Section: Anaesthesiology

Original Research Article

EFFECT OF PERITONSILLAR INFILTRATION OF BUPIVACAINE 0.5% ON POST OPERATIVE PAIN RELIEF IN TONSILLECTOMY PATIENTS

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ABSTRACT

Background: Tonsillectomy is associated with substantial early postoperative pain, particularly in children, which may impair their recovery. This study aimed to evaluate whether peritonsillar infiltration with 0.5% bupivacaine improves early postoperative pain relief compared with normal saline. **Materials and Methods:** This prospective, randomised, controlled study included 60 patients undergoing tonsillectomy, who were equally allocated to the bupivacaine and control groups. Peritonsillar infiltration with 0.5% bupivacaine or normal saline was administered before the tonsillectomy. Postoperative pain, pulse rate, systolic blood pressure, diastolic blood pressure, and respiratory rate were assessed at 30 min, 1 h, 2 h, and 4 h. **Result:** Sixty patients were included in the study, with 30 patients in each group. The mean age was 9.62 ± 3.35 years. Pain scores were significantly lower with bupivacaine than control at 30 minutes, 1 hour, 2 hours, and 4 hours (2.57 ± 0.57 vs. 4.00 ± 0.95; 1.40 ± 0.50 vs. 2.77 ± 0.82; 1.13 ± 0.35 vs. 2.47 ± 0.94; 1.03 ± 0.18 vs. 1.90 ± 0.71; all P<0.001). Pulse rate (P<0.001 at 30 minutes and P=0.001 at 2h), systolic (P<0.001 at 30 minutes and 1h and P=0.008 at 2h) and diastolic blood pressure (P=0.001, <0.001 and 0.018 at 30 minutes, 1h and 2h) and respiratory rate (P=0.005, <0.001 at 30 minutes and 1h) were lower with bupivacaine at the early time points. **Conclusion:** Peritonsillar 0.5% bupivacaine infiltration provided effective early postoperative analgesia and improved selected physiological outcomes after tonsillectomy.

INTRODUCTION

Tonsillectomy is one of the most commonly performed procedures in otorhinolaryngology and is mainly performed for recurrent tonsillitis and upper airway obstruction. Despite improvements in surgical and perioperative care, postoperative pain remains a common problem. It is often most troublesome during the early postoperative period and can affect oral intake, hydration, sleep, recovery, and patient and caregiver satisfaction. Poor pain control may also delay recovery and increase healthcare use and caregiver burden.[1-3] Postoperative pain is particularly important in children. Younger patients may find it difficult to describe their pain clearly, while throat pain can make swallowing unpleasant and reduce oral intake. Pain may affect hydration, sleep, daily activities, and recovery. Paediatric tonsil surgery has shown variations in the severity and duration of pain, with tonsillectomy generally causing greater postoperative morbidity than less extensive tonsillar procedures. Irregular or inadequate use of prescribed analgesics may further contribute to ongoing pain during recovery.[1,2] Therefore, effective and reliable early pain relief is an important part of tonsillectomy care.

Multimodal analgesia is commonly used after tonsillectomy. Paracetamol and nonsteroidal anti-inflammatory drugs are widely used as systemic analgesics, whereas dexamethasone is often included to support recovery and reduce associated symptoms. Opioids are generally used for rescue analgesia when pain remains poorly controlled. However, pain can still be significant during the early postoperative period, despite these measures. This has led to continued interest in treatments that act directly at the surgical site.[4-6] Local anaesthetic infiltration is one such approach because tonsillectomy causes tissue injury in the tonsillar fossae and surrounding pharyngeal tissues. Peritonsillar infiltration can act directly on the peripheral pain pathways arising from the operative site and may enhance the effect of systemic analgesics. Bupivacaine is a long-acting local anaesthetic and is therefore considered suitable when prolonged local analgesia is desired during the early postoperative period. Peritonsillar infiltration

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may thus reduce pain at its local source and improve postoperative comfort.[7,8]

Several studies have examined the administration of local anaesthetics during tonsillectomy. Bupivacaine infiltration has been associated with reduced postoperative pain and analgesic requirements, supporting its possible use as an adjunct to conventional analgesia. Studies in paediatric patients have also examined different bupivacaine infiltration approaches, including differences in the anatomical site and technique of administration.[9-12] However, the evidence is not completely consistent. Differences in patient characteristics, surgical technique, timing and method of infiltration, accompanying analgesic treatment, and pain assessment can produce different findings across studies. Despite established analgesic protocols, postoperative pain after tonsillectomy remains an important clinical issue.[3,4] Therefore, it is important to determine whether peritonsillar bupivacaine provides additional early pain relief compared with an appropriate control under a standardised perioperative approach.

