

Use of Intravenous Steroids at Induction of Anesthesia for Septoplasty to Reduce Post-Operative Nausea and Vomiting and Pain: A Double-Blind Randomized Controlled Trial

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Abstract To determine the effectiveness of dexamethasone to reduce pain, nausea and vomiting after septoplasty. Study is a prospective double-blind randomized controlled trial. A total of 90 patients were enrolled and received an either of dexamethasone or placebo in the induction of anesthesia. The patients were asked to note the level of pain on the visual analogue scale in the first 24 h after surgery. They also had to record their severity of nausea and number of vomiting attacks. There were statistically significant differences between the two groups for the level of pain noted on the visual analogue scale. The severity of nausea was lower after treatment with dexamethasone but the difference between two groups was not significant. There was also a significant decrease in the number of vomiting attacks in patients treated with dexamethasone. A single dose of 8 mg of dexamethasone, given intravenously, at induction of anesthesia for septoplasty significantly decreased the pain, post-operative nausea and vomiting for the day of operation.

Keywords Septoplasty · Post-operative pain · Nausea and vomiting · Dexamethasone · Steroids

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Introduction

Septoplasty is a common procedure and post-operative pain, nausea and vomiting is sometimes troublesome. The idea of using dexamethasone to reduce pain, nausea and vomiting after surgery comes from its successful use for reducing post-operative morbidity of tonsillectomy and dental procedures [1].

Analgesic effects of dexamethasone are secondary to its anti-inflammatory potentials. It is also believed that inhibition of inflammatory mediators, leads to suppression of central mechanisms of nausea and vomiting [1].

The incidence of post-operative nausea and vomiting is reported to be about 70 percent in ear, nose and throat (ENT) cases. Post-operative pain and PONV are separate entities, anyway, the anxiety produced by pain, may lead to initiation or deterioration of PONV [1]. This is why in most studies these two topics are approached together.

Evidences suggest that a single dose of dexamethasone is a safe and effective treatment for reducing post-operative morbidities [1, 2]; but there is a lack of studies for evaluation of the effects of dexamethasone in septoplasty. In fact, there is no study that we are aware of that look specifically at the effect of dexamethasone on post-operative pain scores and PONV after septoplasty.

We decided to measure post-operative pain scores and incidence of PONV after septoplasty. We believe that measuring of pain scores, will give a truer reflection of the subjective feeling of patients.

Materials and Methods

This is a double-blind, randomized, prospective trial. Ninety consecutive patients, who met the inclusion criteria

and were scheduled to undergo elective septoplasty under general anesthesia, entered the study. Exclusion criteria were presence of physical or mental comorbidities, cases of reoperation and presence of a sinonasal disease that imposes an additive work on septoplasty (such as middle turbinate concha bullosa or severely hypertrophied turbinates). Patients were allocated according to a randomly generated number sequence to the control group who received 2 ml of normal saline intravenously at induction of anesthesia and the trial group who received 8 mg (2 ml) of dexamethasone intravenously at induction of anesthesia. Neither patient, nor surgeon, nor researcher knew whether the patient had received dexamethasone. The consistent anesthetic technique involved induction with thiopental sodium 5 mg/kg, atracurium 0.5 mg/kg and dexamethasone 8 mg or normal saline. The patient was then intubated. Intermittent positive pressure ventilation with oxygen in 50% nitrous oxide with isoflurane was then used. A submucoperichondrial resection and repair technique was used for septoplasty. The operations were done by different surgeons. Post-operative regimen for analgesia was not given routinely and 500 mg Acetaminophen tablets was given on demand of patients. Post-operatively, the patients were asked to complete a questionnaire. A visual analogue score of 0–100 was use for estimating the subjective degree of pain 5, 12 and 24 h post-operatively. The patients asked to report the severity of nausea (none, minimal, moderate and severe), number of vomiting attacks in first 24 h after surgery. With regards to pain; the result of a single sided power calculation shows that for a decrease of ten point on a visual analogue scale of 0–100, each sample group should contain at least 30 patients to provide power of 80% at a significance level of 0.05 (95%). With regards to PONV, the χ^2 test requires at least 20 patients in total for the test to have significance.

Statistical analysis was carried out using SPSS 15.0 package. The χ^2 test was used to test for the significance of the incidence of PONV. The unpaired Student's *t* test was used to establish the significance of the results regarding the post-operative pain scores.

Table 1 Gender of patients in case and control groups

Dexamethasone	Gender		Total
	Male	Female	
Yes	35	10	45
	77.8%	22.2%	100.0%
No	33	12	45
	73.3%	26.7%	100.0%
Total	68	22	90
	75.6%	24.4%	100.0%

Table 2 Age of patients is case and control groups

Age	Dexamethasone	Mean	N	Std. deviation
No	27.78	45	8.697	
Total	28.37	90	9.851	

Results

Ninety patients (68 male and 22 female) were enrolled in the study. There were no obvious basic demographical differences between patients of case and control groups (Tables 1, 2). No adverse effects from dexamethasone were reported.

