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# COMPARISON OF EFFECTIVENESS OF TOPICAL EMLA APPLIED PRIOR TO INTRAVENOUS CANNULATION FOR 15 MINUTES AND 60 MINUTES

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**ABSTRACT:**

**Objective**: This study was designed to compare the efficacy of EMLA to ease the pain of intravenous cannulation after 15 minutes of application and 60 minutes of application.

**Material and method:** Randomized cross-sectional study was conducted on 100 patients. EMLA was applied for 15 minutes in 50 patients and in remaining 50 patients for 60 minutes. Pain was assessed in two groups by VAS score.

**Result:** Pain was assessed in both the groups and showed lower pain score. Both the groups were haemodynamically stable for intravenous cannulation.

**Conclusion:** EMLA can also be considered for 15 minutes prior to intravenous cannulation rather than 60 minutes.

**Keywords:** EMLA, Intravenous Cannulation, VAS score.

**INTRODUCTION:** EMLA cream (Lidocaine 2.5% and prilocaine 2.5%) is an emulsion in which the oil phase is a eutectic mixture of lidocaine and prilocaine in a ratio of 1:1 by weight. This eutectic mixture of lidocaine has a melting point below room temperature and therefore both local anesthetics exist as a liquid oil rather than as crystals.

Peripheral venous cannulation is a very painful procedure but also prerequisites for delivering anesthesia for patient. Numerous studies have shown that much of the pain can be avoided by using local anesthetic agents. In emergency there may be no time but, in many instances, when surgery is planned it is feasible to wait for local anaesthesia to take effect. The agent will be given either by needle for infiltration or noninvasive method that is topical mixture of L.A. (EMLA). Superficial venous puncture in adults in performed currently without anaesthesia, as it is considered to be a less traumatic experience for them when compared to children. However, this procedure has been reported to produce significant pain and therefore the use of percutaneous anaesthetic agents may be appropriate. The needle prick can also make a patient uncooperative and the anxiety caused can result in a haemodynamic stress response leading to increase in heart rate and blood pressure of patient. Many attempts have been made to produce local analgesia and to allow painless venipuncture by the topical application of various drug. Topical 4% lignocaine or 20% benzocaine have been employed but their use has been limited by concern about local irritation, systemic toxicity and inadequate analgesia.

Other methods like use of ethyl chloride spray, lignocaine iontophoresis and topical application of ibuprofen, have been described, but each one has certain drawbacks such as the relative ineffectiveness of concentration of uncharged base of the anaesthetic product or too poor skin absorption. With the advent

of eutectic mixture of local anaesthetic (EMLA) cream, effective topical analgesia of intact skin is now claimed to be feasible without the need for subcutaneous injection or exposure to high concentrations of local anaesthetic. EMLA cream is a 1:1 % oil in water emulsion of 2.5% lignocaine and 2.5% prilocaine bases. This mixture is termed eutectic, as it has a melting point lower than its individual components. This mixture is liquid at room temperature, while individual components are crystalline substances.

Safe and patent venous cannulation access for drug & fluid administration is pre-requisite for administering anaesthesia to any patient. Needle prick can also cause patient anxiety and discomfort which further result in hemodynamic stress response (increase heart rate and blood pressure). Many studies have shown that pain can be avoided by using local anaesthesia by many mode (local spray, local infiltration of the site, cream base LA). Many attempts have been made to produce local analgesia to allow painless venipuncture by topical application of various drug. EMLA cream causes effective topical analgesia of local site. In our study, we have compared EMLA efficacy in 15 mins and 60 mins respectively.

**AIM:** To evaluate the efficacy of EMLA and effect of timing of application to ease out pain during cannulation.

## MATERIAL AND METHOD:

The study was performed in Safdarjung Hospital, New Delhi and Santosh Medical College and Hospital Ghaziabad over a period of one year. A total of 100 in patient in psychiatry ward and in Operation theatre for elective surgery belonging to ASA grade I and II were selected. The patient belonged to either sex and were of the age group 18 to 60 years. EMLA was applied for 15 minutes in 50 patients and in remaining 50 patients for 60 minutes. Pain was assessed in two groups by VAS SCORE.

The following patients were excluded:

- Allergic to EMLA content
- Drug ingested that may alter pain perception
- Refusal to participate
- Potentially difficult cannulation
- Aggressive and uncooperative patients
- Patients were also excluded from statistical analysis if there were incomplete data or more then one attempt were made for venipuncture.

## PROCEDURE:

Patients were randomized in two groups 50 each:

E15: IV cannulation done after 15 mins of EMLA application.

E60: IV cannulation done after 60 mins of EMLA application.

Medical staff (interns, resident and faculty) working in psychiatry ward and O.T performed intravenous cannulation via 20 G cannula according to following protocol. The staff member performing the cannulation choose an envelope explaining trial to the patients, consent form & VAS score.

