

Oxycodone and
Dexamethasone for
pain management after
tonsillectomy

Material/Methods

- 90 randomly chosen operated adults were divided into three groups. Group 1 (n=30) was treated with OxyContin (Oxycodone) injections; Group 2 (n=30) was treated with Dexacort (Dexamethasone), and Group 3 (n=30) was a placebo group. Pain assessment included visual analogue scale (VAS) pain score and the EMG data like the timing, electric amplitude and graphic patterns of muscular activity during deglutition. We investigated masseter, infrahyoid and submental-submandibular muscles. Records from trapezius muscle were used for control. The results were compared with previously established normative database. The patients were tested 24 h after surgery. The sEMG data were compared with VAS pain score with regard to changes in clinical condition of the patients

- Administration of the oxycodone, dexamethasone, and the placebo was as follows: each subject in the Group 1 received an intravenous 7-hr infusion of oxycodone 2 mg/hr (Martindale Complete Drug Reference, 35th ed., 2007) starting from 16 hours after surgery; each subject in the Group 2 received an intravenous infusion of dexamethasone (Dexacort, 20 mg) 20 hours after surgery; each subject in the Group 3 received an intravenous 7-hr infusion of normal saline ('placebo') (16–23 hours after surgery). The 4-hour interval for Group 2 was chosen because terminal half-time for dexamethasone is approximately 4 hours [
- The following popper user interface control may not be accessible. Tab to the next button to revert the control to an accessible version.
- Destroy user interface control¹⁵]. The initial surface EMG testing itself was performed 16 (Groups 1 and 3) or 20 (Group 2) hours after surgery, the final testing was performed 24 hours after surgery. After the EMG test was performed, the patients from the both groups received further analgesia at as needed basis.

Table 2

Dysphagia severity rating scale used in the current study.

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- 0 Normal swallowing mechanism. Examination demonstrates no abnormality
 - 1 Normal swallowing, no complaints. Examination: incomplete postsurgical recovery
 - 2 Minimal dysphagia. Changes in sensation during swallowing. No change in diet.
 - 3 Minor dysphagia. Some swallowing difficulties, choking episodes, regular diet
 - 4 Prolonged mealtime and/or smaller bite sizes with normal diet
 - 5 Mild dysphagia. Specific swallowing suggestions and slight modification of diet
 - 6 Soft diet. Diet is limited primarily to soft food. Requires special meal preparation
 - 7 Liquefied diet. Oral intake is adequate when limited to a liquefied diet
 - 8 Drinks water normally, with potential for aspiration of other consistencies
 - 9 Drinks only water. Significant potential for aspiration exists
 - 10 Severe dysphagia and odynophagia. "Nothing by mouth" recommended
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Table 3

Throat edema severity rating scale.

