ORIGINAL ARTICLE

Side Effects and Adverse Events Related to Intraligamentous Injection of Sclerosing Solutions (Prolotherapy) for Back and Neck Pain: A Survey of Practitioners

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ABSTRACT. Dagenais S, Ogunseitan O, Haldeman S, Wooley JR, Newcomb RL. Side effects and adverse events related to intraligamentous injection of sclerosing solutions (prolotherapy) for back and neck pain: a survey of practitioners. Arch Phys Med Rehabil 2006;87:909-13.

Objective: To study the side effects and adverse events related to intraligamentous injection of sclerosing solutions (prolotherapy) for back and neck pain.

Design: Practitioner postal survey.

Setting: Postal survey of practitioners of prolotherapy for back and neck pain in the United States and Canada.

Participants: A sample of prolotherapy practitioners from 2 professional organizations were surveyed about their training and experience, use of specific treatment procedures, estimated prevalence of side effects, and adverse events related to prolotherapy for back and neck pain.

Interventions: Not applicable.

Main Outcome Measures: Prevalence of side effects and adverse events.

Results: Surveys were completed by 171 practitioners (response rate, 50%). Ninety-eight percent held medical degrees, and 83% were board certified in various disciplines. Respondents had a median of 10 years of experience, during which they had treated a median of 500 patients and given a median of 2000 treatments. Side effects with the highest median estimated prevalence were pain (70%), stiffness (25%), and bruising (5%). There were 472 reports of adverse events, including 69 that required hospitalization and 5 that resulted in permanent injury secondary to nerve injury. The vast majority (80%) were related to needle injuries such as spinal headache (n=164), pneumothorax (n=123), temporary systemic reactions (n=73), nerve damage (n=54), hemorrhage (n=27), nonsevere spinal cord insult (ie, meningitis, paralysis, spinal cord injury) (n=9), and disk injury (n=2).

Conclusions: Side effects related to prolotherapy for back and neck pain, such as temporary postinjection pain, stiffness, and bruising, are common and benign. Adverse events related to prolotherapy for back and neck pain are similar in nature to other widely used spinal injection procedures. Further study is needed to fully describe the adverse event profile of prolotherapy for back and neck pain.

Key Words: Adverse effects; Back pain; Neck pain; Rehabilitation; Sclerosing solutions; Spinal injections.

PATIENTS WITH CHRONIC BACK and neck pain face a variety of treatment options. Without compelling evidence regarding the long-term efficacy of most conventional therapies, patients often turn to complementary and alternative medicine (CAM) for spinal care.[1] Lack of knowledge about the safety of particular CAM therapies may hinder their acceptance. This is especially true of the more invasive CAM therapies that have a greater potential for serious adverse events, such as injection of solutions into soft tissue (ie, ligament and/or tendon) to promote their growth and/or repair (prolotherapy).

Prolotherapy has been used for back and neck pain for more than 60 years for a variety of chronic musculoskeletal conditions.[2] This treatment approach was adapted from sclerosing injections used for soft-tissue disorders such as hernia and varicose veins. Prolotherapy involves repeated injection of various drug solutions commonly consisting of chemical irritants into ligaments and tendons. One of the proposed mechanisms is that prolotherapy induces the acute inflammatory cascade resulting in fibroblastic proliferation and collagen growth in chronically injured connective tissue.[3] This mechanism may partially explain the pain relief achieved with prolotherapy.

The safety of prolotherapy has been questioned openly in the literature by medical authorities and privately by a number of physicians.[4] Thus, its safety needs to be investigated. Dozens of clinical efficacy studies reporting on thousands of patients have not reported any serious adverse events (defined as life threatening, resulting in death, hospitalization, disability, or congenital anomaly, or requiring intervention to prevent permanent impairment or damage) related to prolotherapy for back and neck pain.[2,5] It is likely, however, that the incidence of serious adverse events is too low to be detected with these methods or is underreported in these studies. Research aimed at improving our understanding of adverse events related to prolotherapy must therefore use other methods of study (eg, surveys) capable of capturing a much larger population of patients exposed to this treatment. A questionnaire for practitioners of prolotherapy was recently developed to address this issue.

The primary objective of this study was to record the number, nature, and sequelae of adverse events related to prolotherapy for back and neck pain. Secondary objectives were to describe the training and experience of practitioners offering this treatment, determine the use of specific treatment procedures, and estimate the prevalence of common side effects.

