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Sequential treatment of chronic constipation in paraplegic subjects

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Chronic constipation is the main gastrointestinal complaint of spinal cord injury (SCI) patients, and has a significant effect on patients' lives, concerning nursing dependence, morbidity and complications. Many therapies have been proposed to treat chronic severe constipation, most of them with limited effect or being unpredictable in their effect or being expensive or very radical. Ten spinal cord injury patients have been submitted to a therapeutic protocol based on a high residue diet, a standardised water intake, and on the use of a sequential schedule of evacuating stimuli. After four weeks of treatment the patients showed an increased frequency of bowel movements per week, a decreased total gastrointestinal transit time, and a decreased need for oral and rectal laxatives. This treatment seems to be effective in modifying patients' bowel habits, and therefore could be considered as a standardised protocol for the management of severe constipation in those who are paraplegic.

Keywords: paraplegia; chronic constipation; diet; spinal cord injury

Introduction

Chronic constipation is the main gastrointestinal complaint after a SCI. According to international standardised criteria[1] chronic constipation is defined as the presence for at least 12 months, of the following complaints, when not taking laxatives: fewer than two bowel movements per week on average, or two or more of the following complaints: (a) straining with at least 25% of bowel movements; (b) a sensation of incomplete evacuation after at least 25% of bowel movements; (c) hard or pellet-like stools with at least 25% of bowel movements; (d) bowel movements less frequent than three per week.

Severe constipation in SCI patients rarely responds to the usual conservative types of treatment, and not infrequently, paraplegic patients use aggressive but inadequate means to avoid colorectal impaction and prevent faecal overflow and incontinence. Nevertheless these methods, unless properly indicated and used, are often ineffective and may force patients to have frequent cleansing enemas. In addition the outcome may be unpredictable and unsatisfactory as they may induce repetitive bowel movement and/or faecal incontinence. Inadequately treated chronic constipation may limit normal daily activities, social life, and increase the dependency of SCI patients.

Chronic constipation is usually the result of two main pathophysiological mechanisms: slow colonic transit and impaired defaecation. In paraplegic patients a prolonged total large-bowel transit time is a constant finding,[2,3] mostly due to slow transit in the descending and sigmoid colon. The gastrocolonic reflex is absent after SCI[4] and depending on the neurological level of the lesion, two kinds of motility alteration may ensue: an increase in non-peristaltic contractions of the sigmoid colon and/or a decrease of the peristaltic contractions.[5]

In SCI there is loss of the conscious urge to defaecate with inability to trigger the defaecatory act; in addition, once rectal distension activates the defaecatory reflex, the timely inhibition of the anal canal is opposed by the dyssynergic contraction of the external anal sphincter and of the other pelvic muscles.[5,6]

The aim of this study was to assess if a therapeutic protocol which combines the means to accelerate large bowel transit and to trigger the defaecatory act, can increase the frequency and optimise the timing of bowel movements, and thus decrease the necessity for the use of oral laxatives and/or enemas in SCI patients.

Patients and methods

Patients

Ten SCI patients (5F, 5M; mean age 33 years, range: 20–60 years), were enrolled for the study; all except two had an (ASIA A) lesion;[7] the SCI level ranged from C3 to L4. The period which followed the lesion varied from 2 and 23 years. The cause of the lesion was a neurological disease in four patients and spinal cord

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trauma in the other six. All had chronic constipation and required to use different stimuli for bowel evacuation (Table 1).

Study protocol and methods

The study protocol is shown in Figure 1; it required: (a) withholding evacuating stimuli such as enemas and/or laxatives; (b) the use of a sequential step-by-step protocol of evacuating stimuli, aimed to identify, among several defaecatory stimuli, the one which, being equally effective, maximise the patient's control on the bowel.

The patients were instructed to attempt defaecation after stimulus, starting from the first step of the protocol and only if unsuccessful to progress with the following steps. Patients received a diet with a standardised fibre (15 g/die) and water (1500 ml/24 h) intake (Figure 2).

The study protocol was approved by the ethical committee of the II Clinica Medica, University of Rome, and all patients gave their informed consent.

