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## Mobility and Motility: Constipation Impairs Enteral Feeding in Disabled and Immobile Patients



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**At least a third of children and adults with neurodevelopmental disabilities with or without limited mobility are significantly undernourished. The incidence and severity of malnutrition increases with the duration and severity of disability. Nutritional support in children and adults with a variety of neurodevelopmental disabilities can result in weight gain, increased muscle mass, improved peripheral circulation, better wound healing, fewer and less severe decubitus ulcers, less irritability and spasticity, and fewer hospitalizations, all of which result in an improved sense of well-being and an improved quality of life. Chronic constipation is a commonly unrecognized contributor to feeding intolerance among children and adults with neurodevelopmental disabilities and/or limited mobility. This article will provide the clinician with tools to recognize and treat what can be a very debilitating condition.**

### CASE PRESENTATION

**W**.R. is a 24-year-old young man who was born extremely prematurely and as a result, has a number of chronic complications including quadriparetic spastic cerebral palsy, cortical blindness, profound global developmental delay with intellectual disability, a chronic seizure disorder, chronic respiratory difficulties that are likely the result of subclinical aspiration, and chronic feeding difficulties for which he had a gastrostomy placed during infancy. He also has a long history of chronic constipation. He has been hospitalized on at least three occasions this past year with acute respiratory illnesses that appear to be related to aspiration events and there are concerns that he

is more prone to aspiration because of chronic, inadequately treated constipation. On examination he has the stigmata of severe quadriparetic cerebral palsy and appears quite malnourished with minimal subcutaneous tissue and muscle mass. His height is 152 cm and his weight is 45.8 kg (BMI = 14.49 kg/M<sup>2</sup>), which is well below the first percentile.

It is certainly not surprising W.R. suffers from chronic constipation given his profound spastic cerebral palsy, chronic under nutrition, and lack of mobility. Nearly all children and adults with this constellation of symptoms will have difficulties with constipation. The constipation in this setting is multifactorial, in part due to a lack of mobility, and possibly due to the chronic ingestion of a liquid diet lacking fiber (although data on use of fiber is inconclusive). Spasticity may be a major contributor as well. When patients with spasticity strain to defecate, they often paradoxically contract

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their pelvic floor and external sphincter making the defecation process inefficient and ineffective. In addition to this, when these patients are ill or in pain, their spasticity often worsens making defecation even less efficient and effective. Nearly all patients like this require some sort of chronic laxative regimen. Laxatives and stool softeners alone are often insufficient to produce regular bowel movements in this population. Clinicians may need to resort to regular use of stimulant suppositories or even large volume enemas to produce regular bowel movements. In some patients with these problems, cecostomy placement to administer antegrade enemas daily can result in a major improvement in their quality of life.

It is also quite possible and in fact quite probable that W.R.'s difficulties with constipation are contributing to his recurrent pulmonary difficulties. Chronic constipation can slow gastric emptying and exacerbate or even precipitate the symptoms of GE reflux. As such, in many effected individuals, regulation of their bowel habit improves their tolerance of tube feedings with less bloating, gagging, retching, vomiting and/or signs/symptoms of GE reflux.

## **INTRODUCTION**

Studies suggest at least 1/3 of children and adults with neurodevelopmental disabilities with or without limited mobility are significantly undernourished, and not surprisingly, the incidence and severity of malnutrition increases with the duration and severity of disability. Historically, this state of malnutrition was considered to be part of the diseases they are suffering from, however a number of studies have demonstrated that nutritional support in children and adults with a variety of neurodevelopmental disabilities can result in weight gain, increased muscle mass, improved peripheral circulation, better wound healing, fewer and less severe decubitus ulcers, less irritability and spasticity, and fewer hospitalizations, all of which are associated with an improved sense of well-being and an improved quality of life.<sup>1</sup>

As many as 90% of children and adults with significant disabilities experience gastrointestinal difficulties including, but not limited to, dysphagia, aspiration during swallowing, gastroesophageal reflux, poor gastric emptying, and chronic

constipation, any or all of which may interfere with the ability to ingest adequate nutrition<sup>2</sup> (Table 1). As oral or enteral intake diminishes and nutritional status deteriorates, gastrointestinal symptoms may worsen, further compromising the patient's ability to ingest adequate calories resulting in a vicious and self-perpetuating downward spiral.

