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Original Article

Anesthesia with topical lidocaine hydrochloride gauze in acute traumatic wounds: An interventional study

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Abstract

Introduction: The use of gauze soaked in lidocaine hydrochloride (2%) can painlessly induce anesthesia to suture wounds, without causing the anxiety due to fear of injection in adult patients who were admitted to the emergency department with limb laceration.

Methods: This is a triple-blinded interventional study in which trauma patients with limb wounds were included. Distilled water impregnated gauze will be used for the control group and 2% lidocaine impregnated gauze will be used for the intervention group. The gauze will be placed on the wound for 5 minutes. The pain will be assessed with visual analog scoring (VAS).

Results: A total of 180 patients were enrolled in the study, with a normal distribution (*P* value=0.079) proven by Kolmogorov-Smirnov statistical test. The mean age of the participants was 32.02± 13.97 years. The mean of pain intensity of the patients in the case group at the time of admission was 7.92 ±0.64, based on VAS. The mean of pain severity in the patients after lidocaine-impregnated gauze anesthesia was 7.54±0.91. The mean of pain severity in the patients of the control group at the time of admission was 7.82± 0.61, based on VAS. The mean of patients' pain severity after topical lidocaine injection was 3.51±1.51. In the case group, the topical injection of lidocaine was repeated for anesthesia for all patients, while in the control group, the injection was repeated only for 3 patients ($P \leq 0.0001$)

Conclusion: The pain intensity after anesthesia was significantly different in the two groups and was reduced dramatically in the local anesthesia group.

Introduction

Treating acute wounds in the emergency department can be painful for the patient, and may require cleaning the wound using a serum wash or closing the wound with sutures or bandages. Therefore, to facilitate wound healing and to reduce the pain, available anesthetic drugs, especially amino amides such as lidocaine or prilocaine, are used.[1]

These drugs can be injected into the edges of the wound or penetrated topically. Recently, Cochrane authors have concluded that local anesthetics may be effective in providing sufficient anesthesia to wash the wounds.[2]

However, most studies investigated a combination of the available drugs with an effective cardiovascular agent with a vascular affinity, such as lidocaine-adrenaline tetracaine or tetracaine adrenaline-cocaine. The likelihood of vasoconstriction increases the duration and intensity of local anesthesia.[3]

Where a wound is present, lidocaine should be absorbed quickly without the skin barrier, and soaked gauzes also appear to affect the wound in this way.[4]

Several published studies have examined the pharmacological effects of local anesthetics and they have reported conflicting results.[1-12]

This study aimed to gather evidence on whether using gauze soaked in lidocaine hydrochloride (2%) can induce painless anesthesia to suture wounds, without causing the fear of injection in adult patients who were admitted to the emergency department with limb lacerations. Therefore, instead of a topical injection of lidocaine, lidocaine-impregnated gauze or cotton will be used, so there will be no injection pain and fear of injection.

Methods

Type of study

This study is a triple-blinded interventional study.

Population sample and sampling method

This is a triple-blinded interventional study in which patients with limb traumas after obtaining the informed consent, are included. Patients with a Glasgow coma scale (GCS) under 15, a history of lidocaine allergy, unwillingness to participate in the study, or with injuries in other parts of the body except the limbs and mucous

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membranes, are excluded from the study.

According to the Jenkins study, using the Cochrane's formula with an alpha coefficient of 0.05 and a strength of 95%, 86 patients were included, but 90 patients were selected to increase the strength of the study.[4]

Study design

A code is assigned for the patients before the study and then a gauze will be selected for each code randomly with Excel software. Only the person who coded and numbered the cotton gauze was aware of the content. Distilled water impregnated gauze was used for the control group and 2% lidocaine impregnated gauze was used for the intervention group. The doctor who applied the gauze was unaware of the gauze's content and only knew whether it was group A gauze or group B gauze. The statistical analyzer and the patients were also unaware of the groups' contents. The gauze was placed on the wound for 5 minutes.[6] The pain was then assessed with visual analog scoring (VAS).

In the case group, 2% lidocaine-soaked gauze was placed on the wound site for 5 minutes[6] and then we started to do the sutures. If the patient felt severe pain above 7, left the study and like the traditional way, 2% lidocaine was injected with an insulin syringe at the site and then the wound was sutured. In the control group, distilled water impregnated gauze was used for the blinding method, and after 5 minutes, the edges of the wound were anesthetized with an insulin syringe containing 2% lidocaine, and then suturing was performed. Pain intensity evaluation was assessed based on the VAS system.

Statistical methods

Data including age, sex, and pain intensity before gauze placement and after gauze placement based on VAS as well as the need for topical lidocaine injection for sutures and possible complications, were collected and entered into SPSS 20.0 statistical software. First, the normal distribution was examined, and then for the quantitative data t-test, and for the qualitative data, chi-square test was used and 0.05 in the area under the curve, was considered significant.

Results

A total of 180 patients were included in the study, which followed a normal distribution with *P* value=0.079 provided by Kolmogorov-Smirnov statistical test.

The mean age of the participants (95% CI 29.96–34.07:) was 32.02 ± 13.97 years.

140 patients were male (77.8%) and 40 patients were female (22.2%). The mean severity of pain in the patients based on VAS at the time of admission, was 7.87± 0.63.

Case group (lidocaine impregnated gauze)

Ninety patients were enrolled in the case group, which followed a normal distribution (*P* value=0.200) by Kolmogorov-Smirnov statistical test.

