

Frequency of postoperative accompanying parathyroidectomy risk factors in Jordanian population. Our experience at King Hussein medical city

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Abstract: To evaluate the frequency and risk factors of unintentional parathyroidectomy after thyroidectomy in our Jordanian population. This retrospective investigation enrolled 103 subjects assigned for thyroidectomy at King Hussein Hospital, King Hussein medical city, Amman, Jordan during the period Jan 2012- Aug 2013. The patient's demographics reported age, sex, preoperative FNA diagnosis and postoperative histopathological reports. The thyroid surgical procedure (subtotal or total thyroidectomy with lobectomy or completion thyroidectomy) was achieved by senior surgeons. Histopathology reports were reviewed for the presence and characteristics of parathyroid tissue glands and thyroid pathology. For statistical analysis, the chi-square test and Fisher exact test were used to evaluate statistical significance. $P \leq 0.05$ was considered statistically significant. Eleven (11) subjects (10.7 %) had their parathyroid glands incidentally removed. There was significant difference between the mean age of patients with and without accompanying parathyroidectomy (35.5 vs. 50 years, $P \leq 0.05$). Nine (81.8%) patients with accompanying parathyroidectomy had only one parathyroid gland excised, one patient (9.1 %) had two removed and one patient (9.1 %) had three removed. The frequency of accompanying parathyroidectomy after thyroidectomy was 10.7% which is within the international limits. Risk factors were female sex, lobectomy thyroidectomy and multinodular goiter.

Keywords: *factors; Jordan; thyroidectomy; parathyroidectomy, accompanying*

1. Introduction

The most frequent postoperative complications of thyroidectomy are hypocalcemia and recurrent laryngeal nerve insult. Postoperative major complications after thyroidectomy generally occur in less than 5 % (1). Thyroidectomy has become safe and successful with better outcome and less morbidity (2). Commonly in high risk subjects. Thyroidectomy is a frequently achieved surgical technique for thyroid conditions. Unintentional parathyroidectomy is one of its postoperative complications which happens. Anatomical relations recall of the parathyroid gland to the thyroid is crucial in preventing postoperative parathyroidectomy.

The frequency of hypocalcemia after thyroidectomy is significantly high, ranging between 1.6% and 50%, with permanent hypocalcemia in 1.5% - 4% (3). An accompanying parathyroid gland appears sometimes in the histopathology reports of thyroid biopsies. Different surgical procedures are used during thyroid surgery to decrease parathyroid injury. Careful identification of the anatomy and preservation of the blood supply to the parathyroid glands is vital. The causes of postoperative hypocalcemia are surgical trauma, devascularization or unintentional excision of parathyroid

glands. Removal of one normal parathyroid gland must not in theory affect level of calcium due to the presence of three other normal glands.

Unintentional removal of parathyroid glands occurs in 9-15% of thyroidectomies. Recently, thyroid surgery is considered a safe modality for most disease conditions. Risk factors for incidental parathyroid removal were young age (who are undergoing surgery for malignancy using aggressive technique), bilateral thyroid removal (due to the extent of dissection and malignant pathology (because of modified anatomy and more complex neck dissection)).

The objective of our investigation was to assess the frequency of the accompanying parathyroid excision during thyroidectomy in our Jordanian population with our Jordanian surgeons.

2. Material and Methods

Our retrospective study included 103 patients scheduled for thyroidectomy at King Hussein Hospital, King Hussein medical city, Amman, Jordan during the period Jan 2012-Aug 2013. The patient's data included age, gender, preoperative FNA diagnosis and postoperative histopathological details. The thyroid surgical interventions (subtotal or total thyroidectomy with lobectomy or completion thyroidectomy) were performed by senior surgeons.

Surgical procedures with modified neck dissection or central compartment node dissection were excluded from the study.

Histopathology details were reviewed for the existence of parathyroid glands, their sites (extracapsular or intracapsular), the number excised, their size, and their histological features. For statistical analysis, the chi-square test and Fisher exact test were used to evaluate the relation between categorical investigation parameter and accompanying parathyroidectomy (yes/no). $P \leq 0.05$ was considered statistically significant.

3. Results

Eleven (11) subjects (10.7 %) had their parathyroid glands incidentally removed. Patient ages with accompanying parathyroidectomy ranged between 17 and 54 years (mean 35.5 years), but there was significant discrepancy between the mean age of patients with and without accompanying parathyroidectomy (35.5 vs. 50 years, $P \leq 0.05$). Most of patients were females, and sex was found to foretell an accompanying parathyroidectomy ($P \leq 0.05$). The thyroid tumor was benign in 70 (67.9 %) patients and malignant in 33 (32.1 %) patients. Nine of parathyroidectomies were in the benign group and two were in the malignant group. The thyroid operations carried out included total thyroidectomy in (27.2 %), thyroid lobectomy in (47.6 %), subtotal thyroidectomy in (12.6%), and completion thyroidectomy in (12.6 %) patients (Table I).

