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Original Research Article

A Study to Determine Efficacy of Glossopharyngeal Nerve Block with Bupivacain 0.5% in Post Tonsillectomy Patient

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Conflict of interest: Nil

Abstract:

Introduction: Tonsillitis, an inflammation of the tonsils is highly prevalent in developing countries among children and adolescents. Managing post-tonsillectomy pain remains a significant clinical challenge. Opioids, carry the risk of side effects and the potential for dependency and abuse. Additionally, high doses of opioids may increase the chance of airway complications, NSAIDs, on the other hand, may not provide adequate pain relief and can increase the risk of postoperative bleeding. Given these limitations, there is a growing interest in exploring regional anesthesia techniques, such as the glossopharyngeal nerve block, to provide targeted pain relief without the systemic side effects associated with traditional analgesics. Considering the above facts the present study was conducted to determine the efficacy of glossopharyngeal nerve block with Bupivacaine 0.5% in post tonsillectomy patient.

Methods: The present quasi-experimental design was conducted in the Department of Anesthesiology of a tertiary care center over a period of 18 months amongst patients admitted to the ENT wards scheduled for tonsillectomy. The study employed a convenient sampling technique. At the end of surgery, patients received a glossopharyngeal nerve block (GNB) using the anterior tonsillar pillar (ATP) method by injecting 0.5% bupivacaine in a dose of 2 mg/kg mixed in 2.5 mL normal saline. The procedure was then repeated on the contralateral side.

Result: The average age was similar, with the intervention group having a mean age of 18.436 years (±8.97) and the control group 19.517 years (±10.34). Gender distribution was also comparable. The intervention group had a significantly higher heart rate in the immediate postoperative period compared to the control group, but the difference diminished over time. The intervention group experienced a consistently lower SBP, DBP, MAP compared to the control group after the glossopharyngeal nerve block. The intervention group experienced longer pain relief and could resume oral intake after completion of standard nbm hours after general anaesthesia sooner than the control group. Also, the intervention group experienced lower incidence of post operative nausea and vomiting's after receiving block than the control group.

Conclusion: In conclusion, the glossopharyngeal nerve block offers significant advantages in managing postoperative pain and promoting recovery in tonsillectomy patients. By providing long-lasting pain relief, delaying the need for additional analgesics, and facilitating earlier oral intake, the GNB not only enhances patient comfort but also accelerates recovery, reducing the likelihood of postoperative complications such as nausea and vomiting.

Keywords: Tonsillitis, Glossopharyngeal Nerve, Bupivacaine, Tonsillectomy, Post Operative Pain.

Introduction

Tonsillitis, an inflammation of the tonsils often caused by bacterial or viral infections, is highly prevalent in developing countries, particularly among children and adolescents. The high incidence of recurrent tonsillitis in these populations often necessitates tonsillectomy, the surgical removal of the tonsils, as a definitive treatment. Despite the routine nature of this procedure, managing post-tonsillectomy pain remains a significant clinical challenge.

Opioids, while effective, carry the risk of side effects such as nausea, vomiting, constipation, and, importantly, the potential for dependency and abuse.

Additionally, high doses of opioids may increase the chance of airway complications, which is a significant concern in the postoperative period. NSAIDs, on the other hand, may not provide adequate pain relief and can increase the risk of postoperative bleeding. [1]

Given these limitations, there is a growing interest in exploring regional anesthesia techniques, such as the glossopharyngeal nerve block, to provide targeted pain relief without the systemic side effects associated with traditional analgesics. The glossopharyngeal nerve block involves the administration of a local anesthetic to the glossopharyngeal nerve, which innervates the tonsillar region. This approach has the potential to significantly reduce pain by blocking the transmission of pain signals from the surgical site. Bupivacaine, a long-acting local anesthetic, is commonly used due to its prolonged duration of action, which is beneficial in managing postoperative pain. The nerve block can be performed bilaterally to ensure comprehensive analgesia. The clinical implementation of glossopharyngeal nerve block in tonsillectomy patients has shown multiple benefits beyond pain relief. Reduced postoperative pain leads to earlier discharge from the hospital, decreased need for opioid analgesics, and improved patient satisfaction. Park et al. (2007) demonstrated that patients receiving glossopharyngeal nerve blocks with bupivacaine reported significantly lower pain scores both at rest and during swallowing compared to those who did not receive the block. The study also found that the analgesic effect was strongly correlated with the extent of obtunded gag reflex, suggesting a reliable clinical indicator for the success of the nerve block [2]. A study by Vyas et al. (2009) evaluated the safety and efficacy of glossopharyngeal nerve block with bupivacaine and reported significant pain reduction with no major complications [3]. Moreover, the potential for complications associated with nerve blocks, such as the risk of upper airway obstruction, must be carefully considered. Bean- Lijewski (1997) reported two cases of life-threatening upper airway obstruction following glossopharyngeal nerve block in pediatric tonsillectomy patients. These cases highlight the importance of careful patient selection and monitoring when utilizing nerve blocks for pain management [4]. Ahmed and Omara (2019) also reported that children who received GNB had a prolonged duration of analgesia, with the time for the first request for rescue analgesia significantly extended compared to those who did not receive the block [5]. Considering the above facts the present study was conducted to determine the efficacy of glossopharyngeal nerve block with Bupivacaine 0.5% in post tonsillectomy patient.

