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Evidence-informed management of chronic low back pain with traction therapy

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Abstract **EDITORS' PREFACE:** The management of chronic low back pain (CLBP) has proven to be very challenging in North America, as evidenced by its mounting socioeconomic burden. Choosing among available nonsurgical therapies can be overwhelming for many stakeholders, including patients, health providers, policy makers, and third-party payers. Although all parties share a common goal and wish to use limited health-care resources to support interventions most likely to result in clinically meaningful improvements, there is often uncertainty about the most appropriate intervention for a particular patient. To help understand and evaluate the various commonly used nonsurgical approaches to CLBP, the North American Spine Society has sponsored this special focus issue of *The Spine Journal*, titled Evidence-Informed Management of Chronic Low Back Pain Without Surgery. Articles in this special focus issue were contributed by leading spine practitioners and researchers, who were invited to summarize the best available evidence for a particular intervention and encouraged to make this information accessible to nonexperts. Each of the articles contains five sections (description, theory, evidence of efficacy, harms, and summary) with common subheadings to facilitate comparison across the 24 different interventions profiled in this special focus issue, blending narrative and systematic review methodology as deemed appropriate by the authors. It is hoped that articles in this special focus issue will be informative and aid in decision making for the many stakeholders evaluating nonsurgical interventions for CLBP.

Keywords: Chronic low back pain; Traction therapy; Chiropractics; Physical therapy

Description

Numerous nonsurgical therapies that mechanically unload the spine have been used to treat chronic low back pain (CLBP) for many years. These treatments are variably known as traction, distraction, or decompression therapies. Although new traction-based therapies are often promoted as being superior to existing devices, their mechanical effects remain based on the principle of spinal distraction, thought to decompress neural structures and the intervertebral disc.

Terminology

Traction therapy refers to any method of separating the lumbar vertebrae with the primary force directed along the inferior-superior axis of the spine, in an attempt to treat CLBP.

History

Traction has been used to treat spinal disorders since at least 1800 BC [1]. Hippocrates (5th–4th century BC) was likely the first to devise a formal apparatus to apply spinal traction [2]. By the 19th century, the traction bed was used to treat scoliosis, backache, rickets, and spinal deformity, and traction corsets, traction chairs, and body suspension were promoted by individual practitioners [3].

Traction became a common treatment for CLBP in the early 20th century and opinions developed regarding how

FDA device/drug status: approved for these indications (VAX-D and DRX9000).

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traction should be applied, including debates about the ideal amount of force, degree of pull, duration of pull, and timing of force intervals [4]. Cyriax promoted traction for not only CLBP but also for lumbar disc lesions, theorizing that traction would produce negative pressure in the disc and thereby reduce disc herniations [5]. Other investigators suggested that off-axis moments, such as flexion or extension, be added to axial traction to preferentially reduce back or leg pain. As a result, a group of therapies collectively referred to as distraction-manipulation developed of which auto-traction (AT) [6] and flexion-distraction (FD) [7] are perhaps best known.

Subtypes

The most common classification of traction therapy is based on the duration of application, which may be 1) continuous (hours to days), 2) sustained (20–60 minutes), or 3) intermittent (alternating traction and relaxation with cycles of a few minutes or less) [4–8]. Traction therapy can also be described by the direction of force, whether 1) axial, 2) positional distraction, or 3) distraction-manipulation. Axial traction limits the force to the superior-inferior (caudad-cephalad) axis of pull. Positional distraction and AT allow the patient to determine the direction and amount of force based on improvement in their symptoms. In distraction-manipulation, the provider decides the direction and extent of off-axis force (most often flexion, lateral flexion, or extension) to be used based on patient symptoms and tolerance for the treatment. The amount of recommended force for axial traction varies but high-dose traction (30%–50% of body weight) is thought to be most effective.

General description

Traction can be applied with the patient in most positions including supine, prone, side-lying or suspended upright or inverted. Patients receiving axial traction are most often treated in the supine position with the knees and hips partly flexed. The use of a split-table (stationary upper portion and mobile lower portion) reduces the amount of force needed to counteract body weight and separate the vertebrae. Typically a harness is applied to both the pelvis and the chest and force is transmitted from the device through the harnesses. Although originally applied by manual means or by using weights, axial traction is most often applied with motorized or hydraulic systems today.

Patients receiving positional distraction and distraction-manipulation are often treated in a prone or side-lying position with a special table that puts the patients' spine in specific postures according to the targeted tissues and desired effect. A harness may or may not be used and often is applied only to the pelvis or ankles to provide axial traction whereas off-axis forces are provided by varying the body posture or motion of the table.

Practitioner, setting, and availability

Traction therapy can be applied by chiropractors, physical therapists, or medical physicians trained in the use of specific traction devices for CLBP. Once the treatment parameters are established by the health provider, a clinical assistant may also apply some of these interventions under supervision. These interventions are widely available in the United States, though specific devices may be limited to proprietary spine centers.

Reimbursement

Traction is reimbursed by most insurance plans under Current Procedural Terminology code 97012, Application of a modality to one or more areas, traction, mechanical. Distraction-manipulation is often billed by chiropractors under CPT code 98940, Chiropractic manipulative treatment, one or two regions. The typical cost for a session of traction therapy is $50 to $100.

Most insurers will cover traction therapy that is prescribed by a licensed health provider, though there may be limits on the number of sessions allowed per episode or year.

Regulatory status

Many traction therapy devices are regulated by FDA as class II medical devices based on substantial equivalence to existing devices.

Theory

Mechanism of action

Several theories have been proposed to explain the possible clinical benefit of traction therapy for CLBP. Distracting the motion segment is thought to change the position of the nucleus pulposus relative to the posterior annulus fibrosus [7–9] or change the disc-nerve interface [10]. These effects are plausible based on studies examining the kinematics of the lumbar spine during traction therapies. In addition to separating the vertebrae, traction has been shown to reduce nucleus pulposus pressure [11,12] and increase foraminal area [12]. However, it is unlikely that mechanical changes observed in a prone position will be sustained after a patient resumes an upright, weightbearing posture. Any lasting clinical response to traction therapy would more likely be because of the effect of traction on the mechanobiology of the motion segment or neural tissues.

Complicating the issue further is that not all traction therapies exert the same force on the spine and animal studies have found the mechanobiology of the disc to be sensitive to the amount, frequency, and duration of loading [13]. It is possible that some forms of traction stimulate disc or joint repair [14], whereas others promote tissue degradation