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Surveillance of Accidental Parathyroid Glands in Post Thyroidectomy Histopathological Specimens

Maram Mohammed Al Ghumlas, Mohammed Gamal Aly, Abdulazi Albidi, Aeshah Abdulmohsen Al Hejji

Otolaryngology - Head and Neck Surgery, Johns Hopkins Aramco Healthcare, Dharan, Saudi Arabia

Abstract: ***Background: Incidental excision of parathyroid glands is a common event during thyroid surgery, and despite the divergent results that can be obtained from the literature about its clinical significance, all efforts must be used to preserve them. Objective: To study the prevalence of parathyroid tissues in thyroid specimens obtained after thyroidectomy surgeries and its relation post operative hypoparathyroidisim. Materials and methods: From January 2016 to December 2022, 526 consecutive patients with benign and malignant thyroid disorders underwent unilateral or bilateral thyroidectomy at Johns Hopkins Aramco Healthcare (JHAH) center. The histopathological parameters of each patient were blindly determined by one co - author specializing in thyroid and parathyroid pathology. In addition, all pathologic slides were reviewed for the presence, number, and location (extrathyroidal, intrathyroidal, or intracapsular) of inadvertently removed parathyroid glands within the submitted thyroid specimen. Results: 526129 (24.5%) found to have parathyroid tissues were detected among our thyroid specimens, and 58 (44.6%) were in malignant thyroid speciemens parathyroid tissues. In most temporary hypoparathyroidism, 73 (65.8%) hadn't parathyroid tissue in their specimens, 30 had one parathyroid tissue, 7 had two parathyroid tissues, and only one specimen had three tissues. Regarding permanent hypothyroidism, two specimens had no parathyroid tissue, and one specimen had three parathyroid tissues. Conclusion: Incidental parathyroidectomy was common in thyroid surgeries in this study. Although transient hyperparathyroidism had a high percentage, the permanent hypoparthyoidism was extremely low. Further studies are needed to correlate the hypoparathyroidisim with positive parathyroid tissues in thyroid specimens.***

Keywords: Specimen, Thyroidectomy, Parathyroid, Tissue, Malignant

1. Introduction

Thyroidectomy is one of the most frequent operations performed in iodine - deficient regions [1, 2]. Thyroidectomy is typically associated with low morbidity if performed to identify and preserve parathyroid glands and laryngeal nerves. However, permanent or temporal dysfunction may result from these structures' conscious or unintentional sacrifice [3].

An incidental parathyroidectomy is a frequent event during thyroid surgery, occurring in 6.4% to 31.1% of cases [4 - 6]. Those rates have the potential to be decreased with a meticulous surgical technique. Still, the complete elimination of inadvertent removal of parathyroid tissue will depend on developing a system capable of identifying all the glands, including rare intrathyroidal tissues. Furthermore, the clinical significance of the incidental removal of a single gland is not apparent; the traditional idea that one well - perfused parathyroid gland may be sufficient for maintaining calcium homeostasis has yet to be rebutted [7].

2. Materials and Methods

Retrospective systemic review through EPIC data base system, for patient underwent Thyroid surgeries in Johns Hopkins Aramco Health care (JHAH), From January 2016 to December 2022, 526 patients recruited through EPIC data base system, with benign and malignant thyroid disorders underwent unilateral or bilateral thyroidectomy performed by experienced surgeons at otorhinolaryngology head and neck Surgery Unit.

Thyroidectomy was performed under general anesthesia via a transverse cervical incision. All surgeons performed the procedure similarly by using a careful subcapsular dissection technique and attempting to identify and preserve the parathyroid glands and recurrent laryngeal nerves. A particular effort was made to avoid injury to and devascularization of the parathyroid glands. All resected thyroid specimens were carefully examined intraoperatively to identify the presence of parathyroid tissue. Incidentally removed parathyroid glands were autotransplant immediately; these cases were not included in the present study.

The histopathological parameters of each patient were blindly determined by one co - author specializing in thyroid and parathyroid pathology. All pathologic slides of inadvertently removed parathyroid glands within the submitted thyroid specimen were reviewed for their presence, number, and location (extrathyroidal, intrathyroidal, or intracapsular). Histopathological features of the removed parathyroid glands were also evaluated.

Including Criteria:

- Surgery done in JHAH.
- Full Histopathological examination performed

Excluding Criteria:

- Surgery outside JHAH.
- Immediate auto- transplant of parathyroid gland during the surgery.

3. Results

A total of 526 specimens of patients who underwent thyroidectomies in the department were included in the study between the periods of 2016 to 2022.330 (62.7%), were benign specimens. On the other hand, 196 (37.3%) were malignant (Table 1, Figure 1).