Material and Methods:

The present quasi-experimental design was chosen due to the practical constraints in randomly assigning patients to different intervention groups within a clinical setting. The study was conducted in the Department of Anaesthesiology of a tertiary care center over a period of 18 months amongst 112 patients admitted to the ENT male and female wards of the hospital who were scheduled for tonsillectomy. The study employed a convenient sampling technique.

Inclusion Criteria: Patients with ASA (American Society of Anesthesiologists) grade I and II, patients aged between 14 and 40 years and patients willing to participate in the study.

Exclusion Criteria: Patients with ASA grade III and IV, patients aged less than 14 years or more than 40 years, patients not willing to participate in the study and patients with a history of any allergic reaction to the drugs used in the study.

Procedure: The study involved ASA-I and ASA-II patients of both sexes, aged between 14 and 40 years, undergoing elective tonsillectomy surgery. All patients were pre-operatively instructed on how to express pain scores using the Visual Analog Scale (0–100 mm). At the end of surgery, 62 patients received a glossopharyngeal nerve block (GNB) using the anterior tonsillar pillar (ATP) method by injecting 0.5% bupivacaine in a dose of 2 mg/kg mixed in 2.5 mL normal saline. The procedure was then repeated on the contralateral side. While, 62 patients did not receive the glossopharyngeal nerve block (GNB) post operative as control group. Pain scores were measured at 30 minutes in the recovery room and at 2, 6, and 12 hours postoperatively. Baseline and intraoperative heart rate (HR), non-invasive blood pressure (NIBP), and oxygen saturation (SpO2) were monitored every 5 minutes and postoperatively.

Data Management: Data was collected systematically during preoperative, intraoperative, and postoperative phases. Patient information, including demographic data, medical history, and intraoperative monitoring parameters, was recorded in a secure database. Pain scores were documented at predefined intervals: 30 minutes in the recovery room, and 2, 6, and 12 hours postoperatively. Statistical Analysis: Data were entered in Microsoft Excel 2007 and presented in the form of frequencies and percentages. A p-value of less than 0.05 was considered to indicate a significant association between variables. Appropriate statistical tests, such as the Chi-Square test or t-test, were applied wherever required.

Observations and Result:

Table 1: Postoperative Systolic Blood Pressure (SBP) Comparison After Glossopharyngeal Nerve Block

SBP	Intervention Group Mean	Intervention Group SD	Control Group Mean	Control Group SD	p-value
0 min	117	4.4	116.80	4.41	0.98
10 min	114	6	122.83	4.50	<0.001
20 min	112	5.71	123.06	4.64	<0.001
30 min	110	5.06	121.61	4.41	<0.001

