

Intravenous Dexamethasone as Prophylaxis Against Laryngeal Edema Associated with Changes in Sound Quality in Patients Undergoing Total Thyroidectomy

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Abstract

Thyroidectomy is a relatively safe surgical procedure for thyroid gland removal with a with mortality and morbidity rates of less than 2–3%. Complication in the form of sound changes often goes unnoticed in post-thyroid patients despite its high incidence rate, i.e., 87% of all surgical cases. Laryngeal edema as the underlying cause can be triggered by intubation or extubation during anesthesia; malfunction of the strap muscles; surgery that directly causes injury to the superior laryngeal nerve; and recurrent laryngeal nerve injuries. Several studies on the use of dexamethasone to prevent or reduce laryngeal edema that occurs after thyroidectomy have been conducted with controversial results. This study was conducted to solve this controversy. This was a double-blind randomized prospective study on thyroid tumors patients who underwent thyroidectomy at Dr. Hasan Sadikin General Hospital Bandung, Indonesia, from December 2020 to May 2021. This study evaluated dexamethasone effects on the patient's sound changes using the Sound Handicap Index (VHI) questionnaire before surgery, day 1 after the surgery, and day 7 after the surgery. Analysis showed that the VHI significantly decreased on day 1 ($p < 0.01$) and on day 7 ($p < 0.01$), and the difference between the VHI on day 1 (D-1) and day 7 (D-7) was significant ($p < 0.01$). When analyzed using the bivariate analysis, no statistically significant difference was found between the VHI variable before surgery, D-1, and D-7 and VHI H7 in the group of patients using dexamethasone and without dexamethasone. Dexamethasone administration has no significant effect on laryngeal edema associated with changes in sound quality.

Keywords: Intravenous dexamethasone, laryngeal edema, total thyroidectomy, sound quality

Introduction

Thyroidectomy is surgical removal of the thyroid gland, is a relatively safe surgical procedure at this time with mortality and morbidity of less than 2–3%. The goal of modern thyroid surgery is to remove thyroid tissue properly and correctly without great mortality and morbidity. Thyroid surgery technique is done by preserving the recurrent laryngeal nerve, the external branch of the superior laryngeal nerve, parathyroid, and minimizing sound changes. The most common complications are recurrent laryngeal nerve injury and permanent hypoparathyroidism. Injury to the recurrent laryngeal nerve may occur by severance, ligation,

or traction, but should occur in <1% of patient that undergoing thyroidectomy by experienced surgeons.¹ Complications of sound changes often go unnoticed in post-thyroid patients.

A wide spectrum of injuries to the sound or swallowing mechanisms, or both, can occur because of the mixed fibers contained within the nerve.² Temporary or permanent sound change can result and is extremely distressing to the patient. Sound changes can occur without recurrent laryngeal nerve injury. The incidence of sound changes after surgery can reach up to 90% of all surgical cases.³ The sound change is due to laryngeal edema which can be caused by intubation or extubation during anesthesia, malfunction of the strap muscles, surgical procedures that are spontaneously involved. Directly cause injury to the superior laryngeal nerve and recurrent laryngeal nerve

Steroids have been introduced as drugs that can reduce edema. Several studies have used steroids to prevent or reduce laryngeal edema

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following thyroidectomy, with controversial results.⁴ The steroid used in this study was dexamethasone because it is cheap and easy to use. Research American Academy of Otolaryngology-Head and Neck Surgery has published guidelines to improve sound improvement after thyroid surgery with a single dose of dexamethasone and intravenously but several other studies have not shown significant results in the administration of dexamethasone.⁵ Dr. Hasan Sadikin General Hospital has been carried out by the anesthesia team as one of the premedication procedures. The purpose of giving this drug as a premedication to reduce the incidence of post-operative nausea and vomiting (PONV). Dexamethasone has been shown to improve sound changes in patients undergoing thyroid surgery and there are no studies linking dexamethasone administration to changes in sound quality in Dr. Hasan Sadikin General Hospital before.⁶

There are several methods used to evaluate sound changes before and after surgery, one of which is widely used in the world and has been validated in Indonesia is the use of the Sound Handicapped Index (VHI) questionnaire. The Sound Handicapped Index (VHI) has been widely used to assess a person's sound-dependent quality of life. The VHI questionnaire is a subjective, easy-to-fill, economical, reliable, non-invasive, and early assessment to evaluate sound function and has strong reliability in assessing disability caused by sound disorders.⁷ However, the use of VHI to assess sound changes after thyroid surgery has not been done before. Because of this, this study conduct a study to evaluate the effect of intravenous dexamethasone on changes in sound quality using the VHI questionnaire in post-thyroidectomy patients.

