A double-masked evaluation of lignocaine-prilocaine cream used to alleviate the pain on peribulbar injection

Estudo duplo-mascarado do uso do creme de lignocaína-prilocaína no alívio da dor na injeção peribulbar

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SUMMARY

Purpose: **A randomized double-masked study was carried out on 64 patients, scheduled for cataract surgery, in order to assess the efficacy of a topical anesthetic, in alleviating the pain on peribulbar injection.**

Methods: **The patients were divided into two groups. Group I - 36 patients were treated with the lignocaine-prilocaine cream. Group II - 27 patients treated with a placebo cream with the same physical characteristics. Both groups remained with the cream 60 minutes before receiving the peribulbar injection. Pain was assessed objectively by the anesthesiologist, who observed the reaction of the patient when inserting the needle and the anesthesia. The pain was also analyzed subjectively by the patient with a international pain scale.**

Results: **Significantly lower pain scores were recorded, both subjectively and objectively, in Group I patients. None of the patients experienced any side effects during the study, due to the use of the cream.**

Conclusion: **These results support the efficacy and relative safety of lignocaine-prilocaine cream used to alleviate the pain during peribulbar injection.**

Keywords: EMLA; Lignocaine; Prilocaine; Pain; Anesthesia.

INTRODUCTION

Cataract surgery is now increasingly performed in the outpatient clinic setting. For this reason local anesthesia is often preferred, using either a peribulbar or retrobulbar technique, together with facial nerve block, or even eyedrops. The injection of anesthesics causes pain, which increases the anxiety and discomfort to the patient and could complicate the surgical procedure.

The lignocaine-prilocaine cream, when applied to the intact skin for 60 minutes, diminishes the sensitivity of the skin to pain, and may act in the subcutaneous tissue and possibly even in deeper layers [1, 2]. This fact could be useful in reducing the pain of a venous puncture, spinal punctures, and the removal of cutaneous remnants. There are also reports of its use in palpebral surgery and before applying anesthesia in cataract surgery [3-5].

The purpose of this study is to evaluate the efficacy of pain reduction of the anaesthetic cream lignocaine-prilocaine cream to the palpebral skin before performing a peribulbar anaesthetic injection.

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PATIENTS AND METHODS

Patients were volunteers recruited from the Cataract Outpatient Clinic of the Department of Ophthalmology of the UNICAMP Medical School. Patients had to be above 35 years of age, with a cataract surgery scheduled for the first eye (to be performed in the outpatient clinic setting, using local anesthesia). These patients were randomly divided into 2 groups, after having given their written consent. Patients with facial paralysis, ocular, palpebral surgery, facial hypoesthesia, diabetis mellitus, and those in chronic use of analgesics or anti-inflammatory drugs were excluded from this study.

Epidemiologic and personal data were collected from the two groups to establish comparisons. The data included information about systemic arterial hypertension, cardiopathy, chronic pulmonary obstruction, and the use of oral medication.

In patients of Group I (lignocaine-prilocaine - LP - cream) an approximately 0.5 cm thick layer of LP was applied to the skin at the palpebral region, where the peribulbar injection was to be performed. The cream remained in contact with the skin, under an occlusive dressing of Tegaderm® (3M) for 60 minutes.

In patients of Group II (placebo cream) the anesthetic cream was substituted for a vaseline cream. An approximately 0.5 cm thick layer of vaseline, with physical characteristics similar to the LP cream, was applied to the skin at the palpebral region, where the peribulbar injection was to be given. It remained in contact with the skin for 60 minutes under an occlusive dressing of Tegaderm® (3M).

After this time interval, peribulbar injection was performed in all patients following the same technique (standard of the Department of Ophthalmology, Medical School, UNICAMP). That technique basically consists of introducing a 25 x 7 needle into the lateral part of the inferior orbitary edge, and injecting 3 ml of a solution containing bupivacaine 0.5% (3 ml) without vasoconstrictors and Xylocaine 2% (7 ml) without vasoconstrictors. Afterwards a 3 ml of this same solution was injected with the same needle into the medial part of the superior orbital edge.

The nature of the cream applied was unknown both to the patient and to the anesthesiologist, as the tubes had identical labels and were marked by numbers for further identification.