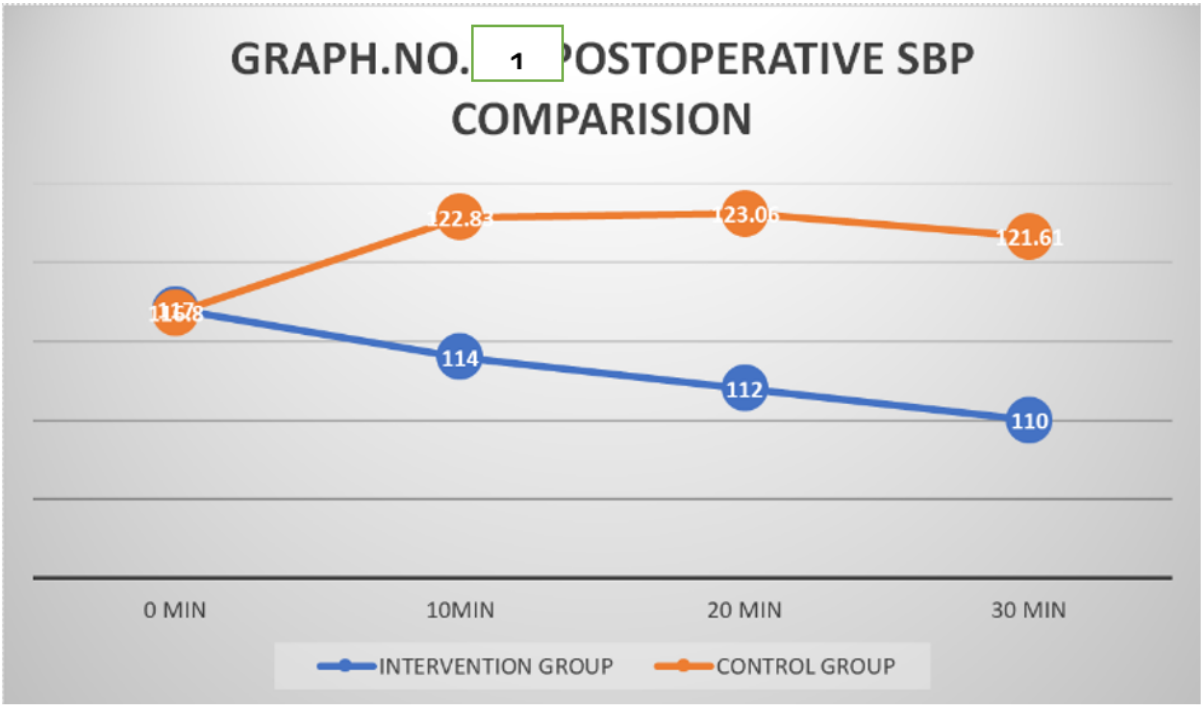

Table no.1 shows the postoperative systolic blood pressure (SBP) was compared between the intervention and control groups after the glossopharyngeal nerve block. At 0 minutes, the mean SBP in the intervention group was 117 mmHg (±4.4), while the control group had a mean SBP of 116.80 mmHg (±4.41), with no statistically significant difference (P = 0.98). By 30 minutes, the intervention group's SBP had dropped to 110 mmHg (±5.06), compared to 121.61 mmHg (±4.41) in the control group, with a highly significant difference (P<0.001). Overall, the intervention group experienced a consistently lower SBP compared to the control group after the glossopharyngeal nerve block.

Table 2: Postoperative Diastolic Blood Pressure (DBP) Comparison After Glossopharyngeal Nerve Block

DBP	Intervention Group Mean(min)	Intervention Group SD	Control Group Mean	Control Group SD	p-value
0 min	75.22	6.2	75.35	4.64	0.89
10 min	70	3.7	73.35	6.14	<0.001
20 min	73	3.25	74.67	4.99	0.025
30 min	68.9	3.33	74.53	3.81	<0.001

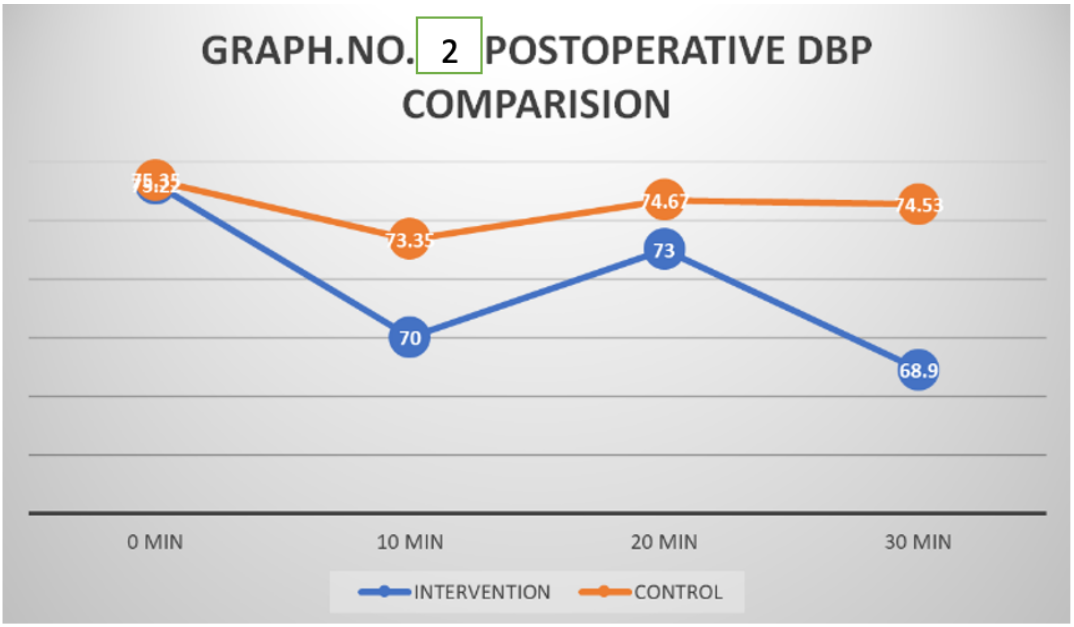

Table no.2 shows that at the 0 minutes, the intervention group had a mean DBP of 75.22 mmHg (±6.2), while the control group had a mean DBP of 75.35 mmHg (±4.64), with no statistically significant difference (P = 0.89). By 30 minutes, the mean DBP in the intervention group was 68.9 mmHg (±3.33), while the control group had a significantly higher mean DBP of 74.53 mmHg (±3.81), with a highly significant difference (P < 0.001). Overall, the intervention group exhibited consistently lower DBP compared to the control group after the glossopharyngeal nerve block, with significant differences from 10 minutes onwards.