Methods

This study was designed a double-blind, prospective randomized clinical trial. This clinical trial is a phase IV clinical trial to see the effectiveness of the drug in thyroidectomy patients. The drug tested was intravenous dexamethasone with the name dexamethasone sodium phosphate which was issued by the drug manufacturer Mepro with the production code F9H129. The study was approved by the Health Research Ethics Committee of Dr. Hasan Sadikin General Hospital number LB.02.01/X.6.5/354/2020. This study arrange from December 2020 until May 2021.

This study evaluated the effect of dexamethasone on sound changes as this study followed the patient's course up to the 7th postoperative day. This study assessed the effect of the drug on sound changes using the VHI questionnaire before surgery, day 1 and day 7. Drug side effects in the form of increased blood sugar and inhibition of wound healing were evaluated on the 7th day.

The study was a double-blind randomized, investigator and surgical operator did not know whether the patients were study subjects or controls. Patients were randomized by a computerized system and identified by the research manager. Patients were explained about the purpose of the study and were not harmed by the study. Patients have the right to get the best therapy.

Total of 78 thyroidectomy patients were divided into two groups: 1) Treatment group (dexamethasone treatment group): 8 mg/2 mL dexamethasone in 100 mL physiological saline solution administered intravenously 30 minutes before induction of anesthesia; and 2) control group: 2 mL of 0.9 percent NaCl in 100 mL of physiological saline solution given intravenously 30 minutes before induction of anesthesia and ondansetron 8 mg injection as anti-vomiting and nausea.

Inclusion Criteria for subject research was men and women aged 18 years or older who have been confirmed to have malignant thyroid tumors that have not yet been operated on and are willing to undergo total thyroidectomy at Hasan Sadikin Hospital, Bandung. The exclusion criteria were set as follows: previous history of thyroid or cervical surgery, history of radioactive iodine therapy, history of intubation during the past year, history of uncontrolled diabetes mellitus, pregnancy, undergoing long-term corticosteroid therapy, there is a change in the sound before the operation, there are signs of iatrogenic trauma to the rln on direct laryngoscopy immediately after thyroidectomy, Recurrent laryngeal nerve transection and superior laryngeal nerve either unilateral or bilateral, history of tracheostomy or conversion of ETT or tracheostomy during surgery, vocal cord abnormalities before.

Selection of patients by randomization system. Randomization was performed by a computer-generated list of random numbers, and the same syringes were prepared by staff not involved in the study according to the random number list. Patients, surgeon, anesthesiologists, and researchers who collected postoperative data were not aware of the randomization

process and the type of drug administered. Only manager of research directing the study know the treatment that each participant receives. In this study, the supervisor, oncology consultant, acts as a manager of research.

Surgery was doing by consultant that responsible as consultant on duty and assisted

with trainee of oncologist division. During surgery, bilateral RLNs are routinely explored and protected. Bilateral vacuum drainage was provided for all patients at the end of surgery. Direct laryngoscopy is routinely performed before extubation to evaluate vocal cord function by senior resident of anesthesiologist

