11 Failure of Nonoperative Management

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Cervical myelopathy and radiculopathy can be debilitating conditions that result in significant functional impairments. As one of the more common reasons that patients seek evaluation from spinal specialists, these degenerative disorders of the cervical spine place a substantial functional, psychosocial, and economic burden upon patients. The treating physician's goal should be the rapid diagnosis and treatment of this condition in order to help patients return to their normal state of health. The majority of initial treatment strategies utilize conservative modalities and primarily focus on rehabilitation. Conservative, nonoperative treatments should be initiated on all patients with new-onset radiculopathy, unless there are signs of significant motor deficit or myelopathy [1]. The objectives of these treatment strategies are pain relief, improvements in function, and prevention of recurrence.

This chapter will primarily focus on the nonoperative modalities for the treatment of cervical myelopathy and radiculopathy. In addition, it will also describe the endpoints used to define the failure of those treatment strategies before advancing to surgical intervention. Many of the conservative measures employed to manage degenerative cervical disorders are supported primarily by anecdotal evidence, making it difficult to standardize an ideal treatment regimen. In 2010, the North American Spine Society (NASS) published the evidence-based guidelines, "Diagnosis and Treatment of Cervical Radiculopathy from Degenerative Disorders," the first known multidisciplinary collaborative statement on this subject [2]. The nonoperative treatment strategies for cervical myelopathy and radiculopathy have not been compared in large-scale, randomized controlled trials. Despite the high incidence of symptomatic cervical degeneration and the widespread use of nonoperative management, the number of comparative trials in the literature is small and usually of poor quality. Any current recommendations are based on recent evidence, comparatively smaller case series, and anecdotal experience.

Nonsurgical treatment is typically the most appropriate course of initial management for cervical radiculopathy, with surgical intervention being utilized in mild, moderate, or severe myelopathy or in cases with continuous and progressive symptoms that have failed nonoperative treatments [3]. In addition, systematic reviews of the literature have demonstrated that up to 90% of patients with radiculopathy will have resolution of symptoms with nonoperative care alone, often observing a time to recovery ranging from 24 to 36 months [1, 4, 5]. Various conservative modalities include pharmacological strategies,

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cervical steroid injections, physical therapy, manipulation techniques, alternative medicine, and other ancillary treatments. While there is a lack of high-quality evidence comparing these strategies to surgical approaches, the following is a compilation of the most recent evidence-based guidelines and peer-reviewed resources addressing the utility of these measures.

Several pharmacological treatments have been used in the treatment of cervical myelopathy and radiculopathy. Common first-line medications include oral analgesics such as nonsteroidal anti-inflammatories, opioids, or oral steroids [2, 4, 6, 7]. Nonsteroidal anti-inflammatory medications (NSAIDs) are one of the mainstay treatment options in the acute relief of symptoms due to their analgesic and anti-inflammatory properties which target the inflammatory response pathway [8]. A short trial of NSAIDs can be effective at relieving symptoms or allowing the patient to tolerate and participate in other treatment modalities [6]. Despite the widespread use of NSAIDs, there lacks high-quality evidence to support their use in the treatment of degenerative cervical disorders. Oral corticosteroids can also be used to acutely manage pain symptoms by inhibiting the inflammatory cascade. Similar to NSAIDs, corticosteroids also lack substantial evidence to support their use in cervical disorders and can lead to riskier adverse effects such as increased susceptibility to infection, osteonecrosis, and hyperglycemia [1, 6].

Opioid narcotics are another pharmacologic strategy for pain control. When possible, the clinician should avoid the use of opioid medications as they can lead to physiologic dependence and result in secondary effects that can make postoperative pain management more difficult [8]. However, if the patient presents with poorly controlled pain, a short and closely monitored course of oral opioids can be beneficial. Other pharmacological options that are often used to address the symptoms of degenerative cervical disorders include antidepressants, antiepileptics, neuropathic medications, and muscle relaxants [9]. While there have been case reports of patients achieving relief of symptoms, the 2010 NASS systematic review demonstrated that no literature adequately examined the role of these pharmacologic treatments and therefore could not provide a statement on their utility in the management of cervical radiculopathy [2]. When suggesting pharmacologic treatments for patients, it is important to design an individualized strategy that incorporates appropriate considerations such as age of the patient, potential drug interactions, and other comorbidities.

Cervical steroid injections may also be considered in the nonsurgical management of cervical radiculopathy and myelopathy. The epidural steroid injections performed under fluoroscopic or CT guidance function by decreasing inflammation at the site of the irritated cervical nerve roots with the hopes of providing symptomatic relief to the patient. Often these injections are utilized as a method of subsiding any pain in order for the patient to tolerate other methods of nonoperative care. The injections may consist of transforaminal or interlaminar epidurals, as well as selective nerve blocks. Certain studies have shown that patients respond well to cervical steroid injections if they had previously confirmed pathology by advanced imaging, such as CT or MRI, and had experienced improvements while taking oral corticosteroids [6]. In addition, a systematic review of the literature has shown some support for epidural steroid injections in the treatment of cervical radiculopathy, with up to 60% of patients experiencing symptomatic relief in the long term with transforaminal epidural steroid injections [2, 4]. In addition, approximately 25% of patients were shown to obtain short-term pain relief thereby negating the need for surgery despite prior clear surgical indications. Due to limited high-quality evidence, it is still unclear whether the benefits seen with cervical epidurals are demonstrating a true treatment response to the injections or whether it is a reflection of the natural progression of the disease course. Likewise, all of the reviewed studies had used transforaminal epidural injections, making it impossible to derive any conclusions or recommendations regarding the safety or efficacy of interlaminar injections as a treatment modality for cervical radiculopathy.

