Evaluation of endorphin content in the CSF of patients with trigeminal neuralgia before and after Gasserian ganglion thermocoagulation

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The β-endorphin content in cerebrospinal fluid (CSF) was evaluated in 10 patients with idiopathic trigeminal neuralgia during medical treatment (with or without carbamazepine) and after selective thermocoagulation of the Gasserian ganglion. These values were compared with those obtained in a control group of seven patients without pain problems. No statistically significant difference was found between patients suffering from trigeminal neuralgia and those without pain. Furthermore, neither pharmacological treatment nor surgery changed CSF endorphin values. It is concluded that there is no pathogenetic relationship between trigeminal neuralgia and endorphins.

KEY WORDS • trigeminal neuralgia • Gasserian ganglion thermocoagulation • carbamazepine • endorphin • pathogenesis

In the last few years, morphine-like endogenous substances (namely, the endorphins and the enkephalins) have been associated with the problem of pain. Observations by Almay, et al., von Knorring, et al., Lindblom and Tegnér, and Terenius showed that the concentration of these morphine-like substances in the cerebrospinal fluid (CSF) changes according to the kind of pain, whether psychological or organic. These observations are based on two lines of investigation. On the one hand, pharmacological studies with naloxone and other inhibitors of morphine-like substances indirectly demonstrate the presence and analgesic action of such endogenous substances. On the other hand, endorphins have been found and measured in the CSF of patients suffering from pain before and after adequate treatment.

To determine if endorphins play a role in the pathogenesis of idiopathic neuralgia, and if this kind of neuralgia might be connected with an altered (lowered) endorphin content in the CSF, we measured the CSF endorphin content in patients with pharmacologically treated trigeminal neuralgia and in another group not treated pharmacologically. The CSF endorphin values were further compared in the same patients with the values obtained after Gasserian ganglion thermocoagulation and complete remission of pain. In addition, these endorphin values were compared with those of a group of subjects who had no pain problem.

Clinical Material and Methods

Ten patients with idiopathic trigeminal neuralgia were studied. Their ages ranged from 35 to 55 years (mean 46 years). Five were men and five women. Four patients complained of both second and third division neuralgia, three of second, and three of third division neuralgia. In six, a typical trigger zone was present. All of these patients had previously been treated with carbamazepine.

All 10 patients underwent surgical treatment with thermocoagulation of the Gasserian ganglion. In five cases, surgical treatment was undertaken because drug therapy had become ineffective with time. At the time of operation, the patients had not received medication for at least 1 week and were still suffering pain crises. In the other five cases, surgery was decided upon because a continuous dose of 600 mg/day of carbamazepine to control pain was resulting in blood dyscrasia. Until the time of operation, these latter five
patients were under pharmacological treatment and were relieved of pain.

In these 10 patients, 2 to 3 ml of CSF was withdrawn by lumbar puncture and 2 hours before thermocoagulation. A lumbar puncture was performed 48 hours after surgery, at which time pain was completely absent in all patients and no medical treatment was administered. Along with the evaluation of endorphin content, routine cytochemical analysis of CSF was performed, both before and after the thermocoagulation. There were normal findings in all patients.

A control group consisted of seven patients who had no pain problems, but were being treated with lumbar drainage for CSF fistulas. There were four men and three women, whose ages ranged from 31 to 58 years (mean 43 years). Routine CSF cytochemical examination was normal in these patients as well.

The technique of evaluation of CSF endorphin content was that described by Rossier, et al., with minor modifications. The endorphin fraction was extracted by heating the specimen for 10 minutes at 100°C, then lyophilization, producing fivefold concentration. We used a radioimmunoassay which is highly specific for Leu14-His27 segment of β-endorphin. Since β-endorphin is the C-terminal 31 amino acid fragment of β-lipotropin, radioimmunoassay detects both β-endorphin and β-lipotropin content in every sample. However, column chromatography separates the two molecules, and the CSF value of β-endorphin could be obtained.

Results

The mean CSF endorphin content for the seven cases in the control group was 332.85 ± 109.97 (SD) pg/ml and for the patients with trigeminal neuralgia before operation it was 382.30 ± 78.83 pg/ml. There was no statistically significant difference between the two groups (p = 0.74).

The level of CSF endorphins in trigeminal neuralgia patients was unchanged after pharmacological and surgical treatment. Before thermocoagulation of the Gasserian ganglion, mean CSF endorphin values were 389.4 ± 76.74 pg/ml with carbamazepine and 376.1 ± 89.12 pg/ml without the drug. After thermocoagulation, mean values were 381.1 ± 71.38 pg/ml with carbamazepine and 401.3 ± 72.57 without. These data were submitted to an analysis of variance according to a two-factor mixed design, in which pharmacological treatment (with or without carbamazepine) was the between factor, and time of CSF subtraction (before and after surgery) the within factor. Both treatment (F = 0.01) and time (F = 0.18) factors did not show significant differences, and neither did the interaction (F = 0.61).

Discussion

In our patients with trigeminal neuralgia, the CSF endorphin content was not different from that of normal patients without pain. This rules out the existence of a basic generalized defect in CSF endorphins in trigeminal neuralgia patients that could make them sensitive to pain.

These findings, however, do not exclude the possibility that a localized decrease of endorphin content may occur in the Gasserian ganglion or in the surrounding CSF. Experimental reports have shown a variable topographical distribution of morphine-like substances in the central nervous system, with a significantly higher concentration in the trigeminal system.

Pharmacological and surgical treatment of trigeminal neuralgia did not modify the CSF level of endorphins, which would exclude the likelihood of the therapeutic effect being mediated by an endorphinergic mechanism.

In conclusion, on the basis of our findings, we cannot suggest any direct pathogenetic relationship between trigeminal neuralgia and endorphins.

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