

## CASE REPORT

## Vocal Cord Palsy: A Very Rare Complication of Radioiodine Therapy for Hyperthyroidism

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### Abstract

Laryngeal palsy occurs extremely rarely after radioiodine therapy for Graves' disease. We describe a case of complete right laryngeal paralysis in a 73 year old man who received two conventional doses of radioiodine (15 mCi) 9 months apart. He presented one day after the radioiodine therapy with loss of voice, discomfort in the right side of his neck, dry cough and throat irritation. The pain disappeared in a couple of weeks but the dysphonia persisted. Direct laryngoscopy confirmed complete right vocal cord paralysis and imaging excluded other regional pathology. His voice improved progressively to full recovery by six months though the vocal paralysis persisted even at 12 months of follow up. The case reminds physicians that radioiodine therapy for Graves' disease may rarely cause complications that need timely recognition and treatment.

**Key Words:** Thyroid gland, Hyperthyroidism, Thyroiditis, Laryngeal Paralysis, Radioiodine.

### Introduction

Graves' disease is a common condition. The available modes of therapy include anti-thyroid drugs, radioiodine and surgery. Radioiodine therapy is indicated in patients with nearly all causes of hyperthyroidism and is considered as one of the three effective therapies in the treatment of adults with Graves' hyperthyroidism (1-4). Radioiodine therapy is safe, definitive and cost-effective though pregnancy and breast-feeding are absolute contraindications for its use. In the long term, hypothyroidism follows sooner or later in nearly all patients treated with radioiodine. Radioiodine therapy can lead to exacerbation of active infiltrative ophthalmopathy (3-6). It has no adverse effects on the health of the offspring of treated patients (5-6). There is no evidence for increased rates of thyroid cancer, leukemia, infertility or neonatal abnormality (5-6). In the short term, patients may experience transient nausea, symptoms of radiation thyroiditis (4-6) and radiation sialadenitis, as iodine is partly excreted through the saliva (7). These are self limiting with conventional doses for thyrotoxicosis

but may be more marked with doses for thyroid cancer. In clinical practice, sialadenitis is usually reduced by regular stimulation of salivation and regular intake of fluids (7). If severe, it responds well to anti-inflammatory drugs or a short course of Prednisolone (4). Rarely other complications may occur and their course may be complicated by lack of awareness of doctors and patients. We report here, on an example of such extremely rare complication to increase

physicians' awareness and highlight the importance of its timely recognition and management.

#### Case Report

This is a 73 year old man who suffers from Graves' disease, mild stable Graves' ophthalmopathy and recurrent hyperthyroidism. He received a therapeutic dose of 15 mCi of Radioiodine 9 months previously. For the current episode

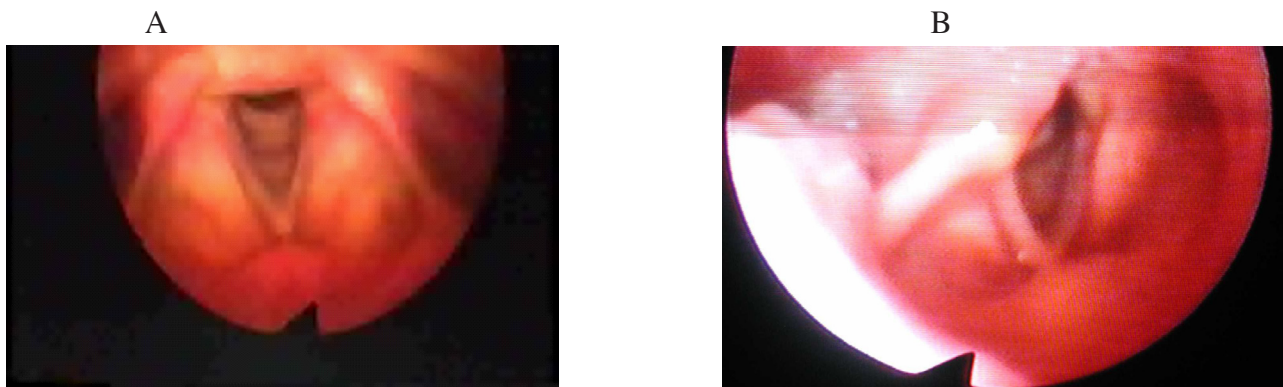


Figure 1. The direct laryngoscopic appearance of (A) a normal vocal cords and (B) the patients in this report demonstrating the total right vocal palsy. (B) shows the distorted shape of the space due to the paralyzed right cord. The accumulating secretions were a cause of concern but full imaging showed no evidence of local pathology.

