Cervical Facet Block

September 2000

Gabor B. Racz, M.D. FACA, FACPM Lubbock, Texas

LECTURE OBJECTIVES

To recognize the role of pain that originates from the cervical facet and the methods in doing diagnostic and therapeutic block and interventions in the form of radiofrequency thermocoagulation.

Cervical facet syndrome is a diffuse entity characterized by neck pain, limitation of movement, shoulder pain, arm pain, and possibly headache. There may be a radiating component secondary to muscle spasm and nerve root compression. The diagnosis is often missed and commonly labeled as trigger points of the trapezius muscle. The etiology may be related to trauma, whiplash injury, posture, arthritis, muscle spasm, tension, or without identifiable cause. Associated syndromes include occipital and temporal pain via cranial nerves 2 and 3 and the auricular nerves. Diagnosis of this syndrome is via history and physical exam. History of trauma should be followed by examination, by lateral pressure on the cervical facet joints, as well as pressure over the trapezius muscles causing pain. Tenderness to palpation of the trapezius muscle alone may be secondary to trigger points but when seen in combination with neck tenderness, it is usually caused by cervical facet syndrome. Cervical facet injections with local anesthetic and steroid provide a high yield of pain relief in 17 out of 24 consecutive patients with neck pain using facet injections. Radiofrequency thermocoagulation has been employed by Sluijer to treat neck pain.[4] The purpose of this paper is to look at the benefit of diagnostic cervical facet injection followed by radiofrequency thermocoagulation in the treatment of the patients with cervical face syndrome. We have treated 80 patients with cervical facet syndrome over the past 24 months (as of January 1994).

TECHNIQUE OF LOCAL ANESTHETICS AND STEROID INJECTION

The patient is placed supine on a special fluoroscopy table with a head extension, which overhangs the legs of the table so that the C-arm has free circumferential rotation. An IV is started and monitors placed (EKG, dinamap, and pulse oximeter). The posterior border of the cervical transverse processes are palpated, and a line is marked on the skin using a marking pen. Needle entry points are on this line with the shaft of the needle horizontal to avoid anterior placement of the needle tip and possible spearing of a nerve root. The neck is painted with sterile solution and draped. The C-arm is then brought in from the head of the table and is initially rotated 30 degrees obliquely. This reveals the facet joint as a string of beads. The location of the vertebral artery and the cervical nerve root can also be determined in the oblique view. Under fluoroscopy guidance a 21-gauge 2" needle is placed near the facet joint at the desired levels. Correct location of the needle is indicated when it is in contact with bone prior to injection. The oblique view will reveal anterior needle placement as if the needle enters the neural foramen. This view assures that needle stays free of the vertebral artery or nerve root. An anterior-posterior view rules out placement of the needle into the spinal canal or cord. Confirmation of correct needle placement by an anterior posterior view will show the needle touching the lateral border of the cervical spine at the

level of the joint. After negative aspiration, 2cc of a mixture of 0.5% marcaine plus 40mg triamcinolone is injected. This is repeated at other levels based on the patient's examination. Most commonly C2-C5 levels are injected with the patient in the supine position. Below C5 there is a possibility of pneumothorax as a complication with the supine-horizontal needle approach. For C5, C7 and upper thoracic levels the prone position posterior approach is used. Flaccidity of the trapezius muscle is often noted upon completion of the block. After the diagnostic block the patient's neck is moved back and forth, and the patient is asked to evaluate his pain. Aggressive physical therapy is very important for maintaining and increasing the therapeutic effectiveness of the block. The patient may expect the effects of the block to last from several hours to several days to a lifetime. Before attempting this technique, it is helpful to observe these procedures.

TECHNIQUE OF RADIOFREQUENCY THERMO COAGULATION

Placement of the patient and the C-arm is identical to that for injection of local anesthetic. A Radionics radiofrequency lesion generator model RFC-3B is utilized. After proper placement of the 5cm SMK (Radionics) needle and conformation in both the oblique and anterior-posterior view, the nerve is localized by sensory stimulation with electric current at 50 Hz and 0.5 - I volt. The purpose of the stimulation is to try to reproduce the patient's neck pain. If no pain is elicited, then the needle is repositioned slightly and the stimulation is performed until the painful spot is found; therefore, the facet nerve is located. Motor Stimulation at 2Hz is then carried out increasing the voltage from I to 4 volts. Movement of the paraspinous muscles is acceptable, but there should be no movement or sensation in the ipsilateral shoulder, arm, or hand. If such movement occurs, the needle tip is probably near a nerve root and should be repositioned. After positive sensory stimulation and negative motor stimulation, 0.5 - 1.0cc of local anesthetic injected and then radiofrequency thermocoagulation is carried out at 80 degrees Celsius for 70 seconds. The above is repeated at other levels as dictated by the patient's history and physical exam.

