

Dexamethazone Prophylaxis before Near Total Thyroidectomy to Reduce Vocal Dysfunction: A Randomized Clinical Trial

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ABSTRACT

Background: Thyroidectomy operation is one of the most common operations around the world. There are different complications of thyroidectomy including vocal cords dysfunction, hypocalcaemia, pain, bleeding, hematoma, nausea and vomiting.

Objective: This study aimed to study the prophylactic effect of dexamethasone 8 mg/2ml amp, intravenous before near total thyroidectomy to reduce vocal dysfunction. Also, to study the effect in relation to pain, nausea, vomiting and hypocalcaemia.

Patients and Methods: This study was conducted in Mansoura University Hospitals, Endocrine Surgery Unit during the period between July 2018 and June 2019. All patients were admitted from the Outpatient Clinic. All patients were informed about the surgical procedure in the clinic and a written consent was taken from all patients participating in the study. Sample size was calculated using G- Power with effect size 0.8 and power of 0.8 where it was 100 patients (50 patients in each group).

Results: comparing the 2 groups postoperatively, the dexamethasone group had fewer complications as regards postoperative nausea, vomiting, pain, hypocalcaemia and vocal dysfunction.

Conclusion: From this study, it was shown that dexamethasone 8 mg/2ml IV before near total thyroidectomy has significant effect regarding reduction of postoperative nausea, pain, vomiting, hypocalcaemia and vocal cords mobility, which was less affected. In addition, there was no side effects of dexamethasone administration. Therefore, we advise to give dexamethasone to all patients before thyroid surgery.

Keywords: Dexamethasone, near total thyroidectomy, vocal dysfunction.

INTRODUCTION

One of the most frequently performed surgical procedures in the world is thyroidectomy. Immediate complications postoperative include pain, nausea, vomiting, bleeding, hematoma, and voice change. Because of post intubation vocal fold edema, neural injury, local tissue changes and inflammation may occur, which cause voice change ⁽¹⁾. Total thyroidectomy and subtotal thyroidectomy are the most common operations for multi nodular goiter in adults. However, near total thyroidectomy is defined as a postoperative thyroid remnant less than 1 mL and is supposed to be a similarly effective but safer option than total thyroidectomy ⁽²⁾. Voice change may be permanent or transient due to injury to the recurrent laryngeal nerve, which can cause significant morbidity for patients and significant voice change may occur in injury of the external branch of the superior laryngeal nerve, intubation trauma, cricothyroid dysfunction, psychological reaction in the postoperative period, edema, and scarring of the strap muscles ⁽³⁾.

Post-operative nausea and vomiting is not only uncomfortable for the patient but the repeated times of vomiting may lead to bleeding which can obstruct the airway and may lead to entry the operating room again. Therefore, the importance of avoiding nausea and vomiting events are very important even than pain postoperatively ⁽⁴⁾. Dexamethasone is a widely used

corticosteroid, which has significant benefits in reduction of pain, nausea and vomiting in postoperative period ⁽⁵⁾.

The aim was to study the prophylactic effect of dexamethasone 8 mg/2ml amp, intravenous before near total thyroidectomy to reduce vocal dysfunction and to study the effect in relation to pain, nausea, vomiting and hypocalcaemia.

PATIENTS AND METHODS

This study was conducted for patients admitted to Mansoura University Hospitals, Endocrine Surgery Unit during the period between July 2018 and June 2019. All patients were admitted from the Outpatient Clinic. All patients were informed about the surgical procedure in the clinic and a written consent was taken from all patients participating in the study. Sample size was calculated using G- power with effect size 0.8 and power of 0.8 and it was 100 patients. A randomized clinical trial was done where the patients were randomized into 2 groups, 50 patients in each group:

❖ **Group A (study group):** Received 8mg/2ml amp of dexamethasone immediately I.V before induction of anesthesia



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❖ **Group B (control group):** Dexamethasone was not given before induction of anesthesia.

❖

Ethical approval:

Approval of the Ethical Committee, Faculty of Medicine, Mansoura University was obtained.

Inclusion criteria:

Patients with nodular goiter in euthyroid state, both genders and patients fit for surgery.

Exclusion criteria:

1. Patients with malignant thyroid diseases.
2. Pregnancy.
3. Patients with chronic pain disorders.
4. History of previously thyroid surgery.
5. Patients not fit for general anesthesia.

