Journal of Cranio-Maxillo-Facial Surgery 47 (2019) 1861–1867

Contents lists available at ScienceDirect

Journal of Cranio-Maxillo-Facial Surgery

journal homepage: www.jcmfs.com

Effect of chlorhexidine/benzydamine soaked pharyngeal packing on throat pain and postoperative nausea & vomiting in orthognathic surgery

Çağıl Vural [a, *], Mehmet Emre Yurttutan [b], Kevser Tütüncüler Sancak [c], Ayşegül Mine Tüzüner [b]

[a] Ankara University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, Division of Anesthesiology, Ankara, Turkey
[b] Ankara University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, Ankara, Turkey
[c] Private Practice, Ankara, Turkey

ARTICLE INFO

Article history:
Paper received 1 July 2019
Accepted 20 November 2019
Available online 29 November 2019

Keywords:
Orthognathic surgery
Pharyngeal packing
Postoperative nausea and vomiting
Sore throat

ABSTRACT

Pharyngeal packing is believed to reduce postoperative nausea and vomiting (PONV) frequency, but has the disadvantage of causing throat pain. The present study aimed to investigate whether applying pharyngeal packs soaked with a combination of chlorhexidine gluconate 0.2% and benzydamine hydrochloride 0.15% (CGBH) were effective in preventing postoperative throat pain and PONV in patients undergoing orthognathic surgery. A total of 101 patients scheduled for orthognathic surgery were enrolled in this prospective, double-blind, randomized study. Patients were randomly allocated into two groups: those with CGBH-soaked packing, and those with saline-soaked pharyngeal packing. PONV was recorded using a 5-point Likert scale (0: no PONV to 4: severe PONV) immediately after the surgery at 5, 10, and 30 min, and at 2, 4, 6, 12, and 24 h postoperatively. The severity of throat pain was assessed via two methods: visual analogue scale (VAS, 0: no pain, 10: severe pain) and 6-point Likert scale (0: no pain, 5: strongly severe pain) score at 2, 4, 6, 12, and 24 h postoperatively. Mean VAS scores of throat pain were significantly lower in patients receiving CGBH-soaked pharyngeal packs compared to patients receiving saline-soaked pharyngeal packs, at all measured time points. There was a tendency towards less PONV in patients receiving a CGBH-soaked pharyngeal pack compared to those receiving a saline-soaked pharyngeal pack; however, this difference did not reach statistical significance. The results of this study suggest that the usage of CGBH-soaked pharyngeal packs reduce postoperative throat pain in patients undergoing orthognathic surgery. Our results support the implementation of CGBH-soaked pharyngeal packing in orthognathic surgery practice, as a measure to improve patient comfort.

1. Introduction

Postoperative nausea and vomiting (PONV) is a frequent complication of surgery, which influences postoperative patient comfort in 20%–30% of patients. It is associated with the type of anesthesia and surgical procedure (Gan et al., 2014). Anesthetic agents, especially opioid analgesics, are presumed to be the potential cause of PONV. However, ingestion of blood during surgical procedures involving the pharynx and particularly orthognathic surgery, may also lead to nausea and vomiting. Pharyngeal packing is currently used to minimize the amount of blood ingested in such surgeries and to prevent aspiration of foreign bodies such as teeth, pieces of bone, and small surgical hardware. However, packing comes with some disadvantages, including mild-to-severe sore throat and aphthous stomatitis (Basha et al., 2006). Furthermore, if the pharyngeal pack is not removed before the tracheal tube is removed, more severe complications, such as airway obstruction and even lethal outcomes, may occur (Knepil and Blackburn, 2008). Although the practice of pharyngeal packing is beneficial in reducing PONV, throat pain—an undesirable complication of this application—has been shown to reach an incidence of 60% in some

* Corresponding author. Tel.: +90 532 475 05 45, +90 312 296 55 90 (mobile); Fax: +90 312 212 39 54.
E-mail address: cagilvural@hotmail.com (Ç. Vural).

https://doi.org/10.1016/j.jcms.2019.11.014
1010-5182/

studies (Conway et al., 1960; Edmonds-Seal and Eve, 1962; Hartsell and Stephen, 1964).

Orthognathic surgery is commonly used for the correction of a variety of growth disturbances and congenital anomalies of the oral and maxillofacial region. Bleeding is one of the most serious complications of orthognathic surgery, leading to a demand for blood transfusions in up to 12% of patients (Panula et al., 2001). Bleeding in this region may also cause blood ingestion and aspiration; thus, pharyngeal packing is often used in orthognathic surgery to reduce these occurrences. However, current data are insufficient to draw conclusions regarding the role of pharyngeal packing in these procedures, and also whether adverse effects such as throat pain can be prevented.