-Free intake of: pasta, meat, fish, cheese, sugar, lipids.
-Limited intake of rice: maximum 70 gr. twice a week.
-Daily intake of:
1) salad (100 gr.)
2) one of the following vegetables:
-cooked or raw peas (70 gr.)
-raw carrots (120 gr.)
-cooked broccoli (85 gr.)
-cooked spinach (55 gr.)
-potatoes (170 gr. raw weight)
-raw tomatoes (250 gr.)
-cauliflower (130 gr. raw weight)
-olives (80 gr.)
-beans (50 gr. raw weight)
3) raw fruit (400 gr.): pears, peaches, apples, oranges, bananas

Figure 2 Example of the diet used in the trial: it is a Mediterranean diet enriched in vegetables and fruit

Table 1 Neurological and bowel characteristics of the patients

	Patients		*Cord lesion*			*Bowel habit*	
no	*s*	*yrs*	*level*	*cause*	*duration*	*bf*	*stimuli to evacuate*
1	M	37	D5–6	trauma	10 yrs	3	ano-rectal digitation ± manual evacuation
2	M	31	C5–6	trauma	8 yrs	3	laxative suppository + oral laxative
3*	F	24	T12–L1	myelitis	6 yrs	2–3	oral laxative + laxative suppository + fiber supplement
4	F	20	C7	neurinoma	17 yrs	2–3	laxative suppository
5*	F	53	T1–3	myelitis	7 yrs	2–3	enema + oral laxative + manual evacuation
6	M	22	T12–11	trauma	2 yrs	3	microenema of glycerin
7	F	69	L3–4	trauma	8 yrs	3	oral laxative + manual evacuation
8	M	22	TA–5	trauma	8 yrs	3	glycerin suppository + abdominal massage
9	M	28	C4–6	trauma	7 yrs	2	laxative suppository + ano-rectal digitation ± manual evacuation
10	F	23	L1	sp. bifida	23 yrs	1–3	fiber supplement

s = sex; bf = bowel frequency ev/week); * = Patients with incomplete lesion

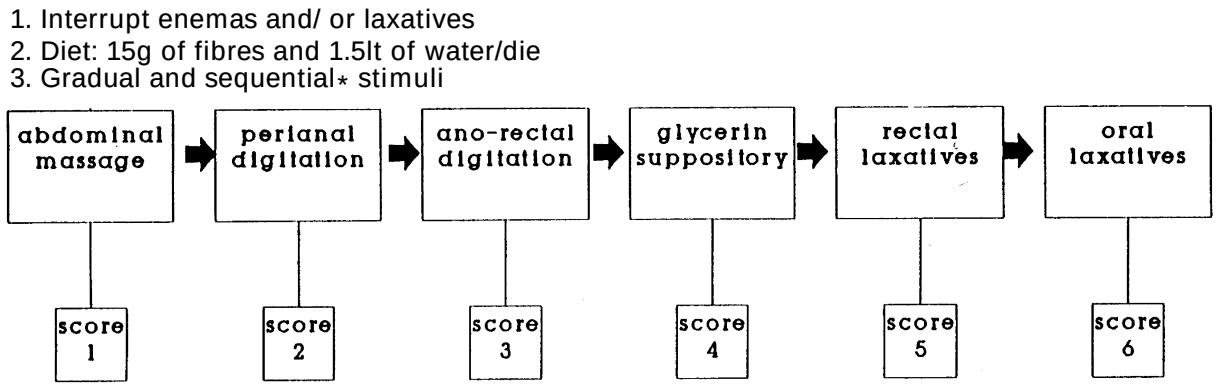

Figure 1 Therapeutic protocol of chronic constipation in paraplegic subjects. According to the protocol of the study, patients were required to stimulate defaecation starting from the first step and only if unsuccessful to progress to subsequent steps. The stimuli were evaluated by means of a one to six numerical score as shown in the figure

The following variables were assessed in basal conditions and after 4 weeks of treatment: bowel movement frequency, bowel habit, total and segmental large-bowel transit time.

The modality of bowel evacuation was evaluated by means of a six-point scale score, which measured the six steps of the protocol (Figure 1). Large bowel transit was carried out by means of radioopaque markers according to a previously described method[2] (Figure 3). The daily percentage output of markers from each large-bowel segment was used to measure the transit index of the right, left colon and rectum.[8]

Results are expressed as mean and standard deviation ($m \pm SD$) and their statistical analysis was carried out by means of Wilcoxon's test.