After explaining the procedure, consent was obtained and the skin prepared with 65% alcohol.

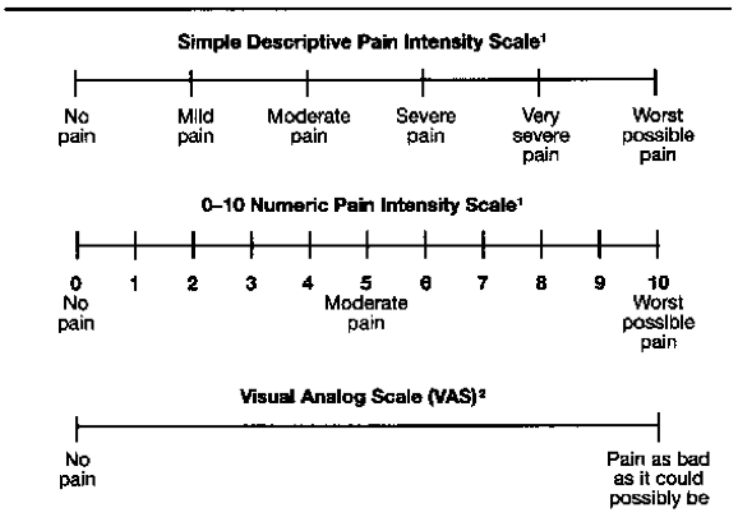
Non dominating hand was chosen and suitable vein on dorsum of hand was selected.

In group E15 & E 60, thick layer of EMLA CREAM 1.5gm/$cm^2$ area was applied over cannulation site. Site was covered with an occlusive dressing. EMLA cream was applied for 15 min and 60 mins in group E15 & E60 RESPECTIVELY.

after prescribed time, occlusive bandage was removed and. I.V cannulation was done after cleaning the site.

In both the groups the patient was then asked to mark the pain on VAS, heart rate and systolic and diastolic blood pressure recorded before and during cannulation.

Pain score was graded using VAS SCORE as shown below:




This pain scoring was done by observer blindly with respect to time of EMLA application.

**STATISTICAL ANALYSIS:**

Statistical analysis was done by chi-square test.
P value <.05 was considered as statistically significant.

**OBSERVATION AND RESULT:**

100 patients belonging to age group 20 - 60 year of either sex were selected. They were divided into 2 groups E15 and E60.
Both groups were compared on the basis of age, sex and time of EMLA application. VAS PAIN SCORING and haemodynamic parameters.
Multiple attempts were done in 2 pts in the group E15 and 2 pts had local irritation in group E60. No adverse reaction seen.

| GROUP | MINI. AGE | MAX. AGE | MEAN | STD DEVIATION | P Value |
|---|---|---|---|---|---|
| E15 | 20 | 60 | 40.8 | 13.691 | |
| E60 | 21 | 53 | 35.2 | 10.263 | .223 |

AGE DISTRIBUTION

Both groups had higher number of pts within age group 35-45 years with non-significant p value.

| SEX | GRP E15 | GRP E 60 |
|---|---|---|
| F(NO) | 24 | 22 |
| % | 50 | 45.8 |
| M(NO) | 24 | 26 |
| % | 50 | 54.1 |
| TOTAL | 48 | 48 |

SEX DISTRIBUTION

| GRP | PAIN SCORE | | | | MEAN | STD. DEVI | P VAL |
|---|---|---|---|---|---|---|---|
| | NO(0) | MILD.1 | MOD.2 | SEV.3 | | | |
| E15 | 16 | 32 | 4 | 0 | 1.41 | .576 | |
| E60 | 20 | 28 | 0 | 0 | 1.28 | .481 | .1 |

PAIN SCORING DURING CANNULATION
NO PAIN: (0-1), MILD (2-4), MODERATE (4-6), SEVERE (6-8)

In both groups pain score was compared. E60 Showed more patients in no pain group but it was comparable with E15 group. The p value was insignificant when both groups were compared.

| CANNU | GROUP | NO. | MIN. | MAX | MEAN | ST. DEV | P VAL |
|---|---|---|---|---|---|---|---|
| BEFORE | E15 | 48 | 58 | 110 | 81.52 | 16.11 | |
| | E60 | 48 | 62 | 108 | 82.91 | 11.87 | .46 |
| AFTER | E15 | 48 | 64 | 120 | 86.70 | 16.53 | |
| | E60 | 48 | 56 | 116 | 85.40 | 13.64 | .78 |

COMPARISON OF HEART RATE IN BOTH GROUPS

Both groups had no significant change in heart rate but group E15 had an increase in heart rate when compared with E60.