While cervical epidural injections are considered safe and well tolerated, the provider and patient must be aware that these procedures are not without significant risks and potential complications. In particular, cervical transforaminal and interlaminar steroid injections can result in neurological deficits, epidural hematomas, vascular infarcts, or death [4]. As of 2014, the Federal Drug Administration felt that these risks were significant enough to result in the addition of a black box warning for the use of corticosteroids in the epidural space [1, 10]. While evidence suggests that corticosteroid injections may lead to short-term, symptomatic improvement in radicular symptoms, there is no current method of predicting which patients will experience improvements from these injections [4, 6]. Transforaminal epidural steroid injections under imaging guidance may be considered as a nonoperative strategy when designing a treatment plan for patients suffering from cervical degenerative disorders. However, it is important for the physician to be cautious in recommending cervical epidural injections, and consideration should be given to the potential complications. In the setting of overt moderate or severe myelopathy with image-documented cord compression, many clinicians recommend against the use of epidural injections in order to avoid further potential epidural compression.

Physical therapy is another nonoperative modality that is often utilized as a stand-alone treatment strategy or in conjunction with other treatment methods for cervical degenerative disorders. The aim of physical therapy is to restore range of motion and strengthen the neck and chest musculature with the goal of decreasing symptoms and preventing recurrence. A carefully tailored physical therapy regimen should progress through stages, as the patient's pain improves [8]. Early on in the treatment regimen, the patient should begin with gentle range of motion exercises and stretching techniques. As the pain subsides, stretching techniques, isometric strengthening, and active range of motion and resistance exercises may be incorporated as tolerated [5]. In addition, most programs will also include components of postural and ergonomic training with the hopes of preventing recurrence of radicular symptoms.

The difficulty in comparing the overall effectiveness of physical therapy as a treatment modality is that exercise regimens vary widely in their frequency, duration, and intensity [8]. On average, these regimens consist of 15–20 sessions lasting 30–45 min in duration over a 3-month period [3]. Several trials and systematic reviews have evaluated the utility of physical therapy for the treatment of cervical radiculopathy and myelopathy. Those studies demonstrated a moderate benefit in providing relief of neck pain and improvements in muscle strength. However, these benefits were shown to be short term and dissipate after 6 months to a year. The overall review of the literature highlights a lack of trials that adequately assess the utility of physical therapy as a treatment modality in the management of cervical myelopathy and radiculopathy.

Similar to physical therapy, manipulative therapy involves numerous techniques often focused on the cervical spine in order to provide relief and prevent the recurrence of symptoms. Manual therapy includes options such as immobilization, muscle energy techniques, traction, or soft-tissue and neural mobilization [11]. Some studies have promoted the benefits of immobilization and cervical traction at decreasing the symptoms associated with cervical radiculopathy [4]. The concept behind these techniques is that short-term immobilization would allow for a decrease in inflammation, while cervical traction would increase the dimensions of the neural foramen. Both methods result in a decompression of the nerve root with the goal of improving symptoms [7].

Cervical traction can play a major contribution toward rehabilitation in cervical radiculopathy, especially if incorporated with other conservative modalities, though high-quality literature examining the topic remains lacking. A recently published case report described successful management of cervical radiculopathy utilizing traction: A 52-year-old woman with a 2-month history of cervicobrachial pain and a presentation consistent with cervical radiculopathy underwent a simultaneous combination of cervical traction and slider neural mobilization [12]. Neural

mobilization techniques have also been advocated in the management of cervical radiculopathy as a method of relieving nerve adherence and facilitating nerve gliding. These concepts are thought to normalize the cervical nerve root's structure and function, thereby decreasing any symptoms. While both techniques have been used and studied independently in treatment plans, there is a lack of sufficient data regarding the efficacy of combining both strategies. After undergoing the combination treatment, the patient noted improvements in all outcomes measured after a period of 4 weeks. The patient noted that her pain had almost disappeared and she was able to perform her activities of daily living without any limitations or difficulty. A recent prospective randomized clinical trial discovered similar findings by demonstrating that the addition of mechanical traction to a strengthening regimen in patients suffering from cervical radiculopathy resulted in better 6-month and 1-year outcomes when compared to strengthening exercises alone [13]. The findings of these reports support the concept of combining cervical traction with other treatment modalities in order to provide significant improvements in the treatment of cervical radiculopathy.

