Suppurative *Acinetobacter baumanii* Thyroiditis with Bacteremic Pneumonia: Case Report and Review

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Suppurative thyroiditis is rare, and the major pathogens are *Staphylococcus* and *Streptococcus* species. We present a case caused by *Acinetobacter baumanii,* which has never before been reported. We review another 191 cases from the English-language literature (1980 to April 1997) and make a comparison with a review of 224 cases (1900–1980). As the numbers of immunocompromised patients increase, cases of suppurative thyroiditis are increasing. *Pneumocystis carinii* has become an important pathogen. Most patients (83.1%) with bacterial infections were euthyroid, whereas those with fungal or mycobacterial infections tended to be hypothyroid (62.5%) and hyperthyroid (50%), respectively.

According to the etiology and clinical course, thyroiditis is divided into three categories: suppurative thyroiditis (mostly acute), subacute thyroiditis (including de Quervain's thyroiditis and subacute lymphocytic thyroiditis), and chronic thyroiditis (Hashimoto's thyroiditis). The latter two categories are common diseases and are caused by a viral infection and an autoimmune process, respectively. On the contrary, suppurative thyroiditis is rare. Berger et al. reviewed 224 cases characterized by abscess formation and/or demonstration of microorganisms in the thyroid gland that were reported in the English-language literature from 1900 to 1980 [1]. In that era, the major pathogens were *Staphylococcus* and *Streptococcus* species.

We report a case of suppurative *Acinetobacter baumanii* thyroiditis with bacteremic pneumonia, which, to the best of our knowledge, has never been reported. Moreover, we review the English-language literature from 1980 to April 1997. The comparisons of age/sex distribution, underlying diseases, pathogens, results of thyroid function/scan, and fatality rate are made between these cases and those reviewed by Berger et al.

Case Report

A 70-year-old man who was a heavy smoker with mild obstructive lung disease had right-flank soreness for 2 days, followed by severe neck pain, fever, and chills. Physical examination revealed a body temperature of 38.5°C and an erythematous nonfluctuant mass over the right lobe of the thyroid.

The significant laboratory findings included a WBC count of 13,900/mm^3 (13% band forms, 83% neutrophils); 6–8 RBCs per high-power field (HPF) and 8–10 WBCs/HPF in urine; a T_4 (thyroxine) level of 12.2 μg/dL (normal, 4.5–12.5 μg/dL); a T_3 (triiodothyronine) level of 106.3 ng/dL (80–187 ng/dL); a TSH (thyroid-stimulating hormone) level of 0.24 μU/mL (0.5–5.6 μU/mL); negative HIV screening; and numerous polymorphonuclear leukocytes in a thyroid aspirate (5 mL).

The chest radiograph showed hyperinflated lungs, and a radiograph of the abdomen revealed right ureter stones with hydronephrosis. Both sonography of the thyroid and CT of the neck showed a hypodense/heterogeneous hypoechoic lesion (3.7 cm × 2.7 cm) in the right lobe of the thyroid, but there was no evidence of thyroglossal duct remnants. The iodine 131 (^{131}I) thyroid scan and the technetium 99m (^{99m}Tc) sodium pertechnetate neck scan showed no uptake in the thyroid beds. Under the impression of the occurrence of suppurative thyroiditis, we used parenteral ampicillin/sulbactam and gentamicin initially until both blood and thyroid aspirate cultures revealed *A. baumanii* growth. At that time the antibiotics were changed to ciprofloxacin and amikacin.

Two weeks later, the chest radiograph showed multiple pneumonic patches with only normal flora in the sputum. The gallium 67 citrate (^{67}Ga) scan showed accumulation of the radiotracer bilaterally in the lower lobes of the lungs (but no uptake in the thyroid). No pathogens were cultured from specimens from the right collecting system (obtained via retrograde pyelography) or from the initial urine specimen obtained on arrival.

By repeated aspiration of the thyroid and 5 weeks' parenteral ciprofloxacin treatment, the patient's condition improved. The thyroid lesion shrank (to 1.6 × 1.0 cm), and the pneumonic patches resolved. After discharge, the esophagogram showed no evidence of pyriform sinus fistulae. Although the origin of *A. baumanii* was undetermined, there was a high suspicion for a urinary tract origin.

Literature Review

A MEDLINE search of the English-language literature (1980 to April 1997) for contemporary case reports of suppurative thy-

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Table 1. Comparison of pathogens in the review of Berger et al. [1] and the present literature review (including present case).

