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Abstract

Background/Objective: In spinal cord injury (SCI), loss of central or peripheral neural control causes neurogenic bowel. Patients may not exhibit the typical signs and symptoms of gastrointestinal disease. Few studies have looked at the risk of gastrointestinal disease in this group and the indications for preventive screening. The objective of this study was to study colonoscopic lesions in patients with SCI and determine whether there are any differences in the prevalence of lesions between SCI and control patients.

Design: Case control study.

Methods: Twenty-five patients with SCI were compared with 41 control patients who received colonoscopy at the same time. Mann-Whitney test for continuous variable, and Fisher exact test for frequency variables were used.

Outcome Measures: Demographic information, duration of SCI, and colonoscopy findings were gathered.

Results: Colonic lesions were observed in 52% of patients with SCI and in 41.5% of control patients. Most frequent lesions in SCI group were inflammatory bowel disease (16%) and polyp (16%), followed by proctitis (12%) and hemorrhoid (12%). In the control group, hemorrhoid (17.1%) was most common, followed by polyp (12.2%) and melanosis coli (9.8%). No significant differences were found between the 2 groups. In the SCI group, no significant differences in lesions were found among the patients with cervical, thoracic, and lumbar SCI in the SCI group. Duration of SCI did not affect the pattern of colonoscopic lesions.

Conclusion: Patients with SCI had the same incidence of colonoscopic lesions as control patients. Inflammatory bowel disease, which is a risk factor for cancer, was the most common findings in the SCI group, although there was no significant difference from the control group. In patients with SCI, colonoscopy screening is warranted at the same frequency as for the general population.

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Key Words: Spinal cord injuries; Bowel management; Neurogenic bowel; Colonoscopy; Screening, colon cancer; Prevention; Inflammatory bowel disease

INTRODUCTION

In spinal cord injury (SCI), signs and symptoms such as constipation, hematochezia, abdominal pain, and diarrhea are found frequently (1). The prolongation of colonic transit time, decrease of colonic motility, and anorectal dysfunction result from the loss of central or peripheral neural control (2,3). In these situations, abnormal bowel function has a significant impact on

quality of life, and may cause increases in morbidity and mortality (1,4,5).

However, diagnosis and management of these problems may be exceedingly difficult because patients with SCI can manifest with limited or nonspecific symptoms such as increased spasticity or autonomic dysreflexia (6). Moreover, impaired bowel movements in patients with SCI often results in inadequate bowel preparation for colonoscopy (7). Therefore, patients were reported to receive colonoscopy significantly less than general population according to a self-reported survey (8,9).

Most of the studies focused on functional problems such as colonic transit time or anal dysfunction. Only a few studies were done using colonoscopy for anatomical lesions.

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Table 1. Demographic Information, Gastrointestinal Symptoms, and Neurologic Classification of Patients Before Colonoscopy

	Control	SCI	P
No.	41	25	
Age (SD)	47 (8)	55 (7)	0.34 ^a
Sex (no. of male, %)	23 (56)	24 (96)	<0.01 ^b
Symptoms			
Abdominal pain and discomfort (%)	19 (46)	11 (44)	1.00 ^b
Diarrhea (%)	16 (39)	8 (32)	1.00 ^b
Constipation (%)	12 (29)	5 (20)	0.56 ^b
Rectal bleeding/melena	2 (5)	7 (28)	0.02 ^b
Weight loss (%)	1 (2)	0 (0)	1.00 ^b
Tenesmus (%)	1 (2)	0 (0)	1.00 ^b
Anorexia (%)	1 (2)	0 (0)	1.00 ^b
ASIA classification	C	T	L
A	8	3	3
B	3	2	2
C	0	0	4
D	0	0	0

^a Mann-Whitney test.

^b Fisher exact test.

C, cervical SCI; T, thoracic SCI; L, lumbar SCI; and ASIA, American Spinal Injury Association.

This study enrolled patients with who had gastrointestinal symptoms and consequently had colonoscopy done. The colonoscopic and pathologic findings were studied and compared with the findings of a control group without SCI.

METHODS

Design

This was a case-control study. All the medical information was acquired based on clinical medical records retrospectively. This study was approved by the Ethics Committee.

Participants

Twenty-five patients with SCI who had colonoscopy from July 2002 through May 2007 were enrolled retrospectively. The control group had 41 patients chosen from patients who underwent colonoscopy on the same day as did the patients with SCI. The patients with SCI were 40 to 70 years of age and as were the control group patients. Patients who had colonoscopy or colon surgery within the last 5 years were excluded.