In hour 5 post-operative, 86.7% of cases and 95.4 of controls had nausea. These values were 84.4 and 95.4 for hour 12 and 71.1 and 93.3 for hour 24 respectively.

The details about sensation of nausea in post-operative hours 5, 12 and 24 are shown in Tables 3, 4 and 5. These data show a trend toward effectiveness of dexamethasone for reducing of post-operative nausea, but the difference was not statistically significant.

There was a statistically significant higher frequency of vomiting in control group (Table 6).

Post-operatively, there was no significant difference between the groups in the time taken before first ingestion of food or drink and the consumption of analgesics was not statistically different in two groups in post-operative hours 5, 12 and 24.

On the day of the operation the mean pain score was 10.3 out of 100 in the control group, compared with 7.4 in the trial group. This is a statistically significant relative decrease in pain, with a *P* value < 0.005 (Table 7).

Discussion

Steroids have several physiological actions. They include anti-inflammatory and immunosuppressive actions along

Table 3 Post-operative nausea in hour 5

Dexamethasone		Nausea in 5 h	Total			
			No	Mild	Moderate	Severe
Yes	Count	6	29	9	1	45
	%	13.30	64.40	20.00	2.20	100.00
No	Count	2	27	14	2	45
	%	4.40	60.00	31.10	4.40	100.00
Total	Count	8	56	23	3	90
	%	8.90	62.20	25.60	3.30	100.00

Table 4 Post-operative nausea in hour 12

		Nausea in 12 h				Total	
		No	Mild	Moderate	Severe		
Dexamethasone	Yes	Count	7	24	13	1	45
		%	15.60	53.30	28.90	2.20	100.00
	No	Count	2	19	20	4	45
		%	4.40	42.20	44.40	8.90	100.00
Total		Count	9	43	33	5	90
		%	10.00	47.80	36.70	5.60	100.00

Table 5 Post-operative nausea in hour 24

		Nausea in 24 h				Total	
		No	Mild	Moderate	Severe		
Dexamethasone	Yes	Count	13	18	13	1	45
		%	28.90	40.00	28.90	2.20	100.00
	No	Count	3	18	21	3	45
		%	6.70	40.00	46.70	6.70	100.00
Total		Count	16	36	34	4	90
		%	17.80	40.00	37.80	4.40	100.00

Table 6 Number of vomiting attacks in first post-operative day ($P < 0.005$)

		Dexamethasone	N	Mean	Std. deviation	Std. error mean
Vomiting	Yes		45	0.4889	0.69486	0.10358
	No		45	0.9778	1.82768	0.27245

Table 7 Pain in post-operative hours 5, 12 and 24

Dexamethasone		Pain after 5 h	Pain after 12 h	Pain after 24 h
Yes	Mean	20.22	10.33	7.44
	Std. deviation	17.547	9.909	5.802
No	Mean	37.11	21.22	10.33
	Std. deviation	16.393	10.344	6.519
Total	Mean	28.67	15.78	8.89
	Std. deviation	18.899	11.463	6.306

with effects on metabolism, electrolyte and water balance, skeletal muscle, the cardiovascular system, the central nervous system and blood elements [3, 4]. They exert their effect by altering gene expression after binding specific intracellular receptors that then, blocking formation of some substances and accelerating production of others. Clinical effects take time to become apparent because time is required for this gene transcription and protein synthesis to take place [5].

Surgeons use steroids because of their anti-inflammatory actions. These are mediated by inhibition of production of inflammatory factors such as cytokines in macrophages, monocytes, and lymphocytes. These effects result in decreased extravasation of leukocytes, release of lysosomal enzymes and vascular permeability in areas of injury [5, 6]. This reduces edema. There is also ultimately decreased fibrosis during healing [5].

Complications of steroid use are dose related, and a single dose of glucocorticoid is “virtually without harmful effects” [7].

The mechanism of effect of dexamethasone is not well understood. It may be effects on outside of the blood brain barrier (area postrema of brainstem) or inside the blood–brain barrier and vomiting centre [1]. Dexamethasone may also reduce inflammation at the operative site, thereby reducing the release of inflammatory mediators into the circulation. This would lead to a lesser stimulation of the vomiting centre. However, as yet, there is no evidence to support this as a mode of action [1, 2].

The results of this study confirmed the benefits of single dose of dexamethasone in reducing of post-operative pain and PONV after septoplasty. The mean pain scores are relatively low and this means that there is no need for routine post-operative analgesics. Anyway, dexamethasone can be assumed as a safe and effective treatment for post-operative nausea and vomiting.

Conclusions

This study has shown a single dose of 8 mg of dexamethasone, given intravenously, at induction of anesthesia for septoplasty significantly decreased the pain scores for the day of operation. Post-operative nausea and vomiting was also reduced significantly for the day of operation. There may be economic benefits because of reduced need for analgesia and anti-emetics. There were no adverse effects from dexamethasone seen.

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