A Comparative Evaluation of Nalbuphine Addition to Levobupivacaine in Sciatic Nerve Block for Post-Operative Analgesia

Jitendra Agrawal[1], Ajay Singh[2], Rakhi Mittal[3], Bhanu Choudhary[4]

ABSTRACT

Introduction: Pain is a predictable and unavoidable issue in the postoperative Period. Untreated or poorly treated postoperative pain may lead to clinical and psychological changes which enhanced morbidity and mortality as well as the cost and it also impairs the quality of life. Study aimed to evaluate and compare analgesic effect and safety of nalbuphine in addition to levobupivacaine postoperatively in lower limb orthopedic surgeries.

Material and Methods: Sixty patients of America Society of Anaesthesiologists physical status I and II scheduled for lower limb orthopaedic surgeries in the Department of Anaesthesiology, Gajra Raja Medical College and JA Group of Hospitals, Gwalior were studied. The patients were divided into Group N (n=30, were given 24ml of 0.25% levobupivacaine hydrochloride + 1 ml(10mg) of nalbuphine) and Group C (n=30, were given 24ml of 0.25% levobupivacaine hydrochloride + 1ml of normal saline). Postoperative analgesia in terms of VAS score, time to first rescue analgesic (duration of analgesia) and side effect or complication were studied in each group.

Results: Male preponderance was noted in both group (25 in Group N and 26 in Group C; p=0.749). Mean age of patients in Group N and Group C was 37.90±10.03 and 38.93±12.55 years respectively (p>0.05). Vital parameters like mean pulse rate (min), Blood Pressure in mmHg (systolic and diastolic), and Sp02 (%) were comparable between groups (P>0.05). Mean Arterial Pressure (mmHg) was not significantly high in Group C compared to Group N. VAS score was 38.56±1.79 at 16 hours in Group N, and Group C had 49.46±1.132 at 8 hours (p value < 0.001). At 24 hours VAS score of group N and C were 15.17±1.497 and 15.67±1.714 respectively. Two patients in Group N and one patient in Group C experienced postoperative nausea and vomiting and one patient in each Group C and N experienced shivering postoperatively.

Conclusion: Nalbuphine along with Levobupivacaine hydrocholoride is a good alternative for post-operative pain relief as compared to Levobupivacaine alone with minimal postoperative complication.

Keywords: Orthopaedic Surgery, VAS Score, First Rescue Analgesic, Nalbuphine

INTRODUCTION

Clinical and psychological changes can occur due to untreated or partially treated postoperative pain and increases morbidity and mortality as well as cost. To improve quality of life appropriate and effective pain management requires a proactive approach using a variety of treatment modalities.[1] Regional anesthesia is a safe, inexpensive technique along with benefit of extended pain relief postoperatively. Effective treatment of pain blunts autonomic, somatic and endocrine responses. Treatment of postoperative pain by multimodal approach has become common practice, as no single drug has yet been identified to inhibit nociception without associated side effects.[2,3]

Many drugs and adjuvants have been used in the past and research still going on to find out drugs and different techniques that could prolong the duration of regional anesthesia and prolonged postoperative pain relief.

Nalbuphine is an opioid, structurally related to oxymorphone with an agonist action at the κ-opioid receptor and an antagonist activity at the μ-receptor. Nalbuphine and other agonists had provided reasonably potent analgesia in certain models of visceral nonciception.[5] Nalbuphine has been used as ambulatory sedative for MRI and other outpatient surgeries and is popular in producing analgesia during conscious sedation.

Hence present study was hypothesized to compare postoperative analgesic effect and safety of nalbuphine in addition to levobupivacaine in lower limb orthopedic surgeries.

MATERIAL AND METHODS

A prospective study including 60 patients of America Society of Anaesthesiologists physical status I and II scheduled for lower limb orthopaedic surgeries in the Department of Anaesthesiology, Gajra Raja Medical College and JA Group of Hospitals, Gwalior was done.

