Visceral Pain and Life Quality in Persons With Spinal Cord Injury: A Brief Report

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Received July 13, 2004; accepted May 25, 2005

Abstract

Background/Objective: Few studies have examined the prevalence of visceral pain in persons with spinal cord injury (SCI), and virtually no studies have looked at the relationship between visceral pain and self-reported quality of life. We examined the frequency of reported visceral pain at 5, 10, and 15 years after injury to determine whether the presence of visceral pain is related to quality of life, and to determine to what extent visceral pain should be of concern to clinicians treating patients with SCI.

Methods: Visceral pain and quality of life in persons with SCI were compared from a combined Craig Hospital and National Model SCI Systems database at 5 (N = 33), 10 (N = 132), and 15 (N = 96) years after injury.

Results: The rates of visceral pain increased at each measurement (10% at year 5, 22% at year 10, and 32% at year 15); although these numbers reflect cross-sectional data, they do show a clear statistical change. Only a limited true longitudinal sample was available, but at 10 years after injury, individuals who had reported visceral pain at any time reported a significantly lower quality of life than those never experiencing visceral pain, $F_{1,188} = 3.95$, $P < 0.05$.

Conclusions: Although visceral pain may not be as prevalent as the more researched neuropathic and musculoskeletal subtypes of pain, it may account for a higher percentage of people with SCI who report pain than previously recognized. More quantitative and longitudinal research is needed to examine the relationship of visceral pain with overall quality of life and to pursue interventions.

J Spinal Cord Med. 2005;28:333–337

Key Words: Spinal cord injuries; Visceral pain; Quality of life

INTRODUCTION

Estimates of pain prevalence after acute spinal cord injury (SCI) vary greatly, ranging from approximately 33% to 94% of persons with SCI (1,2). This variance may be explained, in part, by methodological issues, including poor questionnaire response rate and time since SCI onset (eg, during acute rehabilitation vs several years after injury; Ref. 3). Siddall and colleagues (2) found that at 6 months after injury, 64% of people reported some

pain, and 21% reported severe pain. Although the prevalence estimates vary, research is increasingly demonstrating the impact of severity of pain after SCI. One study reported that 37% of individuals with higher-level SCI and 23% of persons with lower-level SCI would, given the opportunity, trade pain relief for loss of bladder, bowel, or even sexual function (4).

One shortcoming in the literature on pain related to SCI that has been well documented is the lack of a universal classification scheme. Many classification schemes for SCI pain have been proposed over the years, but none has been universally accepted (5). For the purpose of this study, the classification scheme proposed by Siddall and associates (2), which considers location, description, and origin of pain, was used. Briefly, these authors proposed that musculoskeletal pain is that pain which is dull, aching, worse with movement or exercise, and appears to arise from musculoskeletal structures.

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This study was funded by Rocky Mountain Regional Spinal Injury System grant (H133A011108), National Institute on Disability and Rehabilitation Research (NIDRR).

Sharp, shooting, stabbing, electric, or burning pain in the dermatomes at or just above the level of injury would be considered "at-level neuropathic pain," whereas similar descriptors for pain below the level of lesion could be labeled "below-level neuropathic pain." Finally, visceral pain after SCI is defined as pain which originates from deep visceral structures (6), and can be identified by location (abdomen) and by pain features (dull, cramping; Refs. 1 and 7).

Of these subtypes of pain after SCI, visceral pain has been the least researched. One possible explanation for the paucity of research on visceral pain after SCI is that few studies have examined the prevalence of visceral pain after SCI, but all have concluded that its prevalence is low, with estimates ranging from 5% to 10.6% (1,2,7). Unfortunately, these low prevalence estimates may contribute to visceral pain being overlooked both scientifically and clinically.

Chronic pain with abdominal localization is a common clinical entity with multiple etiologies, of which, many remain unknown. Furthermore, the mechanisms of transmission of visceral pain in persons with SCI are not fully understood. Several scientists have investigated this (8–10), but have postulated different mechanisms. Donovan and colleagues (10) found no identifiable gastrointestinal, genitourinary, or pelvic abnormalities in their clinical cases that could account for visceral pain symptoms, and could only suggest that visceral pain may be caused by: (a) a continuous slow fiber discharge caused by unrecognized alterations in visceral function; (b) a phenomenon occurring at the sympathetic chain ganglia; or (c) a distortion of the afferent impulses from the viscera crossing the zone of injury in the spinal cord. Cervero and Laird (9) proposed that the neurological mechanisms of visceral pain are different from those in somatic pain, and argued that brief acute visceral pain may initially be triggered by the activation of high-threshold afferent impulses. Finally, Ness (11) summarized the extensive sources that may contribute to chronic abdominal pain and suggested that chronic visceral pains probably have both peripheral and central components.

