Non-pain-related complaints of paediatric patients after dental treatment under general anaesthesia



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Abstract

Aim To investigate the prevalence, duration, and severity of non-pain-related complaints after dental treatment under general anaesthesia (DTGA) and to identify correlating factors from patient's characteristics and treatment.

Study design Cross-sectional observational study.

Methods Parents/caregivers of children treated under general anaesthesia were asked to fill in a dichotomous questionnaire during hospitalisation and the postoperative week. Several complaints were evaluated in relation to factors associated with dental treatment and general anaesthesia.

Results Drowsiness (86.4%), oral bleeding (81.7%) and vomiting (57.2%) were the most common non-pain related complaints, followed by cough (42.7%), eating difficulty (37.9%) emergence agitation (27.1%), nasal bleeding (21.3%), facial swelling (17.5%), sleep disturbance (13.5%) and fever (3.9%). Most complaints were significantly reduced or ceased by the 3rd postoperative day, however, facial swelling or eating difficulties were observed for up to a week. Age, length of surgery, number and class of extracted primary tooth, type of airway device and intraoperative administered systemic analgesics showed significant positive correlation with postoperative complaints.

Conclusion Postoperative morbidity after DTGA is common. Patients and their parents should be informed about the possibility of experiencing mild to moderate complaints, and adverse events that may last up to 7 days.

KEYWORDS paediatric dentistry, general anaesthesia, postoperative complaint, bleeding, emergence agitation, nausea and vomiting, dental treatment.

Introduction

Comprehensive dental care positively contributes to the oral health-related quality of life of children [Park et al., 2018]. However, very young individuals can only be treated under general anaesthesia. Fifteen percent of Hungarian children younger than 36 months are affected by early childhood caries, commanding a significant demand for dental treatment under general anaesthesia (DTGA) [Radacsi et al., 2021]. Although DTGA is routinely and safely performed, awareness must be raised on the associated complications and complaints. While mortality or serious morbidity are rare [Lee et al., 2013; El-Mowafy et al., 2019], minor adverse events (e.g., pain, bleeding, nausea, and vomiting, agitation, sleepiness) frequently occur related to GA or dental interventions [Escanilla-Casal et al., 2016; Rajab et al., 2022]. As this may be distressing for patients and their families [Lim and Borromeo, 2017], thorough explanation of possible morbidity prior to intervention is essential.

In our previous study we investigated the presence, severity, and duration of postoperative pain in the light of patient- and intervention-related factors. The use or lack of local anaesthesia during treatment did not affect postoperative pain experience. On the other hand, patient age, treatment time, type of airway management (nasotracheal intubation-NTI or laryngeal mask airway-LMA), class of extracted primary tooth (molar/anterior) significantly influenced pain during the postoperative week [Radacsi et al., 2023]. However, pain in the postoperative period is not a major complaint in children compared to other complaints [Rodd et al., 2014]. Many authors have reported non-pain related adverse events, with varying prevalence in diverse follow-up periods. These studies are hard to compare due to the non-uniform variables [Hu et al., 2018]. Most patients experience some postoperative morbidity that usually subside by the third day. Frequent non-pain related complaints are difficulties in eating, agitation, bond to parents [Ghafournia et al., 2021; Rajab et al., 2022] Escanilla-Casal et al. [2016] found a high postoperative morbidity after DTGA, but interestingly, there was no significant difference between ASAI and ASAII-III patient groups.

The present study addresses non-pain related complaints and determines potential association with this type of treatment modality in healthy (ASA I) patients. Our aim is to predict the occurance of postoperative morbidity and to highlight factors reducing complications.

