Epidural Local Anesthetic Plus Corticosteroid for the Treatment of Cervical Brachial Radicular Pain: Single Injection Versus Continuous Infusion

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Background: Efficacy of epidural local anesthetics plus steroids for the treatment of cervicobrachial pain is uncertain.

Methods: A prospective study randomized 160 patients with cervicobrachial pain resistant to conventional therapy. Patients were divided into 4 groups on the basis of the time between pain onset and treatment initiation: group A, 40 patients with pain onset 15 to 30 days; group B, 40 patients with pain from 31 to 60 days; group C, 40 patients, 61 to 180 days; and group D, 40 patients with pain > 180 days. Patients of each group were randomized to receive an epidural block with bupivacaine and methylprednisolone at intervals of 4 to 5 days (Single injection) or continuous epidural bupivacaine every 6, 12, or 24 hours plus methylprednisolone every 4 to 5 days (Continuos epidural). The maximum duration of treatment (9 blocks in Single injection, and 30 days in Continuos epidural) was dependent on achieving Pain Control (PC) ≥ 80%. [PC is defined by this formula: (100) (VASinitial − VASfinal)/VASinitial]. Follow-up at 1 month and 6 months compared PC and the number of pain-free hours of sleep.

Results: One hundred forty-one patients completed the study. The 4 groups had similar characteristics. At the 1-month and 6-month follow-up analysis based on the time between pain onset and treatment initiation showed that patients of group D, who received the Continuous epidural treatment, had significantly greater PC and significantly more pain-free hours of sleep compared with similar patients in Single injection.

Conclusions: Therapy with continuous epidural local anesthetic and methylprednisolone provides better control of chronic cervicobrachial pain compared with Single injection. These results are discussed with respect to the possible mechanism of action of the drugs and may relate to the physiopathologic mechanisms associated with neuronal plasticity that result in chronic pain.

Key Words: cervicobrachial pain, chronic pain, epidural local anesthetic, epidural corticosteroid


Cervicobrachial pain (radicular pain) is characterized by an acute or chronic pain in the area of the last 4 cervical nerves and the first thoracic nerve. It is a common condition with an annual prevalence of 53.6% (41% in male, 59% in females) and about 15% of these patients have moderate to severe pain.

The most common causes of cervicobrachial pain are cervical spondylolisthesis, herniation of the nucleus pulposus, neuropathy of the brachial plexus, trauma of the neck and shoulder with stretching of the nerve roots, and peripheral neuropathy by compression or trauma. Spinal abnormalities in patients with cervicobrachial pain can often be observed using imaging techniques.

Cervicobrachial pain has been described as constant or intermittent and sharp or burning, with an onset that can be either spontaneous or caused by movement. When the pain is accompanied by sensory or motor symptoms, it is better defined as cervical radiculopathy. However, on the basis of literature, the direct treatment of radicular pain with or without motor and sensory symptoms is the same.

The intensity of pain in cervicobrachial syndrome can reach severe or very severe levels, with symptomatic relief being the primary goal of physical therapies (cervical collar, kinesiotherapy, local heat application, vertebral manipulation) and pharmacologic treatment (nonsteroidal anti-inflammatory drugs, tramadol, systemic corticosteroids, anxioytics, muscle relaxants, and opioids). Equivocal efficacy has been found with transcutaneous electrical stimulation, infiltration of trigger points with local anesthetics and acupuncture.

Variable efficacy has been demonstrated with physical treatments, and although pharmacologic treatment would appear to be a rational choice, it is not considered first-line, especially for chronic pain, because of the possible
long-term side effects of some of the drugs. On the basis of positive results in lower back pain and cervical syndromes, the use of epidural corticosteroids, with or without local anesthesia, has been reported. Most studies agree that epidural corticosteroids provide a certain level of efficacy in the treatment of cervical syndromes and back pain. The observed efficacy of corticosteroids for these syndromes has been suggested to relate to their antiedema effect and anti-inflammatory and immunosuppressive actions in addition to the probable inhibition of neurotransmission within C-fibers. On the contrary, the efficacy of the epidural local anesthetics is still unclear.