Chlorhexidine gluconate is an antimicrobial agent commonly used for skin antisepsis. Benzydamine hydrochloride is a nonsteroidal anti-inflammatory agent that has been shown to reduce the incidence of throat pain when applied to endotracheal tube cuffs before endotracheal intubation (Mekhemar et al., 2016). In the present study, we aimed to investigate the impact of pharyngeal packs, soaked with a combination of chlorhexidine gluconate 0.2% solution and benzydamine hydrochloride 0.15% solution (CGBH), on postoperative throat pain and PONV in patients undergoing orthognathic surgery.

2. Materials and methods

2.1. Patients and procedures

A total of 111 patients scheduled for orthognathic surgery in Ankara University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, between January 2017 and June 2018 were included in this randomized, double-blind, prospective study. Inclusion criteria were as follows: age between 18 and 60 years, an American Society of Anesthesiologists (ASA) physical status score of 1 and 2, and an indication for Le Fort I osteotomy, surgically assisted rapid palatal expansion (SARPE), sagittal split ramus osteotomy (SSRO), and bimaxillary orthognathic surgery. Patients with a history of difficult intubation, bleeding disorders, malignancies, motion sickness, and those with morbid obesity were excluded from the study. In addition, patients demanding 5 or more rescue analgesics due to excessive pain within the postoperative 24 h were also excluded.

Written informed consent for surgery and study inclusion were obtained from all patients. The study protocol was approved by the Institutional Ethical Committee (Decision No: 18/2) and registered at clinicaltrials.gov (NCT03574246). The study was performed in accordance with the Declaration of Helsinki, and all participants signed an informed consent agreement.

Before randomization, all eligible subjects were sufficiently informed of the study protocol verbally and via a standardized written form in the presence of a member of the research staff. A total of 106 patients were included in the randomization. Five of the patients were excluded because 3 patients did not meet the inclusion criteria and 2 patients did not agree to participate. Using an online random allocation software (www.randomization.com), subjects were randomly assigned to one of the two intervention groups. The first group comprised patients who received saline-soaked pharyngeal packing; the second group comprised patients who received a throat pack soaked with chlorhexidine gluconate 0.2% and benzydamine hydrochloride 0.15% solution (CGBH). Saline and CBGH solutions were filled to a dark 50-ml bottle by the nurse and named 1 and 2 following the codes. The Apfel score was used to stratify patients according to risk for PONV (Watcha and White, 1992). The patients who had an Apfel score of 0, 1, and 2 were included.

No analgesics or anxiolytics were prescribed prior to surgery. General anesthesia was induced with intravenous propofol 3 mg/kg, fentanyl 1 mg/kg and 0.6 mg/kg rocuronium, and was then maintained with sevoflurane 2% in 60% N_2O/40% O_2. Each subject received 40 mg intravenous methylprednisolone prior to surgery, and the dose received was completed to 1 mg/kg by the end of surgery. Also, 4 mg ondansetron was administered to all patients at the end of surgery. A randomization envelope was used to identify the study group of each patient. CGBH or saline-soaked pharyngeal packs were situated under direct vision. Throat packs made of gauze with a length of 20 cm and a width of 10 cm (folded transverse four times) were placed by the surgeon blinded to the study groups. During this placement, delicate movements were carefully practiced so as not to injure the pharyngeal mucosa. Once the surgery was completed, pharyngeal packs were removed gently by the same member of the surgical team who was blinded to randomization. All patients received Dexketoprofen 50 mg intravenously, just before they were awakened from general anesthesia. After recovery, paracetamol (500 mg tablet) was routinely administered to each patient every 6 h.

PONV was assessed by research staff who were unaware of the group allocation of the patients at nine time points: Immediately after the surgery at 5, 10 and 30 min, and at 1, 2, 4, 6, 12 and 24 h postoperatively. Scoring definitions were as follows: 0: no PONV, 1: mild nausea, 2: moderate nausea, 3: severe nausea/mild vomiting, 4: continuous vomiting (Weilbach et al., 2006). The severity of throat pain was also evaluated by research staff blinded to the study groups using both visual analogue scale (VAS, 0: no pain, 10: most severe pain imaginable) score and a 5-point Likert scale (0: no pain, 4: severe pain) at 2, 4, 6, 12, and 24 h postoperatively. Data regarding surgical pain was collected using a 5-point Likert scale (0: no pain, 4: severe pain). Intramuscular 75 mg diclofenac sodium was administered as the first-choice analgesic to patients reporting a VAS pain score higher than 4, and metoclopramide 10 mg intravenous was administered to those having 3 or more episodes of PONV within 15 min.

2.2. Statistical analysis

Statistical analyses were carried out using SPSS for Windows, version 17 (SPSS, Chicago, IL). The distribution of the variables was checked with the Kolmogorov–Smirnov test. Continuous variables are presented as mean ± standard deviation (mean ± SD) and categorical variables as frequency (n) and percentage (%). Comparisons among groups regarding quantitative variables, such as VAS scores and Likert scores were performed using the Student t test. The chi-square test was used for univariate analysis of categorical variables. Two-sided p values of $\leq$0.05 were interpreted as statistically significant.