	Type of medication	Active agent	Trade name, specification	Route of admin. †	Unified/ Optional
Pre operative	Sedative	midazolam syrup	compounded medication: 1mg/ml	p.o.	Unified
	Systemic analgesics	ibuprofen	Nurofen® suspension, 20 mg/ml Reckitt Benckiser, Budapest, Hungary	p.o.	
Intra operative	General anesthetic	sevoflurane	Sevorane®, AbbVie S.r.l., Campoverde di Aprilia (LT), Italy	inhalation	
	Opioids	fentanyl	Fentanyl-Richter® 50 µg/ml, Richter Gedeon, Budapest, Hungary	i.v.	Optional
		nalbuphine hydrochloride	Nalbuphine Serb®, 20 mg/2 ml, Serb Laboratoires, Paris, France	i.v.	
	LA	lidocaine-adrenaline	Lidocaine-adrenalin® 20 mg/0,01 mg/ml, EGIS, Budapest, Hungary	sm. inflitr.	
	Antibiotics	amoxicillin-clavulanic acid	Augmentin® 500mg/100mg, Biopharma S.r.l., Rome, Italy	i.v.	
	Anti-hemorrhagic	etamsylate	Dicynone® 125 mg/ml solution	i.v.	
Post operative	Opioids	nalbuphine hydrochloride	Nalbuphine Serb®, 20 mg/2 ml, Serb Laboratoires, Paris, France	i.v.	
	NSAIDs	ibuprofen	Nurofen® suspension, 20 mg/ml Reckitt Benckiser, Budapest Hungary	p.o.	
		diclofenac	Cataflam® suspension, 15 mg/ml Novartis Hungaria, Budapest, Hungary	p.o.	
	Antibiotics	amoxicillin-clavulanic acid	multiple manufacturer	p.o.	
	Antiemetics	ondansetron	Emetron® 2 mg/ml, Richter Gedeon, Budapest Hungary	i.v.	

† Route of administration: LA, local anesthesia; NSAID, non-steroidal anti-inflammatory drug; p.o., per os; i.v., intravenous; sm. infiltr., submucosal infiltration. Optional administration was left to the operator's discretion.

TABLE 1 Medications administered to patients

Materials and methods

Patients

This prospective cross-sectional observational study was approved by the local ethics committee of the university (Regional Research Ethics Committee, Clinical Centre, University Pecs, Hungary, No. 6823). All methods were performed in accordance with the relevant guidelines and regulations. Children, who underwent DTGA at our division (Paediatric Dentistry, Department of Dentistry, Oral and Maxillofacial Surgery, Medical School and Clinical Centre, University of Pecs, Hungary) in the form of day-care surgery voluntarily participated in our study. Informed consent was obtained from their parents/guardians. Patient inclusion and attrition flow-chart is shown in our previous article [Radacsi et al., 2023]. Indications for DTGA included lack of cooperation (where the outcome of other behavioural management was unsatisfactory), extensive treatment owing to multiplex caries lesions, and, less commonly, dental trauma and its inflammatory consequences. None of the patients had any mental disabilities or notable general diseases; they were assigned to ASA Class 1. The patients were treated by qualified paediatric dentists and anaesthesiologists. Inter-operator variability was tested for the personnel. After surgery, the patients were monitored in the ward for at least 6 h before discharge.

DEMOGRAPHIC DATA OF THE STUDY POPULATION

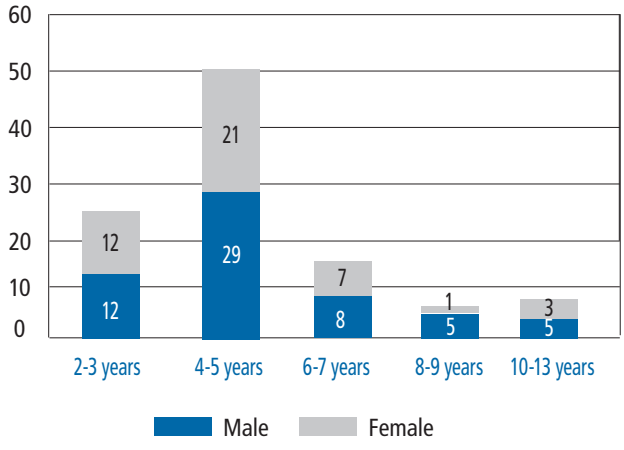


FIG. 1 Age and gender distribution of patients involved in the study.

Questionnaires

Based on our literature search, complaints associated with DTGA were collected and organised in a dichotomous answer sheet. Questionnaires were provided for parents/caregivers on the morning of the operation. They were asked to report nasal and oral bleeding, cough, vomiting, emergence agitation (crying, shouting) and drowsiness during hospitalisation period (right after awakening and 3 hours and 6 hours later). In the postoperative week daily reports on bleeding, facial swelling, fever, difficulties in eating or sleeping were obtained. Questionnaires were returned to the office at the follow-up appointment.

Other parameters

Parameters of the patients were collected from the regularly applied medical record. These included: age, gender, length of surgery, type of GA administration (inhalation narcosis through laryngeal mask or nasotracheal intubation), number and types of interventions (focusing on the amount, type, and class of extractions), and the use of preoperative, intraoperative, and postoperative medications (Table 1). In case of primary tooth extraction(s), bleeding control management (absorbable suture) was placed at the operator's discretion. The patients and parents were not aware of the intraoperative medications administered.