A review suggests that in some studies local anesthetic by the epidural route was used without a rationale, whereas in other studies, it was used to determine the correct spinal level for epidural steroid injection or as a diluent for corticosteroids to increase injection volume based on the hypothesis that volume may facilitate rupture of possible adherence between the spinal root and nearby structures. However, local anesthetic has also been used to obtain immediate short-term symptomatic relief without determining efficacy for the treatment of chronic pain. Few are the studies that report the use of local anesthetic through continuous infusion (continuous epidural local anesthetic) and even in those studies the local anesthetic is not considered as a “curative” drug, but is merely used as a symptomatic, effective during the short periods of the infusion. In cervicobrachial syndromes, as in other pathologies, repeated and intense stimulation causes functional and structural modifications of the central nervous system that result in the neuronal plasticity which seems to be the basis for onset of chronic pain. The local anesthetic attenuates the processes affecting neuronal plasticity through a reduction of the peripheral nociceptive afferents of the central neurons.

On the basis of the above, it is likely that the use of epidural local anesthetic could have a more relevant and specific role than what has been hypothesized. The purpose of this study, therefore, was to evaluate the efficacy in the cervicobrachial pain, with or without sensory and motor symptoms, resistant to conventional therapy by continuous epidural local anesthetic in combination with a steroid bolus, compared with a single injection of the same drugs based on the time between pain onset and treatment initiation.

**MATERIALS AND METHODS**

A prospective randomized study was conducted at 4 university medical centers in 160 patients affected with cervicobrachial pain resistant to conventional therapy. The ethics committee of each institution approved the study protocol and informed written consent was obtained from each patient.

**Inclusion Criteria**

- Diagnosis of unilateral cervicobrachial pain (acute or chronic pain in the area of the last 4 cervical nerves and the first thoracic nerve) with or without sensory and motor symptoms (muscle weakness, paresthesia, and sensory loss) in the same distribution of pain with a clinical and historical evaluation.
- Visual analog scale score (VAS) ≥ 6 on a 10-cm VAS for at least 15 days, resistant to conventional therapy (pharmacologic or physical approaches).
- Instrumental analysis: computed tomography or and magnetic resonance imaging with evidence of herniation of the nucleus pulposus or cervical spondylosis (hypertrophy of zygapophyseal joint, hypertrophy of uncovertebral joint, foraminal encroachment) compatible with the pain. Electromyography was not required, but it was evaluated when brought by the patient.

**Exclusion Criteria**

- History of the peptic ulcers, diabetes, serious and diffuse osteoporosis, alterations in blood clotting tests, cervical spine surgery, neoplastic pathology, and traumas in the last 15 days.
- Allergy to local anesthetics or corticosteroids.
- Instrumental analysis: computed tomography and magnetic resonance imaging compatible with myelopathy, neoplastic pathology, infection, anatomic alterations of the cervical or thoracic spine.
- Cervical-root compression (visualized on imaging) in presence of functionally motor deficit, then liable of surgical intervention.

None of our patients had surgical interventions in the period of follow-up. At the baseline, the number of hours of pain-free sleep (PFS) was recorded in all the patients.

**Duration of treatment in this study was conditional on the efficacy of the treatment itself and was evaluated by repeated measurements using the VAS score to provide an index of Pain Control (PC) that was calculated according to the following formula: PC (%) = (100) (VAS_initial − VAS_final)/VAS_initial.**

The enrolled 160 patients were divided in 4 groups (40 patients per group) on the basis of the time pain onset: group A, 40 patients with pain onset 15 to 30 days; group B, 40 patients with pain from 31 to 60 days; group C, 40 patients with pain from 61 to 180 days; and group D, 40 patients with pain > 180 days. Patients of each group were randomized based on received therapy: 20 with Single injection and 20 with Continuous epidural.

