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Original Research Article

Effect of Bilateral Infratrochlear and Infraorbital Nerve Block Combined With General Anesthesia for Nasal Surgeries: A Prospective Randomised Study

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Abstract:

Introduction: Pain and agitation are the commonest side effects after nasal surgeries which not only affect the recovery of the patient but also increase the hospital stay. With this background we decided to conduct the study in which we gave bilateral infra-trochlear and infra-orbital nerve blocks along with general anesthesia for nasal surgeries.

Method: 60 patients, who were posted for routine nasal surgeries were equally divided into 2 groups with 30 patients each (Group NB and Group GA). In group NB (Nerve block+ General anesthesia) we gave bilateral nerve blocks (Infra-trochlear and infraorbital) by using 0.5% Bupivacaine 5ml after general anesthesia, in group GA (General anesthesia) we didn't give any nerve block after general anesthesia. We observed intraoperative and postoperative analgesic requirement as well as hemodynamic stability of the patients.

Result: Total analgesic requirement were significantly less in group NB as compared to group GA both in intraoperative as well as early postoperative period. There was decrease in the time spent by the patient in postoperative anaesthesia care unit in Group NB as compared to Group GA.

Conclusion: Bilateral infra-trochlear and infraorbital nerve blocks, using 0.5% Bupivacaine during general anesthesia for nasal surgeries will not only decrease the intra-operative and post-operative analgesic requirement but also increase the intraoperative & postoperative hemodynamic stability.

Keywords: Bilateral Nasal Blocks, General Anaesthesia, Nasal Surgeries.

Introduction

Nasal surgeries under General Anaesthesia can usually be seen with mild to moderate post-operative pain, which can become severe post-operative pain in some instances.[1,2] This requires appropriate pain management strategies as it can lead to emergence agitation, which may result into self-extubation causing severe complication such as bleeding, aspiration, hypoxia or re-operation.[3,4]

The post-operative phase can involve significant discomfort, which can arises from factors such as soft tissue trauma, irritation of periosteal tissues, & the effects of interventions on bones, including osteotomies.[5,6] Moreover pain can be exacerbated by nasal packing after the surgery.[6,7] Therefore, we have to use the high doses of narcotics to decrease pain, but may also produce decreased alertness, respiratory depression, hypoxia, nausea and vomiting. However these side effects can be avoided when regional nerve block techniques are added with general anaesthesia. In other words, Pre-emptive analgesia can be a good option, which will also produce effective post-operative analgesia.[8] The American Society of Anesthesiologist's guidelines for Acute pain management during the peri-operative stage recommend a multi-modal analgesia approach, emphasizing the use of regional blockade techniques, where applicable.[9] Peripheral nerve blocks offer multiple advantages such as reducing tissue edema, ensuring a more comprehensive range of anaesthesia, and diminishing pain at surgical site.[10]

Facial nerve blocks are described for outpatient nasal surgeries, but their use for nasal procedures of prolonged duration and with risk of bleeding is limited.[11] Nasociliary and maxillary nerves form the primary nerve supply of the nose, nasal mucosa, septum and nasal cavity.[12] These 2 peripheral nerve blocks have been reported to facilitate pain management, reduce complications, and reduce anesthetic agent consumption after nasal procedures. Therefore, we decided to conduct a study with aim of determining the effect of preemptive bi-lateral infra-trochlear & infra-orbital nerve blocks on the dose of intraoperative fentanyl in nasal surgery under general anaesthesia.

Methodology

This Double-Blinded, Prospective, Randomized, Observational Controlled study was performed after taking permission from Institutional Ethics Committee of LNMC & JK Hospital, Bhopal (M.P.) The study was conducted from August 2022 to October 2023in our hospital. Patients aged between 18 to 60 years, having American Society of Anesthesiologists (ASA) physical status I and II, and undergoing elective nasal surgeries (should be less than 2 hours) were included in the study. Patients with ASA status III& above, allergy to local anaesthetic drug, bleeding disorder, surgical time exceeded 2 hours, pregnancy or not willing to attend the study were excluded.