Studies have demonstrated that malnutrition in and of itself can produce feeding intolerance. Nutritional restitution can improve gastric motility and lessen the severity of gastroesophageal reflux,<sup>3,4</sup> in addition to improving gastric compliance and lessening early satiety.<sup>5</sup> In some cases, the feeding intolerance associated with worsening malnutrition is a result of superior mesenteric artery syndrome in which the third portion of the duodenum is compressed due to narrowing between the superior mesenteric artery and the abdominal aorta<sup>6</sup> (see Figure 1). In many cases, in undernourished or malnourished individuals, nutritional restoration can improve feeding tolerance. Nutritional repletion, either via a jejunal tube or parenterally, is the treatment of choice for superior mesenteric artery syndrome.<sup>7</sup>

## **Constipation**

Another less commonly recognized contributor to feeding intolerance among children and adults with neurodevelopmental disabilities and/or limited mobility is chronic constipation. As many as two-thirds of children and adults with disabilities and/or limited mobility suffer from chronic constipation.<sup>8</sup> The severity of constipation

**Table 1. Gastrointestinal Complications in Children and Adults with Disabilities**

- ◆ Oral motor dysfunction
- ◆ Dysphagia
- ◆ Aspiration during swallowing
- ◆ Gastroesophageal reflux with or without aspiration
- ◆ Poor gastric emptying
- ◆ Chronic constipation
- ◆ Generalized intestinal dysmotility

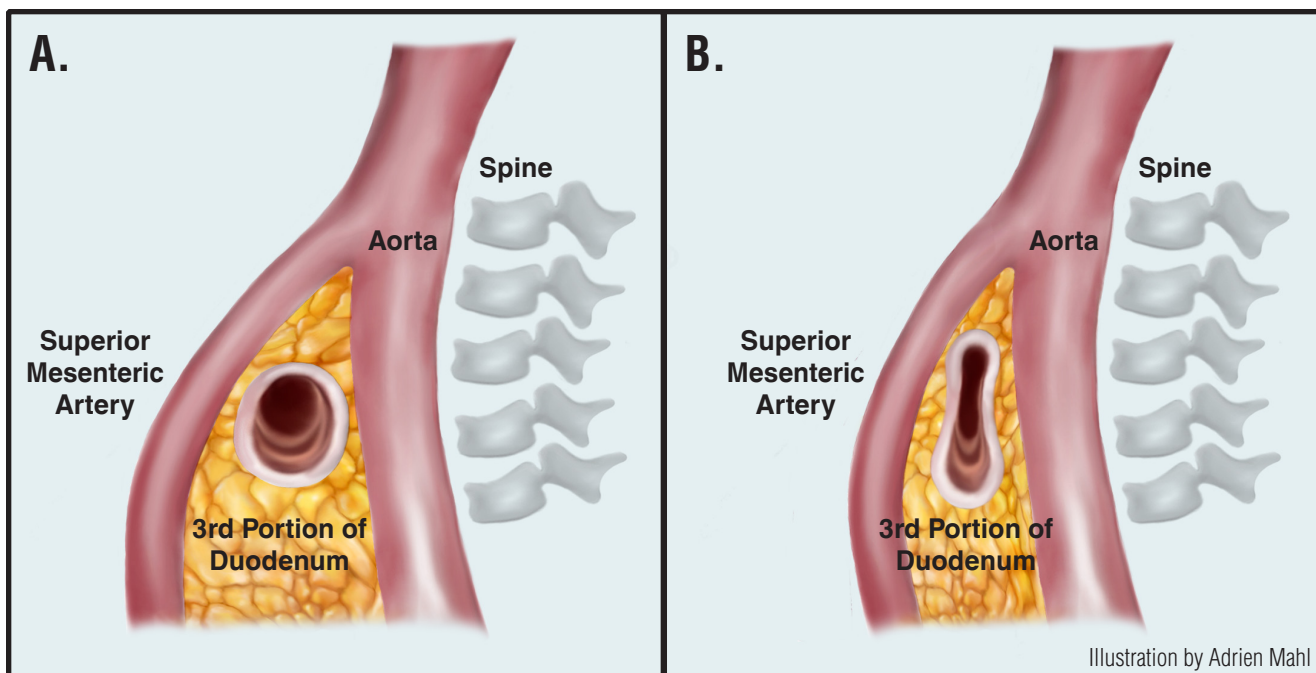


Figure 1. Duodenal Compression with Superior Mesenteric Artery Syndrome

Table 2. Untoward Effects of Chronic Constipation

- ◆ Abdominal cramping
- ◆ Bloating
- ◆ Perianal pain due to fissures and/or perineal skin breakdown
- ◆ Increased risk of recurrent urinary infections
- ◆ Produce or exacerbate vesicoureteral reflux
- ◆ Diminished enteral feeding tolerance
  - Delays gastric emptying
  - Causes early satiety
- ◆ Recurrent vomiting
  - Increased risk of aspiration pneumonia
- ◆ Exacerbate or precipitate the symptoms of gastroesophageal reflux