Statistical analysis

The analysis was performed using SPSS (IBM Corporation, New York, USA, v25.0). A result was considered as statistically

PREVALENCE OF COMPLAINTS DURING HOSPITALISATION AND IN THE POSTOPERATIVE WEEK

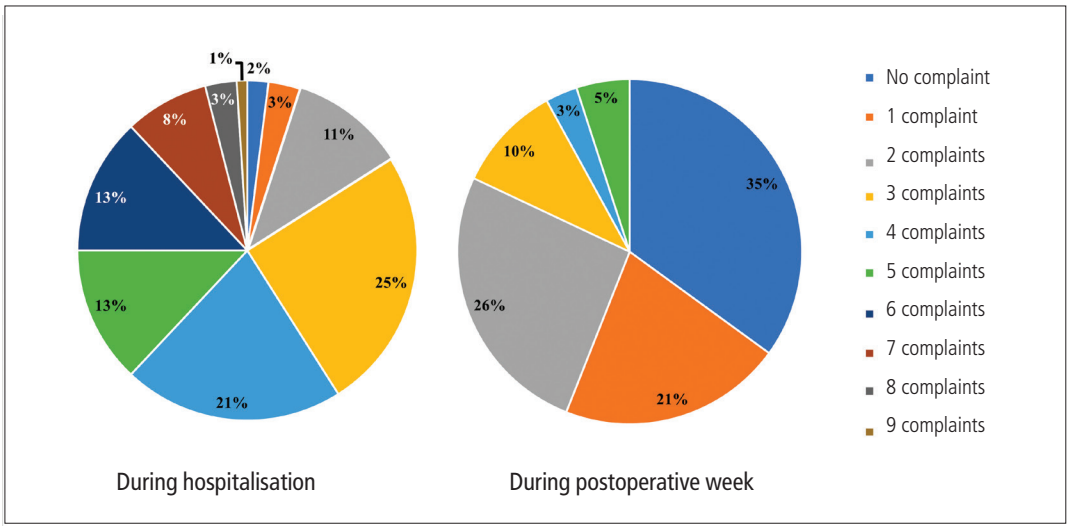


FIG. 2
Number of complaints reported during hospitalization and in the postoperative week. The figure shows a decrease in the number of complaints in the postoperative week.

significant if p<0.05. Due to the non-normal distribution of the data all analyses were carried out with non-parametric tests: Mann-Whitney U-test was used to compare differences between two groups, while Kruskal-Wallis tests with Mann-Whitney post hoc analysis and Bonferroni type 1 error correction were applied in cases of more groups. Spearman's rho correlation analysis or Chi square tests or Fisher tests were used to examine connections between two variables.

Results

One hundred and three questionnaires were fully completed and returned during the study. The age distribution of the patients is shown in Figure 1. Patient-and intervention-related data are presented in Table 2. During hospitalisation 98% of the patients reported postoperative complaints, the number of complaints decreased in the postoperative week (Fig. 2). The distribution of adverse events in the postoperative week is shown in Figure 3.

Oral bleeding was analysed among extraction cases. During the hospitalisation period it was reported in 81.7% (76) of the patients. Its presence showed significant positive correlation with age (p=0.021), length of surgery (p=0.042) and number of primary tooth extractions p=0.007). Emergence agitation (p=0.335) sex (p=0.592), type of airway device (p=0.105), administration of LA (p=0.969), suturing (p=0.187), the class (anterior, molar, both) of primary tooth extraction (p=0.159), presence of preoperative pain (p=0.515), or intraoperative administration of intravenous etamsylate did not affect the frequency of oral bleeding (p=0.764) (Table 3).

During postoperative week oral bleeding was reported in 13.9% (13) of cases. The presence of oral bleeding showed positive correlation with the number of primary tooth extractions (p=0.045) but not with age (p=0.717), sex (p=0.359), length of surgery (p=0.936), suturing (p=1.000), or class of tooth (front, molar, both) extracted (p=0.159) (Table 3). As oral bleeding in the postoperative week was present only in a limited number of cases and for a short time, duration could not be used in statistical analysis.

