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Negative effects of smoking, workers' compensation, and litigation on pain/disability scores for spine patients

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Abstract

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Background:

When initiating treatment for patients with spinal disorders, we examined the impact of smoking, workers compensation, and litigation on disability and pain scores.

Methods:

With Institutional Review Board approval, the medical records of 13,704 consecutive patients with spinal disorders treated at two university spine centers were reviewed. Particular attention was focused on the pretreatment impact of three variables: smoking, workers compensation, and litigation. All patients completed a questionnaire that included a modified Oswestry Disability Index (ODI), a visual analog pain scale (VAS) and a history of smoking, workers compensation, and/or litigation issues. Analysis of Variance (ANOVA) with Bonferroni (when appropriate) was used to analyze the data.

Results:

ODI scores significantly correlated with a smoking history: Current Smoker > Previous Smoker > Never Smoked (44.22 > 38.11 > 36.02, respectively). Pain scores and ODI scores had a direct correlation to workers compensation and litigation status. Workers compensation, litigation and smoking combined created even higher scores. There was no significant difference between previous smokers and nonsmokers.

Conclusions:

This study demonstrates that a history of smoking, workers compensation, and/or litigation, considered alone

or worse, combined, negatively impacted outcomes for patients seeking treatment at our spine centers. For optimal outcomes in spine patients, cessation of smoking and treatment of attendant psychological and social factors prove critical.

Keywords: Disability, litigation, outcomes, pain, smoking, worker's compensation

INTRODUCTION

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It has previously been documented that patients being treated for spinal disorders, who are smokers, or have open worker's compensation cases and/or litigation, fair worse with treatment.[6,7,9,10,12,15,17–22] This study was designed to determine how spinal patients' initial presentation (prior to surgery) with one or more of these variables would fare following spinal treatment. In addition, we sought to define differences in the frequency of these variables in our patient population. Our preoperative hypothesis was that all three variables would negatively impact outcomes. We documented this utilizing visual analog pain (VAS) and modified Oswestry Disability Index (ODI) scores. We also sought to determine, utilizing the same outcome measures, the effect of a previous smoking history vs those who currently smoke vs nonsmokers.

MATERIALS AND METHODS

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After obtaining approval from the Institutional Review Board, the medical records of 13,704 consecutive patients treated at two university spine centers (2000-2008) were retrospectively reviewed. Our aim was to assess the effects of smoking, workers compensation, and litigation at the time of presentation on outcome. All patients presented with a chief complaint of axial spine pain with or without radicular symptoms.

As part of a prospectively maintained database, all patients completed a self-administered questionnaire that included a modified ODI, VAS, a smoking history, and worker's compensation or litigation issues. The smoking history was broken down into current smokers, previous smokers, and nonsmokers. Questionnaires were filled out by the patients independently, prior to being evaluated by the treating physician. Only the initial visit (baseline) questionnaires were analyzed; this was performed retrospectively.

The dependent variables for this study were ODI and pain scores. ODI was analyzed with a 3×3 (workers compensation × litigation × smoking status) analysis of variance (ANOVA). Pain scores were analyzed with a 3×3 (workers compensation × litigation × smoking status) ANOVA. Separate 3×3 ANOVAs were completed for the four pain scores (current pain, worst pain, least pain, and average pain). When appropriate, post-hoc analyses were completed using a Bonferroni correction. Statistical analysis was performed using SPSS 18 (Chicago, Illinois).

RESULTS

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As indicated by the patients in their self-reported questionnaires, a total of 12,324 patients answered the question regarding smoking status; 24% were current smokers, 30% were previous smokers, and 46% had never smoked. A total of 1626 patients indicated involvement in workers′ compensation/litigation. Within the entire sample, workers′ compensation claims involved 5.7% of those surveyed, while another 6.1% were involved in litigation.

A significant difference resulted between smoking status groups for ODI scores ($P < 0.001$). It was shown that the worst ODI scores were reported by current smokers (44.33), followed by previous smokers (38.11), and lastly by nonsmokers (36.02). [Figure 1] Post-hoc analysis for smoking status revealed a significant difference in pain scores between nonsmokers and current smokers ($P < 0.001$), and between previous smokers and current smokers ($P < 0.001$). Significant differences were noted for patients with open workers′ compensation or litigation claims with regard to ODI scores ($P < 0.001$). Patients with workers′ compensation (47%) or litigation issues (49%) had significantly worse ODI scores than those without (38%) [Figure 2]. Scores of previous smokers and nonsmokers were not significantly different. This was true for all categories of pain scores including: current, least, worst, and average pain for the preceding week. [Figure 3]