The average age of participants (95% CI: 28.62–34.52:) was 31.57 ± 14.08 years. Seventy-three patients were male (81.1%) and 17 patients were female (18.9%).

The mean severity of pain in the patients based on VAS at the time of admission, was 7.92± 0.64. The mean severity of pain in the patients after lidocaine impregnated gauze anesthesia was 7.54 ±0.91 (*P* value=0.292)

For all patients, due to lack of anesthesia, lidocaine injection was performed (100% of the patients had the injection). Complications were observed in only 2 patients, both of which developed itching at the site of the laceration (2.2%).

The control group (topical injection)

Ninety patients were enrolled in the control group, which followed a normal distribution (*P* value=0.200) by Kolmogorov-Smirnov statistical test.

The average age of participants (29.55-35.38: CI95%) was 32.47 ± 13.92 years. Sixty-seven patients were male (74.4%) and 23 patients were female (25.6%).

The mean of pain severity in the patients based on VAS at the time of admission was 7.82± 0.61. The mean of pain severity in the patients after topical injection was 3.51 ± 1.51 (*P* value=0.026)

For 3 patients, due to lack of anesthesia, local lidocaine had to be re-injected (3.3%).

Only in 3 patients complications were seen, each of which was pruritic, the other 2 patients felt burning on the injection spot (3.3%).

Comparison of the case and control groups (lidocaine-impregnated gauze and topical injection of lidocaine)

Comparing the two groups, there was no significant difference in terms of age and sex and pain intensity before the anesthesia, but the pain intensity after anesthesia was significantly reduced in the anesthesia group with local

Table 1. Comparison of variables between the two groups

	Group	Mean	Standard deviation	*P* value
Age	lidocaine impregnated gauze	31.57	14.078	0.667
	Local anesthesia with injection	32.47	13.921	
Gender	lidocaine impregnated gauze	1.19	0.394	0.285
	Local anesthesia with injection	1.26	0.439	
VAS before anesthetics	lidocaine impregnated gauze	7.92	0.640	0.285
	Local anesthesia with injection	7.82	0.610	
VAS after anesthetics	lidocaine impregnated gauze	7.54	0.914	≤0.0001
	Local anesthesia with injection	3.51	1.508	

VAS, visual analog scoring.

injection compared to the other group (Table 1).

In the case group, the topical injection of lidocaine was repeated for anesthesia for all the patients, while in the control group, the injection was repeated for only 3 patients ($P \leq 0.0001$).

In the case group, 2 patients showed complications and in the control group, 3 patients showed local complications and the difference was not significant.

Study Highlights

What is current knowledge?

- Lidocaie in any pharmacological form can reduce pain in any procedure

What is new here?

- The lidocaine soaked Gauze is not effective for analgesia

Discussion

One hundred eighty people were included in the study, and followed the normal distribution by Kolmogorov-Smirnov statistical test. The average age of participants was 32.02±13.97 years. 140 patients were male and 40 patients were female. Also, the severity of pain in patients based on VAS at the time of admission was 7.87± 0.63.

There was no significant difference between the case and the control groups in terms of age and sex distribution, and these variables were demographically similar. Also, the average and the distribution of pain intensity at the beginning of the procedure in both groups, were not significantly different. However, the severity of pain after anesthesia was significantly decreased in the anesthesia group with topical injection. In the case group, all the patients had to be injected topically as the pain was not controlled, but in the control group, only 3 patients underwent re-injection to reduce pain, which meant failure to control the pain and local sensation in the case group.

Holst and Evers compared 5% lidocaine with a placebo and found that the analgesic effect was induced when the test stimulator was administered with a 30-degree needle approximately 2 mm deep for a period of 2 to 3 minutes.[7]

In this study, 2 patients showed complications in the case group and 3 patients in the control group. This showed that these complications were local and not significant.

Three trials reported that infiltrated local anesthesia was significantly more effective than topical lignocaine-prilocaine cream (EMLA).[13-15]And two randomized controlled trials concluded that EMLA had comparable or greater analgesia.[16,17]

A randomized controlled trial reported that the EMLA (AstraZeneca) patch provided more pain relief over lidocaine for the placement of a 25 GB spinal needle in 169 adult patients.[18]

Only one randomized clinical trial evaluated lidocaine ointment (5% xylocaine ointment; AstraZeneca). Lander et al showed that 5% lidocaine ointment is more effective than EMLA for venous cannulation in adults.[19]

Olday et al compared 60 minutes of 4% tetracaine topical gel with infused local anesthesia. In this study, 100 adults underwent radial perforation and comparable efficacy was observed between the two forms of anesthesia. The method was intravenous culture.[20]

Speirs et al showed that topical tetracaine provides more pain relief than EMLA, but the difference in visual analog scale scores was not statistically significant.[21]

Molodecka et al had 22 comparisons of the effectiveness of 5% tetracaine cream for 30 and 60 minutes. Although the mean scores of the visual analog scale were higher in the last group, the results were not statistically different.[22]

Conclusion

this study, reports that, soaked gauze with lidocaine can not prepare a good and acceptable anesthesia. We advise to use injected lidocaine for local anesthesia.

Conflict of Interest

The authors declare no conflicts of interest

Ethical Approval

This study was registered in the regional ethics committee of Tabriz University of Medical Sciences with the number IR.TBZMED.REC.1399.046. Informed consent was obtained from patients. All the patients' data was kept confidential.

Authors' contribution

AA, study design and writing; PJ, data Gathering and analysis; PM study conduct and critic.

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