Pathogen	No. of cases in present review			No. of cases in review by Berger et al.		
	Pure culture	Mixed culture	Total	Pure culture	Mixed culture	Total
Gram (+) aerobic bacterium						
Streptococcus species	14	14	28	31	5	38
Staphylococcus species	18	1	19	20	6	26
Corynebacterium diphtheroides	0	1	1			0
Enterococcus	1	0	1			0
Gram (+) cocci, not specified	0	1	1			0
Nocardia asteroides	1	0	1			0
Gram (−) aerobic bacterium						
Enterobacteriaceae						
Salmonella species	5	0	5	40	0	40
Escherichia coli	5	0	5			
Klebsiella pneumoniae	4	0	4			
Acinetobacter baumanii	1	0	1			
Acinetobacter species	0	1	1			
Other, not specified				6	2	8
Pseudomonas aeruginosa	5	0	5	1	0	1
Haemophilus influenzae	1	1	2	2	0	2
HACEK group						
Haemophilus parainfluenzae	0	1	1			0
Actinobacillus actinomycetemcomitans	0	0	0	1	0	1
Eikenella corrodens	2	2	4			0
Brucella species	3	0	3			0
Gram (−) rods, not specified	0	1	1			0
Gram (+) anaerobic bacterium						
Peptostreptococcus species	4	0	4			0
Clostridium septicum			0	1	0	1
Actinomyces species				2	0	2
Gram (−) anaerobic bacterium						
Fusobacterium species	0	4	4			0
Bacteroides fragilis	0	1	1			0
Bacteroides distasonis	0	1	1			0
Bacteroides melaninogenicus	0	1	1			0
Other anaerobe, not specified	1	4	5	5	3	8
Fungus						
Pneumocystis carinii	16	0	16			0
Aspergillus species	0	0	0			26*
Candida species	3	0	3			1
Coccidioides immitis	0	0	0			3
Allescheria boydii	0	0	0			1
Mycobacterium	12	0	12			21
Gumma	0	0	0			6
Parasite	0	0	0			11†

NOTE. HACEK = *Haemophilus, Actinobacillus, Cardiobacterium, Eikenella,* and *Kingella.*

* Almost all the diagnoses were made postmortem.

† The parasites included *Echinococcus granulosus* and *Cysticercus* species.

roiditis was done with use of the key words *thyroiditis* and *suppurative.* In addition, the references of these papers were reviewed for additional cases. There is confusion about possible duplication of cases in two publications [2, 3]. The comparisons of the gender, underlying diseases, and pathogens between the older (>20 years) and younger patients were made by means of χ^2 analysis.

Some descriptions used in the interpretation of thyroid function were not clear, e.g., patients were noted to be ''euthyroid'' [2–4] or ''clinically euthyroid'' [5, 6] without mention of serum FT_4 (free thyroxine), FT_4I (free thyroxine index), T_4, or TSH data. According to the values of serum T_4, FT_4, FT_4I, and TSH, we classified the thyroid function into five groups:

Table 2. Summary of thyroid function in patients with suppurative thyroiditis, compiled from the literature and the present case.

Characteristic	Bacterium (n = 53)	Fungus (n = 16)	Mycobacterium (n = 4)	No growth (n = 12)	No mention (n = 10)	Total (n = 95)
Euthyroid	10 (18.9)	0 (0)	0 (0)	1 (8.3)	6 (60)	17 (17.9)
Hyperthyroid	6 (11.3)	3 (18.8)	2 (50)	0 (0)	0 (0)	11 (11.6)
Hypothyroid	3 (5.7)	10* (62.5)	1 (25)	1 (8.3)	1 (10)	16 (16.8)
Euthyroid sick syndrome	3 (5.7)	0 (0)	0 (0)	0 (0)	0 (0)	3 (3.2)
''Euthyroid'' by authors (no data mentioned)	31 (58.5)	3 (18.8)	1 (25)	10 (83.3)	3 (30)	48 (50.5)

NOTE. Data are no. (%) of patients.
* One patient had persistent hypothyroidism [22].

euthyroid, hyperthyroid, hypothyroid, euthyroid sick syndrome, and euthyroid by authors without data mentioned.

Discussion

Suppurative thyroiditis is rare because of the rich vascular/lymphatic supply, a well-developed fascial encapsulation, and the high iodine content of the thyroid gland [7–9]. Clinical manifestations include fever, chills, neck pain, neck mass, dysphagia, and local erythema with heat. We reviewed 191 cases from the period of 1980 to April 1997 [2–6, 10–67]. The disease could occur in any age and occurred equally in both sexes, with a female/male (F/M) ratio of 49.7%/50.3% in both our review and that of Berger et al.

