



Abscopal effect in a patient with solitary extramedullary plasmacytoma of the thyroid: case report

Mariko Aoyama¹, Takashi Shono², Tomohiro Inui¹, Naoki Miyamoto¹, Shinichi Sakamoto¹, Seiya Inoue¹, Satoshi Fujiwara¹, Masakazu Goto¹, Hiroaki Toba¹, Hiromitsu Takizawa¹

¹Department of Thoracic, Endocrine Surgery and Oncology, Institute of Health, Biosciences, The University of Tokushima, Tokushima, Japan;

²Department of Surgery, Tokushima Red Cross Hospital, Tokushima, Japan

Correspondence to: Mariko Aoyama. Department of Thoracic, Endocrine Surgery and Oncology, Institute of Health, Biosciences, The University of Tokushima, 3-18-15, Kuramoto-cho, Tokushima 770-8509, Japan. Email: aoyama.mariko@tokushima-u.ac.jp.

Background: The abscopal effect is a systemic antitumor response that occurs distant to the irradiation site and is induced by local irradiation. We herein describe a case of solitary extramedullary plasmacytoma (SEP) of the thyroid in which bone metastases disappeared after thyroidectomy and cervical radiotherapy (RT).

Case Description: A 68-year-old man with a right cervical swelling for approximately 10 years visited a hospital with left elbow pain that persisted for 5 months. He was referred to our hospital for more detailed examinations and treatment. An immobile mass of approximately 10 cm in diameter was palpable on the right side of the patient's neck. Computed tomography (CT) showed osteolytic changes in the left humerus and right scapula, and a tumor in the right lobe of the thyroid gland. The patient was diagnosed with widely invasive follicular carcinoma and multiple bone metastases and underwent total thyroidectomy. During surgery, tumor infiltration into the trachea was observed. Shaving between the tumor and trachea was performed. Based on the results of a pathological examination, the patient was diagnosed with primary extramedullary plasmacytoma of the thyroid. After surgery, external beam RT was performed on the neck, which also reduced the pain in the left elbow. Positron emission tomography (PET)-CT showed the decreased accumulation of fluorodeoxyglucose (FDG) in the left humerus and right scapula, and the amelioration of osteolytic changes on CT.

Conclusions: SEP of the thyroid is rare, and to the best of our knowledge, this is the first case report in which the abscopal effect was observed after thyroidectomy and cervical RT.

Keywords: Primary solitary plasmacytoma of the thyroid; external beam radiotherapy (external beam RT); abscopal effect; case report

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Introduction

Solitary plasmacytoma (SP) is characterized by the local accumulation of monoclonal plasma cells in either bone or soft tissue (1). A plasma cell neoplasm in soft tissue is known as a solitary extramedullary plasmacytoma (SEP), and SEP of the thyroid is rare (1). We herein describe a patient with a thyroid tumor and multiple bone lesions in the arm due to SEP. Total thyroidectomy was performed and followed by cervical radiotherapy (RT). The attenuation of bone

lesions was noted and attributed to the abscopal effect. This is the first case report of SEP with the abscopal effect. We present the following article in accordance with the CARE reporting checklist (available at <https://tcr.amegroups.com/article/view/10.21037/tcr-22-1419/rc>).

Case presentation

A 68-year-old man with unremarkable medical and family histories had a swelling on the right side of the neck for

