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Prolotherapy Assists in Treating Chronic Chest Pain Associated With Trauma

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Abstract **Case Report**

Chest pain can have various causes, and such patients often expend much effort to identify the cause. Patients often first visit the cardiology department for detection of a possible heart disease. In the absence of cardiac dysfunction, they are referred to the gastroenterologists for abdominal and esophageal evaluation, and thereafter, to the pulmonologists. Eventually, they visit the pain clinic to evaluate musculoskeletal causes. Chest pain can be classified as visceral and somatic. The former three causes are visceral, while the last is somatic. Somatic pain originates from superficial musculoskeletal structures, such as bone, facet joint, muscles, etc., and the location of the pain can usually be identified. When we encounter patients with musculoskeletal chest pain, spinal causes are first considered. However, the cause may lie in the chest wall itself. If radiologic examinations do not reveal any abnormalities and physical examinations shows tenderness on palpation and limitation of movement, it should be considered that laxity of ligaments of the chest wall may underlie the symptoms; this condition can be treated by prolotherapy. We report the case of a woman who had suffered from chest pain for years after a car accident, who was successfully treated with prolotherapy.

Keywords: Car accident, chest pain, prolotherapy.

INTRODUCTION

Chronic pain is usually defined as pain that persists for more than 3 months or beyond the time of normal healing. Musculoskeletal conditions are the most common reason for chronic pain experienced by American adults [1]. Musculoskeletal disorders have a marked economic impact in the United States of America: in 2011, these conditions cost $796.3 billion, nearly 6% of the annual GDP [1].

Musculoskeletal conditions may involve laxity of the ligaments, which may be due to strains, sprains, and tearing of the fibers. It may occur as the result of trauma, such as performing an unaccustomed task, a car accident, which causes shearing injuries, and it sometimes accompanies fractures, dislocations, etc. Considering the high prevalence rate and economic cost of musculoskeletal diseases, nonsurgical treatment that is cost-effective, has reduced risk, and results in rapid fast healing is needed. Prolotherapy may be a suitable therapy.

Prolotherapy is an injection-based therapy in which an irritant is injected at the osteotendinous junction. It has long been used as an alternative therapy for the treatment of various chronic musculoskeletal conditions. Since the 1950s, when it was formalized by Dr. George Hackett, prolotherapy has become an efficacious therapeutic strategy for treat ligamentous laxity [2]. There have been numerous reports about the effect of prolotherapy on various musculoskeletal structures, including the neck, temporomandibular joint, lumbar region, pelvis, shoulder, elbow, finger, knee, lower limb, etc. [1]. However, to date there have been no reports of the effect of prolotherapy on chest pain.

We here report the case of a 48-year-old woman who had suffered from severe chest pain for 2 and half years after a car accident, who experienced pain relief after prolotherapy.

CASE REPORT

A 48-year-old woman visited our pain clinic for chronic pain of the chest, shoulder, axilla, and right upper back that had been present since a rear-end collision car accident 2 and a half years earlier. The most painful area was the right-side of the chest in the T6 dermatomal field. Her numeric rating scale (NRS) score was 9/10. Her sleep was severely disturbed. Pain was aggravated by lifting any weight. She had sought assistance at various hospitals, with no improvement, and the diagnostic examinations, including cardiological, pulmonary, and gastrological studies, which had been performed at other hospitals had

revealed no abnormality, except for a thoracic spine magnetic resonance image that showed mild disc bulging at T3/4, mild central disc protrusion at T5/6, disc bulging at T6/7 and T11/12, and central disc protrusion at T8/9.

Her vital signs were normal except for high blood pressure (180/125 mmHg). Tenderness was severe in the right T6 dermatomal area. Her laboratory test results were normal. We performed thoracic epidural block at the T6/7 level with 0.5% bupivacaine 2 mL + normal saline 8mL + dexamethasone 2 mg (Fig. 1). Thereafter, her pain in shoulders, axilla, and left chest was relieved, but the pain in the right upper back and right chest remained. We administered an ultrasound-guided intercostal nerve block under the T6 rib, using 0.5% bupivacaine 2 mL + normal saline 8 mL + triamcinolone 8 mg (Fig. 2.), but this did not relieve the pain. Repeated trials had the same results.

We subsequently used prolotherapy, involving injection of 15% dextrose solution. We mixed 20% dextrose 7.5 mL with 0.5% bupivacaine 2.5 mL and injected 1–2 mL into the painful points of the T6 rib, under ultrasound guidance (Fig. 3).

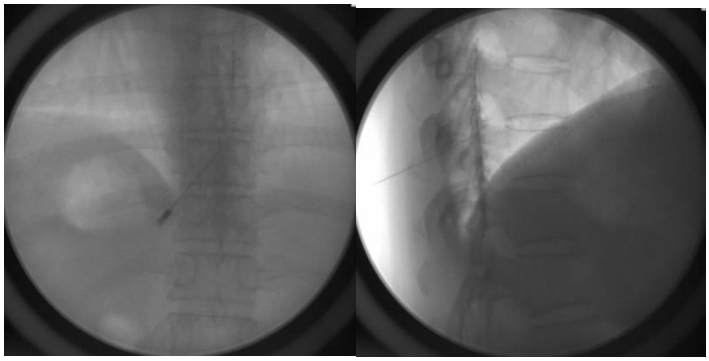

Fig-1: C-arm guided thoracic epidural block at the T6/7 level: AP and lateral view