A total of 129 (39%) parathyroid tissues were detected among the thyroid specimens out of 330 specimens, and 58

(29.6%) of them were in detected in malignant thyroid tissues out of 196 malignant thyroid specimens. (Table 2, Figure 2).

260 specimens were from total thyroidectomy surgeries; more than half of them, 138 (53.1%), were malignant, and 122 (46.9%) were benign.111 patients had temporary hypoparathyroidism, 58 (52.3%) of them have malignant histopathological results. Only three continue to have persistent hypoparathyroidisimater 6 months and considered to have permanent hypothyroidism, and all of them were malignant (Table 3, Figure 3). The high percentage of incindntal parathyroid tissue detection was in 2018 and then the curve of percentage was improving starting from 2020.

Table 4 and Figure 4 show the incidence of hypoparathyroidism in relation to parathyroid tissue numbers in the final specimen. In most temporary hypoparathyroidism, 73 (65.8%) hadn't parathyroid tissue in their specimens, 30 had one parathyroid tissue, 7 had two parathyroid tissues, and only one specimen had three tissues. Regarding permanent hypoparathyroidism, despite the absence of the parathyroid specimen two patients had permanent hypoparathyroidism, and the last patient with permanent hypoparathyroidism had three parathyroid tissues.

Table 1: The incidence of benign and malignant thyroid specimens between 2016 and 2022

	2016	2017	2018	2019	2020	2021	2022	Whole period
Benign Specimens	41	63	53	46	46	38	43	330 (62.7%)
Malignant Specimens	17	23	32	33	32	26	33	196 (37.3%)
Total Specimens	58	86	85	79	78	64	76	526

Figure 1: Distribution of thyroid malignancy between 2016 and 2022

Table 2: The incidence of parathyroid tissue in benign and malignant thyroid specimens between 2016 and 2022

	2016	2017	2018	2019	2020	2021	2022	Whole period
Parathyroid tissue	10	23	29	25	19	7	16	129
Parathyroid with malignancy	5	10	15	11	8	3	6	58

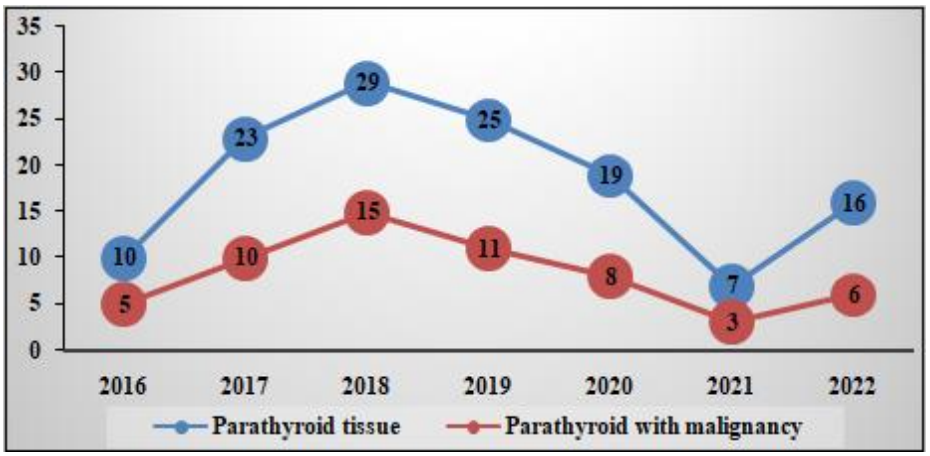

Figure 2: Distribution of parathyroid malignancy in the final histopathological specimen between 2016 and 2022.

Table 3: The incidence of hypoparathyroidism in total thyroidectomy surgeries

	Total Thyroidectomy (TT)	Tarnisent Hypoparathyroidism	Permanent Hypoparathyroidism
Number	260	111 (42.7%)	3 (1.2%)
Malignant	138 (53.1%)	58 (52.3%)	3 (100%)
Benign	122 (46.9%)	53 (47.7%)	0 (0%)