Statistical analyses were carried out using SPSS for Windows, version 11.5 (SPSS, Chicago, IL). The distribution of the variables was checked with the Kolmogorov–Smirnov test. The results are presented as frequencies, percentages, and mean ± standard deviation. A P value $< .05$ was considered to indicate statistical significance. The Student t test and Mann–Whitney U test were used to determine the significance of the difference in the mean values between the groups. The relationship between two qualitative variables were evaluated with chi-square and Fisher exact tests. A Spearman correlation coefficient was used, since normal distribution assumptions were not provided, to make determinations between two quantitative variables.

3. Results

Of the 106 patients, 101 completed all treatment process and assessment. Bronchoalveolar spasm occurred during extubation period in 4 patients. Also, 1 patient decided not to continue to

study. These patients were excluded from the study (Fig. 1). There were no significant differences between the groups with respect to age, sex, body mass index (BMI), ASA scores, duration of the operation and anesthesia, Apfel scores, and type of the operation performed (Table 1). There was a trend towards less PONV in patients receiving a CGBH-soaked pharyngeal pack compared to those receiving a saline-soaked pharyngeal pack; however, this difference did not reach statistical significance at any postoperative time point (Table 2). Mean VAS scores of throat pain in patients receiving CGBH-soaked pharyngeal packs were significantly lower at 2 h (2.50 ± 2.13 vs. 4.10 ± 2.55, $p = 0.001$), 4 h (2.15 ± 1.78 vs. 3.32 ± 2.11, $p = 0.002$), 6 h (1.78 ± 1.47 vs. 2.83 ± 1.80, $p = 0.001$), 12 h (1.73 ± 2.06 vs. 3.25 ± 2.19, $p < 0.001$), and at 24 h (1.15 ± 1.53 vs. 2.06 ± 1.53, $p < 0.001$) postoperatively (Table 3, Fig. 2). In addition, mean Likert scores measuring throat pain were also significantly lower in patients receiving CGBH-soaked pharyngeal packs compared to those receiving saline-soaked pharyngeal packs at all postoperative time points. However, mean Likert scores of postoperative surgical pain were similar in the two groups. Finally, recipients of CGBH-soaked pharyngeal packs were also found to require rescue analgesics less frequently.

Both operation time and anesthesia time were found to be strongly correlated with all VAS-TP scores (Table 4).

4. Discussion

The present study demonstrates that, in patients undergoing orthognathic surgery, CGBH-soaked pharyngeal packing is associated with a reduction in throat pain. In addition, the need for rescue analgesics was significantly lower in patients receiving CGBH-

