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Upper airway invasion by well-differentiated thyroid carcinoma

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Abstract
Invasion of the upper airway by well-differentiated thyroid carcinoma is very unusual. Treatment is primarily surgical resection, but the extent of the resection has been controversial. Adjuvant treatment using I^{131} or radiotherapy also has an important role in management. We describe two cases of direct infiltration of the larynx and trachea by well-differentiated thyroid carcinoma and discuss the current recommendations for the management of this difficult problem.

Key words: Thyroid neoplasms; Carcinoma; Airway obstruction

Introduction

It is well recognized that the airway is often involved with thyroid tumours. Lawson (1983) reported an incidence of 35 per cent, including compression, displacement, neurogenic dysfunction and invasion of the airway. However, direct infiltration of the airway by well-differentiated thyroid malignancies is uncommon with a frequency of 7 per cent (Batsakis, 1987). We report two such cases and discuss the treatment options for the management of patients with airway invasion.

Case reports

Case 1

A 75-year-old lady presented to the ENT outpatients with a four-year history of hoarseness. She was a non-smoker and had a longstanding goitre. Examination of the larynx revealed a right-sided supraglottic swelling, and neck palpation confirmed the presence of a smooth symmetrical goitre. Thyroid function tests were normal and an ultrasound of the neck showed a multinodular goitre. A thyroid isotope Tc scan 99m demonstrated glandular enlargement. At direct laryngoscopy a smooth cystic lesion was removed from the right laryngeal ventricle. The histology of this was reported as a benign papillary cystadenoma. She made an uneventful recovery and was reviewed in the outpatient department; no evidence of laryngeal abnormality was seen.

Two years later the hoarseness recurred and on indirect laryngoscopy a vascular swelling of the right vestibular fold with decreased mobility of the right vocal fold was seen. There was no obvious change in the goitre. At direct laryngoscopy a vascular mass was found involving the right vocal and vestibular folds as well as the laryngeal ventricle. Multiple biopsies were taken and the histology was reported as an adenocarcinoma, probably of thyroid origin. On reviewing the previous histological slides, it was felt that the initial lesion was in fact an adenocarcinoma. A CT scan of the neck revealed a large thyroid tumour with marked destruction of the right ala of the thyroid cartilage (Figure 1) and retrosternal extension. At operation a total thyroidectomy and laryngectomy was performed with the creation of a tracheo-oesophageal fistula for insertion of a speaking valve. Post-operative recovery was uneventful and she was discharged home on thyroxine. A follow-up I^{131} scan revealed no residual tumour. Macroscopically tumour was found in the right lobe of the thyroid gland, extending into the larynx (Figure 2). The histological sections showed a well-differentiated tall-cell papillary adenocarcinoma. She was alive and well one year later with no recurrence of the tumour.

Case 2

A 76-year-old man presented to the accident and emergency department with marked stridor, which had been worsening over the past month. He had a long history of thyroid follicular carcinoma and had at least ten operations on his thyroid gland over the past twenty years in another hospital. Examination of his larynx with the fibreoptic naso-pharyngoscope revealed significant swelling in the supraglottic region with fixation of the right vocal fold and a subglottic mass. The neck was woody from previous surgery with a hard mass palpable in front of the trachea. A lateral neck X-ray showed a partially calcified mass anterior to the trachea and near total occlusion of the trachea by a soft tissue mass (Figure 3). He was intubated with difficulty by passing a

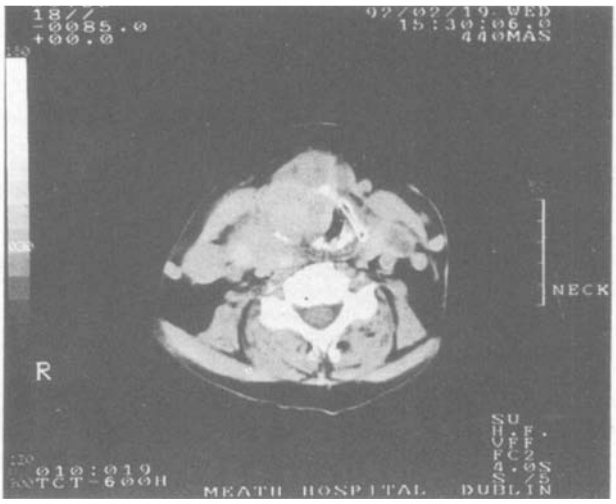

FIG. 1
CT scan demonstrating tumour invading the larynx with destruction of the right ala of the thyroid cartilage.

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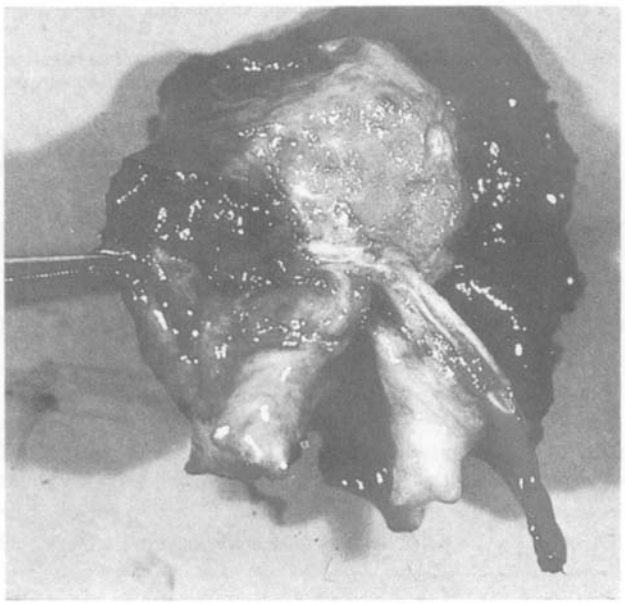

FIG. 2

Gross specimen showing tumour adherent to the larynx with destruction of the right ala of the thyroid cartilage.