Nasal bleeding (epistaxis) during hospitalisation was reported in 21.3% (22) of the cases. It did not show positive correlation with age (p=0.221), sex (p=0.436), length of surgery (p=0.678), type of airway device (p=0.197), or intraoperative administration of etamsylate (p=0.932) (Table 4). Parents did not report nasal

COMPLAINTS REPORTED IN THE POSTOPERATIVE WEEK

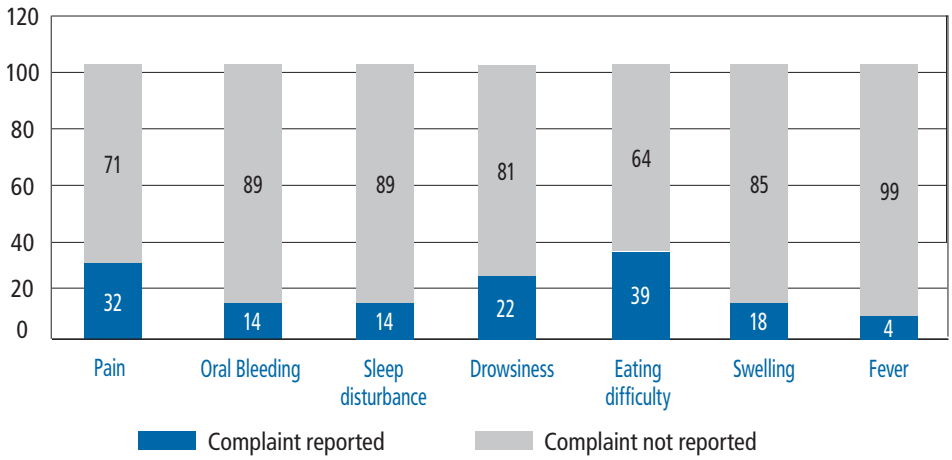


FIG. 3 Number of different complaints reported during the postoperative week.

TABLE 2
Data on patients and interventions conducted during dental treatment under general anesthesia

	Patient-related parameters		
	Male	Female	Average age (years) ± SD
	59	44	5.07 ± 2.55
	Operation-related parameters		
	Length of operation		96.41 ± 43.63 minutes
Dental interventions for all cases	Primary tooth filling		309
	Permanent tooth filling		20
	Primary tooth pulpotomy		35
	Permanent tooth root canal treatment		2
	Primary tooth extraction		459
	Permanent tooth extraction		15
Medication for all cases	Administered intraoperative LA		52
	Intraoperative systemic analgesia		96
	Postoperative systemic analgesia during hospitalization		73
Airway device for all cases	LMA		8 (only extraction(s))
	NTI	Only restorative treatment	13
		Restorative treatment and extraction(s)	68
		Only extractions	14

SD: standard deviation; LMA: laryngeal mask airway; NTI: nasotracheal intubation; LA: local anaesthesia

bleeding during postoperative week.

Cough during hospitalisation was reported in 42.7% (44) of the cases. It showed no positive correlation with age (p=0.250), sex (p=0.375), length of surgery (p=0.201), type of airway device (p=1.000), or oral bleeding (p=0.334) (Table 4).

Emergence agitation was registered in 28 cases (27.1%). It did not show significant positive correlation with either patient related factors (age p=0.143; sex: p=0.174), or operation related factors (length of surgery: p=0.164, type of airway device: p=0.680, number of primary tooth extractions: p=0.858; use of LA: p=0.067; type of intraoperative systemic analgesia: p=0.517) (Table 4).

Nausea and vomiting were separately asked in the questionnaire, but as nausea is difficult to define to children, it was omitted from the analysis. Vomiting was reported in 57.2% (59). Its frequency showed positive correlation with age (p=0.001) but not with sex (p=0.375), length of surgery (p=0.223), type of airway device (p=0.721), number of primary tooth extractions (p=0.363), administration of LA (p=0.932) or type of intraoperative systemic analgesia (p=0.079). The postoperative use of ondansetron did not affect the presence of vomiting either (p=0.244). The presence of oral or nasal bleeding did not influence the frequency of vomiting (p=0.961 and p=0.497 respectively) (Table 5).

Postoperative sleep disturbance (difficulty in initiating and maintaining sleep) was found in 13.5% (14). Sleeping difficulty subsided by the 6th postoperative day. Due to the limited occurrence, duration could not be used for statistical analysis. The presence of sleeping difficulty did not correlate with age (4.57±2.31 years with sleeping difficulty vs. 5.15±2.59 years without difficulty p=0.531), sex (p=0.241), length of surgery (p=0.254), number of primary tooth extractions (p=0.581), type of airway device (p=1.000) or type of intraoperative systemic analgesia (p=0.794) (Table 6).