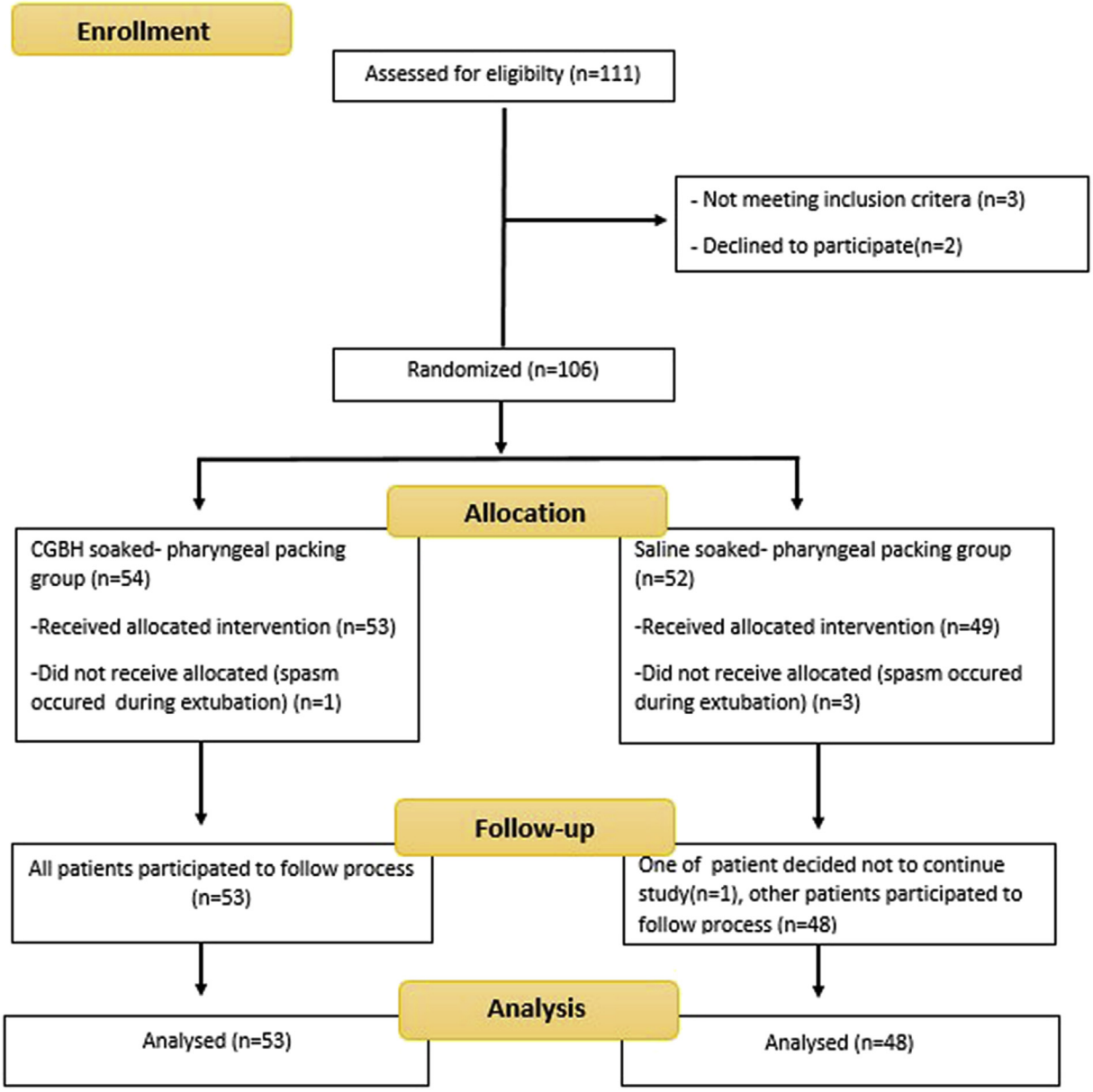

Fig. 1. Flow diagram of study.

Table 1
Baseline characteristics of the study population.

Variables		Saline-Soaked PP (n:48)	CGBH-Soaked PP (n:53)	p value
Age (years)	Mean ± SD	27.77 ± 20.60	27.47 ± 779	0.325[b]
	Median (Min.-Max.)	23.50 (18.00–64.00)	26.00 (18.00–61.00)	
Gender; n (%)	Male	19 (39.6)	20 (37.7)	0.849[c]
	Female	29 (60.4)	33 (62.3)	
BMI (kg/m$^{2)}$	Mean ± SD	22.44 ± 3.77	23.23 ± 3.40	0.270[a]
	Median (Min.-Max.)	22.75 (15.81–31.14)	23.38 (18.22–34.89)	
Operation time (min.)	Mean ± SD	255.08 ± 93.27	237.26 ± 82.40	0.310[a]
	Median (Min.-Max.)	272.50 (70.00–390.00)	255.00 (74.00–365.00)	
Anesthesia time (min.)	Mean ± SD	278.31 ± 94.25	262.11 ± 85.05	0.343[b]
	Median (Min.-Max.)	300.00 (85.00–420.00)	282.00 (90.00–384.00)	
ASA score	Mean ± SD	1.04 ± 0.20	1.04 ± 0.19	0.920[b]
	Median (Min.-Max.)	1.00 (1.00–2.00)	1.00 (1.00–2.00)	
Apfel Score	Mean ± SD	1.37 ± 0.81	1.38 ± 0.74	0.850[b]
	Median (Min.-Max.)	2.00 (0.00–2.00)	2.00 (0.00–2.00)	
Type of surgery; n (%)	Bimaxiller Osteotomy	28 (58.3)	32 (60.4)	0.562[d]
	Le Fort I Osteotomy	2 (4.2)	5 (9.4)	
	SSRO	8 (16.7)	7 (13.2)	
	SARPE	0 (0.0)	2 (3.8)	

Data are presented as mean ± standard deviation.
BMI, body mass index; SARPE, surgically assisted rapid palatal expansion; SSRO, sagittal split ramus osteotomy.
[a] Student *t* test.
[b] Mann-Whitney U test.
[c] Chi-square test.
[d] Fisher exact test.

Table 2
Comparison of PONV in patients receving CGBH and saline-soaked pharyngeal packing.

