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Original research article

COMPARISON OF BUPIVACAINE ALONE AND BUPIVACAINE PLUS LIDOCAINE IN SUPRACLAVICULAR BLOCK UNDER ULTRASOUND GUIDANCE

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Abstract: *This study aimed to compare the effectiveness of bupivacaine alone versus bupivacaine combined with lidocaine in patients undergoing ultrasound-guided supraclavicular block. Specifically, the study focused on the onset time and duration of the block effect. The study was designed as a retrospective study in the anesthesia room of the operation theater of Sheikh Zayed Hospital, Lahore, from 2nd November 2021 to 1st May 2022. A total of 200 patients who met the inclusion criteria were included in the study. Prior to the intervention, patients were given midazolam (2mg) to help alleviate anxiety. The participants were then divided into two groups, with 100 patients in each group. Group A received bupivacaine 20 ml (5 mg/ml), while Group B received bupivacaine 10 ml (5 mg/ml) in combination with lidocaine 10 ml (20 mg/ml). The onset and block effect times were recorded in a Performa and subjected to statistical analysis. The results of the study showed that the mean block onset time in Group A (bupivacaine alone) was 9.4±1.34 minutes, while in Group B (bupivacaine plus lidocaine), the mean block onset time was 5.4±0.83 minutes (p=0.000). A comparison of the mean block effect time revealed that in Group A, the mean block effect time was 4±1.34 minutes, while in Group B, the mean block effect time was 6±0.83 minutes. This difference was found to be statistically significant (p=0.000). In conclusion, the study demonstrated that the combination of bupivacaine plus lidocaine was significantly associated with a shorter block onset time and a longer block effect time compared to bupivacaine alone.*

Keywords: Block anesthesia, Bupivacaine, Lidocaine,

Introduction

Ultrasound-guided blockade of the brachial plexus is used for supraclavicular, infraclavicular, and axillary approaches. (Waly and Nasr, 2019) Among the different methods to brachial plexus, the supraclavicular block has widespread blockade of the sensory system. (Mounir et al., 2020; Small et al., 2021) Ultrasound-guided supraclavicular partnerships result in the elimination of block failure seen with neurostimulation done alone in the past. It has improved safety in locating blocks and visualizing pleura and needle position. Due to this, its use has increased over the past few years. Lidocaine is an anesthetic given locally, and it is water soluble and has solubility in lipids. It can be utilized in all types of regional blocks. (Stillman and Whittaker, 2019) Although it can be used in nerve blocks peripherally, most clinicians prefer using long-acting anesthetics. It is because of a need for a persistent effect of anesthesia during the postoperative period. In comparison to local anesthetics, bupivacaine is an anesthetic that is long-acting and is an inexpensive agent. (Prasad et al., 2020)

A combination of Bupivacaine and Lidocaine anesthetics has been used in various surgeries to attain a long and deep block effect of bupivacaine and quick onset of action of lidocaine. (Kukreja et al., 2019) A study revealed that the block was effective in 95.7% of patients administered combination treatment; bupivacaine had a longer onset time compared to bupivacaine plus lidocaine (p< 0.001). (Xuan et al., 2021) The block effect time also was longer in the group that received the combination of bupivacaine and lidocaine compared to bupivacaine alone, i.e., 6.1±2.21 hours and 4.4±1.21 hours respectively, and this difference was statistically significant too (p =0.001).

However, no study has been conducted in Pakistan, specifically regarding supraclavicular block. This study compares the effect of Bupivacaine alone and Bupivacaine plus Lidocaine in patients undergoing ultrasound-guided supraclavicular block regarding onset time and block effect time. This would help in creating awareness regarding the anesthetic strategy that is more effective and would yield better outcomes, thus making it more comfortable and satisfactory for the patients.

Methodology

The retrospective study was conducted in the anesthesia room of the operation theater of Sheikh Zayed Hospital, Lahore, from 2nd November 2021 to 1st May 2022. Two hundred patients aged > 18 who were candidates for hand or forearm surgery were included. Patients with hypotension, neurological disorders, those receiving anti-thrombotic treatment, having an infection, or drug addiction were excluded. All patients signed consent to become a part of the study. The ethical board of the hospital approved the study.

Demographic details were noted down on the Performa by the researcher herself. Patients were then shifted to a regional anesthesia room within the operation theater. Blood pressure, heart rate, and peripheral oxygen saturation were monitored. Patients were sedated with midazolam (2mg) before the intervention to overcome anxiety. Then,

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the participants (100 in each group) were divided into two groups. Group A was administered bupivacaine 20 ml (5 mg/ml), and Group B was given bupivacaine 10 ml (5 mg/ml) plus lidocaine 10 ml (20 mg/ml). The onset time and block effect time were noted on the Performa and subjected to statistical analysis.

All the data was analyzed using SPSS 17. Mean and standard deviation were used for quantitative data such as age, block onset time, block effect time, and depth of needle insertion. Qualitative data such as gender, needle insertion angle, and number of needle redirection were presented as frequency and percentages. Stratification according to age, gender, needle insertion angle, depth of needle insertion, and number of needles redirection was done. A stratification t-test was applied to deal with the effect. Comparison in terms of block onset time and effect time between the two groups was made by independent sample–test. A p-value of less than or equal to 0.05 was considered statistically significant.

