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A Comparison Between Dexamethasone and Methylprednisolone for Vomiting Prophylaxis After Tonsillectomy in Inpatients Children: A Randomized Trial

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Abstract

Background—The frequent incidence of postoperative vomiting in children undergoing tonsillectomy, in addition to the occurrence of severe pain, may delay postoperative oral intake and lead to increased risk of dehydration. Thus, prophylactic therapy is indicated in this high-risk group. Glucocorticoids, such as dexamethasone and methylprednisolone, have antiinflammatory and antiemetic properties with dexamethasone being frequently used. We hypothesized that methylprednisolone should be noninferior to dexamethasone for the prevention of vomiting in children after tonsillectomy.

Methods—We designed a randomized double-blinded trial to compare the efficacy of a single prophylactic dose of 0.5mg/kg dexamethasone with a dose of 2.5 mg/kg methylprednisolone on the incidence of postoperative vomiting during the first 24 hours (primary outcome) in children undergoing total or partial tonsillectomy with a noninferiority margin set at 9%. One hundred sixty children undergoing total or partial tonsillectomy under general anesthesia were randomly assigned to receive either IV dexamethasone 0.5 mg/kg (n=79) or methylprednisolone 2.5 mg/kg (n=81) after induction of anesthesia. Secondary analysis of all studied outcomes was also performed according to the type of surgery.

Results—An intention-to-treat analysis showed an overall incidence of vomiting of 30% in the dexamethasone group and of 22% in the methylprednisolone group (difference: 8%, 95% CI: –5 to 21%). A per protocol analysis showed an incidence of vomiting of 32% and 23% respectively (difference: 9%, and 95% CI of the difference: –5 to 23%, $P_{sup}=0.28$). The time and quality of oral intake, the duration of IV hydration, as well as pain and satisfaction scores and the need for analgesics were similar between the 2 groups. The incidence of vomiting was also similar in patients who had total versus partial tonsillectomy; however, time to first oral intake, duration of IV hydration, and the need for analgesics were less with better satisfaction scores in partial versus total tonsillectomy patients.

Conclusion—Methylprednisolone is at worst 5% less effective than dexamethasone by the intention-to-treat analysis, and by the per protocol analysis. Thus, it is noninferior to dexamethasone in preventing vomiting after tonsillectomy in children.

Introduction

Tonsillectomy with or without adenoidectomy is one of the most frequently performed surgical operations in children and is associated with a frequent incidence of postoperative vomiting (POV) that may exceed 70%.¹ The frequent incidence of POV in addition to the occurrence of severe pain may delay postoperative oral intake and lead to inadequate oral feeding, which may increase the risk of dehydration. Thus, prophylactic therapy is indicated in this high-risk group.¹

Glucocorticoids, such as dexamethasone and methylprednisolone, decrease local inflammation by blocking the chemical mediators of inflammation and subsequently have analgesic properties.² They also possess antiemetic properties which occur by a mechanism as yet unknown. They may exert their antiemetic action via prostaglandin antagonism, release of endorphins, and reduction of serotonin level in the gut and neural tissue.³ Also, they enhance the effect of other antiemetics by sensitizing their pharmacological receptors.³ Therefore, their antiemetic effects in addition to their analgesic effects make them particularly useful after tonsillectomy.

Numerous studies using different doses of dexamethasone have shown that IV dexamethasone decreases the incidence of POV and improves oral intake after tonsillectomy in children.^{1,4–12} Recently, the clinical practice guideline issued for tonsillectomy in children made a strong recommendation that clinicians administer a single intraoperative dose of IV dexamethasone to children undergoing tonsillectomy, the 0.5 mg/kg dose being the most frequently used. Also, the panel stated that dexamethasone administration would not only lead to decreased incidence of postoperative nausea and vomiting (PONV), an important morbidity associated with pediatric tonsillectomy, but would also decrease throat pain and time to resumption of oral intake.¹³