Variables		Saline-Soaked PP (n:48)		CGBH-Soaked PP (n:53)		p value
		n	%	n	%	
PONV 5th min.	None	28	58.3	39	73.6	0.223[a]
	Mild	11	22.9	10	18.9	
	Moderate	8	16.7	4	7.5	
	Severe	1	2.1	0	0.0	
PONV 10th min.	None	30	62.5	38	71.6	0.480[a]
	Mild	10	20.8	11	20.8	
	Moderate	7	14.6	3	5.7	
	Severe	1	2.1	1	1.9	
PONV 30th min.	None	27	56.2	36	67.9	0.243[a]
	Mild	10	20.8	12	22.6	
	Moderate	9	18.8	3	5.7	
	Severe	2	4.2	2	3.8	
PONV 1$^{st\ hour}$	None	26	54.3	37	69.8	0.174[a]
	Mild	16	33.3	8	15.1	
	Moderate	3	6.2	5	9.4	
	Severe	3	6.2	3	5.7	
PONV 2nd hours	None	33	68.8	43	81.1	0.408[a]
	Mild	11	22.9	6	11.3	
	Moderate	3	6.2	2	3.8	
	Severe	1	2.1	2	3.8	
PONV 6th hours	None	36	75.0	46	86.8	0.461[a]
	Mild	8	16.7	5	9.4	
	Moderate	3	6.2	1	1.9	
	Severe	1	2.1	1	1.9	
PONV 12th hours	None	42	87.5	50	94.3	0.469[a]
	Mild	5	10.4	2	3.8	
	Moderate	1	2.1	1	1.9	
PONV 24th hours	None	45	93.8	50	94.3	0.826[a]
	Mild	3	6.2	2	3.8	
	Moderate	0	0.0	1	1.9	

[a] Fisher-exact test.

soaked pharyngeal packs. The number of patients experiencing PONV was also lower in patients receiving CGBH-soaked pharyngeal packs compared to those receiving saline-soaked pharyngeal packs, although statistical comparisons did not show significant differences. The present study also shows a significant correlation between throat pain and surgical characteristics such as duration of operation and anesthesia.

Orthognathic surgery is increasingly used worldwide for the correction of several growth disturbances and congenital anomalies of the oral and the maxillofacial region. Since orthognathic surgery is mostly focused on the maxillofacial region—a highly vascularized area—operations concerning this region can cause severe bleeding, which may increase PONV frequency due to the ingestion of blood in some patients (Olsen et al., 2016). Therefore, the use of pharyngeal packs, which act as a physical barrier to prevent the transition of blood, have become a mainstay of maxillofacial surgery. Even though current evidence is insufficient to advocate the implementation of pharyngeal packs for these purposes, many surgeons and anesthesiologists continue to employ them in oral, nasal and maxillofacial surgical procedures because of positive experiences.

Several studies that have investigated the use of throat packs in various surgical procedures, including nasal and paranasal sinus surgery and upper airway or head and neck operations, conclude that there seems to be no benefit gained by the routine implementation of pharyngeal packing in terms of reducing the incidence of PONV or throat pain (Marais and Prescott, 1993; Basha et al., 2006; Korkut et al., 2010). On the contrary, throat packing may occasionally be harmful by increasing the frequency and intensity of postoperative throat pain due to the damage sustained by the pharyngeal mucosa. In the present study, no such complications related to throat packing were observed.

One of the first studies investigating the routine use of throat packs in patients undergoing nasal surgery was conducted by Basha et al. who found that the placement of a pharyngeal pack had no effect on the incidence of PONV but was associated with a significantly increased incidence of throat pain (Basha et al., 2006).

Table 3
Postoperative throat pain and analgesic use.

Variables	Saline-Soaked PP (n:48)		CGBH-Soaked PP (n:53)		p value
	Mean ± SD	Median (Min.-Max.)	Mean ± SD	Median (Min.-Max.)	
VAS TP 2nd hours	4.10 ± 2.55	4.15 (0.00–10.00)	2.50 ± 2.13	2.00 (0.00–10.00)	0.001[a]
VAS TP 4th hours	3.32 ± 2.11	3.00 (0.00–9.10)	2.15 ± 1.78	1.70 (0.10–8.80)	0.002[a]
VAS TP 6th hours	2.83 ± 1.80	2.65 (0.00–8.40)	1.78 ± 1.47	1.40 (0.00–7.60)	0.001[a]
VAS TP 12th hours	3.25 ± 2.19	2.70 (0.00–9.50)	1.73 ± 2.06	1.10 (0.00–8.60)	<0.001[a]
VAS TP 24th hours	2.06 ± 1.53	1.90 (0.00–7.50)	1.15 ± 1.53	0.50 (0.00–7.20)	<0.001[a]
LTP 2nd hours	2.56 ± 1.22	3.00 (0.00–5.00)	1.89 ± 0.93	2.00 (1.00–5.00)	0.001[a]
LTP 4th hours	2.38 ± 1.04	3.00 (0.00–4.00)	1.77 ± 0.95	2.00 (1.00–4.00)	0.002[a]
LTP 6th hours	2.10 ± 0.90	2.00 (0.00–5.00)	1.51 ± 0.72	1.00 (0.00–4.00)	<0.001[a]
LTP 12th hours	2.21 ± 1.05	2.00 (0.00–5.00)	1.45 ± 1.01	1.00 (0.00–5.00)	<0.001[a]
LTP 24th hours	1.67 ± 0.78	2.00 (0.00–3.00)	1.23 ± 0.78	1.00 (0.00–4.00)	0.001[a]
LSP 2nd hours	2.33 ± 1.21	2.00 (0.00–5.00)	2.23 ± 1.03	2.00 (1.00–5.00)	0.734[a]
LSP 4th hours	2.23 ± 1.10	2.00 (0.00–5.00)	1.98 ± 1.05	2.00 (1.00–5.00)	0.191[a]
LSP 6th hours	2.13 ± 0.91	2.00 (1.00–4.00)	1.85 ± 1.05	2.00 (0.00–5.00)	0.100[a]
LSP 12th hours	1.92 ± 1.01	2.00 (0.00–5.00)	1.66 ± 1.04	1.00 (0.00–5.00)	0.103[a]
LSP 24th hours	1.50 ± 0.68	1.00 (0.00–3.00)	1.32 ± 0.70	1.00 (0.00–4.00)	0.113[a]
Number of patients receiving RA; n (%)					
0	10 (20.8)		29 (54.7)		0.001[b]
1	21 (43.8)		18 (34.0)		
2	16 (33.3)		5 (9.4)		
3	1 (2.1)		1 (1.9)		

