Ⅱ. Case report

Ⅱ. 3 Hungry bone syndrome after parathyroid carcinoma resection: a case report

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Abstract

We report a case of hungry bone syndrome (HBS) following parathyroid carcinoma resection. The patient was a 72-year-old woman who presented with a 2-month history of general malaise. Her serum calcium and parathyroid hormone levels were high. Neck computed tomography and Technetium sestamibi scintigraphy revealed a functioning tumor in the lower left side of the thyroid gland. We performed transcervical tumor resection on the patient. The resected specimen measured 20 mm in diameter. Histopathological examination revealed capsular and vascular invasion of the tumor cells, and thus, parathyroid carcinoma was diagnosed. HBS occurred on postoperative day 5, as indicated by a very low level of serum calcium, the patient was administered needed calcium and vitamin D medication for a prolonged period of time. HBS is a complication of parathyroidectomy, and is characterized by an increase in bone metabolism and hypocalcemia. Early diagnosis and treatment of HBS may reduce the morbidity associated with parathyroid cancer resection. The parathyroid cancer is rare and it is challenging to make an accurate diagnosis preoperatively. We completely resected the tumor, and the patient has survived for 7 years with no evidence of disease. This case demonstrated that complete resection of parathyroid cancer can be curative.

Key words: hyperparathyroidism, primary/surgery, hypocalcemia/therapy, parathyroid neoplasms/pathology/surgery, parathyroidectomy/adverse effects, syndrome

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Introduction

Parathyroid cancer is a rare disease. One percent or fewer patients with primary hyperparathyroidism have parathyroid cancer[1]. Here, we describe a case of hungry bone syndrome (HBS) that occurred after successful parathyroidectomy for parathyroid cancer. This condition is caused by rapid bone remineralization resulting in hypocalcemia and requirement of calcium and vitamin D supplementation[2].

Case Report

A 72-year-old woman presented with a 2-month history of general malaise. Her medical history included hypertension. Her laboratory data showed high serum levels of calcium (Ca), alkaline phosphatase (ALP), and parathyroid hormone (PTH) (Table 1).

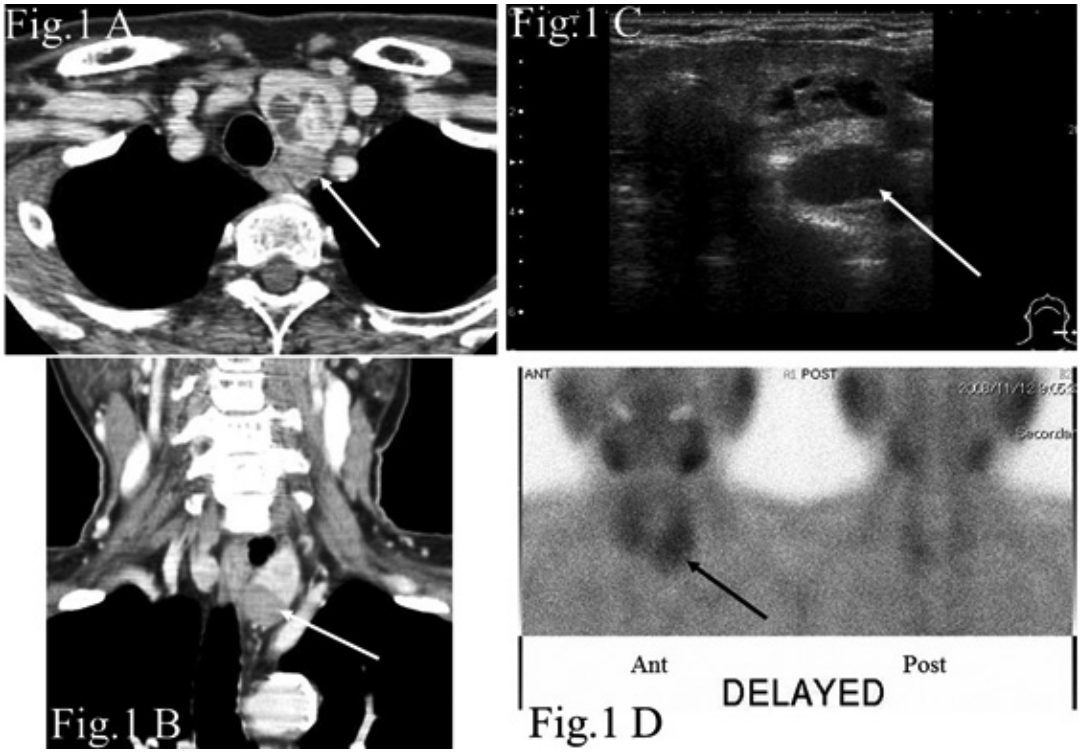

Fig. 1. Imaging

1A : Neck enhanced computed tomography (CT), axial section. 1B : Neck enhanced CT, coronal section. 1C : Ultrasonography. 1D : Technetium sestamibi scintigraphy. A tumor in the lower left side of the thyroid was shown with arrows

Neck enhanced computed tomography (Fig. 1A, 1B), ultrasonography (Fig. 1C), and technetium sestamibi scintigraphy (Fig. 1D) revealed a functioning tumor in the lower left side of the thyroid. The patient was diagnosed with primary hyperparathyroidism due to a parathyroid tumor.