Methylprednisolone, another glucocorticoid, has also been shown to be a potent antiemetic in the setup of chemotherapy-induced emesis¹⁴ or intractable hyperemesis gravidarum¹⁵ and has recently emerged as a useful drug for analgesia after orthopedic surgery,¹⁶ breast surgery,¹⁷ and total knee arthroplasty¹⁸ with equal analgesic efficacy as nonsteroidal antiinflammatory drugs^{16,17} but with a more sustained effect.¹⁶ Some of these studies^{17,18} reported as a secondary outcome a significant decrease in the incidence and severity of PONV in patients receiving methylprednisolone versus placebo or nonsteroidal antiinflammatory drugs. Only one study performed a head-to-head comparison between dexamethasone and methylprednisolone as prophylactic treatment for PONV in adult female patients undergoing abdominal or laparoscopic surgery.³ In this study, methylprednisolone 40 mg IV was found to be significantly better than placebo with an incidence of PONV of 15% versus 35% respectively and a number-needed-to-treat of 5, while no significant difference was found between dexamethasone 8 mg IV and placebo with an incidence of 29% versus 35% respectively and a number-needed-to-treat of 17. With only 40 patients per group, this study was not sufficiently powered to detect any statistically significant difference between dexamethasone and methylprednisolone.

Since dexamethasone is the only representative of its class for PONV prophylaxis in children, an alternative may be needed,¹⁹ especially in this era of multiple drug shortages.²⁰ We hypothesized that methylprednisolone should be noninferior to dexamethasone for the prevention of POV in children after tonsillectomy. Thus, we designed a randomized double-blinded trial to compare the efficacy of a single prophylactic dose of 0.5mg/kg IV dexamethasone with an equipotent dose of 2.5 mg/kg IV methylprednisolone^{14,21} on POV during the first 24 hours (as primary outcome) in children undergoing total or partial tonsillectomy with or without adenoidectomy and myringotomy. Postoperative pain, quality

of oral intake, parents' satisfaction, and differences in pain or vomiting related to the type of surgery were considered secondary outcomes.

Methods

After IRB approval and written parental/guardian consent, we conducted a randomized prospective study in ASA I and II children aged between 2 and 12 years presenting for total or partial tonsillectomy with or without adenoidectomy and myringotomy under general anesthesia. Patients who received antiemetics, steroids, antihistaminics, or psychoactive drugs within 24 hours before surgery or those with diabetes or in whom IV induction was indicated were excluded.

Premedication consisting of oral midazolam 0.5 mg kg^{-1} (maximal dose 15 mg) was administered 30 minutes before anticipated induction. After establishing standard patient monitoring, inhaled induction was initiated with sevoflurane, followed by the insertion of an IV cannula. Anesthesia was maintained with 70 % N_2O and 2–4% sevoflurane. All children received $1\text{--}2 \text{ }\mu\text{g.kg}^{-1}$ fentanyl and 10 to 15 ml.kg^{-1} of normal saline solution during the intraoperative period. Patients were randomly allocated by using a computer-generated random table. Group allocation was concealed in sealed opaque envelopes; these envelopes were numbered and opened sequentially after patient consent had been obtained. Then patients were assigned to receive either dexamethasone 0.5mg/kg IV or methylprednisolone 2.5mg/kg IV. This was a double-blinded study, with neither patients/parents nor treating physicians or nurses recording data aware of the treatment assignment. Dexamethasone was visually indistinguishable from methylprednisolone treatment to preserve blinding. The study drug was prepared by a resident who was not involved in data collection and was administered after induction of anesthesia and before surgery start time. The attending surgeon, using an electrodissection technique, performed total tonsillectomy in patients presenting for recurrent tonsillitis. Patients with predominant tonsillar hypertrophy and obstructive symptoms underwent microdebrider-assisted partial tonsillectomy. The degree of tonsillar enlargement was graded according to the following scale: 1= Tonsils within tonsillar folds, 2= Tonsils just outside tonsillar folds, 3= Tonsils well outside tonsillar folds but not reaching uvula, 4= Tonsils reaching uvula or past uvula.⁹ At the end of surgery, all children had their gastric contents suctioned via an orogastric tube and received paracetamol (acetaminophen) 15mg/kg IV (Perfalgan^R Bristol-Myers Squibb, Middlesex, UK) for postoperative pain relief. They were tracheally extubated awake in the operating room and transferred to the postanesthesia care unit (PACU) where standard monitoring was established, and they were observed until standard discharge criteria were met.