**Single Injection**

Patients on this group were administered a series of epidural blocks every 4 to 5 days using the hanging drop technique via a Tuohy needle (16 to 18 G) introduced at the level of the C6-C7, or C7-T1, or T1-T2 intervertebral space. The first block consisted of 0.25% bupivacaine.
with epinephrine (1:200,000) in a volume of 6 mL with 80 mg methylprednisolone acetate. The second block, after 4 to 5 days, was done with 6 mL of bupivacaine (0.25% with epinephrine 1:200,000) with 40 mg methylprednisolone acetate, and the third block, with the same drugs, followed after other 4 to 5 days. The protocol allowed VAS evaluation 24 to 36 hours starting from the third block. Treatment was suspended upon reaching a PC ≥ 80% for more than 24 to 36 hours. If this PC value was not reached, the treatment was continued upon reaching a PC ≥ 80% but not over 9 blocks (intervals among the blocks was every 4 to 5 d always). VAS evaluation was carried out 24 to 36 hours after each block.

**Continuous Epidural**

Patients in the continuous epidural group received placement of an epidural catheter using the hanging drop technique via a Tuohy needle (16 to 18 G) introduced at the level of the C6-C7, or C7-T1, or T1-T2 intervertebral space, inserted upwards for approximately 3 to 5 cm and connected with an antibacterial filter. Positioning was verified by direct fluoroscopy and with a lidocaine test.

Bupivacaine (0.25% with epinephrine 1:200,000) in a volume of 6 mL combined with 80 mg methylprednisolone acetate was administered through the catheter. After a period of 12 to 24 hours, bupivacaine (0.25%) in a volume of 6 mL was administered every 6, 12, or 24 hours with the timing dependent upon ensuring pain-free periods of 24 hours. Methylprednisolone (40 mg) was administered every 4 to 5 days via the catheter. After a 24 to 36 hours interval after the first 10 days of administration (during which the catheter was left in place), a VAS evaluation was performed. Treatment was suspended upon reaching a PC ≥ 80% for more than 24 to 36 hours, but if pain persisted, the cycle of treatment was repeated, with a total allowed treatment period of 30 days (during which the catheter was left in place). These treatment cycles lasted 4 to 5 days and at the end of each cycle the PC was evaluated after 24 to 36 hours. One week after the end of treatments, the level of PC was reevaluated in all patients.

As PFS may contribute to patient quality of life, the difference in the number of hours of PFS pretreatment versus posttreatment was compared as a secondary end point. The patients maintained a daily sleep diary. At the 1-month and 6-month follow-ups, the difference between the 2 therapies in terms of PC and hours of PFS was researched in the 4 groups of patients, to verify the efficacy (Single injection vs. Continuous epidural) based on the time between pain onset and treatment initiation.

In each university medical center, 1 operator administered the blocks, placed the catheter, and arranged drugs supply. A second operator performed the evaluation. To demonstrate an increase of PC of 10% by means of the continuous infusion treatment, with respect to the single injection one, a 20 patients size was calculated for each group.

In the 4 categories of enrolled patients (15 to 30, 31 to 60, 61 to 180, and more than 180 d onset time of pain), the 2 treatment groups (single injection and continuous group) were compared in terms of initial VAS, posttreatment VAS, PC, initial hours of PFS, posttreatment hours of PFS, age and length of pain by means of unpaired Student t test. Sex distribution was compared by means of χ² test. To confirm the persistence, after 6 months, of the PC obtained at 1-month follow-up, a paired t test was performed. The same tests were used to compare the same parameters in the 2 groups, including all patients treated by single injection and continuous infusion, respectively.

### RESULTS

Of the 160 enrolled patients, 19 were excluded: 4 from group A (3 in Single injection, 1 in Continuous epidural); 4 from group B (2 in Single injection, 2 in Continuous epidural); 5 from group C (3 in Single injection, 2 in Continuous epidural); and 6 from group D (3 in Single injection, 3 in Continuous epidural) for the following reasons: 2 for difficulties in epidural technique, 4 for dislocation of the catheter during the first 10 days of treatment, 6 withdrawals (3 voluntary, 3 owing to onset of hypotension, and profuse sweating probably because of the epidural administration of the drugs), and 7 were lost to follow-up after 6 months. None of the patients had complications or collateral effects beyond the above. The groups were similar in age, sex, VAS scores, and hours of PFS (Table 1).

