Is local resection sufficient for parathyroid carcinoma?

Salim Ilksen Basceken,¹ Volkan Genc,² Siyar Ersoz,³ Yusuf Sevim,⁴ Suleyman Utku Celik,² Ilknur Kepenekci Bayram²
¹General Surgery, Islahiye State Hospital, Gaziantep, Turkey. ²Ankara University Medical School, Department of General Surgery, Ankara, Turkey. ³Ankara Numune Training and Research Hospital, Department of General Surgery, Ankara, Turkey. ⁴General Surgery, Ankara Penal Institution Campus State Hospital, Ankara, Turkey.

OBJECTIVES: Parathyroid carcinoma is a rare malignant disease of the parathyroid glands that appears in less than 1% of patients with primary hyperparathyroidism. In the literature, the generally recommended treatment is en bloc tumor excision with ipsilateral thyroid lobectomy. Based on our 12 years of experience, we discuss the necessity of performing thyroid lobectomy on parathyroid carcinoma patients.

RESULTS: Eleven parathyroid carcinoma cases were included in the study. All operations were performed at the Department of Endocrine Surgery at Ankara University Medical School. Seven of the patients were male (63.6%), and the mean patient age was 48.9 ± 14.0 years. Hyperparathyroidism was the most common indication for surgery (n = 10, 90.9%). Local disease was detected in 5 patients (45.5%), invasive disease was detected in 5 patients (45.5%) and metastatic disease was detected in 1 patient (9.1%). The mean follow-up period was 99.6 ± 42.1 months, and the patients' average disease-free survival was 96.0 ± 49.0 months. During the follow-up period, only 1 patient died of metastatic parathyroid carcinoma.

CONCLUSION: Parathyroid carcinoma has a slow-growing natural progression, and regional lymph node metastases are uncommon. Although our study comprised few patients, it nevertheless showed that in selected cases, parathyroid carcinoma could be solely treated with parathyroidectomy.

KEYWORDS: Parathyroid; Carcinoma; Surgery; Thyroid Lobectomy.

INTRODUCTION

Parathyroid carcinoma is a rare parathyroid gland malignancy, accounting for less than 1% (1) of primary hyperparathyroidism cases. Although extremely high blood calcium levels may indicate parathyroid carcinoma (2), it is usually diagnosed through detailed pathological analysis after surgery. Currently, surgery is the only effective and curative treatment for parathyroid carcinoma. The goal of the surgery (3) is to remove the tumor en bloc with any adherent tissue and enlarged lymph nodes as well as the ipsilateral thyroid lobe. In this study, based on our 12 years of experience, we discuss the necessity for performing a thyroid lobectomy in cases of parathyroid carcinoma.

MATERIALS AND METHODS

Eleven patients diagnosed with parathyroid carcinoma between 2000 and 2012 were included in our study.

Demographics, previous neck surgery history, parathyroidectomy indications, surgery type, disease duration, follow-up periods, disease-free survival, pathological findings, and metastatic disease presence were retrospectively evaluated.

RESULTS

Of the 522 patients who underwent parathyroid surgery at the Department of Endocrine Surgery at Ankara University Medical School, 11 had parathyroid carcinoma (a 2.1% ratio). The patient demographic data are provided in Table 1.

The mean patient age was 48.9 ± 14.0 years. Seven of the patients were male (63.6%), and the mean age of the male patients was 53.3 ± 12.0 years. The mean age of the female patients was 41.3 ± 15.7 years. Two of the patients had undergone a previous thyroidectomy (18.2%). Although hyperparathyroidism was the most common indication for surgery (n = 10, 90.9%), suspected parathyroid carcinoma (n = 3), papillary thyroid carcinoma (PTC) (n = 2), and nodular goiter (n = 1) were also indications for the surgery (Table 1).

Parathyroidectomy was performed on each patient. The surgical procedures and pathological analysis results are shown in Table 2. Frozen sections were obtained from 5 patient samples, revealing suspected malignancy in 4 patients and parathyroid cancer in 1 patient. Parathyroidectomy was used as a stand-alone procedure in 5 patients;
Table 1 - Demographic features and indications for surgery of parathyroid carcinoma patients.

| Mean age (y)          | 48.9 ± 14 |
|-----------------------|-----------|
| Male (n = 7)          | 53.3 ± 12 |
| Female (n = 4)        | 41.3 ± 15.7 |

| Gender               |          |
|----------------------|----------|
| Male                 | 63.5%    |
| Female               | 36.4%    |

| Indications for parathyroidectomy (n, %) |
|-----------------------------------------|
| Hyperparathyroidism                      | 10 (90.9%) |
| Suspected parathyroid carcinoma         | 2 (18.2%)  |
| Papillary thyroid carcinoma             | 2 (18.2%)  |
| Nodular goiter                          | 1 (9.1%)   |