Drowsiness (excessive daytime sleepiness) was reported in 86.4% (89) of the cases during hospitalisation and in 21.3% (22) during postoperative week. Its longest reported duration was 2 days.

During hospitalisation it did not show significant correlation with age (p=0.091), sex (p=0.569) or length of surgery (p=0.052). However, it showed significant correlation with the type of airway device and the type of intraoperative systemic analgesia (Table 6). Drowsiness was significantly more frequent in patients of the NTI group compared to the LMA group (p=0.011). Opioid type systemic analgesia significantly increased the prevalence of postoperative drowsiness (p=0.05).

During postoperative week it did not correlate with age (p=0.793), sex (p=0.847), length of surgery (p=0.192), the type of airway device (p=0.197) or the type of administered intraoperative systemic analgesics (p=0.617) (Table 6).

Facial swelling was registered in 17.5% (18) of the patients. It was reported until the 7th postoperative day. It showed positive correlation with the number of primary tooth extractions examined for all cases (p=0.044), and with the administration of antibiotics (p=0.004). Age (p=0.138), sex (p=0.871) and suturing (p=0.874) did not affect the prevalence of facial swelling (Table 7).

The frequency of eating difficulty was 37.9% (39) among the cases. It was reported up to seven days (whole study period). Examined among all cases, significant positive correlation was shown with age (p=0.011), number (p=0.008) and class of primary tooth extractions (anterior, molar, both p=0.045), with the order of prevalence as follows: both molar and anterior, solely molar or anterior tooth removals. The duration (p=0.002) and the average severity of pain (p<0.001) during postoperative week correlated positively with this symptom. No positive correlation was found with sex (p=0.170) (Table 7).

Fever was reported in 3.9% (4) cases. In 3 cases, it was present on the first postoperative day only, while in one case it lasted for 4 days. Due to the limited prevalence of fever no statistical analysis could be carried out regarding correlations with other parameters.

Discussion

Postoperative complaints (and complications) among patients undergoing DTGA are common [Farsi et al., 2009]. To reduce their frequency, we must have a better understanding of the

	Oral bleeding during hospitalisation			Oral bleeding during postoperative week		
	Reported	Did not report	p	Reported	Did not report	p
n	76	17		13	80	
Age (years)	4.65±1.90	6.57±3.13	0.021	4.85±2.34	5.08±2.39	0.717
Sex (male/female)	43/33	9/5	0.592	6/7	46/31	0.359
Length of surgery (minutes)	100.53±43.73	75.71±52.14	0.042	97.69±36.26	96.43±47.06	0.936
Number of primary tooth extractions (median, minimum, maximum)	me.: 4, min.:1, max.:20	me:2; min.:1, max.:6	0.007	me.:6, min.:1, max.:19	me.:3, min.:1, max.:20	0.045
Emergence agitation present (yes/no)	24/52	2/12	0.035	na	na	na
Type of airway device (LMA/NTI)	5/71	3/11	0.105	na	na	na
Local anaesthesia (yes/no)	43/33	9/5	0.969	na	na	na
Suture (yes/no)	58/18	8/6	0.187	10/3	56/21	1.000
Primary extraction(s) (front/molar/both)	10/27/38	4/7/3	0.159	na	na	na
Intraoperative iv. etamsylate (yes/no)	27/49	4/10	0.764	na	na	na

LMA: laryngeal mask airway, NTI: nasotracheal intubation, iv.: intravenous, na: not applicable

TABLE 3 The prevalence of oral bleeding during hospitalization and in the postoperative week

factors contributing to their presentation.

Bleeding from the oral cavity after tooth extractions is a common phenomenon regardless of the setting of the intervention (outpatient vs. day care patient). It is recommended to provide complete, comprehensive dental rehabilitation under GA to reduce the chance for retreatment [Knapp et al., 2017]. Multiple extractions, carried out in a single appointment, may lead to prolonged bleeding [Huang et al., 2022]. Bleeding positively correlated with the number of primary tooth extractions, and it was more common among younger patients during hospitalisation. The latter finding is related to the advanced physiological root resorption of primary teeth in older patients, where extraction leaves smaller wound surfaces, thus blood clot formation and stability are more ideal, resulting in less bleeding. Based on our results, administration of LA containing vasoconstrictor (adrenalin) during operation did not have an impact on oral bleeding. The adrenalin in LA has a local vasoconstrictor effect and results in reduced perioperative bleeding [McWilliams and Rutherford, 2007; Townsend et al., 2009]. On the contrary, the subsiding effect of the locally administered adrenalin promotes vasodilatation and therefore bleeding. Therefore, epinephrine may mask intraoperative bleeding, but secondary bleeding can occur after the diminishing local effect. The use of LA in case of primary tooth extractions does not provide protection against postoperative bleeding [Czembirek et al., 2014] and according to our previous study it does not reduce postoperative pain either [Radacsi et al., 2023].

