Section: Radiology

Case Series

ROLE OF CT CHEST IN EVALUATION OF UNILATERAL VOCAL CORD PARALYSIS: A CASE SERIES IN SOUTH INDIAN TERTIARY CARE HOSPITAL

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Abstract

In this case series we, have discussed cases of dysphonia due to unilateral vocal cord paralysis. These patients underwent computed tomography scan of the neck and upper thorax. In this case series, we have selected four patients who presented with dysphagia, likely due to vocal cord paralysis. We excluded other conditions like local laryngeal pathologies or central brain stem pathologies, which could also cause vocal cord palsy. CT scan of neck shows obliteration of the aorto-pulmonary window causing compression of the left recurrent laryngeal nerve, leading to vocal cord paralysis.

INTRODUCTION

Vocal cord palsy can be caused by any process that interferes with the normal function of the vagal nerves of recurrent laryngeal nerve. The vocal cord palsy may be the first sign of severe and extensive pathology.[1] In this case series, we have discussed mediastinal causes causing vocal cord palsy. The recurrent laryngeal nerve supplies all the intrinsic muscles of the larynx except for the cricothyroid muscle supplied by the external laryngeal nerve. The opening of the vocal cords is done by posterior cricoarytenoid muscle, which is supplied by recurrent laryngeal nerve. So anypathology involving the recurrent laryngeal nerve will lead to the paralysis of the vocal cord. The patients usually present with dysphonia due to para median position of the vocal cord.

Any condition affecting the nerve from the origin (brain stem) to the inferior border of the nerve leads to vocal cord palsy. There are many conditions like neurological, iatrogenic, malignant, vascular, infective and inflammatory causes can lead to vocal cord palsy.[2] As most of the conditions cannot be detected on local examination, Contrast enhanced computed tomography will help in identifying many causes along the path of recurrent laryngeal nerve. Due to its high resolution and multiplanar reconstruction CECT is the investigation of choice for the assessment of recurrent laryngeal nerve palsy.

CASE NUMBER: 1

A young male patient aged 25 years presented to the medical examination with hoarseness of voice, which has been gradually progressing since 3 months. No significant medical history was reported. The patient was referred to an otolaryngologist for a laryngoscopy, which evaluated both laryngeal structure and function. The examination revealed the left vocal cord is paramedian in position. The right vocal cord motility was normal.

It was therefore suggested to perform USG and CECT of the neck and thorax to search for the possible cause of unilateral vocal cord paralysis not detectable at the clinical examination.

Initial chest X ray showed gross cardiomegaly with an obliterated aorto –pulmonary window. USG of neck showed no mass lesions in the thyroid and para thyroids. There were no significantly enlarged lymphnodes. After acquiring informed consent, a Contrast enhanced CT of the neck was performed. Axial CT was planed from the base of the skull superiorly to the complete thorax, inferiorly. Axial CT sections of the neck showed dilatation of the left pyriform sinus and dilatation of the laryngeal ventricle. No enhancing mass lesion seen in the larynx. The thyroid gland appears normal. CT sections of the thorax showed gross dilatation of four chambers of the heart. There is significant dilatation of right main pulmonary artery with obliteration of aorto-pulmonary window, likely compressing the left recurrent laryngeal nerve. No

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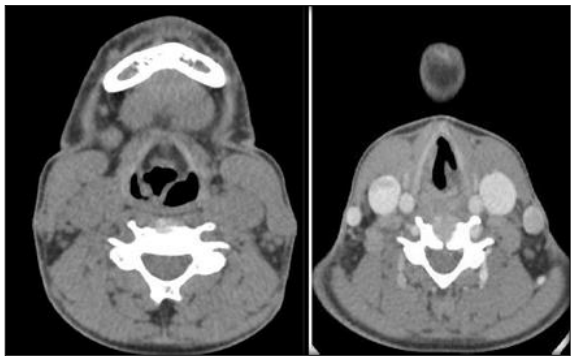
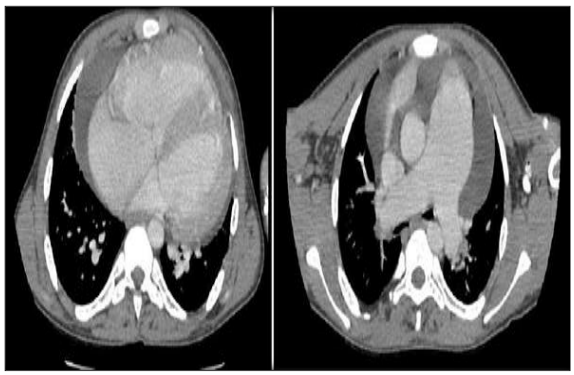
enlarged mediastinal lymph nodes were noted. No pulmonary opacities seen.