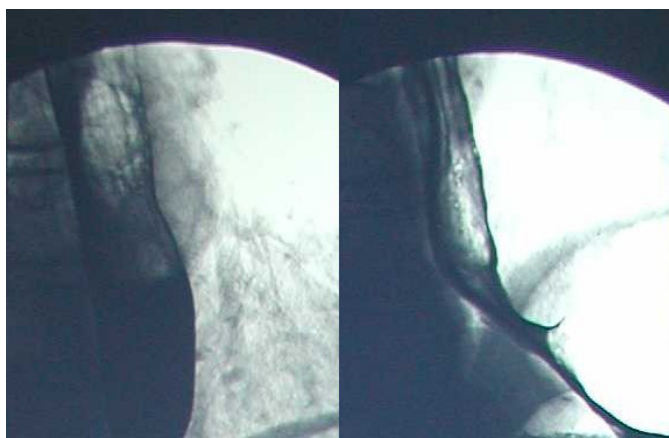


Figure 2. Barium Swallow of the patient with normal appearance and lack of any compressive abnormalities in this anatomical region.

of thyrotoxicosis, he was initially stabilized medically using standard doses of Carbimazole. Later, he was treated with a therapeutic dose of Radioiodine of 15 mCi (similar to the first dose). In our clinic, once we are informed that a patient received Radioiodine, a follow up appointment is automatically scheduled at 6 weeks with a repeated measurement of thyroid functions done before hand. However, the patient presented on the next day after Radioiodine with loss of voice, discomfort in the right

side of his neck, dry cough and throat irritation. He was extremely distressed as he lived on his own and could not communicate. He was advised by his local general practitioner to “contact” the Endocrine Clinic. However, being unable to communicate over the phone he decided to wait till his clinic appointment. The pain disappeared in a couple of weeks but the dysphonia persisted. In the endocrine clinic, he was clinically and biochemically euthyroid. The thyroid gland was mildly enlarged and

Table 1. Vocal Cord Paralysis Reported in Association with Radioiodine Therapy for Thyrotoxicosis (References 11-15).

First author and year	Radioiodine dose	Case Summary and vocal cord paralysis outcome (1)
Craswell, 1972	5 mCi	Vocal cord paresis following radioiodine therapy for toxic multinodular goiter in a 49 year old woman recovered after 3 weeks.
Snyder, 1978	7.3 mCi	Vocal cord paralysis after therapy in a 61 year old woman with Graves' disease. No vocal cord recovery after 20 months.
Robson. 1981	6 mCi	Vocal-cord paralysis after treatment of thyrotoxicosis in a 65 year old man, recovered fully after 15 months
Coover, 1999, 2000	29.3 mCi	Permanent iatrogenic vocal cord paralysis after I-131 therapy for right lobe solitary toxic nodule in a 75 year old woman. No vocal cord recovery by 14 months.
Present Case	15 mCi	Permanent vocal cord paralysis following second dose for recurrent Thyrotoxicosis. No vocal cord recovery by 12 months.

1. All these cases involved the right vocal cord.
2. Same patient communicated by a letter to the editor initially and reported fully with follow up of outcome and a review of the literature latter.

not tender. He had a severe hoarseness of voice. He was referred urgently to the Otorhinolaryngology Clinic where direct laryngoscopy confirmed complete right vocal cord paralysis but no other local abnormalities (Figure 1). A soft tissue X-ray, neck ultrasound scan, Barium swallow and CT scan excluded other local pathology (Figure 2). The diagnosis was explained to the patient and its possible relationship to Radioiodine was postulated but its rare occurrence was stressed. It was thought to be too late to consider him for steroids or anti-inflammatory drugs as there was no evidence of thyroiditis or marked swelling at this stage. His voice improved slowly and has recovered to normal by 6 months but the laryngeal paralysis persisted at follow up 1, 6 and 12 months and it was deemed to be permanent.

### Discussion

Radioiodine therapy has an established role in the management of both benign and malignant thyroid disease and its efficacy and safety are well established (1-3). The doses and consequently the side effects are greater when radioiodine is used for thyroid cancer than for benign disease. The larynx and laryngeal nerves are so closely related to the thyroid gland that they are likely to be involved in malignant infiltration and surgical trauma. Although vocal-cord paresis may be seen in association with malignant or benign thyroid disease or may follow thyroid surgery, injury to the vocal cords or recurrent laryngeal nerves is not anticipated as a complication of radioiodine therapy for hyperthyroidism (4). Vocal cord paralysis has been reported following I-131 ablation of a post-thyroidectomy remnant in two cases (9, 10). Both cases had bilateral vocal cord paralysis of differing severity. The former patient required an emergency tracheostomy but the latter case was milder and was adequately treated with anti-inflammatory drugs. To our knowledge, this is the fifth case of laryngeal paralysis in association with Radioiodine therapy for hyperthyroidism to be reported in the literature (11-15). These cases are summarized in Table 1. Many authoritative endocrine texts fail to mention it as a recognized complication of radioiodine (1, 2) and a recent specialist national report from the United Kingdom on radioiodine therapy made no reference to it (3). Specialized thyroid texts and monographs do however document it as a very rare complication (5, 6 and 8). An internet search of patients' information sheets from web sites of over 15 world-reputable endocrine and thyroid associations and centers of excellence found no mention of this complication (Beshyah, unpublished). The lack of awareness of this complication by professionals and patients could have contributed to the delay in diagnosis

