

ORIGINAL RESEARCH

A Comparative Study of CT scan versus MRI in diagnosing laryngeal carcinoma

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ABSTRACT:

Background: The present study compared CT and MRI in diagnosis of laryngeal carcinoma. **Materials & Methods:** The present study was conducted on 70 cases of laryngeal carcinoma of both genders. All MR imaging studies were performed on a 3T MR imaging system with a 16-channel head and neck coil. CT scans were performed with 16-slice CT scanner. **Results:** Out of 70 patients, 40 were males and 30 were females. CT assessed lesions in 68 (97.1%) and MRI in 64 (91.4%) of laryngeal carcinoma cases. Sensitivity of CT was 97.1, specificity was 94.2 and positive predictive value was 95.6. Sensitivity of MRI was 91.4, specificity was 88 and positive predictive value was 92.6. **Conclusion:** Authors found that although CT scan is found to be better in terms of detecting laryngeal carcinoma but both modalities can be comparable.

Key words: CT scan, MRI, Laryngeal carcinoma.

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INTRODUCTION

The larynx is a system of mucosal folds supported by a cartilaginous framework. Laryngeal masses are classified as benign or malignant. Benign laryngeal tumors include papilloma (85%), chondroma, and neurofibroma.¹ Over 90% of laryngeal malignancies are epithelial tumors of the squamous cell variety. Endoscopy helps to accurately assess the mucosal involvement of tumor and also in taking biopsy of the lesion.

Computed tomography (CT) allows evaluation of intrinsic and deep soft tissues of the larynx as well as of the cartilaginous skeleton around the larynx. CT delineates the extent of primary disease and size and volume of tumor.²

Magnetic resonance imaging (MRI) allows better analysis of potential cartilage invasion and has been considered to have an advantage in defining the tumor muscle interface.³ Used in combination with clinical history and laryngoscopy, the accuracy rates of CT and MRI in T staging of laryngeal carcinoma could reach 80% and 87%, respectively. However, in the assessment of anterior commissure lesions, MRI had a relatively high accuracy but low specificity compared with CT which either overestimates or underestimates the involvement of cartilage.⁴

The evaluation of deeper structures is capable only through CT imaging or MRI. CT imaging has become the most commonly used technique for general laryngeal imaging.⁵ It is readily available at most hospitals and even at some outpatient centers. The acquisition time for a CT image is extremely short (within a matter of seconds), which is quite useful for the laryngeal examination, as patients are generally

required to hold their breath to reduce movement.⁶ The present study compared CT and MRI in diagnosis of laryngeal carcinoma.

MATERIALS & METHODS

The present study was conducted in the department of Radiodiagnosis. It consisted of 70 cases of laryngeal carcinoma of both genders. The study was approved from institutional ethical committee. All enrolled patients were informed regarding the study and their consent was obtained.

Data of patients such as name, age, gender etc. was recorded. All MR imaging studies were performed on a 3T MR imaging system with a 16-channel head and neck coil. CT scans were performed with 16-slice CT scanner with the following parameters: 100 and Sn140-kV tube voltages, 200 and 200 effective mAs, 0.33-second rotation time, 32X 0.6-mm collimation with a z-flying focal spot, and a pitch of 0.6. All the patients underwent transcervical open surgeries, including 8 total laryngectomies, 8 frontal partial laryngectomies and 10 supracricoid partial laryngectomies. The surgical specimens were resected integrally and then fixed with 10% formalin. After that, the specimens were cut into 3–6 segments parallel to the plane of vocal cords and then paraffin-embedded. Each embedded segments were further cut into axial serial section slices (5 µm) parallel to the plane of vocal cords at 0.4 mm intervals. Hematoxylin-eosin staining was performed on each slice. All the slices were reviewed independently by two senior pathologists. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 70		
Gender	Males	Females
Number	40	30

Table I shows that out of 70 patients, males were 40 and females were 30.