Table 3: Postoperative Mean Arterial Pressure (MAP) Comparison After Glossopharyngeal Nerve Block

MAP	Intervention Group Mean	Intervention Group SD	Control Group Mean	Control Group SD	p-value
0 min	89.02	5.5	89.14	3.5	0.93
10 min	82.72	10.10	89.87	4.21	<0.001
20 min	86.33	2.99	90.85	3.52	<0.001
30 min	83.90	2.84	90.19	3.09	<0.001

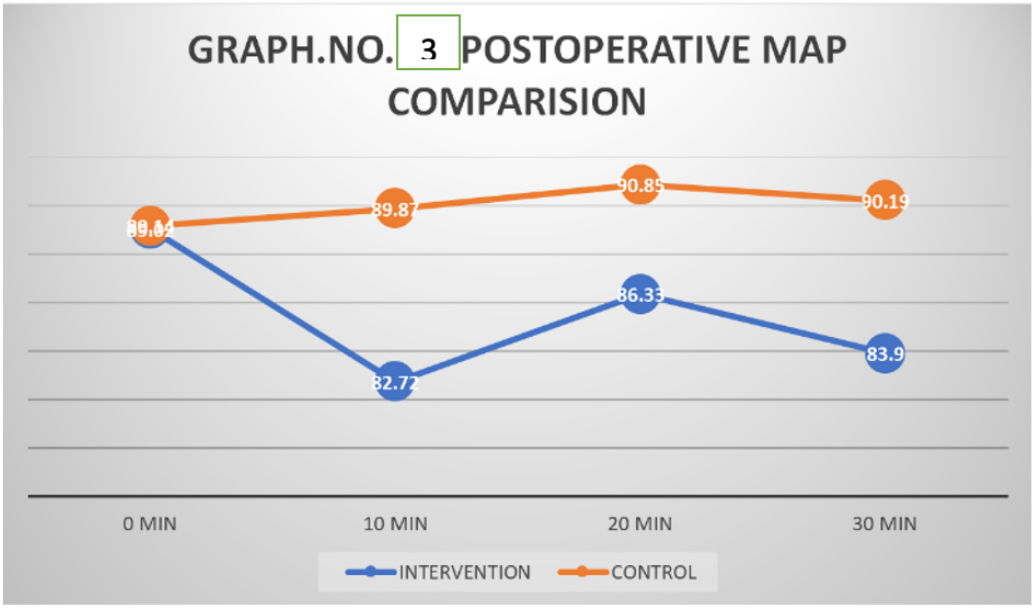

Table no.3 shows that at the 0 minutes, the mean MAP in the intervention group was 89.02 mmHg (±5.5) compared to 89.14 mmHg (±3.5) in the control group, with no statistically significant

difference (P = 0.93). By 30 minutes, the intervention group's mean MAP had further decreased to 83.90 mmHg (±2.84), while the control group had a much higher mean MAP of 90.19 mmHg (±3.09), with a highly significant difference (P < 0.001). Overall, the intervention group exhibited a significantly lower MAP compared to the control group after the glossopharyngeal nerve block, with statistically significant differences observed at all time points after 10 minutes.

Table 4: Postoperative Visual Analog Scale (VAS) Pain Score Comparison Between Intervention and Control Groups

Postoperative Time	Intervention group	Control group	P-value
VAS after 30 minutes in recovery	1±0	1.048±0.21	0.1301
VAS after 2 hours	1.14±0.35	2.37±0.6	<0.001
VAS after 4 hours	1.91±0.55	3±0.51	<0.001
VAS after 6 hours	2.64±0.65	4.06±0.5	<0.001
VAS after 12 hours	3.41±0.49	5.25±0.44	<0.001

