age-related enteric neurodegeneration.¹⁴⁻¹⁶ Bowel management strategies may have to be reassessed and adapted as individuals age with their SCI. It is also notable that many of the medications clinicians use to treat chronic pain and bladder dysfunction in SCI can impair gut motility. While opiates and anticholinergic agents may be necessary to help manage other secondary effects of SCI, tapering or discontinuing them may improve efforts to optimize treatment of NBD.

For people whose NBD cannot be adequately managed with dietary modification, medications, and stimulation, colostomy may be considered. Although colostomy may be associated with risk of infection and need for revision,^{17,18} Krassioukov et al¹⁹ highlight data showing reductions in

hospitalizations and time spent performing bowel regimens and improvements in QOL. When evaluating people with severe NBD, some surgeons recommend the Malone Antegrade Continence Enema (MACE) procedure.²⁰ In this surgery, the appendix is used to create an abdominal wall valve that enters the right colon. People who have undergone this procedure may use that portal to administer enemas, and several studies have shown it to be associated with reductions in fecal continence, time to bowel evacuation, and AD.^{18,20,21}

Education

An educational component should be part of the strategies for NBD management. Education should be given to both patients and caregivers in a readily comprehensible and accessible format. As part of promoting independence, patients should be able to direct others in providing their care.

An NBD education program should focus on:

- anatomy of GI system
- process of defecation
- effect of SCI on bowel function
- description of bowel program, with emphasis on timing (after a meal) and proper positioning (upright on a commode, if possible)
- goals of bowel program: predictable and regular bowel movements, complete bowel emptying in an acceptable time frame, prevention of accidents
- safe and effective use of medications
- management of complications and/or emergencies

Case Resolution

We presented the case of a middle-aged man with motor complete cervical SCI who was developing spasticity, sweating, and hypertension due to difficulties with his bowel regimen. It would be reasonable to begin his evaluation with a plain abdominal film to rule out significant stool back up. If he has a large fecal burden, he ought to be referred for a colonoscopy to ensure that he does not have an obstructing lesion, even while adjusting his NBD regimen. We would suggest reducing the number of enemas he uses while ensuring adequate fluid intake and adding senna to his regimen. If these changes do not improve his bowel function, referral to an SCI specialist would be appropriate, as would a consultation with a colorectal surgeon for consideration of a colostomy.

Conclusion

Management of NBD after SCI can be challenging. However, it also offers us the opportunity to substantially improve the QOL of individuals living with injuries. By working with people with SCI and NBD to identify ways in which they would like to improve their bowel management strategies and by optimizing their use of dietary modification, prescription medications, and stimulation, we can hope to help ameliorate one of the major secondary effects of chronic SCI.

Acknowledgments

The authors report no conflicts of interest.

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