

# Bilateral recurrent laryngeal nerve palsy following anterior cervical surgery subsequent to contralateral apical lung radiotherapy

Timothy Woodacre\*, Nooshin Jahromi, Geraldine Goh, Thomas Clifton, David Dillon

Royal Perth Hospital State Spinal Unit, Perth, Australia.

\*Correspondence: Timothy Woodacre, Royal Perth Hospital State Spinal Unit, Victoria Square, Perth WA 6000, Australia. Email: timothy.woodacre@nhs.net

**How to cite this article:** Woodacre T, Jahromi N, Goh G, et al. Bilateral recurrent laryngeal nerve palsy following anterior cervical surgery subsequent to contralateral apical lung radiotherapy. *Arch Clin Cases*. 2022; 9(4):154-156. doi: 10.22551/2022.37.0904.10223

## ABSTRACT

Unilateral recurrent laryngeal nerve palsy is a potential complication of the anterior approach for cervical surgery. It is a rare complication of radiotherapy to the neck. Only one case has been reported following radiotherapy apical lung cancer. It can result in unilateral vocal cord paralysis. We report a patient who demonstrated bilateral vocal cord paralysis immediately following right-sided anterior cervical surgery, with significant consequences, including aphonia, respiratory distress and subsequent takotsubo cardiomyopathy. She was diagnosed with acute, (temporary) post-operative right recurrent laryngeal nerve palsy, on the background of undetected and previously asymptomatic left recurrent laryngeal nerve palsy following radiotherapy for left apical lung cancer. The possibility of recurrent laryngeal nerve palsy should be considered in patients with previous apical lung cancer and/ or radiotherapy. Patients undergoing subsequent anterior cervical surgery should be considered for the appropriate precautions in the form of same-side surgery or pre-operative investigation for vocal cord paralysis.

**KEYWORDS:** Spinal Surgery; Cervical; Radiotherapy; Nerve Palsy

## INTRODUCTION

Unilateral recurrent laryngeal nerve palsy can occur during the anterior approach for cervical spine surgery [1]. It occurs either from neural traction or from direct injury. It is typically temporary (in the case of the former) lasting a few days to months, but can be permanent [1]. It results in unilateral vocal cord paralysis. This may present as dysphonia or dysphagia, or it may be entirely asymptomatic.

Bilateral recurrent laryngeal nerve palsy is a possible complication of bilateral anterior approaches to the neck, such as during thyroidectomy [2]. It results in bilateral vocal cord paralysis and presents with stridor, respiratory distress and aphonia [2].

Radiotherapy also has the potential to cause damage to local nerves. This can be from direct damage or from compression from fibrosis and scarring of adjacent tissue from radiation toxicity. Unilateral recurrent laryngeal nerve injury has been documented as a complication from direct radiotherapy to the neck [3]. There has been one published case of unilateral recurrent laryngeal nerve injury following radiotherapy to the apex of the thorax, with chronic fibrosis damaging the nerve in its course under the subclavian vessels in this region [4].

Patients undergoing anterior cervical spine surgery who are at risk of having sustained a previous insult to a recurrent laryngeal nerve (e.g. from previous anterior neck surgery) require pre-operative investigation to ensure this is not the case and that they do not have a pre-existing unilateral vocal cord paralysis [5,6]. This prevents contralateral surgery causing a contralateral recurrent laryngeal nerve palsy and subsequent bilateral vocal cord paralysis, with the aforementioned consequences.

## CASE PRESENTATION

A 60-year-old woman presented with neck pain and facial trauma after falling forwards from standing height. She sustained a forehead strike to the floor and a subsequent hyper-extension injury to the cervical spine. She had a history of a left apical lung cancer treated with radiotherapy. Details of this were initially sparse due to a language barrier and the treatment having occurred in a different hospital. Examination revealed facial injuries and central cervical spine tenderness, but no neurological deficit.

