Transanal irrigation for the treatment of neuropathic bowel dysfunction

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Myelomeningocele; Faecal incontinence; Constipation; Transanal irrigation

Abstract
Introduction: Children with spinal cord lesions very often experience bowel dysfunction, with a significant impact on their social activities and quality of life. Our aim was to evaluate the efficacy of the Peristeen transanal irrigation (TI) system in patients with neuropathic bowel dysfunction (NBD).

Material and methods: We prospectively reviewed 40 children with spina bifida and NBD who did not respond satisfactorily to conventional bowel management and were treated with the Peristeen TI system. Dysfunctional bowel symptoms, patient opinion and level of satisfaction were analysed before and during TI treatment using a specific questionnaire.

Results: Thirty-five children completed the study. Mean patient age and follow up were 12.5 years (6–25) and 12 months (4–18), respectively. Average irrigation frequency and instillation volume were once every 3 days and 616 ml (200–1000), respectively. Bowel dysfunction symptoms including faecal incontinence improved significantly in all children. Patient opinion of intestinal functionality improved from 2.3/6 to 8.2/6 (P < 0.0001) and mean grade of satisfaction with the Peristeen system was 7.3. Patient independence also improved from 28 to 46% and no adverse events were recorded.

Conclusions: TI should be used as a first therapeutic approach in those children with NBD who do not respond to conservative or medical bowel management before other more invasive treatment modalities are considered. The Peristeen system is as effective as other TI methods, but it is easy to learn, safe and increases the patient’s independence.

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Introduction

Children with spinal cord lesions such as myelomeningocele (MMC) very often experience bladder and bowel dysfunction. They may suffer constipation, faecal incontinence or both, and these may have a significant impact on their

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social activities and quality of life as well as decrease their self-esteem [1,2]. However, while urological sequelae and their treatment are well documented, neuropathic bowel dysfunction (NBD) management is less so, perhaps due to the misperception that it has a less serious morbidity than bladder dysfunction. Management of NBD has often involved diet and mild laxatives combined with enemas or digital manoeuvres [3,4]. However, in some patients regular conventional bowel management (CBM) is not effective and in these cases transanal irrigation (TI) can be useful. TI is not a new concept. Indeed, it is a very old procedure that was reinvented in the 1980s by Shandling and Gilmour [5] with the introduction of the enema continence catheter for children with NBD. Since then, different studies have demonstrated its efficacy [6–8], avoiding the need for other more invasive techniques. In those children in whom TI is not effective in controlling faecal incontinence and constipation, more invasive techniques, such as the Malone antegrade continence enema or sacral nerve stimulation, have a place [9,10].

There is limited published evidence supporting any given bowel management programme in children with spina bifida over any other [11]. Therefore, the present study evaluates whether TI using the Peristeen TI system (Coloplast A/S Kokkedal, Denmark) improves NBD symptoms and quality of life in children who had not responded satisfactorily to CBM, comparing their status before and during TI treatment.

Material and methods

Forty children with severe NBD secondary to MMC who did not respond satisfactorily to regular CBM and who presented with persistent constipation, faecal incontinence and other bowel symptoms were enrolled in this prospective study after written consent was obtained.

In all children, TI was performed using the Peristeen anal irrigation system composed of a coated rectal balloon catheter, manual pump and water container. The system makes it possible for even immobilized children or children with poor hand function to perform the irrigation procedure without assistance from their parents or caretakers. All of the components are latex-free. The catheter is inserted into the rectum and the balloon inflated to hold the catheter in place within the rectum while a tap water enema is slowly administered with the manual pump. Subsequently, the balloon is deflated and the catheter removed, followed by bowel emptying of the enema and other bowel contents. During the first 2 weeks children/parents were trained in how to use this system by specialized nurses. The volume of water used, the degree of balloon inflation and the frequency of irrigation were determined by trial and error during this period for each individual child. During the TI treatment period no patient used any drug or other alternative method for evacuation.

A standard questionnaire evaluating the efficacy of this system for NBD was hospital administered during initial and control visits. It was structured to cover: bowel function (method and frequency of defecation, frequency of diarrhoea and faecal incontinence, difficulty and/or pain during defecation, the feeling of incomplete evacuation, abdominal pain or discomfort before and/or after defecation, sweats or headache during or after defecation, time spent on intestinal evacuation, etc.) and quality of life (patient/parent opinion about daily activity and general level of satisfaction). The influence of the current bowel management on quality of life and grade of satisfaction was assessed on a numeric box scale (range 0–10, with 0 representing great reduction and 10 representing great improvement). ‘Faecal continence’ was defined as no involuntary stool loss in the absence of treatment, ‘pseudocontinence’ as no involuntary stool loss with the use of a treatment modality and ‘incontinence’ as involuntary stool loss. ‘Occasional’ faecal incontinence was defined as no more than three inadvertent escapes of faecal material during 1 month and ‘frequent’ as at least one episode per week. Constipation was defined as a stool frequency of less than three times weekly and/or hard, large stools that were difficult and painful to pass, and/or use of laxatives.