Often cervical facet injection will need to be supplemented with suboccipital nerve block or injection of upper thoracic facet joints. The suboccipital nerve block will relieve pain secondary to entrapment of the greater and lesser occipital nerves and auricular nerves. Injection of the upper thoracic facet joints is necessary because with injection of the cervical facet joints the lowest facet that can be blocked is C6 or C7. In order to inject the upper thoracic facet joints, the patient must be placed in a prone position.

ANATOMY AND INNERVATION OF FACET JOINTS

The cervical facet joints are innervated by the posterior-primary rami of the nerve roots as these are given off distal to the dorsal root ganglion.[3] The dorsal rami travel in the groove of the transverse procis of the cervical vertebra and divide into the ariculating branch and the medial branches. The nerves subsequently sand branch to the joint above and the joint below so that if the innervation is considered, one needs to be involved in blocking or lesioning the affected joint as well as the nerve above and the nerve below.

Because of the work of Bogduk and recognition of the innervation and causation of neck pain from the disc as well as the facet joints, there are three techniques in approaching the pain originating from the facet joints. Of the three techniques, we have described the one

where the oblique fluoroscopic visualization is used to place the needle at the posterior border of the cervical facet joint for radiofrequency lesioning purposes because this is the technique where the least likely damage from a misplaced needle can be observed because of the oblique fluoroscopic visualization during the movement of the needle. Basically there are three recognized techniques:

1. This technique is a slightly more anterior approach where the needle is intentionally placed to the posterior neural foramen, and the needle is walked off the bone and advanced into the neural foramen in the anterior-posterior view in such a way that the needle does not go beyond halfway the distance of the facet joint. Once the needle enters the neural foramen, beyond the halfway distance, the distinct hazard is the entry into the vertebral artery. Additional hazard is the needle entering into the segmental spinal artery especially at C6 area. Paresthesia should not be elicited because the presence of paresthesia may indicate closeness of the needle to segmental artery blood supply as mentioned earlier especially at C6. Injection or severing of the feeding artery is a definite hazard that should be avoided.

2. Our preferred technique is where the oblique fluoroscopic visualization is used, and the posterior part of the facet joint is aimed for. During radiofrequency lesioning, the high frequency stimulation (50-75 Hz) at the low amplitude (0-1 volt) will reproduce the pain followed by motor stimulation of 2x sensory amplitude and 2Hz that may cause contracture of posterior neck muscles but not of the muscles of the arm. Following stimulation outlined, the lesioning is safely carried out without significant hazard to the mixed cervical primary nerve roots. Also this approach avoids the hazard of hitting the segmental spiral artery at C6 as well as the placement of the needle into the spinal cord as is the faint possibility with technique number 1.

3. This is an approach which is carried out in the prone position where the initial needle placement is to the lamina, and the needle is walked off into the mid grove position of the transverse process. The posterior primary ramus comes underneath a transverse ligament, and high frequency stimulation reproduces the recognizable paresthesia and pain. Motor stimulation will verify up to twice the sensory stimulation that the needle is not close to the cervical motor nerve root; additionally because a larger part of the uninsulated radiofrequency needle is placed along a longer segment of the posterior primary ramus, the size of the lesioned segment of the nerve is going to be larger. The effectiveness of the technique likely will be greater than the lateral approach. Usually a 5mm un-insulated needle is used to carry out the lesioning when radiofrequency technique is utilized.

Treatment of cervical facet joint syndrome with injection of local anesthetic and steroid followed by radiofrequency thermocoagulation is a safe and effective technique. Although there are many potential complications associated with needle placement in this area, hyperesthesia presumably secondary to incomplete lesioning of the medial branch was the only problem we experienced. Tactile hyperesthesia is usually self-limiting and resolves in a couple of months. We have successfully treated this with a centrally acting tranquilizer such as clonazepam 0.5 mg three times a day. Occasionally injection of the facet joint at C2 is necessary for treatment of headache.

Our workup often includes plain films, EMG, CAT scan, magnetic resonance imaging, careful history, and physical exam. Lateral x-ray may show bony spurs. An EMG evidence of nerve injury consistent with radiculopathy necessitates treatment with a cervical epidural catheter. Our success rate in the treatment of radiculopathy via cervical epidural catheter is 85 percent.[4] Physical exam includes lateral pressure on the facet joints. Lateral rotation of the neck as well as checking range of motion of the shoulder joint is necessary to rule out a frozen shoulder.