Siddall and colleagues (12) suggested that visceral pain has characteristics that are quite different from other types of pain after SCI. One difference is that visceral pain seems to have the longest time of onset. These authors found that the average onset of visceral pain after SCI was 4.2 years after injury. Based on these findings, studies that have examined the prevalence of visceral pain immediately after acute SCI or 1-year follow-ups, may have underestimated the prevalence of this condition. Furthermore, Siddall and coworkers (12) concluded that, although the number of persons with visceral pain is less than the number of persons with musculoskeletal or neuropathic pain, visceral pain was the pain most often described as severe or excruciating.

To what degree this pain affects psychological well-being has not been studied. In fact, little is known about the relationship between any of the subtypes of SCI pain and function. Therefore, we sought to examine prevalence rates of visceral pain at 5, 10, and 15 years after injury to determine the actual prevalence of visceral pain and to determine whether visceral pain is related to subjective quality of life.

METHODS

The current study is part of an ongoing comprehensive, longitudinal, multi-center project that seeks to explore the incidence and prevalence of several health conditions that accompany living with a SCI, and to explore the services available to individuals with SCI as they attempt to address these conditions throughout their lives. This effort began in 1990 and was spearheaded by Craig Hospital in Denver, Colorado in collaboration with other Model SCI Systems programs in Alabama, California, Georgia, and Michigan. More than a decade of research on this topic has yielded findings that have been instrumental in gaining a better understanding of many problems related to aging with SCI, but has provided only 2 data points thus far (5 years apart). Because it is likely that many changes occurring over time (such as the development of visceral pain) can be observed only after many years, the third (and current) cycle of this multi-center project builds upon the previous 2 data collection points with their examination of physical and psychosocial secondary conditions of SCI. However, this third phase adds several new areas of inquiry, all of which focus on maintaining health and function. One of these identified areas is that of chronic pain.

Persons with SCI were compared on pain and quality of life from the combined Craig Hospital and the National SCI Statistical Center (NSCISC) database at 5 (N = 33), 10 (N = 132), and 15 (N = 96) years after injury. The 16 Model SCI Systems are geographically dispersed throughout the United States and represent both rural and urban populations. Eligibility for the NSCISC database has remained relatively constant since its inception, and typically includes persons with traumatic onset of SCI who are admitted into one of the Model SCI Systems within 60 days of injury (3).

The presence or absence of visceral pain was determined by a question from the Medical History and Current Status questionnaire, an instrument used in the multi-center effort since its inception, which reads, "have you had problems with stomach or intestinal pain (other than gas or from something you may have eaten) in the past 5 years?" Similarly, quality of life was assessed via a Likert scale self-report question from the Medical History and Current Status questionnaire that asks, "How would you rate your quality of life at the present time", with 0 as poor, 1 = fair, 2 = good, and 3 = excellent.

RESULTS

Our sample was 75% male, 85% white, 11% African American, and 4% of unknown race. Persons with incomplete paraplegia represented the smallest portion of the sample (16.7%). Individuals with complete paraplegia constituted 38.3% of individuals in this sample; 23.3% of the sample were individuals with incomplete tetraplegia, and 21.6% was composed of persons with complete tetraplegia. Age at injury ranged from 15 years to 65 years with a mean of 28.36 years ($SD = 10.86$).

