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The Impact of Pressure Dressing on Post-Thyroidectomy Hypocalcemia: Prospective Randomized Controlled Clinical Study

Original Investigation

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Abstract

Objective: The aim of the study was to evaluate the efficacy of pressure dressing on complications after total thyroidectomy and its correlation with serum calcium levels.

Methods: The study involved 112 patients who underwent total thyroidectomy. Patients were randomized into two groups-with and without pressure dressing-and followed prospectively. The calcium levels were measured at 6, 24, and 48 hours postoperatively, respectively. Hypocalcemia was diagnosed when patients were symptomatic or calcium level was below 8.0 mg/dL. Dressing and drain were removed at the 48th hour of postoperatively.

Results: No statistically significant difference was found between the two groups in terms of age; gender; thyroid gland weight; calcium concentrations at the 6th, 24th, and 48th hours; total drain liquid; and hypocalcemia rates. Postoperative hematoma developed in 7.1% of the cases and was statistically higher in the without-dressing group compared to with-dressing group. Thyroid gland weight was correlated positively with total drain liquid. There was no correlation between thyroid gland weight and total drain liquid level and 6th-, 24th-, and 48th-hour calcium levels.

Conclusion: Pressure dressing after total thyroidectomy significantly reduces postoperative hematoma. Postoperative serum calcium levels were slightly higher in the pressure dressing group but not statistically significant.

Key Words: Total thyroidectomy, hypocalcemia, pressure dressing, complication

Introduction

Hematoma, seroma, and temporary hypocalcemia are the most common complications after thyroidectomy. For minimizing the risk for hematoma and seroma, the formation of dead space should be reduced, in addition to effective bleeding control. In the literature, in the studies conducted on the necessity of drain usage, drained and non-drained patients were compared in terms of postoperative hematoma, seroma, and the amount of the liquid accumulation in the thyroidectomy bed, and similar results were reported for both groups (1, 2). Nevertheless, many surgeons still use drain after thyroidectomy (1-3). Another way of reducing post-thyroidectomy dead space volume is to perform pressure dressing with drainage (3). In the studies conducted recently about drain usage and pressure dressings after total thyroidectomy, postoperative hematoma and seroma complications have been emphasized, but the relationship between the risk for hypocalcemia and the type of dressing has not been investigated. The aim of this study was to evaluate the relationship between pressure dressing after total thyroidectomy and its complications.

Methods

Approval of the ethics committee of Bağcılar Training and Research Hospital was received before beginning the study. One hundred twelve patients who underwent total thyroidectomy in our clinic between 2010 and 2014 were involved in the study after written informed consent was obtained from them. The patients who underwent one-sided thyroidectomy, had coexisting central or lateral neck dissection, used calcium, and had a known parathyroid disorder were excluded from the study. All operations were performed by the same surgeon using the same technique. Post-thyroidectomy thyroid gland weight was measured. The same type of closed vacuum drain was used for each patient. The patients were randomly divided into a pressure dressing group and non-pressure dressing group through a computer program. Pressure dressing was performed for the pressure dressing group before extubation. For the other group, the sutures were closed with strips after the control of bleeding. Serum ionized calcium concentrations of the patients were measured at the 6th, 24th, and 48th postoperative hours. The patients whose calcium concentrations were below 8.0 mg/dL or

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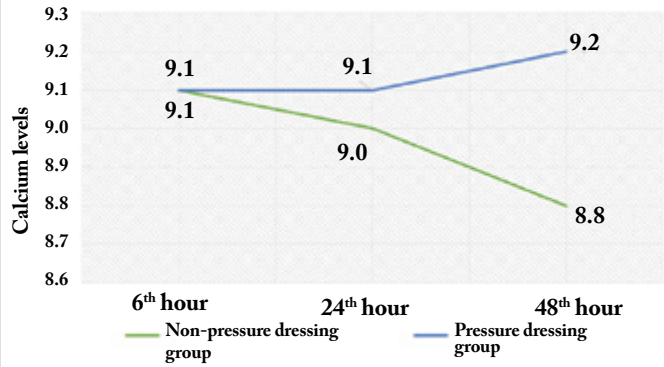

Figure 1. Calcium concentrations of the groups at the 6th, 24th, and 48th postoperative hours