Table 1 Voice Handicap Index Indonesian Version⁶

Part 1: Function					
1	Is it hard for others to understand your voice?	0	1	2	3 4
2	Do other people find it difficult to understand you in a noisy environment?	0	1	2	3 4
3	Does your family have a hard time understanding you when you call them home?	0	1	2	3 4
4	Did you stop using the phone because of your voice?	0	1	2	3 4
5	Do you avoid groups of people because of your voice?	0	1	2	3 4
6	Are you talking less and less to your friends, neighbors, and relatives because of your voice?	0	1	2	3 4
7	Does the other person ask you to repeat what you say when you speak?	0	1	2	3 4
8	Does your voice limit you in your personal and social life?	0	1	2	3 4
9	Do you feel alienated from a conversation or discussion because of your voice?	0	1	2	3 4
10	Are your voice problems causing you to lose your job?	0	1	2	3 4
Part 2: Physical					
1	Do you find it difficult to breathe when you speak?	0	1	2	3 4
2	Does your voice vary in the morning and during the day?	0	1	2	3 4
3	Are you asking "What's wrong with your voice"?	0	1	2	3 4
4	Does the sound you feel like hissing or dry?	0	1	2	3 4
5	Do you find it difficult to make a sound?	0	1	2	3 4
6	Is the clarity of your voice unpredictable?	0	1	2	3 4
7	Are you trying to change your voice to sound different?	0	1	2	3 4
8	Are you making more effort to talk?	0	1	2	3 4
9	Does your voice get worse at night?	0	1	2	3 4
10	Do you lose your voice in the middle of a conversation?	0	1	2	3 4
Part 3: Emotion					
1	Do you feel tense when talking to other people because of your voice?	0	1	2	3 4
2	Are other people annoyed by your voice?	0	1	2	3 4
3	Do you feel that other people don't understand your voice problem?	0	1	2	3 4
4	Does your voice bother you?	0	1	2	3 4
5	Are you socializing less and less because of your voice?	0	1	2	3 4
6	Do you feel imperfect because of your voice?	0	1	2	3 4
7	Do you feel bad when other people ask you to repeat what you said?	0	1	2	3 4
8	Do you feel embarrassed when people ask you to repeat what you said?	0	1	2	3 4
9	Does your voice make you feel useless?	0	1	2	3 4
10	Are you ashamed of your voice problem?	0	1	2	3 4

on duty with supervision from consultant anesthesiologist on duty. The Voice Handicap Index (VHI) questionnaire was filled in by all patients before surgery and on days 1 and 7 postoperatively. Postoperative blood glucose levels and wound complications were evaluated on day 7.

This study used the standard VHI questionnaire to assess postoperative sound quality. Before starting the study, we used a translated questionnaire form in the sample group of patients to make it fluent and valid with a Cronbach alpha ratio of 0.84 (kappa 4 0.93). The VHI questionnaire contains 10 questions each of which is assigned a score of 0 to 4 by the patient.⁷

For the analysis of numerical data, it was tested using an unpaired T test if the data were normally distributed, alternative to the Mann Whitney test if the data were not normally distributed. For the analysis of the categorical data, it was tested using the chi-square statistical test, the alternative Kolmogorov Smirnov test. For analysis of Numerical data (side p value) was tested using the Mann Whitney test because the data were not normally distributed. For analysis of numerical data (p-value aside) this was tested using the Friedman test because the data were not normally distributed. The results of statistical tests in the study group above obtained information on the P value on the variables, the values of the algorithms were considered statistically significant if the P value was <0.05.

Results

In this study 78 patients were included and randomly divided into two groups, each group consisting of 39 patients. Table 1 describes the characteristics of research subjects based on age, sex, thyroid weight, and blood sugar at the time (GDS). In this study, most of the 67 (86%) patients were women. For various ages with the most being in the range of 41–60 years (54%). For age, the average was 45.10±14,376 years in the category <18 years as many as 3 or 4%, 18–40 years as many as 22 or 28%, 41–60 years as many as 42 or 54% and >60 years as many as 11 or 14% with 11 male patients or 14% and female patients 67 or 86%. For the weight of the thyroid has an average of 98.68 ± 193.443 grams. The GDS has an average of 95.83±21,297.

In this study, patients who were the target of the study were patients with suspected

Table 2 Description of Research Subject Characteristics

Variable	N=78
Age	
Mean±std	45.10±14.376
Median	47.00
Range (min-max)	14.00-77.00
Age category (years)	
<18	3 (4%)
18–40	22 (28%)
41–60	42 (54%)
>60	11 (14%)
Sex	
Male	11 (14%)
Female	67 (86%)
Thyroid weight (gram)	
Mean±std	98.68±193.443
Median	38.00
Range (min.-max.)	2.00–1225.60
Blood glucose	
Mean±std	95.83±21.297
Median	91.50
Range (min.-max.)	57.00–200.00
Dexamethasone	
Yes	39 (50%)
No	39 (50%)
Histopathology	
Papillary thyroid Carcinoma	41 (53%)
Follicular thyroid carcinoma	23 (29%)
Medullary thyroid carcinoma	2 (2%)
Mix type	12 (16%)
Hoarseness	
Mild (VHI 0–30)	78 (100%)
Moderate (VHI 31–60)	0 (0%)
Severe (VHI 60–120)	0 (0%)

Note: For categorical data, it is presented with number/frequency and percentage, while numerical data is presented with mean, median, standard deviation and range

Table 3 Comparison Between the Characteristics of Research Subjects by Group Using Dexamethasone