Suturing the gingiva around the extraction socket of primary teeth for the re-approximation of retracted soft tissues and for the stabilisation of the blood cloth is well established in surgery [Kumbargere Nagraj et al., 2018]. Suturing did not reduce the prevalence of postoperative bleeding in our study. This finding may be a result of different suturing techniques used (interrupted sutures, simple continuous sutures) or the fact that postoperative bleeding was evaluated by a non-professional observer (parent), and the extent of bleeding was not described, however none of the participants required further professional intervention to reduce bleeding. Further evaluation and studies are needed to assess this issue. On the

	Nasal bleeding (epistaxis)		
	Reported	Did not report	p
n	22	81	
Age (years)	5.64±2.59	4.91±2.54	0.221
Sex (male/female)	11/11	48/33	0.436
Length of surgery (minutes)	94.32±35.62	96.98±45.53	0.678
Type of airway device (LMA/NTI)	0/22	8/73	0.197
Intraoperative iv. etamsylate (yes/no)	7/15	25/56	0.932
	Cough		
n	44	59	
Age (years)	4.66±2.21	5.37±2.76	0.250
Sex (male/female)	23/21	36/23	0.375
Length of surgery (minutes)	103.52±47.28	91.10±40.28	0.201
Type of airway device (LMA/NTI)	3/41	5/54	1.000
Oral bleeding present during hospitalisation (yes/no)	35/9	42/17	0.334
	Emergence agitation		
n	28	75	
Age (years)	4.75±2.98	5.19±2.39	0.143
Sex (male/female)	13/15	46/29	0.174
Length of surgery (minutes)	86.43±46.19	100.13±42.35	0.164
Number of primary tooth extractions (median, minimum, maximum)	me.:4, min.:0, max.:19	me.:3, min.:0, max.:20	0.858
Type of airway device (LMA/NTI)	3/25	5/70	0.680
Local anaesthesia (yes/no)	10	42/33	0.067
Intraoperative systemic analgesia (no/fentanyl/nalbuphine/both)	3/3/14/8	4/5/36/30	0.517

LMA: laryngeal mask airway, NTI: nasotracheal intubation, iv.: intravenous

TABLE 4 Nasal bleeding, cough, and emergence agitation during hospitalization

	Vomiting		
	Reported	Did not report	p
n	59	44	
Age (years)	5.69±2.66	4.23±2.16	0.001
Sex (male/female)	36/23	23/21	0.375
Length of surgery (minutes)	100.51±41.48	90.91±46.28	0.223
Number of primary tooth extractions (median, minimum, maximum)	me.:3 min.:0 max.:20	me.:3.5 min.:0 max.:19	0.363
Type of airway device (LMA/NTI)	4/55	4/40	0.721
Local anaesthesia (yes/no)	30/29	22/22	0.932
Intraoperative systemic analgesia (no/fentanyl/nalbuphine/both)	2/3/27/27	5/5/23/11	0.079
Oral bleeding present during hospitalisation (yes/no)	44/15	32/12	0.961
Nasal bleeding (epistaxis) present during hospitalisation (yes/no)	14/46	8/36	0.497
Postoperative ondansetron administration (yes/no)	15/44	7/37	0.244
LMA: laryngeal mask airway, NTI: nasotracheal intubation			

