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## Case report

# CT and MR imaging of laryngeal metastasis from renal cell carcinoma: A case report <sup>☆</sup>

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## ABSTRACT

Laryngeal metastasis is an extremely rare condition. To the best of our knowledge, there has been no previous report on a laryngeal metastasis from renal cell carcinoma, which describes on details of the CT and MR imaging findings. A male patient in his 80s. Laryngoscopy revealed reddish-colored masses in the right false vocal cord and in the subglottic larynx. CT and MR imaging of this case showed multiple hypervascularized lesions with a wash-out effect in the supra and subglottis of the larynx and in the right intervertebral foramen of the cervical spine. Angiography revealed a hypervascular tumor consistent with the subglottic lesion. The histopathology and immunohistochemistry findings were compatible with laryngeal metastasis from renal clear cell carcinoma. A history of postoperative renal clear cell carcinoma about 7 years ago was later confirmed, which was not stated at the time of the initial imaging evaluation. It is a possible differential diagnosis in cases of multiple hypervascular masses in the head and neck region with a history of renal carcinoma. In particular, if the contrast-enhancement pattern of the lesion on the dynamic CT is similar to that of renal cell carcinoma. It is also important to reconfirm the patient's medical history, including postoperative status.

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## Introduction

Laryngeal metastasis is an extremely rare condition. To the best of our knowledge, there has been no previous report on a laryngeal metastasis from renal cell carcinoma, which describes on details of the CT and MR imaging findings. We would like to present a rare case of hematogenous laryngeal metastasis of renal cell carcinoma with detailed description of CT and MR imaging findings.

## Case presentation

A male patient in his 80s underwent an upper gastrointestinal endoscopy for his medical check-up, about 6 months ago, which revealed an incidental laryngeal mass. Because the patient was asymptomatic at the time, he was followed-up at a local out-patient clinic. However, he subsequently presented himself to the department of otolaryngology at our hospital, because of sore throat on coughing and hemoptysis. Blood investigation was unremarkable. Laryngoscopy revealed reddish-colored masses in the right false vocal cord and in the subglottic larynx (Fig. 1) which had enlarged from six months ago. Non-contrast computed tomography (CT) revealed a soft-tissue density mass of 1.3 cm in diameter in the posterior median aspect of the subglottis (Fig. 2A). On arterial phase image of a dynamic contrast-enhanced CT showed a marked enhancement (Fig. 2B). The delayed phase showed a moderate enhancement with some poor microcystic enhancement (Fig. 2C), which was considered as a wash-out effect. Further lesions were detected on the right supraglottis/false vocal cord (Figs. 2D–F) and in the right intervertebral foramen of the cervical spine (Figs. 2G and H), which also showed the same enhancement effect as the ones seen in subglottic lesion. Angiography revealed a hypervascular tumor consistent with the subglottic lesion (Fig. 3). The subglottic lesion showed a high signal intensity on T2-weighted MR imaging (Fig. 4A), a low signal intensity on T1-weighted MR imaging (Fig. 4B), and a slightly high signal intensity (mildly decreased diffusion) on diffusion-weighted imaging (Fig. 4C). Embolization was performed from the superior laryngeal artery, a branch of the superior thyroid artery, as a preoperative management. Subglottic tumor was removed and the histopathology revealed

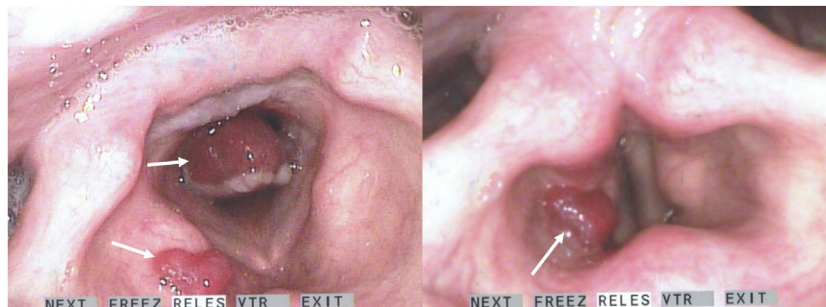
atypical epithelial cells with pale cytoplasm and mildly enlarged round nuclei, proliferating in tubular and vesicular structures. The immunohistochemistry showed AE1/AE3(+), CD34(-), CD31(-), CD10(+: focal), PAX8(+), p63(-), Calponin(-), RCC(+: focal), Calponin(-), RCC(+: focal). These findings were compatible with laryngeal metastasis from renal clear cell carcinoma. A history of postoperative renal clear cell carcinoma about 7 years ago was later confirmed, which was not stated at the time of the initial imaging evaluation. Chest and abdominal CT showed no obvious locoregional recurrence or distant metastasis of renal cell carcinoma. He was later transferred to another hospital, but unfortunately passed away. The detail of the cause of his death is unknown.