Our primary outcome was the incidence of vomiting during the first 24 hours after surgery. All other outcomes were considered secondary outcomes.

The PACU nurse recorded the total number of vomiting episodes (which represents severity of vomiting) and antiemetics received, the pain scores at arrival, at 30 min, and at discharge from PACU, using a Wong-Baker faces rating scale. Morphine 0.1 mg/kg IV was administered for pain scores >6 . After transfer to the floor, a soft diet was offered to all children during their hospital stay. Also, a maintenance IV infusion was kept until their oral intake was judged adequate by the primary team. The time of removal of the IV line was recorded. Paracetamol 15 mg/kg continued to be administered every 6 hours upon request. The route of administration was IV in the presence of IV infusion or oral (paracetamol syrup) after IV line removal. At 24 hours (study period), the parent or the child (when possible), reported to one of the investigators the following information that he was instructed to observe: the total number of vomiting episodes and antiemetics received, the time to first oral intake, the quality of oral intake assessed by parents using the following

scale: 1= child requests food, 2= child accepts it when offered, 3= child accepts it when coaxed, 4= child refuses it, the pain scores recorded on the faces scale at 12 and 24 hours after surgery, the total number of analgesics received, as well as parents' satisfaction score rated as excellent, good, fair or poor. Episodes of vomiting occurring less than 5 minutes apart were considered one episode. Nausea was not recorded secondary to inadequate assessment in children. Retching was not considered vomiting. Recurrent vomiting (>2 episodes) was treated with ondansetron 0.15 mg/kg IV. Persistent vomiting despite treatment with ondansetron was treated with metoclopramide 0.15 mg.kg⁻¹. PACU vomiting was defined as vomiting in the PACU, and late vomiting was defined as vomiting after discharge from PACU. The summed pain score was calculated as the sum of pain scores at all 5 time intervals.¹⁸ All children remained at the hospital for 24 hours postoperatively (study period). The occurrence of posttonsillectomy bleeding was audited by the attending surgeon and was collected one month after surgery.

The power analysis was based on a noninferiority principle. Patients were included in the per protocol analysis if the primary outcome measure was available. Both per protocol and an intention-to-treat analysis were performed for the primary outcome. In the intention-to-treat analysis, a conservative approach was used where we assumed that patients with missing primary outcome did not have vomiting. Our primary outcome was the proportion of patients who vomited at any time in the 24 hours after tonsillectomy. Based on a previous placebo-controlled trial of dexamethasone (62% incidence of vomiting in placebo group vs 24% in the dexamethasone),⁹ we set a noninferiority margin of 9% which corresponds to 25% of the difference in the proportions of patient who vomited after tonsillectomy between dexamethasone and placebo. Additional support for the margin of 9% can be found in Engelman et al, who reported that the most pessimistic estimate of the effect of prophylactic dexamethasone in children is 32.4% when the baseline risk is 55%, and is 17.7% when baseline risk is 30%. If the rate with methylprednisolone were 9% higher than with dexamethasone, it would still be well below the baseline rate. Thus, methylprednisolone would have clinical value if for some reason treatment with dexamethasone was not possible or advisable.²² With 76 patients per group (total sample size of 152), and assuming 24% as the true incidence of vomiting with dexamethasone, and 15% incidence with methylprednisolone, we had 80% power to establish noninferiority of methylprednisolone at the 0.025 level (one-sided). Therefore, the target number of patients to be recruited was at least 80 in each group.

Normally distributed data were reported as mean±SD and confidence intervals of the differences and analyzed using student's t-test with equal variances. Categorical data were reported as numbers and percentages and were analyzed using Fisher's exact test. Confidence intervals for difference of percentages were calculated using Wilson's procedure without continuity correction http://vassarstats.net/prop2_ind.html.²³ Skewed data were reported as median and range, and analyzed using Mann Whitney U-test. P <0.05 was considered significant. The data were tested for normality using the Kolmogorov-Smirnov normality test with Lilliefors correction and were considered normally distributed if P>0.05. All analyses were performed using SPSS (version 19, Chicago, Illinois).