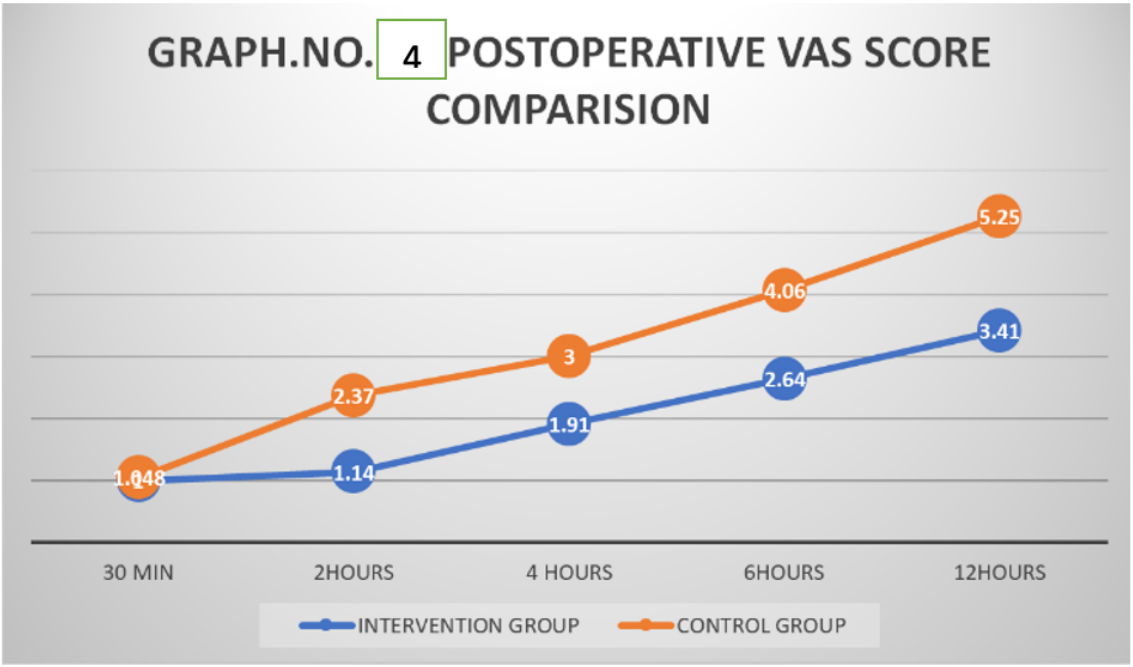

Table no.4 shows the postoperative Visual Analog Scale (VAS) pain scores were compared between the intervention and control groups at different time points. After 30 minutes in recovery, the mean VAS pain score was similar in the intervention group (1 ± 0) compared to the control group (1.048±0.21), though the difference was not statistically significant (P =0.1301). At 6 hours postoperatively, the intervention group had a mean VAS score of 2.64 ± 0.65, which was significantly lower than the control group's mean of 4.06 ± 0.5 (P <0.001). By 12 hours, the intervention group's mean VAS score was 3.41 ± 0.49, while the control group had a mean score of 5.25 ± 0.44, with a statistically significant difference (P <0.001). Overall, the intervention group experienced significantly lower pain scores at some time points compared to the control group.

Table 5: Time to First Analgesic Requirement and Oral Intake After Completion Of Standard NBM Hours Comparison Between Intervention and Control Groups

Parameter	Intervention group	Control group	P Value
First time to need analgesic (hours)	9.3±2.05	2.56±049	<0.0001*
First time for oral intake after completion of standard NBM (hours)	2.27 ± 0.45	5.46 ±0.56	<0.0001*

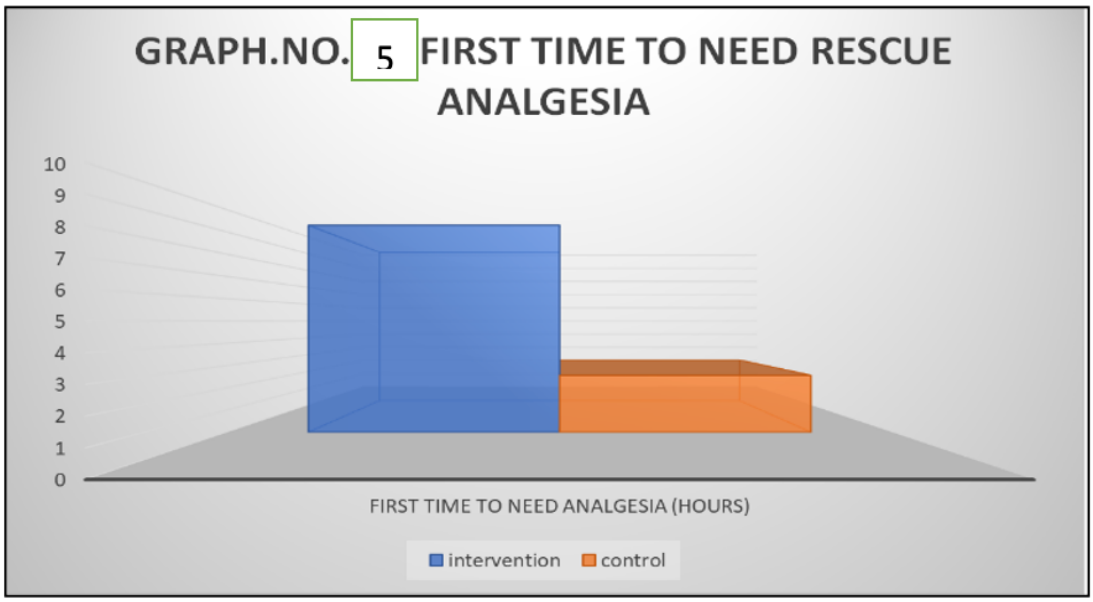

Table no.5 shows the time to the first analgesic requirement and the time to first oral intake after completion of standard nbm hours after general anaesthesia were compared between the intervention and control groups. The intervention group had a significantly longer time to first analgesic requirement, with a mean of 9.3 ± 2.05 hours, compared to 2.56 hours (±0.49) in the control group, with a highly significant difference (P < 0.0001). Similarly, the time to first oral intake after completion of standard NBM hours after general anaesthesia was significantly shorter in the intervention group, with a mean of 2.27 hours (±0.45), compared to 5.46 hours (±0.56) in the control group, again with a highly significant difference (P < 0.0001). These results indicate that the intervention group experienced longer pain relief and could resume oral intake after completion of standard nbm hours after general anaesthesia sooner than the control group.