Table II Assessment of laryngeal carcinoma

Method	Number	Percentage
Histopathology	70	100
CT	68	97.1
MRI	64	91.4

Table II, graph I shows that CT assessed lesions in 68 (97.1%) and MRI in 64 (91.4%) of laryngeal carcinoma cases.

Graph I: Assessment of laryngeal carcinoma

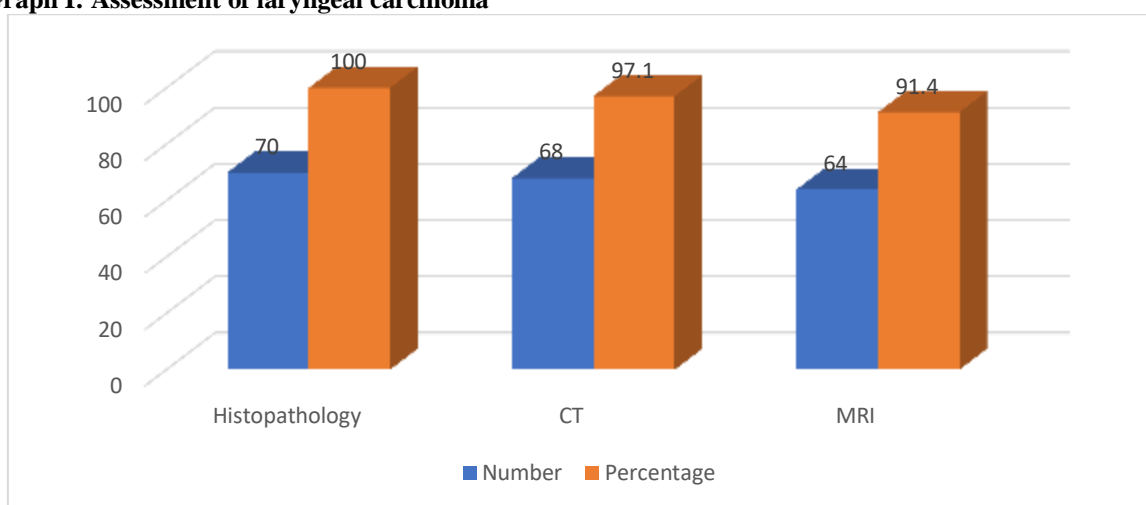
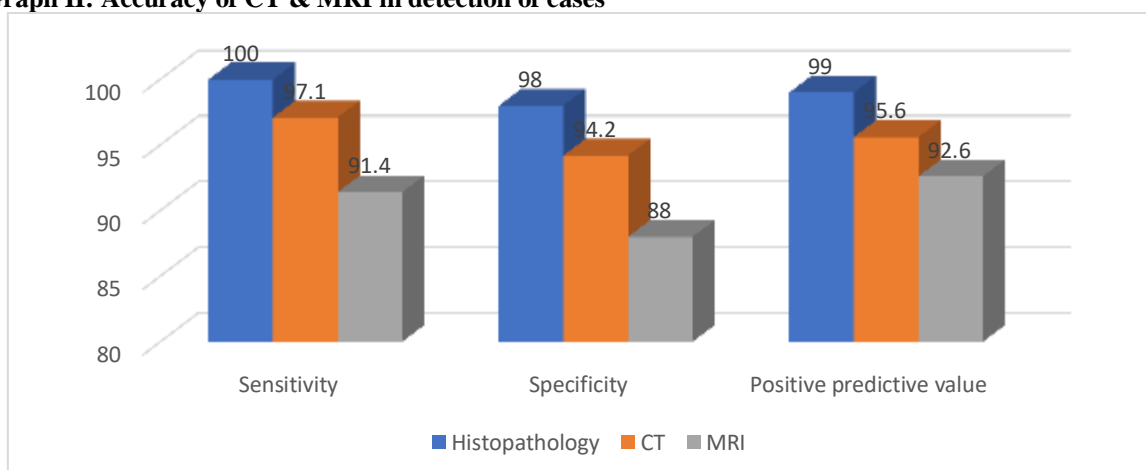


Table III Accuracy of CT & MRI in detection of cases

Parameters	Histopathology	CT	MRI
Sensitivity	100	97.1	91.4
Specificity	98	94.2	88
Positive predictive value	99	95.6	92.6

Table III shows that sensitivity of CT was 97.1, specificity was 94.2 and positive predictive value was 95.6. Sensitivity of MRI was 91.4, specificity was 88 and positive predictive value was 92.6.