The pain felt by the patient (subjective pain) was evaluated using the Numerical Rating Scale (NRS) - a scale marked from 0 to 10 degrees with the extremes of the scale marked the expressions "*no pain*" and "*maximum pain*" [6].

The objective pain, the reaction of the patient to the pain felt on introducing anesthetics, was evaluated by the anesthesist according to the following scale [6]:

Level 0 - no pain (patient does not show any pain)
Level 1 - slight pain (verbal complaint without pain reflexes)
Level 2 - moderate pain (verbal complaint + pain reflexes)
Level 3 - severe pain (intense verbal complaint + continuous pain reflexes)

The results obtained were analyzed statistically using the homocedasticity test (comparison of variances) and on an average of treatments.

RESULTS

Sixty-four patients participated in this study, 31 females and 33 males between the ages of 47 and 80 years (average 61.2 years). These characteristics did not differ statistically between two groups. There was a total of 37 patients in Group I (lignocaine-prilocaine cream) and 26 in Group II (placebo cream).

After using the homocedasticity hypothesis, it can be concluded with a 95% to 99% reliability that the variations of the samples were the same. The data are shown in Table 1.

On comparing the average scores of the groups, with a reliability rate of 95% to 99%, the scores obtained for subjective pain in Group I (lignocaine-prilocaine) before applying the peribulbar anesthesia were lower than for those who received the placebo (Group II), this difference was statistically significant (Figure 1).

The study of the objective pain also showed a significant statistical difference between the groups (Figure 2) with lower scores for the group that received the lignocaine-prilocaine cream.

Table 2 shows the average values and the standard deviation of the results obtained in Groups I and II during the study of subjective and objective pain.

DISCUSSION

The use of the lignocaine-prilocaine cream before applying the peribulbar injection showed that there was a significant

Table 1. Comparing the variance similarity between the lignocaine-prilocaine (EMLA®) Group and placebo Groups.

Hypothesis test	F calculated	F critical (5%)	F critical (1%)
Subjective pain	1.5859	1.79	2.29
Objective pain	1.2297	1.79	2.29

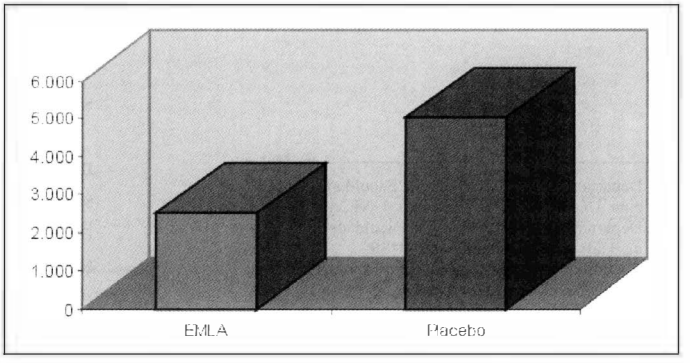

Fig. 1. Analysis of subjective pain in Group I (EMLA) and Group II (placebo). Numerical rating scale of pain

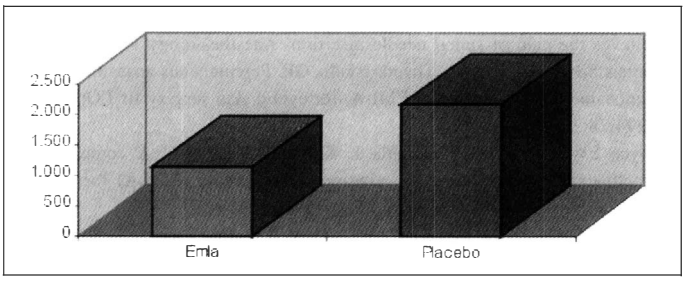

Fig. 2. Analysis of objective ain in Group I (EMLA) and Group II (placebo) - (see text for scale).

Table 2. Analysis of subjective and objective pain in Groups I and II (average values and standard deviation)

Evaluation of pain	Group I (EMLA®) AV ± SD	Group II (placebo) AV ± SD	
Subjective pain	2.514 ± 1.726	5.038 ± 1.371	p < 0.01
Objective pain	1.135 ± 0.976	2.154 ± 0.881	p < 0.01

AV: average values; SD: standard deviation

reduction in both the objective as well as the subjective pain felt by patients who underwent cataract surgeries.