After taking written informed consent, 60 patients were randomized using coin method and allocated into two groups (group A or group B). Patients in group A (n = 30) received bilateral nasociliary and maxillary nerve block with 15 mL of the local anaesthetic mixture (equal volume of 0.5% bupivacaine and 2% lignocaine) after administration of general anaesthesia. Group B (n = 30) patients did not receive any nerve block (control group). For blinding, plasters were applied on both sides of injection sites in patients in both groups. The patients were advised a fasting period of atleast 6 hrs. before surgery. In the preoperative room, Intravenous access was secured and adrenaline packing (without local anaesthetic) in nasal cavity was done as part of routine care.

On arrival in the operating room, standard monitors including ECG, Non-invasive blood pressure and Pulse oximetry were applied and baseline values were recorded. All patients were given intravenously 0.2mg Inj. Glycopyrrolate, 1mg Inj. Midazolam before the induction of anaesthesia. General anaesthesia was induced following 3 min of preoxygenation with fentanyl 2 µg/kg and 1.5-2mg Inj. Propofol given until response to verbal commands was lost. Vecuronium bromide 0.1 mg/kg was provided intravenously to assist tracheal intubation. Following induction of general anaesthesia, the pre-emptive nerve block was given on Group A. The infra-trochlear nerve block was given using a 24-gauge needle, inserted 1 cm above the inner canthus and directed medially and backward, keeping in contact with bone at the anterior ethmoidal foramen with 2.5mL of the study drug on either side. For infra-orbital nerve block, we have to imagine a line down from pupil to the inferior border of the infraorbital ridge, bicuspid teeth, & mental foramen. After that we have to find the inferior border on the infraorbital rim. Insert the needle on infraorbital foramen & after negative aspiration, 5 mL of the study drug was administered on either side. Anaesthesia was maintained with 1% Isoflurane & 33% Oxygen and 66% Nitrous oxide. Positive pressure ventilation was initiated with a tidal volume of 8 mL/ kg with an adjusted respiratory rate to maintain end-tidal carbon dioxide between 35 and 40 mmHg. The surgery was commenced 10 min later to allow for the full effect of the block. When the surgeon began nasal packing at the end of the surgery, isoflurane administration was discontinued and the fresh gas flow rate was increased to 6 L/min of oxygen only. At the beginning of spontaneous breathing by the patient, the reversal of neuromuscular blockade was done with a standard dose of Neostigmine and Glycopyrrolate. The trachea was extubated when the patient spontaneously breathed with tidal volume 5–8 mL/kg and could respond to a verbal request. In the PACU, the quality of recovery was assessed using modified Aldrete scoring on arrival and then every 15 min until 60 min. On the same schedule, pain intensity was assessed using the pain Visual Analogue Scale (VAS), and the time taken for the first request of analgesia was noted (period from the PACU arrival to the first request made by the patient for rescue analgesics). Both for intraoperative & postoperative analgesia, we use Inj. Tramadol for mild to moderate pain and Inj. Fentanyl for severe pain. For any increase from 15%-20% in heart rate & blood pressure, we gave resuce analgesia. Patients having any complications like PONV, anxiety, etc. were noted.

Result

This study included 60 patients by the Coin sampling method. Patient's demographic data were statistical non-significant with a p-value of more than 0.1. Mean age of patients were 34±0.8 years, Mean weight of patients were of 68±0.1 kgs, &Mean height of patients were 159±0.4cms. We had observed the analgesic requirement in both the groups, by measuring intraoperative & postoperative hemodynamic variation as well as postoperative VAS score. In table 1, we compared the mean Heart rate during intra-operative & post-operative period. O hours is considered as time of induction. On comparing 2 groups, there was a very well differentiation of Heart rate between 2 groups. As in group NB, Heart rate was very well

maintained within normal range, with statistical significant (p-value< 0.003).

