

## Gallium-67 accumulation to the tumor thrombus in anaplastic thyroid cancer

Mana YOSHIMURA,\* Atsuo KAWAMOTO,\* Kenji NAKASONE,\* Dai KAKIZAKI,\*  
Hidemitsu TSUTSUI,\*\* Hiromi SERIZAWA\*\*\* and Kimihiko ABE\*

*Departments of \*Radiology, \*\*Surgery, and \*\*\*Pathology,  
Tokyo Medical University*

A sixty-five-year-old woman was hospitalized for examination of swelling in the left arm. Gallium-67 scintigraphy showed the same radioactivity in the left lobe of the thyroid gland and the junction of the internal jugular vein and the subclavian vein. Operation then proved obstruction of the left internal jugular vein and subclavian vein due to tumor thrombus accompanied by anaplastic thyroid cancer. Gallium-67 scintigraphy was extremely useful in grasping the extent and feature of the tumor.

**Key words:** gallium-67 scintigraphy, anaplastic cancer, thyroid cancer, tumor thrombus

### INTRODUCTION

TUMOR THROMBOSIS of large vessels are frequently observed in slow-growth-type tumors, such as tumor thrombus of portal vein or hepatic vein in hepatocellular carcinoma and tumor thrombus of a renal vein or inferior vena cava in renal cell carcinoma. Here, we present a case of tumor thrombus of internal jugular vein and subclavian vein associated with anaplastic thyroid cancer. Tumor thrombosis of large vessels in this disease is so rare that the preoperative diagnosis is very difficult. Color Doppler ultrasonography (US) and gallium-67 scintigraphy were extremely useful in grasping the extent and features of the tumor thrombus of anaplastic thyroid cancer.

### CASE REPORT

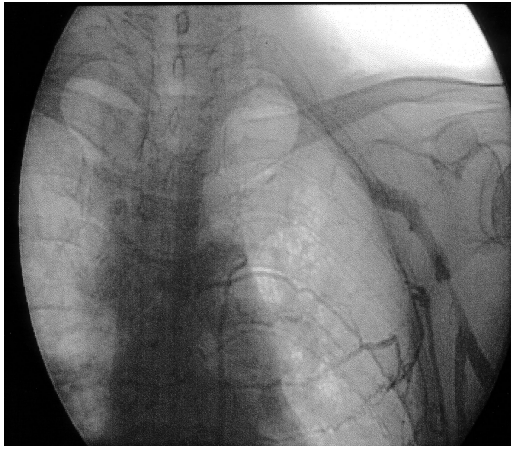
A 65-year-old woman had a main complaint of swelling in the left arm. She consulted a neighborhood hospital in November 2000. Since deep venous thrombosis (DVT) in

the left upper limb or thoracic outlet syndrome was suspected, she was referred to the Department of Vascular Surgery of our hospital for a thorough examination and treatment. When she presented, her left arm was swollen to its periphery with a cyanotic tone, and subcutaneous varicosis in the region was observed. At the age of 37, she had received isotope treatment with I-131 for Basedow's disease. Subsequently, she suffered from late hypothyroidism and was taking oral L-thyroxine. On venography, complete obstruction was observed from the distal subclavian vein, complicated by bypass formation (Fig. 1). DVT of the left subclavian vein was diagnosed and systemic anticoagulant treatment for the thrombus was administered. There was no remarkable abnormality in biochemical values except for a mild increase in LDH. For further investigations, CT and US were performed. The CT findings showed a mass lesion in the enlarged left lobe of the thyroid gland and expansion of the internal jugular vein and subclavian vein with no enhancement (Fig. 2). And the US showed these vessels to be filled with solid echo, suggesting a thrombus. Color Doppler US showed a blood flow signal in the thyroid node and the solid portion in the vessels (Fig. 3). So anaplastic thyroid cancer with tumor thrombus was suspected. But tumor thrombus is atypical in anaplastic thyroid cancer, and so MRI and gallium-67 scintigraphy<sup>1</sup> were performed to confirm the diagnosis. Gallium accumulation was

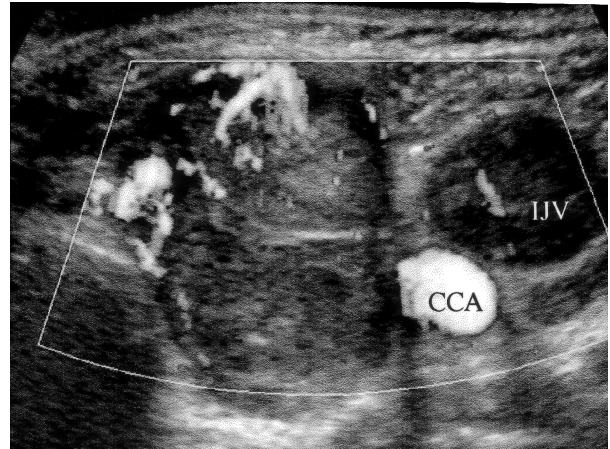
Received January 28, 2003, revision accepted September 1, 2003.