### TABLE 1. Characteristics of Enrolled Groups

| Group A | | Group B | | Group C | | Group D |
|---------|---------|---------|---------|---------|---------|
| **Age** | 62.75 ± 7.19 | 65.35 ± 6.74 | 64.65 ± 7.08 | 64.9 ± 5.03 | 63.6 ± 6.57 | 63.9 ± 7.51 | 65.25 ± 6.47 | 65.25 ± 6.58 |
| **VAS** | 7.98 ± 1.19 | 8.39 ± 1.12 | 8.09 ± 1.17 | 8.09 ± 1.09 | 8.05 ± 1.04 | 7.94 ± 1.13 | 7.95 ± 1.15 | 8.11 ± 1.29 |
| **Sleep** | 2.77 ± 1.01 | 2.5 ± 1.08 | 2.87 ± 0.88 | 2.95 ± 1.45 | 2.9 ± 0.91 | 2.85 ± 1.12 | 2.75 ± 1.24 | 2.5 ± 1.41 |
| **Onset** | 18.7 ± 4.66 | 18 ± 3.21 | 48.3 ± 7.7 | 46.95 ± 8.31 | 113.8 ± 33.65 | 115.65 ± 33.35 | 304.25 ± 180.3 | 320.3 ± 151.43 |
| **Sex** | 12F, 8M | 12F, 8M | 12F, 8M | 11F, 9M | 11F, 9M | 10F, 10M | 9F, 11M | 12F, 8M |

**Age:** mean ± SD; VAS before treatment, mean ± SD.

**F** indicates female; **M**, male; onset, time (d) between pain onset and initiation of therapy, mean ± SD; sleep, hours of PFS before treatment, mean ± SD.

No statistically significant differences were registered within the groups among patients exposed to the 2 therapies.
All patients in both groups had PC ≥ 80% at 1 week after the end of treatment.

The duration of the 2 therapies increased with the increase in pain chronicity. Patients in Single injection: group A required a median of 4 blocks, range 3 to 7; group B, a median of 5 blocks, range 3 to 9; group C, a median of 6 blocks, range 5 to 9; and group D, a median of 7 blocks, range 5 to 9. Patients in Continuous epidural: group A average duration of continuous epidural 13.84 ± 4.33 days, group B epidural for 16.94 ± 5.67 days, group C epidural for 22.83 ± 4.82 days, and group D epidural for 24.23 ± 4.64 days.

At the 1-month and 6-month follow-ups, no significant differences were registered between Single injection and Continuous epidural in patients of group A, B, or C in terms of PC and pain-free hours (Tables 2, 3). On the other hand in group D, at the 1-month and 6-month follow-ups, patients in the continuous epidural treatment had PC and a number of pain-free hours statistically greater than patients treated with single injection treatment.

Indeed at the 1-month follow-up, the PC in patients in continuous epidural and in single injection were 75.34 ± 15.21 versus 58.97 ± 20.68, respectively (P = 0.0065) (Table 2). The results were confirmed at the 6-month follow-up (73.71 ± 16.03 vs. 58.49 ± 22.97, P = 0.016) (Table 2). Similarly, also the number of hours of PFS, at the 1-month and 6-month follow-ups, was statistically greater in patients treated with Continuous epidural than in those in Single injection (1-mo follow-up, 3.02 ± 1.35 vs. 1.70 ± 1.07, P = 0.0007; 6-mo follow-up, 3.05 ± 1.35 vs. 1.55 ± 1.11, P = 0.0017) (Table 3).

**DISCUSSION**

The results of this randomized study show a statistically significant efficacy of the treatment of cervicobrachial pain with epidural local anesthetic plus corticosteroids in continuous infusion rather than in single injection, in patients with chronic pain who did not respond to conservative therapies (patients with pain > 180 d).

There seem to be no statistically significant differences between the 2 treatments in patients with pain < 180 days. In fact, group analysis based on pain chronicity (ie, the time interval between pain onset and initiation of therapy) demonstrated a significant benefit (PC and number of hours of PFS) of continuous infusion compared with single injection in those patients with an interval > 180 days (group D) between pain onset and treatment initiation. On the contrary, no differences were registered between the 2 therapies within groups A, B, and C (Tables 2, 3).

These data suggest that continuous epidural local anesthetic plus corticosteroid has greater efficacy than a single injection of these drugs for the treatment of chronic cervicobrachial pain (ie, pain lasting > 6 mo).