Variable	Dexamethasone Utilization		P Value
	Yes N=39	No N=39	
Age			
Mean±Std	44.15±14.221	46.05±14.652	0.563
Median	46.00	47.00	
Range (min-max)	15.00–70.00	14.00–77.00	
Age Category (years)			
<18	1	2	0.906
18–40	14	8	
41–60	19	23	
>60	5		
Sex			
Male	5	6	0.745
Female	34	33	
Thyroid weight(gram)			
Mean±Std	94.88±168.635	102.47±217.618	0.807
Median	40.00	36.80	
Range (min.-max.)	2.00–995.00	5.00–1225.60	

p<0.05 with chi-square test * significance < 0.05, ** significance < 0.01

Table 4 Comparison between Voice Handicap Index (VHI) before surgery Day 1 after surgery (H1) and Day 7 after surgery (H7) in the group of patients using Dexamethasone and Without Dexamethasone

Variable	Dexamethasone Utilization		P Value
	Yes N=39	No N=39	
VHI Preop			0.664
Mean±Std	25.44±18.629	26.64±17.948	
Median	23.00	31.00	
Range (min-max)	1.00-78.00	0.00-60.00	
VHI H1			0.768
Mean±Std	22.59±18.055	23.13±16.631	
Median	20.00	28.00	
Range (min-max)	0.00-75.00	0.00-57.00	
VHI H7			0.745
Mean±Std	18.54±16.543	19.40±15.705	
Median	16.00	21.00	
Range (min-max)	0.00-65.00	0.00-55.00	
P Value	<0.01	<0.01	

p<0.05 Mann Whitney test * significance <0.05, ** significance <0.01

Table 5 Observation of Electrolyte Value as a Side Effect of Dexamethasone Injection and Postoperative Calcium Value of Thyroidectomy

Variable	Dexamethasone Utilization		P Value
	Yes N=39	No N=39	
Sodium			
Mean±Std	137.05±2.59	137±2.56	2.627
Median	136.5	137	
Range (min.-max.)	133-143	133-143	
Potassium			
Mean±Std	3.80±0.55	3.80±0.59	0.800
Median	3.85	3.85	
Range (min.-max.)	3.1-4.9	3.1-4.8	
Chloride			
Mean±Std	97.36±2.70	97.32±2.63	0.540
Median	97	97	
Range (min.-max.)	86-102	86-102	
Calcium			
Mean±Std	95.68±3.49	95.35±3.33	0.987
Median	95.5	95	
Range (min.-max.)	90-103	90-103	
P value	<0.01	<0.01	

malignancy and it was decided to do a total thyroidectomy, histopathological examination of these patients was performed. From all patients, papillary thyroid carcinoma were 41 patients (53%), follicular thyroid carcinoma were 23 patients (29%), medullary thyroid carcinoma were 2 patients (2%), and mix type were 12 patients (16%).

Assessment of hoarseness in patients using VHI and the results showed that the VHI value was in the range of 0-30 as many as 78 patients (100%) so that it was still in the mild category and did not cause disturbances to persistent sound quality.

In the group using dexamethasone, the average age was 44.15±14,221 years with the category <18 years being 1, 18-40 years being 14, 41-60 years being 19, and >60 years as many as 5 with male patients as many as 5 and women as many as 3. For the weight of the thyroid has an average of 94.88±168.635 grams. The GDS has an average of 98.08±25,803.

In the control group, the average age was 46.05±14.652 years with the category <18 years being 2, 18-40 years being 8, 41-60 years

being 23 and >60 years as many as 6 with male patients as many as 6 and women as many as 33. For Thyroid weight has an average of 102.47±217.618 grams. For GDS has an average of 93.59±15.585.

The results of statistical tests for age, thyroid weight and blood sugar showed there are no significant difference between the variables of age, thyroid weight and blood sugar when in the group of patients taking dexamethasone and without dexamethasone. Along with the insignificant difference in proportion between age and gender categorical variables in the group of patients taking dexamethasone and without dexamethasone.

From the results of the comparative analysis of the characteristics of the two groups above, it can be concluded that the two groups are the same or there is no difference in characteristics at the beginning of the examination. This shows that the two groups are the same or homogeneous.

In the dexamethasone group, VHI before surgery had a mean of 25.44±18,629, VHI H1 had an average of 22.59±18,055 and VHI H7

had an average of $18.54 \pm 16,543$. In the group without dexamethasone, the VHI before surgery had a mean of $26.64 \pm 17,948$, VHI H1 had a mean of $23.13 \pm 16,631$ and VHI H7 had a mean of $19.40 \pm 15,705$.