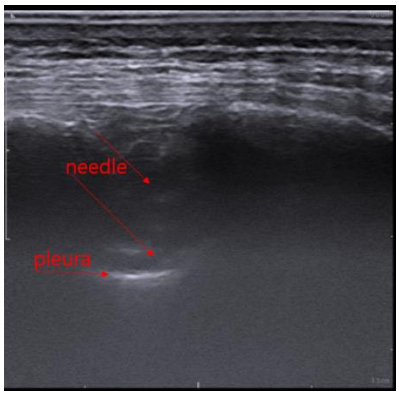

Fig-2: Ultrasound image of intercostal nerve block. The needle tip and downward bulging pleura can be observed

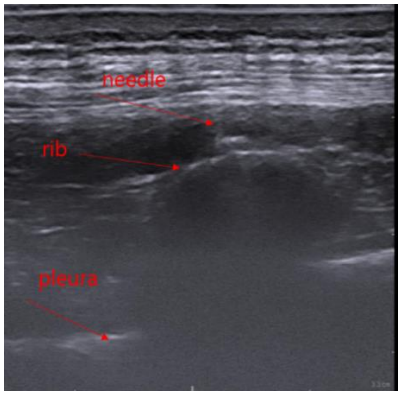

Fig-3: Ultrasound image of prolotherapy. The needle tip is in contact with the rib-bone at T6 and the spread of the injected drug can be seen

At follow-up 2 weeks after prolotherapy, her NRS score had decreased from 8/10 to 6/10 and she was satisfied with the therapy. Subsequently, prolotherapy was repeated at 2-week intervals for a period of 4 months; at the last session, her NRS was 2–3/10. At that time, she experienced markedly less pain aggravation

upon lifting any weight. Three months later, her pain status was maintained.

DISCUSSION

In the case described here, prolotherapy had a beneficial effect, although it did not resolve the patient's pain completely. However, for the patient, it provided marked relief from excruciating pain. Our aim in the treatment of chronic pain is to attain a "tolerable status," as central sensitization may play a role in the chronicity of pain in almost every chronic case. In chronic whiplash-associated disorder, such as this case, central sensitization is thought to cause widespread pain hypersensitivity [3]. At present, the patient's pain is tolerable, and she is satisfied.

Ligament laxity can be caused by degeneration that originates from repetitive use, or by trauma, such as sports injury or car accident. In the rear-end collision our patient experienced a whiplash injury, which commonly causes increased laxity of the capsular ligament of the neck [4]. In such accidents, areas other than the neck, particularly the thoracic area, are also involved; thus, thoracic pain and dysfunction can also occur, explaining the right-side symptoms of this patient [5]. Symptoms, such as pain and muscle spasms, can be experienced within the normal range of motion when instability due to ligament laxity is present. Muscle spasms can cause intense pain and are the body's response to the ligament instability, because the ligaments act as sensory organs in ligamento-muscular reflexes. The ligamento-muscular reflex is a protective reflex elicited from mechanoreceptors (i.e., Pacinian corpuscles, Golgi tendon organs, and Ruffini endings) in the ligaments and transmitted to the muscles. Subsequent activation of these muscles helps to preserve joint stability, either directly by muscles crossing the joint, or indirectly by muscles that do not cross the joint but that limit joint motion [6].

Prolotherapy involves the injection of an irritant into a joint space, ligament, or tendon insertion site, with the main target of relieving pain. Various solutions have been used. In recent years, hyperosmolar dextrose has been the most commonly used solution [7].

The mechanism of action of prolotherapy is not well established, but current theory holds that the injected proliferant causes an inflammatory reaction, which triggers the release of growth factors and collagen deposition, leading to proliferation and strengthening of connective tissues, improving joint stability, and decreasing pain and dysfunction [1].

Ligament laxity leads to two types of pain: trigger point pain and referred pain. Trigger point pain is very important in diagnosis, for "(1) locating the exact ligament or tendon causing the pain, (2) confirming the diagnosis by needling, and (3) precisely placing the needle for prolotherapy" [8]. In this case, the authors easily found trigger points on the T6 rib where tenderness on palpation and needle contact was present, and we injected the dextrose solution at these points.

Prolotherapy has been widely used in chronic musculoskeletal pain. According to a recent systematic review, prolotherapy has some evidence to support its use for the treatment of tendinopathies, knee and finger joint osteoarthritis, and spinal/pelvic pain due to ligament dysfunction. However, its efficacy in acute pain, as first-line therapy, and in myofascial pain, is not clear from the literature [1].

Hackett described trigger points, injection sites, and referred pain patterns in all body parts, including the chest wall [8]. However, we were unable to find any other report about the efficacy of prolotherapy for pain of the chest wall, and thus this case report contributes to the understanding of the use of prolotherapy for this type of pain.

CONCLUSION

In addition to whiplash neck injury, chest pain associated with a car accident is common. If chest pain is present with tenderness upon palpation of the bone and limitation of movement, ligament laxity should be suspected. If the pain persists after other evaluation and treatments, prolotherapy could be attempted, as it is safe and it has few, if any adverse effects. Moreover, it can be used repeatedly if it is found to be effective

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