Table 2 - Surgical procedures and pathological diagnoses.

| Surgical procedures                                      | Number of patients (%) |
|----------------------------------------------------------|------------------------|
| Parathyroidectomy (stand-alone procedure)                | 5 (45.5%)              |
| Parathyroidectomy + Thyroid lobectomy                    | 1 (9.1%)               |
| Parathyroidectomy + Thyroid lobectomy + Unilateral central lymph node dissection | 2 (18.2%) |
| Parathyroidectomy + Total thyroidectomy                  | 1 (9.1%)               |
| Parathyroidectomy + Total thyroidectomy + Central lymph node dissection | 2 (18.2%) |

| Pathological diagnoses |          |
|------------------------|----------|
| Parathyroid carcinoma  | 11 (100%)|
| Nodular goiter         | 1 (9.1%) |
### Table 3 - Patient characteristics.

| Patient | Age | Previous operation | Indications for parathyroidectomy | Frozen section | Surgical treatment | Extent of disease | Pathological findings | Follow-up period (months) |
|---------|-----|-------------------|-----------------------------------|---------------|-------------------|-------------------|----------------------|--------------------------|
| 1       | 42  | None              | HPT, nodule goiter                | Suspected malignancy | Thyroid lobectomy, parathyroidectomy, and central lymph node dissection | Invasive | Nodular goiter and locally invasive parathyroid carcinoma | 139                      |
| 2       | 36  | None              | HPT, parathyroid carcinoma        | Malignant       | TT, parathyroidectomy, and central lymph node dissection | Metastatic | Invasive parathyroid carcinoma | 37                       |
| 3       | 64  | None              | HPT                               | None            | Parathyroidectomy | Local             | Parathyroid carcinoma | 149                      |
| 4       | 37  | None              | PTC, suspected parathyroid carcinoma | Suspected malignancy | TT, parathyroidectomy, and central lymph node dissection | Invasive | PTC and invasive parathyroid carcinoma | 138                      |
| 5       | 19  | None              | HPT                               | None            | Parathyroidectomy | Local             | Parathyroid carcinoma | 79                       |
| 6       | 56  | None              | HPT                               | Suspected malignancy | Thyroid lobectomy and parathyroidectomy | Local | Parathyroid carcinoma | 134                      |
| 7       | 56  | None              | HPT                               | Suspected malignancy | Thyroid lobectomy, parathyroidectomy and central lymph node dissection | Invasive | Invasive parathyroid carcinoma | 140                      |
| 8       | 65  | None              | HPT, PTC                          | None            | TT and parathyroidectomy | Local             | Papillary thyroid carcinoma and parathyroid carcinoma | 83                       |
| 9       | 54  | TT                | HPT                               | None            | Parathyroidectomy | Invasive | Parathyroid carcinoma | 86                       |
| 10      | 59  | TT                | HPT                               | None            | Parathyroidectomy | Invasive | Parathyroid carcinoma | 36                       |
| 11      | 50  | None              | HPT                               | None            | Parathyroidectomy | Local             | Parathyroid carcinoma | 75                       |

HPT: hyperparathyroidism, TT: total thyroidectomy, PTC: papillary thyroid carcinoma.

### Author Contributions

Genc V and Bayram IK designed the study, Basceken SI and Celik SU acquired the data. Sevim Y, Genc V, Bayram IK, and Basceken SI analyzed and interpreted the data. Sevim Y, Ersöz S, and Basceken SI drafted the manuscript. Sevim Y, and Basceken SI designed the study. Basceken SI et al. offered critical revisions.

### References

1. Yip L, Seethala RR, Nikiforov MN, Nikiforov YE, Ogilvie JB, Carty SE, et al. Loss of heterozygosity of selected tumor suppressor genes in parathyroid carcinoma. Surgery. 2008;144(6):949-55. [http://dx.doi.org/10.1016/j.surg.2008.08.030](http://dx.doi.org/10.1016/j.surg.2008.08.030).

2. Givi B, Shah JP. Parathyroid carcinoma. Clin Oncol (R Coll Radiol). 2010;22(6):498-507. [http://dx.doi.org/10.1016/j.jconcl.2010.04.007](http://dx.doi.org/10.1016/j.jconcl.2010.04.007).

3. Digonnet A, Carlier A, Willems E, Quiriny M, Dekeyser C, de Saint Aubain N, et al. Parathyroid carcinoma: a review with three illustrative cases. J Cancer. 2011;2:532-7. [http://dx.doi.org/10.7150/jca.2.532](http://dx.doi.org/10.7150/jca.2.532).

