well; her QT was 0.54 second, with a normal QRS duration (0.07 second). Because of palpitations, the amiodarone was increased to 400 mg/day alternating with 200 mg/day, with cessation of therapy for one day per week. After two months she was again hospitalized because of palpitations. An ECG showed periods of ventricular bigeminy (Fig 2A). A few hours later she lost consciousness, and concomitantly an episode of AVT was recorded (Fig 2B). Atropine, 1.5 mg IV, transiently increased the heart rate to 80/min, but 20 minutes later the VPBs and episodes of AVT recurred. Isoproterenol up to 3 µg/min was also ineffective. About 60 attacks of AVT were recorded during this period, two of them associated with short periods of loss of consciousness (Fig 2C). Bedside ventricular pacing at the rate of 98/min immediately abolished all rhythm disturbances. Trials to stop pacing or even to reduce the rate to 90/min during the next five days was followed by recurrence of AVTs. It was possible to stop pacing only on the sixth day. During the next ten days the QT remained 0.64 second and the QTc 0.60 second. On the 17th day after AVT, these parameters started to regress toward normal. A QT at upper limit of normal was observed only after one month. Only then was neoglyrrhythm 60 mg/day started again. During the next six months she did not complain, and all ECG parameters, including QT interval, were normal, except for sparse atrial premature beats.

**Discussion**

Our patient is, to the best of our knowledge, the first in whom quinidine, disopyramide, and amiodarone, each while administered alone, induced AVT. This happened each time after an increase in drug dosage; thus, the AVT appears to be dose-dependent in this patient. The normal QRS width in our patient at the time the AVT started is in contrast to the accepted view that a QRS widening by 25 percent or a QRS width of 0.14 second are the major indications for stopping antiarrhythmic therapy; in our case, only a prolonged QT, sinus bradycardia, and premature beats were found in the periods immediately preceding or following the attacks of AVT. The dangerous QT prolongation disappeared shortly after stopping therapy with quinidine and disopyramide, respectively, whereas after amiodarone therapy was discontinued, the patient’s QT began to shorten only after two weeks and returned to normal only after a month.

Considering the large number of patients receiving amiodarone, AVT is probably a very rare complication of this drug. Our patient’s basic tendency to bradycardia, enhanced by amiodarone, may have helped the electric dispersion and lack of uniformity of depolarization, thus creating the conditions necessary for AVT. The prolonged action after cessation of amiodarone, usually listed as one of the advantages of this agent, may become disadvantageous and even dangerous when therapy must be terminated rapidly. It seems to us that amiodarone, mainly in the higher doses, is not advisable in persons with a history of AVT induced by another antiarrhythmic drug.

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**Chronic Persistent Cough**

An Uncommon Presenting Complaint of Thyroiditis

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We report two patients with non-conventional thyroiditis whose chief complaint was chronic persistent cough. Cough was attributed to thyroiditis only after extensive diagnostic evaluations failed to uncover another cause and only after cough and thyroiditis disappeared simultaneously with suppressive therapy for the latter. Although thyroiditis is a rare cause of persistently troublesome cough, the diagnosis can be made by systematic evaluation of the sites of receptors and afferent nerves subserving the cough reflex.

Although there is considerable variation in the onset and severity of conventional subacute (nonsuppurative) thyroiditis, symptomatic disease should not present a major diagnostic dilemma. Patients present complaining of local neck and/or nonspecific systemic symptoms approximately 90 percent and 60-100 percent...
cent\(^1,2\) of the time. Moreover, systemic complaints suggestive of hyper- or hypothyroidism may occur up to 46 percent of the time.\(^4\)

In this communication, we report two patients with nonconventional thyroiditis who presented major diagnostic dilemmas. The disease smoldered for 18 and 8 months, respectively, and was associated with minimal neck tenderness, no fever and no systemic manifestations. Each patient sought medical attention for chronic persistent cough, a symptom not previously reported to be the presenting manifestation of conventional, subacute thyroiditis. In the past, cough has been mentioned only as an infrequent symptom in 3 percent of patients\(^1\) with subacute thyroiditis who had other, more prominent local neck and systemic complaints.