in this population is often underestimated and its significance on their quality of life is frequently unrecognized or discounted by health care professionals (Table 2). Abdominal cramping, bloating, and perianal pain due to fissures and/or perineal skin breakdown can be quite debilitating. Moreover, chronic constipation increases the risk of recurrent urinary infections, worsens vesicoureteral reflux, and diminishes enteral feeding tolerance by delaying gastric emptying and producing early satiety.<sup>9</sup> Numerous studies have demonstrated that otherwise healthy children and adults with chronic constipation have delayed gastric emptying that improves with effective management of the constipation.<sup>10</sup> In healthy adults, voluntary suppression of defecation significantly slows gastric emptying,<sup>11</sup> and moreover, intermittent painless rectal distension significantly slows gastric emptying and small bowel motility.<sup>12</sup> The mechanism of the effects of rectal distension on gastric emptying is unclear but likely reflects a combination of both humoral and neural effects.<sup>10,12</sup> Chronic constipation can cause chronic or recurrent vomiting and exacerbate or even precipitate the symptoms of gastroesophageal reflux and once the constipation is adequately treated, the vomiting and symptoms of reflux may abate.<sup>10,13</sup>

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Many factors contribute to the high prevalence of chronic constipation in children and adults with neurodevelopmental disabilities and/or limited mobility. While it is commonly assumed that inadequate intake of dietary fiber and a lack of sufficient fluid intake are major contributors, there is remarkably little evidence this is the case.<sup>14</sup> In contrast, there is good evidence that undernutrition slows colonic motility<sup>14</sup> and that diminished physical mobility slows gastrointestinal motility, and as a result, constipation and fecal impaction are common complications of prolonged immobility.<sup>15</sup>

Spasticity and/or dystonia are often significant contributors to chronic constipation as spasticity

and dystonia can disrupt normal defecation dynamics. In healthy individuals, rectal distension triggers the recto-inhibitory reflex and cues the individual to the urge to defecate after which he or she increases intra-abdominal pressure by taking a breath, closing their glottis, pushing downward with the diaphragm and tensing the lower abdominal muscles while simultaneously relaxing the muscles of the pelvic floor and the external anal sphincter. Individuals with spasticity or dystonia will often paradoxically contract the pelvic floor muscles and external sphincter while they are straining making the process of defecation extremely inefficient, ineffective, and more painful. Appropriate positioning during defecation may help mitigate these involuntary and counter-productive behaviors. If possible, have the person sit on the toilet. If there is a tendency for their buttocks to slip through the toilet seat, use a seat insert so they do not need to work to suspend themselves above the toilet bowl. While they are sitting, their knees should be flexed and at or above the level of their hips and their feet should be flat on the floor. Often it is necessary to place a step stool beneath their feet so they can achieve the appropriate posture. If the person is unable to sit on the toilet to defecate, have them lie left side down (e.g., the position we usually recommend when administering enemas), knees flexed at or above the level of the hips, and put something immobile beneath their feet to push against like the footboard of the bed.

### Assessment of Constipation

Given how often children and adults with neurodevelopmental disabilities and/or limited mobility suffer from constipation, early identification and aggressive management of constipation is warranted. When eliciting a history, it is important not only to ask about the frequency of bowel movements, but whether there is any bleeding with the passage of bowel movements and also about the size, caliber and consistency of the bowel movements (Table 3). If the bowel movements are long and slender “snakes”, or if they pass small bowel movements throughout the day, this suggests the patient is experiencing anismus (failing to relax the pelvic floor muscles and external sphincter during attempted defecation) and is not completely relaxing his or her pelvic

**Table 3. Clinical Assessment of Constipation**

- ◆ Frequency of bowel movements
- ◆ History of bleeding with the passage of bowel movement
- ◆ Size of bowel movements
- ◆ Caliber of bowel movements
- ◆ Consistency of bowel movements
- ◆ Perianal pain associated with defecation
- ◆ History suggestive of anismus during defecation
  - Clenched buttocks while straining
  - Legs stiff and/or trembling during defecation
  - Long, slender “snake-like” bowel movements
- ◆ Anal inspection and digital rectal exam
  - Presence of anal fissures and/or hemorrhoids
  - Fecal impaction
- ◆ Abdominal radiograph or transabdominal ultrasonography to assess colonic “stool burden”

floor and external sphincter while straining and thus their defecation process is relatively inefficient/ineffective.<sup>16</sup> In most cases, anismus is the result of the patient experiencing perianal pain with defecation, however, as mentioned above, patients with spasticity or dystonia frequently paradoxically contract their pelvic floor and external sphincter while straining. Often the best way to determine if the patient is experiencing anismus is to ask about their posture while they are trying to defecate. If their buttocks are clenched and/or their legs are stiff and/or trembling, it is quite likely they are not relaxing their pelvic floor and external sphincter while straining.