Table 6: Incidence Of Postoperative Nausea And Vomiting(PONV)

	Intervention Group	Control Group	P Value
Incidence of PONV	8(12.90%)	14(22.58%)	<0.001
No PONV	54(87.09%)	56(77.41%)	
Total	62	62	

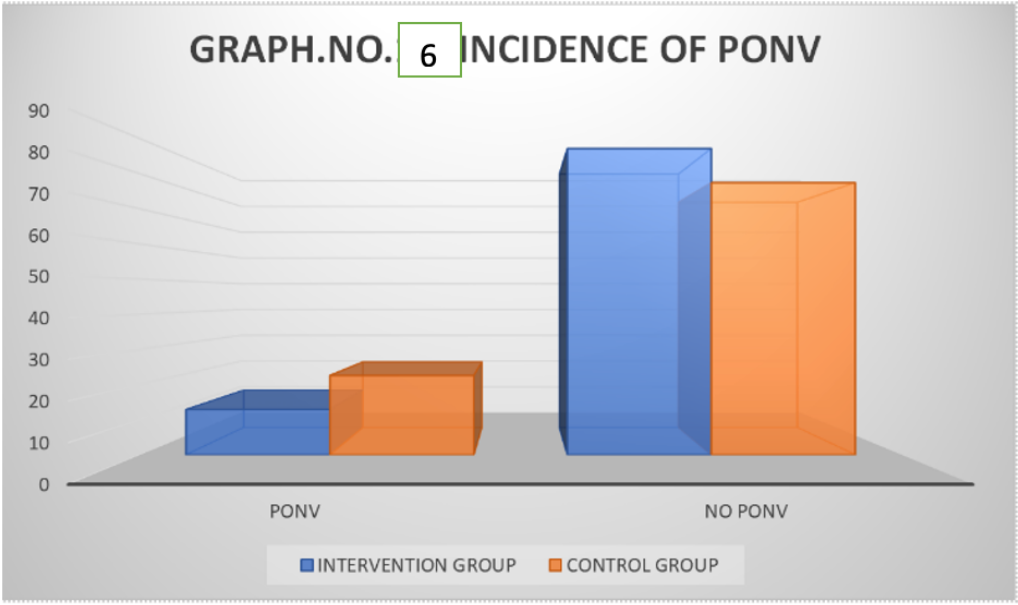

Table no.6 shows the incidence of post operative nausea and vomiting were compared between the intervention and control groups. The intervention group had a significantly lower incidence of post operative nausea and vomiting 12.90%, compared to 22.58% in the control group, with a highly significant difference ($P < 0.0001$). These results indicate that the intervention group experienced lower incidence of ponv after receiving block than the control group.

Discussion

The intervention group had a mean age of 18.436 years (±8.97) and the control group had 19.517 years (±10.34), ensures that age-related factors such as metabolism and drug response are unlikely to influence the results disproportionately across groups.

In the study by Unal et al (2007), the pediatric population had a similar lack of significant differences in baseline demographics (age, gender, and weight), which strengthens the assumption that outcomes can be more directly linked to the interventions. [6]

Body weight, another important parameter, shows no significant difference between the intervention and control groups ($P = 0.71$). Since pharmacokinetics and the distribution of local anaesthetics like bupivacaine and ropivacaine can be influenced by body weight, this balance ensures that any differences in postoperative pain outcomes can be more confidently attributed to the intervention itself rather than differences in body mass.

In conclusion, the lack of statistically significant differences between the intervention and control groups in terms of age, gender, and body weight supports the robustness of the study's findings. The similarity between the groups ensures that any observed differences in postoperative pain, analgesic use, or other outcomes can be more confidently attributed to the intervention, specifically the use of glossopharyngeal nerve block or local anesthetic infiltration.

The postoperative heart rate comparison reveals significant differences between the intervention and control groups in the immediate postoperative period, following the administration of the glossopharyngeal nerve block (GNB). The higher heart rate observed in the intervention group suggests a possible physiological response to the nerve block, but the difference diminishes over time, indicating that the effects of the block stabilize as the patients recover.

This trend is consistent with findings from Bean-Lijewski et al [7] (1997), where patients receiving glossopharyngeal nerve blocks demonstrated initial fluctuations in heart rate, likely due to the interaction of the block with adjacent autonomic nerves. However, the elevated heart rate in this study does not appear to be associated with hemodynamic instability, as both groups remained within a normal range.