All patients were subjected to the following:

- A) **History:** history taking from each patient as regards age, present, past and medical history and family history.
- B) **General Examination:** examination of each patient from head to toes including body built, look, decubitus, vital signs (sleeping pulse, blood pressure and temperature), mental state, facial expression, upper and lower limbs, chest, heart, abdomen and skeletal examinations.
- C) **Local Examination:** thyroid examination including inspection, palpation, percussion, auscultation and comment on any swelling (regarding site, size, side, shape, surface and consistency). Vocal cords assessment was done to all patients and all were freely mobile.
- D) **Investigations:** Thyroid function tests (serum free T3, T4 and TSH). Complete Laboratory tests (random blood glucose level, E.C.G, neck U/S, F.N.A.C and post-operative final pathology).

Steps of the Near total thyroidectomy:

1. In group (A) patients were given dexamethasone 8mg/2ml ampoule I.V immediately before induction of anesthesia while in group (B) dexamethasone was not given.
2. All operations were performed under general anesthesia.
3. Anesthesia was induced with propofol and fentanyl and vecuronium was used to facilitate tracheal intubation.
4. The patient was put in the supine position on the table on a head ring with a pillow between the shoulders to help extension of the neck.
5. The table head was tilted up 15 degree to decrease venous engorgement.
6. Collar (Kocher's) incision was done. It was curved incision with the concavity upward. It was about 1-2 cm above the suprasternal notch in one of skin creases; it extends to the posterior border of each sternocleidomastoid muscles.
7. The skin incision, superficial fascia and platysma were incised.

8. Elevation of skin & platysma flap superiorly to upper border of thyroid cartilage and inferiorly to suprasternal notch.
9. Division of the investing layer, pre-tracheal fascia longitudinally in midline by diathermy.
10. Separation of the strap muscles was done with lateral reflection.
11. The middle thyroid vein was identified and ligated then divided.
12. Identification and preservation of upper and lower parathyroid glands.
13. Careful exposure of the upper pole of the thyroid gland was done and identification of upper thyroid vessels.
14. Selective ligation & division of the superior thyroid vessels.
15. The inferior thyroid artery and veins were identified and ligated at the lower pole of the gland.
16. The recurrent laryngeal nerve was identified and preserved during ligation of the inferior thyroid artery.
17. Delivery of thyroid lobe by blunt dissection from deep surface of pre-tracheal fascia & strap muscles.
18. Removal of thyroid lobe except a subcentimeter of the any lobe at the entrance of the recurrent laryngeal nerve into the larynx and around the parathyroid.
19. Exposure & devascularization of other lobe by the same manner with removal of pyramidal lobe when present.
20. Good hemostasis was done then closure of layers on a suction drain.
21. Extubation was performed.

Postoperative follow up:

Early (within the first week after surgery):

- Examination for the vital signs.
- Estimation of the amount of blood collected in the Redivac drain.
- Drain was removed 24 hours after surgery proved that the amount of blood collected in the bag was within normal.
- Patients were evaluated 8, 24, 32, 48 hours after surgery.
- Expose the wound for early detection of wound hematoma to avoid its compression manifestation.
- Vocal cord function was assessed immediately and 48 h after surgery.
- Subjective voice function was assessed by a Voice Visual Analog Scale (VVAS: 100 = normal voice, 0 = worst voice imaginable)
- Postoperative pain, nausea and vomiting were assessed and recorded.
- Pain was assessed with a standardized Visual Analog Scale (VAS) that ranged from 0 (no pain) to 100 (worst pain imaginable).
- Post-operative nausea and vomiting, measured as 0 = no nausea; 1 = mild nausea; 2 = severe nausea; and 3 = vomiting.

- Postoperative need of analgesics (frequency and substance).
- Postoperative need of anti-emetics (frequency and substance).
- Examination of patients for postoperative hypocalcaemia.
- Voice assessment was done in all patients before they were discharged.
- Wound infection and delayed wound healing was evaluated.
- In the first visit to Outpatient Clinics (one week after operation), the stitches were removed and patient was advised to take eltroxin as a replacement therapy after surgery and the dose of oral corticosteroid was adjusted.

Late (3 and 6 months after surgery):

- In the subsequent visits, one month, 3 months and six months, ultra- sensitive TSH was estimated and eltroxin was given accordingly.