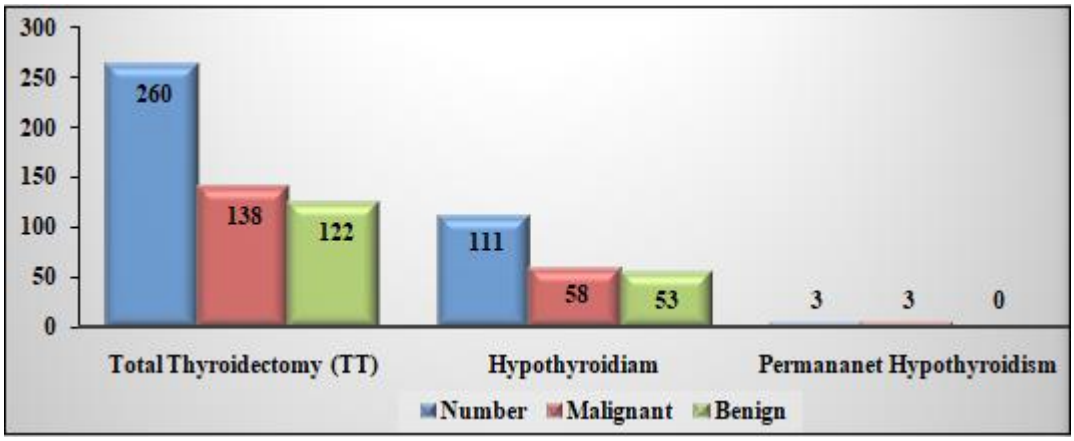

Figure 3: Incidence of hypoparathyroidism in total thyroidectomy surgeries

Table 4: Incidence of hypoparathyroidism in relation to parathyroid tissue numbers in the final specimen

	Hypoparathyroidism	Permanent hypoparathyroidism
0	73	2
1	30	0
2	7	0
3	1	1
4	0	0

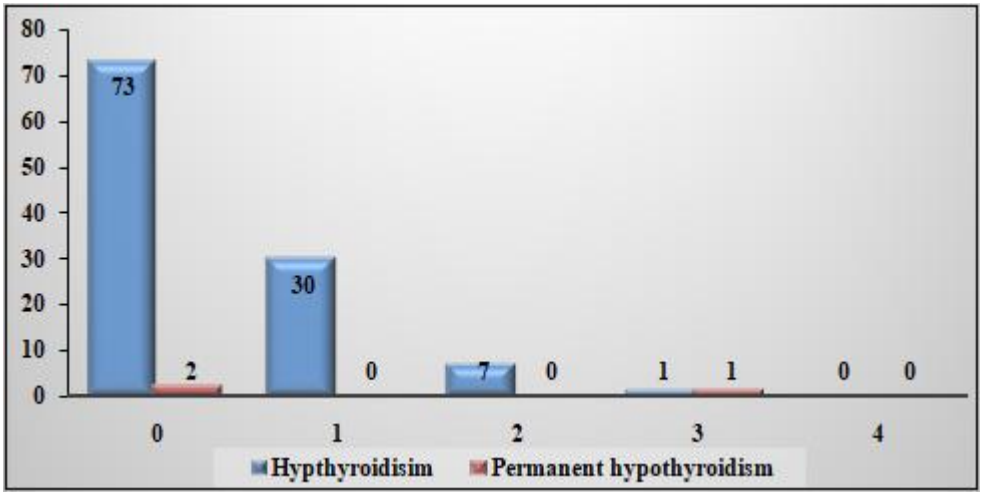

Figure 4: Correlation of hypoparathyroidism in relation to parathyroid tissue numbers in the final specimen

4. Discussion

It is essential to preserve the parathyroid glands and their vascular supply during thyroid surgery to avoid hypoparathyroidism. However, despite meticulous care, parathyroid glands are occasionally found in surgical specimens [8]. Herein we aim to study the prevalence of parathyroid tissues in thyroid specimens obtained after thyroidectomy surgeries.

The incidence rate of inadvertent parathyroidectomy during thyroid surgery in literature showing significant variation (6.4% to 31.1%) In a comparison to a previous study in which it was done in Saudi Arabia, aretrospective study was conducted in two tertiary care hospitals in Riyadh, Saudi Arabia, the final result showed the incidence of IP was 23 [9], and in our study was 24.5%. It is clearly obvious that the presence of the parathyroid tissue showing descending curve which mostly related to surgeons learning curve [4 - 6].

Postoperative hypothyroidism is a significant complication after thyroid disorders surgeries and appeared in 32.8% of the cases in the series reported by De Carlucci et al. [10]. Transient hypoparathyroidism incidence has been estimated to range from 6.9% to 46% [11 - 13], and permanent hypotparahyroidism from 0.4% to 33% [11, 14 - 16]; nevertheless, it depends on the patient's follow - up interval and their investigators in how they define the time to consider it permanent hypoparathyroidism [17]. Regarding our specimens, the incidence of transient hypoparathyroidism was 42.7%, while the incidence of permanent hypoparathyroidism was found in (1.2%).

Most hypoparathyroidism 73 (65.8%) hadn't parathyroid tissue in their specimens. Most previous studies correlated the incidence of hypoparathyroidism with parathyroid tissue in their specimens, not hypoparathyroidism with parathyroid tissue in their specimens. So, this point needs more studies to detect it certainly.

5. Conclusion

Incidental parathyroidectomy was common in thyroid surgeries in this study. Although transient hypoparathyroidism had a high percentage, the permanent hypoparthyoidism was extremely low. Further studies are needed to correlate the hypoparathyroidisim with positive parathyroid tissues in thyroid specimens.

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