These manipulative techniques are often utilized in various methods, frequencies, intensities, or durations making it difficult to standardize their efficacy and determine their optimal therapeutic benefit [11]. Although there has been no established cause and effect relationship between these manipulative techniques and an improvement in radicular symptoms, the results for short-term benefits have been generally promising. However, there is a lack of high-quality evidence in the literature to support the use of cervical traction in the long-term management of cervical radiculopathy [5]. A recent Cochrane Review stated that current research cannot adequately support or refute the efficacy of cervical traction in the management of cervical radiculopathy as compared to other conservative treatment modalities [14].

In addition, manipulative therapy is not without risk, with complications such as worsening radiculopathy, myelopathy, or spinal cord injury [5]. A systematic review also identified several case reports describing serious vascular and non-vascular complications associated with manipulation including vertebral artery compression and disc herniation, with most serious complications requiring emergent surgical treatment [14]. As the efficacy of manipulation in the treatment of cervical radiculopathy is not completely understood, careful consideration should be given prior to incorporating these techniques within a treatment strategy as there is evidence suggesting that manipulation may lead to worsened symptoms or significant complications [11]. Well-conducted randomized controlled trials are needed to clarify the safety and efficacy of traction and establish clear and effective treatment protocols for patients with cervical degenerative disorders.

Finally, examples of other ancillary treatments often utilized by patients include transcutaneous electrical nerve stimulation, acupuncture, or ozone injections [2, 15, 16]. These methods have recently started gaining attraction due to their associations with improvements in pain in uncontrolled case series. However, the research has yet to distill whether the observed improvements were truly from the treatment modalities or a natural progression of the disease course. Further ongoing research will be required in order to be able to determine the efficacy of incorporating these other nonoperative modalities in treatment regimens.

Nonoperative treatment is a labor-intensive, collaborative effort requiring the physician to carefully select treatment strategies specific to each patient's needs and to routinely monitor their progression. Despite the high incidence of symptomatic cervical degeneration and the widespread use of nonoperative management, there is currently no high-quality evidence comparing nonoperative and operative treatment modalities. However, a typical conservative approach would have patients attempt to control their symptoms using primarily a combination of physical therapy, manipulation techniques, and pharmacotherapy. More invasive conservative treatment options, such as cervical epidural injections, may benefit those patients that have not responded to simpler nonoperative alternatives. If patients

fail to improve with nonoperative treatments or exhibit progressively worsening symptoms, surgical intervention should be considered.

References

1. Woods BI, Hilibrand AS. Cervical radiculopathy: epidemiology, etiology, diagnosis, and treatment. J Spinal Diord Tech. 2015;28:251–9.
2. Bono CM, Ghiselli G, Gilbert TJ, North American Spine Society, et al. An evidence-based clinical guideline for the diagnosis and treatment of cervical radiculopathy from degenerative disorders. Spine J. 2011;11(1):64–72.
3. Hirpara KM, Butler JS, Dolan RT, O'Byrne JM, Poynton AR. Nonoperative modalities to treat symptomatic cervical spondylosis. Adv Orthop. 2012;2012:294857.
4. Wong JJ, Cote P, Quesnele JJ, et al. The course and prognostic factors of symptomatic cervical disc herniation with radiculopathy: a systematic review of the literature. Spine J. 2014;14:1781–9.
5. Caridi JM, Pumberger M, Hughes AP. Cervical radiculopathy: a review. HSS J. 2011;7:265–72.
6. Corey DL, Comeau D. Cervical radiculopathy. Med Clin N Am. 2014;4:791–9.
7. Eubanks J. Cervical radiculopathy: nonoperative management of neck pain and radicular symptoms. Am Fam Physician. 2010;81(1):33–40.
8. Iyer S, Kim HJ. Cervical radiculopathy. Curr Rev Musculoskelet Med. 2016;9:272–80.
9. Onks CA, Billy G. Evaluation and treatment of cervical radiculopathy. Prim Care Clin Office Pract. 2013;40:837–48.
10. Food Drug Administration Center for Drugs Evaluation Research. FDA drug safety communication: FDA requires label changes to warn of rare but serious neurologic problems after epidural corticosteroid injections for pain (FDA Maryland). 2014.
11. Boyles R, Toy P, Mellon J Jr, Hayes M, Bradley H. Effectiveness of manual physical therapy in the treatment of cervical radiculopathy: a systematic review. J Man Manip Ther. 2011;19(3):135–42.
12. Savva C, Giakas G. The effect of cervical traction combined with neural mobilization on pain and disability in cervical radiculopathy. A case report. Man Ther. 2013;18:443–6.
13. Jellad A, Salah ZB, Boudokhane S, Migaou H, Bahri I, Rejeb N. The value of intermittent cervical traction in recent cervical radiculopathy. Ann Phys Rehabil Med. 2009;52:638–52.
14. Graham N, Gross A, Goldsmith CH, et al. Mechanical traction for neck pain with or without radiculopathy. Cochrane Database Syst Rev. 2008;(3):CD006408.
15. Bocci V, Borrelli E, Zanardi I, Travagli V. The usefulness of ozone treatment in spinal pain. Drug Des Devel Ther. 2015;9:2677–85.
16. Walsh D, Howe T, Johnson M, et al. Transcutaneous electrical nerve stimulation for acute pain. Cochrane Database Syst Rev. 2009;(2):CD006142.