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Klinik Çalışma

Usage of lidocaine-prilocaine cream in the treatment of postburn pain in pediatric patients

Çocuk hastalarda yanık sonrası ağrı tedavisinde lidokain-prilokain krem kullanımı

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BACKGROUND

Facial burns are quite common among children. Many different wound-covers can be used for dressing burn wounds, which is usually painful for the patients. These covers can also be combined with local anesthetic creams. Lidocaine-prilocaine cream 5% (LPC) is commonly used as a topical anesthetic by physicians performing plastic surgery. In the present study, we investigated the effects of topical LPC on pain cessation in pediatric patients with face burn and compared results with a control group in which LPC was not used in the wound dressing.

METHODS

Thirty pediatric patients (average age 11.3, range 8-15) among those who admitted to our emergency service and plastic surgery outpatient clinic between 2003 and 2006 were included in this study. The patient's burned areas ranged between 1 and 5% percent of their total body surface.

RESULTS

The need for analgesic medicine was recorded in the first, second and third 8-hour periods postburn in both groups, and pain level was evaluated at these time points using a verbal rating scale. There was a significant difference between the two groups with respect to values of the first and second 8-hour periods, while in the third 8-hour period, no significant difference was observed. We conclude that topical local anesthetics administered for 16 hours postburn significantly reduce the duration of pain after injury, which suggests a potential use in clinical practice in the treatment of children with face burn.

CONCLUSION

While LPC was found to have an ameliorating effect in the first 16 hours, we recommend oral analgesic co-therapy support since it loses its efficacy in the last 8-hour period.

Key Words: Burn in children; face burn; postburn pain; lidocaine-prilocaine cream.

AMAÇ

Çocuklarda yüz yanıkları oldukça sık gözükmektedir. Ağrı çeken hastaların yanık yaralarını kapatma amacı ile birçok yara kapama örtüleri kullanılabilir. Bu örtüler ağrıyı azaltma amacı ile lokal anastezikler ile kombine edilebilirler. Lidokain - prilokain krem (%5'lik) (LPC) plastik cerrahlar tarafından lokal anatezik olarak değişik amaçlarla kullanılmaktadır. Bu çalışmada, yüzü yanan çocuk hastalarda ağrının kesilmesinde topikal LPC etkilerini, LPC pansumanın kullanılmadığı bir kontrol grubuyla da karşılaştırarak araştırdık.

GEREÇ VE YÖNTEM

2003 ile 2006 yılları arasında acil servis ve plastik cerrahi polikliniğine başvuran 30 çocuk hasta (ortalama yaş 11,3; dağılım 8-15) çalışmaya dahil edildi. Hastaların yanık alanları toplam vücut yüzeyinin yüzde 1'i ile 5'i arasında değişmekteydi.

BULGULAR

Her iki grupta yanık sonrası ağrı kesici ilaç ihtiyacı birinci, ikinci ve üçüncü 8 saatlik sürelerle kaydedildi. Ağrı düzeyi bu zamanda sözel numaralandırma skalası kullanılarak değerlendirildi. Sonuçta ilk ve ikinci 8 saatlik dönemde LPC kullanmayan grup ile kullanan grup arasında anlamlı fark gözlendi. Üçüncü 8 saatlik dönemde ise anlamlı fark gözlenmedi. LPC'nin pansumanda kullanımı ile yaralanma sonrası ilk 16 saatte etkinliğinin güçlü olduğu ve daha sonra ağrı kesici ihtiyacının gerektiği ve klinik uygulamada çocukların yüz yanıklarında uygulanabileceği sonucuna varıldı.

SONUÇ

LPC ilk 16 saat içinde iyileştirmede etkili bulunmuştur. Son 8 saatlik süre içinde etkinliğini kaybettiğinde destek oral ağrı kesici tedavisini öneririz.

