ORIGINAL ARTICLE

Pain-Reducing Modalities Before Botulinum Type A Injections for Hemifacial Spasm Treatment: A Comparative Study

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Background: Botulinum toxin A (Botox) therapy is safe and effective for hemifacial spasm, however, the associated discomfort and pain from injections limit its usefulness.

Objective: To evaluate pain, preparation difficulty, and satisfaction following application of a eutectic mixture of local anesthetic (EMLA) cream, ice application, and placebo before Botox injections for hemifacial spasm.

Materials and Methods: Twenty-two patients received four Botox injections in the facial area to treat hemifacial spasm, between June 2022 and March 2023. The initial treatment began in June 2022, followed by treatments at 3, 6, and 9 months. The EMLA cream, ice application, control, and placebo were administered consecutively for each Botox treatment. Pain, preparation difficulty, and satisfaction were evaluated on a 0 to 10 scale. Neurological and bleeding complications were recorded.

Results: The mean pain score for EMLA cream application was the lowest, followed by cold compressions. The mean pain score in the control with placebo intervention was not significantly different from that in the control. The control without placebo intervention had the lowest difficulty in preparation score at 0.82 and showed no significant difference with EMLA application. Whereas cold compression had the highest difficulty in preparation score. The highest satisfaction score was obtained with the EMLA cream application at 9.45. The satisfaction score was higher in the control with placebo intervention at 8.32 than in the control, which had the lowest satisfaction score at 6.91. The number of injections and neurological complications did not differ among the four methods. The bleeding site ratio was the lowest with the cold compression method.

Conclusion: EMLA cream application resulted in the lowest mean pain and the highest satisfaction scores. Control with placebo intervention increased the satisfaction score without reducing the mean pain score. Cold compression decreased bleeding complications, and the second-lowest mean pain scores.

Keywords: Ice; Local anesthetics; EMLA; Hemifacial spasm; Botox injection; Pain reduction

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Hemifacial spasm is a neurological disorder that causes involuntary and asymmetrical facial muscle twitching or contraction[1]. Hemifacial spasm treatment depends on symptom severity and the underlying cause of the condition[1,2]. Botulinum toxin type A (Botox) injections can temporarily paralyze the affected muscles and reduce spasm severity[3]. Injections are required every few months[4,5]. During Botox injection, some techniques can be used to reduce patient pain and discomfort such as cold compression or a eutectic mixture of local anesthetics (EMLA) cream application[6].

Cold compression involves the application of ice or a cold pack to the injection site before and after injection. The cold temperature helps to numb the area and reduces pain, inflammation, and the incidence of bleeding complications[7]. In contrast, EMLA cream is a topical anesthetic applied to the skin before injection. EMLA cream contains a combination of lidocaine and prilocaine, which work together to numb the skin and reduce pain[8].

Studies have shown that EMLA cream application is effective in significantly reducing pain during Botox injections[9]. However, reports suggest that cold compression may not differ significantly or be more effective than EMLA in reducing pain[6,10].

Therefore, the choice between cold compression

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and EMLA cream application depends on patient preferences and needs, as well as clinician recommendations. The present study compared the results of cold compression, EMLA cream application, control, and control with placebo intervention during Botox injection for the treatment of hemifacial spasm regarding pain control, preparation difficulty, patient satisfaction, and complications, at Krathumbaen Hospital, Samut Sakhon, Thailand.

Materials and Methods

The present study was a prospective study approved by the Research and Ethics Committee of Krathumbaen Hospital, Samut Sakhon (COA No. 014/2565), Ministry of Public Health, Thailand. The study was conducted between June 2022 and March 2023. Twenty-two patients experiencing hemifacial spasms participated. Each participant signed informed consent. The study adhered to the principles of Good Clinical Practice (Helsinki Declaration) (No.014/65). The inclusion criteria were patients having spasms affecting the zygomaticus and risorius muscles. The exclusion criteria included resistance to botulinum toxin, prior surgical treatment, local infections, pregnancy, breastfeeding, or failure to complete four follow-up sessions. All participants received four botulinum toxin A (Botox, Allergan, USA) treatments, with a dosage of 20 to 30 units per patient in the facial area. The initial treatment took place in June 2022, followed by treatments at 3, 6, and 9 months.

All participants received four interventions in the same sequence as follows. During the first treatment, an ice pack (size of 15×20 cm) was applied to the face for five minutes before injection. For the second treatment, 5% EMLA cream (2.5% lidocaine and 2.5% prilocaine, Aspen, USA), was applied to the face 30 minutes before injection, while the third treatment was performed without any prior application of pain-reducing agents and used as control. The fourth treatment involved the application of a base cream, which was used as control with placebo intervention, at the injection site 30 minutes before the procedure.