Figure 1: Chest X ray shows gross cardiomegaly with obliteration of aorto –pulmonary window





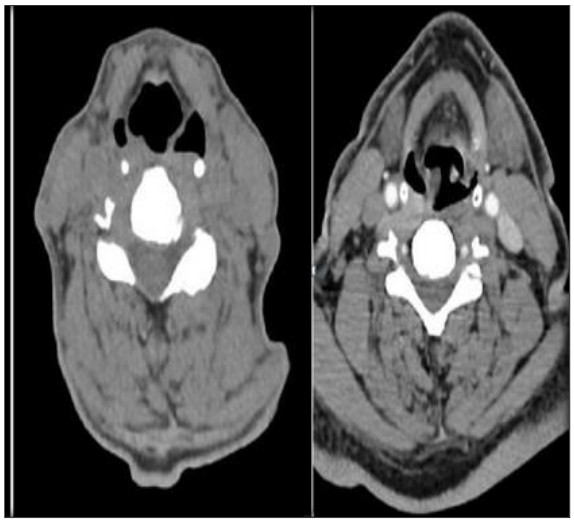
A**) and B) Axial plain CT sections at the level of the larynx shows dilated ipsilateral laryngeal ventricle. C) and D) Axial post contrast CT images shows grossly enlarged cardia with significantly dilated main pulmonary artery with obliterated aorto-pulmonary window**

CASE NUMBER: 2

A male patient aged 57 years presented to the medical department with hoarseness of voice, which has gradually progressed since 3 months. The patient has been known to be hypertensive and diabetic for 10 years and is on medication. After an initial clinical examination, the patient was referred to an otolaryngologist for a laryngoscopy. On laryngoscopy, the motility of the right vocal cord is normal, whereas the left vocal cord is immobile, and there is thickening of the aryepiglottic fold. No obvious growth was seen.

The chest x-ray showed a prominent aortic arch. Further, the patient was referred to the radiology department for USG and CECT. USG was negative. On contrast-enhanced CT scans, axial sections of the CT neck showed dilatation of the ipsilateral laryngeal ventricle and medialization of the left vocal cord. No obvious enhancing mass lesion was noted in the brainstem, in the larynx, or in the thyroid. Further CT of the chest showed fusiform aneurysm of the aorta with obliteration of the aortopulmonary window. As there are no significant findings in the neck, the most likely implicated cause was fusiform aneurysm of the aorta compressing on the left recurrent laryngeal nerve, causing left vocal cord paralysis.

Chest x ray Shows prominent aortic arch with unfolding of aorta and its is causing mild displacment of trachea to the right side



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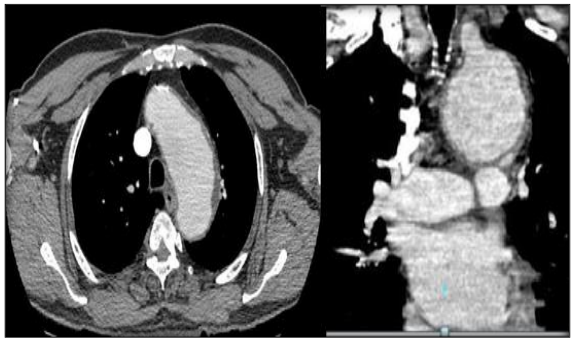
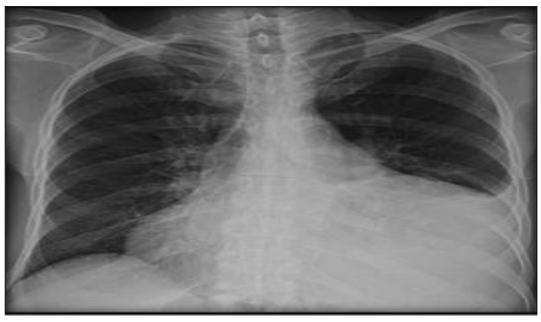


And b) Axial CT section at the level of the larynx shows dilated ipsilateral laryngeal ventricle and thickened aryepiglottic fold. c) Axial CT section at the level of chest shows dilated arch of aorta. d) Coronal reconstructed CT section of neck and upper thorax shows fusiform aneurysm of the aorta.