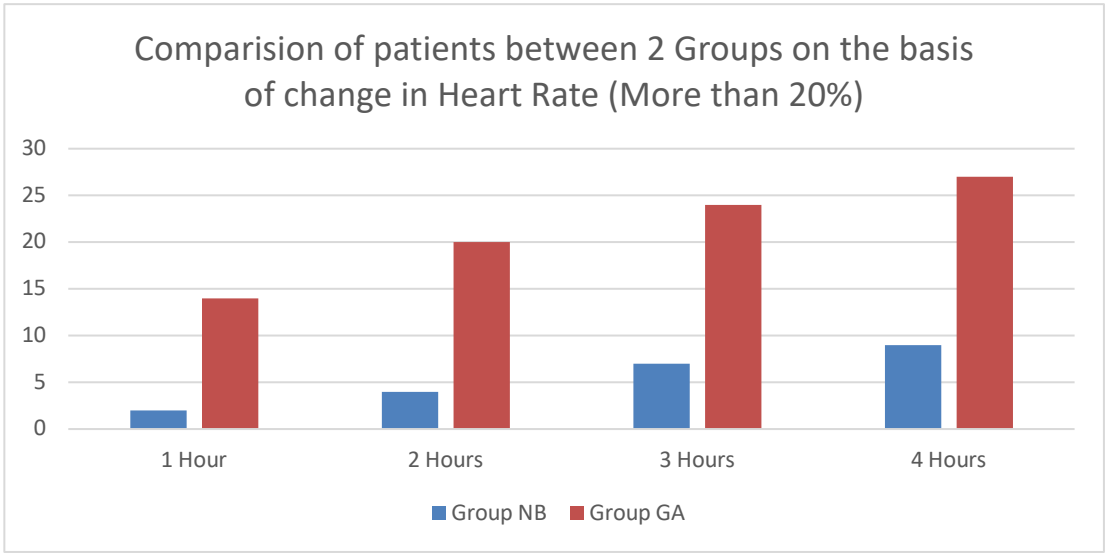

Figure 1: Comparison of patients between 2 Groups on the basis of change in Heart Rate (More than 20%)

In Table 2, we compared the mean blood pressure during intraoperative & postoperative period. O hours are considered as time of induction. On comparing 2 groups, there was a significant difference in mean blood pressure between 2 groups. In group NB, at different time interval blood pressure was not fluctuating from normal range, and it was statistically significant also (p-value< 0.003). In table 3, we compared the analgesic requirement of patients both in intraoperative as well as postoperative period. 0 hour is considered as time of induction & time of nerve blocks. During intraoperative period, only 3 patients required analgesic supplement in NB group while a total of 18 patients required analgesic supplements in group GA. And if we compared postoperative analgesic requirement, almost all 30 patients requires analgesic drug in group GA while in group NB, approx. 50% of the patients doesn't required analgesic drug upto 6 hours of surgery. Certain patients don't feel any pain upto 24 hours of surgery. We gave Inj. Tramadol for mild (VAS>3) to moderate (VAS 3-6) pain & Inj. Fentanyl for severe (VAS<7) pain during postoperative period. For intraoperative period, we gave Inj. Tamadol as analgesic supplement. During postoperative period, patients of group GA was having moderate to severe pain while patients of group NB had only mild pain. 12 patients of group GA had PONV while only 1 patient of group NB had the same.

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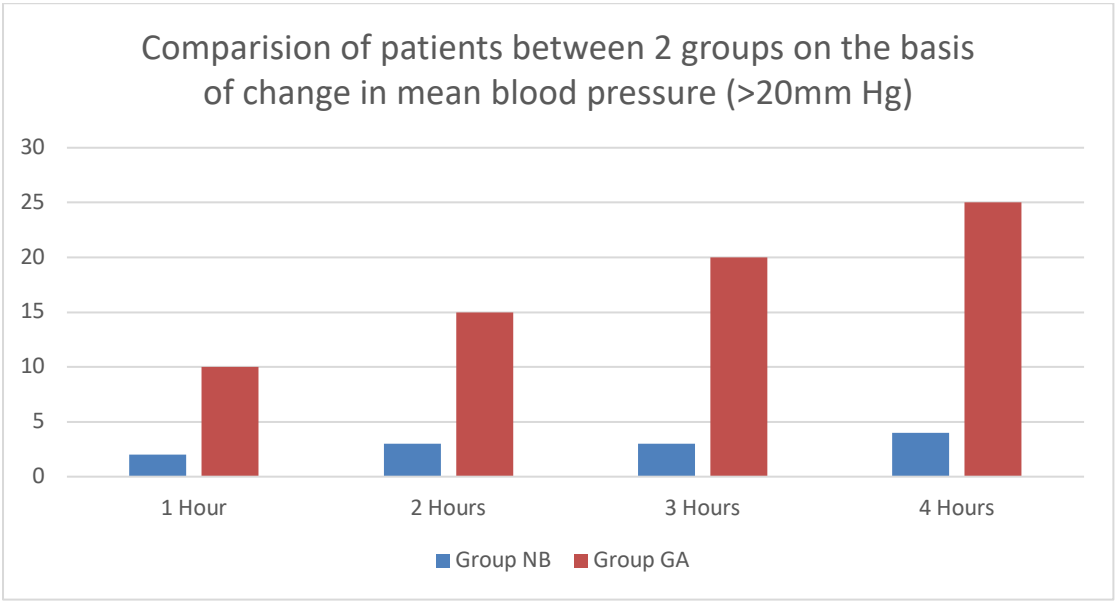