For bowel preparation, patients took 2 bisacodyl tablets, 250 mL of magnesium carbonate solution, 45 mL of sodium phosphate oral solution, and then 1 to 2 liters of water on the day before the examination. In the morning, patients were instructed to take 45 mL of

sodium phosphate oral solution and 1 to 2 liters of water before colonoscopy. If preparation was incomplete at the time of procedure, 133 mL of sodium phosphate enema solution was supplied through the colon by colonoscope, and the enema was repeated. Conscious sedation was induced with intravenous midazolam 0.07 to 0.08 mg/kg and meperidine 25 to 50 mg. Hyoscine *N*-butylbromide 20 mg was used as an antispasmodic. Colonoscopy was performed by an experienced gastroenterologist, using a CV-260 Videoendoscope (Olympus, Tokyo, Japan). Any abnormal lesions were photographed and biopsied, for example, inflammation, polyps, and melanosis coli. The histological information was obtained from the pathologic report.

Statistical Analysis

The Mann-Whitney test was used for the continuous variable (age), and the Fisher exact test was used for the frequency variables. Significance was defined as $P < 0.05$. Analysis was performed using SPSS 15.0 for Windows.

RESULTS

We studied 25 patients with SCI and compared them with a group of 41 control patients. All colonoscopies were successful, but there were some difficulties because of the decreased colonic tone in about one third of the patients with SCI. Approximately one half of the SCI group needed extra bowel preparation in comparison with controls. No complications were observed such as perforation, bleeding, or autonomic dysreflexia.

Table 1 shows that the SCI group had a mean age of 55.32 ± 6.83 (SD) years (range, 43–67 years), and the control group had a mean age of 46.60 ± 8.06 years (range, 41–73 years). According to neurologic level, 44% of patients had cervical, 20% had thoracic, and 36% had lumbar lesions; 56% had complete SCI. Mean time since SCI was 10.38 ± 6.95 years (range, 1–25 years). The most frequent gastrointestinal symptoms were abdominal pain and discomfort, which was followed by diarrhea in both groups. Patients with SCI had significantly more bleeding or melena than the control group. Otherwise, there was no difference in symptoms between the 2 groups.

Colonic lesions were observed in 52% patients with SCI. Most frequent lesions were polyps and inflammatory lesions, followed by proctitis, and last, hemorrhoids. In the control group, hemorrhoid was the most common lesion, followed by polyp, and then melanosis coli (Table 2). There was no significant difference in frequency of colonic lesion between the SCI and control groups, except proctitis. Even in proctitis, the control group was zero, so the P value could not be used as a statistical significance. Colonoscopic findings did not show significant difference between cervical, thoracic, and lumbar SCI groups (Table 2). The colonoscopic findings did not change much during the time span after the spinal injury. No significance or trend was found (Table 3).

Table 2. Colonoscopic Findings

	Control	SCI	<i>p</i> ^a	C	T	L
No. (%)	41 (62)	25 (38)		11 (44)	5 (20)	9 (36)
Normal (%)	24 (59)	12 (48)	0.45	7 (58)	1 (8)	4 (33)
Hemorrhoid (%)	7 (17)	3 (12)	0.73	1 (33)	2 (68)	0 (0)
Diverticulosis (%)	1 (2)	1 (4)	1.00	0 (0)	0 (0)	1 (100)
IBD (%)	1 (2)	4 (16)	0.06	0 (0)	2 (50)	2 (50)
Polyp (%)	5 (12)	4 (16)	0.72	1 (25)	1 (25)	2 (50)
Proctitis (%)	0 (0)	3 (12)	0.05	2 (67)	1 (33)	0 (0)
Ileitis (%)	0 (0)	1 (4)	0.38	1 (100)	0 (0)	0 (0)
Cancer (%)	1 (2)	0 (0)	1.00	0 (0)	0 (0)	0 (0)
Melanosis coli (%)	4 (10)	1 (4)	0.64	1 (100)	0 (0)	0 (0)
Megacolon (%)	0 (0)	1 (4)	0.38	0 (0)	1 (100)	0 (0)

IBD, inflammatory bowel disease; C, cervical SCI; T, thoracic SCI; and L, lumbar SCI.

^a Fisher exact test (comparing control group and SCI group).

DISCUSSION

Gastrointestinal problems are one of the common medical problems that can affect the quality of life. Screening colonoscopy is a health management recommendation for the general population. The diagnosis and management of gastrointestinal problems are not well established in patients with SCI.