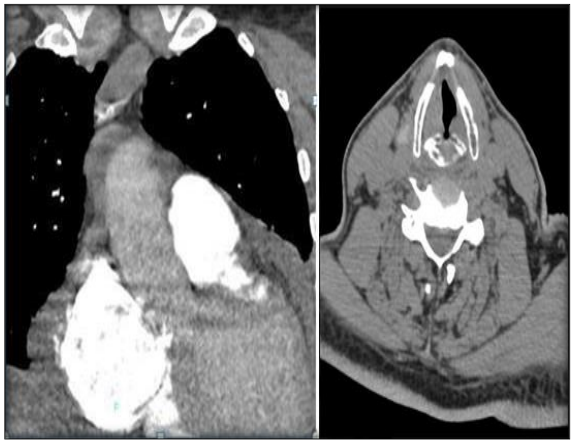
CASE NUMBER: 3

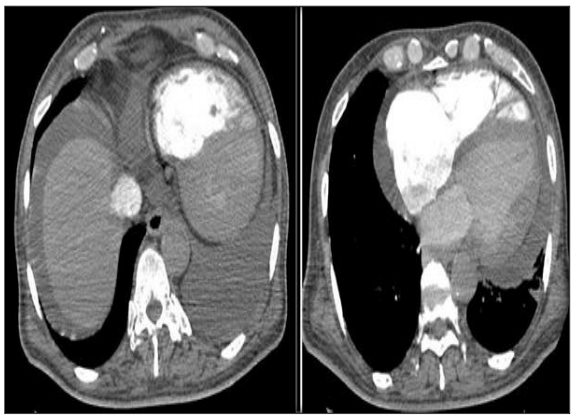
A male patient aged 60 years presented to the otolaryngology department with hoarseness of voice, which has gradually progressed since 8 months. The patient also complains of breathlessness and pedal edema. The patient has been a known hypertensive for 20 years and is on medication for it. Further laryngoscopic examination revealed the paramedian position of the left vocal cord, which is immobile. The right vocal cord appears to be normal. No mass is seen.

Further USG neck and CECT neck was advised to find out the cause of vocal cord palsy. USG neck showed no positive findings. The thyroid gland appears to be normal. No significantly enlarged lymphnodes were seen. A contrast-enhanced CT of the neck and thorax was performed, which revealed cardiomegaly with pericardial effusion and pleural effusion in the thorax sections, medialization of the vocal cord, and a thickened aryerpiglottic fold in the axial neck sections. No enhancing mass lesion was seen in the neck or thorax. No mediastinal lymphnodes were seen. No pulmonary opacities were seen. The pleural fluid aspirate was sent for histopathological / cytological examination and culture, sensitivity. The aspirate turned out to be transudate in nature. The culture and sensitivity report was negative.



Chest X ray shows enlarged cardia with cardiac shadow obscuring left lower zone and blunting of left costophrenic angle seen. Left pleural effusion was seen





A) Coronal reconstructed CT section of the upper thorax shows cardiomegaly with pericardial effusion. B) Axial CT sections of the neck showed medialization of the vocal cord and a dilated ipsilateral laryngeal ventricle. C and D) An axial CT section at the level of the upper abdomen shows ascites and left pleural effusion.

CASE NUMBER: 4

A female patient aged 63 presented to the otolaryngologist with hoarseness of voice, which has been gradually progressing for 6 months. The patient has been known to be hypertensive for 8 years and is on medication. Further patient underwent laryngoscopy, and it revealed the paramedian position of the left vocal cord. The right vocal cord appears normal. No significant mass lesion was visible on a fibroscopy.

To identify the cause, the patient underwent USG neck. The USG neck was normal. As the patient did not gave consent for contrast study. Only plain CT scan of neck and chest was done. On contrast-enhanced CT, axial CT sections show thickening of aryepiglottic folds and dilatation of the laryngeal ventricle, and further CT sections of the chest show saccular aneurysm of the aorta with aortic wall calcifications. No significantly enhanced mass lesion was seen in the larynx, thyroid, or mediastinum. No enlarged mediastinal lymphnodes were seen. All the other structures are normal except for the saccular aneurysm of the aorta.

