

ORIGINAL ARTICLE

The pattern of colorectal dysfunction changes with time since spinal cord injury

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Background: Cross-sectional studies suggest that colorectal dysfunction after spinal cord injuries (SCI) worsens as time goes by. However, follow-up studies are needed to prove this.

Study design: Prospective study.

Objective: To describe long-term colorectal function in SCI patients.

Setting: Members of the Danish Spinal Cord Injuries Association.

Methods: In 1996, 424 members of the Danish Paraplegic Association answered a detailed questionnaire describing their colorectal function. In 2006, those who continued as members ($n = 284$) received an identical questionnaire. Data for patients responding both in 1996 and in 2006 ($n = 159$) were compared.

Results: In 1996, 25% of the respondents reported that colorectal dysfunction had some or a major impact on their quality of life. At follow-up 10 years later, it was 38% ($P < 0.005$). In 1996 11% defecated less than every second day and 16% spent more than 30 min at each defecation; in 2006, it was 19% ($P < 0.01$) and 25% ($P < 0.00001$), respectively. Digital anorectal stimulation or evacuation was performed at least once every week by 48% in 1996 and by 56% in 2006 ($P < 0.0001$). Fecal incontinence was reported at least once a month by 22% in 1996 and by 17% in 2006 ($P < 0.001$).

Conclusion: While the frequency and severity of constipation-related symptoms increase with time since SCI, there is a decrease in the frequency of fecal incontinence.

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Introduction

The longevity of individuals with spinal cord injuries (SCI) has improved significantly in the recent four decades.^{1–3} This has made long-term effects of SCI increasingly important. Colorectal dysfunction is a common problem^{4–11} affecting approximately 80% of patients.^{4,12} Accordingly, fecal incontinence- and constipation-related symptoms often impair the quality of life (QOL) and/or activities of daily living^{11,13} of SCI patients.^{4–6} Cross-sectional studies suggest that colorectal dysfunction after SCI worsens as time goes by.^{4,5} However, results from cross-sectional studies may be biased and should be proved by prospective studies. Accordingly, the aim of the present study was to compare bowel symptoms in a well-described group of SCI patients 10 years ago and today.

Patients and methods

In 1996, we performed a cross-sectional questionnaire study of colorectal symptoms among 424 of the 589 members of the Danish Spinal Cord Injuries Association.⁵ In 2006, 284 of the original 589 members from 1996 were available for follow-up. To all of these members, we mailed a questionnaire almost identical to the one used in 1996. The questionnaire was composed of 34 items describing age, gender, time since the lesion, limits of cutaneous sensibility, motor control, constipation (five items), obstructed defecation (five items), fecal incontinence (seven items) and impact on QOL or social activities (seven items). The reproducibility and validity of most items used in the questionnaire have been published in a recent study.⁴ Only items with very good, good or acceptable reproducibility and validity were used in the present study. On the basis of the patients' own knowledge or their description of motor and sensory function, the level of SCI was described as cervical, thoracic or lumbar, and the severity as complete or incomplete.

Those who did not respond within 4 weeks received an identical questionnaire encouraging them to respond.

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Analyses of all data were performed with the program SPSS/PC+, Advanced Statistics (Superior Performing Software Systems, Chicago, IL, USA). Data were entered twice to minimize the risk of typing errors.

Descriptive statistics were performed and the proportions of respondents reporting symptoms in 1996 and 2006 were compared using the Pearson χ^2 test. The neurogenic bowel dysfunction (NBD) score,¹⁴ where each symptom of bowel dysfunction is weighted concerning its impact on QOL, was computed in 1996 and 2006 and compared using the Wilcoxon matched-pairs signed-ranks test. $P < 0.05$ was defined as statistically significant.

Results

Among the 284 members of the Danish Spinal Cord Injuries Association in 1996 and who continued to be members in 2006, 202 (71%) responded. Of these, the 159 (79%) who also had answered in 1996 were used for further analysis. Demographic data for the whole group of respondents in 1996 and the 159 responding both in 1996 and 2006 are presented in Table 1.

Constipation and time since injury

Constipation-related symptoms increased significantly in the 10-year period (Table 2). In 1996, 17 of the 159 respondents (11%) defecated less than every second day. In 2006, it was 31 (19%) ($P < 0.001$). The time needed for each defecation was more than 30 min in 24 (16%) in 1996, and 10 years later the corresponding number was 37 (25%) ($P < 0.00001$). Figure 1 illustrates the changes in time needed for each defecation. Accordingly, the number of respondents performing digital stimulation or evacuation of the anorectum every day or at least once per week increased from 34 (23%) and 69 (48%) to 48 (33%) ($P < 0.00005$) and 80 (56%) ($P < 0.0001$), respectively.