Results

All patients complied with the protocol and did not use oral contact laxatives or enemas during the study period. The most relevant results of the study are summarised in Figure 4.

In the basal period, four and two patients used oral and rectal contact laxatives, respectively; at the end of the training period no patient took contact laxatives orally and two used laxative suppositories. The score which expressed the degree of altered evacuation in accordance with the sequential schedule and reported in Figure 1, was 4.5 ± 1.9 in the basal period, and 3.1 ± 2.7 during the training period ($P < 0.05$).

Reported bowel frequency was 2.9 ± 2 ev/week, in the basal period, and 4.1 ± 3 ev/week (ns) at the end of the training period. The consistency of the stool did not vary significantly; one patient reported two episodes of faecal incontinence during the study period.

The total gastrointestinal transit time (TGITT) was significantly reduced at the end of the study (146 ± 45 *vs* 93 ± 49 h; $P < 0.01$), while the segmental transit index did not vary in any of the large bowel segments (right colon: 79 ± 15 *vs* 86 ± 17; left colon 37 ± 17 *vs* 44 ± 15; rectum: 58 ± 29 *vs* 54 ± 23).

Discussion

Bowel dysfunctions in patients with spinal cord injury have a significant disturbing effect on the quality of life by impairing daily activities and on the health status by causing morbidity and possible severe complications such as dynamic ileum or colonic volvulus, even leading to death.[9,10]

Many therapeutic protocols have been proposed to treat chronic constipation using different kinds of medicine such as oral and rectal laxatives, enemas,[9,11] prokinetic drugs,[12–14] colostomy[15] and neurological interventions (sacral nerve root electrical stimulation).[16,17] Recently case reports[12–14,18] and not-controlled clinical studies have reported conflicting data on the possible use of cisapride, a prokinetic drug which increases gastro-intestinal motility, in the management of chronic constipation. However controlled studies[19,20] have shown that the administration of cisapride did not influence the oro-anal transit time, the segmental colonic transit and the bowel frequency.

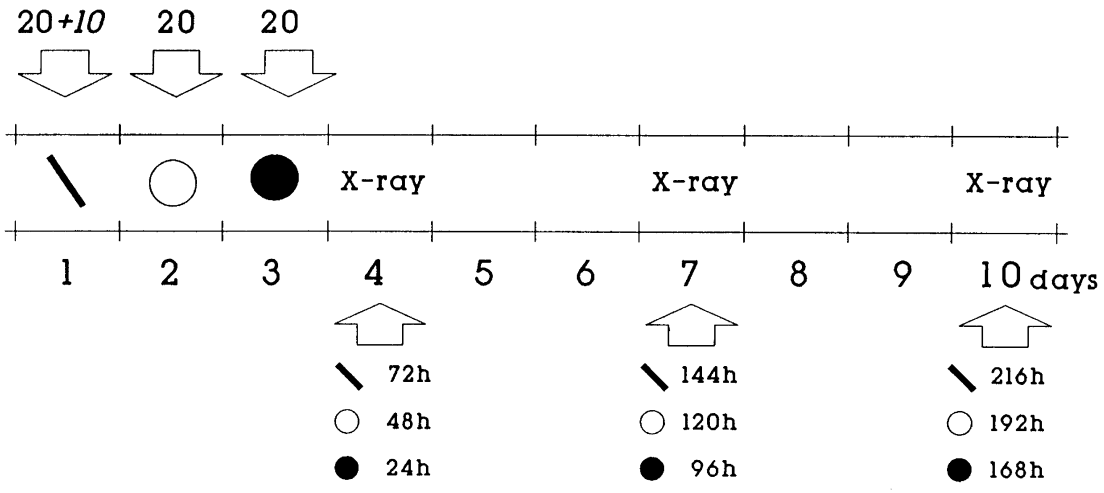

Figure 3 Measurement of large bowel transit times. Patients swallowed 20 radiopaque markers of different shapes on the first, second and third day of the study. On the first day patients also inserted ten radiopaque markers directly into the rectum. X-ray of the abdomen was performed on the fourth, seventh and tenth day, to assess the number and location of the markers in the different parts of the large bowel (right colon, left colon and rectum)

