



ORIGINAL RESEARCH PAPER

Anaesthesiology

TOPICAL ANAESTHESIA FOR ARTERIAL CANNULATION: EMLA CREAM VS LIGNOCAINE SPRAY

KEY WORDS: Dermal analgesia, EMLA cream, 10% Lignocaine spray, Intra-arterial Cannulation

Dr. Mumtaz Hussain

Dr Rajesh Kumar* Senior Resident I.G.I.M.S,Patna *Corresponding Author

ABSTRACT

Background: An intra-arterial cannulation is the most commonly performed invasive procedure in hospital patients especially if wide fluctuations in blood pressure is anticipated following an elective surgery. It is painful and associated with a high incidence of vasovagal reactions and pressor responses in patients.

Objectives: To evaluate the efficacy of eutectic mixture of local anaesthetic (EMLA) cream on comparing it with Lidocaine 10% w/w Local Anaesthetic Spray producing dermal analgesia in response to intra-arterial cannulation.

Material and Method: A total of 100 patients were selected randomly of either sex, and divided into two groups. In group-I EMLA cream was applied and in group-II 10 % lignocaine spray were applied over the cannulation area. Pain for Intra-arterial cannulation was assessed by VAS scale.

Results: The mean pain score for intra-arterial cannulation in patients with EMLA cream was comparable to 10 % lignocaine spray and was statistically not significant.

Conclusion: EMLA cream as well as 10 % lignocaine spray is equally effective in producing dermal analgesia in response to arterial cannulation.

INTRODUCTION

Pain is a complex matrix of biological, psychological and sociological phenomena; it is a vital function of the nervous system that provides information and helps avoid danger to the human body. The nociceptive apparatus associated with skin can often produce fear of medical procedures, causing discomfort, pain and anxiety, which sometimes lead to vasovagal attacks[1]. Venous cannulation is the most commonly performed invasive procedure in hospital patients[2]. It is painful and associated with a high incidence of vasovagal reactions and pressor responses in patients[3]. Various methods have been employed to alleviate pain and anxiety resulting from venous cannulation, including ethyl chloride spray, intradermal or subcutaneous injection of lignocaine and distraction techniques[4]. The major step in pharmaceutical research on topical drugs came with a serendipitous discovery that a specific mixture of crystalline bases of lidocaine and prilocaine had a lower melting point than the melting point of the individual drugs. This combination is termed a eutectic mixture and such a combination of local anaesthetics is a liquid at room temperature and the individual components are crystalline solids[5]. The EMLA (Eutectic Mixture of Local Anaesthetic) cream consists of an oil in water emulsion of a eutectic mixture of lignocaine base 2.5% and prilocaine base 2.5% with a thickener (carbopol) added to obtain suitable consistency[6]. With the advent of eutectic mixture of local anaesthetics (EMLA) cream, effective topical anesthesia of intact skin is now claimed to be feasible without the need for subcutaneous injections or exposure to high concentrations of local anesthetics[5]. Lidocaine 10% w/w Local Anaesthetic Spray contains the active ingredient lidocaine, which works by stopping the nerves that sense pain from working temporarily and as a result the area that is to be treated becomes numb for a short time..

AIMS AND OBJECTIVES

A study was conducted to evaluate the efficacy of eutectic mixture of local anaesthetic (EMLA) cream on comparing it with Lidocaine 10% w/w Local Anaesthetic Spray producing dermal analgesia in response to intra-arterial cannulation.

MATERIALS AND METHODS

After ethical committee approval and informed and written consent, ASA Physical status I and II a total of 100 patients undergoing elective operative procedure requiring invasive blood pressure monitoring were included in our study. The patients belonged to either sex and were of the age group

between 18 and 78 years. A routine pre-operative evaluation was done for all patients and the following patients were excluded:
Patients with known hypersensitivity to EMLA cream or any other local anaesthetics.

Patients with methemoglobinemia or on drugs that may cause methemoglobinemia.

Patients with mental illness & Any coagulation disorders
Patients with open wounds on dorsum of hand.

Investigations included routine haemogram, urine analysis, blood sugar and other specific tests like ECG, chest X-ray, blood urea, serum creatinine etc. as required for respective patients and surgeries. The purpose and procedure of the study was explained and informed consent was obtained from all patients. The patients were selected randomly and modified Allens test was performed in both the study groups and then were divided into two groups.

Group-I: Patients applied with EMLA cream before intra-arterial cannulation.

Group-II: Patients applied with 10% Lignocaine Spray(Four times) before intra-arterial cannulation.

In group-I patients, EMLA cream 1.5 to 2 gm/ 10 cm² area was applied over the site of cannulation in a thick layer. This layer was then covered with an occlusive dressing. EMLA cream was applied for a minimum period of 1 hour. The occlusive dressing was removed just before the cannulation. The area was then wiped dry with gauze. After disinfecting with spirit, intra-arterial cannulation of radial artery was performed with 20 gauge cannula in a non-dominant hand and before cannulation modified Allens test were performed. Pain during arterial cannulation was scored using visual analogue scale. In group-II, Lignocaine spray 10% (Four times Spray) was applied over the site of cannulation for a minimum period of 20 minutes. After disinfecting with spirit, arterial cannulation was performed with 20 gauge cannula. Pain during arterial cannulation was scored using visual analogue scale.

The perception of pain is highly subjective hence this variable was standardized by using data from visual analogue scale (VAS)[7]. First advocated by Revill and Robinson in 1976, VAS consists of a 10 cm line anchored at one end by a label such as 'no pain' and at the other end by a label such as

'worst pain imaginable'. The patient simply marks the line to indicate the pain intensity.