4. Schaapveld M, Jorna FH, Aben KK, Haak HR, Plukker JT, Links TP. Incidence and prognosis of parathyroid gland carcinoma: a population-based study in The Netherlands estimating the preoperative diagnosis. Am J Surg. 2011;202(5):590-7. [http://dx.doi.org/10.1016/j.amjsurg.2010.09.025](http://dx.doi.org/10.1016/j.amjsurg.2010.09.025).

5. Mittendorf EA, McHenry CR. Parathyroid carcinoma. J Surg Oncol. 2005;89(3):136-42. [http://dx.doi.org/10.1002/(ISSN)1096-9098](http://dx.doi.org/10.1002/(ISSN)1096-9098).

6. Wei CH, Harari A. Parathyroid carcinoma: update and guidelines for management. Curr Treat Options Oncol. 2012;13(1):11-23. [http://dx.doi.org/10.1007/s11864-011-0171-3](http://dx.doi.org/10.1007/s11864-011-0171-3).

7. Shane E. Clinical review 122: Parathyroid carcinoma. J Clin Endocrinol Metab. 2001;86(2):485-93. [http://dx.doi.org/10.1210/jcem.86.2.7207](http://dx.doi.org/10.1210/jcem.86.2.7207).

8. Hakkim AG, Esselstyn CB Jr. Parathyroid carcinoma: 50-year experience at The Cleveland Clinic Foundation. Cleve Clin J Med. 1993;60(4):331-5. [http://dx.doi.org/10.1094/ccjm.1993.60.4.331](http://dx.doi.org/10.1094/ccjm.1993.60.4.331).

9. Duhney WC, Bodenner D, Stack BC Jr. Parathyroid carcinoma. Otolar-yngol Clin North Am. 2010;43(2):441-53. [http://dx.doi.org/10.1016/j.otc.2010.01.011](http://dx.doi.org/10.1016/j.otc.2010.01.011).

10. Gao WC, Ruan CP, Zhang JC, Liu HM, Xu XY, Sun YP, et al. Nonfunctional parathyroid carcinoma. J Cancer Res Clin Oncol. 2010;136(7):969-74. [http://dx.doi.org/10.1007/s00432-009-0740-z](http://dx.doi.org/10.1007/s00432-009-0740-z).

11. Wilkins BJ, Lewis JS Jr. Non-functional parathyroid carcinoma: a review of the literature and report of a case requiring extensive surgery. Head Neck Pathol. 2009;3(2):140-9. [http://dx.doi.org/10.1007/s12105-009-0115-4](http://dx.doi.org/10.1007/s12105-009-0115-4).

12. Schulte KM, Talat N, Miell J, Schultz PN, El-Naggar AK, Clayman GL, et al. Parathyroid carcinoma: a 43-year outcome and survival analysis. J Cancer Res Clin Oncol. 2011;136(7):969-74. [http://dx.doi.org/10.1007/s00432-009-0740-z](http://dx.doi.org/10.1007/s00432-009-0740-z).

13. Hindahl SA, Fleming ID, Fremgen AM, Menck HR. Two hundred eighty-six cases of parathyroid carcinoma treated in the US between 1985–1995. Cancer. 1999;86(3):538-44. [http://dx.doi.org/10.1002/(ISSN)1097-0142](http://dx.doi.org/10.1002/(ISSN)1097-0142).

14. Busaidy NL, Jimenez C, Habra MA, Schulz PN, El-Naggar AK, Clayman GL, et al. Parathyroid carcinoma: a 43-year experience. Head Neck. 2004;26(8):716-26. [http://dx.doi.org/10.1002/(ISSN)1097-0347](http://dx.doi.org/10.1002/(ISSN)1097-0347).

15. Harari A, Waring A, Fernandez-Ranvier G, Hwang J, Suh I, Mittmaker E, et al. Parathyroid carcinoma: a 43-year outcome and survival analysis. J Clin Endocrinol Metab. 2011;96(12):3679-86. [http://dx.doi.org/10.1210/jc.2011-1571](http://dx.doi.org/10.1210/jc.2011-1571).

16. Schulte KM, Talat N, Galata G, Gilbert J, Miell J, Hofbauer LC, et al. Oncologic resection achieving r0 margins improves disease-free survival in parathyroid cancer. Ann Surg Oncol. 2014;21(6):1891-7. [http://dx.doi.org/10.1245/s10434-014-3530-z](http://dx.doi.org/10.1245/s10434-014-3530-z).