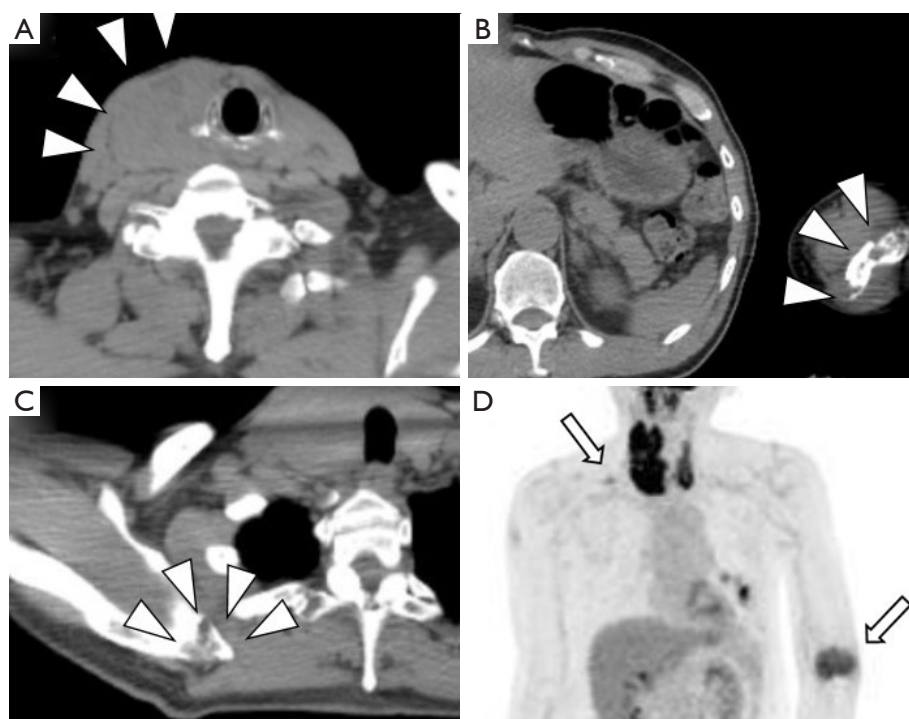


Figure 1 CT and PET-CT. CT showed a mass of approximately 10 cm in diameter in the right lobe of the thyroid gland (A; white triangles), and osteolytic changes in the left humerus (B; white triangles) and right scapula (C; white triangles). The accumulation of FDG was observed in these bones (D; white arrows). CT, computed tomography; PET, positron emission tomography; FDG, fluorodeoxyglucose.

approximately 10 years. Pain developed in the left elbow and persisted for 5 months and, thus, he visited a hospital. Computed tomography (CT) showed osteolytic changes at the end of the left humerus. The patient was referred to our hospital for a detailed examination with a diagnosis of a metastatic bone tumor.

In a physical examination, a poorly mobile mass was palpable on the right side of the neck. Ultrasonography of the neck showed a hypoechoic and internal non-uniform solid mass with a maximum diameter of 10 cm in the right lobe of the thyroid gland. There was no mass in the left lobe of the thyroid gland and no swollen lymph nodes. CT showed a mass of approximately 10 cm in diameter in the right lobe of the thyroid gland, which was present from supraclavicular fossa to mandible. The trachea was displaced to the left (*Figure 1A*). A mass was observed in the right lobe of the thyroid gland on positron emission tomography (PET)-CT, and the accumulation of fluorodeoxyglucose (FDG) with SUVmax of 12.6 was noted. The accumulation of FDG was also detected in the upper left arm with SUVmax of 5.7 and in the right scapula with SUVmax of 3.9, and CT showed osteolytic changes in these bones

(*Figure 1B-1D*). Laboratory data were as follows: thyroid-stimulating hormone (TSH), 3.15 mIU/L (normal 0.65–5.55 mIU/L); free T3, 5.07 pmol/L (normal 3.53–5.68 pmol/L); free T4, 0.10 pmol/L (normal 0.12–0.23 pmol/L); thyroglobulin (Tg), 58.94 pmol/L (normal 0.64–3.86 pmol/L); anti-Tg antibody titer, 1,380 IU/mL (normal <28.0 IU/mL). There were no laboratory data to indicate hypercalcemia, renal dysfunction, or anemia. In fine needle aspiration (FNA), it was difficult to distinguish between benign and malignant lesions. Core needle biopsy (CNB) was performed on the mass in the right lobe of the thyroid. A pathological examination showed the dense growth of small thyroid follicular cells. Their cell nuclei were large and no nuclear findings of papillary carcinoma were found. Biopsy of the right scapula was also performed and only inflammatory cells were detected. Therefore, the patient was diagnosed with widely invasive follicular thyroid carcinoma and multiple bone metastases.