## Discussion

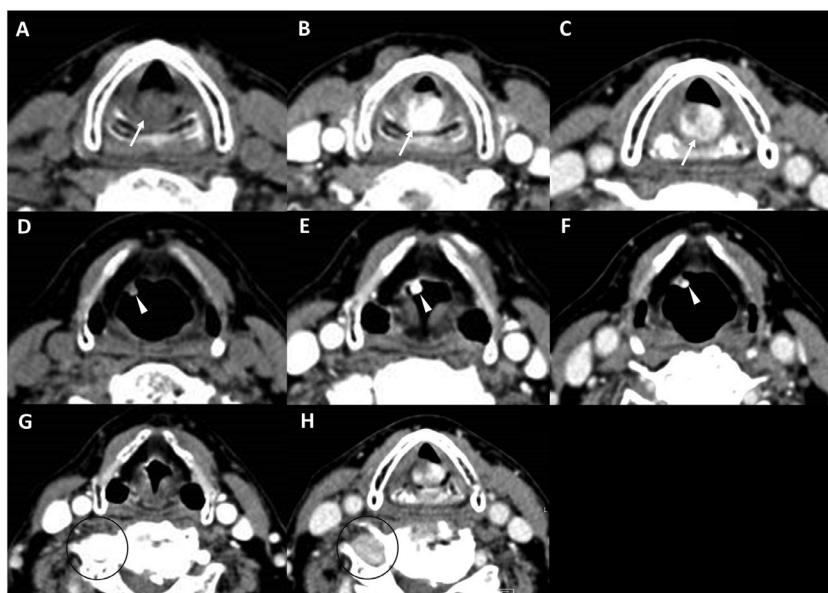
In cases when imaging studies revealed multiple hypervascularized masses in the head and neck region, metastasis of renal cell carcinoma can be an important differential diagnosis, especially if there is a known history of renal cell carcinoma.

Distant metastasis to the larynx is extremely rare, occurring in 0.09% – 0.4% of metastatic cases [1]. Ferlito et al. reported that 120 cases of laryngeal metastases were somewhat more common in males (male:female = 2:1) and ranged in age from 24–83 years [2]. Ferlito et al. reported that the most common primary lesions are malignant melanoma, renal cell carcinoma, breast cancer, lung cancer, prostate cancer, colorectal cancer, and gastric cancer, in the order of prevalence [2]. Zenga et al. reviewed 41 cases of laryngeal metastases and reported the following list of primary lesions in the order of frequency: colorectal cancer (adenocarcinoma), renal cancer (renal cell carcinoma), prostate cancer (adenocarcinoma), skin cancer (malignant melanoma), lung cancer (adenocarcinoma), soft tissue tumors of the lower extremities (liposarcoma, osteosarcoma), breast cancer (invasive ductal carcinoma of the breast), thyroid cancer (papillary thyroid carcinoma), uterine cancer (endometrial adenocarcinoma), hepatocellular carcinoma, sacral chordoma and ovarian anaplastic tumors [3].

The common sites of laryngeal metastasis are the supraglottis, subglottis, and glottis (frequency of 38.2%–18.4%–5.3%, respectively) [2]. It is thought that the glottis is less frequently metastasized compared to supraglottis and subglottis, because glottis has fewer blood and lymphatic supply [2]. In our



**Fig. 1 – Laryngoscopic view**  
Laryngoscopy showed a reddish mass in the right false vocal cord and subglottic larynx (arrows)