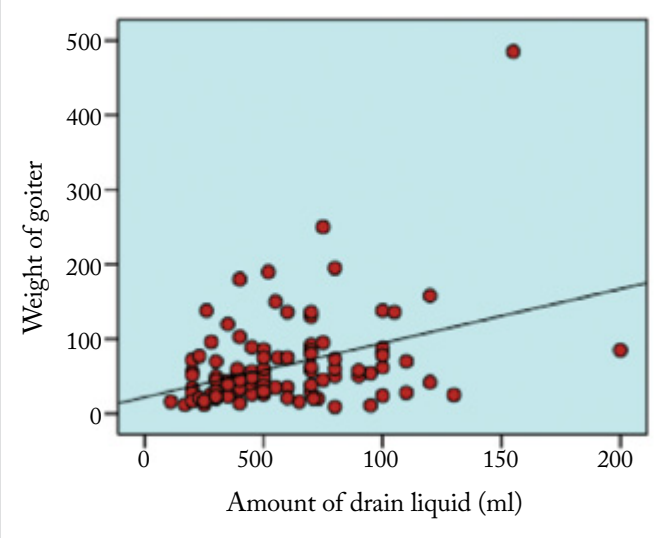

Figure 2. Scatterplot showing the correlation between the weight of thyroidectomy material and the amount of drain liquid

who were symptomatic were accepted as hypocalcemia, and oral or systemic calcium therapy was initiated for them. At the 48th postoperative hour, pressure dressings and drains of all patients were removed. While doing this, the amount of postoperative total drain liquid was recorded.

Statistical Analysis

Mean, standard deviation, minimum-maximum, median, ratio, and frequency values were used for the descriptive statistics of the data. The distribution of the variables was evaluated using Kolmogorov-Smirnov test. Independent-samples t-test and Mann-Whitney U-test were used for analyzing quantitative data. Qualitative data were analyzed with chi-square test. For evaluating the correlation, Spearman correlation analysis was employed. Statistical Package for the Social Sciences (SPSS) 21.0 was used during the analyses.

Results

The mean age of the 112 total thyroidectomy patients included in the study was 43.4±11.5 years (min-max: 15-72). The pressure dressing group involved 54 patients, while the non-pressure dressing group involved 58 patients. The distributions of age and gender were similar in both groups (p>0.05). The mean weight of thyroidectomy material was 65.8±70 gr (9-485 gr) in the non-pressure dressing group and 61.2±50.1 gr (11-250 gr) in the pressure dressing group. No statistically significant difference was found between the two groups (p>0.05). The mean calcium concentrations at the 6th, 24th, and 48th postoperative hours were 9.1±0.6, 9.0±0.7, and 8.8±0.7 mg/dL in the non-pressure dressing group and 9.1±0.7, 9.1±0.7, and 9.2±0.9 mg/dL in the pressure dressing group, respectively. There was no significant difference between the two groups (p>0.05) (Figure 1). Temporary hypocalcemia was observed in 12 patients in the non-pressure dressing group and in 9 patients in the pressure dressing group. No statistically significant difference was found between two groups (p>0.05). The mean total drain liquid level was 61.3±32 mL (11-155 mL) in the non-pressure dressing group, while it was 54±32 mL (17-200 mL) in the pressure dressing group; and there was no statistically significant difference (p>0.05). Postoperative hematoma developed in 1 patient (1.9%) in the pressure dressing group and in 7 patients in the non-pressure dressing group (12.1%). There was a statistically significant difference between both groups in terms of postoperative hematoma (p<0.05) (Table 1).

When the weight of thyroidectomy material and drain liquid level were compared, a positive correlation was found (p<0.05) (Figure 2). However, there was no significant correlation between the weight of thyroidectomy material and serum calcium concentrations at the 6th, 24th, and 48th postoperative hours (p>0.05). On the other hand, no significant correlation was observed between drain liquid level and calcium concentrations at the 6th, 24th, and 48th postoperative hours (p>0.05) (Table 2).

Temporary vocal cord paralysis occurred in 2 patients in the pressure dressing group (3.7%) but in 5 patients in the non-pressure dressing group (8.6%). Permanent vocal cord paralysis was not observed in either group. Temporary hypocalcemia was found in 9 patients in the pressure dressing group and in 12 patients in the non-pressure dressing group. Permanent hypocalcemia was not found in either group. The distribution of other complications is demonstrated in Table 3.

Discussion

Total thyroidectomy is one of the most frequently conducted operations of the neck region. After excision of the thyroid gland, the blood and serum leaking into the surgical site accumulate in the dead space. This rapid filling up with blood after thyroidectomy causes tracheal compression and respiratory distress, and thus, it becomes a life-threatening complication (1, 2). Although drain does not prevent the formation of hematoma, many surgeons conventionally prefer to use drain for removing accumulated blood and serum (1-4). Some studies have been conducted for questioning the necessity of drain after thyroidectomy. Sanabria et al. (2) evaluated 11 prospective randomized trials comparing the cases with and without drain

Table 1. Distribution of patients in the pressure and non-pressure dressing groups