Results

The mean age (in years) of the patients was 41±8.97. The mean block onset time was 7.4±2.35 minutes. The mean block effect time was 5±1.36 minutes. The mean depth of the needle was 4.1±0.72cm. There were 109 (54.5%) males and 91 (45.5%) females. Regarding needle insertion angle, in 13 (6.5%) patients, the needle was inserted at 10 degrees angle. In 108 (54%) patients, the needle was inserted at 15 degrees angle. In 53 (26.5%) patients, the needle was inserted at 20 degrees; in 26 (13%), the needle was inserted at 25 degrees. In terms of the number of needle redirections, the hand was redirected one time in 6 (3%) patients, two times in 130 (65%) patients, three times in 31 (15.5%) patients, four times in 23 (11.5%) patients, five times in 7 (3.5%) patients and six times in 3 (1.5%) patients.A comparison of mean block onset time was made, and it was revealed that in Group A (bupivacaine alone), the mean block onset time was 9.4±1.34 minutes, and in Group B (bupivacaine plus lidocaine), the mean block onset time was 5.4±0.83 minutes (p=0.000). A comparison of mean block effect time was made, and it was revealed that in Group A (bupivacaine alone), the mean block effect time was 4±1.34 minutes, and in Group B (bupivacaine plus lidocaine), the mean block effect time was 6±0.83 minutes (p=0.000). Stratification of mean block onset time in both groups according to age, gender, depth of needle insertion, number of needle redirections, and needle insertion angle was done, and the results revealed a statistically significant difference between the two groups with respect to all effect modifiers (P <0.05) (Table I). Stratification of mean block effect time and mean block effect time in both groups revealed a statistically significant difference between the two groups with respect to all effect modifiers (P<0.05).

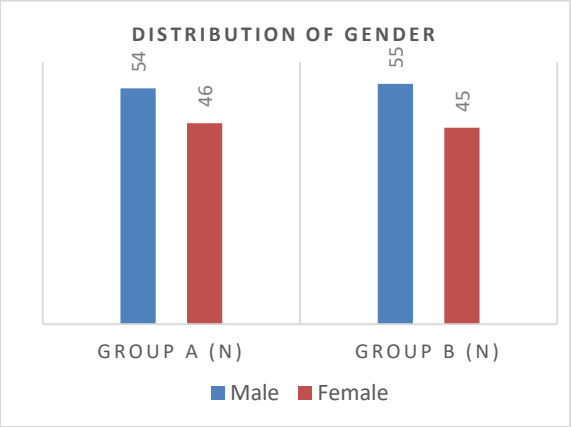

Figure 1 Distribution of Gender in both groups

Table I Stratification of mean block onset time and mean block effect time based on study variables

Variable	Group		P value
	Group A (n)	**Group B (n)**	
Age			
18-40	48	43	<0.05
41-60	52	57	
Sex			
Male	54	55	<0.05
Female	46	45	
Depth of needle			
<3cm	22	18	<0.05
>3cm	78	82	
Number of needle redirection			
<3	87	80	<0.05
>3	13	20	
Needle angulation			
<15degree	62	59	<0.05
>15degree	38	41	

Discussion

The result of the current study show that block onset time and block effect time in both groups differ significantly, and the mean block onset time was shorter in the combination group compared to bupivacaine alone (p=0.000), and the mean block effect time was higher in the former group

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(p=0.000). The mean block onset time and mean block effect time differed significantly between the groups with respect to age, gender, needle insertion depth, needle redirections, and needle insertion angle. In addition to providing sustained postoperative analgesia, an ultrasound-guided approach to axillary brachial plexus block is a good alternative as it results in vasodilatation and causes minimal hemodynamic variation. (Zhang et al., 2020) While bupivacaine local anesthesia has a longer duration of action, its onset is slower than that of lidocaine. (Jiang et al., 2020) A study assessed the efficacy of supraclavicular block with 0.5% bupivacaine alone compared to co-administration of additives to bupivacaine. It was revealed that in the lidocaine plus bupivacaine group, the mean block onset time was 9.74 minutes compared to 20.39 minutes in the bupivacaine alone group. (Zhang et al., 2021) Espahbodi et al. evaluated the effect of bupivacaine with an additive versus bupivacaine alone in patients undergoing upper limb orthopedic surgery. They reported that onset was significantly shorter in the combination group (p=0.0001) (Espahbodi et al., 2022). These findings are consistent with our study findings that the mean block onset time was significantly shorter in patients who received a combination of bupivacaine plus lidocaine than bupivacaine alone.

Abdelhady et al. compared bupivacaine alone with bupivacaine plus lidocaine for axillary brachial plexus block, and the results showed that regarding the onset of sensory anesthesia, there was a statistically non-significant difference between both groups where the combination group had a shorter time of onset than bupivacaine alone group,i.e., 9.05±1.36 versus 9.77±0.97 minutes. (Abdelhady et al., 2022) A study determined the difference in duration of effect by adding 0.5% bupivacaine to 2% lidocaine compared to 2% lidocaine with adrenaline. It was revealed that the block duration was longer in the combination group compared to the group where lidocaine was used alone, i.e., 5.7 hours versus 3.9 hours(Chongarunngamsang, 2017). These findings are consistent with our study findings that the mean block effect time was significantly longer in patients who received a combination of bupivacaine plus lidocaine compared to bupivacaine alone.

However, few studies showed that there was no significant difference in terms of effect time between patients who received bupivacaine alone compared to those who received bupivacaine plus lidocaine. (Başkan et al., 2022; Gunjiyal et al., 2021)Our study findings are inconsistent with these as in our study; there was a significant difference between the two groups.

The current study had certain limitations. Firstly, the sample size was small, and the study was carried out at a single center, so the results' generalizability was addressed. Secondly, the effect was only assessed in supraclavicular blocks; thus, the impact in other brachial plexus blocks of the agents cannot be commented on. Lastly, it was not considered whether an increased dose of lidocaine or a sequential increase in the dosage of lidocaine accelerated the onset of the block or not.

Conclusion

The current study concluded that the combination of bupivacaine plus lidocaine was significantly associated with a shorter block onset time and a long block effect time compared to bupivacaine alone.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

Approved by the department Concerned.

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

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