For reprint contact: Mana Yoshimura, M.D., Department of Radiology, Tokyo Medical University, Nishi-shinjuku 6-7-1, Shinjuku-ku, Tokyo 106-0023, JAPAN.

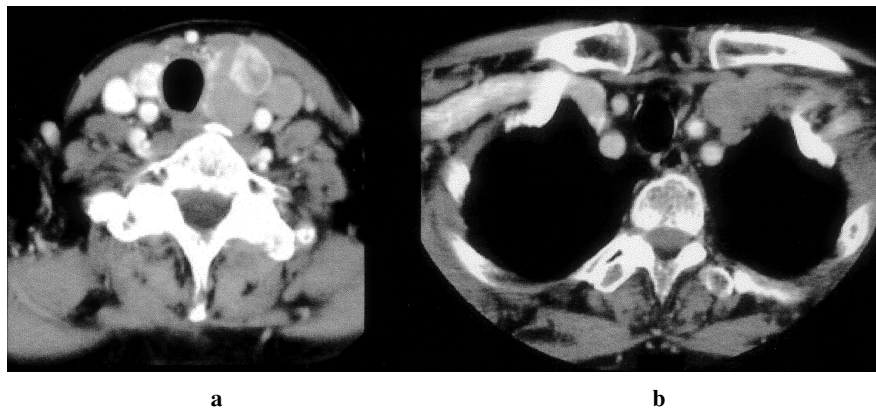
E-mail: mana@za2.so-net.ne.jp



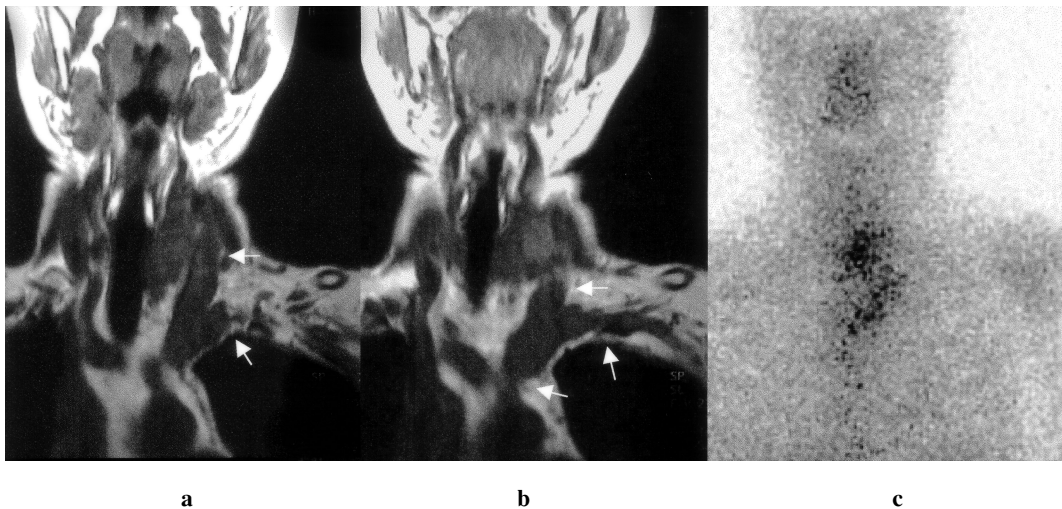
**Fig. 1** On venography, a complete obstruction was observed from the distal subclavian vein, complicated by bypass formation.



**Fig. 3** Color-Doppler US showed blood flow signal in the thyroid node and the left internal jugular vein.



**Fig. 2** CT showed that the left lobe of the thyroid gland was enlarged and occupied by an irregularly shaped nodular lesion (a). Left internal jugular vein (a) and the subclavian vein (b) were expanded and had no enhancement.