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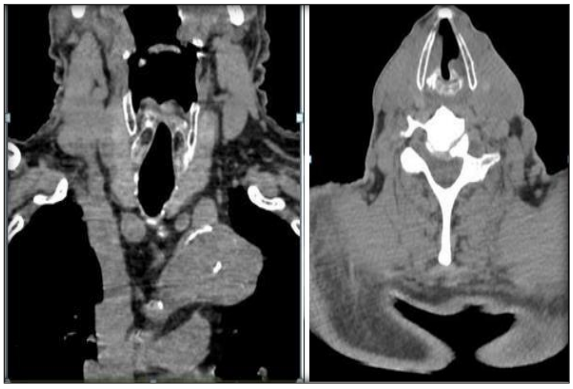
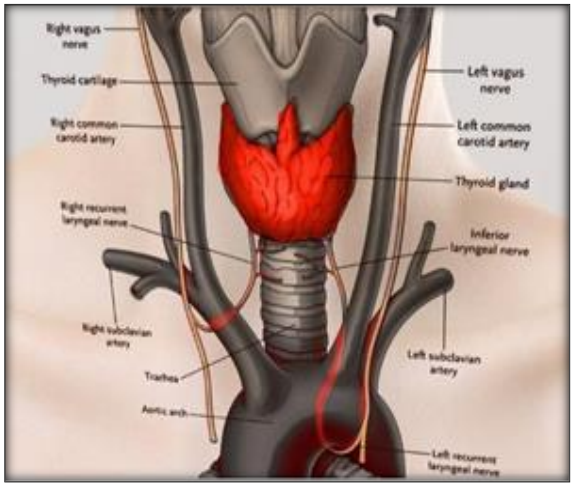


A) Coronal reconstructed CT image shows saccular aneurysm of aorta with aortic wall calcifications seen. B) Axial CT sections show thickening of aryepiglottic fold and dilatation of the laryngeal ventricle

DISCUSSION

Vocal cord paralysis can be caused by any process that interferes with the normal function of the vagal nerve or recurrent laryngeal nerves. It may be a sign of extensive and severe pathology.[3] Radiologists must therefore be able to recognize the imaging findings of vocal cord paralysis. Vocal cord paralysis may be caused by a variety of mediastinal disease entities, including various neoplastic, inflammatory and vascular conditions and may be presenting symptom of an otherwise clinically occult disease. The radiologist must be aware of the spectrum of diseases that can result in vocal cord paralysis and should include mediastinum to the level of the aortopulmonary window or brachiocephalic artery in CT studies.

The larynx is supplied by the recurrent and superior laryngeal nerves, which are branches of the vagus nerve. The superior laryngeal nerve will divide into two branches: internal and external laryngeal nerve.The internal laryngeal nerve will provide the sensory supply to the larynx up to the glottis while the external laryngeal nerve will give motor branch to the cricothyroid muscle.The recurrent laryngeal nerve on the right side will form a loop around the subclavian artery and on left side, it will loop around the arch of aorta and then ascends in the trachea- esophageal groove.The recurrent laryngeal nerve will give motor innervations to all the intrinsic muscles of the larynx except for cricothryoid and it will give sensory supply to the mucosa inferior to the glottis.



Because of its longer course and its extension into the mediastinum, the left side of recurrent laryngeal nerve is more commonly affected than the right side. On left side, aortic aneurysm, cardiomegaly, upper lobe tumors have implicated as potential causes, whereas on right side, supraclavicular tumors and aneurysms of the subclavian artery may be the cause.[4]

The most specific findings of unilateral vocal cord paralysis are; 1) widening of the laryngeal ventricle, 2) medial deviation and thickening of the aryepiglottic fold, and 3) dilatation of the pyriform sinus.[5]

Chest pathologies include mediastinal mass, vascular aneurysm, lung mass and lung tumors can involve and affect the left recurrent laryngeal nerve and result in vocal cord palsy. The mediastinal masses appear to be the most common among chest pathologies to cause vocal cord palsy. This case series demonstrates the importance of the CT upper chest to identify the underlying etiology of vocal cord palsy.

CONCLUSION

Recurrent laryngeal nerves can be affected more commonly on the left side due to their long course. Various mediastinal pathologies causing obliteration of aorto- pulmonary window can compress the left recurrent laryngeal nerve and result in ipsilateral vocal cord palsy. So radiologist must be aware of various causes resulting in vocal cord paralysis. The CT protocol should include the base of the skull and the lower extent should cover the entire mediastinum, which will help us rule out mediastinal pathologies. Additionally, lung window is also suggested to look for apical lung masses.

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