**CASE REPORTS**

**Case 1**

A 26-year-old man complained of an unproductive cough of 1½ years' duration. Cough had appeared as other symptoms of an upper respiratory tract infection had subsided. History, physical and laboratory evaluation including fiberoptic bronchoscopy ruled out lower respiratory tract disease, gastroesophageal reflux, chronic bronchitis from cigarette smoking, passive congestion of the lungs and sinusitis. Normal spirometric findings (FEV\(_1\)/FVC, %, FVC and FE\(_{25-75\%}\)) and two negative methacholine inhalational challenges\(^3\) ruled out asthma. Since the patient complained of having to clear his throat constantly, the initial clinical impression was that cough was due to postnasal drip. However, failure of cough to improve on a week of therapy with 6 mg of dexamethasone plus 120 mg of doxepin every 8 hours ruled this possibility out.\(^4\) At the time of referral (8/12/76), it became clear that a sore throat had also been associated, although less prominent, symptom for the past 1½ years. When the patient was asked where his throat was sore, he pointed to the area of his thyroid gland, and stated that the pain occasionally radiated to the angle of his right jaw and ear. He denied symptoms of hyper- or hypothyroid function. On physical examination, the isthmus of the thyroid was slightly tender and firm, as well as enlarged. The patient coughed when the isthmus was gently palpated and when he hyperextended his neck. \(^1\) Thyroid uptake in 24 hours was in the low normal range (19.1 percent), total thyroid iodine (5.2 \(\mu\)g/dl) and Westergren erythrocyte sedimentation rate (8 mm/hr) were normal, and antithyroglobulin and antimicrosomal antibodies were negative. Thyroid scan (Fig 1a) was consistent with localized thyroiditis. The patient was begun on a daily dose of 0.1 mg of levothyroxine sodium and then, after ten days, maintained on 0.2 mg. No other medication was given. Two weeks after suppressive therapy had been initiated, the patient's cough and sore throat were improved. Two weeks later, these symptoms were gone. After one year of therapy, levothyroxine sodium was tapered over a six-week interval. Cough did not reappear and physical examination was normal. Repeat \(^1\) thyroid uptake in 24 hours was normal (29.5 percent), as was the thyroid scan (Fig 1b).

**Case 2**

A 27-year-old woman complained of chronic and persistent cough of eight months' duration. Nine months before, she had symptoms of an upper respiratory tract infection. As rhinorrhea, sore throat, myalgias and arthralgias subsided, a dry cough began, followed by hoarseness and then aphonia. History, physical and laboratory evaluation including fiberoptic bronchoscopy ruled out lower respiratory tract disease, gastroesophageal reflux, chronic bronchitis from cigarette smoking, passive congestion of the lungs and postnasal drip. An atopic diathesis was ruled out by skin testing as well as history. Results of spirometric testing were normal. Since edematous vocal cords were seen during bronchoscopy, the patient was discharged with a diagnosis of laryngitis, etiology undetermined. Cough and hoarseness improved only transiently during a one-week interval when codeine and 60 mg of daily prednisone had been prescribed. At the time of referral (2/26/74), the patient was unable to speak. By answering questions in writing, she described a mild sore throat as an initial and then recurring complaint after prednisone had been rapidly discontinued. She pointed to the area of the thyroid as the region of her sore throat. The left lobe of the thyroid was slightly tender and enlarged. \(^1\) Thyroid uptake in 24 hours was in the low normal range (17 percent), total thyroid iodine

![Figure 1. Serial \(^1\)I thyroid scintigrams. The patchy uptake localized to the isthmus in (a, upper) has disappeared in (b, lower).]
(6.3 μg/dl), triiodothyronine resin uptake (39 percent) and Westergren erythrocyte sedimentation rate (5 mm/hr) were normal; antithyroglobulin and antimicrosomal antibodies were negative. Thyroid scan was consistent with thyroiditis localized to the left lobe. The patient was begun on 25 mg of indomethacin taken qid and 300 mg of desiccated thyroid (USP) taken daily. Within two days, cough and aphony began to improve. Two weeks later, cough, thyroid tenderness and hoarseness had totally disappeared. Although indomethacin was discontinued because it produced dizziness, suppressive thyroid therapy with desiccated thyroid was continued for 19 months. One year after all therapy had been discontinued, the patient was symptom-free.

