Pharmacological Reports 68 (2016) 1069–1075

Contents lists available at ScienceDirect

Pharmacological Reports

journal homepage: www.elsevier.com/locate/pharep

Original article

Intravenous lidocaine infusions in a multidirectional model of treatment of neuropathic pain patients

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ARTICLE INFO

Article history:
Received 9 May 2016
Received in revised form 10 June 2016
Accepted 13 June 2016
Available online xxx

Keywords:
Neuropathic pain
Pharmacotherapy
Intravenous lidocaine
Adverse effects

ABSTRACT

Background: Neuropathic pain, is caused by damage or disease affecting the somatosensory nervous system, leads to deterioration of the quality of life of patients. Most commonly, this deterioration is due to the inefficacy of treatment or to the adverse effects of systemic treatment. Pharmacotherapy of neuropathic pain involves the use of antiepileptic agents, antidepressants, and opioids that may lead to numerous adverse effects, particularly in elderly patients. Intravenous infusions of lidocaine may improve the efficacy of the analgesic treatment of neuropathic pain patients while not causing any significant adverse effects.

Methods: In our study, we carried out a retrospective analysis of 85 patients with various neuropathic pain syndromes. In this group, 81 patients received 3–25 intravenous infusions of lidocaine (5 mg/kg of body weight over 30 min). In the remaining 4 patients, the treatment was discontinued after the first infusion due to the lack of efficacy.

Results: The analgesic effect of intravenous lidocaine was better when the intensity of pain experienced before the infusion was high. In addition, better effects were observed in elderly patients. No need to interrupt the infusion occurred in any of the patients. No serious adverse effects were observed either. Transient dizziness, not requiring additional treatment, occurred in 5 patients after the infusion.

Conclusions: The best therapeutic effects of lidocaine infusion was observed in pain symptoms characterized by the highest intensity of baseline pain. Intravenous lidocaine administered at the dose of 5 mg/kg of body weight over 30 min is effective, safe and caused no significant adverse effects.

Introduction

Neuropathic pain is a cause of significant deterioration of the quality of life in the affected patients. Although the mechanisms of origin of neuropathic pain are known, and although numerous pharmacotherapeutic algorithms were established to provide help in the treatment, therapeutic effects are achieved in as little as 30–40% of patients [1,2]. The efficacy of the proposed pharmacotherapy of neuropathic pain cannot be predicted; in addition, the commonly used drugs (antiepileptic drugs, antidepressants, opioids) may lead to adverse effects that are not accepted by patients and the adjustment of effective doses is not always successful [1,2].

Intravenous local anesthetics infusions used in the treatment of refractory neuropathic pain was introduced in the 1950s [3]. Further studies and meta-analyses confirmed the efficacy of lidocaine infusions in various neuropathic pain syndromes [4–6]. Although the efficacy of this treatment was demonstrated in patients with spinal cord injury pain, central pain syndrome, diabetic neuropathy, postherpetic neuralgia, trigeminal neuralgia, or complex regional pain syndrome, little information can be found regarding the efficacy of this treatment in chemo-induced peripheral neuropathy or persistent post-operative pain. Although studies on the use of lidocaine in the treatment of acute post-operative pain are available, their results are not unambiguous [7]. In our study, we examined different neuropathic pain syndromes: those with well-documented research being available as well as

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http://dx.doi.org/10.1016/j.pharep.2016.06.010
1734-1140X/

persistent post-operative pain or chemo-induced peripheral neuropathy which had not been analyzed in terms of the applicability of lidocaine treatment. Intravenous lidocaine may be a useful supplementation of systemic pharmacotherapy. In addition, patients with well-controlled neuropathic pain may experience exacerbated pain periods [2]. In these cases, intravenous lidocaine may reduce pain without the need to increase the dose of systemic treatment. Intravenous lidocaine infusions may also improve the quality of life and reduce symptoms in patients with treatment-refractory neuropathic pain [8].

The objective of our study was to perform a retrospective analysis of the efficacy and safety of intravenous lidocaine infusions in patients of the Pain Treatment Clinic of the University Hospital in Kraków, who had been diagnosed with one of the neuropathic pain syndromes. The proposed intravenous infusions comprised an element of multidirectional treatment in patients previously treated according to the principles of management of this type of pain being currently in force [1,2,6]. Detailed analysis was carried out with regard to the correlation between the intensity or duration of pain and the efficacy of the treatment. Our goal was to determine what was the percentage of patients with various neuropathic pain syndrome who could experience relief in their pain, to estimate the scale of this relief, and to identify pain syndromes in which intravenous infusions would bring about best results. The group in which this treatment was proposed as an element of multidirectional treatment consisted of patients whose earlier treatment to date was not satisfactory, patients who experienced adverse effects they found unacceptable, and patients whose pain was well-controlled yet who experienced periodic exacerbation of symptoms; lidocaine was administered as an alternative to an increase in the dosage of the systemic medications.