**TABLE 2.** Comparison of Single Injection Treatment of Bupivacaine Plus Methylprednisolone Versus Continuous Bupivacaine Plus Methylprednisolone on PC in the Group Analysis Based on Duration of Time Between Pain Onset and Initiation of Therapy, at the 1-month and 6-month Follow-ups

<table>
<thead>
<tr>
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<th>A (No. Patients)</th>
<th>B (No. Patients)</th>
<th>C (No. Patients)</th>
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<tr>
<td>PC (%) at the 1-mo follow-up</td>
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<td>Single injection</td>
<td>86.48 ± 10.92 (17)</td>
<td>87.06 ± 12.81 (18)</td>
<td>72.68 ± 12.78 (17)</td>
<td>58.97 ± 20.68* (17)</td>
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<td>Continuous</td>
<td>84.00 ± 11.54 (19)</td>
<td>82.49 ± 15.90 (18)</td>
<td>73.89 ± 16.11 (18)</td>
<td>75.34 ± 15.21 (17)</td>
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<td>PC (%) at the 6-mo follow-up</td>
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<tr>
<td>Single injection</td>
<td>86.44 ± 11.09 (17)</td>
<td>84.88 ± 16.07 (18)</td>
<td>70.84 ± 14.31 (17)</td>
<td>58.49 ± 22.97** (17)</td>
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<tr>
<td>Continuous</td>
<td>82.14 ± 13.89 (17)</td>
<td>82.78 ± 17.91 (18)</td>
<td>72.16 ± 15.69 (18)</td>
<td>73.71 ± 16.03 (17)</td>
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*P = 0.0065; **P = 0.016.
A, 15-30 d; B, 31-60 d; C, 61-180 d; D, > 180 d.

**TABLE 3.** Comparison of Single Injection Treatment of Bupivacaine Plus Methylprednisolone Versus Continuous Bupivacaine Plus Methylprednisolone on the Increase in Hours of PFS in a Group Analysis Based on Duration of Time Between Pain Onset and Initiation of Therapy, at the 1-month and 6-month Follow-ups

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<th>A (No. Patients)</th>
<th>B (No. Patients)</th>
<th>C (No. Patients)</th>
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<td>Increase in PFS (h) at the 1-mo follow-up</td>
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<td>Single injection</td>
<td>3.81 ± 1.12 (17)</td>
<td>3.63 ± 1.31 (18)</td>
<td>3.14 ± 1.19 (17)</td>
<td>1.70 ± 1.07* (17)</td>
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<tr>
<td>Continuous</td>
<td>3.92 ± 1.20 (19)</td>
<td>3.13 ± 1.98 (18)</td>
<td>2.80 ± 1.60 (18)</td>
<td>3.02 ± 1.35 (17)</td>
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<td>Increase in PFS (h) at the 6-mo follow-up</td>
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<tr>
<td>Single injection</td>
<td>3.85 ± 0.88 (17)</td>
<td>3.53 ± 1.31 (18)</td>
<td>3.08 ± 1.14 (17)</td>
<td>1.55 ± 1.11** (17)</td>
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<tr>
<td>Continuous</td>
<td>3.84 ± 1.25 (19)</td>
<td>3.11 ± 1.98 (18)</td>
<td>2.80 ± 1.35 (18)</td>
<td>3.05 ± 1.35 (17)</td>
</tr>
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Values are mean ± standard error.
*P = 0.0007; **P = 0.0017.
A, 0-30 d; B, 31-60 d; C, 61-180 d; D, > 180 d.
Consequently, these data also suggest that pain chronicity may be an important factor in the symptomatology of cervical brachial pain and also in the approach to its treatment.

Up to now, most of the literature that describes this pathology and its treatment does not distinguish between the acute phase and the chronic phase. Nevertheless, as with other forms of chronic painful pathologies, the mechanisms associated with chronic pain are often different from those present at the time of onset. Therefore, the results of this study suggest the necessity of considering acute versus chronic cervicobrachial pain with respect to pathologic mechanisms as a basis for approaches to treatment.

The similar efficacy in the 2 treatments for acute and subacute pain is in agreement with what has previously been shown. According to our data, however, in the chronic state, treatment with Continuous epidural local anesthetic plus corticosteroid seems to have a better effect than Single injection in the treatment. A rationale for this difference could be found in the physiopathologic mechanisms that form the basis for chronic pain.

