ORIGINAL ARTICLE

Compare the Analgesic Efficacy of Nalbuphine with Ropivacaine Versus Ropivacaine alone in Supraclavicular Brachial Plexus Block

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ABSTRACT

Objective: To compare the efficacy of ropivacaine with nalbuphine versus ropivacaine alone in supraclavicular block.

Study Design: Randomized controlled trial

Place and Duration of Study: Department of Anesthesia, Doctors Trust Teaching Hospital Sargodha and Department of Anesthesia, DHQ Teaching Hospital Sargodha, from 1st January 2020 to 31st July 2020.

Methodology: Sixty patients of both genders with ages 20 to 65 years undergoing elective upper limb surgeries having ASA class I and II were enrolled in this study. All the patients were divided equally in to two groups, each group consist of 30 patients. Group I received ropivacaine with nalbuphine and group II received ropivacaine with normal saline. Effectiveness between both groups in term of time to sensory blockade and motor blockage and time to rescue analgesia were examined.

Results: No significant difference was observed regarding age, gender, body mass index and ASA class I/II between both groups with p-value >0.05.A significant difference was found regarding onset time of sensory and motor blockade between both groups I and II (6.56±2.34 vs 12.64±2.27 min) and (10.58+3.24 vs 16.32±3.78 min) p-value <0.05. In group I mean duration of sensory blockade was longer 548.74±28.33 minutes as compared to group II 357.18±24.66 min minutes. Mean duration of motor blockade was also longer in group I 452.43±22.38 minutes as compared to group II 234.21±15.84 minutes (p-value <0.05).

Conclusion: Ropivacaine 0.75% as an adjuvant to nalbuphine is safe and effective for supraclavicular brachial plexus block in patients undergoing elective upper limb surgeries.

Keywords: Brachial plexus block, Ropivacaine, Nalbuphine, Supraclavicular, Postoperative analgesia

INTRODUCTION

In upper limb surgery, Brachial plexus block is a safe alternative to general anesthesia (GA). When used optimally, regional nerve blocks provide good operating conditions. They not only offer exceptional intraoperative analgesia, but also provide strong analgesia after surgery. They cause the least conflict with the body's essential physiological functions and lower the response to stress.[1] Disadvantages are ineffective or failed block, local toxicity to anesthetic that can be reduced under ultrasound guidance by giving block.

Secure methods for regional blocks are enabled by ultrasound simulation of anatomical structures. The anesthetist secures optimum needle placement with the aid of USG and can track local anesthetic delivery in real time.[2,3]

Ropivacaine is a noble local anesthetic that is considered to be superior to bupivacaine because when given through the epidural path, it provides more differential block. This produces less toxicity to the cardiovascular and central nervous system than bupivacaine. When used at high concentrations in peripheral nerve blocks and epidural anesthesia[4], the reduced systemic toxicity makes it ideal for local anesthetic agents. Ropivacaine was used with great benefit in the brachial plexus block.[5]

Different drugs and local anesthetic adjuvant have been used to extend the duration of analgesia during the brachial plexus block. In processes such as subarachnoid block (SAB), epidural block, nalbuphine, an agonist-antagonist opioid, has been studied as an adjuvant and has been found to be successful in increasing block length. It has the ability to sustain or even improve analgesia dependent on μ-opioid while simultaneously mitigating the side effects of μ-opioid.[6] Nalbuphine is cardiacally stable with an onset of action of 2 to 3 minutes, an action time of 3 to 6 hours, and has mild side effects of 0.2 to 0.4 mg/kg.[7] Nalbuphine can be used for pain relief in children with burns, neoplastic or haematological diseases because of its safety profile. Nalbuphine has not been extensively investigated for its effects as an adjuvant to local anaesthetics during brachial plexus blocks, despite its known benefits for pain management.[8]

Present study was conducted with aimed to compare the efficacy of ropivacaine as an adjuvant to nalbuphine and ropivacaine alone in supraclavicular brachial plexus block in patients undergoing elective upper limb surgeries.