7.5 mm endotracheal tube over a bougie, and a tracheostomy was performed. At operation the tumour was found to be growing into the trachea, and the larynx was also grossly infiltrated.

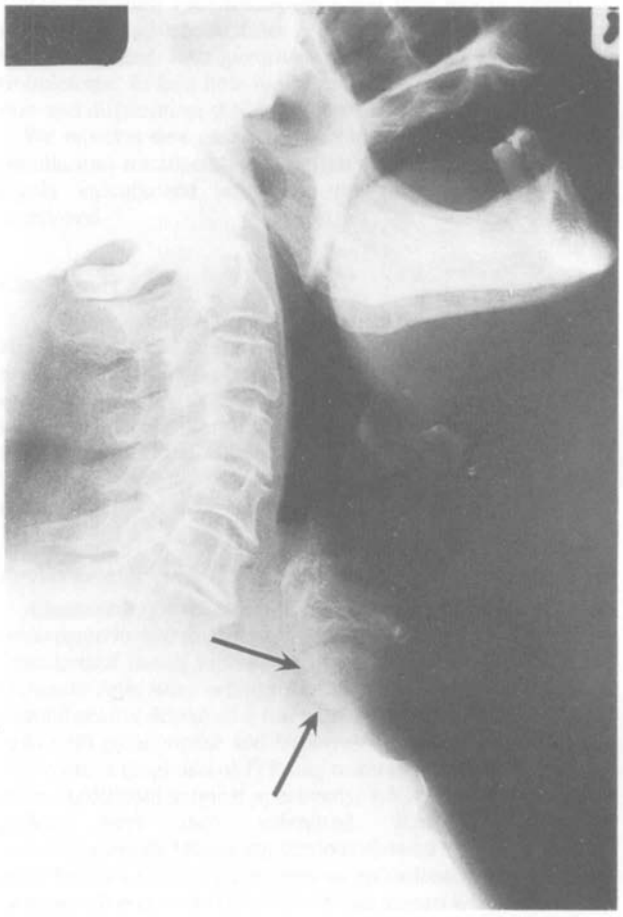

FIG. 3

Lateral neck X-ray shows tumour mass in the lumen of the trachea almost totally obstructing the airway (arrows indicate the position of the tumour in the trachea).

Biopsies of the tumour showed a well-differentiated follicular carcinoma of the thyroid gland. Following surgery he received external beam radiotherapy and is still alive with a tracheostomy tube in situ, two and a half years after radiotherapy.

Discussion

It is difficult to determine the incidence of upper airway invasion by well-differentiated thyroid carcinoma. Batsakis (1987), on reviewing the literature, states that laryngotracheal invasion by thyroid carcinoma has a frequency of approximately seven per cent. In this review all histological types were represented, with differentiated carcinomas being the most common. There is no significant difference between papillary and follicular carcinomas of the thyroid gland with regard to the incidence of airway invasion (Djalilian *et al.*, 1974; Breaux and Guillamondegui, 1980; Segal *et al.*, 1984).

Involvement of the airway is often heralded by the onset of hoarseness or stridor. These symptoms may represent intraluminal invasion or neural involvement. The development of haemoptysis, although uncommon, invariably means intraluminal invasion (McCaffrey and Lipton, 1990). When airway involvement is suspected CT scanning is extremely useful in determining the extent of cartilaginous involvement (as in *Case 1*). This information is important regarding prognosis as intraluminal invasion of the upper aerodigestive tract structures has a poorer prognosis than extraluminal cartilage invasion (Tovi and Goldstein, 1985).

The management of locally invasive well-differentiated carcinoma of the thyroid has been controversial. The main debate has focussed around the issue of the extent of surgical resection of the upper aerodigestive tract structures. Should surgery be radical with removal of all tumour without preservation of function or should it be more conservative with removal of all gross tumour, sparing function where possible and treating residual disease with adjuvant therapy? In several studies no significant difference in survival has been shown in those patients treated by radical surgery, including total laryngectomy, pharyngectomy and tracheal resection, compared to patients treated by less extensive procedures which conserve the function of these structures (Breaux and Guillamondegui, 1980; Lawson, 1983; Segal *et al.*, 1984; Lipton *et al.*, 1987). However, Lipton *et al.* (1987) have also reported that survival is markedly reduced if gross residual tumour is left behind. It is recommended that whenever intraluminal invasion occurs radical surgery is usually required. Otherwise a more conservative approach should be adopted for less extensive local disease.

Adjuvant therapy in the form of I^{131} is recommended when there is residual tumour or it is anticipated. However, not all well-differentiated thyroid carcinomas respond uniformly to I^{131} (Lore, 1991). In particular pure tall-cell papillary carcinoma has poor uptake of iodine. External beam radiotherapy can also be used effectively to manage both residual and non-resectable disease (Simpson and Caruthers, 1978). It is particularly useful in cases of tumours with limited uptake of I^{131} or where there is gross local residual disease (as in *Case 2*).

While each case should be treated on an individual basis, the basic principle is removal of all reasonably resectable disease. Function should be preserved using conservative surgery and adjuvant I^{131} unless intraluminal invasion has occurred. In such cases it is necessary to perform radical surgery. Extensive unresectable local disease can be managed with external radiotherapy.

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