Patients and method

The retrospective study was conducted in 85 patients with different neuropathic pain syndromes subjected to intravenous lidocaine infusions in the Pain Treatment Clinic of the University Hospital in Kraków between January and November 2015. Detailed analysis was carried out in a population of 81 patients who received 3–25 infusions. In 4 patients, treatment was discontinued after the first infusion due to the lack of therapeutic effect and to the further treatment being considered unacceptable by the patients. Patients were selected according to literature data on the efficacy of this type of treatment; in addition, included in the study group were patients in whom the infusions could prove efficient as judged from their diagnosis [2,6,8,9]. Infusions were administered to patients suffering from the following disorders: trigeminal neuralgia (18), chemo-induced peripheral neuropathy (6), post-herpetic neuralgia (16), diabetic neuropathy (7), persistent post-operative pain (21), and other pain syndromes, including phantom pains, mononeuropathies, compression neuropathies, central pain syndrome, complex regional pain syndrome and facial neuropathy (17). A total of 814 infusions were delivered to 85 patients.

Infusions were delivered to patients who met the following criteria:

- Age between 18 and 90 years.
- Diagnosed with neuropathic pain syndrome according with the International Association for the Study of Pain (IASP) criteria.
- No contraindications for intravenous infusions of lidocaine.
- Previously subjected to other treatment in line with current recommendations.
- No serious systemic diseases restricting the applicability of treatment.

No lidocaine infusions were delivered in cases of:

- History of cardiac arrhythmias.
- Tachycardia as monitored prior to the planned infusion.
- Allergy to lidocaine.
- Lack of patients' consent.
- Previous treatment not in line with the recommendations.

Before each intravenous infusion, the intensity of pain was assessed in each patient using the numerical rating scale (NRS). Prior to each infusion, cardiac monitor was connected to assess patient's heart function. Cardiac function monitoring was continued throughout the infusion until patient's verticalization after treatment completion. Patients remained at the center for 1-h supervision after the infusion. Each patient received intravenous infusions of lidocaine at the dose of 5 mg/kg over 30 min once a week. Treatment was delivered as single infusions, and subsequent infusions were proposed if improvement in pain symptoms as assessed using the NRS was achieved. During the infusion, patients remained in supine position under supervision of a qualified nurse able to assess potential adverse effects and capable of immediately interrupting the infusions should such effects occur. The physician who ordered the infusion was available at nurse's call throughout the infusion. In the observation period, 3–25 infusions were delivered to each of the 81 in the study groups.

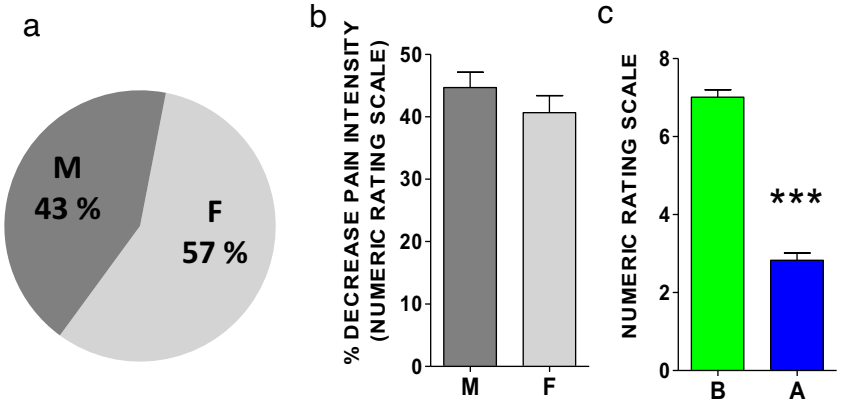

Fig. 1. The (a) percentages of males and females included in the observation; (b) percentage relief in pain symptoms as assessed by the numerical rating scale in males and females; (c) reduction of pain symptoms as assessed by numerical rating scale (0–10) before and after the infusion for the entire study population. The data are presented as means ± SEM. Significance was defined using Student's *t*-tests as $^{***}p < 0.001$ (c). *Abbreviations:* males (M), females (F), before (B) and after (A).