It is well known that in the presence of noxious peripheral stimulation, excess nociception results in sensitization of the pain pathways at several neuronal levels. Excess release of neurotransmitters is considered responsible for complex central responses such as secondary hyperalgesia, windup, or dark neurons. The ultimate effect of these responses is gene regulation within the involved central neurons resulting in an increase in nociceptive sensitization of the nervous system and phenotypic changes considered part of neuronal plasticity. Such mechanisms of neuronal plasticity are similar to those that form the basis of chronic pain syndromes and neuropathic pain.

Our results could be explained by hypothesizing a direct efficacy of the local anesthetic on these mechanisms and by a synergism with corticosteroids.

Despite some contention over epidural steroids for the treatment of lower back pain and other radicular syndromes, their efficacy is generally accepted and their use has been shown to be common and consistent with suggested guidelines. The observed efficacy of these drugs is probably related to their multiple short-term effects including anti-inflammatory and immunosuppressive activity, and the probable inhibition of neurotransmission within C-fibers. In the present study, methylprednisolone seems to be effective in the treatment of acute and subacute pain (T1 to T3). However, corticosteroids are not generally used for chronic or neuropathic pain syndromes because they have low efficacy for these disease states. The lower symptomatic efficacy observed in the patients in group D treated with Single injection could potentially be due to somatization which often occurs in patients with chronic pain, and against which corticosteroids have low efficacy. Likewise, morphine, which is now considered a second line drug in the treatment of neuropathic pain, does not provide a significant advantage for treatment of the symptomatology of chronic cervical brachial pain.

In contrast, local anesthetic has been shown to be effective in the treatment of neuropathic pain including prevention of onset and treatment of phantom-limb syndrome and may be used as a first-line agent for these conditions. As previously stated, the fundamental difference between the 2 therapeutic protocols in this study has been the administration of the local anesthetic. Whereas the first group was administered the drugs once every 4 to 5 days for a series of blocks, the objective in the second group was to keep the patient pain-free for 24 hours, and for the entire course of treatment. This difference may have had an important effect on the chronic pain that would not seem to be sensitive to corticosteroids. Therefore, in the present study, the significant difference observed between Single injection and Continuous epidural for chronic pain (group D), may be attributed to an action similar to that of the local anesthetic in chronic or neuropathic pain pathologies.

On the basis of the local anesthetic properties, as already identified in the literature (suppression of nociceptive discharge, the block of the axonal transport, the block of the sympathetic reflex arc, the block of sensitization, anti-inflammatory effects), we think the following rationale for the mechanism of action of the local anesthetic in reducing chronic cervicobrachial pain can be proposed.

It is known that the temporary suppression of nociceptive discharge obtained with a nerve block by local anesthetic could normalize the state of hyperexcitability of the central neurons by resolving the symptoms of allodynia and hyperalgesia for a longer time than the nerve block itself. As a hypothesis, we could say that the continuous administration of local epidural anesthetic for a median period of 19 days, with complete remission of symptomatology for the full 24 hours, may have resulted in the prolonged suspension of nociceptive stimulation. Blockade of afferent fibers would reduce or eliminate the physiopathologic mechanisms that initiate and sustain the process of sensitization, that is, the depolarization of the afferent fibers. Consequently, there would also be a reduction in both the release of neurotransmitters and in the stimulation of gene expression that results in phenotypic changes within the central neurons.

It is also known that local anesthetic is also able to block the axonal transport of the nerve fibers with lower concentrations compared with those which are necessary for a block of nerve conduction. This ability of the local anesthetic may be responsible for 2 events. The first is a block of the transport toward the periphery of the newly synthesized neurotransmitters induced by the chronic pain stimulation, and the second is an interruption in the hormonal stimulation that contributes to the long-term phenotypic modification of the central neurons. In this regard, recent studies have attributed an important role to nerve growth factor in the creation of the persistent inflammatory pain.
as a peripheral trophic factor that would induce hyperalgesia.\(^{38-40}\)

Furthermore, an additive effect can occur by blocking both the afferent component of the sympathetic reflex arc\(^ {11,15}\) and the motor reflex that provides the basis for initiation of the trigger points. Moreover, the phenomenon of neuronal plasticity also occurs in the superior structures of the central nervous system in the presence of stimulation of adequate intensity with a consequence alteration of transmission of nociceptive information in the spinal-thalamic cortical circuit.\(^ {20,21}\) This interruption of the afferents could consequently turn back the process of sensitization in these structures.