**Fig. 2 – CT findings**

Non-contrast CT (A) and dynamic CT (B, C) at the level of the subglottis showed a mass-like lesion (arrows). The lesion showed soft tissue density on the non-contrast CT (A), a marked enhancement on the arterial phase of the dynamic contrast CT (B), and a moderate enhancement in the delayed phase (C) with some cystic enhancement defects, which was considered as a washout. Non-contrast CT (D) and dynamic CT (E, F) at the level of the supraglottis: a nodular lesion (arrowheads) was seen on the right false vocal cord. The lesion showed soft tissue density on non-contrast CT (D), with a marked enhancement effect on arterial phase of dynamic contrast CT (E), and a moderate enhancement effect on delayed phase (F), which was also considered to be a washout. Dynamic CT (G, H) showed a lesion (within the circle) in the right intervertebral foramen of the cervical spine with the same enhancement effect as the lesions described in laryngeal region



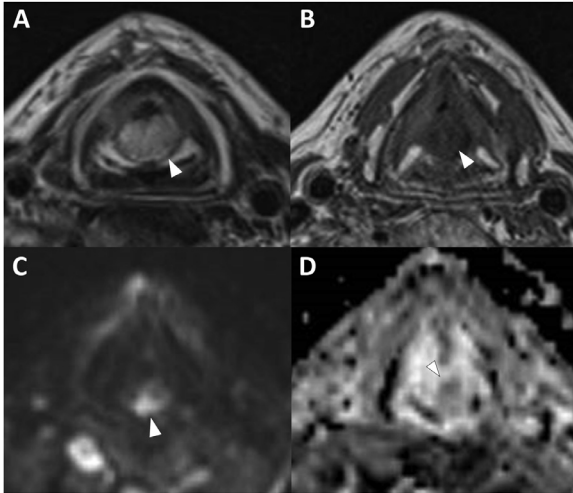
**Fig. 3 – Angiography**

Angiography showed a hypervascularized lesion (arrow) consistent with the subglottic lesion

case, metastatic lesions were found in the supra and subglottis, which was consistent with the results of this study. The possible mechanisms of laryngeal metastasis are hematogenous metastasis and lymphogenous metastasis. In the case of hematogenous laryngeal metastasis, the pathway might be via the superior thyroid artery to the laryngeal artery or

the retrograde pathway via the vertebral venous plexus. In the case of lymphogenous laryngeal metastasis, the pathway might be via the supraclavicular lymph nodes to the subglottic lymph nodes [2,4]. Since this was a metastatic case from a hypervascular renal cell carcinoma with suspected metastasis in the right intervertebral foramen of the cervical spine, without neck lymph node metastasis, it is thought that the metastasis occurred via the hematogenous laryngeal metastasis pathway. Therefore, if laryngeal metastases are present, there is a higher risk of the lesions to have spread to the whole body [1], which is consistent with this case, where metastatic lesion was also found in the right intervertebral foramen of the cervical spine.

CT and MR imaging of this case showed multiple hypervascularized lesions in the supra and subglottis of the larynx and in the right intervertebral foramen of the cervical spine. Therefore, vasculolymphatic malformation, pyogenic granuloma (lobular capillary hemangioma), metastases (of rich vascular tumor such as renal cell carcinoma), and multiple paraganglioma may also be considered as imaging differential diagnoses. On retrospective evaluation of the radiological images, the pattern of enhancement of dynamic CT of these lesions were similar to that of renal cell carcinoma (showing an early intense enhancement with subsequent washout), which is considered to be highly characteristic finding for this diagnosis. In this case, the diagnosis of laryngeal metastasis from renal cell carcinoma was made by the postoperative



**Fig. 4 – MR imaging findings**  
**The known lesion (arrowhead) showed a high signal intensity on T2-weighted image (A) and a low signal intensity on T1-weighted image (B). Diffusion-weighted imaging showed slightly high signal (C), and ADC map (D) showed low value, suggesting mild diffusion reduction**

histopathology, and only then the history of postoperative renal carcinoma was revealed. Therefore, it is important that radiologists are more aware of patient's medical history.

## Conclusion

Although laryngeal metastases from renal cell carcinoma is extremely rare, it is a possible differential diagnosis in cases of multiple hypervascular masses in the head and neck region

with a history of renal carcinoma. In particular, if the contrast-enhancement pattern of the lesion on the dynamic CT is similar to that of renal cell carcinoma. It is also important to reconfirm the patient's medical history, including postoperative status.

## Patient consent

Patient consent was obtained from the patient.

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