The rates of visceral pain increased at each cross-sectional measurement (10% at year 5, 22% at year 10, and 32% at year 15). We found the percentage of individuals reporting visceral pain 5 years after injury to be slightly higher than the percentage reported by Siddall and colleagues (12). At 10 and 15 years after injury, it appears that visceral pain may be far more prevalent than during the early course of recovery. Statistical analyses of the cross-sectional data revealed a significant time effect for each of the 3 measurement time points, suggesting increases in prevalence from 5 to 10 years ($\chi^2_1 = 29.63$, $P < 0.001$); from 10 to 15 years ($\chi^2_1 = 4.74$, $P = 0.029$); and from 5 to 15 years ($\chi^2_1 = 61.27$, $P < 0.001$). There was no significant relationship between visceral pain and quality of life at any of the time measurements (5, 10, or 15 years after injury). However, at 10 years after injury, individuals who had reported visceral pain at any time reported a significantly lower quality of life than those without visceral pain ($F_{1,188} = 3.95$, $P < 0.05$). Table 1 illustrates the point estimates and confidence intervals for the cross-sectional samples.

In addition to the cross-sectional comparisons, we conducted longitudinal comparisons on a very limited subsample ($N=29$) of persons at 5 and 10 years after injury and a separate subsample ($N=23$) of persons at 10 and 15 years after injury by using McNemar tests. Although visceral pain prevalence in this first group increased from 10% at year 5 to 16.7% at year 10, this difference did not reach statistical significance ($\chi^2_1 = 0.167$, $P = 0.68$), nor was there a statistically significant difference from 10 to 15 years ($\chi^2_1 = 0.00$, $P = 1.00$). Of the 3 individuals experiencing visceral pain at 5 years after injury, 2 were no longer reporting visceral pain at 10 years after injury, whereas 1 person continued to indicate the presence of visceral pain. In the second longitudinal subsample, visceral pain prevalence increased from 22% at year 10 to 26% at year 15. Again, this was not a statistically significant increase ($\chi^2_1 = 0.610$, $P = 0.65$). Of the 5 individuals reporting visceral pain at year 10, 3 still experienced visceral pain at year 15. Still, it is worth noting that prevalence of visceral pain increased in both the longitudinal sample and cross-sectional sample, with a robust cross-sectional effect. Table 2 illustrates the point estimates and confidence intervals for the longitudinal samples.

We also examined the relationship between visceral pain and neurological level and completeness of injury. Our sample size did not allow us to use 4 subgroups of

Table 1. Cross-Sectional Samples

Year	N	Point Estimate	95% Confidence Interval
5	33	9%	2%–22%
10	132	22%	16%–29%
15	97	32%	23%–42%

complete tetraplegia, incomplete tetraplegia, complete paraplegia, and incomplete paraplegia. Therefore, we examined the effects of lesion level and lesion completeness separately, splitting the sample first by paraplegia vs tetraplegia and then by complete and incomplete injuries.

The percentages of those experiencing visceral pain were almost identical when comparing persons with complete injuries and those with incomplete injuries. Twenty-five percent of individuals with complete injuries ($N = 36$) experienced visceral pain at one of the post-injury measurements, whereas 24% percent of persons with incomplete injuries ($N = 24$) reported experiencing visceral pain after injury. Thus, statistical analysis revealed that there was no significant difference between individuals with complete injuries vs incomplete injuries in developing visceral pain after injury ($\chi^2_1 = 0.013$, $P = 0.91$).

For persons with paraplegia (both complete and incomplete, $N = 33$), 70% did not experience any visceral pain, whereas 30% reported experiencing visceral pain at some time after injury. On the other hand, 82% of individuals with tetraplegia ($N = 27$; again, both complete and incomplete), indicated that they had never experienced any visceral pain, whereas 18% indicated the presence of visceral pain at some point after injury. However, regarding the likelihood of experiencing visceral pain at some time after injury, there was not a significant difference between individuals with tetraplegia vs those with paraplegia ($\chi^2_1 = 2.05$, $P = 0.15$). There was a significant difference in the presence of visceral pain for those individuals with tetraplegia 10 years after injury vs individuals with tetraplegia 15 years after injury, with fewer individuals at 15 years reporting visceral pain ($\chi^2_1 = 1777.50$, $P < 0.05$). Again, these numbers represent cross-sectional data and should be interpreted accordingly. Persons with paraplegia did not demonstrate any significant time trends in their experience of visceral pain ($\chi^2_1 = 0.05$, $P = 0.82$).