Results

One hundred seventy children were screened for the study from September 2007 to June 2011. Ten were excluded (not meeting inclusion criteria) and 160 children were randomized. Of the 160 children enrolled, 7 patients were excluded from further analysis because of incomplete data collection, 4 from the dexamethasone group and 3 from the methylprednisolone group. Of the remaining 153 children, 75 received dexamethasone and

78 received methylprednisolone (Figure 1). Patients' as well as surgical characteristics were comparable between the two groups (Table 1).

Discharge time from PACU was approximately 60 min in both groups. Methylprednisolone was noninferior to dexamethasone in terms of overall incidence of vomiting during the first 24 hours. An intention-to-treat analysis showed an overall incidence of vomiting of 30% in the dexamethasone group and of 22% in the methylprednisolone group (difference: 8%, 95% CI: -5 to 21%). A per protocol analysis showed an overall incidence of vomiting of 32% in the dexamethasone group and 23% in the methylprednisolone group (difference: 9%, 95% CI: -5 to 23%).

All secondary outcomes were comparable between the two groups: the PACU and post PACU discharge incidence and severity of POV and the number of antiemetics received, the overall severity of POV and antiemetics received during the first 24 hours after surgery, the quality and time to first oral intake, duration of IV hydration, satisfaction scores (Table 2), as well as pain scores at all time intervals (Table 3). Three patients in each group received one dose of morphine in the PACU. The median number of paracetamol doses received during the study period was 3 (1–4) in dexamethasone group versus 2 (0–4) in the methylprednisolone group ($P=0.26$). The median values of summed pain scores (added-up pain scores) were 14 (0–42) in group dexamethasone and 10 (0–40) in group methylprednisolone ($P=0.2$).

The data were analyzed according to the type of surgery, i.e., microdebrider-assisted partial tonsillectomy versus total tonsillectomy, using an electrodissection technique. Patients who had partial tonsillectomy were younger with larger tonsils than total tonsillectomy patients (Table 4). Subsequently, no correlation was found between age and the highest pain scores in the PACU (Pearson's $r^2=0.08$, $P=0.31$). Data on vomiting were comparable between total and partial tonsillectomy patients (Table 5). However, time to first oral intake and duration of IV hydration were shorter and satisfaction scores were better in partial tonsillectomy patients (Table 5). Pain scores were significantly lower at 30 min after surgery and at PACU discharge in partial tonsillectomy patients (Table 6). Six tonsillectomy patients received one dose of morphine in the PACU versus none from the partial tonsillectomy group ($P=0.037$). The median number of paracetamol doses received during the study period was 3 (1–4) in the total tonsillectomy group versus 2 (0–4) in the partial tonsillectomy group ($P=0.004$). The summed pain scores (added-up pain scores) were 14 (0–42) in group total tonsillectomy and 10 (0–40) in group partial tonsillectomy ($P=0.003$).

No bleeding was recorded in any of the patients within one month after surgery.

Discussion

Our study showed that methylprednisolone (2.5 mg/kg) is noninferior to dexamethasone (0.5 mg/kg) in the prevention of vomiting in children undergoing total or partial tonsillectomy with an overall incidence of vomiting of 30% in the dexamethasone group and of 22% in the methylprednisolone group (intention-to-treat analysis) and 32% versus 23% respectively (per protocol analysis). Time to first oral intake, quality of oral intake, duration of IV hydration, as well as satisfaction scores were also comparable between the two groups as evidenced by narrow 95% confidence intervals (Table 2). When analyzed according to the type of surgery our data showed that patients undergoing microdebrider-assisted partial tonsillectomy were younger and experienced less discomfort after surgery and higher satisfaction as compared to children undergoing electrodissection total tonsillectomy.