Graph II: Accuracy of CT & MRI in detection of cases



DISCUSSION

In patients with laryngeal and hypopharyngeal squamous cell carcinomas (SCCs), diagnosing cartilage invasion is extremely important for making treatment-related decisions.⁷ The thyroid cartilage plays a critical role in primary tumor staging because the extent of thyroid cartilage invasion is a defining factor between T3 and T4a stages. When tumor extends through the thyroid cartilage into the superficial soft tissue of the neck, the patient is staged T4a and may require total laryngectomy.⁸ In cases in which cartilage invasion is localized without transcartilaginous extension, potentially organ-preserving treatment may still be performed. Therefore, inappropriate treatment choices secondary to over- or underestimation of thyroid cartilage invasion can have grave implications for a patient's quality of life.⁹ The present study compared CT and MRI in diagnosis of laryngeal carcinoma.

In present study, out of 70 patients, males were 40 and females were 30. CT assessed lesions in 68 (97.1%) and MRI in 64 (91.4%) of laryngeal carcinoma cases. Sarkar et al¹⁰ comprised 33 patients (29 males and 4 females) and included patients who were clinically diagnosed patients of laryngeal masses, were first evaluated under indirect laryngoscopy and then sent for CT and MRI. Post imaging biopsy was undertaken via direct laryngoscopy. The sensitivity and specificity in cartilage invasion were as follows: thyroid cartilage (91.7% vs. 71.4%); cricoid cartilage (85.7% vs. 75%); and arytenoid cartilage (91.7% vs. 71.4%). The accuracy rate of MRI in detection of cartilage invasion was thyroid cartilage 84.2%; arytenoid cartilage 84%; cricoid cartilage 78.9%. Diagnostic accuracy of CT staging versus histopathological staging showed sensitivity 60.0%, specificity 85.7%, positive predictive value (PPV) 60.0%, negative predictive value (NPV) 85.7%, accuracy 78.9% ($P = 0.084$). Diagnostic accuracy of MR staging versus histopathological staging showed sensitivity 80.0%, specificity 92.9%, PPV 80.0%, NPV 92.9%, accuracy 89.5% ($P = 0.006$). We found that sensitivity of CT was 97.1, specificity was 94.2 and positive predictive value was 95.6. Sensitivity of MRI was 91.4, specificity was 88 and positive predictive value was 92.6. Wu et al¹¹ compared the accuracy of CT and MRI in determining the invasion of thyroid cartilage by and the T staging of laryngeal carcinoma with anterior vocal commissure (AVC) involvement. A total of 26 cases of laryngeal carcinomas was selected. The accuracy was 88.46% (23/26) of MRI scan and 57.69% (15/26) of CT scan respectively ($P < 0.01$). We also reported three cases who were misdiagnosed on CT or MRI about either the thyroid cartilage was involved or not, and one case of preliminary study of DWI. Compared to CT, MRI exhibited a higher accuracy rate on T staging of laryngeal carcinomas with AVC involvement. Combined utility of CT and MRI could help improve the accuracy of assessment of thyroid cartilage

involvement and T staging of laryngeal carcinomas with AVC involvement.

Becker et al¹² also observed that MR imaging is more sensitive than CT in detecting neoplastic invasion of cartilage, but the inability to differentiate between nonneoplastic inflammatory changes and tumor with MR imaging leads to overestimation of neoplastic invasion.

CONCLUSION

Authors found that although CT scan found to be better in terms of detecting laryngeal carcinoma but both modalities can be comparable.

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