Anahtar Sözcükler: Çocuk yanıkları; yüz yanığı; yanık sonrası ağrı; lidokain-prilokain krem.

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Burn injury constitutes a serious type of tissue damage that activates inflammatory mechanisms, often causing pain, disfiguration or malfunction. Conventional management of partial-thickness burn wounds includes the use of paraffin gauze dressing, frequently with topical antibacterial creams. Lidocaine-prilocaine cream 5% (LPC) (25 mg of each in 1 g; Emla, Astra, Sweden) is a eutectic mixture of the local anesthetics lidocaine (25 mg/g) and prilocaine (25 mg/g) that provides dermal anesthesia/analgesia following topical application. The principal indication in which eutectic LPC has been studied is in the management of pain associated with venipuncture or intravenous cannulation.

In the present study, we investigated the effects of topical LPC on pain cessation in pediatric patients with face burn.

MATERIALS AND METHODS

This study was conducted under the supervision of Zonguldak Karaelmas University.

Thirty pediatric patients among those who admitted to our emergency service and plastic surgery outpatient clinic between 2003 and 2006 were included in this study. The average age was 11.3 years (range: 8-15). The patient's burned areas ranged between 1 and 5% percent of their total body surface (mean: 2.9% in experimental group and 2.6% in the control group), and burns varied between first to second degree. Patients with third-degree burns were not included in the study. Patients were randomly divided into two groups by the research staff (EK). In the control group, rifocin (Rifocin 125 mg/1.5 ml 1 ampul, Aventis, USA) gauze dressing with topical fucidin pomad (Fucidin 2%, 20 g pomad, Abdi Ibrahim, Turkey) was applied; no anesthesia was used in the control group. In the experimental group, in addition to the applications in the control group, we applied lidocaine-prilocaine cream 5% (LPC), which was mixed with the rifocin gauze dressing and topical fucidin pomad at the site of the dressing. The dressing was maintained at the test site for 24 hours. The selected patients were hospitalized for 24 hours. Serial blood samples were collected to measure lidocaine, prilocaine and methemoglobin (4th and 8th hours). Pain and need for analgesia of patients in test areas with LPC and without treatment was compared at 8 hours, 16 hours and 24 hours after application. Pain felt during administration of the anesthetic and in the group without anesthetic was assessed using a verbal rating scale. Additionally, a verbal numerical rating score of pain was made in the first, second and third 8-hour period after application of the burn dressing.[1]

Table 1. Analgesic need in the experimental group

No	Age	Sex	%	Degree	1st 8 hours	2nd 8 hours	3rd 8 hours
1	8	F	2	2	–	–	+
2	11	M	3	2	–	–	–
3	9	M	2	2	–	–	–
4	13	M	2	1	–	–	+
5	10	M	4	1-2	–	–	–
6	8	F	4	2	–	+	–
7	14	F	4	2	–	–	+
8	12	M	5	1	+	–	–
9	12	F	3	1	–	–	–
10	11	M	3	2	–	–	–
11	15	M	3	1-2	–	–	+
12	9	M	1	2	–	–	–
13	9	F	2	1	–	–	–
14	11	F	3	1	–	+	+
15	13	F	2	2	–	–	–

(–): No need for analgesic drug; (+): Need for analgesic drug; M: Male; F: Female.

The Verbal Rating Scale (VRS)

"How intensely do you perceive your actual pain?"

– No pain: 1

– Mild pain: 2

– Moderate pain: 3

– Severe pain: 4

– Worst possible pain: 5

Statistical Analysis

The two groups were compared at the first, second and third 8-hour periods. Mann-Whitney U test and Fisher exact chi-square test were used to evaluate the results. VRS results were in concordance with the need for oral analgesics. A significant difference was observed between the two groups according to the VRS evaluation and need for analgesics in the first and second 8-hour periods ($p<0.05$ for both). In the third 8-hour period, however, no significant difference was observed between the groups regarding evaluation of analgesic need and VRS results.