0 Normal swallowing mechanism. Examination demonstrates no abnormality

1 Minor edema. Some swallowing difficulties, choking episodes, regular diet

2 Mild edema. Specific swallowing suggestions and slight modification of diet

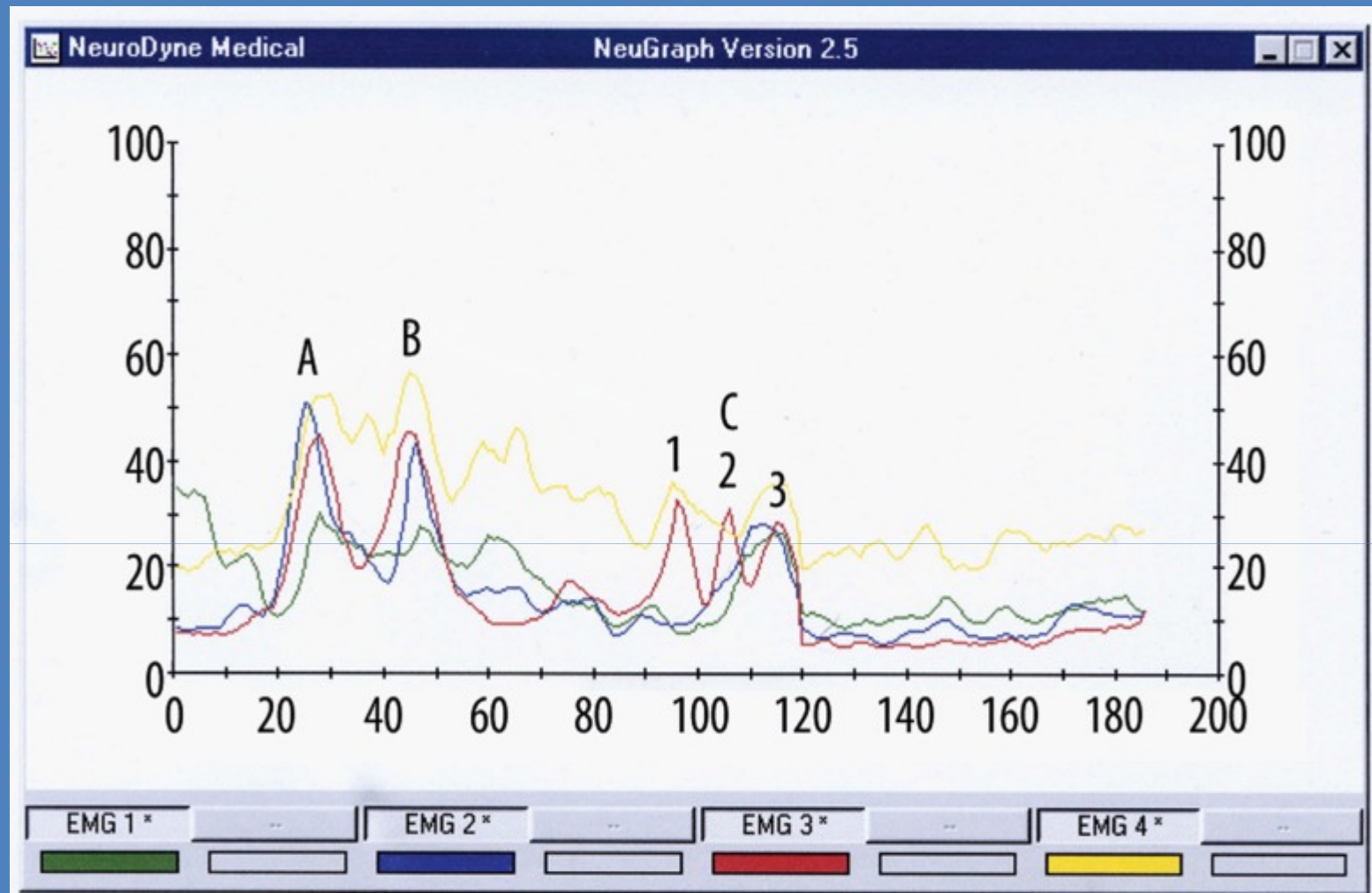
3 Liquefied diet. Oral intake is adequate when limited to a liquefied diet

4 Drinks only water. Significant odynophagia exists

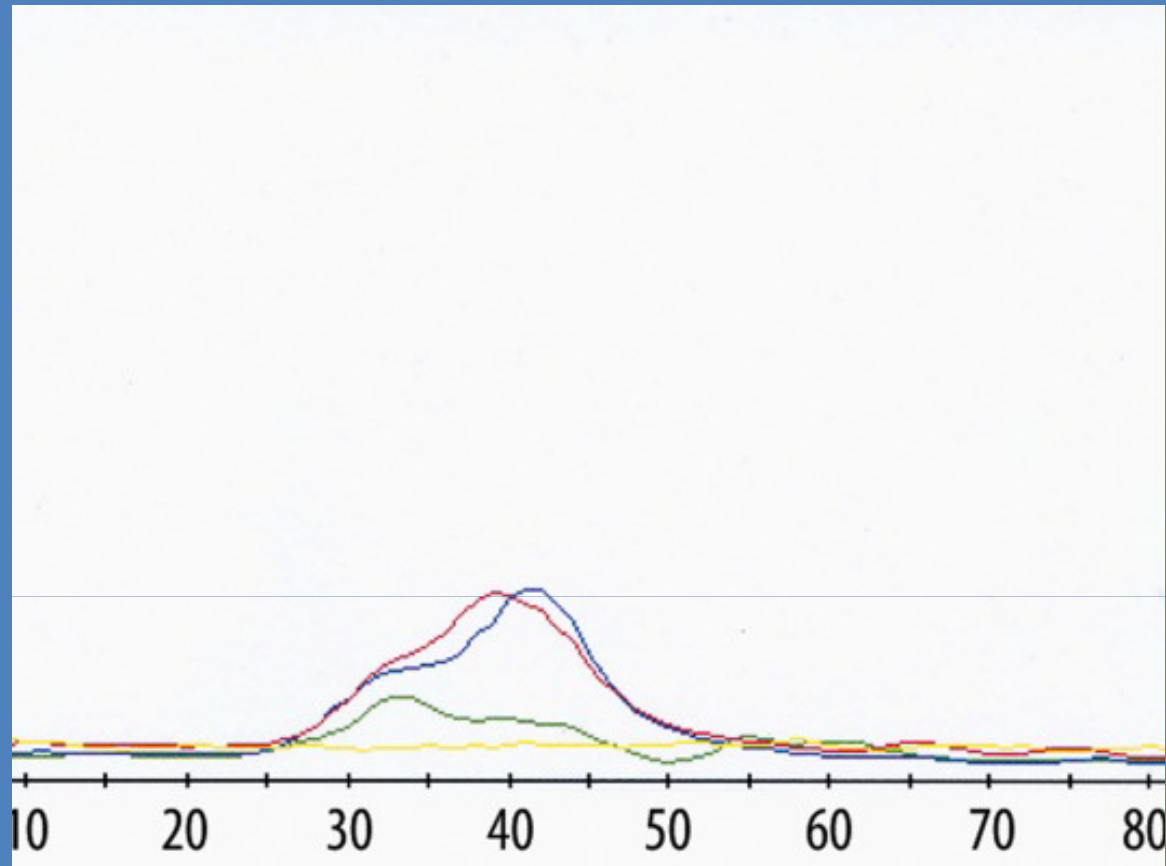
5 Severe edema and dysphagia. "Nothing by mouth" recommended