- Vocal cords examination was done after one month, 3months and 6 months postoperative.

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Qualitative data were described using number and percent. Quantitative data were described using median (minimum and maximum) for non-parametric data and mean and standard deviation for parametric data after testing normality using Kolmogrov-Smirnov test. Significance of the obtained results was judged at the (0.05) level.

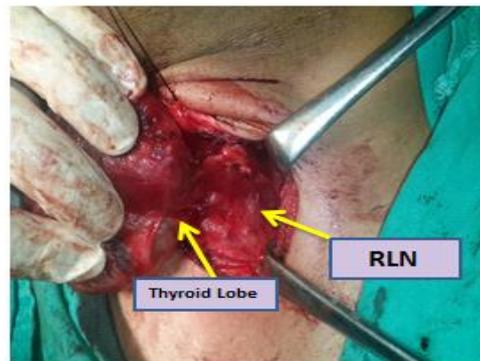
Examples of patients in our study:

Patient (1): 60 years old female patient with simple MNG, given dexamethasone and underwent near-total thyroidectomy and specimen was removed for final pathology.

Patient No. 1



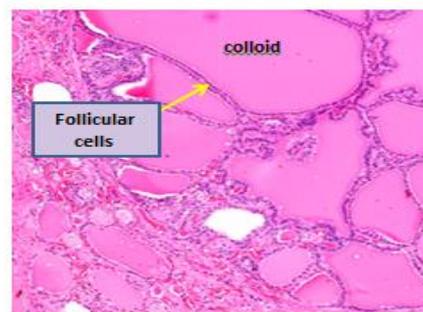
Female patient 60 years old with MNG (given dexamethasone)



Thyroid bed after near total thyroidectomy



Removed specimen



Colloid goiter with hyperplastic changes

Figure (1): Procedures of near total thyroidectomy for patient (1)

RESULTS

Our study included 100 patients over a period of one year (July 2018 and June 2019). In our study, the mean age of the included patients in our study was 41.34 ± 11.59 years at control group, 41.76 ± 12.59 years at study group. Males represented 7 patients (7%) while females represented 93 patients (93%). Fine needle aspiration cytology (FNAC) was done to all patients 100 patients (100%) and showed that 50 patients (50%) are colloid, 1 case (1%) was hyperplastic nodule, 17 patients (17%) are benign follicular and 32 patients (32%) are bloody smear. Ultra sound examination in our patients showed that 40 patients (40%) with TIRADS 2, While 52 patients (52%) with TIRADS 3, And 8 patients (8%) showed TIRADS 4. All patients in our study (100%), 50 patients in each group underwent near total thyroidectomy operation (Table 1).

Table (1): Mean age, sex, fine needle aspiration cytology and TIRADS of the patients in our study.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Age (years) Mean ± SD	41.34 ± 11.59	41.76 ± 12.59	T = 0.174 p = 0.863
Sex			
Male	4 (8.0)	3 (6.0)	FET
Female	46 (92.0)	47 (94.0)	P = 1.0
FNAC			
Bloody smear			
Hyperplastic nodule	11 (22.0)	21 (42.0)	
Colloid	1 (2.0)	0 (0.0)	
Benign follicular	28 (56.0) 10 (20.0)	22 (44.0) 7 (14.0)	MC P = 0.146
TIRADS			
T2	21 (42.0)	19 (38.0)	MC
T3	24 (48.0)	28 (56.0)	P = 0.635
T4	5 (10.0)	3 (6.0)	

Table (2) showed patients in our study who had either neck swelling or compression manifestation including neck fullness, dysphagia, odynophagia, choking and dyspnea. 78 patients were complaining of neck swelling and only 22 patients were complaining of compression manifestations. All patients had either simple multi nodular goiter or controlled secondary toxic goiter. 81 patients (81%) had criteria of simple MNG whoever only 19 patients (19%) had criteria of secondary toxic goiter.

Table (2): Complaint and thyroid disease frequency among studied patients.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Patient complaint			
Neck swelling	34 (68.0)	44 (88.0)	$\chi^2 = 5.83$ p = 0.016*
Compression manifestation	16 (32.0)	6 (12.0)	
Thyroid disease			
MNG	41 (82.0)	40 (80.0)	$\chi^2 = 0.06$ p = 0.798
2ry toxic goiter	9 (18.0)	10 (20.0)	

The effect of dexamethasone on nausea and vomiting was observed early postoperative. In control group, 19 patients were noted (38%) however, only 6 patients (12%) were noted in study group. P-value was significant as regards post-operative nausea and vomiting (Table 3).