RESULTS

In the experimental group, only one patient needed analgesic support in the first 8-hour period; however, in the second 8-hour period, three patients, and in the third 8-hour period, five patients, needed analgesic support (Table 1). According to the VRS of patients in this group, one patient expressed moderate pain in the first 8-hour period, while two patients expressed moderate pain in the second 8-hour period. In the third 8-hour period, two patients expressed moderate pain, two patients expressed severe pain and two patients expressed worst possible pain (Table 2). In the control group, eight patients required analgesics in the first 8-hour period, seven patients in the second 8-hour period and six patients in the third 8-hour period (Table

Table 2. Verbal rating scale results in the experimental group

No	Age	Sex	%	Degree	1st 8 hours	2nd 8 hours	3rd 8 hours
1	8	F	2	2	1	1	3
2	11	M	3	2	1	1	3
3	9	M	2	2	1	1	1
4	13	M	2	1	1	1	4
5	10	M	4	1-2	1	1	1
6	8	F	4	2	1	3	1
7	14	F	4	2	1	1	4
8	12	M	5	1	3	1	1
9	12	F	3	1	1	1	1
10	11	M	3	2	1	1	1
11	15	M	3	1-2	1	1	5
12	9	M	1	2	1	1	1
13	9	F	2	1	1	1	1
14	11	F	3	1	1	3	5
15	13	F	2	2	1	1	1

No pain: 1; Mild pain: 2; Moderate pain: 3; Severe pain: 4; Worst possible pain: 5.

Table 3. Analgesic need in the control group

No	Age	Sex	%	Degree	1st 8 hours	2nd 8 hours	3rd 8 hours
1	9	M	3	2	+	–	+
2	9	M	3	1	–	+	–
3	11	M	2	1-2	–	+	+
4	14	F	3	1	+	–	–
5	8	M	3	2	–	–	+
6	15	M	3	2	+	+	–
7	12	F	2	1	–	+	–
8	10	M	5	1	+	–	+
9	12	M	1	2	–	–	–
10	14	M	1	1-2	+	+	–
11	11	F	2	2	+	–	+
12	8	M	2	1-2	+	–	–
13	12	F	4	2	–	+	+
14	10	M	2	2	–	–	–
15	12	M	3	1	+	+	–

(–): No need for analgesic drug; (+): Need for analgesic drug.

3). Regarding the VRS results, two patients expressed moderate pain, while five patients expressed severe pain and one patient expressed worst possible pain in the first 8-hour period. In the second 8-hour period, one patient expressed moderate pain, four patients expressed severe pain and two patients expressed worst possible pain. In the third 8-hour period, three patients expressed severe pain and three patients expressed worst possible pain (Table 4).

All wounds had healed at the end of the second week. No infectious, allergic or cardiovascular complications were observed. Lidocaine and prilocaine concentrations were below toxic levels; α-toluidine was not detected. Methemoglobin remained between 1 and 3%.

In first 16-hour period, narcotic use was less in the patients who received LPC. In the interval of postburn 0-16 hours, a pronounced decrease in the degree of pain was observed in the skin treated with LPC compared with skin treated without LPC. Consequently, LPC cream was observed to provide sufficient anesthesia in the first and second 8-hour periods, and reduced the need for analgesics when it was used in the preliminary dressing. However, it had no effect on pain cessation during the third 8-hour period. VRS results were also in concordance with this conclusion.

Table 4. Verbal rating scale results in the control group

No	Age	Sex	%	Degree	1st 8 hours	2nd 8 hours	3rd 8 hours
1	9	M	3	2	3	1	5
2	9	M	3	1	1	4	1
3	11	M	2	1-2	1	4	4
4	14	F	3	1	4	1	1
5	8	M	3	2	1	1	4
6	15	M	3	2	5	5	1
7	12	F	2	1	1	3	1
8	10	M	5	1	4	1	5
9	12	M	1	2	1	1	1
10	14	M	1	1-2	4	5	1
11	11	F	2	2	4	1	4
12	8	M	2	1-2	3	1	1
13	12	F	4	2	1	4	5
14	10	M	2	2	1	1	1
15	12	M	3	1	4	4	1

No pain: 1; Mild pain: 2; Moderate pain: 3; Severe pain: 4; Worst possible pain: 5.