In summary, the postoperative heart rate data indicate that patients in the intervention group experienced a transient increase in heart rate during the immediate postoperative period, likely due to autonomic responses triggered by the glossopharyngeal nerve block. However, this difference diminished over time, and by 30 minutes postoperatively, there were no significant differences between the groups. This transient increase in heart rate is consistent with the findings from Bean-Lijewski et al [7]. (1997) and Ghosh et al [8]. (2018), which showed that nerve blocks can cause short-term autonomic responses without leading to adverse clinical outcomes. The return to baseline heart rate by 30 minutes further supports the safety and efficacy of glossopharyngeal nerve block for managing postoperative pain in tonsillectomy patients.

The postoperative systolic blood pressure (SBP) comparison, shows significant differences between the intervention and control groups following the administration of the glossopharyngeal nerve block (GNB). The intervention group consistently exhibited lower SBP readings compared to the control group, indicating a potential hypotensive effect may be due to no pain and other physiological condition. However, this reduction in SBP remained within a clinically acceptable range, suggesting that the intervention did not cause dangerous levels of hypotension.

In conclusion, the postoperative SBP data reveals that the glossopharyngeal nerve block was associated with a mild but statistically significant reduction in systolic blood pressure during the early postoperative period. While the intervention group exhibited consistently lower SBP values compared to the control group, these reductions remained within safe limits and did not lead to clinically concerning hypotension. The transient hypotensive effect observed this may be due to increase in duration of general anaesthesia as patient receive block intraoperative or may be due to patient not having pain and consistent with the known pharmacological properties of local anaesthetics like bupivacaine, which can induce vasodilation and lower blood pressure by inhibiting sympathetic nerve activity. These findings are in line with previous studies, such as those by Ghosh et al [8]. (2018) and Wang et al [9]. (2021), which similarly reported safe, manageable reductions in blood pressure following nerve block administration. Overall, the results support the conclusion that glossopharyngeal nerve block is an effective and safe method for managing postoperative pain in tonsillectomy patients.

The postoperative diastolic blood pressure (DBP) data shows significant differences between the intervention and control groups following the glossopharyngeal nerve block (GNB). The intervention group consistently exhibited lower DBP values compared to the control group from 10 minutes postoperatively onwards, indicating a mild but significant hypotensive effect associated with the GNB. This pattern suggests that the nerve block influenced autonomic regulation, reducing blood pressure through its local anesthetic effects.

In conclusion, the postoperative DBP data indicates that the glossopharyngeal nerve block caused a mild but significant reduction in diastolic blood pressure during the early postoperative period, with the most significant effects occurring from 10 minutes onwards. Although the intervention group consistently exhibited lower DBP values compared to the control group this may be due to increase in duration of general anaesthesia as patient receive block intraoperative or may be due to patient not having pain these reductions remained within a safe range, suggesting that the nerve block did not lead to clinically significant hypotension. These results are consistent with findings from Ghosh et al [8]. (2018) and Sharifian et al [10]. (2006), which reported similar reductions in DBP following nerve blocks using local anaesthetics like bupivacaine. Overall, the data supports the use of glossopharyngeal nerve block as a safe and effective intervention for managing postoperative pain in tonsillectomy patient.

The postoperative mean arterial pressure (MAP) data presented highlights a significant difference between the intervention and control groups following the glossopharyngeal nerve block (GNB). The intervention group consistently exhibited lower MAP values compared to the control group starting at 10 minutes postoperatively, suggesting that the GNB had a marked hypotensive effect. This is in line with the pharmacological effects of local anaesthetics such as bupivacaine, which can block sympathetic nerve activity, resulting in vasodilation and a reduction in blood pressure.

In summary, the postoperative MAP data indicates that the glossopharyngeal nerve block caused a significant and slight reduction in mean arterial pressure during the early postoperative period. This hypotensive effect became apparent at 10 minutes postoperatively and persisted through 30 minutes, with the intervention group exhibiting lower MAP values compared to the control group. These findings may be due to increase in duration of general anaesthesia as patient receive block intraoperative. or may be due to patient having lesser pain, findings may consistent with the known pharmacological effects of bupivacaine, which can induce vasodilation and reduce blood pressure by inhibiting sympathetic nerve activity. Despite the substantial differences in MAP between the groups, the reductions in the intervention group remained within a clinically manageable range, and there were no reports of adverse effects. These results are consistent with studies such as Ghosh et al [8]. (2018) and Sharifian et al [10]. (2006), which reported similar decreases in MAP following the administration of local anaesthetics for nerve blocks. Overall, the data supports the conclusion that glossopharyngeal nerve block is an effective and safe method for managing postoperative pain in tonsillectomy patients, with manageable hemodynamic effects.