Informed written consent was taken from patients who were willing to participate in study. Patients posted for lower limb orthopaedic surgeries of ASA physical status I and II, age group between 18 to 65 years of either sex and having weight 50-90 kg and height ≥ 150 cm were included.

Patients who were not able to understand pain assessment test (VAS) and uncooperative were not included. Patients having history of clinically significant cardiovascular, pulmonary

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and other systemic disorder, patients having severe obesity (BMI > 35 kg/m2), coagulation disorder, on anticoagulants, allergy to local anaesthetic, or any contraindication to spinal anaesthesia, patients with history of drug allergy, patient on long term steroid therapy and pregnant patients were excluded from the present study.

Study groups were divided into Group N (n=30, were given 24ml of 0.25% levobupivacaine hydrochloride + 1 ml (10mg) of nalbuphine) and Group C (n=30, were given 24ml of 0.25% levobupivacaine hydrochloride + 1ml of normal saline)

RESULTS

Most of the patients were male in both the groups (25 in Group N and 26 in Group C; p=0.749). Mean age of patients in Group N and Group C was 37.90±10.03 and 38.93±12.55 years respectively (p>0.05) (table-1,2).

In Group N two patients experienced nausea and vomiting while in group C only one patient experienced nausea and vomiting. In Group C and N only one patient experienced postoperative shivering (graph-1,2).

Intra-operative Parameters	Group N	Group C	P value
Pulse rate (min)	86.752±4.19	91.519±15.79	NS
SBP (mmHg)	117.440±23.22	118.743±27.60	NS
DBP (mmHg)	85.522±5.36	89.619±7.60	NS
MAP (mmHg)	82.325±4.90	82.694±5.60	NS
Sp02 (%)	98.567±12.74	97.214±7.07	NS

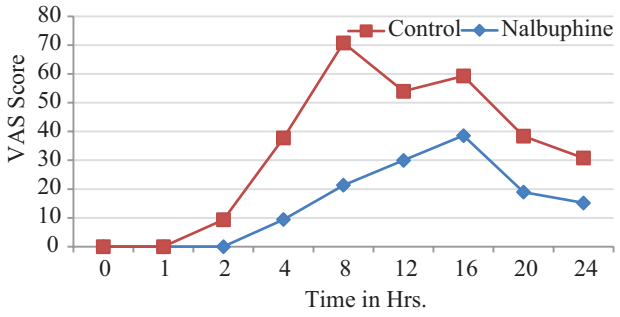
SBP; systolic blood pressure, DBP; diastolic blood pressure, MAP; mean arterial pressure, SpO_2; partial pressure of oxygen, NS; not significant, P value of<0.05 is considered as significant

Table-1: Comparing Intra-operative parameters between groups

Post-operative Parameters	Group N	Group C	P value
Pulse rate (min)	97.59±2.81	97.94±0.90	NS
SBP (mmHg)	105.522±5.36	111.619±7.60	NS
DBP (mmHg)	72.30±4.57	79.89±5.67	0.01*
MAP (mmHg)	97.59±2.80	97.94±0.91	NS
Sp02 (%)	97.567±12.07	98.214±7.17	NS

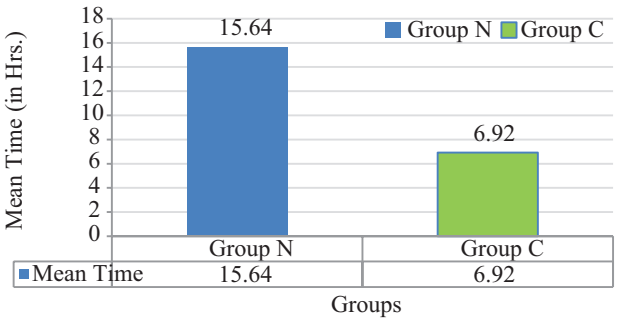
*between Group N and Group C, SBP; systolic blood pressure, DBP; diastolic blood pressure, MAP; mean arterial pressure, SpO_2; partial pressure of oxygen, NS; not significant, P value of<0.05 is considered as significant