Transcervical tumor resection was performed. The operation was completed without any complications. Postoperative histopathological examination revealed capsular and vascular invasion of the tumor cells, and thus, a parathyroid carcinoma was diagnosed (Fig. 2).

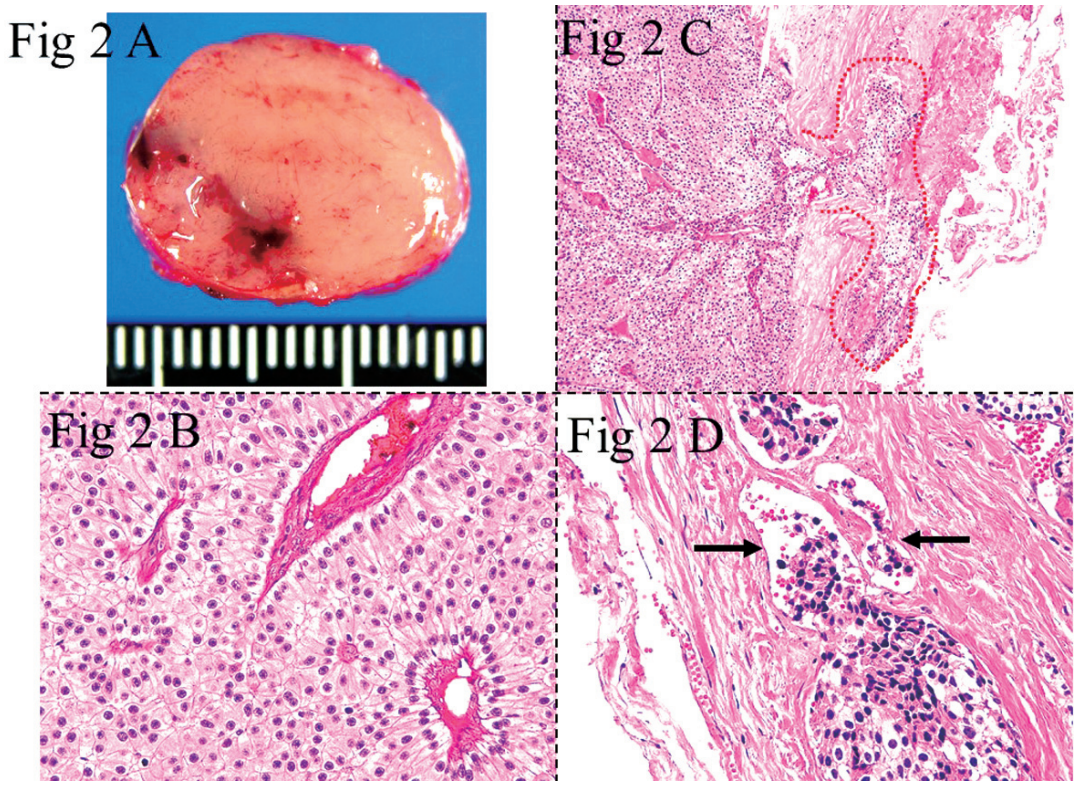

Fig. 2. Histopathological findings

2A：The resected parathyroid tumor was 20mm in diameter. In the sectioned surface, a soft homogenous lesion enclosed by a capsule was present. 2B：Neoplastic hyperplasia of the parathyroid gland cells was visible. The cells showed poor atypia, and mitotic figures were absent. 2C：The tumor cells showed capsular penetration (red dotted area). 2D：The tumor cells showed vascular invasion (black arrows). Panels 2B, 2C, and 2D represent images of hematoxylin and eosin-stained sections and are shown at 40× magnification.

On postoperative day (POD) 5, she complained of diarrhea and systemic bone pain, and development of HBS was observed. The serum Ca level was very low, and Ca carbonate and alfacalcidol were promptly administered to the patient. Her symptoms improved immediately, and she was discharged on POD 13. The patient required medication for a prolonged period (Table 1). The patient was alive with no evidence of disease (NED) for 7 years postoperatively.