| CANNU | GROUP | NO. | MIN | MAX | MEAN | ST. DEV | P VAL |
|---|---|---|---|---|---|---|---|
| BEFORE | E15 | 48 | 100 | 150 | 121.60 | 13.82 | |
| | E60 | 48 | 110 | 140 | 118.12 | 11.68 | .23 |
| AFTER | E15 | 48 | 110 | 160 | 124.57 | 14.57 | |
| | E60 | 48 | 100 | 154 | 122.83 | 12.95 | .1 |

COMPARISON OF SYSTOLIC BLOOD PRESSURE BEFORE AND AFTER

In both groups systolic blood pressure found to be insignificant.

| CANNU | GROUP | NO. | MIN | MAX | MEAN | ST. DEV | P VAL |
|---|---|---|---|---|---|---|---|
| BEFORE | E15 | 48 | 50 | 100 | 80.21 | 9.15 | |
| | E60 | 48 | 60 | 90 | 78.86 | 6.93 | .14 |
| AFTER | E15 | 48 | 60 | 100 | 83.42 | 9.12 | |
| | E60 | 48 | 70 | 100 | 81.85 | 7.54 | .3 |

COMPARISON OF DIASTOLIC BLOOD PRESSURE BEFORE AND AFTER

Difference in both groups found to be insignificant when diastolic B.P was compared.

## DISCUSSION:

The objective of this study was to compare efficacy and effect of timing of application of EMLA on pain of intravenous cannulation. 100 patients of either sex, age 20 to 60 years, were randomly divided in 2 groups, and posted for elective surgeries or admitted in psychiatry ward.

Pain assessment was done by VAS SCORE by Cordoni A, Cordoni le (2001), in 96 patients EMLA was applied prior to cannulation. 2 groups were comparable regarding age and sex, and there was no statistical difference with respect to these parameters. Each group had more patients in age group 35 - 45. Various study had been done to show efficacy and timing of application of EMLA to provide analgesia for cannulation. As study, conducted by Cordoni a, Cordoni le (2001), on the patients using a 0 to 10 cm visual analogue scale, pain during intravenous needle insertion was scored. They also observed that their patients in EMLA group experienced less pain than those in the placebo group.

In our study we concluded that the mean vas score in E60 is 1.28 whereas in group E15 is 1.42. This showed that EMLA cream is effective after applying for 15 mins also but a similar study conducted by Ehrenstrom, Reiz G, Reiz S et al (1983) revealed a minimum effective application time of 45 minutes prior to IV cannulation, whereas MR Nott and JL Peacock (1990) showed that EMLA cream had significantly less pain score after 5 minutes of EMLA cream application, Hopkins CS and Buckley CJ (1988).

Norbert Griessinger (1995) suggested that application of EMLA cream can be useful measure to facilitate venipuncture in patient with reflex sympathetic dystrophy as it avoids any haemodynamic alteration. Speirs A F, Taylor KH et al (2001) conducted a study of topical analgesia and it revealed that EMLA cream and ametop produce effective skin analgesia for venous cannulation and that the use of topical analgesia reduces anxiety about future cannulation procedures. In our study, heart rate, systolic blood pressure and diastolic blood pressure were recorded before and during cannulation in all patients. We observed that application of EMLA cream did not cause a significant rise in haemodynamic parameter during cannulation. The same finding was appreciated by Lindh et al (2000) that EMLA cream application decreased stress response to venipuncture in new born. The result of our study is also comparable with finding of Ehrenstrom-Reiz, Reiz and Stockman who evaluated the minimal effective onset time of EMLA cream required to decrease intravenous cannulation pain in adult. Their study was one of the first studies evaluating the effectiveness of EMLA cream with shorter application time (15 min). The authors also found a significant difference in pain score between those that received placebo cream.

Smith Eggar et al results are not comparable with our study. They evaluated 15 and 60 minutes of applications of ibuprofen, placebo and EMLA cream. The result of 100 mm VAS for pain post intravenous cannulation demonstrated no significant difference between the three creams when compared at 15 minutes. However, their study did suffer from a small sample size (n=10).

Yamamoto and Boychuk also found no benefit pf EMLA compared to placebo. They evaluated a 20 mins application in 40 subjects. Their study utilized a randomized, placebo controlled, paired trial method where the subject had both hands cannulated. Each subject was asked to identify the more painful hand using 10 cm VAS which was also just opposite to our study

## SUMMARY:

Efficacy of EMLA in alleviating pain produce by I.V cannula was determined in our study

We compare 100 pts of either sex belonging to ASA 1 & 2 of age group 20-60 years.

Both groups had low mean vas score value 1.28 & 1.41.

Effective time of application of cream in producing adequate analgesia was found to 15 mins.

Both the groups were hemodynamically stable.

Hence, we concluded that EMLA application for 15 mins is equally effective as compared to 60 mins of application.

## CONCLUSION:

We concluded that EMLA application for 15 mins is equally effective as compared to 60 mins application.

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