The comparison of postoperative Visual Analog Scale (VAS) pain scores between the intervention group (who received a glossopharyngeal nerve block) and the control group, shows significant improvements in pain management in the intervention group, particularly at later time points. The intervention group consistently reported lower pain scores compared to the control group, particularly after 4 hours postoperatively.

At 30 minutes in recovery, the mean VAS pain score for the intervention group was 1, while the control group reported a slightly higher mean score of 1.048±021, the difference was not statistically significant (P=0.1301), indicating that this action may be due analgesia that given intraoperative to both groups. This finding aligns with the expected onset of long-acting local anaesthetics like bupivacaine, which typically take some time to achieve maximum pain relief.

At 6 hours, the intervention group's pain score was significantly lower (2.64 ± 0.65) compared to the control group's 4.06 ± 0.5 (P<0.001). The control group despite receiving rescue analgesia, experienced more pain than the interventional group. This sustained reduction in pain highlights the prolonged effectiveness of the nerve block, allowing patients in the intervention group to experience better pain control over time. These results mirror findings from studies like Sharifian et al [10]. (2006), where the use of bupivacaine for postoperative pain control led to lower VAS pain scores at similar postoperative intervals.

By 12 hours, the intervention group still reported significantly lower pain scores (3.41 ± 0.49) compared to the control group (5.25 ± 0.44), with a statistically significant difference (P <0.001). The control group despite receiving rescue analgesia, experienced more pain than the interventional group. After 12 hours some patient of interventional group required rescue analgesia. This sustained pain relief indicates that the effects of the glossopharyngeal nerve block are long-lasting, continuing to provide significant benefits to patients even into the later stages of postoperative recovery. Studies such as Wang et al [9]. (2021) have similarly

found that local anesthetic nerve blocks can provide prolonged postoperative pain relief, reducing the need for additional analgesics during recovery.

The data from this study demonstrate that the glossopharyngeal nerve block provided superior pain relief to the intervention group, particularly from 4 hours postoperatively and continuing through 12 hours. While the early postoperative pain scores at 30 minutes not significantly different between the groups, the significant reductions in pain observed at 2, 4, 6, and 12 hours indicate the long-lasting effects of the nerve block. This prolonged pain relief can significantly improve patient comfort and reduce the reliance on additional analgesics. The results are consistent with prior research showing the efficacy of nerve blocks in managing postoperative pain, particularly in surgeries involving the oropharyngeal region.

A comparison between the intervention group (who received the glossopharyngeal nerve block) and the control group in terms of the time to first analgesic requirement and the time to first oral intake after completion of standard NBM hours after general anaesthesia. The results demonstrate substantial advantages for the intervention group, indicating that the glossopharyngeal nerve block significantly prolonged the duration of pain relief and facilitated earlier resumption of oral intake postoperatively.

The time to first analgesic requirement was markedly longer in the intervention group, with a mean time of 9.3 hours (±2.05) compared to 2.56 hours (±0.49) in the control group. This difference was highly significant ($P < 0.0001$), indicating that patients in the intervention group experienced extended pain relief before requiring additional analgesics. The longer duration of analgesia in the intervention group is consistent with the known effects of bupivacaine, a long-acting local anesthetic, which can provide prolonged pain control after surgery. This finding mirrors previous research, such as Ghosh et al [8]. (2018) and Sharifian et al[10]. (2006), where patients receiving bupivacaine-based nerve blocks demonstrated delayed need for postoperative pain relief due to the sustained analgesic effects of the nerve block.

The ability to delay the need for analgesia and facilitate earlier oral intake not only improves patient comfort but also reduces the risk of complications associated with prolonged fasting and delayed hydration. Faster recovery of oral intake is particularly important in pediatric and adolescent patients, where early hydration and nutrition are critical for overall recovery and minimizing hospital stay duration.

The incidence of post operative nausea and vomiting were compared between the intervention and control groups. The intervention group had a significantly lower incidence of post operative nausea and vomiting 12.90%, compared to 22.58% in the control group, with a highly significant difference ($P < 0.0001$). These results indicate that the intervention group experienced lower incidence of ponv after receiving block than the control group Studies such as Wang et al [9]. (2021) and Alshawadfy et al [11]. (2022) have similarly reported that patients who received local anesthetic blocks has lower incidence of post operative nausea vomiting than those in control groups, further supporting the findings of this study.

Conclusion:

In conclusion, the glossopharyngeal nerve block offers significant advantages in managing postoperative pain and promoting recovery in tonsillectomy patients. By providing long-lasting pain relief, delaying the need for additional analgesics, and facilitating earlier oral intake, the GNB not only enhances patient comfort but also accelerates recovery, reducing the likelihood of postoperative complications such as nausea and vomiting. The study's findings strongly support the use of glossopharyngeal nerve blocks in clinical practice as an effective, safe, and valuable tool for improving postoperative outcomes in tonsillectomy patients. Given the consistent benefits observed, the GNB should be considered as part of routine postoperative care for individuals undergoing tonsillectomy.

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