Accompanying parathyroidectomy was more frequent in subjects with lobectomy (5, 10.2%) then with subtotal thyroidectomy (3, 23.1%), with total thyroidectomy (2, 7.1%) and finally with completion (1, 7.7%). ($P \leq 0.05$). Papillary carcinoma was found to be the most frequent malignancy (63.6%) and the most frequent benign pathological abnormality was multinodular goiter (27.1%) and follicular adenoma (24.3%) (Table II). Nine (81.8%) patients with accompanying parathyroidectomy had only one parathyroid gland excised, one patient (9.1 %) had two removed and one patient (9.1 %) had three removed. Of the 11 parathyroid glands removed incidentally, 11 (100 %) were extracapsular and 0 (0 %) were intracapsular. Table III. One case of papillary cancer was associated with 3 parathyroid glands removal

The factors evaluated for incidental removal of the parathyroid glands during thyroidectomy are demonstrated in Table I. Lobectomy thyroidectomy, extracapsular spread, and multinodular goiter were associated with a significantly increased frequency of accompanying parathyroidectomy,

4. Discussions

Accompanying parathyroidectomy is a known complication of thyroidectomy. Theodor Kocher, who performed the first 100 thyroidectomies in 1883, remarked tetany in patients postoperatively (4). William Halsted recommended careful surgical interventions to avoid injuring the parathyroid glands and participated to the prevention of postoperative parathyroidectomy after thyroidectomy that made early thyroidectomy full of complications (5).

The aim of our investigation study was to evaluate the frequency of accompanying parathyroidectomy after thyroidectomy. We showed that the frequency of accompanying parathyroidectomy in our patients to be 10.7 % which ranges in the rates shown in the literature (5.2%–21.6%) (6). Careful following the anatomical landmarks and surgical protocol is crucial for decreasing the frequency of iatrogenic hypoparathyroidism after thyroidectomy (7). The surgeon must keep in mind the anatomical differences of the parathyroid glands (8) to avoid incidental damage, vascular injury, or excision of the parathyroid parenchyma. There is a wide difference in the number of parathyroid glands, but in many subjects, there are 4, each approximately 6–8 mm in diameter and sited extracapsularly on the posterior area of the thyroid gland. The superior parathyroids are frequently sited at the superior pole of the thyroid, and the site of the inferior parathyroids is more variable, and is often intrathyroidic. Dissection to find all parathyroid glands during thyroid surgery may be full of complications (9).

In our investigation, risk factors for accompanying parathyroidectomy enrolled lobectomy thyroidectomy ($P \leq 0.05$), multinodular goiter ($P \leq 0.05$), and extracapsular spread ($P \leq 0.05$) (Table I). In total thyroidectomy, bilateral dissection increased the risk of parathyroid removal. Bilateral dissection may harm all four glands. In our investigation, total thyroidectomy was performed mostly for malignant thyroid disease. Malignancy was demonstrated to foretell accompanying parathyroidectomy in earlier studies (10), although it was not a risk factor in our investigation ($P \geq 0.05$). In other investigations (11) total thyroidectomy was shown to be a risk factor for accompanying parathyroidectomy.

Multinodular goiter was the second risk factor and a foreteller of inadvertent parathyroid removal in our investigation ($P \leq 0.05$), not as in other studies (12), where thyroiditis causes an increased risk of accompanying parathyroidectomy by the formation of scar tissue due to inflammation and by increased bleeding, both of which may lead to surgical difficulties.

Table I. Patients characteristics

	Females	Males
number	78	25
Age(yr)	14-75	19-86
Thyroid pathology		

Table II. Frequency of accompanying parathyroidectomy with risk factors

	Females	Males
no	11	0
Age		
14-20	1	
21-30	3	
31-40	2	
41-50	4	
51-60	1	
61-70	0	
71-75	0	
Thyroid pathology		
Benign	9	
malignant	2	
Extracapsular extension	11	
Multinodular goiter	3	
Papillary cancer	2	
Surgery		
Total thyroidectomy	2	
Thyroid lobectomy	5	
Completion thyroidectomy	1	
Subtotal thyroidectomy	3	

Table III. Relation between age and thyroid tumor (no)

	F	M
14-20	6(2 papillary cancer)	1(1 multinodular goiter)
21-30	12(4 papillary cancer 2 multinodular goiter)	3(1 papillary cancer)
31-40	21(6 multinodular goiter 3 papillary cancer)	6(1 multinodular goiter 1 papillary cancer)
41-50	21(4 papillary cancer 5 multinodular goiter)	3(1 papillary cancer)
51-60	13(4 multinodular goiter 1 papillary cancer)	7(1 multinodular goiter 3 papillary cancer)
61-70	3(1 papillar cancer)	2(2 multinodular goiter)
71-80	2	2(1 multinodular goiter 1 papillary cancer)
81-90		1

Extracapsular extension was not considered to be a risk factor in a previous investigation (13). In our investigation, it is considered a foreteller of accompanying parathyroidectomy. Extracapsular extension occurs in malignancy, and subjects operated upon for thyroid malignancy, with an invasive technique, are at an increased risk. In our investigation, all patients with accompanied parathyroidectomy were females and the factors that did increase the risk for incidental parathyroidectomy were age(41-50 yr), pathological characteristics (benign) and lobectomy thyroidectomy. In other investigations, female gender (9) and younger age (10) were considered as risk factors. Others considered (14) male sex as a predictor of inadvertent parathyroidectomy. The relation between completion thyroidectomy and accompanying parathyroidectomy is discussed in literature. Rix and Sinha (15) demonstrated a

significant relation. In our investigation, completion thyroidectomy was not a risk factor, despite the surgical difficulties encountered.

Intracapsular parathyroids were sited in 2% to 5% of autopsy investigations (16) and inadvertent resected parathyroids are intracapsular located in 40% - 50% of patients (17). Inadvertent parathyroidectomy can happen even in the hands of more experienced thyroid surgeons.

Inadvertent parathyroidectomy during thyroidectomy is not uncommon. It happened in 0.7 % of patients in our study. Lobectomy thyroidectomy, extracapsular extension of the tumor and multinodular goiter were considered the risk factors for accompanying parathyroidectomy. Unintentional parathyroidectomy of intracapsular structure is unpreventable even with development in the surgical technique

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