Finally, the recent data showed the local anesthetics anti-inflammatory effects.\(^ {37}\) These anti-inflammatory effects could be an important side about the curative rule of local anesthetics. However, we reckon it should be pointed out that, even though in this study a comparison between Continuous epidural versus Single injection without dividing the groups on the basis of the time of pain onset was not planned, such a comparison could be important. On this point, at a later stage a comparison was made in terms of PC and hours of PFS, analyzing again the total of patients treated with Single injection versus the total of patients treated with Continuous epidural; that is to say without considering the time between pain onset and treatment initiation. In accordance what is reported in the literature,\(^ {2-4}\) in our study we have not noticed the differences of effectiveness of the treatments among patients with sensory-motor symptoms (radiculopathy) and those without (alone radicular pain) (data not shown). Even though it was not one of the “goals” of the study, later on we have compared the total of patients treated with Single injection and the total of patients in Continuous epidural.

The 2 groups were homogeneous as far as age, sex, VAS pretreatment, hours of PFS pretreatment, and time between pain onset and treatment initiation. At the end of the treatment, the total of patients in Single injection was 69, whereas in Continuous epidural was 72, the median number of blocks was 5 (range 3 to 9), and the mean duration of treatment in Continuous epidural was 19.31 ± 6.42 days. At the 1-month and 6-month follow-ups, no statistically significant differences were registered between the 2 therapies in terms of PC and number of pain-free hours (Table 4).

In conclusion, a review of data carried out at a later stage, comparing the 2 therapies without taking into account the time between pain onset and treatment initiation, did not produce statistically significant differences in terms of PC and number of hours of PFS. These data, even though it was obtained by a reexamination of data, would confirm the necessity to differentiate the patients in acute, subacute, and chronic pain in studies concerning pain. Indeed, in cervical brachial pain too, as in all pain syndromes, the efficacy of therapies has to be studied dividing the patients on the basis of the time between pain onset and treatment initiation in order not to obtain distorted results. In this case in fact, the efficacy and the hypothesis of functioning (which require further studies) of the continuous local anesthetic in patients with chronic pain, could lack a division between acute or subacute and chronic pain. Therefore, at the present stage, considering the knowledge we have at the physiopathologic level of pain onset and of chronic pain, we can start to consider the local anesthetic no longer as the “temporary palliative” but rather as the “drug of choice.”

In conclusion, although the follow-up of this study was limited to 6 months, the data seem to suggest that treatment via catheterization for continuous corticosteroids plus local anesthetic for a long period of time seems to be effective in patients with intense, painful symptomatology, especially chronic pain, based on its potential effects on physiopathologic mechanisms that provide the basis of the chronic pain.

The lack of blinding may be caused by an approach of this study. In fact the patients in Continuous epidural had more meetings with the physician, and this greater habitual visiting with the physician might have been perceived as a more intensive treatment, as a greater and more effective interest on his part, thus reflecting on the perception of pain. However, by observing the results, this assumption seems to be confirmed only in patients with chronic pain.

The most important implication of corticosteroids therapy are the side effects such as suppression of the hypothalamic-pituitary axis, immunosuppression, or gastrointestinal damage.\(^ {8}\) At the end of the study, the average dosage was 320 mg over 30 days, the overall dosages we used were anyway within the ranges described in literature\(^ {12,41-43}\); none of our patients showed side effects connected to the corticosteroid use. On the basis of our results and of the literature, we think that this dosage is safe.

The safety of cervical epidural treatment is now widely demonstrated,\(^ {4,13,14,18}\), but we reckon that the placement of the epidural catheter (paying attention to the sterility and the coagulative state of the patient) in the presence of acute or chronic pain and predictable lengthening of recovery, could be preferred to a single injection. This would also reduce the risk of error.
REFERENCES


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