A new insulated caudalis nucleus DREZ electrode

Technical note

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A new insulated radiofrequency electrode for making nucleus caudalis dorsal root entry zone lesions reduces the incidence of ataxia.

KEY WORDS □9 trigeminal nerve □9 nucleus caudalis □9 dorsal root entry zone □9 electrode □9 instrumentation

The localized destruction of the trigeminal nerve nucleus caudalis is one choice of surgical therapy for intractable facial pain. These lesions, similar to the dorsal root entry zone (DREZ) lesions in the spinal cord for chronic pain, are produced with a radiofrequency (rf) electrode placed into the nucleus caudalis for thermocoagulation. One of the complications of this procedure in the region of the medulla is ataxia of the ipsilateral limbs. This is thought to be due to inclusion of the spinocerebellar tracts in the radius of thermocoagulation. A new rf electrode has been designed to reduce the incidence of this problem.*

Description of Electrode

The original DREZ electrode has a 2.5-mm uninsulated tip which is designed to destroy the first five Rexed layers of the dorsal horn. The newer nucleus caudalis electrode is 3 mm in length with the proximal 1 mm electrically insulated by a Teflon coating. The shoulder of the electrode is also insulated in order to protect the surface of the medulla during lesioning. The distal 2 mm is uninsulated for thermocoagulation. The total length of the electrode is adjustable by movement within the Nashold caudalis DREZ guide cannula (Fig. 1).

Discussion

Nucleus caudalis DREZ lesions have proved an effective surgical therapy for intractable facial pain. Placement of these lesions is a major operation and anatomically involves an area of great complexity. The incidence of ataxia after this operation led us to consider what might be the true anatomy of our lesions. In theory, the lesions are made in the nuclear portion of the trigeminal nerve nucleus caudalis in order to destroy the second-order neurons. It was believed that there was undue involvement of the dorsal spinal cerebellar tract when the original (uninsulated) DREZ electrode was used (Fig. 2). This new electrode is designed to restrict the lesion as far as possible to the nucleus caudalis. In use, the electrode passes through the dorsal spinocerebellar and the trigeminal nerve tracts into the trigeminal

* Electrode designed by Eric Cosman, Ph.D., Radionics, Inc., Burlington, Massachusetts (patent pending).
FIG. 2. Diagram showing that the approach to the trigeminal nerve nucleus caudalis requires passage through the dorsal spinocerebellar tract, which contains afferent input from the upper extremities. It is thought that the original uninsulated dorsal root entry zone (DREZ) electrode included this tract in its field of thermocoagulation, causing ataxia of the ipsilateral upper limb. V = trigeminal nerve; IV ventricle = fourth ventricle.

nucleus. The uninsulated distal 2 mm should be within the trigeminal nucleus, leaving the insulated portion of the electrode in the areas to be preserved (Fig. 3).

Our experience with this electrode is still quite limited, but preliminary results show a decrease in the incidence of postoperative ataxia. With the older electrode, 17 of 21 nucleus caudalis DREZ procedures resulted in ataxia (81%). In our first nine procedures using the newer electrode, there have been only two incidences of obvious ataxia, with an additional two questionable cases of mild ataxia (for a total incidence of 22% or 44%).

FIG. 3. Diagram showing the newer nucleus caudalis dorsal root entry zone (DREZ) electrode in use. This electrode is designed to spare the more superficial dorsal spinocerebellar tract. V = trigeminal nerve.

References


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