Pain, preparation difficulty, and satisfaction scores were subjectively evaluated, each on a 0 to 10 scale. All neurological and bleeding complications were documented. The bleeding site was recorded when bleeding was observed immediately after needle removal. The bleeding and bruise site ratios were calculated by dividing the number of bleeding sites by the number of injection sites, and the number of bruise sites by the number of injection sites, respectively.

Table 1. Patient demographic and clinical data

Characteristics	Total n=22
Age (years); mean±SD	61.9±13
Sex; n (%)	
Male	6 (27.3)
Female	16 (72.7)
Underlying disease; n (%)	
DM	4 (18.2)
HT	8 (36.4)
Old CVA	1 (5.6)
SLE	1 (5.6)

SD=standard deviation; DM=diabetes mellitus; HT=hypertension; CVA=cerebrovascular accident; SLE=systemic lupus erythematosus

Statistical analysis

All statistical analyses were performed using Microsoft Excel and Stata Statistical Software, version 16 (StataCorp LLC, College Station, TX, USA). The mean and standard deviation of the pain score, preparation difficulty, satisfaction score, bleeding site ratio, and bruise site ratio were compared among the four methods. The number of injection sites and neurological complications were compared using chi-square tests for trend. Continuous variables were compared with repeated measure ANOVAs. Statistical significance was set at a p-value less than 0.05.

Study sample calculation

According to the authors' related (unpublished) pilot study, the mean pain score during Botox injection for the treatment of hemifacial spasm after cold compression was 4.0±1.5. The authors projected that including 18 patients in the present study would demonstrate a significant difference in pain score between cold compression and EMLA cream application of 1, using a standard deviation of 1.5, an alpha value of 0.05, and an expected power of 80%. Thus, with an estimated 20% loss to follow-up, 22 patients needed to be enrolled in the present study.

Results

Table 1 provided key demographic and clinical information of the 22 study participants. Four underlying diseases were presented among the participants, diabetes mellitus (DM), hypertension (HT), old cerebrovascular accident (CVA), and systemic lupus erythematosus (SLE).

Table 2. Comparison of the four pain-reducing interventions before botulinum toxin injection treatment

Outcomes	Method 1 Cold compression	Method 2 EMLA cream application	Method 3 Control	Method 4 Control with placebo intervention	p-value (among all methods)	p-value of
Pain score; mean±SD	3.82±1.97	2.14±1.67	5.45±1.53	5.14±2.27	<0.01*	1 vs. 2, 0.02*
						1 vs. 3, 0.03*
						1 vs. 4 0.14
						2 vs. 3, <0.01*
						2 vs. 4, <0.01*
						3 vs. 4, 1.00
Preparation difficulty; mean±SD	2.41±1.26	1.50±0.91	0.82±0.59	1.73±1.32	<0.01*	1 vs. 2, 0.03*
						1 vs. 3, <0.01*
						1 vs. 4, 0.22
						2 vs. 3, 0.22
						2 vs. 4, 1.00
						3 vs. 4, 0.03*
Satisfaction score; mean±SD	8.50±1.63	9.45±0.91	6.91±1.23	8.32±0.95	<0.01	1 vs. 2, 0.06
						1 vs. 3, <0.01*
						1 vs. 4, 1.00
						2 vs. 3, <0.01*
						2 vs. 4, 0.02*
						3 vs. 4, <0.01*
Number of injection sites; median (range)	9 (7 to 11)	9 (8 to 12)	9 (7 to 12)	9 (7 to 13)	1.0	
Neurological complication-transient facial asymmetry or drooling while drinking water; n (%)	5 (22.72)	6 (27.27)	5 (22.72)	6 (27.27)	0.97	
Bleeding site ratio; mean±SD	0.30±0.14	0.44±0.18	0.42±0.18	0.44±0.22	0.035*	
Bruise site ratio; mean±SD	0.05±0.08	0.09±0.10	0.07±0.08	0.10±0.08	0.19	

SD=standard deviation; EMLA=eutectic mixture of local anesthetics

* Significant differences among the four methods

Significant differences were observed in pain scores among the four interventions ($p<0.01$) (Table 2). Specifically, the mean pain score for the EMLA cream application was significantly lower than the other three methods at 2.14 to 3.82, 5.45, and 5.14, respectively. Cold compression was significantly lower than the mean pain score for the control and the control with placebo intervention. Finally, the mean pain score for the control with placebo intervention was not significantly different from the mean pain score for the control. The difference in preparation difficulty score among the four methods was statistically significant ($p<0.01$). The control without placebo intervention had the lowest preparation difficulty score at 0.82 and showed no significant difference with EMLA application. Cold compression had the highest preparation difficulty score. The highest satisfaction score was achieved by EMLA cream application at 9.45 and significantly higher than the control and the control with placebo interventions. A higher satisfaction score was observed in the control with placebo intervention at 8.32 than in the control, which showed the lowest satisfaction score at 6.91. The number of injection sites and neurological complications were not significantly different among the four methods. The bleeding site ratio was lowest in the cold compression method. The four interventions showed significant differences. However, no differences were observed between the interventions. Moreover, the bruise site ratio among the four methods showed no significant differences.