The use of oral laxatives, suppositories and enema did not change significantly in the 10-year period (Table 2). Also, the need for help from others for bowel management did not change (Table 2).

Fecal incontinence and time since injury

In the 10-year period, the number of respondents reporting fecal incontinence at least once every month decreased from 32 (22%) to 26 (17%) ($P < 0.001$). In 1996, fecal incontinence was a daily problem to 3 (2%) and a weekly problem to 6 (4%) respondents. Ten years later, the corresponding numbers were 2 (1%) (not significant (NS)) and 6 (4%) (NS).

The proportion of respondents reporting flatus incontinence and perianal skin problems or using constipating drugs did not change in the 10-year period (Table 3). However, significantly more respondents had started using diapers due to fecal incontinence (Table 3).

Quality of life and time since injury

Overall, the number of respondents reporting that colorectal dysfunction in general caused some or major restrictions on

Table 1 Comparison of the whole group of respondents in 1996 and the 159 responding both in 1996 and in 2006

	All respondents in 1996	Subjects available for follow-up and responding both in 1996 and in 2006
Number	424	159
<i>Gender</i>		
Female	124 (29%)	45 (28%)
Male	300 (71%)	114 (72%)
Mean age, years (range)	41 (8–88)	37 (15–70)
Mean time since injury, years (range)	14 (0–59)	10 (0–48)
<i>Cause of lesion</i>		
Trauma	318 (75%)	121 (77%)
Spinal surgery	34 (8%)	5 (3%)
Myelomeningocele	17 (4%)	10 (6%)
Infection	17 (4%)	10 (6%)
Spinal thrombosis or hemorrhage	13 (3%)	4 (2%)
Other	25 (6%)	9 (6%)
<i>Level of injury</i>		
Cervical	182 (43%)	63 (39%)
Thoracic	161 (38%)	40 (26%)
Lumbar	81 (19%)	56 (35%)
Complete lesion	254 (60%)	107 (67%)
Incomplete lesion	170 (40%)	52 (33%)
Colorectal dysfunction causes some or major restriction on general condition	155 (39%)	39 (25%)
Need more than 30 min per defecation	101 (25%)	26 (17%)
Defecation less than every second day	95 (23%)	17 (11%)
Fecal incontinence at least once every month	81 (20%)	33 (21%)

QOL or social activities increased from 39 (25%) in 1996 to 60 (38%) 10 years later ($P < 0.005$) (Figure 2). The number of respondents reporting that constipation in general had some or major influence on QOL increased from 20 (15%) to 30 (23%) ($P < 0.15$). The corresponding numbers for difficult rectal evacuation were 37 (25%) and 47 (32%) ($P < 0.001$), and those for fecal incontinence were 26 (20%) and 34 (26%) ($P < 0.26$). The number of patients considering colorectal dysfunction a greater problem than urinary or sexual dysfunction was 38 (26%) in 1996 and also 38 (27%) (NS) at follow-up.

The neurogenic bowel dysfunction score and time since injury

The NBD score has been developed to assess the severity of bowel symptoms in individuals with SCI.¹⁴ In 1996, the mean NBD score was 6 (range: 0–25) and 10 years later it was 7 (range: 0–26) (NS). Restricting the analysis to subjects who had been injured 5 years or less in 1996 ($n = 38$) did not change this pattern. Accordingly, their mean NBD score was 8 (range: 0–18) in 1996 and 7 (range 0–26) in 2006 (NS).

Table 2 Constipation-related symptoms in 159 individuals with SCI responding both in 1996 and in 2006

Symptom	Number of respondents with symptom in 1996	Number of respondents with symptom in 2006	Level of significance
Colorectal dysfunction causes some or major restriction on general condition	39 (25%)	60 (38%)	$P < 0.005$
Need more than 30 min to defecate	24 (16%)	37 (25%)	$P < 0.00001$
Defecation less than every second day	17 (11%)	31 (19%)	$P < 0.001$
Digital evacuation or stimulation at least once a week	75 (48%)	82 (56%)	$P < 0.0001$
<i>Medication to relieve constipation</i>			
Tablets	25 (18%)	27 (21%)	NS
Drops	15 (12%)	17 (14%)	NS
Use of enema	92 (62%)	87 (58%)	NS
Need help for bowel management	49 (32%)	53 (35%)	NS

Abbreviations: NS, not significant; SCI, spinal cord injuries.