Aim

This study aimed to evaluate the efficacy of peritonsillar infiltration with 0.5% bupivacaine in reducing early postoperative pain following tonsillectomy compared with normal saline infiltration and to assess its effect on postoperative analgesic outcomes and perioperative physiological parameters during the first 4 h after surgery.

MATERIALS AND METHODS

A prospective, randomised, controlled study was conducted on 60 patients who underwent tonsillectomy. Ethical clearance was obtained before initiation of the study.

Inclusion criteria

Patients of either sex undergoing tonsillectomy, who were eligible for peritonsillar infiltration and whose postoperative pain and physiological parameters could be assessed during the first 4 hours after surgery, were included in the study.

Exclusion criteria

Patients with known allergy or contraindication to bupivacaine or local anaesthetic agents, significant cardiovascular or respiratory disease affecting physiological parameters, or those with incomplete postoperative pain or physiological assessments were excluded.

Methods: The patients were divided into two equal groups of 30 patients each. Group A received peritonsillar infiltration with 0.5% bupivacaine, and Group B received normal saline infiltration. The study included patients of either sex with postoperative pain and physiological parameters assessed during the early postoperative period.

All patients underwent preoperative assessment. Patients underwent tonsillectomy according to a standard surgical protocol. Patients in the bupivacaine group received peritonsillar infiltration with 0.5% bupivacaine, whereas those in the control group received normal saline infiltration. Infiltration was administered into the peritonsillar region before tonsillectomy. Postoperative pain was assessed at 30 min, 1 h, 2 h, and 4 h. Pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and respiratory rate were recorded at the same postoperative time points. Postoperative pain scores and physiological parameters were compared between the two groups.

Statistical analysis: Data were analysed using IBM SPSS Statistics version 21.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. The distribution of continuous variables was assessed for normality before analysis. Baseline continuous variables were compared between the two groups using the independent-samples t-test. Categorical variables were compared using Pearson's chi-square test and independent-samples t-tests, as appropriate. A two-tailed P value <0.05 was considered statistically significant.

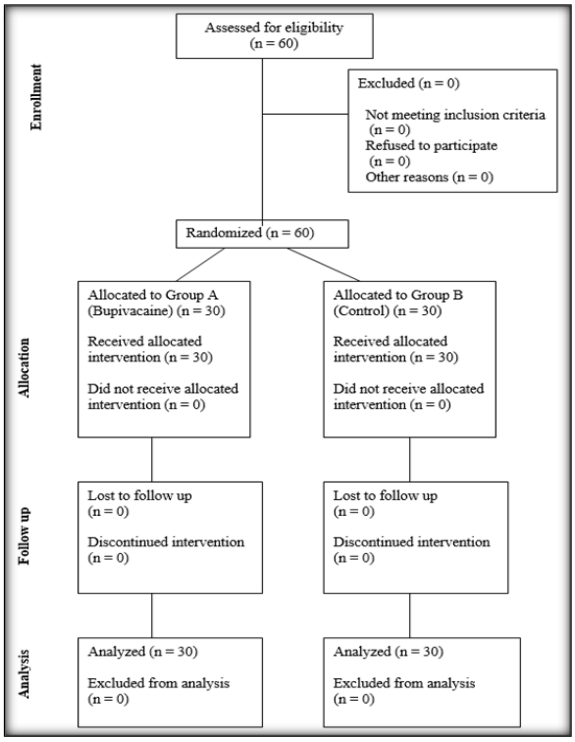

Figure 1: CONSORT Flowchart

RESULTS

A total of 60 patients were included in the study, with 30 in each group. The overall mean age was 9.62 ± 3.35 years; 33 (55%) were female, and 27 (45%) were male [Table 1].