Electromyography techniques

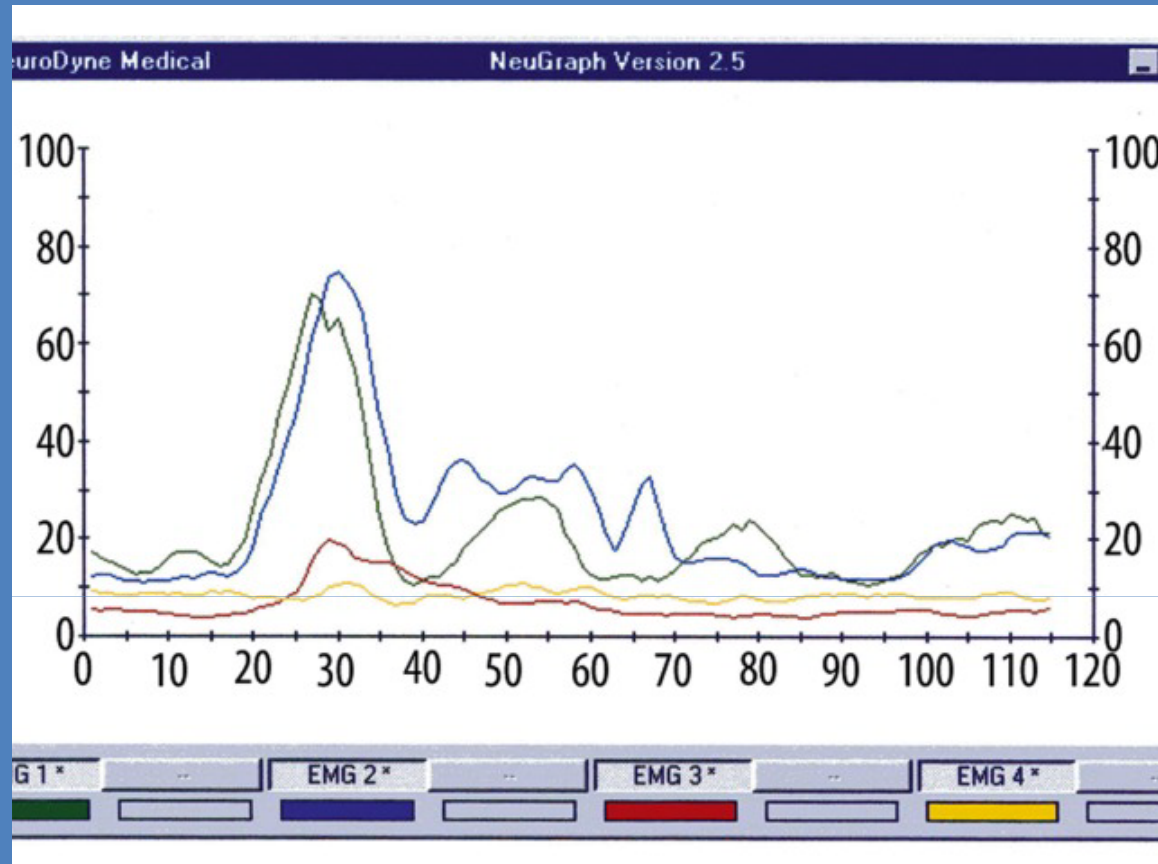
- Four muscle locations were examined: (1) m. masseter (MS location), (2) the submental-submandibular muscle group (SUB), (3) laryngeal strap muscle group (LSM), and m. trapezius (TZ). These superficial muscles are involved in the oral and pharyngeal phases of the swallow. The trapezius muscle was examined as a control muscle not involved in deglutition. All EMG recordings were made using standard surface electrodes (AE-131). The equipment used for the EMG recordings was a NeuroDyne Neuromuscular Sys/3 four channel computer based EMG unit with NeuroDyne Medical software (NeuroDyne, Cambridge, MA, USA), and AE-204 Active sensors attached to AE-131 electrodes. Each EMG record was full-wave rectified and low-passed filtered. The computer program indicates mean, SD, minimum, maximum, range of muscle activity during each trial, and its duration. Muscle activity (EMG) is quantified in microvolts.