RESULTS

In the present study, a total of 100 patients in Group-I and Group-II were compared with respect to age, sex and visual analogue pain scale. Data analysis was done by Z-test. Age difference among male and female was statistically insignificant in group-I ($z=1.22, p>0.05$). Age difference among male and female patients is statistically insignificant in group-II ($z=1.93, p>0.05$). In our study, we observed that the mean VAS pain score among the patients who were applied with EMLA cream was (0.30), when compared with the mean VAS pain score in the patients who were applied with 10 % Lignocaine spray the (0.2). The VAS pain score among group-I and group-II shows no significant change ($p>0.05$).

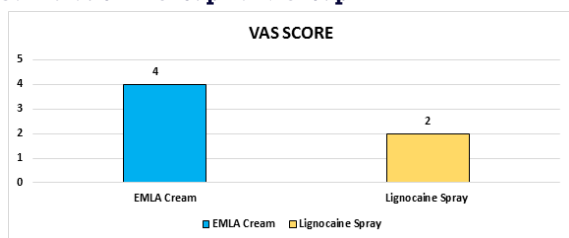
Table 1: Age and Sex Wise Distribution of Cases in Group-I (n=50)

Age	Sex		Total
	Male	Female	
18 – 37	08	06	14
38 – 57	10	12	22
58 – 77	07	07	14
Total	25	25	50
Mean	34.52	32.98	32.34
SD	9.43	10.23	10.84

Table 2: Age and Sex Wise Distribution of Cases in Group-II (n=50)

Age	Sex		Total
	Male	Female	
18 – 37	11	05	14
38 – 57	08	08	22
58 – 77	06	12	14
Total	25	25	50
Mean	31.28	30.12	36.71
SD	10.42	10.78	10.23

Figure 1: Comparison of Mean VAS Pain Score during Cannulation in Group-I and Group-II



DISCUSSION

Our study evaluated the efficacy of eutectic mixture of local anaesthetic cream over 10 % Lignocaine spray in producing dermal analgesia for intra-arterial cannulation. Over 100 patients of either sex belonging to the age group 18-78 years posted for elective surgeries requiring intra-arterial blood pressure monitoring were divided into two groups i.e., group-I and group-II with 50 patients in each group. In group-I patients, EMLA cream was applied before intra arterial cannulation. In group-II patients 10 % Lignocaine spray 4 puffs (40mg) were applied before intra-arterial cannulation. The groups were compared regarding age and sex and no statistical difference with respect to these variables was found. Pain score was assessed in these patients for intra-arterial cannulation by the visual analogue scale. In our study, we observed that the mean VAS pain score among the patients who were applied with EMLA cream was (0.30), when compared with the mean VAS pain score in the patients who were applied with 10 % Lignocaine spray the (0.2). The VAS pain score among group-I and group-II shows no significant change ($p>0.05$).

Manner T et al[8] (1987) studied the local analgesic efficacy of EMLA cream in reducing pain at venous cannulation. Subjective pain scores, expressed with a visual analogue scale, were significantly lower in the EMLA group compared with both the groups treated with placebo cream and the open control group. In the study conducted by Cordoni A, Cordoni LE9 (2001), intravenous insertion pain was scored by the patient using a 0 to 10 cm visual analogue scale. They also observed that the patients in the EMLA group experienced less pain than those in the placebo group.

Moledocka J and Stenhouse C[10](1994) conducted a study wherein the efficacy of topical amethocaine cream was compared to 5% EMLA cream in alleviating pain of venous cannulation. Pain was assessed on a 4-point rank score. Good analgesia was obtained in all the groups. Significantly lower pain scores were recorded in children treated with EMLA cream.

Jameson et al.[11], using the 10% Xylocaine Spray, randomised 60 patients due for upper GI endoscopy to 50, 100, or 200 mg doses of lidocaine to the pharyngeal area. The study concluded that 100 mg doses of lidocaine were optimal. Plasma lidocaine levels were not assayed within the first 20 minutes of dosing and, thus, the peak may have been missed in some patients.

Scott et al.[12] performed a similar study with 5% and 10% (50 mg and 100 mg doses were given in 10 sprays) solutions and found that plasma concentrations after 100 mg doses were higher in paralysed (mean Cmax 1.6 µg/mL) vs spontaneously breathing patients (mean Cmax 1.03 µg/mL). Peak concentrations were seen at 15-25 minutes post dose, and plasma concentrations reached more than 2 µg/mL in some patients.

The observations in our study are in line with the observations made in the above studies. In our study, we applied the EMLA cream for a minimum period of 1 hour as per the recommendations made in various studies. Smith AJ and Stacey MR11 (1996) conducted a study and revealed significantly lower pain scores for EMLA cream at 60 minutes. A study conducted by Vaghadia H, Al-Ahlan OA, Nevein K12 (1997) revealed that EMLA patch when applied to the skin for 60-90 minutes before venous cannulation reduced the pain of venepuncture and also reduced vasovagal side effects. Hallen B, Olsson G et al6 (1984) conducted a study to assess the effect of application of EMLA cream and their study also revealed that the effect of cream became evident at about 60 minutes for venepuncture. But a similar study conducted by Ehrenstrom, Reiz G, Reiz S et al13 (1983) revealed a minimum effective application time of 45 minutes prior to IV cannulation. In our study, only two patients had blanching at the site of EMLA cream application. There were no other side effects.

CONCLUSION

In our study, we concluded that both EMLA Cream as well as 10 % Lignocaine spray were effective in alleviating pain on performing intra-arterial cannulation.

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