The mean age was 9.33 ± 3.44 years in the bupivacaine group and 9.90 ± 3.28 years in the control group (P=0.516). Females comprised 17 (56.7%) and 16 (53.3%) and males comprised 13

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(43.3%) and 14 (46.7%) in the two groups, respectively (P=0.795) [Table 2].

Table 1: Baseline demographic characteristics of patients

		N (%)
Sex, N (%)	Female	33 (55%)
	Male	27 (45%)
Mean Age (years)		9.62 ± 3.35
Treatment group	Bupivacaine	30 (50%)
	Normal saline	30 (50%)

Table 2: Comparison of basic demographics between groups

		Groups		P value
		A	B	
Age (years)		9.33 ± 3.44	9.90 ± 3.28	0.516
Sex, N (%)	Female	17 (56.7%)	16 (53.3%)	0.795
	Male	13 (43.3%)	14 (46.7%)	

Pain scores were lower with bupivacaine at 30 minutes (2.57 ± 0.57 vs. 4.00 ± 0.95; P<0.001), 1 hour (1.40 ± 0.50 vs. 2.77 ± 0.82; P<0.001), 2 hours (1.13 ± 0.35 vs. 2.47 ± 0.94; P<0.001), and 4 hours (1.03 ± 0.18 vs. 1.90 ± 0.71; P<0.001). PR was lower at 30 minutes (104.47 ± 7.39 vs. 115.93 ± 13.41; P<0.001) and 2 hours (89.97 ± 5.18 vs. 97.87 ± 10.95; P=0.001), but not at 1 hour (96.30 ± 8.66 vs. 97.37 ± 8.19; P=0.626) or 4 hours (91.67 ± 5.26 vs. 93.43 ± 7.34; P=0.289). SBP was lower at 30 minutes (117.00 ± 7.42 vs. 129.33 ± 11.73; P<0.001), 1 hour (107.00 ± 7.02 vs. 121.33 ± 12.24; P<0.001), and 2 hours (109.47 ± 10.14 vs. 117.67 ± 12.78; P=0.008), but not at 4 hours (106.67 ± 7.13 vs. 111.00 ± 10.62; P=0.069). DBP was lower at 30 minutes (76.00 ± 6.22 vs. 83.00 ± 8.77; P=0.001), 1 hour (66.33 ± 6.15 vs. 76.00 ± 6.22; P<0.001), and 2 hours (68.80 ± 6.32 vs. 73.33 ± 8.02; P=0.018), but not at 4 hours (66.83 ± 6.76 vs. 70.00 ± 9.83; P=0.152). Respiratory rate was lower at 30 minutes (15.67 ± 0.80 vs. 17.83 ± 3.83; P=0.005) and 1 hour (13.60 ± 1.00 vs. 16.37 ± 2.68; P<0.001), but not at 2 hours (13.87 ± 1.78 vs. 14.67 ± 2.60; P=0.171) or 4 hours (14.73 ± 1.72 vs. 15.93 ± 2.96; P=0.061) [Table 3].

Table 3: Overall postoperative outcome measures across assessment time points between groups

		Groups		P-value
		A	B	
Pain score	30 min	2.57 ± 0.57	4.00 ± 0.95	<0.001
	1 h	1.40 ± 0.50	2.77 ± 0.82	<0.001
	2 h	1.13 ± 0.35	2.47 ± 0.94	<0.001
	4 h	1.03 ± 0.18	1.90 ± 0.71	<0.001
PR	30 min	104.47 ± 7.39	115.93 ± 13.41	<0.001
	1 h	96.30 ± 8.66	97.37 ± 8.19	0.626
	2 h	89.97 ± 5.18	97.87 ± 10.95	0.001
	4 h	91.67 ± 5.26	93.43 ± 7.34	0.289
SBP	30 min	117.00 ± 7.42	129.33 ± 11.73	<0.001
	1 h	107.00 ± 7.02	121.33 ± 12.24	<0.001
	2 h	109.47 ± 10.14	117.67 ± 12.78	0.008
	4 h	106.67 ± 7.13	111.00 ± 10.62	0.069
DBP	30 min	76.00 ± 6.22	83.00 ± 8.77	0.001
	1 h	66.33 ± 6.15	76.00 ± 6.22	<0.001
	2 h	68.80 ± 6.32	73.33 ± 8.02	0.018
	4 h	66.83 ± 6.76	70.00 ± 9.83	0.152
Respiratory rate	30 min	15.67 ± 0.80	17.83 ± 3.83	0.005
	1 h	13.60 ± 1.00	16.37 ± 2.68	<0.001
	2 h	13.87 ± 1.78	14.67 ± 2.60	0.171
	4 h	14.73 ± 1.72	15.93 ± 2.96	0.061