Discussion

The present study compared four pain-reducing methods before Botox injection treatment for hemifacial spasm regarding pain, preparation difficulty, satisfaction, and complications. All patients were consecutively treated with cold compression, EMLA cream application, no intervention, or placebo before Botox injection. The results of this study suggest that cold compression and EMLA cream application effectively reduce pain during Botox injections, whereas placebo treatments and no interventions are less effective. EMLA cream application showed the lowest mean pain score

significantly compared with the other three methods. Moin and Irfan reported a remarkable pain reduction and easier Botox administration in patients with facial dystonia compared with a control by using EMLA cream before Botox injections[9]. Elibol et al. showed that EMLA and skin cooling application significantly decrease pain associated with periocular Botox injection, compared with cold compression. However, no clinical or statistically significant difference was observed in pain scores between the two methods[6]. Reports have shown the benefits of ice application on patient comfort[7,11,12]. One report even showed better performance of ice application over EMLA in patients with palmar hyperhidrosis[10]. An explanation for this might be the difference in affected areas, for face versus hands in this case, or between highly vascularized areas and skin with normal thickness. EMLA may be more effective in highly vascularized, thin skin areas such as that of the face or mucosa compared with low vascularized, thick skin such as the hands or other extremities[13,14].

Regarding the perceived preparation difficulty for the procedure, unsurprisingly the control without placebo intervention had the lowest score, indicating that it was perceived as the least complex. EMLA cream application did not significantly differ from the control without placebo intervention in terms of difficulty. Cold compressions were associated with the highest difficulty scores. This may be because patients do not tolerate the weight of the ice bag or because of difficulties with molding the bag to a contoured area[15,16].

The application of EMLA cream yielded the highest patient satisfaction scores, significantly surpassing those observed in both the control and control receiving placebo intervention. However, it is important to note a limitation of EMLA, which necessitates application 30 minutes prior to a Botox injection. This extended preparation time stands in contrast to the 5-minute application time for cold compression. This factor could potentially account for the lack of significant difference in satisfaction scores between the two modalities. Additionally, the authors observed that the control receiving placebo intervention had a higher satisfaction score than the control without placebo intervention, with no difference in pain scores between the two approaches. Literature had shown that EMLA and placebo creams could reduce pain without significant differences during the procedure[17,18]. Consequently, the present study suggests that the presence of the cream, rather than its actual efficacy, might have contributed to the increased satisfaction score in the control receiving the placebo intervention.

No significant differences were observed in the number of injection sites or neurological complications among the four pre-injection methods. Transient neurological side effects of Botox injections are usually not severe, these include ptosis, excessive facial weakness such as mouth droop, diplopia, dry eyes, eyelid edema, tearing, corneal exposure, and difficulty focusing caused by ciliary muscle weakness[19]. The bleeding site ratio was lowest in the cold compression method and showed significant differences among the four interventions, however, no differences were observed between the interventions. In terms of bleeding sequelae, the bruise site ratio among the four methods showed no significant differences. Ice application may decrease bleeding complications due to the vasoconstrictive effect of cold[5,12], while EMLA has no clinically relevant vasoconstriction effects[20].

Conclusion

The EMLA cream application had the lowest mean pain and highest satisfaction scores. Control with placebo intervention increased the satisfaction score without reducing the mean pain score. Iced compression decreased bleeding complications and had the second-lowest mean pain scores.

However, the present study had limitations, and further research is needed to confirm these findings.

What is already known on this topic?

1) Botox is a recognized and established therapy for hemifacial spasm.

2) Botox injections can be effective in treating hemifacial spasm but may cause discomfort and pain.

3) The associated pain and discomfort from Botox injections can limit its usefulness.

What does this study add?

This study evaluated different approaches before Botox injections, namely, the use of a EMLA cream, ice application, and placebo, as potential methods to alleviate pain and improve patient satisfaction before Botox injections for hemifacial spasm. This study provides valuable insights into the effectiveness of these approaches in terms of pain management, preparation difficulty, and patient satisfaction, as well as their potential impact on complications such as bleeding. Notably, this study found that placebo administration results in higher patient satisfaction compared to the control, irrespective of pain scores.

Conflicts of interest

The authors declare no conflicts of interest.

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