The statistical analysis was performed using the SPSS version 11 programme. The Wilcoxon test was used to analyse the ordinal variables. Statistical significance has been set at $P \leq 0.05$.

Results

Forty children were enrolled and 35 completed the questionnaire and were included in the study. The average age was 12.5 years (6–25), and there were 18 boys and 17 girls. Demographic data are summarized in Table 1.

In these children CBM consisted of manual evacuation, abdominal massage, enemas and laxatives. Fifteen children...
regularly employed more than one method for defecation (Table 2).

Average time of using the TI system was 12 months (4–18). The average volume of tap water used during irrigation was 616 ml (200–1000). The total time spent on bowel management and irrigation frequency is recorded in Table 3. Total time spent on bowel management was significantly less with the Peristeen TI system (3% of children spent more than 1 h) than with CBM (63% spent more than 1 h). Most children used the Peristeen TI system every 3 days.

TI was performed before meals in 63% of children, after meals in 29%, and 9% did not have any routine. During CBM, 43% defecated before meals, 11% after, and 46% without any routine.

Responses regarding NBD management symptoms before and while using the Peristeen TI system are reported in Table 4. When we compare the results using CBM and during TI treatment there was a significant improvement in symptoms such as: difficulty and/or pain during defecation ($P < 0.005$), feeling of incomplete evacuation ($P < 0.0001$), abdominal pain or discomfort before or after defecation ($P < 0.0001$), and sweats or headache during or after defecation ($P < 0.05$). Twenty-five children had faecal incontinence always or very often during CBM and five occasionally. During TI treatment faecal incontinence levels improved significantly in all children. Of the 25 children with faecal incontinence (frequent or always), 18 (72%) were pseudocontinent, two improved from ‘frequent’ to ‘occasionally’, and five from ‘always’ to ‘frequent’ ($P < 0.0001$). During this follow up no child had faecal retention or impaction.

Before TI treatment 72% of the children needed some assistance to evacuate their bowel intestine and 28% were partially or totally independent. With the Peristeen system, 46% were partially or totally independent.

Patients/parents did not find any difficulty in introducing the catheter into the rectum. Catheter expulsion during TI was recorded occasionally in 17% of the children and often in one. Leakage of irrigation fluid was only occasionally present in 26% of children and no adverse events were recorded.

There was an improvement in patients’ opinion of their intestinal functionality from $2.3 \pm 1.4$ to $8.2 \pm 1.5$ ($P < 0.0001$), and the mean grade of satisfaction with the Peristeen system was 7.3.

### Table 2 Methods used for defecation before TI treatment.

<table>
<thead>
<tr>
<th>Method</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual evacuation</td>
<td>4</td>
</tr>
<tr>
<td>Abdominal massage</td>
<td>3</td>
</tr>
<tr>
<td>Plus manual evacuation</td>
<td>4</td>
</tr>
<tr>
<td>Enemas</td>
<td>6</td>
</tr>
<tr>
<td>Plus enemas</td>
<td>2</td>
</tr>
<tr>
<td>Laxatives</td>
<td>7</td>
</tr>
<tr>
<td>Plus enemas</td>
<td>5</td>
</tr>
<tr>
<td>Plus manual evacuation</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 3 Total time spent on bowel management and irrigation frequency (IF).

<table>
<thead>
<tr>
<th></th>
<th>&lt;15 min</th>
<th>15–30 min</th>
<th>30–60 min</th>
<th>&gt;60 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before TI</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>During TI</td>
<td>1</td>
<td>21</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 4 Symptoms before and after commencing TI treatment

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Often</th>
<th>Always</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty and/or pain during defecation</td>
<td>7</td>
<td>9</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>The feeling of incomplete evacuation</td>
<td>16</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>Abdominal pain or discomfort before/after defecation</td>
<td>2/13</td>
<td>12/7</td>
<td>12/6</td>
<td>7/8</td>
<td>2/1</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Sweating or headache during or after defecation</td>
<td>13/25</td>
<td>7/5</td>
<td>6/3</td>
<td>8/2</td>
<td>1/0</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Leakage of faeces</td>
<td>16</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Abdominal pain or discomfort before/after defecation</td>
<td>24</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

**Discussion**

Spinal cord lesions affect colorectal motility, transit times and bowel emptying, and often lead to constipation, faecal incontinence, or a combination of both. Although these symptoms are not life-threatening, they may have a severe impact on quality of life and increase levels of anxiety and depression. In these children, squeeze pressure, anorectal sensitivity and anal resting pressure may also be impaired, while rectal compliance may be reduced due to hyperre-activity of the rectum [12,13].