		Non-pressure dressing group mean±s.d.	Pressure dressing group mean±s.d.	p
Age		44.2±12	41.4±9.5	0.078
Gender	Female	43, 74.1 %	43, 79.6 %	0.492
	Male	15, 25.9%	11, 20.4%	
Weight		65.8±70	61.2±50.1	0.748
Calcium	6th hour	9.1±0.6	9.1±0.7	0.861
	24th hour	9.0±0.7	9.1±0.7	0.536
	48th hour	8.8±0.7	9.2±0.9	0.067
Drain liquid (mm^3)	61.3±32	54±32	0.231	
Hypocalcemia	No	46, 79.3%	45, 83.3%	0.586
	Yes	12, 20.7 %	9, 16.7%	
Hematoma	No	51, 87.9%	53, 98.1%	0.036
	Yes	7, 12.1%	1, 1.9%	

Independent samples test/chi-square test/Mann-Whitney U-test

Table 2. Comparison of the correlations of the weight of thyroidectomy material and drain liquid with postoperative calcium concentrations

		From drain	6th hour Ca^{++}	24th hour Ca^{++}	48th hour Ca^{++}
Thyroid weight	R	0.381	-0.312	-0.090	0.029
	P	0.000	0.174	0.357	0.775
Drain liquid	R	-	-0.142	-0.035	0.016
	P		0.136	0.712	0.868

Spearman correlation; Ca: calcium

Table 3. Distribution of data according to the groups

	Pressure dressing group	Non-pressure dressing group	Total	Total %
Hematoma	1	7	8/112	7.1%
Seroma	0	1	1/112	0.9%
Wound infection	0	0	0	0%
Suture reaction	0	0	0	0%
Temporary vocal cord paralysis	2	5	7/112	6.3%
Permanent vocal cord paralysis	0	0	0/112	0%
Temporary hypocalcemia	9	12	21/112	18.8%
Permanent hypocalcemia	0	0	0/112	0%
Papillary Carcinoma	22	21	43/112	38.4%
Multinodular goiter	32	37	69/112	61.6%

in their meta-analysis. In this study, no statistically significant difference was determined between the two groups with regard to postoperative hematoma/seroma frequency. They found the mean hospitalization time to be longer in the cases with drain (2, 5). In spite of the fact that the superiority of drain for hemorrhage and seroma has not been reported in the literature, many surgeons continue to use drain, because they feel safer. We also use routine drain for all patients undergoing thyroidectomy.

In head and neck surgery, particularly in operations including neck dissection, in which dead space occurs more often, pressure dressing is almost routinely performed. When considered from this point of view, it can be thought that applying pressure dressing with drain is rational for reducing dead space. In the study conducted by Piromchai et al. (3), they found that the amount of liquid accumulated in the drain and thyroid bed was equal in the pressure and non-pressure dressing groups after total thyroidectomy or lobectomy (3). In their study, postoperative hematoma developed in 1 patient from the non-pressure dressing group. In our study, the amount of drain liquid was similar in both groups, as in the study of Piromchai et al. On the other hand, postoperative hematoma was observed only in 1 patient in the pressure dressing group, while it was observed in 7 patients in the non-pressure dressing group. All of our patients underwent total thyroidectomy, which is a strength of our study compared to the study of Piromchai et al. (3), in which they included one-sided thyroidectomy applications.

Although the parathyroid glands are protected in thyroidectomy surgery, the blood supply of the parathyroids is disrupted after thyroidectomy. Accordingly, temporary, and sometimes permanent, post-thyroidectomy hypoparathyroidism can occur. Therefore, after completion of thyroidectomy, the parathyroids with disrupted blood supply can be embedded into the sternocleidomastoid muscle (6). The parathyroids embedded into the muscle are re-supplied with blood and begin to secrete PTH (parathormone) (6). Blood-liquid that has accumulated in the thyroid bed after thyroidectomy can influence the blood supply of the parathyroid glands. Reduction of blood-liquid accumulation in the thyroid bed may lead to better blood supply by increasing the contact of the parathyroid glands with the tissue.

In addition to the studies investigating the relationship between post-thyroidectomy drain and pressure dressing and hematoma/seroma, the effect of pressure dressing on postoperative calcium concentrations was examined in this study. While calcium levels were similar in the pressure dressing and non-pressure dressing groups during the first 6 postoperative hours, they were higher in the pressure dressing group at the 24th and 48th postoperative hours. This difference, even if it was not statistical, makes us think that parathyroids were less affected by ischemia.

A positive correlation was found between peroperative thyroid gland weight and drain liquid level. Therefore, it can be said that the use of drain and pressure dressing is more important, especially after surgeries of the large thyroids. Compared to similar

studies, the limitations of this study are duration of hospitalization, pain scoring for pressure dressing, and lack of records for the compression of pressure dressing. The compression of the dressing was adjusted according to our clinical experiences.

Conclusion

Applying pressure dressing in total thyroidectomy statistically decreases the incidence rate of postoperative hematoma. On the other hand, early postoperative calcium concentrations are higher in the pressure dressing group, even if they are not statistically significant.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Bağcılar Eğitim Araştırma Hastanesi (18.03.2013/123).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

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