The Effects of Lidocaine/Prilocaine Cream on Pain and Anxiety before Intravenous Cannulation

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Abstract. This quasi-experimental study (IRB No KBC13130) attempted to understand the effect of lidocaine/prilocaine (EMLA) cream on pain and anxiety in adult patients before intravenous cannulation. The subjects were 58 adult patients aged 19 years and over who were hospitalized in the internal medicine unit and experienced intravenous cannulation using an 18-gauge needle. Data analyses involved Chi-square test, Fisher’s exact test and Independent t-test using IBM SPSS Statistics 19.0. Subjects receiving or not receiving EMLA cream did not show statistically significant differences in the scores of trait anxiety before intravenous cannulation and state anxiety after intravenous cannulation. However, the mean score of pain in subjects receiving EMLA cream was significantly lower than the control group.

Keywords: EMLA Cream, pain, anxiety, intravenous cannulation

1 Introduction

Intravenous cannulation is a necessary medical practice for most hospitalized patients, as it is used as a delivery method of drugs, crystalloids, blood, and nutrients. Since intravenous therapy produces a more rapid therapeutic effect than intramuscular or subcutaneous injections, and because a large volume amount of drugs can be instilled through intravenous cannulation, it is widely used.

Intravenous cannulation is an invasive technique, which is accompanied by pain [1]. In reality, few adult patients refuse injection due to pain related to the intravenous cannulation, in contrast to the problems experienced with pediatric patients. However, even adult patients often complain of pain or discomfort due to repeated venipuncture or failure of venipuncture. In addition, nurses who take care of these patients experience stress while working bedside due to their patients’ discomfort.
EMLA cream is a topical anesthetic that contains a mixture of lidocaine and prilocaine. The cream is useful in relieving pain and anxiety from intravenous cannulation in pediatric patients \[1\][2][3]. Studies of non-invasive methods, such as the use of topical anesthetics, relaxation therapy, and cryotherapy have been reported \[4\][5][6][7]. Application of EMLA cream or spray have brought pain relief of venipuncture \[8\][9][10][11]. This study is a further exploration of the benefit of EMLA cream on relief of pain and anxiety in intravenous cannulation in adult patients.

2. Method

2.1 Study Design

This non-equivalent, controlled, quasi-experimental study was conducted to identify the effect of the application of EMLA cream on intravenous injection-related pain and anxiety before intravenous cannulation in medical patients aged 19 years and over. The study was conducted after receiving institutional review board approval in K Hospital (KBC 13130).

2.2 Subjects

This study involved adult patients hospitalized in the gastrointestinal internal medicine unit in K Hospital located in Seoul, who received intravenous cannulation. Regarding the sample size with the two-tailed test, with an effect size of 0.5 and an alpha size of 0.05, 54 subjects were required if t-test was conducted between two independent groups. Assuming a drop-out rate of 20%, 64 subjects were selected by convenience sampling, comprising 32 subjects for the study group and 32 subjects for the control group. Inclusion criteria were age of 19 years and over, ability to communicate, provision of informed written consent, hospitalization in the medical unit, fluid therapy of 100 cc and more for the purpose of treatment, use of 18-gauge needle during the fluid therapy, and installation of intravenous (IV) line once after application of the cream. If the first paracentesis failed and was repeated, the study or control subject was excluded.

2.3 Study Instrument and Confidence

Anxiety was divided into trait anxiety and state anxiety. A Korean translation \[13\] of an anxiety analytical instrument \[12\] was used. Responses to each of the 20 questions were ranked using 4-point Likert scale. Each degree of anxiety was scored (minimum, 20; maximum, 80) with higher scores indicting greater anxiety. The confidence of trait anxiety was Cronbach’s \(\alpha\) 0.766, and the confidence of state anxiety was Cronbach’s \(\alpha\) 0.794. Pain was rated by patients immediately after intravenous cannulation using a visual analogue scale (VAS).
2.4 Data Collection

Once subjects were selected, trait anxiety was measured on the first day of hospitalization prior to cannulation. Lots were drawn to allocate patients to received the actual EMLA nutrient cream or to the control group, which received cream similar in appearance to EMLA cream. Both patients and investigators were blinded to the allocation. Data on pain and anxiety were collected, 30 minutes after the application of cream. Also, blood pressure and pulse were measured after intravenous cannulation.

Based on prior research of the efficacy of EMLA cream at least 30 minutes after cannulation [3], we applied 2 mm thickness of EMLA cream on an expected intravenous injection site of subjects at least 30 minutes before IV injection. The same prior study suggested putting on a tegaderm after applying EMLA cream to maximize skin absorption of EMLA cream. However, we only applied EMLA cream to reduce the inconvenience of multiple manipulations [3]. After at least 30 minutes, the cream was removed with gauzes and vital signs (blood pressure and pulse) were measured. The initial cohort included of 64 subjects. Six failed the first intravenous injection. Thus, 58 subjects (29 subjects in the study group and 29 subjects in the control group) participated in the study. To minimize the difference of results due to experiences and skills of nurses who performed the intravenous injection therapy, one nurse with three years nursing experience was allowed to conduct the intravenous cannulation therapy for all subjects.

2.5 Data Analysis

The data was analyzed using IBM SPSS Statistics 19.0. The homogeneity of general characteristics between study and control groups was analyzed using the Chi-square test and Fisher's exact test. The comparison of the degree of pain and anxiety between the two groups was analyzed using the independent t-test.

3 Result

There were no statistically significant differences between the group concerning gender, age, education level, religion, marital status, occupation, and economic status. Among variables that may affect pain and anxiety related to the intravenous cannulation, hands and anatomical sites of venipuncture, and physiological indexes including blood pressure and pulse measured before intravenous cannulation were compared. There were no significant differences between the study and control groups. The mean score of trait anxiety was 45.51 for the study group and 45.96 for the control group. The mean score of state anxiety was 43.43 for the study group and 42.25 for the control group. These mean scores were not significantly different. The mean score of pain was 3.41 in the study group, which was significantly lower than the 5.14 mean score in the control group. Physiological indexes of blood pressure and pulse measured after intravenous cannulation in the study group and control group did not show statistically significant differences.
4 Conclusion

Application of EMLA cream is effective in relieving pain during IV line insertion in adults. To expect a full effect, EMLA cream should be applied at least 30 minutes prior to cannulation. Therefore, unless emergency, intravenous cannulation or venipuncture is done, EMLA cream can be used to relieve pain in clinical situations.

References