and treatment provision. This may have contributed to the distress and frustration experienced by our patient.

The course of the vocal cord paralysis after radioiodine therapy for a solitary toxic thyroid nodule reported by Coover (14, 15) was similar to our patient but the hoarseness started one week after treatment in his case which could be due to growth rate and size of the gland. Indirect laryngoscopy at the time confirmed right vocal cord paralysis. When the examination was repeated in 6 months, no improvement was noted; vocal cord paralysis was then declared permanent similar to the present case. Eleven months after the onset of symptoms, the patient observed improvement in her voice and at 14 months, she experienced complete vocal recovery. A computed tomography performed after this showed that her right vocal cord paralysis was unresolved. In our patient, a significant voice recovery was evident at 6 months, but repeat laryngoscopy confirmed persisting vocal cord paralysis at 12 months, though we did not repeat the computed tomography at 12 months. The apparent complete recovery of her voice was believed to be a result of adaptive compensatory mechanisms (8,16).

The right vocal cord was affected in all of unilateral cases suggestive of some anatomical predisposition. Perhaps its shorter path allows less opportunity to accommodate the enlarging thyroid gland. This may need further elucidation. The complication was observed with doses of 5-29-3 mCi for treatment of hyperthyroidism and high doses of the order of 100 mCi for ablation therapy of postoperative thyroid remnants. The <sup>131</sup>I emits mostly beta particle radiation, reaching only a few millimeters. Hence it usually causes mild and transient thyroiditis. However, these may reach closely related structures. The mechanism of vocal cord paralysis may be related to direct radiation damage of a normal recurrent laryngeal nerve, or it may represent damage to an already impinged nerve, possibly related to stretching of the nerve by the enlarging thyroid gland. (16). The latter hypothesis may be supported by vocal cord paralysis observed in cases of sub acute De Quervain's thyroiditis (17-19) and acute suppurative thyroiditis (20). In the subacute cases, recurrent laryngeal nerve paralysis persists many months after the patient's complete recovery from thyroiditis. Previously, Volpe and Johnson found hoarseness in 8 patients out of 56 cases of subacute thyroiditis (18). However, the diagnosis of recurrent laryngeal nerve paralysis was not substantiated by laryngoscopy. The improvement in the impaired vocal cord mobility in response to surgical drainage in the setting of acute suppurative thyroiditis (20) supports the nerve-stretching hypothesis. Vocal cord paralysis complicating Riedel's thyroiditis (21) and parathyroid disease (22-23) lends this

hypothesis further support with stretching being the only possibly plausible explanation (21-23). The difference in time of onset of vocal paralysis in between focal disease (nodules) and diffuse disease (Graves) may be explained on this basis. An alternative explanation was offered by Holl-Allen (8) who suggested that the acute phase inflammation leads to edema or thrombosis of the nerve's vascular supply and the chronic phase to a perineural fibrosis.

The apparent complete recovery of the voice is believed to be a result of adaptive compensatory mechanisms despite the persistent vocal cord palsy (8, 16). There are no data in the literature to suggest a benefit or otherwise from the use of anti-inflammatory drugs and/or steroids specifically for the vocal cord paralysis. However, their use has been recommended for severe symptoms of thyroiditis and sialadenitis (4) and it was used in one case of Radioiodine-induced vocal cord paralysis (15) and in similar but not identical situations of upper airway obstruction due to radioiodine (24). Taking into consideration the seriousness of this complication and the possible long-term grave consequences, it would seem very appropriate to employ such fairly safe measures even on empirical basis with the usual protections against their side effects.

In conclusion, vocal cord paralysis complicating radioiodine therapy for hyperthyroidism is a possible complication. The decreased level of awareness of this complication by professionals and patients alike may cause delay in its recognition and suboptimal management. Perhaps, this complication, albeit extremely rare, should justifiably be highlighted more often in the professional and patients' literature. As a rule, unusual reactions to commonly used therapeutic agents and maneuvers should always be taken seriously to avoid potential harm.

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