DISCUSSION

Our study included paediatric patients who underwent tonsillectomy, with comparable baseline characteristics between the groups. Teunkens et al. studied 200 children aged 4-10 years undergoing adenotonsillectomy, while Raheem and Farouk randomised 60 tonsillectomy patients into two equal groups.[13,14] Peyvandi et al. included patients older than 8 years and compared bupivacaine, lidocaine, and saline infiltration.[15] Our study showed better pain control with bupivacaine. Ortega et al. reported an analgesic-sparing effect, with a standardised mean difference of 0.68 min (95% CI 0.26–1.09; P=0.001) for time to first analgesic and OR 0.22 (95% CI 0.06–0.84; P=0.03) for receiving a narcotic dose.[16] Conversely, Teunkens et al. reported piritramide use in 57% versus 81% with tramadol and bupivacaine, respectively.13 Thus, local infiltration appears useful as an adjunct rather than necessarily equivalent to systemic preemptive analgesia.

Our study showed consistently lower pain with peritonsillar 0.5% bupivacaine than with saline during early recovery. Rajput et al. similarly reported

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lower pain scores with 0.5% bupivacaine: 2.85 versus 5.04 at 2 h, 5.52 versus 7.04 at 4 h, and 7.04 versus 7.61 at 6 h, with significant differences.7 Raheem and Farouk, using 0.25% bupivacaine, found no significant difference at 1 h (P=0.214), but significant differences at 4 h (P=0.002), 8 h (P<0.001), and 24 h (P=0.001).[14] This supports the analgesic benefit but suggests that concentration, timing, technique, and analgesic protocols may influence early effects. Peyvandi et al. reported significantly milder pain with bupivacaine than lidocaine and saline at the fifth, tenth, and twentieth postoperative hours, while lidocaine did not differ significantly from saline.[15]

In contrast, Teunkens et al. found better early analgesia with intravenous tramadol than with 0.25% bupivacaine; piritramide was required by 57% versus 81% of patients (P<0.001), and pain scores during the first 60 min were lower with tramadol.[13] This shows that bupivacaine may be useful against saline but may not equal active systemic preemptive analgesia. Ortega et al., in a meta-analysis of eight articles and 529 participants, reported delayed first analgesic requirement with local anaesthetic injection (standardised mean difference 0.68 minutes, 95% CI 0.26-1.09; P=0.001) and lower odds of receiving at least one narcotic dose on postoperative day 0 (OR 0.22, 95% CI 0.06-0.84; P=0.03).16 Bleeding and dehydration were not increased.

Our study showed lower PR, SBP, DBP, and respiratory rate with bupivacaine at selected early postoperative time points compared to control. Our findings support early analgesic benefit from peritonsillar 0.5% bupivacaine compared with saline, consistent with Rajput et al., Peyvandi et al., Raheem and Farouk, and Ortega et al.[7,14-16] However, Teunkens et al. showed greater early analgesic efficacy with intravenous tramadol than lower-concentration bupivacaine.[13] Differences in concentration, infiltration technique, timing, surgery, analgesic protocols, and outcome assessment may explain variation between studies. Overall, peritonsillar bupivacaine appears to be useful as an adjunct for early pain management after tonsillectomy.

CONCLUSION

Peritonsillar infiltration with 0.5% bupivacaine provided significantly better early postoperative pain relief than normal saline following tonsillectomy. The bupivacaine group also showed lower PR, SBP, DBP, and respiratory rate at selected postoperative time points. Overall, these findings suggest that 0.5% bupivacaine infiltration is an effective local analgesic technique and may be a useful adjunct for improving early postoperative pain management after tonsillectomy.

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