Data are presented as mean ± standard deviation.
LTP, Likert scale scores for throat pain; LSP, Likert scale scores for surgical pain; PP, pharyngeal packing; RA, rescue analgesic; VAS-TP, visual analogue scale score for throat pain.
[a] Mann–Whitney U test
[b] Fisher-exact test.

Similar results were obtained in a study carried out by Piltcher et al. in which the authors investigated the role of hypopharyngeal packing in PONV development among patients undergoing nasal surgery (Piltcher et al., 2007). The impact of applying a dry or wet pharyngeal pack was also studied previously, and no difference was noted between the two methods (Fennessy et al., 2011).

Very few data can be found in the literature regarding the use of pharyngeal packing soaked with nonsteroidal anti-inflammatory agents, and thus, the data on this topic are limited to a few studies with varying degrees of reliability. Previously, Elhakim et al. showed that throat packs impregnated with 0.2% tenoxicam were efficient in reducing moderate or severe postoperative throat pain following elective surgery of the nasal septum (Elhakim et al., 2000). More recently, Meco et al. compared the potency of three distinct types of packing including dry packing, water-soaked packing, and CGBH-soaked packing in patients scheduled for sinonasal surgery. In contrast to earlier findings established by Elhakim et al. their results did not show any difference among the three types of packing (Meco et al., 2016). These differences may partly be explained by the long time interval between the two studies, in which surgical technical advancements may have reduced bleeding during surgical procedures.

In orthognathic surgery, use of pharyngeal packing provides the advantage of preventing not only blood ingestion but also the passage of tissues, other material, and even teeth, making the use of these packs essential in this area of surgery. Unfortunately, none of the studies conducted until now have investigated the role of CGBH-soaked packs in patients who have undergone orthognathic surgery. Consistent with the results of the study performed by Elhakim et al. (2000), this study found that participants receiving CGBH-soaked pharyngeal packs experienced less throat pain compared to those receiving saline-soaked pharyngeal packs. Furthermore, in contrast to earlier findings, it was found that patients receiving CGBH-soaked pharyngeal packs experienced less PONV compared to participants receiving saline-soaked pharyngeal packs, although this difference did not reach statistical significance.

We believe that the potency of CGBH-soaked pharyngeal packs in reducing throat pain is likely derived from the anti-inflammatory effects of the drugs used. Sprays containing CGBH, which have antiseptic and anti-inflammatory properties, have long been administered by otolaryngologists to relieve the symptoms of throat pain, and by anesthesiologists to relieve postoperative throat pain caused by the insertion of laryngeal mask airway devices or endotracheal tubes (Cingi et al., 2010; Chen et al., 2014). However, the literature on this topic is very limited, and although our hypothesis seems to be confirmed by our findings, further studies are necessary.

The present study has some limitations to be discussed. These findings may be somewhat limited by the absence of a control group in which pharyngeal packing was not applied. However, considering the risks of orthognathic surgery, it would have been unethical not to use pharyngeal packing during orthognathic surgery in which a considerable amount of bleeding is expected, even in uncomplicated cases. In addition, assessment of bleeding during surgery as a confounding factor was not performed due to the difficulties in the measurement of blood loss in these surgeries. Nevertheless, the results of this preliminary study are encouraging, and therefore further studies to investigate the role of pharyngeal packing soaked with nonsteroidal anti-inflammatory agents in larger populations undergoing orthognathic surgery must be performed. Allergic reactions due to chlorhexidine have been reported in the literature, no allergic reactions were observed in any patient due to chlorhexidine.