**Fig. 4** MRI T1 weighted coronal image (a, b) showed enlargement of the left lobe of the thyroid gland and expansion of the left internal jugular vein and the subclavian vein. Gallium-67 scintigraphy (c) demonstrated the same radioactivity in the left lobe and junction of the internal jugular vein and subclavian vein, suggesting anaplastic thyroid cancer complicated by tumor thrombus.

recognized on the same region which was detected in the MRI T1-weighted coronal image, i.e. the left lobe of the thyroid gland and the junction of the internal jugular vein and subclavian vein (Fig. 4a, b, c). Then the patient was transferred to the Department of Breast and Endocrine Surgery, where she received a total thyroidectomy and a peritracheal dissection on January 2001. The obstruction observed on the image was revealed to be tumor, and was diagnosed as anaplastic cancer with a giant cell type. Expansion of the tumor thrombus was observed in the internal jugular vein and the proximal side of the lt. subclavian vein. No mass was palpable distal to it in the operation. After the surgery, external irradiation at a dose of 20 Gy and 6 courses of an chemotherapy (carboplatin & paclitaxel) were administered. The patient is alive and well 16 months after the surgery.

## DISCUSSION

Although there are many cases of thyroid cancer accompanied by infiltration to lymphatic and blood vessels, cases of thyroid cancer with tumor thrombus seem to be rare.<sup>2</sup> Onaran et al. reported only 3 such cases (1.5%) out of 204 cases of thyroid cancer that received surgery.<sup>3</sup> Thompson et al. reported a case of SVC syndrome in which carcinoma extended from the right lobe of the thyroid gland. These reports all referred to differentiated thyroid cancer. As for anaplastic thyroid cancer with tumor thrombus, there is no case report. Generally speaking, it is considered to be difficult to diagnose tumor thrombus preoperatively. In this case, however, color Doppler US and gallium-67 scintigraphy were capable of diagnosing the tumor thrombus rapidly and accurately. As for the extent of the tumor thrombus, venography cannot estimate the proximal end and might overestimate the distal end. On the other hand, gallium-67 scintigraphy might underestimate the mass size because of its low resolution. CT and MRI cannot differentiate the tumor from thrombus. Use of the combination imaging of gallium-67 scintigraphy and CT or MRI might solve this problem. Moreover, PET imaging might depict the thy-

roid cancer more accurately.<sup>4</sup>

Many thyroid cancers subjected to irradiation are papillocarcinomas, follicular carcinomas, or a mixture thereof, while only a few are undifferentiated carcinomas.<sup>5,6</sup> In this case, dormant malignant change of follicular carcinoma might have been present for a long time, because a component of follicular carcinoma was partly observed. There are two probable causes for this. First, irrespective of external or internal irradiation, the essential mechanism for developing carcinoma is that increased irradiation dose causes diminishing of the gland and decreased metabolism resulting in the possibility that a tumor that developed will not disappear. The second, an irradiation with a high dose induces hypothyroidism, and this causes a prolonged high value TSH for a long period. This situation might become a hotbed of a carcinoma development.

We reported a case of anaplastic thyroid cancer with tumor thrombus, which occurred after irradiation. Gallium-67 scintigraphy was extremely useful in making the preoperative diagnosis.

## REFERENCES

1. Higashi T, Ito K, Nishikawa Y, Everhart FR Jr, Ozaki O, Manabe Y, et al. Gallium-67 imaging in the evaluation of thyroid malignancy. *Clin Nucl Med* 1988; 13: 792–799.
2. Thomas S, Sawhney S, Kapur BM. Case report: Bilateral massive internal jugular vein thrombosis in carcinoma of the thyroid: CT evaluation. *Clin Radiol* 1999; 43: 433–434.
3. Onaran Y, Terzioglu T, Oguz H, Kapran Y, Tezelman S. Great cervical vein invasion of thyroid carcinoma. *Thyroid* 1998; 8: 59–61.
4. Lind P, Kuming G, Matschnig S, Heinisch M, Gallowitsch HJ, Mikosch P, et al. The role of F-18 FDG PET in thyroid cancer. *Acta Medica Austriaca* 2000; 27: 38–41.
5. Granter SR, Cibas ES. Cytologic findings in thyroid nodules after <sup>131</sup>I treatment of hyperthyroidism. *Am J Clin Pathol* 1997; 107: 20–25.
6. Franklyn JA, Maisonneuve P, Sheppard J, Betteridge J, Boyle P. Cancer incidence and mortality after radioiodine treatment for hyperthyroidism: A population-based cohort study. *Lancet* 1999; 353: 2111–2115.