MATERIALS AND METHODS

This randomized controlled trial was conducted at Department of Anesthesia, Doctors Trust Teaching Hospital Sargodha and Department of Anesthesia, DHQ Teaching Hospital Sargodha from 1st January 2020 to 31st July 2020. A total 60 patients of both genders with ages 20 to 60 years undergoing elective upper limb surgeries were enrolled. Patients detailed demographics including age, sex, body mass index, and ASA class I or II were recorded. Pregnant women, renal failure patients, infection at the injection site, allergy to local anesthetics, preexisting neuromuscular, severe cardiovascular, or pulmonary disease, renal or hepatic disorder, refusal to technique, or inability to visualize the brachial plexus with ultrasound guidance or failure of block were excluded. All the patients

were divided equally in to two groups, each group consist of 30 patients. Group I received 25 ml of ropivacaine 0.75% with 10mg nalbuphine and group II received 0.75% ropivacaine with normal saline. All the patients received brachial plexus block through the supraclavicular approach using US guidance (The Sonosite Micromaxx™ Bothell, Washington, USA machine with a 6–13 MHz linear probe) by an experienced anesthesiologist. Effectiveness of doses in term of onset time to sensory and motor blockade, time duration of sensory and motor blockade and duration of analgesia were examined and compare the results between both groups.

All the data was analyzed by SPSS 24. Chi-square test was applied to compare the findings between both groups. P-value <0.05 was taken as significant.

RESULTS

In group I, 20 (66.67%) patients were males and 10 (33.33%) were females and mean age was 37.34±10.28 years. In group II, 21 (70%) were males and 9 (30%) were females with mean age 38.01±9.75 years. Mean BMI of group I patients was 25.23±2.38 kg/m^2 and in group II it was 25.38±2.16 kg/m^2. In group I 23 (76.67%) patients had ASA class I and 7 (23.33%) had ASA class II, in group II 24 (80%) and 6 (20%) patients had ASA class I and II. No significant difference was observed between both groups regarding age, gender, BMI and ASA class with p-value >0.05 (Table 1).

A significant difference was found regarding onset time of sensory and motor blockade between both groups I and II (6.56±2.34 vs 12.64±2.27 min and 10.58+3.24 vs 16.32±3.78 min with P<0.05 (Table 2). In group I, mean duration of sensory blockade was longer 548.74±28.33 minutes as compared to group II 357.18±24.66 min minutes. Mean duration of motor blockade was also longer in group I 452.43±22.38 minutes as compared to group II 234.21±15.84 minutes. In group I duration of rescue analgesia was significantly longer in group I 655.18±32.27 min as compared to group II 342±30.59 min. Statistically significant difference was observed between both groups with p-value <0.05 (Fig. 1). No significant difference was observed regarding adverse effects between both groups with p-value >0.05 (Table 3)

Table 1: Baseline details of all the patients

Variable	Group I (n=30)	Group II (n=30)
Mean age (years)	37.34±10.28	38.01±9.75
Mean BMI (kg/m^2)	25.23±2.38	25.23±2.38
Gender		
Male	20 (66.67%)	21 (70%)
Female	10 (33.33%)	9 (30%)
ASA class		
I	23 (76.67%)	24 (80%)
II	7 (23.33%)	6 (20%)

P-value >0.05

Table 2: Comparison of onset time to sensory and motor block between both groups

Variables	Group I	Group II	P-value
Onset Sensory block (min)	6.56±2.34	12.64±2.27	0.001
Onset Motor block (min)	10.58+3.24	16.32±3.78	0.001