During the physical exam, it is important to try and determine if there is a fecal impaction. In some patients it is relatively easy to feel a large mass of stool in the descending and/or sigmoid colon. A digital rectal exam may prove useful not only to determine if there is a large amount of firm stool in the rectum, but also to evaluate perianal sensation, anal tone, and the presence of anal fissures or hemorrhoids. If the diagnosis of constipation is unclear based on the history and physical examination, an abdominal radiograph or transabdominal ultrasonography may be helpful in assessing the amount of stool in the colon.<sup>17</sup> Even with a careful history and exam and abdominal

**Table 4. Treatment Options for Severe Constipation in People with Disabilities**

Intervention	
<b><i>Osmotic stool softeners</i></b>	<ul style="list-style-type: none"> <li>◆ Polyethylene glycol 3350</li> <li>◆ Magnesium hydroxide</li> <li>◆ Magnesium citrate</li> <li>◆ Lactulose</li> <li>◆ Sorbitol</li> <li>◆ Sodium acid phosphate</li> </ul>
<b><i>Enemas</i></b>	<ul style="list-style-type: none"> <li>◆ Sodium phosphate (Fleet's enemas)</li> <li>◆ Normal saline</li> <li>◆ Tap water</li> <li>◆ Soap suds</li> </ul>
<b><i>Stimulant laxatives</i></b>	<ul style="list-style-type: none"> <li>◆ Sennosides</li> <li>◆ Bisacodyl</li> </ul>
<b><i>Procedures</i></b>	<ul style="list-style-type: none"> <li>◆ Malone antegrade continence enema (MACE)</li> <li>◆ Percutaneous cecostomy                             <ul style="list-style-type: none"> <li>➤ Daily or twice daily flushes of 500 – 1000 ml of water with 17 – 34 g of polyethylene glycol or 5 ml of glycerine soap</li> </ul> </li> </ul>
<b><i>Positioning</i></b>	<ul style="list-style-type: none"> <li>◆ Consider positioning during toileting; ideally knees should be higher than hips. See squatty potty: <a href="https://www.youtube.com/watch?v=YbYWhdL043Q">youtube.com/watch?v=YbYWhdL043Q</a></li> </ul>
Ineffective Interventions Often Used	
<b>Fiber</b>	<ul style="list-style-type: none"> <li>◆ No evidence of benefit; may worsen gas, bloating, cramping and stool impaction</li> </ul>
<b>Docusate sodium</b>	<ul style="list-style-type: none"> <li>◆ Ineffective for chronic constipation in the doses typically prescribed</li> </ul>

imaging, it can be difficult at times to determine if a child or adult with developmental disabilities and/or limited mobility is truly suffering from constipation, and if that is the case, it is reasonable to treat them empirically.

### Treatment of Constipation

Once the diagnosis of chronic constipation has been established, aggressive treatment should commence. Initial therapy should be aimed at eliminating a fecal impaction, as there is evidence that treatment outcomes of chronic constipation are better if patients undergo some form of disimpaction procedure before they commence daily laxative therapy.<sup>18,19</sup> High doses of polyethylene glycol given over several days appear to be as effective as a series of enemas in eliminating impactions.<sup>19</sup> The usual regimen for oral/enteral disimpaction is 1 g/kg of polyethylene glycol mixed in 8–12 ounces of fluid given three or four times daily for two or three days until the patient develops watery diarrhea.

After disimpaction, some form of bowel regimen should be prescribed to prevent recurrence of the constipation and to produce soft bowel movements ideally every day or every other day.<sup>17</sup> It is probably more important that the patient does not have to strain, and most importantly does not experience pain with defecation, than it is how often the patient is passing bowel movements.