The dose of dexamethasone for PONV prophylaxis in children undergoing tonsillectomy ranges between 50 $\mu\text{g/kg}$ and 1000 $\mu\text{g/kg}$ ^{9,13,24} with the 0.5 mg/kg dose being the most

frequently used.¹³ We elected to use the 0.5 mg/kg dose because it has been shown that the antiemetic effect of dexamethasone was dose-dependent.²⁴ Information derived from studies on prophylaxis of chemotherapy-induced PONV suggest that 20 mg of dexamethasone is as effective as 100mg of methylprednisolone which is 5 times more potent.¹⁴ In our study, the doses of both drugs were calculated according to this potency ratio. Differences in pharmacokinetics (longer biological half-life of 36–54 hours for dexamethasone versus shorter onset of action and half-life of 18–36 hours for methylprednisolone²¹) did not account for any difference in their antiemetic effect during the first 24 hours after tonsillectomy. Other doses may provide different results. More than 90% reported excellent or good satisfaction in both groups. Despite the high satisfaction rate in our study population, the incidence of vomiting during the first 24 hours ranged between 23 and 32% and may be still considered high. The use of nitrous oxide may have contributed to this frequent incidence. Thus, a combination therapy with ondansetron may be indicated as recommended by the association of pediatric anesthesiologists of Great Britain and Ireland.²⁵

Tonsillectomy in children is a painful procedure associated with discomfort lasting for several days after the operation.²⁶ It may lead to poor oral intake and dehydration. Steroids inhibit the early process of inflammation, which may reduce edema, fibrin deposition, capillary dilation, migration of lymphocytes and phagocytic activity. In addition, there is accumulating evidence for their potent analgesic efficacy.¹³ Therefore, steroids are considered an important opioid-reducing measure which may be particularly useful in children with obstructive symptoms and further reduce the risk of PONV. In our study, postoperative analgesia was provided with the combination of a single dose of steroid and paracetamol upon request, with morphine reserved for severe pain. The procedure was accompanied by an acceptable level of discomfort, as evidenced by median pain scores not exceeding 4 on most time intervals and a mean time to first oral intake of 3 hours across the groups. It is suggested that the combination of codeine and paracetamol is not superior to paracetamol alone.¹³ Postoperative pain may be further decreased by adding an NSAID without increasing the risk of bleeding.¹³

It has been shown that high dose dexamethasone (0.5 mg/kg) is associated with posttonsillectomy bleeding.²⁴ In our study, we prospectively followed the occurrence of bleeding up to one month postoperatively. We noted an absence of posttonsillectomy bleeding requiring medical attention in a series of 153 subjects receiving steroids after tonsillectomy with a 95% confidence interval of bleeding between 0% and 2% compared to the much higher rates noted in the article by Czarnetski et al.²⁴ This is a very important finding given the surprising results published by the above-quoted article. However, their findings have been challenged on the grounds that there were other confounding factors such as the lack of statistical power for the secondary outcome of bleeding, in addition to the surgical technique and NSAID consumption. The lack of bleeding in our study is in concordance with the results of Gunter et al. who reported a very low incidence of 0.4% of self-limited posttonsillectomy hemorrhage in 230 patients who received 0.125 to 0.5 mg/kg dexamethasone.²⁷ Moreover, the clinical practice guideline issued for tonsillectomy in children strongly recommends based on randomized controlled trials and systematic reviews of randomized controlled trials with a preponderance of benefit over harm that clinicians should administer a single, intraoperative dose of IV dexamethasone to children undergoing tonsillectomy.¹³ However, the panel recommends also that clinicians who perform tonsillectomy should determine their rate of primary and secondary posttonsillectomy hemorrhage at least annually.¹³

The leading indication for tonsillectomy in the United States now is obstructive sleep apnea symptoms.²⁸ This is in contrast with the figures reported in the United Kingdom where only