Table (3): Post-operative nausea and vomiting among studied patients

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
PONV			
Absent	31 (62.0)	44 (88.0)	$\chi^2 = 9.01$ p = 0.003*
Present	19 (38.0)	6 (12.0)	

Table (4) showed the effect of dexamethasone on postoperative pain. The need for analgesics was observed and calculated using pain visual analogue score. In control group, 26 patients (52%) developed pain and required analgesics post-operative. However, in study group, 15 patients (30%) developed pain and patients needed analgesics were 17 (34%). P-value was significant as regards pain and need of analgesics was less in study group.

Table (4): Post-operative pain and analgesics among studied patients.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Post-operative pain			
Absent	24 (48.0)	35 (70.0)	$\chi^2 = 5.002$ p = 0.025*
Present	26(52.0)	15(30.0)	
Post-operative analgesia			
Absent	24 (48.0)	33 (66.0)	$\chi^2 = 3.31$ p = 0.069
Present	26 (52.0)	17 (34.0)	

Among the study group, 11 patients (22%) showed early post-operative hypocalcaemic manifestations and 20 patients among control group (40%) developed hypocalcaemia. Only 3 of these 20 patients (6%) in control group showed signs of carpopedal spasm and needed medical treatment from these manifestations (Table 5).

Table (5): post-operative hypocalcaemic manifestations among studied patients.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Post-operative hypocalcemic manifestations (tingling and numbness)			
Absent	30 (60.0)	39 (78.0)	$\chi^2 = 3.78$ p = 0.052
Present	20 (40.0)	11 (22.0)	
Postoperative carpopedal spasm			
Absent	47 (94.0)	50 (100.0)	FET P = 0.242
Present	3 (6.0)	0 (0.0)	

In our study, only 1 patient (2%) of control group experienced a postoperative hematoma and seroma, it was controlled by conservative treatment and anti-hemorrhagic drugs (Table 6).

Table (6): post-operative hematoma and seroma among studied patients.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Post-operative hematoma , seroma and bleeding			
Absent	49 (98.0)	50 (100.0)	FET P = 1.0
Present	1 (2.0)	0 (0.00)	

In our study, 5 patients (10%) experienced post-operative hoarseness of voice in control group however only 2 patients (4%) in study group developed hoarseness of voice (Table 7).

Table (7): Post-operative voice among studied patients.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Post-op voice			
Normal	45 (90.0)	48 (96.0)	MC P = 0.501
HOV	5 (10.0)	2 (4.0)	
Stridor	0 (0.0)	0 (0.0)	

In our study, we found hypersensitivity reactions after general anesthesia in 5 patients in control group and no patients in study group (Table 8).

Table (8): Sensitivity reaction after anesthesia among studied patients.

	Control Group (Without Dexamethasone) N = 50	Study Group (With Dexamethasone) N = 50	Test of significance
Sensitivity reaction after anesthesia	5 (10.0)	0 (0.0)	FET P = 0.02*

There was no difference in wound healing between studied groups.

Also all 100 patients included in this study are examined by E.N.T specialist to assess the mobility of vocal cords and all the 100 patients (100%) had freely mobile vocal cords. In our study, surgery duration was calculated (minutes) and post-operative hospital stay (days) and the p-value was insignificant for both.

DISCUSSION

Thyroidectomy is one of the commonest operations around the world. Its complications include vocal cord dysfunction, pain, manifestations of hypocalcaemia, nausea and vomiting ⁽¹⁾.

Dexamethasone is a widely used corticosteroid, which has an important role in reduction of postoperative pain, nausea, vomiting and vocal cord edema ⁽⁵⁾.

In our study, we studied and recorded the effect of single dose of dexamethasone before near total thyroidectomy on postoperative pain, nausea, vomiting, vocal dysfunction and hypocalcaemia. Post-operative nausea, vomiting and pain were the most common causes of major discomfort after surgery that have a negative impact on post-surgical outcomes. Although not life-threatening, these symptoms can be severe enough to delay early postoperative mobility and oral intake.