While additional fiber and additional fluid are often prescribed, these are rarely sufficient to assure children and adults with neurodevelopmental disabilities and/or limited mobility are regularly passing soft bowel movements without difficulty or pain, and may worsen gas, bloating and abdominal cramping, and further increase the colonic stool burden. Hence, some form of laxative regimen is almost always required.<sup>17</sup> The most commonly prescribed laxatives are polyethylene glycol 3350, magnesium hydroxide, and lactulose, all of which are osmotic stool softeners. While there are no large comparative studies, most of the available evidence and experience suggest that provided they are given in sufficient doses, these agents are all equally effective; hence, the choice of the agent should be based on patient or family preference, cost, ease of administration, and potential side effects. The most common side effect of all of

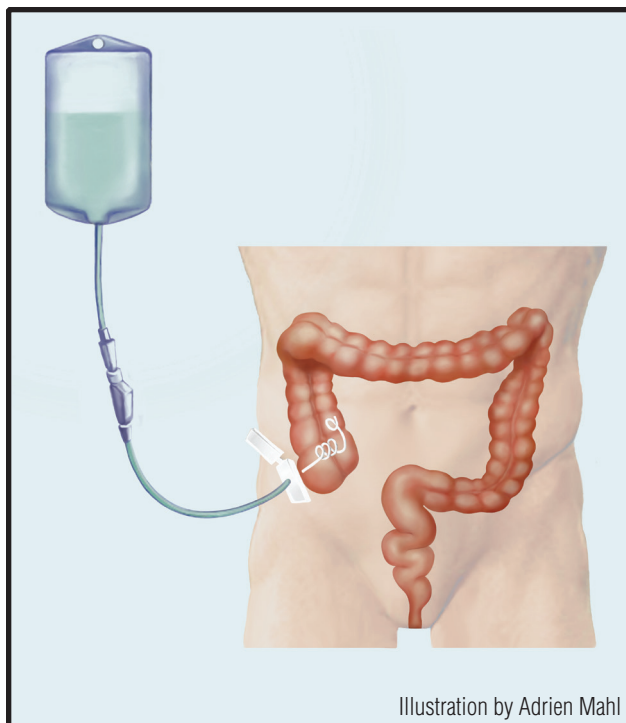


Figure 2. Cecostomy Tube

these agents is diarrhea, however lactulose often produces flatulence, distension and bloating. At higher doses magnesium can produce nausea and there are reports of hypermagnesemia when magnesium containing laxatives are given in very high doses and/or if the patient suffers from renal insufficiency.<sup>20</sup> While docusate sodium is often prescribed, what little evidence there is suggests that in the doses typically prescribed, this agent is not a very effective stool softener.<sup>21</sup>

Given that many (if not most), children and adults with neurodevelopmental disabilities and/or limited mobility who suffer from chronic constipation have disordered intestinal motility,<sup>1,2,17</sup> treatment with osmotic stool softeners is often not sufficient to produce regular soft bowel movements without simultaneously causing fecal leakage or seepage. In this group of patients, the use of a stimulant laxative alone or in combination with osmotic stool softeners can be very effective. The most commonly prescribed stimulant laxatives are sennosides or bisacodyl (See Table 4 for different laxative preparations).

Regardless of the laxative regimen that is prescribed, it is important to explain to the patient/

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family that these agents will almost certainly need to be used chronically, and it is also very important to reassure them that there is no evidence that the chronic use of any of these agents results in dependency or increases the risk of colon cancer.<sup>22</sup>

In cases that don't respond adequately to oral laxative therapy, some patients/families opt for regular use of suppositories or saline enemas. Another option is a Malone antegrade continence enema (MACE) procedure or a percutaneous cecostomy (Figure 2). With both of these procedures, there is a surgically constructed conduit from the skin into the proximal colon that allows the administration of antegrade colonic irrigations/enemas.<sup>17,23</sup> With either a MACE procedure or percutaneous cecostomy, flushes of between 500 and 1000mL of water containing 17 g or polyethylene glycol or 5 ml of glycerin soap are typically administered once or twice daily. For some patients, these procedures can substantially improve their quality of life.<sup>24,25</sup> See Table 4 for treatment options for severe constipation in those with disabilities.

### CONCLUSION

A large number of children and adults with neurodevelopmental disabilities, with or without limited mobility, are undernourished and suffer from chronic gastrointestinal difficulties including feeding intolerance and chronic constipation. While it is not always recognized, chronic constipation can clearly worsen feeding intolerance in this group of individuals. Not only will this worsen their nutritional status, but it may worsen their gastrointestinal symptoms, further compromising their ability to ingest adequate calories and producing a vicious downward spiral. Given how often children and adults with neurodevelopmental disabilities and/or limited mobility suffer from constipation and the potential impact of the constipation on their quality of life, as well as the potential for impairing their ability to tolerate enteral feedings, early identification and aggressive management of constipation is not only appropriate, but the right thing to do. ■

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