INTRODUCTION

Objectives: Magnetic resonance imaging (MRI) scans are important in diagnosing and assessing the extent of tumour involvement in head and neck surgery. Patients who have developed neoplastic invasion of thyroid cartilage are associated with lower response rates to radiation and an increase risk of recurrence. It has also been reported that 70% of patients post laryngectomy suffer from hypothyroidism. A positive scan for thyroid cartilage invasion would have one or more of the following: Low signal on T1 weighted images High signal on STIR sequence adjacent to the tumour Tumour on both sides of the thyroid cartilage The criteria used for assessing thyroid cartilage invasion on MRI scans were as follows: Low signal on T1 weighted images High signal on STIR sequence adjacent to the tumour Tumour involving the thyroid gland

METHODS AND MATERIALS

A retrospective review was undertaken of all patients who underwent total laryngectomy at University Hospital Aintree, Liverpool, UK between 1997 and 2008. The pre-operative staging scans were independently reviewed by two head and neck consultant radiologists, blinded to the histology report. The scan reports regarding invasion of thyroid cartilage and thyroid gland were then compared to the histological findings. The results from this study show that MRI scans are more specific than sensitive in assessing thyroid cartilage invasion. The higher negative predictive value (84%) demonstrating that the scans are more accurate at assessing those patients without cartilage invasion. The criteria used for assessing thyroid gland invasion on MRI scans were as follows: Glottis Hypopharynx Supraglottis Subglottis Tongue Base

RESULTS

THYROID CARTILAGE INVASION

On reviewing the histology there were 22 laryngectomy cases with histological invasion of thyroid cartilage. (See Table 1) This compared to 31 patients cases with histological non-invasion of thyroid cartilage on pre-operative MRI scans.

Sensitivity = 64% Specificity = 71% Positive Predictive Value = 45% Negative Predictive Value = 84%

THYROID GLAND INVASION

Hemi-total thyroidectomy were performed in 68 (89%) of patients with only 10 of these showing radiological evidence of thyroid gland invasion. Low signal on T2 weighted images Total Thyroidectomies were performed on 20 patients although only one of these had thyroid gland invasion on histology.

Sensitivity = 100% Specificity = 89% Positive Predictive Value = 10% Negative Predictive Value = 100%

CONCLUSIONS


REFERENCES


Thyroid gland present
 Negative
 Positive
 Total
 Thyroid gland absent
 Negative
 Positive
 Total
 Table 3. Thyroid gland procedures

DISCUSSION

An accurate assessment of thyroid cartilage invasion and thyroid gland invasion is important for pre-therapeutic staging and the on treatment options available. It has been previously documented that MRI scans over predict the numbers of cases of thyroid cartilage and gland invasion. This might be attributed to motion artefacts, oedema and fibrosis secondary to the underlying pathological process.

The results from this study show that MRI scans are more specific than sensitive in assessing thyroid cartilage invasion. The higher negative predictive value (84%) demonstrating that the scans are more accurate at assessing those patients without cartilage invasion. There were 7 cases where patients were referred for thyroid radionecrosis and within this group there was a higher false positive rate.

On reviewing the primary sites of the tumour in relation to thyroid cartilage invasion the majority are in the glottic group.

Is there a correlation between the primary tumour site and thyroid cartilage invasion?