Feroci et al. ⁽⁶⁾ in his study showed that preoperative administration of dexamethasone in patients with thyroidectomy reported significantly lesser pain (p = 0.008) and the need for analgesic drugs was lower in the steroid group (p = 0.048). Post-operative nausea and vomiting after eight hours in the dexamethasone group was significantly lower as compared to the control group (p = 0.0001).

A meta-analysis showed a significant reduction in the incidence of post-operative nausea and vomiting, the need for additional anti-emetics (P < 0.00001), post-operative pain scores (P = 0.002), and the need for analgesics (P = 0.0008) in patients receiving dexamethasone compared to other patients not receiving dexamethasone. In addition, it had a significantly more effect in minimizing the incidence of post-operative nausea and vomiting when given in greater dose ⁽⁷⁾. **Li et al.** ⁽⁸⁾ showed in his study that preoperative corticosteroid treatment reduced the post-operative nausea and vomiting, but not pain severity and analgesic requirement in patients. A statistically and clinically significant difference in the incidence and severity of postoperative nausea and vomiting was found in favor of dexamethasone (p < 0.00001 and p =

0.04 respectively). **Worni et al.** ⁽⁹⁾ in his study showed that preoperative one dose of steroid reduced nausea, vomiting, and pain and improved postoperative voice function within the first 2 days after thyroidectomy.

In our study, we found a significant reduction in postoperative pain, nausea and vomiting among study group compared to control group. In addition, the need for postoperative analgesics was less in study group. In control group, 26 patients (52%) developed pain and required analgesics postoperatively. however, in study group, 15 patients (30%) developed pain and patients needed analgesics were 17 (34%). P-value was significant as regards pain and need of analgesics, which was less in the study group. The effect of dexamethasone on nausea and vomiting was observed early postoperative. In control group, 19 patients were noted (38%) however, only 6 patients (12%) were noted in study group. **Nasiri et al.** ⁽¹⁰⁾ showed that dexamethasone reduced changes in vocal function after thyroidectomy at the first 24 h after surgery but not after 7 days. **Worni et al.** ⁽⁹⁾ performed voice function test and found that temporary postoperative deterioration of the voice was reduced in patients who received dexamethasone compared to the other group. The awareness of vocal function (ie, the sensation of hoarseness) was improved in the dexamethasone group compared to the control group within the first 24 hours after the intervention.

In our study, we found that 5 patients in control group developed hoarseness of voice, while 2 patients in study group developed hoarseness. There was no significant difference between the 2 groups.

The most severe complication after thyroidectomy is hypocalcaemia and signs of hypoparathyroidism, the most accepted explanation is the manipulation of the parathyroid glands, which lead to partial disrupt of the blood supply of the glands leading to hypocalcaemia ⁽¹¹⁾. In our study, we found that among the study group, 11 patients (22%) showed early postoperative hypocalcaemic manifestations and 20 patients among control group (40%) developed hypocalcaemia. Only 3 of these 20 patients (6%) in control group showed signs of carpopedal spasm and

needed medical treatment of these manifestations. Therefore, a lower occurrence rate in post-operative symptomatic hypocalcemia occurred in the study group when compared to the control group. **Kolahdouzan et al.** (12) showed that post-operative hypocalcaemia and transient hypoparathyroidism did not occur more often in the control group, compared to the dexamethasone group. However, a lower occurrence rate in symptomatic hypocalcaemia post-operative was observed in the dexamethasone group when compared to the other group. His study was conducted on 128 patients who underwent surgery. A total of 50 patients (39.1%) developed hypocalcaemia after surgery. Post-operative symptomatic hypocalcaemia occurred more often in the control group (68%), compared to the dexamethasone group (32%). However, this difference was not statistically significant ($P=0.54$).

In our study, there was no difference in wound healing, surgery duration (minutes) and post-operative hospital stay (days) between studied groups. However, only 1 patient (2%) of control group experienced a postoperative hematoma and seroma.

CONCLUSION

From this study it is shown that dexamethasone 8mg/2ml IV before near total thyroidectomy had significant effect as regards reduction of postoperative nausea, pain, vomiting, hypocalcaemia and vocal cord mobility, which was less affected. Also, there was no side effects of dexamethasone administration. Therefore, we advise to give dexamethasone to all patients before thyroid surgery.

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