This study shows that treatment of cervical facet joint syndrome can be safely and efficiently conducted with good initial results and at two-year follow-up pain relief was sustained in a majority of patients. Over the past two years we have performed cervical facet injections in 80 patients, and (as of January 1994) 62 of these have gone on to receive radiofrequency thermocoagulation. Many were lost to follow-up, but we present data obtained by telephone interview from 41 patients. Seventy-three percent (30/41) of our patients claimed relief from cervical facet joint syndrome after a diagnostic block was performed. This result compares favorably with that of Bogduk et. al.[1] In two of the patients the duration of pain relief from cervical facet injection was greater than 8 months. Patients who responded favorably to local anesthetic and steroid injections but had short duration improvement were candidates for radiofrequency thermocoagulation. Thirty-three, patients went on to have radiofrequency thermocoagulation of their facet joints and 23 patients (69.7%) experienced partial or complete relief of their symptoms. The duration of pain relief has varied from a few days to 18 months.

Nearly 25% of the patients claimed good to excellent pain relief for greater than 6 months. Patients with a good response to radiofrequency thermocoagulation but without sustained pain relief (i.e., < 6 months) were treated with repeat cervical facet injection. If this gave additional pain relief, then radiofrequency thermocoagulation was performed. Our impression of the reason for the lack of sustained pain relief was most likely secondary to incomplete lesioning of the facet nerves. The overall effectiveness of these repeat blocks needs further follow-up.

One of the very exciting new developments has been the publication by Susan Lord, et. al,[5] of a prospective double blind radiofrequency lesioning of the cervical zygapophyseal joint for chronic cervical pain. The excellent prospective double blind study adds credence to the technique that has, in fact, been used for several years. Our approach to speed up the rather cumbersome two-needle placement technique described in the paper has been the use of the curved blunt or curved sharp needle with a posterior approach where the needle tip can be laid along the course of the posterior primary ramus and the innervation of the facet joints. The technique, of course, is made easier if one uses a curved blunt needle by the use of a 16 gauge intravenous cannula as an introducer needle for the curved blunt needle placement. The above study has added greatly to the general acceptance of cervical radiofrequency lesioning for the treatment of cervical facet pain. It must be remembered, however, that in the presence of radiculopathy evidenced by radiating pain through one of the cervical nerves, the outcome is dramatically improved by the combined use of cervical catheter series with the three daily injections at the specific sites were the pain is coming from.

Unfortunately, there are medical/legal considerations, and several cases have occurred where

during cervical nerve root injection with local anesthetic and Depo-Medrol, there is infarction of the spinal cord all the way up to the pons. These patients experience rapid onset of upper extremity weakness, paralysis, and quadriplegia requiring respiratory support and no chance of recovery. Meticulous attention must be paid to the needle placement and, in our practice; we have completely switched over to the use of the Radionics Curved Blunt RF needle[6] in the hope of avoiding such disastrous outcomes.

The informed consent is an important aspect of the cervical facet procedure. The listed hazards should include all the possible complications including bleeding, infection, drug reaction, seizures, convulsions, weakness, numbness, paralysis, temporary and permanent difficulty in breathing secondary to total spinal as well as the possibility of pneumothorax. While the list of potential complications indeed is horrendous, attention to the details described above should make incidents of these very, very minimal. There are no known actual predictors of incidents of complications other than the fact that one hears about the sporadic undesirable outcome along the lines of the above listed complications.

These results confirm that diagnostic cervical facet injection followed by radiofrequency thermocoagulation is an effective therapy for the treatment of cervical facet joint syndrome.

NOTE OF INTEREST

There is a group formed for collecting an up-to-date worldwide list of references for radiofrequency lesioning. The list is periodically updated and may be obtained from Radionics, Inc. P. 0. Box 438, Cambridge Street, Burlington, Massachusetts 01803.

References

1. Bogduk N: The innervation of the cervical intervertebral disc. Spine, 13:1, 1988.
2. Bogduk N: The cervical zygapophysial joints as a source of neck pain. Spine, 13: 6, 1988.
3. Racz GB: Techniques of neurolysis. Boston; Kluwer Academic Publishers, 1989.
4. Suijer ME, Koetaveld-Baart CC: Interruption of pain pathways in the treatment of the cervical syndrome. Anesthesia, 35:202-307,1980.
5. Lord SM, Barnsley L, Wallis BJ, McDonald GJ, Bogduk N: Percutaneous radio-frequency neurotomy for chronic cervical zygapophyseal-joint pain. The New England Journal of Medicine, 335: 1721-1726.
6. Finch PM, Racz GB and McDaniel K: A curved approach to nerve blocks and radiofrequency lesioning. Pain Digest, Springer-Verlag New York Inc. 7:251-257, 1997.