TABLE 5 Vomiting during hospitalisation

	Sleep disturbance in the postoperative week		
	Reported	Did not report	p
n	14	89	
Age (years)	4.57±2.31	5.15±2.59	0.531
Sex (male/female)	6/8	53/36	0.241
Length of surgery (minutes)	85.00±41.42	98.20±43.92	0.254
Number of primary tooth extractions (median, minimum, maximum)	me. :4, min.:0, max.:19	me. :3, min.:0, max.:20	0.581
Type of airway device (LMA/NTI)	1/13	7/82	1.000
Intraoperative systemic analgesia (no/fentanyl/nalbuphine/both)	0/1/8/5	7/7/42/33	0.794
	Drowsiness during hospitalisation		
	Reported	Did not report	p
n	89	14	
Age (years)	5.22±2.63	4.07±1.77	0.091
Sex (male/female)	50/39	9/5	0.569
Length of surgery (minutes)	100.28±42.16	71.79±46.31	0.052
Type of airway device (LMA/NTI)	4/85	4/10	0.011
Intraoperative systemic analgesia (no/fentanyl/nalbuphine/both)	3/6/45/35	4/2/5/3	0.05
	Drowsiness during postoperative week		
	Reported	Did not report	p
n	22	81	
Age (years)	4.59±1.59	5.20±2.75	0.793
Sex (male/female)	13	46	0.847
Length of surgery (minutes)	107.27±41.65	93.46±43.93	0.192
Type of airway device (LMA/NTI)	0	8	0.197
Intraoperative systemic analgesia (no/fentanyl/nalbuphine/both)	0/2/11/9	7/6/39/29	0.617
LMA: laryngeal mask airway, NTI: nasotracheal intubation			

TABLE 6 Sleep disturbance and drowsiness during hospitalisation and postoperative week

other hand, suturing, re-approximation of the soft tissues might be beneficial in promoting healing.

The use of systemic haemostatic agent, etamsylate is indicated in surgical interventions. Intravenous administration promotes thrombocyte adhesion and aggregation at wound sites, but the exact mechanism of action still needs clarification [Cobo-Nuñez et al., 2018]. Based on our results systemic administration of etamsylate had no influence on postoperative bleeding. It may play a role in intraoperative bleeding control, but in our study long-term effect could not be demonstrated.

Oral bleeding during postoperative week showed positive correlation only with the number of primary teeth extracted. It affected 14% of the extraction cases and was reported by parents until the 3rd postoperative day. Parents did not seek any further medical attention; therefore, presumably only mild periodic bleeding might have occurred, possibly related to eating, toothbrushing or drinking.

In a study by Baillargeau et al. [2020] the prevalence of bleeding after primary tooth extractions was 15%, where the presence of preoperative pain was predictive. In our study this correlation was not observed.

Epistaxis did not show statistically significant correlation with any examined parameters. We should however acknowledge that no patient in the LMA group had nasal bleeding, whereas 23.16% prevalence was observed among patients receiving NTI. Due to the limited number of LMA cases statistical analysis could not reveal significant difference, but epistaxis without nasal trauma (NTI) is unlikely to appear. Nasal bleeding related to NTI is an expected complication, but according to El-Seify et al. [2010] its prevalence may be reduced with xylometazoline pre-treatment. In our study it was a rather short-term morbidity, as no parents reported epistaxis during the postoperative week.

Cough could not be associated with any examined parameters. Interestingly, there was no significant difference in the frequency between the NTI and LMA group. This may be due to the low case number in the LMA group, or the irritation related to NTI is truly not a significant factor resulting in coughing.

Emergence agitation (e.g., loud crying, tantrums during awakening) was reported in 27.18% of the cases. Keles and Kocaturk [2018] reported higher incidence of emergence delirium with NTI than with LMA. In our study the prevalence did not correlate with any of the analysed parameters, therefore its prediction remains challenging [Lee and Sung, 2020]. In a study, carried out by Dalens et al. [2006], nalbuphine significantly decreased the incidence and severity of emergence agitation after DTGA, without delaying discharge.

The prevalence of vomiting in our study was much higher (57.2%) compared to other studies (6.1%-35.5%) [Enever et al., 2000; Vinckier et al., 2001; Farsi et al., 2009]. This finding might be related to the different anaesthetic drugs (halothane, isoflurane, sevoflurane, nitrous oxide) or methods used during

	Facial swelling		
	Reported	Did not report	p
n	18	85	
Age (years)	5.72±2.72	4.93±2.51	0.138
Sex (male/female)	10/8	49/36	0.871
Length of surgery (minutes)	107.27±41.65	93.46±43.93	0.192
Antibiotics administered (yes/no)	9/9	14/71	0.004
Number of primary tooth extractions (median, minimum, maximum)	Me:6 Min:1 Max:19	Me:3 Min:0 Max:20	0.044
Suture (yes/no)	12/6	55/30	0.874
	Eating difficulty		
n	39	64	
Age (years)	5.78±2.49	4.75±2.53	0.011
Sex (male/female)	19/40	40/24	0.170
Number of primary tooth extractions (median, minimum, maximum)	me.:5, min.:0, max.:20	me.:2, min.:0, max.:18	0.008
Primary extraction(s) (no/front/molar/both)	3/2/13/21	11/12/21/20	0.045
Duration of pain (postop. week) (days)	me.:2, min.:0, max.:7	me.:0, min.:0, max.:7	0.002
Average severity of pain during the postoperative week	1.04±1.06	0.51±1.22	<0.001