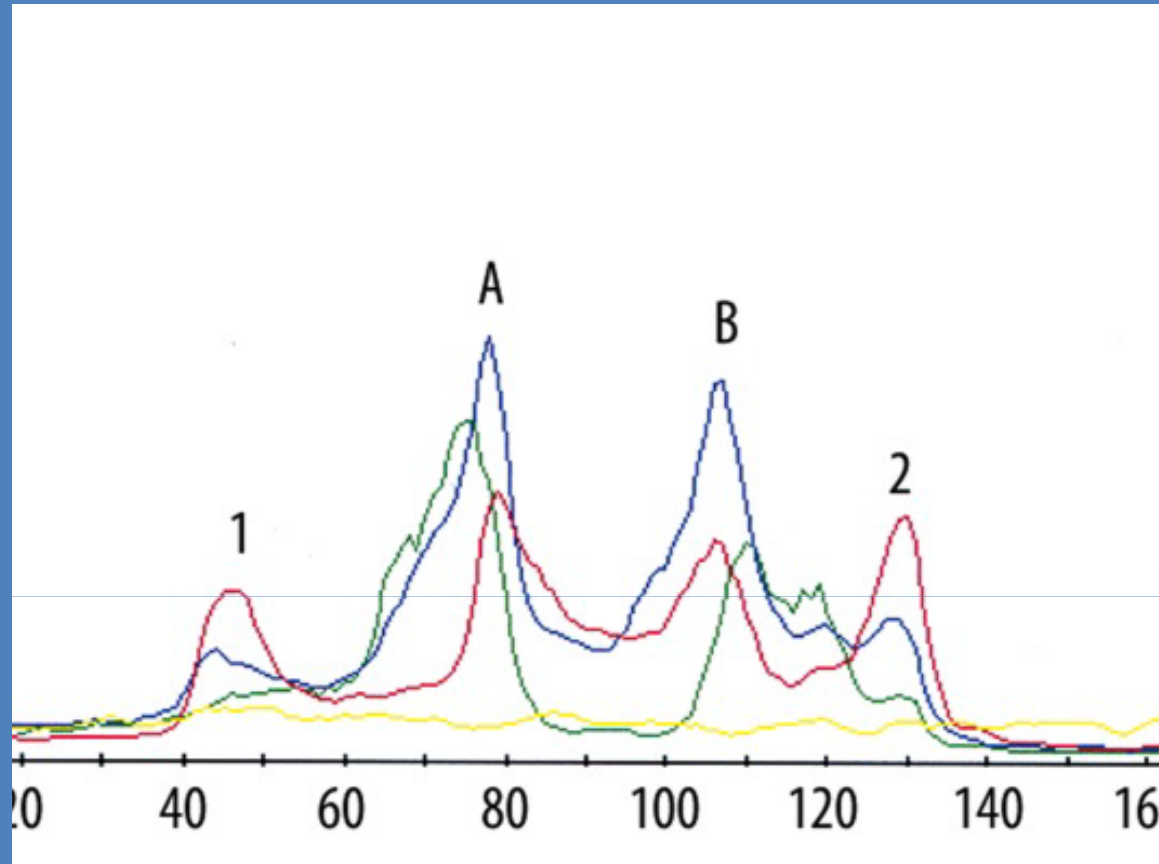
A typical single swallow of a patient 24 hours after tonsillectomy before administration of anesthetics or placebo. Green line – MS location, blue line – SUB location, red line – LSM location, yellow line – TZ location. ...