A CT scan demonstrated no acute spinal fracture but was suspicious of a C5/6 disc injury. Subsequent MRI of the cervical spine confirmed an extension 3 column discoligamentous injury at C5/6 with tear of the C5/C6 disc, anterior longitudinal ligament and ligamentum flavum, injury to the interspinous and nuchal ligaments, avulsion

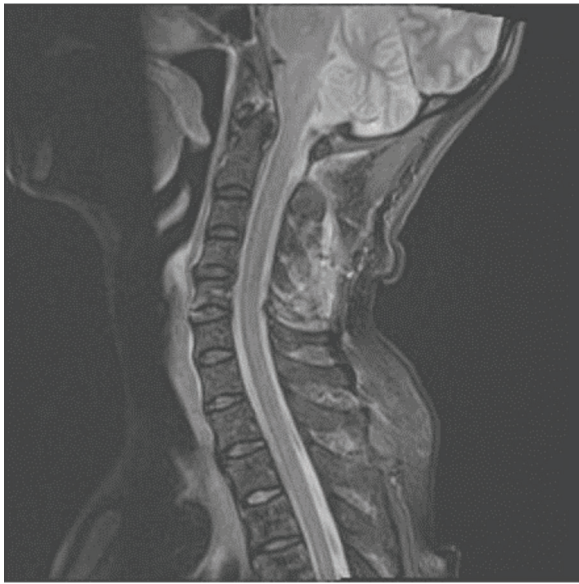
Received: September 2022; Accepted after review: November 2022; Published: December 2022.



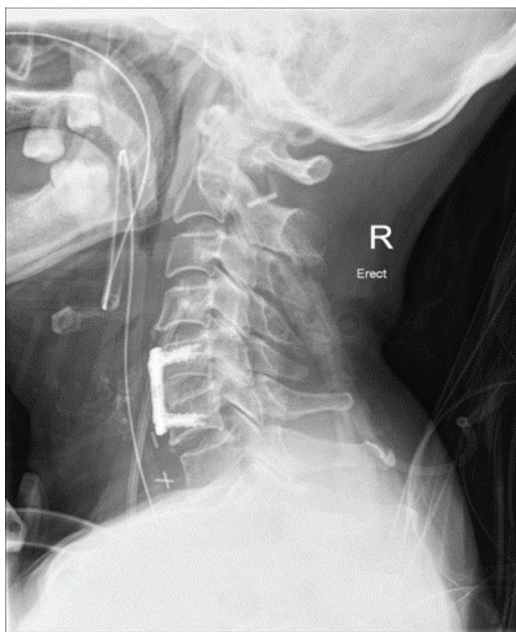
fracture of the anterior inferior C5 vertebral body and a fracture through the C5 spinous process [Figure 1].

The patient underwent a C5/C6 anterior cervical spine discectomy and fusion (ACDF) with iliac crest bone autograft [Figure 2]. A right-sided anterior cervical approach was performed. The surgery itself was uncomplicated.

Post extubation, whilst still in theatre, the patient suffered immediate stridor and respiratory distress. There were no clinical signs of a causative compressive haematoma. The patient was re-intubated and transferred to the Intensive care



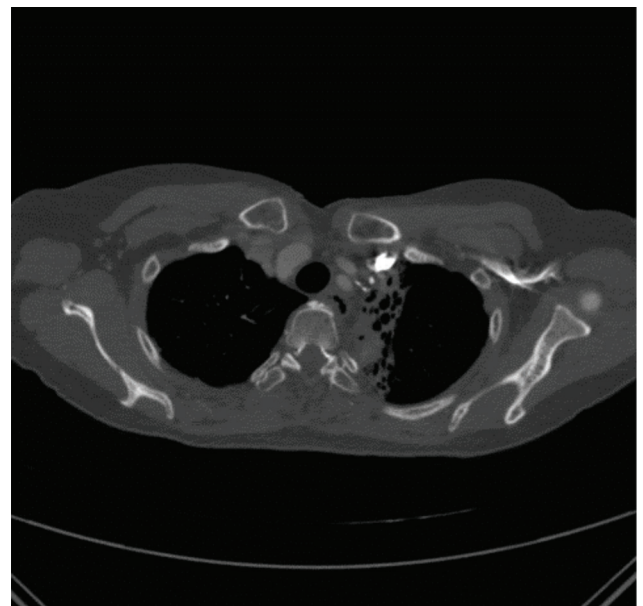
**Fig. 1.** Sagittal MRI scan of the cervical spine demonstrating a 3 column disco-ligamentous injury at C5/6.