He underwent total thyroid resection and cervical lymph node dissection from around the trachea to the outside of the right sternocleidomastoid muscle. During surgery, tumor infiltration into the trachea was observed. Shaving

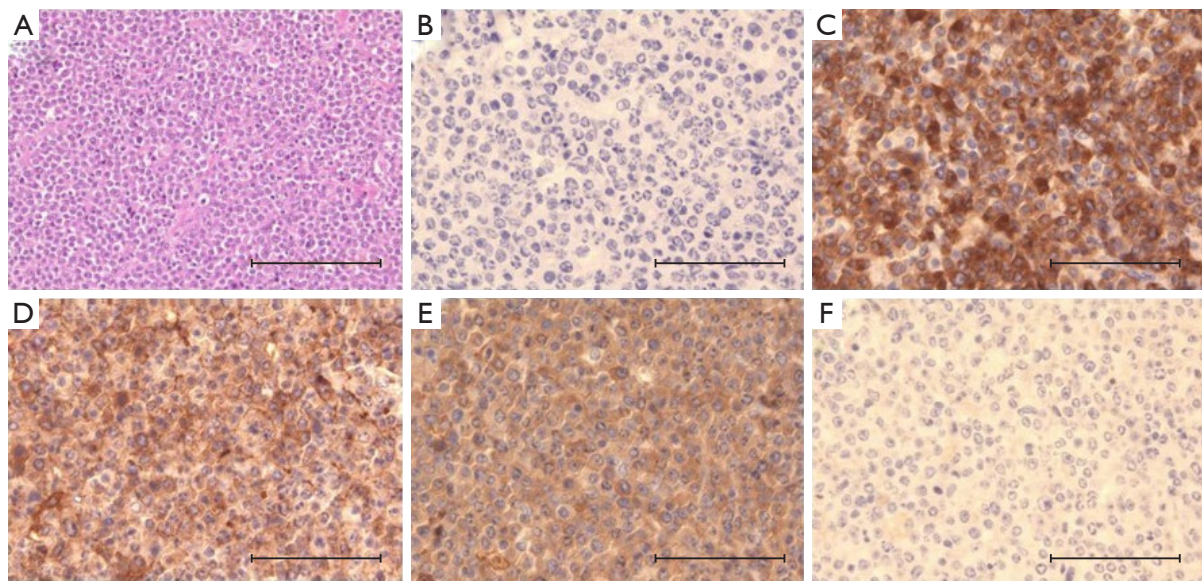


Figure 2 Postoperative pathological results. Staining method: (A) H&E stain, (B) CD20, (C) CD79a, (D) CD138, (E) κ , (F) λ . Magnification: $\times 200$, scale bar: 100 μm .

between the tumor and trachea was performed and the trachea was preserved. Postoperative pathological results revealed large, atypical cells with an uneven distribution of nuclei that had densely proliferated in the tumor area, and apoptosis and nuclei fission were also detected in many of these cells. An immunohistochemical analysis showed that tumor cells were positive for CD79a and CD138. The κ/λ ratio of tumor cells was significantly positive for κ , and monoclonal proliferation was observed (*Figure 2*). No atypical cells or monoclonal proliferation was noted in a bone marrow examination. The patient was diagnosed with SEP of the thyroid. Four weeks after the surgery, three-dimensional conformal RT (40 Gy/20 Fr) was performed on the neck because of the possibility of microscopic lesions remaining in the trachea. After the completion of RT, pain in the left elbow decreased. PET-CT showed a reduction in the accumulation of FDG in the left humerus and right scapula. The amelioration of osteolytic changes in these bones was also observed on CT (*Figure 3*).

Two years and 6 months have passed since the patient underwent surgery. He is being followed up without treatment and has no symptoms of recurrence.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent

was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

Plasma cell dyscrasia are mature B cell malignancies (2). SP accounts for less than 5% of plasma cell dyscrasia and is further subclassified as solitary bone plasmacytoma (SBP) or SEP depending on whether the site of involvement is bone or soft tissue (1,2).