Table-2: Comparing Post-operative parameters between groups



Data is expressed as mean, VAS; visual analogue scale,

Graph-1: Comparing VAS score at different time interval between groups



Graph-2: Showing time for first rescue analgesia between group

DISCUSSION

Pain is the most common established medical reason of delayed recovery and discharge after ambulatory surgery and leads to unwanted stay at hospital resulting in delayed return to work increasing cost of treatment and decreased productivity. Treatment of orthopedic surgical pain by conventional drugs (Paracetamol, non-steroidal anti-inflammatory drugs, and oral or intravenous opioids) is not complete. Use of opioids is associated with adverse effects, such as nausea, sedation, hypotension, reduced lung capacity and increased cardiac load. All these effects interfere with rehabilitation and early discharge.[6]

Mean age of patients in both the groups, Group N and Group C (37.90±10.03 vs. 38.93±12.55 years) were almost identical and comparable (P>0.05). The Mean (±SD) age of the patients in our study was well in accordance with the study done by other workers.[7,8]

Because of the nature of job males are more prone to accidents in comparison to females as evident in present study. Study was conducted only in routine hours after the preanaesthetic assessment of all the patients.

Intra-operative mean pulse rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, SpO2 were found to be stable between both the groups and statistically insignificant (P> 0.05). Post-operative mean pulse rate, blood pressure (systolic, diastolic and mean) between both the groups increased with increase in time due to bearing off of analgesic effect of drugs given intra-operatively but found to be statistically insignificant (P> 0.05). Our result was in accordance with the study conducted by Padma et al who studied the effectiveness of intrathecal nalbuphine as an adjunct for post operative analgesia. They found that intra operative and post-operative haemodynamic were not showing any significant difference.[8]

In present study, VAS score at 1,2,4,8,12,16,20 and 24 hours was almost same in both the groups. These findings were in accordance to Das et al who also found lower VAS score at 24 hours postoperatively in patients who were given nalbuphine along-with levubupivacaine in supraclavicular brachial plexus block for upper limb surgeries.[9] Several mechanisms of action have been hypothesized to explain the analgesic effect of nalbuphine. Nalbuphine is a synthetic

mixed κ-agonist, μ antagonist opioid with a moderate analgesic effect when compared to morphine. Apart from μ opioid based spinal and supraspinal analgesia, neuronal serotonin uptake inhibition leads to augmentation of the spinal inhibitory pathways for pain.[10]

Tiwari et al studied the effect of nalbuphine as adjunct to subarachnoid block and observed that nalbuphine is very effective in prolonging sensory block duration and delays analgesic requirements.[11]

Time for the first rescue analgesia was 15.64±4.34hrs and 6.92±1.24 hrs in nalbuphine and control group respectively which was found to be higher in nalbuphine group ($p<0.01$). Shakooh et al also concluded that intrathecal nalbuphine improved the quality of intraoperative and postoperative analgesia, with minimal side effects.[12]

In our study, we have found nausea and vomiting in both the groups. Nalbuphine group had 2 patients whereas control group had 1 patient. Incidence was quite comparable in both the groups. All the patients were managed with Inj. Ondansentron 4 mg i.v. 1 patient in each nalbuphine and control group had shivering postoperatively. YaDeau et al that buprenorphine either given perineurally or intravenous caused troubling nausea and vomiting although perineural buprenorphine prolonged block duration, reduced the worst pain experienced, and reduced opioid use.[13] Ahulwalia et al found that nausea and vomiting was associated with intrathecal nalbuphine group[14] while Mukherjee et al[15] reported increased incidence of nausea and vomiting with higher dose of nalbuphine given intrathecally.

CONCLUSION

Nalbuphine is a good alternative for post operative pain management given in sciatic nerve block along with Levobupivacaine hydrocholoride compared to Levobupivacaine hydrocholoride alone for post operative analgesia with minimal postoperative complication. Future research is needed to confirm and extend these observations.

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