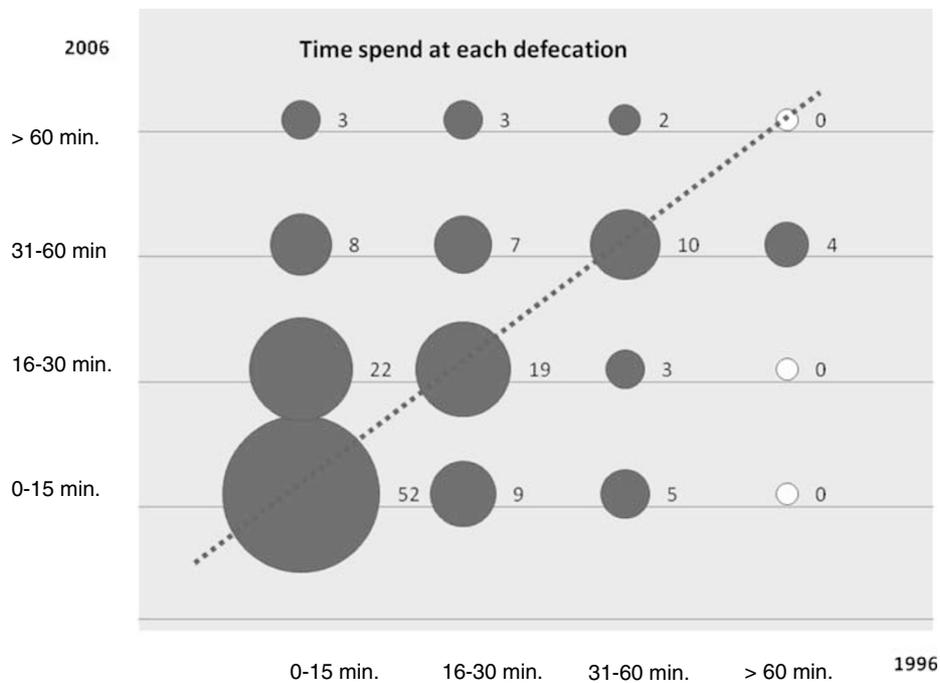


Figure 1 Time spent at defecation at baseline (1996) and 10 years later (2006). On the dotted line are those 81 patients who spent the same amount of time in 2006 as they did in 1996. At the follow-up in 2006, the 21 respondents beneath the line spent less time at defecation compared to baseline in 1996 and the larger group of 45 respondents above the line spent more time ($N = 147$).

Table 3 Fecal incontinence in 159 individuals with SCI responding both in 1996 and in 2006

Symptom	Number of respondents with symptom in 1996	Number of respondents with symptom in 2006	Level of significance
Fecal incontinence at least once every month	32 (22%)	26 (17%)	$P < 0.001$
Fecal incontinence without notice at least once a month	15 (10%)	18 (12%)	NS
Diapers for fecal incontinence	10 (7%)	20 (14%)	$P < 0.002$
Flatus incontinence	64 (42%)	61 (40%)	NS
Perianal skin problems	24 (16%)	28 (19%)	NS
Medication to prevent incontinence	11 (7%)	5 (3%)	NS

Abbreviations: NS, not significant; SCI, spinal cord injuries.