DISCUSSION

Burn injury constitutes a serious type of tissue damage that activates inflammatory mechanisms, often causing pain, disfiguration or malfunction. Burn injury is known to cause thrombosis and occlusion of dermal vessels that come in direct contact with thermal energy.[2] Progressive ischemia secondary to diminished blood flow may compromise dermal tissues immediately surrounding the primary burn site. Since its introduction into clinical practice in 1967 by Charles Fox Jr.,[3] silver sulfadiazine has been the gold standard for topical burn therapy. Conventional management of partial-thickness burn wounds includes the use of paraffin gauze dressing, frequently with topical antibacterial creams. Some creams form an overlying slough that renders wound assessment difficult and are painful upon application. Moist exposed burn ointment is an alternative to conventional management, and this has been proposed as a topical agent that may accelerate wound healing and have antibacterial and analgesic properties.[4]

Pain relief may be improved by reducing sensitization of nociceptive pathways caused by tissue injury.[5] Opiates remain the most common form of analgesic therapy in the burn patient today. Because of increased opiate requirements, optimal relief of burn pain continues to be a problem for these patients. For instance, in minor burns, acetominophen continues to be a useful first-line analgesic. Non-steroidal anti-inflammatory drugs and benzodiazepine are generally combined with opiates. Ketamine has been extensively used during burn dressing changes but its psychological side effects have limited its use. Clonidine, however, has shown promise in reducing pain without causing pruritus or respiratory depression. Topical local anesthetics significantly inhibit the release of several mediators known to play an important part in the pathophysiological events following a burn injury, such as activation of pain mechanisms, edema formation and postburn ischemia.[6] The increased numbers of leukocytes in the burn wound induced by topical local anesthetic treatment could suggest increased influx and/or increased viability of leukocytes postburn. Amide local anesthetics have previously been shown to reduce edema and improve dermal perfusion following experimental burns.[7] In addition, previous studies have demonstrated potent inhibition of burn edema and progressive ischemia with local anesthetics.[8]

Lidocaine-prilocaine cream (LPC) is a eutectic mixture of the local anesthetics lidocaine (25 mg/g) and prilocaine (25 mg/g), which provides dermal anesthesia/analgesia following topical application.[9] The principal indication in which eutectic LPC has been studied is the management of pain associated with venipuncture or intravenous cannulation.[10] Further research in such indications as during kenacort injection, split-skin graft harvesting, lumbar puncture, minor otological surgery, and minor gynecological, urological and andrological procedures in children is likely to further broaden the profile of clinical use for eutectic LPC. LPC has a very favorable tolerability profile, with transient and mild skin blanching and erythema being the most frequent adverse events to occur in association with its application to the skin.[11,12] The potential for inducing methemoglobinemia, attributed to a metabolite of the prilocaine component of the formulation, prohibits its use in infants younger than six months.

The purpose of this study was to determine the effects of topical LPC on pain cessation in pediatric patients with face burn. LPC was observed to have no negative effects on the recovery of the wound, and it reduced use of analgesics considerably, in addition to its pain-relieving effect during the postburn period and the change of dressings. We recommend usage of LPC with fucidin pomad when there is no contrindication present, particularly in pediatric patients, regardless of the agent being used in the dressing. There are numerous advantages for both the patient and family. Since a dressing with LPC alone will not suffice for adequate analgesia after 16 hours postburn, we recommend redressing every 15-16 hours or oral analgesic support to obtain better results in analgesia.

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