SEP of the thyroid gland affects men and women equally at a mean age of 58.5 years (3). The presenting symptoms of SEP of the thyroid are a rapidly enlarging nodule, local compressive symptoms, and hoarseness (4). It is important to note that thyroid involvement may represent the first and/or only extramedullary manifestation during the course of multiple myeloma. Some patients initially present with apparent SEP at the time of the first clinical evaluation; however, further investigations reveal plasma cell tumors at other sites, particularly bone (4).

The diagnosis of SBP or SEP requires the biopsy-proven monoclonal plasma cell infiltration of a single lesion (2). FNA is generally performed to evaluate thyroid nodules. However, the diagnosis of SEP is typically not suspected

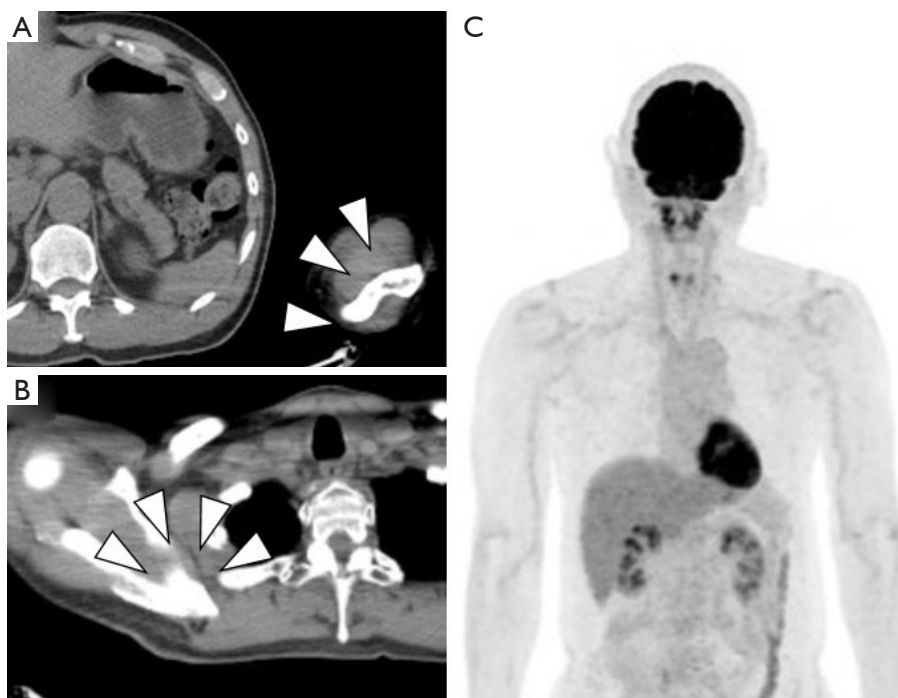


Figure 3 CT and PET-CT after thyroid surgery and radiation therapy to the neck. CT showed the attenuation of osteolytic changes in the left humerus (A; white triangles) and right scapula (B; white triangles). PET-CT showed a decrease in the accumulation of FDG in these bones (C). CT, computed tomography; PET, positron emission tomography; FDG, fluorodeoxyglucose.

or diagnosed before surgery. Furthermore, difficulties are associated with the cytological diagnosis of SEP of the thyroid (4).

In the present case, the thyroid tumor was diagnosed as follicular thyroid carcinoma by CNB before surgery. After surgery, an immunohistochemical analysis was performed, and SEP was diagnosed. Biopsy was also conducted on bone lesions, but did not result in a diagnosis. Bone lesions were attributed to the presence and progression of SEP in the thyroid gland.

After surgery on the thyroid lesion and RT to the neck, pain decreased in the left elbow. Furthermore, the amelioration of bone lesions in the arm was noted on PET-CT and CT. This clinical course was attributed to the abscopal effect.

The effects of RT are traditionally considered to be limited to the radiation field alone. However, the regression of tumors outside of the irradiated field has occasionally been reported, and was defined as the abscopal effect by Dr. Mole in 1953 (5). The ability of RT alone to affect distant lesions is rare and typically confined to case reports (6). Regarding the thyroid gland, there has only been one case

report of medullary carcinoma and none of plasmacytoma. The present case report is the first to describe the abscopal effect for SEP of the thyroid, which is considered to be very rare and valuable.