Table 1. Clinical course, medication and serial determination of serum adjusted Ca (calcium), P (phosphorus), ALP (alkaline phosphatase) and iPTH (intact parathyroid hormone)

Factor	Reference range	Pre-op	1st POD	6th POD	8th POD	12th POD	20th POD	29th POD	43th POD	57th POD	132th POD	166th POD
Adjusted Ca (mg/dl)	8.7-11.0	14.4	11.2	7.4	7.1	7	6.9	7.4	8.5	8.3	9.5	8.8
P (mg/dl)	2.5-5.5	2	1.5	2.7	3.3	3.3	3.4	3.5	4	3.2	3.7	3.2
ALP (IU/L)	104-338	2342	1934			2285	1704	1109		745	425	323
iPTH (pg/dl)	10-65	2040	7	71			124	236	141	199	35	95
Diarrhea				++								
Systemic bone pain				+++	+							
Ca carbonate(g/d)				2	2	2	2	1.2	1.2	1.2	0.6	0
Alfacalcidol (μg/d)				4	4	4	4	4	2	1	1	0

Discussion

Parathyroid cancer: Parathyroid cancer is a rare disease, accounting for <1% of all cases of hyperparathyroidism[1]. According to the SEER (Surveillance Epidemiology, and End Results) database, the incidence of parathyroid cancer was 5.73 per 10 million people between 2000 and 2003[3] and it accounted for 0.005% of solid tumors[4]. The preoperative and intraoperative diagnosis of parathyroid cancer is difficult [3-6]. Surgical resection is the only curative treatment. The overall survival (OS) rates for parathyroid carcinoma are shown in Table 2 [3-7]. Our patient has been alive for 7 years after surgery with NED, and this shows that complete resection can be curative.

Table 2. Survival rate of patients with parathyroid cancer in the literature

Authors	Year	n	Institution or Data Base	5y-OS	10y-OS
Sandelin K[6]	1992	95	Swedish Cancer Registry	85.0%	70.0%
Hundahl SA[4]	1999	286	National Cancer Data Base (USA)	85.5%	49.5%
Munson ND[5]	2003	61	Mayo Clinic	76.5%	
Lee PK[3]	2007	224	SEER (USA)	83.9%	67.8%
Harari A[7]	2011	37	University of California	78.3%	66.7%

OS：Overall survival, SEER: Surveillance, Epidemiology, and End Results

Hungry bone syndrome: HBS is a consequence of parathyroidectomy that affects approximately 12% of the patients who underwent surgery[2]. Patients with HBS are associated with severe and prolonged hypocalcemia, and show tetany, spasms, bone pain, diarrhea, and heart arrhythmia as symptoms. In patients with hyperparathyroidism, hypercalcemia is mainly due to both increased bone turnover with predominant osteoclastic bone resorption and increased renal tubular reabsorption of Ca. After parathyroidectomy, the PTH stimulus is rapidly removed. The rate of ossification exceeds that of bone resorption. Therefore, the serum values of both Ca and phosphorus decrease[8]. Risk factors for developing HBS post-parathyroidectomy include older age, a large parathyroid adenoma, and high preoperative levels of serum Ca, serum PTH, serum ALP, and blood urea nitrogen[2]. HBS can be treated by the prompt administration of Ca and vitamin D [2,8]. There are some reports that suggest preoperative administration of bisphosphonates may prevent postoperative HBS after parathyroidectomy[9].

In summary, parathyroid cancer is rare, and its preoperative diagnosis is difficult. We resected a parathyroid cancer, and the patient has survived for 7 years with NED. This shows that complete resection can be curative. HBS occurred after parathyroid cancer resection. The symptoms improved owing to prompt treatment. These patients need medication for a prolonged period.

Footnote

Conflict of Interest Disclosure

Presenter's Name：Kazuo Kumoi

My presentation contains no clinical research and I have no conflict of interest to disclose.

References

1) Fujimoto Y, Obara T, Ito Y, et al: Surgical treatment of ten cases of parathyroid carcinoma: importance of an initial en bloc tumor resection. World J Surg 8：392－400, 1984

2) Brasier AR, Nussbaum SR: Hungry bone syndrome: clinical and biochemical predictors of its occurrence after parathyroid surgery. Am J Med 84：654－660, 1988

3) Lee PK, Jarosek SL, Virnig BA, et al, Trends in the incidence and treatment of parathyroid cancer in the United

States. Cancer 109: 1736－1741, 2007
4) Hundahl SA, Fleming ID, Fremgen AM, et al: Two hundred eighty-six cases of parathyroid carcinoma treated in the U.S. between 1985-1995: a National Cancer Data Base Report. The American College of Surgeons Commission on Cancer and the American Cancer Society. Cancer 86：538－544, 1999
5) Munson ND, Foote RL, Northcutt RC, et al: Parathyroid carcinoma: is there a role for adjuvant radiation therapy? Cancer 98：2378－2384, 2003
6) Sandelin K, Auer G, Bondeson L, et al: Prognostic factors in parathyroid cancer: a review of 95 cases. World J Surg 16：724－731, 1992
7) Harari A, Waring A, Fernandez-Ranvier G, et al: Parathyroid carcinoma: a 43-year outcome and survival analysis. J Clin Endocrinol Metab 96：3679－3686, 2011
8) Rathi MS, Ajjan R, Orme SM: A case of parathyroid carcinoma with severe hungry bone syndrome and review of literature. Exp Clin Endocrinol Diabetes 116：487－490, 2008
9) Lee IT, Sheu WH, Tu ST, et al: Bisphosphonate pretreatment attenuates hungry bone syndrome postoperatively in subjects with primary hyperparathyroidism. J Bone Miner Metab 24：255－258, 2006

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