**DISCUSSION**

Although chronic persistent cough can be due to a multiplicity of diseases located in a variety of anatomic locations, we have documented, for the first time to our knowledge, that a chronic persistent cough can be due to thyroiditis. Cough was attributed to thyroiditis in our two patients only after extensive diagnostic evaluations failed to uncover another cause and after cough of long duration and thyroiditis disappeared simultaneously with therapy for the latter.

Even though the presentation because of coughing in our patients was unusual for thyroiditis, typical local neck symptoms and signs, while masked, were present and suggested the diagnosis. The condition was preceded by an upper respiratory tract infection in both patients and, later, associated with sore throats in the area of the thyroid gland. In the first patient, pain radiated to the right ear; in the second, throat pain recurred after rapid withdrawal of corticosteroids. On physical examination, both patients had tender and slightly enlarged thyroid glands. While laboratory studies were not definitive, they were helpful diagnostically. Thyroid scans demonstrated patchy uptake of $^{131}$I consistent with localized inflammatory processes. Normal 24-hour $^{131}$I thyroid uptakes, other normal thyroid function studies and normal findings of Westergren erythrocyte sedimentation rates, although unusual in conventional subacute thyroiditis, did not exclude the diagnosis. They have been reported to be normal in localized and/or resolving disease.** Persistence of symptoms, however, suggested to us the presence of smoldering, localized disease rather than resolving inflammation. On the basis of the clinical findings, negative antithyroid antibodies, normal erythrocyte sedimentation rates, remarkable though transient improvement on therapy with corticosteroids in one patient, excellent response to exogenous thyroid therapy with return to the thyroid scan in one patient to normal, and total resolution of symptoms on follow-up evaluations, we believe that our patients had inflammatory disease of the thyroid gland, probably a prolonged and, therefore, nonconventional form of subacute thyroiditis. No further attempts were made to classify the types of thyroiditis present in our patients; biopsies were not performed since they were unlikely to influence the therapy of our patients to justify the risks and expense.

Since the cough long persisted and disappeared with therapy for conventional thyroiditis, we believe that cough was due, in our two patients, to thyroiditis rather than being a coincidentally unrelated symptom. Therapy of our patients consisted of levothyroxine sodium, desiccated thyroid and indomethacin, medicines that have been shown empirically to be effective in relieving symptoms. Although we treated our patients with levothyroxine sodium and desiccated thyroid and arbitrarily continued suppressive therapy for 13 and 18 months, we acknowledge that a shorter duration of therapy and/or other therapy with aspirin and corticosteroids might have been equally successful.

Systematic evaluation of the anatomy of the cough reflex, especially in the head and neck areas, by history, physical examination and laboratory studies, in addition to knowledge of the anatomy of the cough reflex (the sites of receptors and afferent nerves subserving the cough reflex) should reveal, almost without exception, the cause of chronic persistent cough. If cough receptors are not present in thyroid tissue (no one, to our knowledge, has looked), thyroiditis may cause cough by irritating the wall of the trachea and its subepithelial cough receptors and/or one of the branches of the vagus nerve that courses under the thyroid gland. Perhaps the inflammatory processes were uniquely localized near a component of the cough reflex to explain why cough was such a prominent symptom in our patients. Since patients with cough often have tender necks solely from the act of coughing (Irwin, RS, unpublished data), we recommend that a clinical suspicion of thyroiditis as the cause of a chronically persistent and troublesome cough should always be studied by radionuclide uptake and scanning.

**ACKNOWLEDGMENT:** The authors thank Diana L. Coppolino for her secretarial assistance.

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