A typical single swallow of a patient 24 hours after tonsillectomy after Oxycontin was administered. Green line – MS location, blue line – SUB location, red line – LSM location, yellow line – TZ location. Normal sharp apexes ...



A typical single swallow of a patient 24 hours after tonsillectomy after dexamethasone was administered. Green line – MS location, blue line – SUB location, red line – LSM location, yellow line – TZ location. The swallow ...



A typical single swallow of a patient 24 hours after tonsillectomy after placebo was administered. Green line – MS location, blue line – SUB location, red line – LSM location, yellow line – TZ location. A swallow remains ...

Pain scores (VAS 10-points pain scale, mean \pm standard deviation) in two tests after surgery (‘‘before’’) and after (‘‘after’’) administering the medications and the placebo. Intergroup comparison was performed before and after drug/placebo administration. The time period was calculated by the software program from the beginning of the MS activity and to the end of LSM activity.

Test	Group 1			Group 2			Group 3		
	Before	After	P	Before	After	P	Before	After	P
1	7.4 \pm 2.7	4.2 \pm 2.2	<0.05	7.7 \pm 2.5	5.1 \pm 2.1	<0.05	7.5 \pm 2.5	6.6 \pm 2.3	>0.05
2	7.3 \pm 2.9	4.0 \pm 1.8	<0.05	7.7 \pm 2.5	4.3 \pm 1.7	<0.05	7.4 \pm 2.7	6.2 \pm 2.2	>0.05
Intergroup comparison									
1	Gr. 1 vs. Gr. 2		<0.05	Gr. 1 vs. Gr. 3		>0.05	Gr. 2 vs. Gr. 3		<0.05
2	Gr. 1 vs. Gr. 2		>0.05	Gr. 1 vs. Gr. 3		>0.05	Gr. 2 vs. Gr. 3		<0.05

Table 6

Mean of electric activity of masseter (MS), submental (SUB), laryngeal strap (LSM) muscles in swallow and drinking tests, in μV , after the operation of tonsillectomy after ("after") administering the medication and the placebo.

Muscle	Group 1			Group 2			Group 3		
	Before	After	P	Before	After	P	Before	After	P
Single swallow									
MS	14.04	8.74	<0.05	14.04	12.71	>0.05	14.12	13.93	>0.05
	(Normative mean: 6.041)								
SUB	7.42	8.22	>0.05	7.42	7.30	>0.05	7.38	7.95	>0.05
	(Normative mean: 10.781)								
LSM	11.77	6.18	<0.05	11.77	7.55	<0.05	10.63	11.85	>0.05
	(Normative mean: 4.530)								
TZ	18.38	4.25	<0.01	18.38	8.25	<0.01	20.01	8.21	<0.05
Drinking									

Results

- Tables 4–6 display comparative data between Group 1 (Oxycontin group) and Group 2 (Dexacort group), and Group 3 (placebo group). It is clearly observed that Oxycontin significantly changes both VAS pain score and muscle reactions to analgesia (amplitude), dexamethasone insignificantly changes both VAS pain score and muscle reactions, while placebo changes VAS pain score and TZ muscle reaction only.

- For the Group 1, the EMG records showed graphic effect of oxycodone action. A typical single water swallow of a healthy individual between 18 and 70 years of age was observed graphically at the rectified and low-pass filtered sEMG as a normal wave with upward deflections and a sharp apex when recorded from the MS, SUB and LSM locations [8,9,18]. When a patient is in pain, the swallow becomes absolutely disorganized. (Figure 1). When the surface EMG record of a swallow was performed after oxycodone had been administered, it was clearly seen that the sharp apexes were gone and the swallow waves looked smooth (Figure 2). The dexamethasone group (Group 2) EMG records indicated that dexamethasone did not affect muscles the same way as oxycodone did but nevertheless improved the swallow pattern towards its normalization (Figure 3). This positive effect, however, was observed only in 43% of cases (13 out of 30). Clinical data of these 13 patients indicated significant edema around the operated site that was reduced after dexamethasone was administered. For these patients, the throat edema severity rating scale (Table 3) indicated mean 4.1 before and 2.3 after the treatment ($p < 0.05$). The records taken from the patients of the placebo group (Group 3) did not show even these changes

Analgesia with oxycodone smoothed the recorded sEMG swallow peaks and increases time of deglutition.

Dexamethasone normalized muscular activity in deglutition in cases with edema as detected by the EMG records. Statistically significant difference in muscle reactions was detected between the two Groups and the placebo group.