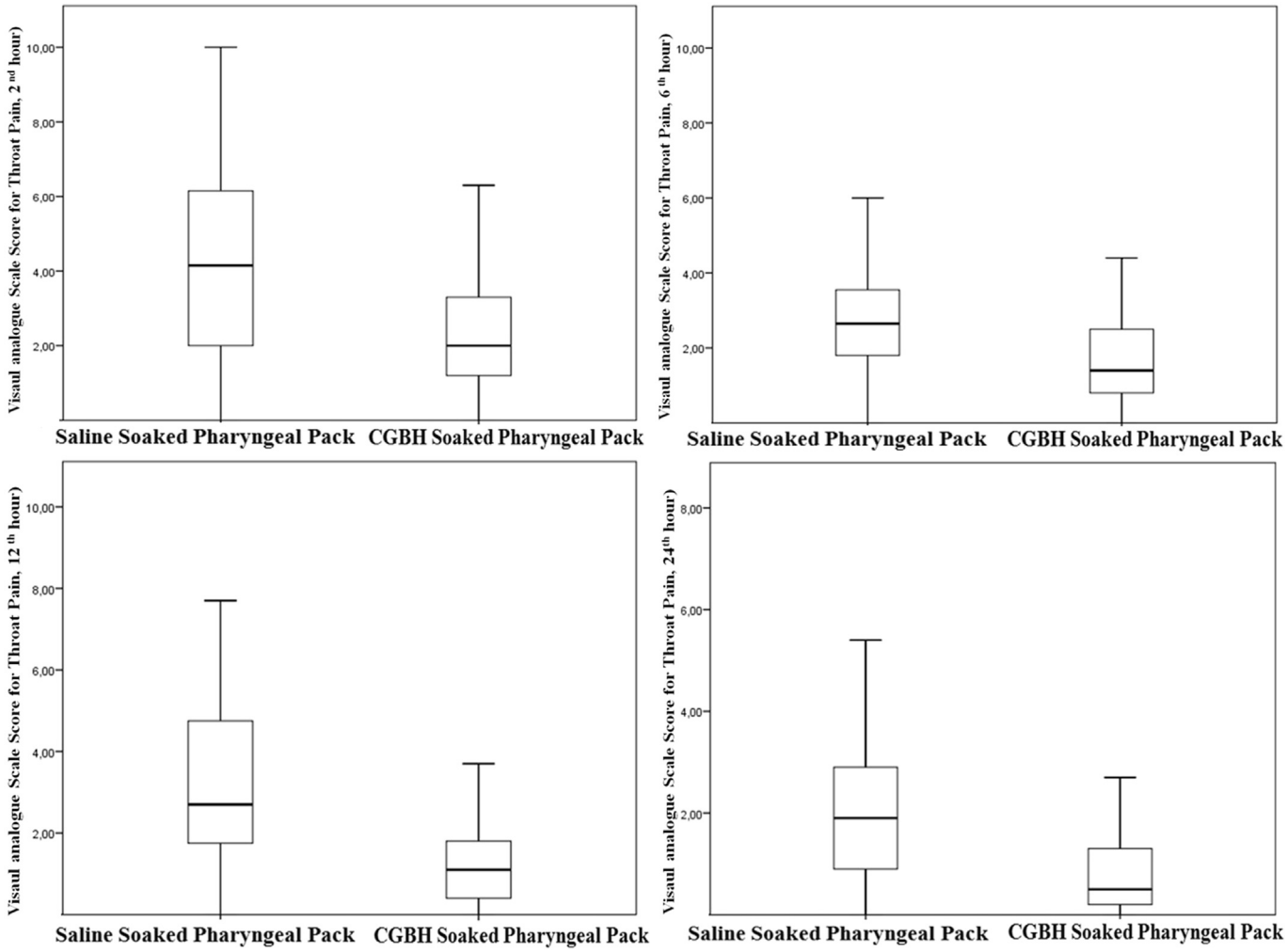

Fig. 2. Comparison of visual analogue scale scores for throat pain in patients receiving CGBH-soaked and saline-soaked pharyngeal packs.

Table 4
Correlation of operation and anesthesia times with throat pain VAS score.

	Operation Time		Anesthesia Time	
	r	p value	r	p value
VAS TP 2nd hours	0.210	0.035	0.211	0.035
VAS TP 4th hours	0.321	0.001	0.323	0.001
VAS TP 6th hours	0.354	<0.001	0.343	<0.001
VAS TP 12th hours	0.285	0.004	0.280	0.005
VAS TP 24th hours	0.264	0.008	0.257	0.001

VAS-TP; visual analogue scale score for throat pain.

5. Conclusion

In the light of our findings, we conclude that the use of CGBH-soaked pharyngeal packs (compared to standard saline-soaked packs) reduce throat pain, an effect lasting up to 24 h post-operatively, in patients undergoing orthognathic surgery. The placement of a CGBH- soaked pharyngeal pack also seems to reduce PONV severity, even though statistical significance was not found. Our results support the use of CGBH-soaked pharyngeal packing to improve patient comfort who undergo orthognathic surgery.

Authors' roles

Vural C., Yurttutan M.E., Sancak K. and Tuzuner A.M contributed equally to this work.