Of the 150 cases involving documented underlying diseases, 106 (70.7%) had diseases or structural abnormalities of the thyroid (e.g., pyriform sinus fistula, goiter, nodule, thyroglossal duct, and thyroid carcinoma). The finding is similar to that in the review of Berger et al., in which 61% of bacterium-infected patients had a history of underlying thyroid disease, especially goiter. The immunocompromised status played the second most important role (36 cases; 24%). Of them, 18 patients had AIDS, 4 had lymphoma/leukemia, and 4 had tuberculosis. More patients under 20 years old had pyriform sinus fistulae (18 of 32 vs. 11 of 66 over 20 years old; $P < .05$) and were more susceptible to bacterial infection (9 of 32 vs. 3 of 66; $P < .05$). In contrast, the older patients tended to be immunocompromised (32 of 66 vs. 4 of 32; $P < .05$), especially by AIDS (18 of 66 vs. 0 of 32; $P < .05$).

The most common pathogens were *Streptococcus, Staphylococcus, Pneumocystis carinii,* and *Mycobacterium* species (table 1). By 1951, 40 cases of salmonella thyroiditis had been reported [68], although it is no longer common now. The reason why 26 patients had aspergillus infection in the review of Berger et al. (almost all by postmortem diagnoses) but none did in ours is that no autopsy studies are described in recent case reports. With greater use of immunosuppressive therapies today, we believe the incidence of infection is underestimated.

Unusual pathogens often occurred with immunocompromised status or special contact histories. *P. carinii* [10–20], *Klebsiella pneumoniae* [2], *Candida* [21–23], and *Brucella melitensis* [24, 25] occurred exclusively in patients with AIDS, diabetes mellitus, leukemia, and persons who had contact with goats or goat milk, respectively. Ten patients (including ours; 17–88 years old, including 7 males and 3 of unknown sex) had coexistent bacteremia or fungemia. Among them, two patients had leukemia and one had both diabetes and pulmonary tuberculosis. *Candida albicans* [21, 22], *Escherichia coli* [3, 26], and *Salmonella typhi* [27] occurred in two cases each; *Staphylococcus aureus* [28], *B. melitensis* [25], *K. pneumoniae* [3], and *A. baumanii* (present case) were cultured in one case each.

It is difficult to assess thyroid function in the review of Berger et al. [1]. Our patient, clinically euthyroid, had a high-normal serum T_4 concentration, a mildly suppressed TSH value, and low I^{131} and ^{99m}Tc uptakes. The results were compatible with hyperthyroidism due to thyroid tissue destruction. We reviewed the thyroid function in 95 cases (table 2). Most patients (83.1%) with bacterial infections were euthyroid (including euthyroid sick syndrome). The fungus-infected patients tended to be hypothyroid (62.5%), and one patient with a candida infection needed persistent thyroid hormone replacement [22]. Those who had mycobacterial infections had a propensity (50%) to be hyperthyroid.

In the study of Berger et al. [1], 90% of bacterial infections and 78% of mycobacterial infections had cold nodules revealed by radionuclide thyroid scan. In our review, ^{123}I, ^{125}I, ^{131}I, ^{99m}Tc, and $^{201}T1$ (thallium 201) radionuclear scans showed cold nodules (no uptake) in the majority of cases (95.3%). ^{67}Ga scans were done in 4 cases, and 3 showed increased uptake [21, 22, 29] whereas 1 did not (our patient). An ^{111}In (indium 111) WBC scan was done in one case to demonstrate that the infectious focus was the thyroid [30].

Risk factors for community-acquired acinetobacter infections include alcoholism, smoking, renal failure, pulmonary diseases, previous antibiotic use, and malignancies [31]. As a

heavy smoker with obstructive lung disease and nephrolithiasis, our patient was prone to acinetobacter infections. Among the common routes of entry of suppurative thyroiditis (pyriform sinus fistulae, remnants of the thyroglossal duct, bloodstream, lymphatics, direct penetrating trauma, and invasion from contiguous structures [7, 69–73]), hematogenous spread from the right collecting system might explain the patient's course.

The management of suppurative thyroiditis includes antimicrobial therapy, incision/drainage, and surgical excision. We used parenteral ciprofloxacin and amikacin [74], along with repeated pus aspiration. The result was satisfactory. The fatality rate associated with suppurative thyroiditis was 12.1% in the review by Berger et al. (11 of 127 bacterial, 11 of 19 fungal, 3 of 17 mycobacterial, 1 of 6 gummatous, and 1 of 10 parasitic infections). In our review, 7 (3.7%) of 191 patients died. Five of them had AIDS and were infected with *P. carinii* [10–12, 18], one had esophageal cancer with *Steptococcus milleri* and mixed anaerobic infection [32], and one had a *Pseudomonas aeruginosa* infection with an unmentioned underlying disease [33].

Conclusion

As the number of immunocompromised patients increases, cases of suppurative thyroiditis are increasing. Many pathogens are of an opportunistic nature, and *P. carinii* has become an important pathogen. It is reasonable to keep this disease in mind with regard to patients with immune disorder. When the disease is accompanied by hypothyroidism or hyperthyroidism, fungal and mycobacterial origins should be considered, respectively.

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