Statistical tests result show no significant difference between the variables VHI before surgery, VHI H1 and VHI H7 in the group of patients using dexamethasone and without dexamethasone. On the other hand, there is a statistically significant mean difference between the variables VHI Preop, VHI H1 and VHI H7 in the group of patients using dexamethasone and in the group without dexamethasone

The two groups were similar in terms of VHI before surgery ($p=0.664$). on the first day after surgery, the dexamethasone group had a decrease in VHI as did the control group with medians of 20 and 28 ($p=0.768$). on the 7th day evaluation when the control patient went to the polyclinic, there was a decrease in the VHI value in both groups with a median of dexamethasone group 16 and control group 21 ($p: 0.745$). In the control group analysis, VHI significantly decreased on day 1 ($p<0.01$) and on day 7 ($p<0.01$), and the difference in VHI on day 1 and day 7 was also significant ($p<0.01$). In the dexamethasone group analysis, VHI significantly decreased on day 1 ($p<0.01$) and on day 7 ($p<0.01$), and the difference in VHI on day 1 and day 7 was also significant ($p<0.01$). After the analysis, there was no statistically significant mean difference between the variables VHI before surgery, VHI H1 and VHI H7 in the group of patients using dexamethasone and without dexamethasone.

One of the concerns in the use of steroids is the side effect of infection, electrolyte imbalance and wound repair. We observe electrolyte value and calcium value as a side effect of dexamethasone administration and total thyroidectomy.

Discussion

Thyroidectomy, the surgical removal of the thyroid gland, is a relatively safe surgical procedure today. Sound changes due to laryngeal edema which can be caused by intubation or extubation during anesthesia, malfunction of the strap muscles, surgery that directly causes injury to the superior and recurrent laryngeal nerves. Identification of the recurrent laryngeal nerve has become a standard procedure in thyroid surgery. Although recurrent laryngeal nerves can be safely dissected and preserved by experienced surgeons, postoperative nerve

paralysis is usually temporary and can occur in 3-4% of patients. An important part of preventing sound changes after thyroid surgery is suppressing edema and inflammation. The aim of this study was to use steroids to suppress inflammation and edema.⁸

The prophylactic effect of steroid administration associated with sound changes has been studied previously but has mixed results. In the study of Feroci et al.⁹ evaluated speech function in 102 patients using a visual analog scale. Patients were evaluated at 8, 24, 32 and 48 hours after surgery, and there was no benefit to speech function in patients receiving dexamethasone. In the study of Lachanas et al.⁶ evaluated dexamethasone in patients undergoing thyroidectomy in relation to sound changes using the Voice Impairment Score in group dexamethasone and no dexamethasone with result no significant differences were noticed between the VHI domains and items of the two groups. These results suggest that perioperative dexamethasone did not affect sound-related quality of life.⁶ Assessment of hoarseness in patients using VHI and the results showed that the VHI value was in the range of 0-30 as many as 78 patients (100%) so that it was still in the mild category and did not cause disturbances to persistent sound quality.

In this study, it was found that sound improvement in both groups were given dexamethasone and not given on the 1st and 7th days after surgery so it could not be determined whether dexamethasone had an effect on sound improvement, the surgery performed on these thyroid patients did not serious complications were found so that there was no significant difference in sound changes between the two groups.

There are several reasons how the sound may change after undergoing thyroid surgery: 1) direct mechanical trauma involving the superior or recurrent laryngeal nerve during surgery; 2) the effect of pressure or pulling on the recurrent laryngeal nerve; 3) trauma or edema of the larynx during intubation and 4) edema and inflammation around the vocal cords or recurrent laryngeal nerves as a result of surgical dissection. With planned and professional surgical procedures these injuries can be avoided so that patient morbidity can be minimized. In our study, there were no injuries that resulted in worsening of the patient's sound. In patients who were given dexamethasone and not given dexamethasone, there was a significant improvement in sound on evaluation day 1 and 7

after surgery ($p < 0.01$).