Vural C., Yurttutan M.E and Tuzuner A.M designed the research.

Vural C., Yurttutan M.E., Sancak K. collected and analyzed the data.

Vural C., Sancak K. and Tuzuner A.M wrote the paper.

Vural C., Yurttutan M.E., Sancak K. and Tuzuner A. have read and approved the final version to be published.

Declaration of Competing Interest

The authors declare no conflict of interest.

Acknowledgements

A pilot study of this article was presented at the 23rd International Conference on Oral Maxillofacial Surgery at Hong Kong, held between 31 March and 3 April 2017, and was published in the International Journal of Oral and Maxillofacial Surgery, April 2017, Supplement Issue 1.

We thank Batuhan Bakirarar for his assistance with statistical analysis.

References

Basha SI, McCoy E, Ullah R, Kinsella JB: The efficacy of pharyngeal packing during routine nasal surgery—a prospective randomised controlled study. Anaesth 61: 1161–1165, 2006

Chen CY, Kuo CJ, Lee YW, Lam F, Tam KW: Benzydamine hydrochloride on postoperative sore throat: a meta-analysis of randomized controlled trials. Can J Anaesth = Journal canadien d'anesthesie 61: 220–228, 2014
Cingi C, Songu M, Ural A, Yildirim M, Erdogmus N, Bal C: Effects of chlorhexidine/benzydamine mouth spray on pain and quality of life in acute viral pharyngitis: a prospective, randomized, double-blind, placebo-controlled, multicenter study. Ear Nose Throat J 89: 546–549, 2010
Conway CM, Miller JS, Sugden FL: Sore throat after anaesthesia. Br J Anaesth 32: 219–223, 1960
Edmonds-Seal J, Eve NH: Minor sequelae of anaesthesia: a pilot study. Br J Anaesth 34: 44–48, 1962
Elhakim M, Siam A, Rashed I, Hamdy MH: Topical tenoxicam from pharyngeal pack reduces postoperative sore throat. Acta Anaesthesiol Scand 44: 733–736, 2000
Fennessy BG, Mannion S, Kinsella JB, O'Sullivan P: The benefits of hypopharyngeal packing in nasal surgery: a pilot study. Ir J Med Sci 180: 181–183, 2011
Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al: Consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg 118: 85–113, 2014
Hartsell CJ, Stephen CR: Incıdence of sore throat followıng endotracheal ıntubatıon. Can Anaesth Soc J 11: 307–312, 1964
Knepil GJ, Blackburn CW: Retained throat packs: results of a national survey and the application of an organisational accident model. Br J Oral Maxillofac Surg 46: 473–476, 2008
Korkut AY, Erkalp K, Erden V, Teker AM, Demirel A, Gedikli O, et al: Effect of pharyngeal packing during nasal surgery on postoperative nausea and vomiting. Otolaryngology-Head Neck Surg 143: 831–836, 2010
Marais J, Prescott RJ: Throat pain and pharyngeal packing: a controlled randomized double-blind comparison between gauze and tampons. Clin Otolaryngol Allied Sci 18: 426–429, 1993
Meco BC, Ozcelik M, Yildirim Guclu C, Beton S, Islamoglu Y, Turgay A, et al: Does type of pharyngeal packing during sinonasal surgery have an effect on ponv and throat pain? Otolaryngology-Head Neck Surg 154: 742–747, 2016
Mekhemar NA, El-Agwany AS, Radi WK, El-Hady SM: Comparative study between benzydamine hydrochloride gel, lidocaine 5% gel and lidocaine 10% spray on endotracheal tube cuff as regards postoperative sore throat. Braz J Anesthesiol (Elsevier) 66: 242–248, 2016
Olsen JJ, Skov J, Ingerslev J, Thorn JJ, Pinholt EM: Prevention of bleeding in orthognathic surgery–a systematic review and meta-analysis of randomized controlled trials. J Oral Maxillofac Surg 74: 139–150, 2016
Panula K, Finne K, Oikarinen K: Incidence of complications and problems related to orthognathic surgery: a review of 655 patients. J Oral Maxillofac Surg 59: 1128–1136, 2001 discussion 1137
Piltcher O, Lavinsky M, Lavinsky J, de Oliveira Basso PR: Effectiveness of hypopharyngeal packing during nasal and sinus surgery in the prevention of PONV. Otolaryngology-Head Neck Surg 137: 552–554, 2007
Watcha MF, White PF: Postoperative nausea and vomiting. Its etiology, treatment, and prevention. Anesthesiol 77: 162–184, 1992
Weilbach C, Rahe-meyer N, Raymondos K, Weissig A, Scheinichen D, Piepenbrock S: Postoperative nausea and vomiting (PONV): usefulness of the Apfel-score for identification of high risk patients for PONV. Acta Anaesthesiol Belg 57: 361–363, 2006