Table 2. Longitudinal Sample

Year	N	Point Estimate	95% Confidence Interval
5	30	10%	3%–24%
10	30	16.7%	6%–32%

Finally, we examined the variables of race, age, and gender to determine whether any of these were related to presence of visceral pain after injury. We found no significant differences between men ($N=46$) and women ($N=16$; $\chi^2_1=0.48$, $P=0.49$); or between whites ($N=50$) and African Americans ($N=9$; $\chi^2_1=0.19$, $P=0.66$) in their likelihood of reporting visceral pain. Furthermore, statistical analysis demonstrated no relationship between age at injury and visceral pain ($t=0.33$, $P=0.75$); or current age and visceral pain ($t=-0.09$, $P=0.93$).

DISCUSSION

Our results were consistent with previous studies that suggested that in the early period after SCI, visceral pain is not as prevalent as the more researched neuropathic or musculoskeletal types of pain. Still, 10 or more years after the SCI, visceral pain accounts for a more significant percentage of people with SCI who report pain than has been heretofore recognized. In fact, our findings reflected a greater prevalence of visceral pain than was found in previous studies conducted by other investigators (2,7,12). Because the current study used cross-sectional data, time trends cannot be definitively inferred, but this observation is supported by the limited longitudinal sampling performed.

The finding that visceral pain was not correlated with quality of life at any of the post-injury measurements is somewhat surprising, given that previous studies have established a relationship between pain and negative mood states (13,14) and general pain and quality of life (3). One possible explanation for this finding is the limited sample size employed in this study. The total number of subjects used was considered adequate; however, with only 10% to 30% of respondents reporting visceral pain, the number of persons experiencing visceral pain was limited. Perhaps studies using more participants, and specifically, more persons who have visceral pain, could re-examine this relationship.

Several important limitations to this study should be considered. Although visceral pain showed a trend of greater prevalence as post-injury year increased, each time sample consisted of different individuals (with the exception of 30 individuals who were sampled at 5 and 10 years after injury, and 23 different individuals who were sampled at 10 and 15 years after injury). Thus, this greater prevalence may be explained by individual characteristics, such as injury level or age. More extensive longitudinal analyses were not conducted because of the currently inadequate sample size.

Another limitation lies in the actual questionnaire that was employed for this study. The presence or absence of visceral pain was ascertained simply by 1 question that reads "Have you had problems with stomach or intestinal pain (other than gas or from something you may have eaten) in the past 5 years?" A positive answer to this question was interpreted as the presence of visceral pain, whereas a negative answer was

inferred to exclude visceral pain. Although research has demonstrated that visceral pain is typically in the abdominal area (1,2,6,7,12), a single question such as the one used in this questionnaire may or may not validly capture the presence of visceral pain, particularly because all of the criteria of Siddall et al (2) for visceral pain (eg, dull, cramping) could not be assured. Again, the inability of pain researchers and clinicians to accurately describe and classify the subtypes of pain in universal agreement is an issue that may prove to be a problematic methodologic issue for future research in visceral pain as well.

Overall, our understanding of the condition of visceral pain is one that remains very much in its primitive stages. Questions such as who develops visceral pain, when does it typically develop, how long does it persist, and how does this condition affect psychological well-being in people with SCI have received little attention thus far. Future investigations may benefit from using more comprehensive instruments for assessing pain, such as the McGill Pain Questionnaire and/or the Visual Analogue Scale, rather than the single-item question employed in this study, to determine other characteristics of visceral pain.

CONCLUSION

In conclusion, the evaluation and treatment of pain after acute SCI poses a significant challenge to rehabilitation professionals. The failure to adopt a universal pain classification scheme is a shortcoming that continues to plague the area; however, work by Siddall and colleagues (8) shows promise. When employing this classification scheme in our analysis of several hundred patients enrolled in the National SCI Statistical Center Database, we believe that visceral pain may be underdiagnosed, or, at the very least, overlooked in lieu of the more prevalent neuropathic and musculoskeletal pains, and may be more problematic than has previously been considered. Further research on the diagnosis and treatment of visceral pain, along with its impact on the quality of life for those with SCI, should be conducted, particularly longitudinal research that may demonstrate time trends in this population.

ACKNOWLEDGMENTS

The authors thank Denise G. Tate, PhD, University of Michigan; James S. Krause, PhD, Medical University of South Carolina; and Tamara L. Bushnik, PhD, Santa Clara Valley Medical Center for their contributions to data collection at their respective Model SCI Systems.

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