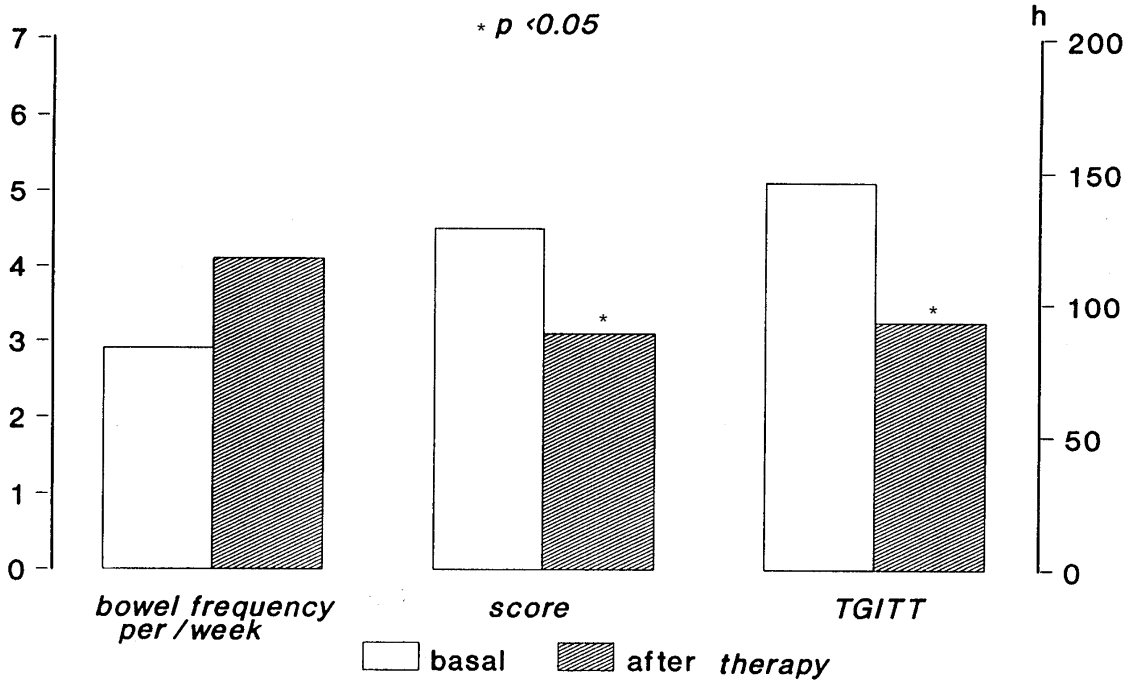

Figure 4 Effects of the sequential treatment of chronic constipation in paraplegic subjects. Empty columns represent the basal condition, straight columns represent the results at the end of the study period. Oro-anal transit and score of the stimuli significantly decreased at the end of the study period; Bowel frequency increased at the end of the study period, but the difference was not statistically significant

Electrical stimulation of the ventral sacral nerve roots S_2, S_3 and S_4 by means of Brindley's stimulator for the management of the neuropathic bladder, can affect the large-bowel motor activity, inducing recto-sigmoid contractions.[21] The clinical use of electrical stimulation in bowel management is still debated, mainly for the uncertain effects on the anal sphincter. It has been reported that electrical stimulation may enable unassisted defaecation by inducing anal relaxation;[16] on the other hand other reports indicated that electrical stimulation could also induce vigorous contractions of the external anal sphincter.[21] Finally, some studies suggested that, of the possible surgical procedures, colostomy could be indicated for chronic constipation in SCI patients, being safe and followed by an improved level of independence and quality of life.[15] All of these procedures, however, have proven to be either ineffective or unpredictable in their outcome, in addition they cause irreversible changes, and they are expensive and may be followed by a high complication rate.

The ideal treatment should be safe, inexpensive, and effective in accelerating colonic transit time and evoking the defaecation reflex at regular time intervals leading to predictable, effective, painless defaecation. The association of a high residue diet and a sequential step-by-step protocol of evacuating stimuli proved to be effective in the majority of patients as it was followed by acceleration of large bowel transit, effective and predictable evacuations and with a reduced need of oral laxative administration. Only if patients are unresponsive to the protocol, may it be necessary to prescribe enemas or oral laxatives, alone or in combination with one or more of the above mentioned stimuli. The frequency of the use of laxatives must be planned in order to avoid rectal impaction and overflow incontinence. In our experience, usually three or fewer administrations per week are sufficient.