Constipation and faecal incontinence are the predominant intestinal symptoms in patients with MMC, and in 48% of these patients this has a negative impact on social activities or quality of life that increases with age [2].

Many methods are used to deal with constipation and faecal incontinence in these children, including conservative and surgical approaches. However, since children with NBD are a heterogeneous population, a uniform policy in the management of constipation and faecal incontinence is impossible. Intake of a high fiber diet and administration of laxatives are used in the prevention and treatment of constipation and overflow faecal pseudocontinence. In children with true faecal incontinence with a deficient faecal continence mechanism and prolonged colorectal motility we have to maintain the left colon stool-free. In our experience, the standard enemas are difficult, if not impossible,
to administer in these children because they cannot retain the enema, which flows out involuntarily through the weak anus during instillation. On the other hand, small doses of laxatives usually accomplish nothing while large doses can result in profound embarrassment. In these cases TI can be useful. It aims to ensure emptying of the left colon. This should prevent faecal leakage between washouts and re-establishes control over time and place of defecation. A regular evacuation of the rectosigmoid moreover would prevent constipation and/or faecal incontinence. The exact mechanism behind colonic irrigation is still not well known. The effect of water administration is in part due to a simple mechanical wash-out effect. It has also been suggested that the administration of water generates colonic mass movements. Different studies have documented its efficacy in treating constipation and faecal incontinence in NBD, and between 41% and 100% of neuropathic patients with faecal incontinence benefit from TI [3,5–8]. The variability in the reported faecal incontinence success rates depends on the pseudocontinence definition used and the length of follow up. Shandling and Gilmour [5] reported a faecal continence success rate of 100%, but they consider as pseudocontinent those patients with no more than three inadvertent minor events of faecal soiling per month. In our study that was considered ‘occasional’ faecal incontinence. On the other hand, in long-term studies the success rate in achieving faecal pseudocontinence decreases because the TI treatment is discontinued. Some long-term studies have reported a discontinuation rate of 45–55% [8,14]. The most frequent reasons for stopping TI were technical problems (catheter expulsion and loss of irrigation fluid during the day) and that the procedure is time consuming. Gosselink et al. [8], using the colostomy irrigation tip to perform TI, reported 74% of their patients had irrigation-related problems and 55% stopped treatment due to those problems. In our study, total time spent on bowel management using the Peristeen TI system decreased compared with CBM.

In two studies undertaken in adults [15,16] with a short follow up where NBD was treated with the Peristeen TI system, the faecal continence success rate was similar to the studies mentioned above (68–73%), and all dysfunctional symptoms related to the evacuation improved significantly. However, differently from other studies, they reported fewer irrigation-related problems (19–25%). In our study, dysfunctional symptoms and faecal incontinence significantly improved during TI treatment in all children, with 18 children being completely pseudocontinent and two occasionally incontinent. Of the five children in whom faecal incontinence improved but did not disappear, this was related to a lower irrigation frequency than was indicated.

In spinal cord lesion patients, treatment with TI is often difficult to manage due to immobility or impaired hand function, and the aim of any bowel programme in patients with NBD must be to correct constipation and faecal incontinence and to make the patient as independent as possible. Therefore, the system used for TI should be designed to be used by the patients themselves, even in patients with immobility or impaired hand function.

According to the results of this study and two other studies carried out in adults [15,16], the Peristeen TI system achieves these goals with an increase in the patient independence rate ranging between 42% and 75%. In our study, patients’ independence also improved from 28% to 46%. The patients’ opinion of their intestinal function and grade of satisfaction also improved significantly.

TI may play a role in bowel emptying in children with NBD and it should be used as a first therapeutic approach in those patients who do not respond to conservative or medical bowel management before other more invasive treatment modalities, such as the Malone antegrade continence enema, are considered. The Peristeen anal irrigation system is as effective as other TI methods, but it is easy to learn and safe with minor side effects, and increases patient independence.

**Disclaimers**

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