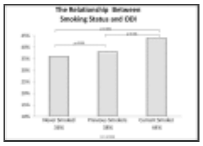

Figure 1
The relationship between smoking status and ODI score

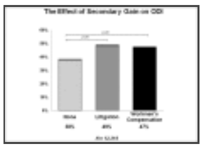

Figure 2
The relationship between workers′ compensation or litigation and ODI score

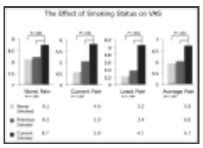

Figure 3
The relationship between smoking status and VAS score

Patients with workers′ compensation or litigation had worse pain scores for all categories of pain. This included: current, least, worst and average pain for the preceding week. [Figure 4] It is important to note that no statistical difference between worker's compensation and litigation was identified from our data, leading to a combination of these two categories for further analysis and discussion.

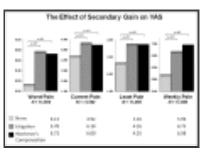

Figure 4
The relationship between workers′ compensation or litigation and VAS score

While there was not a significant interaction, it is interesting to note that current smokers with workers' compensation/litigation issues had the highest mean ODI (47.43), whereas the lowest ODI scores were found among patients who were nonsmokers without workers' compensation/litigation (35.04). In all pain measurements, the highest pain scores were reported when workers′ compensation/litigation and smoking were combined. [Figure 5]

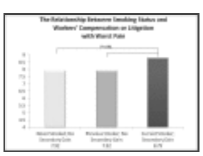

Figure 5
The relationship between smoking and workers′ compensation or litigation on worst pain score

DISCUSSION

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We sought to examine the influence of initial histories of smoking, workers′ compensation, and litigation on spine patients′ function and pain scores. We demonstrated that these three factors are associated with poorer function, and greater pain.

Smoking status had a negative impact on both pain and function scores. We were able to demonstrate that at the time of entry into treatment, previous smokers had significantly worse ODI scores than nonsmokers. It has not been previously shown that previous smokers have worse initial treatment functional scores than nonsmokers, therefore demonstrating a dose dependent effect. All current smokers had significantly higher pain scores when compared with either nonsmokers or previous smokers. Vogt *et al*. demonstrated that smokers described more severe spinal symptoms that affected them for greater proportions of the day than nonsmokers.[21] In addition, there have been several studies that have clearly shown that smoking has negative effects on the outcomes of spine surgery patients.[6,9]

The presence of workers' compensation or litigation issues was statistically significant for worse ODI and all pain scores; this is consistent with previous studies. Fredrickson *et al*. showed that all forms of workers′ compensation/litigation negatively affect postrehabilitation prognosis in patients with chronic low back pain.[5] It has also been shown that patients receiving workers′ compensation fare worse, have delayed recovery from back pain, exhibit later return to work, and are more likely to be receiving disability benefits.[1,4–6]

Slover *et al*. demonstrated that medical and psychosocial comorbidities negatively impact both baseline ODI and SF-36 scores in spine patients. They were able to show that both scores decreased in proportion to the number of baseline comorbidities They were able to show that psychosocial comorbidities such as an active compensation case, self-rated poor health, and smoking predicted significantly less improvement as reported by ODI and SF36 scores ($P < 0.003$) following surgery. The conclusion of their study was that the negative impact of medical and psychosocial comorbidities does not get better with time. They also suggested that physicians should expect smaller improvements in outcome scores following surgical intervention in patients with numerous comorbidities.[16]

Upon examination of the clinical significance of the results of this study several conclusions can be drawn. Copay *et al*. determined that a difference in ODI score of 12 was the minimal clinically important difference in a cohort of 454 patients followed by the Lumbar Spine Study Group. They also found that a difference in VAS of back pain of 1.2 or leg pain of 1.6 were clinically significant.[2,3] In the present study, when smoking and secondary gain were combined together, the threshold for both clinically significant ODI and VAS were reached. The differences found in this study were, therefore, not only statistically significant, but also clinically significant. This should be interpreted with the understanding that the comparisons performed were between groups, and not at two time points for each individual patient.

CONCLUSION

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In conclusion, this study found that patients who smoke or have smoked, and those with workers' compensation or litigation claims, demonstrate worse outcomes as documented by ODI and VAS at the onset of treatment for a spinal disorder. These presenting variables should be taken into consideration when selecting patients for treatment and/or spine surgery.

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The authors disclose that the experiments performed comply with the current laws of the country in which they were performed. The authors declare that they have no conflict of interest. Each author certifies that he has no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest with the submitted article. The following disclaimer applies:

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