

Thyroid imaging in a typical case of acute suppurative thyroiditis with abscess formation due to infection from a persistent thyroglossal duct

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The clinical evaluation of thyroid imaging with ^{99m}Tc , ^{201}Tl , and ^{67}Ga in the uncommon, but potentially serious, disorder of acute suppurative thyroiditis (AST) with abscess formation due to infection from a persistent thyroglossal duct is reported. The ^{99m}Tc image showed functioning areas of the diseased thyroid gland and the ^{201}Tl image demonstrated abscess formation in the thyroid gland of this patient. In addition, marked ^{67}Ga accumulation was demonstrated in a wide area covering not only the area of the thyroid gland involved, but also associated circumferential inflammatory lesions in a patient with AST. The net thyroid uptake of ^{67}Ga at 72 hours was calculated to be 13.8% of the injected dose.

Key words: acute suppurative thyroiditis, thyroid imaging, ^{67}Ga , ^{201}Tl , ^{99m}Tc

INTRODUCTION

IN THE POST-ANTIBIOTIC ERA, acute suppurative thyroiditis (AST) is an uncommon, but potentially serious disorder. However, early in the course of AST, a differential diagnosis may be very difficult and the diagnosis is usually made on clinical grounds and confirmed by needle aspiration or surgical drainage.¹ The use of thyroid imaging with ^{123}I or ^{99m}Tc sodium pertechnetate,² and formerly with ^{131}I in patients with AST has been previously reported.³

Herein, we report on the use of thyroid imaging with ^{99m}Tc , ^{201}Tl chloride and ^{67}Ga citrate in an uncommon, but typical case of AST with abscess formation due to infection from a persistent thyroglossal duct.

CASE REPORT

A 21-year-old male who complained of neck pain and fever (39.0°C) was seen in a private medical clinic on June 15, 1991. He was diagnosed as having de Quervain's thyroiditis and was treated with oral anti-inflammatory analgesic antipyretic drugs and glucocorticosteroids. However, his condition worsened, and he was finally

admitted to our hospital on July 9, 1991. There was no family history of thyroid disease. The patient had no prior history of thyroid abnormality, cervical irradiation, or exposure to tuberculosis. His past medical history was unremarkable. On admission, his temperature was 39.2°C, and his neck was swollen, red, very painful, and sensitive to movement. The pertinent finding on the physical examination was the presence of a large, firm, nonfluctuant and tender anterior mass associated with overlying erythema extending from the midline to the left lateral part of the neck. The abnormal laboratory findings were CRP, 30 mg/dl; WBC count, 19,000/mm³ (Ba. 4%, Seg. 82%, Lym. 8%, Mon. 6%) and ESR, 90 mm/hour and 123 mm/2 hours. The results of initial thyroid function studies were total T₃, 207 ng/dl (normal range 80–180); free T₃, 9.2 pg/ml (2.5–5.8); total T₄, 24.8 µg/dl (5.0–13.7); free T₄, 6.3 ng/dl (0.7–2.3); TSH, 0.05 µU/ml (0.6–5.5) and serum antithyroid antibody negative (TGHA: < × 10² and MCHA: < × 10²). A diagnosis of AST was made on the basis of the clinical and laboratory findings. On July 11, 13, and 16, 1991, thyroid imaging with ^{99m}Tc , ^{201}Tl , and ^{67}Ga was performed by routine procedures in our laboratory. However, the ^{99m}Tc image showed a functioning right thyroid lobe and a large cold left thyroid lobe except for minimal uptake in the right upper part in spite of TSH suppression by circulating leaked thyroid hormone from the diseased thyroid gland due to severe AST (Fig. 1). ^{99m}Tc uptake was 0.35% at 30 min after injection, which was somewhat decreased. The ^{201}Tl thyroid image demon-

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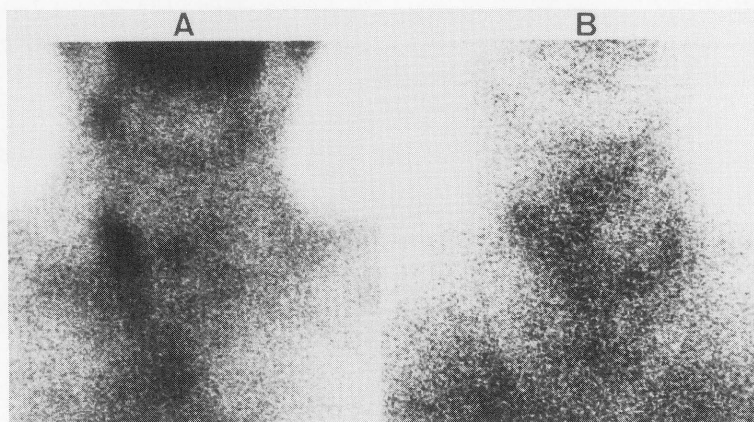


Fig. 1 Thyroid image with ^{99m}Tc shows a functioning right lobe and a large cold left lobe except for minimal uptake in the right upper part in spite of TSH suppression by the circulating thyroid hormone leaked from the diseased thyroid gland (A). The image with ^{201}Tl demonstrates a moderate diffuse uptake in the right thyroid lobe and surrounding a relatively diminished uptake in the center of the involved left lobe (B).