The abscopal effect is one of an antitumor immune response (7-9). Recent studies suggest that immunotherapy and radiation in combination may enhance the abscopal effect (7-9). SEP of the thyroid is often associated with Hashimoto thyroiditis (HT) (10). HT is one of the most common autoimmune disorders and is characterized by thyroid-specific autoantibodies (11). The present case had very high thyroid-related autoantibody positivity and, thus, was considered to have had Hashimoto's disease for a long time. Based on these findings, the background of a chronic autoimmune disease may be related to the development of SEP and the abscopal effect.

There is currently no standard treatment for SEP of the thyroid (1,2,4). Previous cases of SEP of the thyroid were treated by local surgery alone, local RT, and a combination of both (1-4). RT is the most common treatment for SEP because it is highly radiosensitive (1,2). Histologically, a local control rate of 94% has been reported with radiation

doses higher than 40 Gy, which is recommended (12,13). The surgical resection of plasmacytoma is generally not required because these malignancies are radiosensitive (2). On the other hand, surgery was previously shown to be effective for SEP of the thyroid (3). In patients with SEP of the thyroid, 98% were treated with surgery and 55% additionally received local RT (10). The present case did not exhibit any symptoms attributable to a tumor of the thyroid gland prior to surgery. If the patient had a preoperative diagnosis of SEP, RT alone may have been effective.

A rare case of SEP of the thyroid was presented herein. After excision of the primary thyroid lesion and RT to the neck, the attenuation of bone lesions was noted and attributed to the abscopal effect.

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at <https://tcr.amegroups.com/article/view/10.21037/tcr-22-1419/rc>

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the

patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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References

1. Wysocki MS, Weber K. Solitary Extramedullary Plasmacytoma of the Thyroid Gland in a Patient With Subclinical Hyperthyroidism. *AACE Clin Case Rep* 2021;7:303-6.
2. Pham A, Mahindra A. Solitary Plasmacytoma: a Review of Diagnosis and Management. *Curr Hematol Malig Rep* 2019;14:63-9.
3. Rubin J, Johnson JT, Killeen R, et al. Extramedullary plasmacytoma of the thyroid associated with a serum monoclonal gammopathy. *Arch Otolaryngol Head Neck Surg* 1990;116:855-9.
4. Avila A, Villalpando A, Montoya G, et al. Clinical features and differential diagnoses of solitary extramedullary plasmacytoma of the thyroid: a case report. *Ann Diagn Pathol* 2009;13:119-23.
5. Mole RH. Whole body irradiation; radiobiology or medicine? *Br J Radiol* 1953;26:234-41.
6. Abuodeh Y, Venkat P, Kim S. Systematic review of case reports on the abscopal effect. *Curr Probl Cancer* 2016;40:25-37.
7. Demaria S, Formenti SC. The abscopal effect 67 years later: from a side story to center stage. *Br J Radiol* 2020;93:20200042.
8. Lippert TP, Greenberg RA. The abscopal effect: a sense of DNA damage is in the air. *J Clin Invest* 2021;131:148274.
9. Liu Y, Dong Y, Kong L, et al. Abscopal effect of radiotherapy combined with immune checkpoint inhibitors. *J Hematol Oncol* 2018;11:104.
10. Kovacs CS, Mant MJ, Nguyen GK, et al. Plasma cell lesions of the thyroid: report of a case of solitary plasmacytoma and a review of the literature. *Thyroid*

- 1994;4:65-71.
11. Ralli M, Angeletti D, Fiore M, et al. Hashimoto's thyroiditis: An update on pathogenic mechanisms, diagnostic protocols, therapeutic strategies, and potential malignant transformation. *Autoimmun Rev* 2020;19:102649.
 12. Galièni P, Cavo M, Pulsoni A, et al. Clinical outcome of extramedullary plasmacytoma. *Haematologica* 2000;85:47-51.
 13. Mendenhall WM, Mendenhall CM, Mendenhall NP. Solitary plasmacytoma of bone and soft tissues. *Am J Otolaryngol* 2003;24:395-9.

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