The improvement in the score used to measure the modality of evacuation and, hence the degree of bowel disability, expresses the reduced need of using oral laxatives and/or enemas. The results of our therapeutic trial suggest that the proposed treatment may lessen the patient's risk of incontinence and dependence from nursing. It is also likely that a better control of bowel habit enhances the patients' quality of life by improving independence and permitting an increase of daily activities and of social relations.

References

1 Whitehead WE *et al*. Report of an international workshop on management of constipation. *Gastroenterol Internat* 1991; **4:** 99–113.
2 Menardo G *et al*. Large bowel transit in paraplegic patients. *Dis Colon Rectum* 1987; **30:** 924–928.
3 Nino-Murcia M *et al*. Colonic transit in spinal cord-injured patients. *Invest Radiol* 1990; **25:** 109–112.

4 Glick ME *et al*. Colonic dysfunction in patients with thoracic spinal cord injury. *Gastroenterology* 1984; **86:** 287 – 294.
5 Beuret-Blanquart F *et al*. Colonic transit time and anorectal manometric anomalies in 19 patients with complete transection of the spinal cord. *J Auton Nerv System* 1990; **30:** 199 – 208.
6 Weber J *et al*. External anal sphincter function in spinal patients. Electromyography and manometric study. *Dis Colon Rectum* 1991; **34:** 409 – 415.
7 Ditunno JF *et al*. The international standards booklet for neurologic and functional classification of spinal cord injury. *Paraplegia* 1994; **32:** 70 – 80.
8 Corazziari E *et al*. Colonic segmental transit times in chronic non-organic constipation. *Rendic Gastroenterol* 1975; **7:** 67 – 69.
9 Branwell JG *et al*. Management of the neurogenic bowel in patients with spinal cord injury. *Urol Clin North Am* 1993; **20:** 517 – 526.
10 Fenton-Lee D *et al*. Colonic volvulus in the spinal cord injured patient. *Paraplegia* 1993; **31:** 393 – 397.
11 Stiens RA. Reduction in bowel program duration with polyethylene glycol based bisacodyl suppositories in SCI patients' bowel programs. *Rehabil Nurs* 1994; **19:** 334 – 338.
12 De Groot H, De Pagter GF. Effects of cisapride on constipation due to a neurological lesion. *Paraplegia* 1988; **26:** 159 – 161.
13 Etienne M, Verlinden M, Brassine A. Treatment with cisapride of gastrointestinal and urological sequelae of spinal cord transection; case report. *Paraplegia* 1988; **26:** 162 – 164.
14 Binnie NR *et al*. The action of cisapride on the chronic constipation of paraplegia. *Paraplegia* 1988; **26:** 151 – 158.
15 Stone JM *et al*. Colostomy as treatment for complication of spinal cord injury. *Arch Phys Med Rehabil* 1990; **71:** 514 – 518.
16 McDonagh RP *et al*. Control of defaecation in patients with spinal cord injuries by stimulation of sacral anterior nerve root. *Br Med J* 1990; **300:** 1494 – 1497.
17 Frost F *et al*. Electrical stimulation of the sacral dermatones in spinal cord injury: effect on rectal manometry and bowel emptying. *Arch Phys Med Rehabil* 1993; **74:** 696 – 701.
18 Geders GM *et al*. The effect of cisapride on segmental colonic transit time in patients with spinal cord injury. *Am J Gastroenterol* 1995; **90:** 285 – 289.
19 Badiali D *et al*. A double-blind controlled trial on the effect of cisapride in the treatment of constipation in paraplegic patients. *J Gastroint Motility* 1991; **3:** 263 – 267.
20 De Both PSM, De Grot GH, Slootman HR. Effects of cisapride on constipation in paraplegic patients: a placebo-controlled randomized double blind cross-over study. *Eur J Gastroenterol* 1995; **90:** 285 – 289.
21 Varma JS *et al*. Differential effects of sacral anterior root stimulation on anal sphincter and colorectal motility in spinally injured man. *Br J Surg* 1986; **73:** 478 – 482.