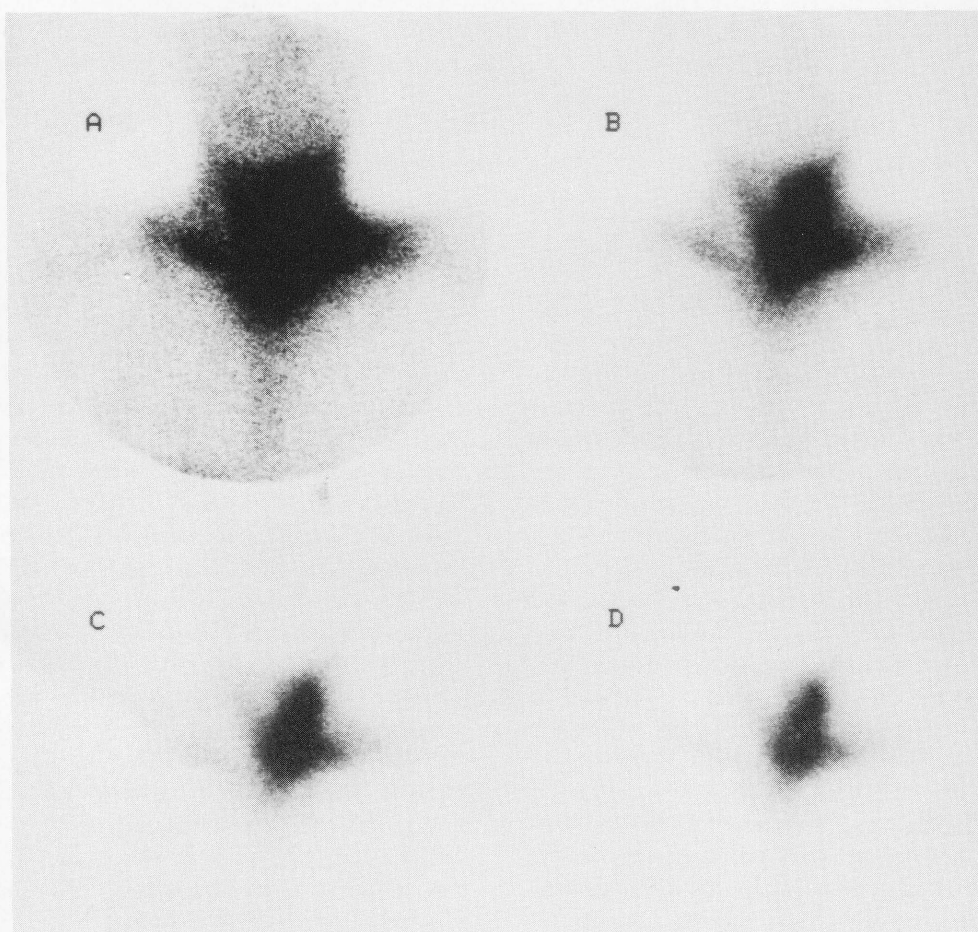


Fig. 2 Image with ^{67}Ga shows marked accumulation in a wide area covering not only the diseased left thyroid lobe, but also associated circumferential areas of inflammation including subcutaneous tissues along with the clavicles. The image was obtained at the upper level of the gray scale in CRT display set at 42 counts (A); 84 counts (B); 126 counts (C); and 168 counts (D).

strated a moderated diffuse uptake of ^{201}Tl in the right thyroid lobe and surrounding a relatively diminished uptake in the center of the involved left thyroid lobe,

suggesting abscess formation in the area involved (Fig. 1). In the ^{67}Ga image, strong accumulation was demonstrated in a wide area covering not only the left thyroid lobe, but

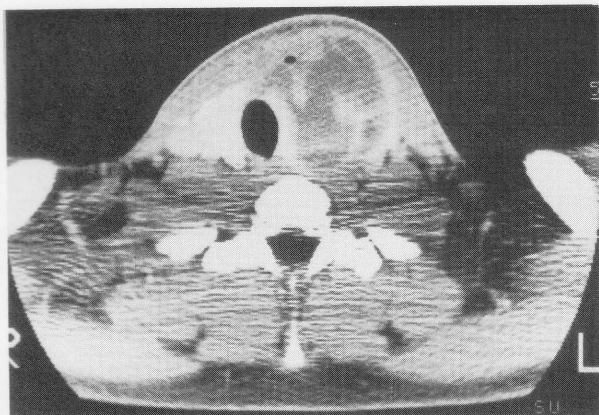


Fig. 3 X-ray CT scan shows abscess formation in the center of the enlarged left thyroid lobe.