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METHODS

Target Population

Postal surveys were mailed to members of the American Academy of Orthopaedic Medicine (AAOM) and the American College of Osteopathic Pain Management and Sclerotherapy (ACOPMS), 2 associations closely affiliated with prolotherapy conference. Surveys were also distributed to nonmembers attending the 2004 AAOM annual conference in La Jolla, CA. Excluded from the survey were association members and conference attendees identified by their credentials as being unable to practice spinal care (ie, podiatrists, dentists), whose postal address was invalid (eg, moved with no forwarding address, retired), or those living outside the United States or Canada. No compensation was provided for participating in the study. This study was determined to be exempt from full review by the Western Institutional Review Board (Olympia, WA).

Questionnaire Design and Distribution

The survey instrument contained 20 questions related to practitioner training and experience, use of specific treatment procedures, estimated prevalence of side effects, number of adverse events, and detailed adverse event reports regarding prolotherapy for back and neck pain (original survey instrument is available on request). To maintain anonymity, surveys were sent by postal mail, and participants were tabulated from numbers on the outside of the return envelopes, which were discarded before data entry. Nonresponders were sent 2 reminders by postal mail at 6-week intervals. Completed surveys were returned between April and September 2004. Survey results were recorded at the University of California at Irvine Statistical Consulting Center and independently verified by an investigator (SD).

Statistical Analysis

Descriptive statistical analysis was conducted by using statistical application software.[a] After observing skewed distribution curves for numeric data, median and interquartile (ie, 25th and 75th percentiles) values were reported along with the mean, standard deviation, and range. Median and interquartile values help minimize the potential effects of statistical outliers on a small dataset of this nature. Given the study design, no inferential statistical analysis was conducted.

RESULTS

Response Rate

Of the 314 AAOM members identified in the directory as practicing prolotherapy, 72 were excluded (9 could not practice spinal care, 51 had invalid addresses, 9 lived overseas, 3 did not practice prolotherapy). Of the 74 ACOPMS members in the directory, 8 were excluded (1 could not practice spinal care, 1 was deceased, 6 had invalid addresses). A total of 153 surveys were received from this population of 308 eligible members, a 50% response rate. An additional 18 surveys were completed by nonmembers attending the 2004 AAOM conference; the total number of responses was therefore 171.

Training and Experience

The most common degree reported was doctor of medicine (MD) (n=104), followed by doctor of osteopathic medicine (DO) (n=60). The most common medical specialties were physical medicine (n=53) and general practice (n=49). One hundred thirty-five of the 153 respondents were board certified in related disciplines. Respondents had learned prolotherapy through continuing medical education courses and by observing colleagues. Respondents had a median of 10 of years of experience with prolotherapy for back and neck pain, during which time they treated a median of 500 patients and provided a median of 2000 treatments. The spinal region treated most often with prolotherapy was lumbosacral (median, 60%) (tables 1, 2).

Table 1: Training of Practitioners Performing Prolotherapy for Back and Neck Pain

Variable	n
Degree	
Doctor of medicine	104
Doctor of osteopathy	60
Doctor of naturopathy	2
Nurse practitioner	2
Medical specialty	
Physical medicine	53
General practice	49
Other	21
Anesthesiology	18
Orthopedics	14
Internal medicine	10
Board certified	
Yes	135
No	28
Board discipline	
General practice	36
Pain management	25
Other	21
Physical medicine	20
Anesthesiology	2
Prolotherapy training	
AAOM course	99
Other	85
Observing a colleague	80
Ravin course	66
Hackett course	60

Use of Specific Treatment Procedures

Prolotherapy solutions typically contained multiple ingredients, primarily anesthetic (ie, lidocaine [n=109], procaine [n=40], marcaine [n=31]) and irritants (ie, dextrose [n=163], phenol [n=72], glycerin [n=64], sodium morrhuate [n=49], zinc [n=3]). Drug solutions were obtained from pharmacies (n=108), prepared by practitioners (n=87), or obtained from other sources (n=12). A minority of respondents administered local anesthetic injections (n=27), intravenous sedation (n=22), or oral sedation (n=12) before the injection procedure. Skin sterilization was performed with alcohol (n=95), alcohol and betadyne (n=40), betadyne (n=25), other (n=7), or none (n=4). The median needle length and gauge used in the lumbosacral region was 7.6cm (3in) by 22 gauge, larger than the median 5.1-cm (2in) by 25-gauge needle used in the cervical and thoracic regions. The median volume of drug solution injected during each treatment was higher in the lumbosacral region (15.0mL) than in the cervical and thoracic regions (10mL).

Side Effects

The side effect with the highest estimated median prevalence was pain (70%), followed by stiffness (25%), bruising (5%), and temporary numbness (1%). Other side effects listed on the