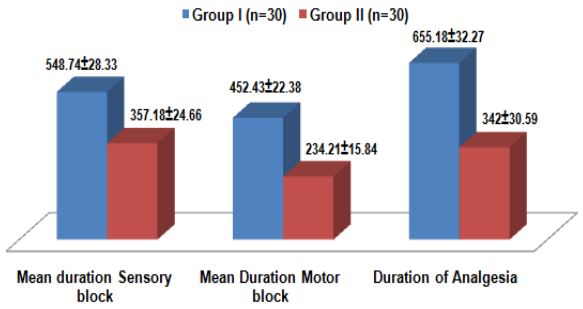

Fig. 1: Comparison of time duration of sensory and motor block and duration of analgesia between both groups

Table 3: Comparison of adverse effects between both groups

Adverse effects	Group I (n=30)	Group II (n=30)	P-value
Nausea	2 (6.67%)	4 (13.33%)	N/S
Vomiting	3 (10%)	4 (13.33%)	N/S

DISCUSSION

Many of drugs have been used to attain the better efficacy for brachial plexus block by supraclavicular approach in which bupvicaine and nalbuphine showed better effectiveness.[9,10] We conducted present study to examine the effectiveness of nalbuphine 10mg with 0.75% ropivacaine and compare with ropivacaine 0.75% alone in supraclavicular brachial plexus block under ultrasound guidance. In this regard 48 patients whom were undergoing upper limb surgical procedures electively were enrolled in this study. Majority of patients in both groups A and B were male 66.67% and 70% and females were 33.33% and 30%. Overall mean age of patients was 35.76±10.82 years. These results was comparable to many of previous studies in which among patients who were undergoing upper limb surgeries, male patients were high in numbers as compared to females 65% to 80% Vs 30% to 40% and the average age of patients was 40 years.[11,12] We found no significant difference regarding body mass index and ASA class I and II. A study by Gupta et al[13] regarding efficacy of nalbuphine as an adjuvant to 0.5% bupvicaine reported that mean BMI of nalbuphine with bupvicaine group patients was 21.63±3.21 and in other group it was 20.58±2.78 kg/m^2.

In present study we found a significant difference regarding onset time of sensory and motor blockade between both groups I and II (6.56±2.34 vs 12.64±2.27 min) and (10.58+3.24 vs 16.32±3.78 min) p-value <0.05. These results were similar to the study by Nazir et al[14] regarding analgesic effectiveness of nalbuphine as an adjuvant to bupvicaine reported that patients received nalbuphine with bupvicaine had significantly shorter onset time to sensory and motor block as compared to bupvicaine alone with p-value <0.05. Another study by Yadav et al[15] reported there was no significant difference between both groups (nalbuphine with ropivicaine and ropivicaine alone) regarding onset time to sensory and motor block 11.58±3.56 vs 10.84±3.24 (p = 0.40) and 13.12±4.98 vs 11.23±3.29 (p = 0.09).

In this study we found that patients whom were received nalbuphine as an adjuvant to ropivacaine had significantly longer duration of sensory blockade

548.74±28.33 minutes and motor block 452.43±22.38 minutes also had longer duration of rescue analgesia 655.18±32.27 minutes as compared to patients whom were received ropivacaine alone sensory blockade duration 357.18±24.66 minute, motor block 234.21±15.84 minutes and rescue analgesia 342±30.59 minutes. These results were comparable to many of previous studies in which patients received nalbuphine as an adjuvant to 0.5% and 0.75% ropivacaine had significantly longer time duration to sensory, motor block and rescue analgesia when compared to bupvicaine alone.[15,16-18]

We found no significant difference was observed regarding adverse effects between both groups with p-value >0.05. A study conducted by Jain et al[19] reported that no significant adverse effects were observed between nalbuphine adjuvant to ropivicaine and ropivacaine.

CONCLUSION

Ropivacaine 0.75% as an adjuvant to nalbuphine is safe and effective for supraclavicular brachial plexus block in patients undergoing elective upper limb surgeries. Nalbuphine as an adjuvant to ropivacaine had significantly longer duration of sensory, motor blockade and duration of rescue analgesia as compared to ropivacaine alone.

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