also associated circumferential inflammatory lesions including subcutaneous tissues along with the clavicles (Fig. 2). The net thyroid uptake of ^{67}Ga at 72 hours was calculated to be 13.8% of the dose injected. The presence of an abscess was confirmed by needle aspiration of at least 50 ml of yellow-brown, foul-smelling, purulent fluid. The abscess subsequently drained spontaneously. The bacterial culture of the fluid specimen revealed an α -*Streptococcus* sp. Before needle aspiration, X-ray CT scan was performed and demonstrated abscess formation in the center of the enlarged left thyroid lobe (Fig. 3). Recovery was rapid following drainage and intravenous antibiotic therapy. On August 24, 1991, he was discharged fully recovered with CRP, 0.1 mg/dl; ESR, 2 mm/hour and 3 mm/2 hours; WBC count, 6,200/mm³ (Ba. 7%, Seg. 55%, Lym. 28%, Mon. 5%, Eo. 5%); and total T₃, 94 ng/dl; free T₃, 4.2 pg/ml; total T₄, 6.5 $\mu\text{g/dl}$; free T₄, 1.0 ng/dl and TSH, 2.28 $\mu\text{U/ml}$. Before discharge, hypopharyngography was performed and barium swallow demonstrated a persistent left thyroglossal duct originating in the apex of the left pyriform sinus and coursing 3.0 cm inferiorly. On September 18, 1991, the patient was readmitted for resection of the thyroglossal duct, and he has had an uneventful post-operative course. The final diagnosis of the patient was AST with abscess formation due to infection from a persistent left thyroglossal duct.

DISCUSSION

Thyroid imaging with ^{123}I , $^{99\text{m}}\text{Tc}$,² or formerly with ^{131}I ,³ in patients with AST is rarely normal, and generally shows an abnormally decreased uptake in the areas involved or occasionally suppressed uptake in normal areas of the thyroid gland. In this patient, the $^{99\text{m}}\text{Tc}$ image showed functioning areas of the diseased thyroid gland in spite of TSH suppression by the circulating thyroid hormone leaked from the diseased thyroid gland due to severe AST. Therefore, it seems that evaluation of the functioning portion of the thyroid gland in patients with AST by thyroid imaging with $^{99\text{m}}\text{Tc}$ is very useful even

though the image may be slightly modified by local inflammatory reactions due to severe inflammation. ^{201}Tl is a potentially useful radionuclide for myocardial imaging. However, significant ^{201}Tl uptake was observed in all cases in which there was thyroid enlargement except for areas with cystic change. In this study we used ^{201}Tl imaging for evaluation of the thyroid gland status of a patient with AST, and demonstrated a moderated diffuse uptake of ^{201}Tl in the right thyroid lobe and surrounding a relatively large area of diminished uptake in the area of abscess formation in the left thyroid lobe (Fig. 1). This suggests that ^{201}Tl imaging is very useful for evaluating abscess formation in the thyroid gland of patients with AST even though the image may be slightly modified by local inflammatory reactions due to severe inflammation. On the other hand, ^{67}Ga imaging is widely used for the detection of not only malignant tumors, but also inflammatory lesions. In this study, we evaluated ^{67}Ga imaging in a typical case of AST, and marked ^{67}Ga accumulation in a wide area—not only the area of the thyroid gland involved, but also associated circumferential inflammatory lesions including subcutaneous tissues along with clavicles was demonstrated. The net thyroid uptake of ^{67}Ga at 72 hours after intravenous administration was calculated to be 13.8% of the injected dose, which corresponds to 12.8 MBq (0.35 mCi) of ^{67}Ga citrate. In this study we used 93 MBq (2.5 mCi) of ^{67}Ga citrate and imaging was performed 72 hours after injection. However, our findings suggest the possibility of using smaller amounts of ^{67}Ga and more rapid imaging, for example 37 MBq (1.0 mCi) of ^{67}Ga citrate and imaging performed at 24 hours after intravenous administration. It is well known that thyroid accumulation of ^{67}Ga is observed in patients with malignant lymphoma of the thyroid,⁴ anaplastic carcinoma of the thyroid,⁴ and occasionally, Hashimoto's thyroiditis.⁵ However, differentiation from these diseases is simple and accurate on the basis of clear differences in the clinical and laboratory findings. The differentiation of similar inflammatory conditions, such as nonsuppurative painful thyroiditis (de Quervain's thyroiditis) and acute hemorrhage into a thyroid nodule or cyst is of great importance. However, thyroid accumulation of ^{67}Ga was also observed in patients with de Quervain's thyroiditis.⁶ The present findings suggested that the scintigraphic findings with ^{67}Ga are very useful in the diagnosis of AST, and differential diagnosis from de Quervain's thyroiditis may not be very difficult by thyroid imaging alone with additional imaging with $^{99\text{m}}\text{Tc}$ and ^{201}Tl .

We conclude that ^{67}Ga imaging is very useful not only for the diagnosis of AST, but also for the evaluation of the associated circumferential inflammatory lesions. In addition, the degree of accumulation of ^{67}Ga in the diseased thyroid gland in patients with AST is correlated with the grade of the inflammation in the thyroid gland. On the other hand, imaging with ^{201}Tl in patients with AST is also useful for the detection of abscess formation in the thyroid

gland. In contrast, ^{99m}Tc thyroid imaging in patients with AST is also useful for evaluation of the functioning areas of the diseased thyroid gland.

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