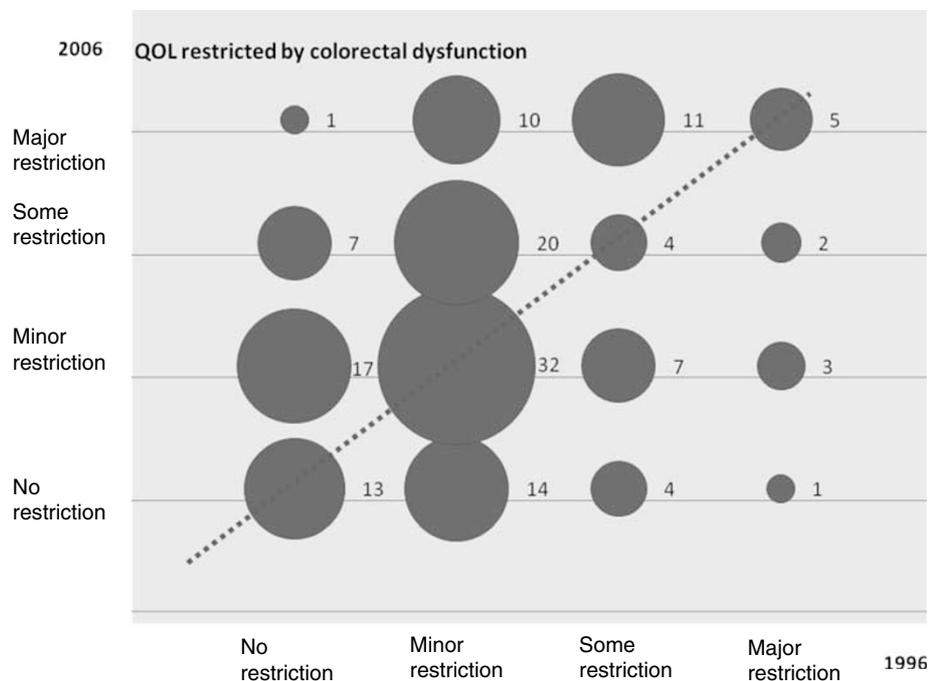


Figure 2 Impact on QOL due to colorectal dysfunction at baseline (1996) and 10 years later (2006). On the dotted line are 54 patients with equal symptoms in 1996 and 2006. The 31 respondents beneath the line reported less severe impact on QOL at follow-up, while the larger group of 66 respondents above the dotted line reported more severe impact ($N=151$).

External validity of results

To assess whether the 159 members responding both in 1996 and 2006 were representative of the whole group of 424 respondents from 1996, we compared their background parameters and some key symptoms in 1996 (Table 1). They were comparable in terms of age, gender, time since lesion and frequency of fecal incontinence. However, the level of lesion was generally lower in those responding both in 1996 and 2006, as well as more patients had complete lesions. Furthermore, those responding both in 1996 and 2006 generally had less severe constipation and less self-reported impact on QOL than the rest.

Discussion

As the longevity of individuals with SCI has improved, the long-term effects of SCI have become increasingly important. The majority of spinal cord-injured individuals suffer from NBD, including constipation and fecal incontinence.^{4-12,15,16} Cross-sectional studies have found an association between the severity of NBD and time since injury,^{4,5} but long-term prospective studies are lacking.

The present prospective study is describing colorectal symptoms in a group of SCI patients followed for a 10-year period. The severity of most constipation-related symptoms increased significantly in the 10-year period. Accordingly, the proportion of respondents reporting impaired QOL due to colorectal symptoms increased from 25 to 38%. The use of digital anorectal stimulation or evacuation increased significantly. Accordingly, Haas *et al.*¹⁷ concluded that manual

removal of stools was associated with a reduced risk of fecal incontinence and less time spent at defecation.

The frequency of fecal incontinence decreased. Whether this changing pattern of bowel dysfunction is caused by pathophysiological changes in bowel function as time goes by since injury or by changes in individual strategies to cope with symptoms remains to be clarified. However, in our data the proportion of respondents using enema, suppositories, oral laxatives or constipating drugs against fecal incontinence remained almost the same. This indicates a change in bowel function resulting from time since injury *per se* and not a change due to changes in treatment strategies.

Age and time since injury is of course strongly correlated, and our findings may to some extent be due to the respondents having become 10 years older. However, in a previous cross-sectional study, we did not find an association between age and bowel symptoms if a multivariate analysis was performed to make corrections for differences in time since injury.⁴

Overall, the NBD score did not change in the 10-year period. However, the score includes aspects of both constipation and fecal incontinence. As constipation becomes more severe while fecal incontinence becomes less severe, the overall score remained largely unchanged.

The risk of selection bias due to subjects lost from follow-up is a problem in most long-term follow-up studies. A comparison between the respondents and the whole group from 1996 (Table 1) revealed that most background parameters were comparable but that those who were still alive and willing to respond had somewhat less severe symptoms than the rest. However, this minor difference cannot explain our results.

In conclusion, constipation becomes more severe with time since SCI. This is probably due to pathophysiological changes in colorectal motility and is not an effect of age or altered treatment strategies. However, long-term follow-up studies of colorectal transport or motility patterns are needed to clarify this.

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