There are several possible reasons that gastrointestinal disease in patients with SCI has not been studied. First, it is difficult to enroll a sufficient number of patients. Even in this facility, which has a specialized unit for SCI, there were only 25 patients who had had a colonoscopy during the 5 years of this study. Second, the manifestation of the gastrointestinal disease is different because patient with SCI have limited sensory and motor function in the gastrointestinal system. Because of sensory deficit, patients may be aware of gastrointestinal symptoms. Symptoms like autonomic dysreflexia and abdominal distension were overlooked and not considered as reasons for further gastrointestinal investigation. Third, colonoscopy is more technically difficult in patients with SCI. The preparation for colonoscopy can be complicated in patients with SCI (7). Bowel preparation may be more difficult because of

neurogenic bowel. Assistance from another person may be needed because of the patient's immobility. Musculoskeletal pain, spasticity, and monitoring for autonomic dysreflexia can make the procedure difficult and expensive. In our study, approximately 50% of patients had difficulties in colonic preparation because of colonic inertia. Colonic atony made it difficult to advance the colonoscope in some cases. However, we succeeded with colonoscopy in all patients without any complications such as autonomic dysreflexia (10), perforation (11), or increased spasticity.

Most studies of neurogenic bowel in SCI were focused on functional aspects, such as colonic transit time, manometry, intrarectal balloon distension, and surface electromyography (4,12). Anatomic lesions in patients with SCI did not receive attention. Correa et al (4) reported some rectoscopic findings, and only a few studies addressed complete colonoscopic findings in individuals with SCI. There are several case reports of colonoscopic findings in patients with SCI who had gastrointestinal bleeding (11,13). Stratton et al (14) reported retrospectively the prevalence and outcome of colorectal cancer in patients with SCI, and no other findings were described (14).

Table 3. Colonoscopic Findings by Years Since Injury

Duration (years)	<5 (n = 6)	5–10 (n = 9)	11–20 (n = 7)	>20 (n = 3)
No pathologic finding (%)	4 (38)	5 (56)	4 (57)	1 (33)
Hemorrhoid (%)	1 (17)	0 (0)	1 (14)	0 (0)
Diverticulosis (%)	1 (17)	0 (0)	0 (0)	0 (0)
IBD (%)	1 (17)	3 (33)	0 (0)	0 (0)
Polyp (%)	1 (17)	1 (11)	2 (29)	0 (0)
Proctitis (%)	0 (0)	1 (11)	2 (29)	0 (0)
Ileitis (%)	0 (0)	0 (0)	0 (0)	1 (33)
Melanosis coli (%)	0 (0)	0 (0)	1 (14)	0 (0)
Megacolon (%)	0 (0)	1 (11)	0 (0)	0 (0)

IBD, inflammatory bowel disease.

About 44% of patients with SCI were reported to have anatomical lesions by rectoscopy (4). In our colonoscopic study, 52% of the patients with SCI had anatomical lesions. The prevalence was not significantly different between these two studies (χ^2 value = 0.58, P = 0.44) (4). The most frequent lesions were inflammatory bowel disease lesion (16%) and polyp (16%), followed by hemorrhoid (12%) and proctitis (12%) in our study. In the control group, the most common finding was hemorrhoid (17%), followed by polyp (12%) and melanosis coli (10%). Only 2.4% of the control group had inflammatory bowel disease lesions. Even though it was not significantly different from the control group, it was interesting to find that inflammatory bowel disease lesion was the most common lesion in the SCI group.

In the SCI group, we looked for differences between the groups, according to neurologic level of injury, duration of injury, and age. There was no difference or trend of the colonoscopic lesions between these groups. The small sample size made it difficult to distinguish the difference.

Although no case of colon cancer was found, it is still important to discuss. Cancer is an important cause of death among people with paraplegia as it is in the general population (8). The frequency of cancer is increasing in the SCI population as a cause of death (15). Age-adjusted incidence rates of colorectal carcinoma have been reported to be 2 to 6 times greater in men with myelopathy than in the general male population (16). One study described that colorectal lesions had been reported to be more advanced at the time of diagnosis in small numbers of people with SCI (14). Considering that inflammatory bowel disease is a risk factor for colon cancer (17), the increased rate of inflammatory bowel disease in patients with SCI in our study could indicate a risk factor for colon cancer. Therefore, in our opinion, the recommendations for screening for colon cancer should be the same as for the general population.

Limitations

There are some limitations in this study. First, the sample size was too small in a single institute to detect the possible difference between the groups. Multi-institutional study may help to alleviate some of the limitations seen in this study. This retrospective study was done using the patients who came to the hospital for gastrointestinal complaints; therefore, selection bias was a limitation.

CONCLUSION

Indications for colonoscopy for either diagnostic or preventive means are not well established for individuals with SCI. In our study, patients with SCI had colonoscopic lesions to the same extent as did the controls. Inflammatory bowel disease, which is a risk factor for colorectal cancer, was the most common finding in patients with SCI. In patients with SCI, colonoscopy

screening is warranted at the same frequency as for the general population.

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