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ORIGINAL ARTICLE

Treatment of neuropathic deafferentation pain using DREZ lesions; long-term results ☆

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KEYWORDS
Brachial plexus avulsion;
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Abstract
Introduction: Deafferentation pain secondary to spinal cord injury, brachial plexus avulsion and other peripheral nerve injuries is often refractory to conventional treatments. This study evaluates the long-term efficacy of spinal DREZ *(Dorsal Root Entry Zone)* lesions for the treatment of neuropathic pain syndromes caused by deafferentation.
Patients and methods: A series of 18 patients with refractory deafferentation pain treated with radiofrequency DREZ lesions is presented. The immediate and long-term efficacy was measured with the Visual Analogue Scale (VAS) before and after treatment, the patient's subjective evaluation, the percentage of patients returning to work and the reduction in pain medication.
Results: Pain on the VAS significantly decreased from 8.6 preoperatively to 2.9 ($p<.001$) at release. Over the long-term, with a mean follow-up of 28 months (6-108) pain remained at 4.7 on the VAS ($p<0.002$). The percentage of patients with moderate to excellent pain relief was 77% at discharge and 68% at the last follow-up. Pain medication was reduced in 67% of the patients and 28% returned to work. The best results were obtained in patients with brachial plexus avulsion, with a significant long-term pain relief in all cases.
Conclusions: Radiofrequency DREZ lesion is an effective and safe treatment for refractory neuropathic pain caused by deafferentation.

☆No work similar to this manuscript has been published or submitted to another journal for publication. Some of the data included in this work were reported at the 14th Annual Conference of the Spanish Neurology Society (SENEC) held in Seville in May 2009.

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†Dr. Francisco García Salazar, the driving force behind pain surgery at our department and the lead surgeon in all the cases presented in this series, died on October 5th, 2009, during the preparation of this manuscript. R.I.P.

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PALABRAS CLAVE
Avulsión plexo braquial;
Desaferentización;
Dorsal root entry zone;
Dolor;
Lesión medular

Tratamiento del dolor neuropático por desaferentización mediante lesión DREZ, resultados a largo plazo

Resumen
Introducción: El dolor por desaferentización secundario a lesiones medulares, avulsión del plexo braquial y otras lesiones de nervios periféricos, es a menudo refractario a tratamientos convencionales. Este trabajo evalúa la eficacia a largo plazo de la cirugía de lesión DREZ *(Dorsal Root Entry Zone)* en diversos síndromes de dolor neuropático por desaferentización.
Pacientes y métodos: Se presenta una serie de 18 pacientes con dolor refractario por desaferentización tratados mediante lesión DREZ con radiofrecuencia. La eficacia inmediata y a largo plazo se valoró mediante la escala visual analógica (EVA) preoperatoria y postoperatoria, la valoración subjetiva del paciente, la reincorporación laboral y la reducción de la medicación analgésica.
Resultados: El dolor en la EVA disminuyó significativamente de 8,6 antes de la cirugía a 2,9 de media al alta ($p < 0,001$). A largo plazo, con un seguimiento medio de 28 meses (6-108), el dolor se mantuvo en 4,7 en la EVA ($p < 0,002$). El porcentaje de pacientes con un alivio moderado a excelente del dolor fue de 77% al alta y 68% a largo plazo. El 67% de los pacientes redujo la medicación analgésica y el 28% se reincorporó al trabajo. Los mejores resultados se obtuvieron en los pacientes con avulsión del plexo braquial con una mejoría significativa del dolor a largo plazo en todos los casos.
Conclusiones: La lesión DREZ por radiofrecuencia es un tratamiento eficaz y seguro para el dolor neuropático refractario por desaferentización.

Introduction

The DREZ region *(dorsal root entry zone)* was described by Sindou and includes: the medial portion of the dorsal root, Lissauer's tract, and the posterior horn of the spinal cord[1]. Several different studies carried out in animals and in patients with spinal cord section have demonstrated paroxysmal neuronal hyperactivity in this region, which might be the physiopathological basis of deafferentation pain.[1] In 1972, Sindou and Fisher published the technique of microsurgical injury to the DREZ region as treatment for neuropathic pain in a patient with infiltration of the brachial plexus due to a Pancoast tumour.[2] Shortly afterward, Nashold introduced the technique of DREZ lesion by thermocoagulation using radiofrequency for pain associated with avulsion of the brachial plexus.[3] Since then, the DREZ lesion technique has been used to treat neuropathic pain in different situations such as: avulsion of the cervical roots of the brachial plexus, postherpetic neuralgia, spinal cord injury, cancer and peripheral nerve injury. In this work, we report our experience and outcomes long term with the technique of DREZ lesion for the treatment of the neuropathic pain.

Patients and methods

A review was made of all patients with neuropathic deafferentation pain refractory to other treatments and treated by means of spinal DREZ lesion at the Gregorio Marañón General University Hospital between 1994 and 2009. During this period, 19 DREZ lesion procedures were performed on 18 patients (7 men and 11 women) with a mean age of 52 years (27-77). The epidemiological, clinical, and surgical data were collected from the clinical history. Evolution of pain was recorded on the basis of the progressive data collected at follow-up visits to the neurosurgery clinic and pain clinic, as well as by telephone interviews of patients not monitored at our centre.

The aetiology of the neuropathic pain was: avulsion of the brachial plexus (8 patients), neoplastic infiltration of the brachial plexus (3 patients), spinal cord trauma (2 patients), and neuropathic pain in other locations (5 patients). The metameric level of pain distribution was cervical in 13 cases, dorsal in 4 cases, and lumbosacral in one case. The mean time between the onset of pain and DREZ surgery was 6 years (1-17). During that time, patients were treated with any number of medical therapies without achieving pain control, as well as various different surgical procedures: stimulation of posterior tracts (11), intrathecal morphine pump (3), neurolysis of the brachial plexus (2), amputation (3), thalamic deep brain stimulation (1). The patients' clinical characteristics are illustrated in table 1.

The surgical technique was carried out under general anaesthesia with the patient lying face down in 15 cases and sitting in 3. The Mayfield craniostat was used in the 11 cases in which the approach was via the cervical spinal cord. The spinal cord was exposed by means of a bilateral laminectomy of all the segments involved and included a rostrally located segment and another, caudally located one. The segments to be injured were determined on the basis of the dermatomes with radiating pain, bearing in