Figure 2: Comparision of patients between 2 groups on the basis of change in mean blood pressure (>20mm Hg)

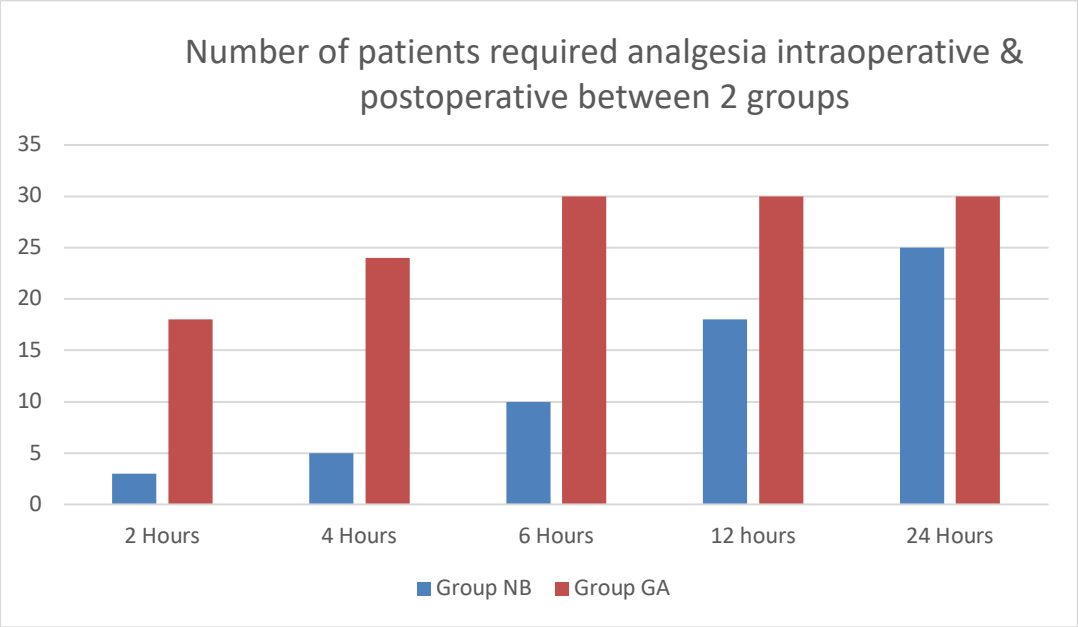

Figure 3: Number of patients required analgesia intraoperative & postoperative between 2 groups

Discussion

During nasal surgeries, the most common side effect is patient's discomfort along with intraoperative as well as post-operative pain. Nasal surgical procedures can be associated with incidence of pain, bleeding and increased hospital stay, thereby delaying recovery.[13] Multiple interventions are applied to the patient before, during and after surgery for the above reason's & the commonest be the combined use of Narcotic and NSAIDS. However, they can be associated with GIT and Neurological Side effects, which may cause patient's discomfort.[14,15] Post-operative pain is characterized as Acute inflammatory pain that originates with surgical trauma and typically can resolves with tissue healing.