9% of tonsillectomy patients report a history of obstructive sleep apnea with the remaining 90% presenting for recurrent or chronic tonsillitis.²⁹ Forty-three percent of our study population presented with a median tonsillar size of 4 for microdebrider-assisted intracapsular partial tonsillectomy to relieve obstructive symptoms. The remaining 57% came for recurrent tonsillitis which mandates complete removal of the tonsils. Our results showed a similar incidence of POV after both techniques with less discomfort, shorter time to first oral intake and better satisfaction in partial tonsillectomy children. Children undergoing tonsillar reduction were smaller than those undergoing total tonsillectomy. However, young age does not seem to be responsible for the lower pain scores, as shown by the lack of correlation between age and pain reported in the PACU. A survey conducted in the United Kingdom considered that aspects related to surgical techniques were beyond the scope of their survey,³⁰ an opinion shared by the authors of a recent review on anesthesia aspects for tonsillectomy and ablation in children.³¹ In contrast to the scarce interest in the surgical technique in the anesthesia literature, interesting data can be retrieved from the otolaryngology literature. A review of the records of 4776 patients aged 1 to 18 years showed that microdebrider-assisted technology was associated with the lowest incidence of major complications such as dehydration and posttonsillectomy hemorrhage (0.7%) versus 3.1% for electrocautery and 2.8% for coblation.²⁸ In a prospective long-term follow-up, Bitar and Rameh found that microdebrider-assisted intracapsular tonsillectomy was associated with less analgesic consumption and severity of pain, with two-thirds of the patients pain-free after day 3 as compared to electrodissection technique.³²

One limitation of our study is the omission of a control group. This was due to the fact that the IRB considered it unethical to omit steroid prophylaxis since it was our standard of care, especially because there is strong evidence regarding its efficacy in this high risk group.¹³ Another limitation is the short follow-up time of only 24 hours.

In conclusion, our study showed that methylprednisolone is noninferior to dexamethasone for the prevention of vomiting after tonsillectomy in children. This report also sheds light on the difference in postoperative morbidity related to the surgical technique. Microdebrider-assisted intracapsular partial tonsillectomy is associated with less discomfort after surgery and better satisfaction than total tonsillectomy using electrodissection technique. However, the incidence and severity of POV remain the same between the two techniques.

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Figure 1.
Consort flow diagram

Table 1

Characteristics of Patients and Surgery

	Group Dexamethasone N=75	Group Methylprednisolone N=78	P
Age (years)	4.6±1.8	4.4±1.9	0.46
Sex (M/F)	48/27	47/31	0.74
Weight (Kg)	19±6.9	18.5±6.1	0.61
Anesthesia Time (min)	65.9±19.5	66.4±19.7	0.87
Surgery Time (min)	48.3±19.6	47.2±20.1	0.73
Type of Surgery Total Tonsillectomy Partial Tonsillectomy	45 30	42 36	0.51
Tonsillar Size	3(1–4)	3(1–4)	0.78
Lactated Ringer's solution received (mL)	223.9±110.4	239.5±100	0.38

Values are means±SD, numbers or median (range)

Table 2

Data on Vomiting and Oral Intake

	Group Dexamethasone N=75	Group Methylprednisolone N=78	<i>P_{sup}</i>	<i>95% Confidence interval of the difference</i>
Patients Vomiting in PACU	11(15)	7(9)	0.32	−5 to 16%
Vomiting episodes in PACU	0(0–3)	0(0–3)	0.16	
Patients Receiving Antiemetics in PACU	2(3)	1(1)	0.62	
Patients Vomiting after PACU discharge	17(23)	15(19)	0.69	−9 to 16%
Vomiting episodes after PACU discharge	0(0–2)	0(0–2)	0.66	
Patients Vomiting during first 24 h (per protocol analysis)	24(32)	18(23)	0.28	−5 to 23%
Patients Vomiting during first 24 h (per intention-to-treat analysis) *	24/79 (30)	18/81(22)	0.28	−5 to 21%
Vomiting episodes during first 24h	0(0–4)	0(0–4)	0.31	
Time to first Oral Intake (hours)	3±1.4	3.1±2.1	0.56	−0.75 to 0.41 h
Time to Removal of IV Line (hours)	12±8.2	11.3±8.5	0.67	−2.23 to 3.47 h
Quality of Oral Intake (Excellent/good) **	59 (82)	60 (82)	1	−12 to 12%
Satisfaction rated as excellent **	28 (39)	34 (47)	0.4	−8 to 23%

PACU= Postanesthesia Care Unit. Values are numbers (%), median (range) or means±SD

* In the intention-to-treat analysis, we assumed that patients with missing primary outcome data did not have vomiting (n=79 in dexamethasone group and n=81 in methylprednisolone group).