Research Nasiri et al.¹⁰ informs that temporary recurrent laryngeal nerve paralysis can be reduced by preoperative and/or intraoperative steroid use. Steroid use reduces the duration of temporary vocal cord paralysis from 9 months to 2 months. This study compiled a prospective study to evaluate the role of dexamethasone injection in preventing recurrent laryngeal nerve paralysis after thyroid surgery. This study showed that the VHI score in patients on the first day was significantly decreased ($p < 0.01$), and constantly improved on day 7 after surgery ($p < 0.01$), when compared with controls, there was no significant difference between patients with dexamethasone and without dexamethasone both showed improvement ($p = 0.768$; $p = 0.745$). In this study, preservation of the NLR was carried out and no trauma was found in the NLR, the decrease in VHI score could be the result of giving dexamethasone which reduces laryngeal, perineural and vocal cord edema or surgical removal of the thyroid gland that compresses the structure of the larynx, but it was not statistically significant.

The age factor also affects the flexibility of the vocal cords. In the study of Kovatch et al.¹² They found that vocal cord trauma in old age is more common due to decreased flexibility and atrophy of vocal cord tissue. In our study, patients were predominantly aged 41–60 years, and statistically, age had no effect on the incidence of sound changes ($p: 0.906$) because of the predominance of adult patients who tended to have more flexible vocal cords.

In a study conducted by Kovatch et al.¹² to look at the final results of sound changes in patients after thyroidectomy, it was found that gender, tumor size, histologic characteristics and extrathyroid extension were not associated with VHI scores in multivariate analysis. found a significant effect, age, gender, tumor size and histopathology on sound changes. ($p = 0.563$, $p = 0.745$, $p = 0.807$)

Laryngeal edema that is the target of dexamethasone administration may be influenced by the length of surgery. From the research, the mean duration of thyroidectomy surgery was $90 \pm 22,143$ minutes influenced by the level of difficulty of the operation. In a study by Lin et al.,¹³ surgery with patients intubated for more than 48 hours resulted in laryngeal edema characterized by stridor sounds and led to post-extubation airway obstruction (PEAO). From this study, it was found that the effect of dexamethasone which significantly reduces

the incidence of laryngeal edema.¹¹ In this study, the length of the operation performed did not significantly affect the final outcome of sound changes in the patient, and there were no complications such as PEAO in the patient, because the patient was relatively intubated for no more than 24 hours.

Laryngeal edema in our study patients was assessed subjectively with the help of the anesthesiologist team who performed a patent test of the vocal cords, and direct inspection with direct laryngoscopy. Of the 79 patients who underwent total thyroidectomy, no significant complications were found which prevented the patient from being extubated and laryngeal edema was not found.

In this study we observe the complication of hypocalcemia that maybe appear after total thyroidectomy. From the result we can see in table 5. There was no major hypocalcemia that life threatening for the patients. There was no different in calcium level in patients with dexametasone and no dexametasone, so we can conclude that administration of dexametasone did not effect the calcium level.

In this study, no side effects of corticosteroids such as electrolyte balance disorders. From the Table 5. There are any complication in electrolyte level after injection dexametasone compare to patients who were not given dexamethasone ($p < 0.01$). We collect sodium, potasium and chloride level after injection dexametasone from their blood and we find almost all the patients in normal level of electrolyte. In the research of Shaikh et al.¹⁴ it was found that patients who received dexamethasone were less likely to complain of postoperative nausea and vomiting, in this study also similar, patients who were given dexamethasone did not complain of postoperative nausea and vomiting, compared to patients who were not given dexamethasone.

One of the concerns in the use of steroids is the side effect of infection, and wound repair. In addition, increased blood sugar levels are a side effect of corticosteroids. In this study, there was no increase in glucose levels as a result of corticosteroid administration (98.08 ± 25.803). This study indicated that there was no increase in blood sugar levels or problems with wound repair in patients given preoperative dexamethasone.

This study, although it did not provide significant evidence that dexamethasone affects laryngeal edema that affects sound improvement, does not rule out other positive values of giving dexamethasone as a prophylactic against thyroid

surgery, such as preventing PONV (post operating nausea and vomiting),¹⁴ which requires further research to may prove a more complete effect of dexamethasone.

From the results of research regarding the administration of intravenous dexamethasone as prophylaxis, found that giving dexamethasone had no significant effect on laryngeal edema accompanied by changes in sound quality in patients undergoing thyroidectomy at Dr. Hasan Sadikin General Hospital Bandung.

There was weakness/limitation of the study that using only one dose of dexamethasone that we suggest research in the further is needed by using various doses of dexamethasone in order to obtain a superior therapeutic value, which may differ between research subjects.

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