When pain triggers, there is release of catecholamines, which may precipitate Cardiovascular incidents, Undesirable neuro-endocrine or metabolic changes, Pulmonary complications, Thromboembolic events, & Prolonged hospital stays.[16] After surgical procedures, pain becomes a significant factor influencing patient well-being. Early analgesic approaches or the introduction of additional interventions, that aim to reduce the need for analgesics and improve patient well-being is become important.[17,18]

Therefore, many patients often undergo treatment using a mix of non-opioid analgesic agents, or known as multi-modal analgesia.[19] The main goal of this approach is to achieve an additive beneficial effect while reducing individual analgesic doses. This will not only helps in preventing adverse effects but also reduces dependence on opioids and its related side effects.[20,21] Commonly used non-opioid drugs included in multimodal analgesic strategies are Paracetamol, NSAIDs, Corticosteroids, Local anesthetics, Ketamine & Gaba-pentinoids.[22]

Peripheral nerve blocks involve the injection of a local anesthetic drug near the nerve that serves the surgical area. These anaesthetic drugs work by changing the Sodium permeability of cell membranes, effectively halting nerve impulse transmission and leading to pain relief.[23] A distinctive feature of peripheral nerve blocks is their tendency to produce fewer side effects and complications, such as reduced swelling at surgical site and lessened pain perception. With this background, we decided to conduct a study in which we gave nasal blocks along with General anesthesia for nasal surgeries.

This blocks not only provide the intra-operative hemodynamic stability but also decrease the post-operative overdose of intravenous analgesic drugs.[24-26] The efficacy of local anaesthetic infiltration technique combined with general anaesthesia during nasal surgery has also shown decreased post-operative pain and opioid consumption.[27,28] However, regional nerve blocks have an advantage over infiltration techniques due to various reasons, including reduced tissue distortion at the operative site and better pain control during handling of deeper tissues.[29]

Certain studies had proved the pre-emptive analgesic effect of different nerve blocks in nasal

surgical procedures.[30-33] In one such study, bilateral infra-orbital and infra-trochlear nerve blocks with 0.25% levobupivacaine showed a significant reduction in postoperative morphine requirement (2.5 ± 2.8 mg vs. 9.5 ± 3.5 mg, $P < 0.001$).[30] In a similar study conducted on 45 patients undergoing nasal surgery, the effect of infraorbital nerve block with 0.25% levobupivacaine showed a decrease in the total meperidine requirement in the PACU (17 ± 16 mg vs. 32 ± 13 mg, $P = 0.01$) when compared with a control.[32] {Both the studies are similar to our study}. The pre-emptive analgesic effect of sphenopalatine ganglion block with different local anaesthetic has been studied in patients undergoing functional endoscopic sinus surgery, which also demonstrated similar findings. (as compared to our study).[34,35]

The use of nasociliary and infraorbital nerve blocks as the sole anaesthetic technique in outpatient nasal surgeries has shown encouraging results by providing good intra-operative conditions in 20 out of 24 patients.[36] However, the study reported a failure rate of 13% (4 out of 24 cases). These failures were only considered a partial loss as the surgery could proceed only with a single local anaesthetic infiltration. The possible explanation for the failure was attributed to the sparing of pterygopalatine nerves. For the above reasons, the maxillary nerve block was performed in the current study instead of the infraorbital nerve to prevent the incidence of block failure. Also, the usefulness of bilateral nasociliary and maxillary nerve block was apparent from successful anaesthetic management of bilateral nasal polypectomy in a patient with Kartagener's syndrome.[37]

In our study, bilateral nasal nerve blocks along with general anaesthesia, not only decrease the time to PACU discharge following nasal surgical procedures but also have a useful effect on post-operative pain management. Although the group receiving nerve block had a significantly longer mean time to first analgesia (8±4 hours versus 2±2 hours) when compared with the control group, the mean time to PACU discharge and the incidence of PONV was comparable between the groups and didn't show early recovery. Our findings suggest that infraorbital and infra-trochlear nerve blocks administered to patients undergoing nasal surgeries provide effective pain control with minimal complications and reduce the dependence on perioperative opioids. Our study also has the following limitations. The sensory testing was not done before surgery as the bilateral nerve blocks were performed under general anaesthesia. Besides, post-operative sensory assessment of block was also hampered by the presence of surgical bruising and dressing. Both the blocks were performed by the extra-oral approach because of their ease of performance.

Conclusion

Bilateral infra-trochlear and infraorbital nerve blocks using 0.5% Bupivacaine during general anesthesia for nasal surgeries will not only decrease the intraoperative and postoperative analgesic requirements but also gave the hemodynamic stability to the patients.

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