** 3 missing values from dexamethasone group and 5 missing values from methylprednisolone group

Table 3

Pain Scores at Different Time Intervals

	Group Dexamethasone	Group Methylprednisolone	P
Arrival to PACU	2 (0–10)	0 (0–10)	0.09
30 minutes after arrival to PACU	0 (0–10)	0 (0–10)	0.47
Discharge from PACU	0 (0–8)	0 (0–10)	0.68
12 hours postoperatively	6 (0–10)	4 (0–10)	0.56
24 hours postoperatively	4 (0–8)	4 (0–10)	0.56
Summed Pain score	14 (0–42)	10 (0–40)	0.2

PACU= Postanesthesia Care Unit. Values are median (range)

Table 4

Characteristics of Patients and Surgery according to type of surgery

	Total Tonsillectomy N=87	Partial Tonsillectomy N=66	P
Age (years)	5.1±2.1	3.7±1.1	<0.001
Sex (M/F)	52/35	43/23	0.51
Weight (Kg)	20.5±7.3	16.4±4.2	<0.001
Anesthesia Time (min)	66.7±20.9	65.5±17.6	0.7
Surgery Time (min)	48.5±21.1	46.8±18.2	0.61
Type of steroid received Dexamethasone Methylprednisolone	45 42	30 36	0.51
Tonsillar Size	3(1–4)	4(3–4)	<0.001
Lactated Ringer received (mL)	245.2±120.5	214.6±78.9	0.08

Values are means±SD, numbers or median (range)

Table 5

Data on Vomiting and Oral Intake Analyzed According to Type of Surgery

	Total Tonsillectomy N=87	Partial Tonsillectomy N=66	<i>P_{sup}</i>	<i>95% Confidence interval of the difference</i>
Patients Vomiting in PACU	12(14)	6(9)	0.45	–6 to 14%
Vomiting episodes in PACU	0(0–3)	0(0–2)	0.46	
Patients Receiving Antiemetics in PACU	2(2)	1(2)	1	
Patients Vomiting after PACU discharge	21(24)	11(17)	0.32	–5 to 19%
Vomiting episodes after PACU discharge	0(0–2)	0(0–2)	0.36	
Patients Vomiting during first 24 h	26(30)	16(24)	0.47	–8 to 19%
Vomiting episodes during first	24h	0(0–4)	0(0–3)	0.56
Time to first Oral Intake (hours)	3.4±1.7	2.5±1.7	0.002	0.32 to 1.47 h
Time to Removal of IV Line (hours)	14.1±8.6	8.5±6.8	<0.001	2.85 to 8.27 h
Quality of Oral Intake (Excellent/ Good) *	64 (78)	55 (87)	0.2	–3 to 21%
Satisfaction rated as excellent *	26 (32)	36 (57)	0.002	9 to 40%

PACU= Postanesthesia Care Unit. Values are numbers (%), median (range) or means±SD

* 5 missing values from total tonsillectomy group and 3 missing values from partial tonsillectomy group

Table 6

Pain Scores According to Type of Surgery at Different Time Intervals

	Total Tonsillectomy	Partial Tonsillectomy	<i>P</i>
Arrival to PACU	2 (0–10)	0 (0–10)	0.12
30 minutes after arrival to PACU	0 (0–10)	0 (0–10)	0.009
Discharge from PACU	0 (0–10)	0 (0–8)	0.02
12 hours postoperatively	6 (0–10)	4 (0–10)	0.1
24 hours postoperatively	4 (0–10)	4 (0–10)	0.47
Summed Pain score	14 (0–42)	10 (0–40)	0.003

PACU= Postanesthesia Care Unit. Values are median (range)