These results agree with the study that showed that lignocaine-prilocaine cream was efficient in diminishing the patient's pain during lumbar punctures, superficial cutaneous procedures, arterial cannulations, being the first anesthetic combination capable of diminishing pain without causing irritation when applied to intact skin [5].

Pain is the result of a complex process involving neurological and psychological mechanisms. Therefore the evaluation of pain is a difficult problem to resolve. However, the use of specific instruments for the quantitative measurement of pain showed reliable clinical and scientific results [2]. According to some specialists there is not an objective unit or "gold standard" to evaluate clinical pain because of factors such as cultural variables, individual psychological attitudes, the perception of pain and the mode of expression could have an influence on the observer's description [2].

The collaboration of the patient is essential in local anaesthesia procedures and is directly related to the degree of confidence in the doctor and understanding what is being done, besides being influenced by pain.

Therefore patients who were given peribulbar anesthesia achieved relief of pain when measured both in a subjective as well as in an objective way. This shows that lignocaine-prilocaine cream when applied before peribulbar anesthesia could be a useful complement to infiltrative anesthesia.

It was concluded that diminishing the pain due to infiltration, helped simplify the surgical - anesthetic performance and in most cases also reduced the anxiety and discomfort of the patient, facilitating the surgical procedure.

The lignocaine-prilocaine cream at 5% (EMLA® - Astra Laboratories, São Paulo, Brazil) is made up of a mixture of lignocaine 25 mg/ml (107 mmol/l) and prilocaine 25mg/ml (113 mmol/l) and is able to act on intact skin to a depth of 0.5 cm if applied topically for more than 30 minutes.

The reduction of pain in the deeper structures can be explained by the following factors: a) the cutaneous blood flow which brings about a washing effect that spreads the anesthesia; b) the thickness of the dermis and epidermis that allows the cream to diffuse.

The insertion of the needle into the patient's skin stimulates 3 different kinds of neural activity: 1) activation of the pressure nerve terminals (Ruffini); 2) activation of the pilose follicle receptors of sensitive movements (pacinian corpuscles) located in the dermis and subcutaneous tissues; 3) direct activation of the innervated mechanoreceptors, which could occur due to the introduction of the needle.

Lignocaine blocks potential action in the small fibres. Pain arises directly from the nerve fibres deep in the dermis and is previously blocked by the superficial mechanoreceptors. The analgesic concentration in the skin is sufficient to block the larger nerve fibres and their mechanoreceptors [1].

As cataract surgeries are undertaken within shorter intervals, we expect that patients who have faced a surgery without feeling discomfort and pain in one eye may be more willing to face surgical treatment in the opposite eye. A controlled study and evaluation of these data are proposed.

CONCLUSIONS

The lignocaine-prilocaine cream when applied locally to the eyelid skin before peribulbar anesthesia showed a significant reduction of pain in patients who underwent cataract surgery when analyzed both subjectively and objectively.

RESUMO

Objetivo: *Um estudo duplo-mascarado, aleatório, foi realizado com 64 pacientes submetidos a cirurgia de catarata, a fim de verificar a eficácia de um anestésico tópico sobre a pele a fim de aliviar a dor da anestesia peribulbar.*

Métodos: *Os pacientes foram divididos em 2 grupos. Grupo I - 36 pacientes foram tratados com creme de lignocaina-prilocaína. Grupo II - 27 pacientes tratados com um placebo, com mesmas características físicas do creme de lignocaína-prilocaína. Ambos grupos permaneceram com o creme 60 minutos antes de receber aplicação de anestesia peribulbar. A dor foi estudada objetivamente por um anestesiologista, que observou a reação do paciente quando da inserção da agulha e do anestésico. A dor foi analisada subjetivamente pelo paciente por meio de uma escala internacional de dor padronizada.*

Resultados: *Dor significantemente menor foi observada tanto objetivamente, quanto subjetivamente no Grupo I de pacientes. Nenhum dos pacientes experimentou qualquer efeito colateral do uso do creme, durante o estudo.*

Conclusões: *Estes resultados corroboram a eficiência e relativa segurança do uso do creme de lignocaína-prilocaína no alívio da dor, durante a injeção peribulbar.*

Palavras-chave: *EMLA; Lignocaína; Prilocaína; Dor; Anestesia.*

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