TABLE 7 Facial swelling and eating difficulty during the postoperative week

the induction and maintenance of general anaesthesia in the studies. In our practice, GA is induced and maintained with sevoflurane using a rebreathing system. In the soda lime of the system sevoflurane can degrade to formaldehyde. Inhalation of formaldehyde is able to provoke significant nausea and vomiting [Bedi et al., 2000]. According to our findings, older age was the only predictive factor for vomiting. This is in correlation with other clinical trials, where toddlers were found to be less susceptible to emetic stimuli, than older children. Over the age of 3 years the risk for vomiting increases [Byers et al., 1995; Eberhart et al., 2004; Rajab et al., 2022]. Opioid analgesics can be major risk factors for postoperative vomiting [Kovac, 2020]. In our study, the prevalence of vomiting was higher in patients receiving nalbuphine solely (54%) or in combination with fentanyl (71%) compared to patients receiving only fentanyl (37.5%) or no intraoperative systemic analgesia (28.57%) (Table 5). Further studies are needed to assess this matter.

Sleeping difficulty during postoperative week was reported in 13.59% of the cases. It did not correlate with any of our examined parameters. Rajab et al. [2022] reported insomnia in the first 3 days postoperatively in 27.4% of the children after DTGA, negatively correlating with age.

Drowsiness during hospitalisation was the most reported complaint (86%). We found correlation with the administration of opioid analgesics. Simultaneous intraoperative use of fentanyl and nalbuphine showed the highest incidence (92%), followed by nalbuphine only (90%), fentanyl only (75%) and no intraoperative systemic analgesic groups (42.86%). Drowsiness during hospitalisation is not necessarily an adverse event if it does not interfere with the time of discharge. Although we did not find significant correlation with the examined parameters, according to Steinmetz et al. [2007], patients having longer operations are at higher risk of developing drowsiness, indicating the role of the elongated sevoflurane inhalation. Drowsiness during postoperative week was also reported in 21.36%, but its frequency did not correlate with any examined parameters.

Facial swelling during the postoperative week was registered in 17.48% of cases. It positively correlated with the number of primary tooth extractions, suggesting that more invasive interventions increase the chance of inflammations. Contrary to the study by Martín-Ares et al. [2017], facial swelling was significantly more common among patients, who received antibiotics (amoxicillin-clavulanic acid) during operation and the postoperative week. In our study antibiotics were administered to prevent superinfection during the healing period in cases where multiple extractions were carried out leaving extended open wounds. These results suggest that the number of tooth extractions is the primary risk factor of postoperative facial swelling. Administration of antibiotics may not have direct impact on the occurrence. Up to our best knowledge, no clinical guide is available related to the administration of antibiotics in cases of extensive primary tooth extractions. Based on the parental questionnaire, none of the patients with facial swelling required medical care related to this complaint. At the follow-up appointment no signs of superinfection were detected. According to the parent's description only mild, temporary local swelling was observed.

Eating difficulty during postoperative week was reported in 37.86% of the cases. Older age, numerous primary tooth extractions showed positive correlation with this parameter. Patients not submitted to extraction or undergoing solely anterior extractions had a lower frequency of eating difficulty (21.43% and 14.29% respectively) than those submitted to molar extractions (38.24%). The highest prevalence was found in cases where both front and molar teeth were extracted (51.22%). The latter partially overlaps with our findings about the number of extractions. In a recent study inability to eat in the first postoperative day was reported in almost 25% of the cases following DTGA, also related to the number of teeth extracted [Almaz et al., 2019]. In our study, children with eating difficulty reported more severe and longer lasting pain during the postoperative week, highlighting the importance of pain management during this period.

Conclusion

A better understanding of factors contributing to postoperative morbidity is essential. Knowledge on adverse events likely to occur after dental treatments under general anaesthesia may help enhancing the treatment planning and informing the patients and their parents/caregivers on what to expect in the postoperative phase.

Based on our findings the revaluation and adjustment of anaesthetic protocols may be reasonable to reduce the incidence of postoperative vomiting.

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Conflicts of Interest statement

The authors declare that there is no conflict of interest.

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