**Fig. 2.** Sagittal post-operative radiograph of the cervical spine.

unit (ICU) for monitoring. A post operative CT scan of the cervical spine confirmed no causative tracheal compression. Following a second extubation, stridor and respiratory distress redeveloped and aphonia and dysphagia were noted. Laryngeal examination by fiberoptic nasoendoscopy revealed a bilateral vocal cord palsy. The patient remained agitated from her stridor and dysphagia. 48 hours later she developed chest pain on inspiration. Her ECG showed septal/lateral T Wave inversion in association with rise in troponin levels. Transthoracic echocardiogram showed apical to mid-wall circumferential severe hypokinesis with basal segment sparing on left ventricle, consistent with Takotsubo cardiomyopathy. Diagnostic coronary angiogram also suggested a diagnosis of stress cardiomyopathy. The patient was managed conservatively for this. The patient did however undergo a tracheostomy to allow safe conscious ventilation and to reduce her respiratory distress, and required nutritional support due to difficulties with dysphagia. Over the next 21 days her swallow and phonation returned and her tracheostomy was removed. Repeat fiberoptic nasoendoscopy revealed persistent left sided vocal cord paralysis but improved right vocal cord function. She was safely discharged from hospital.

A diagnosis was made of bilateral recurrent laryngeal nerve palsy – an acute, temporary, right recurrent laryngeal nerve palsy secondary to her operation, and a chronic, pre-existing, asymptomatic left recurrent laryngeal nerve palsy following radiotherapy for left apical squamous cell carcinoma. This diagnosis was made provisionally on clinical suspicion alone, and later confirmed following review of the patient's historic scans from another institution. These included an axial CT scan demonstrating paramediastinal fibrosis in the upper left lung consistent with post-radiotherapy change [Figure 3], and a PET CT demonstrating left sided apical soft tissue thickening and scarring in the region of the recurrent laryngeal nerve [Figure 4].



**Fig. 3.** Axial CT scan of lung apices demonstrating paramediastinal fibrosis in the upper left lung consistent with post-radiotherapy change.



**Fig. 4.** Coronal PET CT of lung apices demonstrating left sided apical soft tissue thickening and scarring in the region of the recurrent laryngeal nerve.

## DISCUSSION

Precautions are advocated in patients who are at risk of pre-existing/ previous recurrent laryngeal nerve palsy from previous insult (surgery/ radiotherapy) to the anterior of the neck, prior to undertaking further anterior cervical spine surgery [5,6]. One precaution is to perform surgery on the ipsilateral side as the previous insult. This avoids any potential injury to the contralateral recurrent laryngeal nerve. However this potentially involves the risks of operating in an area of distorted anatomy and scar tissue and the complications this can cause. The other precaution is to first perform laryngoscopy. This assesses the function of the vocal cords, and hence recurrent laryngeal nerve. An intact vocal cord on the side of previous surgery indicates no previous recurrent laryngeal nerve palsy. An operation can therefore be performed on the contralateral side of the neck (an easier approach through virgin tissue with no hindrance from previous scarring) because even if a contralateral recurrent laryngeal nerve palsy subsequently occurs, there is no risk of a bilateral palsy and bilateral vocal cord paresis, nor the serious consequences of this [2].

Recurrent laryngeal nerve injury and vocal cord palsy from radiotherapy to the lung apex is either very rare, with only one previously published case [4], is missed from being asymptomatic, or is potentially missed from a delay in the development of fibrosis and the onset of symptoms

following radiotherapy, preventing any association being made. This case however highlights that recurrent laryngeal nerve injury and vocal cord palsy from radiotherapy to the lung apex is possible, and that the consequences of this being missed and a bilateral nerve palsy occurring from subsequent intervention are severe. We therefore suggest that patients who have undergone apical lung radiotherapy but who require anterior cervical surgery are treated with the same precautions, as previously discussed, as those who have had previous neck surgery/radiotherapy.

## CONCLUSION

The possibility of recurrent laryngeal nerve palsy should be considered in patients with previous radiotherapy for apical lung cancer. Bilateral recurrent laryngeal nerve palsy and subsequent vocal cord paralysis is a serious and life-threatening condition. Patients who have undergone apical lung radiotherapy yet who require subsequent anterior cervical surgery should be treated with the appropriate precautions, or screened, for the potential of an associated recurrent laryngeal nerve injury.

## Competing interests

The authors declare that they have no competing interests.

## Consent for publication

Written informed consent from the patient has been taken and is available for review by Editor in chief of the journal.

## REFERENCES

- Gokaslan ZL, Bydon M, De la Garza-Ramos R, et al. Recurrent Laryngeal Nerve Palsy After Cervical Spine Surgery: A Multicenter AOSpine Clinical Research Network Study. *Global Spine J.* 2017; 7(1 Suppl):53S-57S. PMID: 28451492; PMCID: PMC5400187, doi: 10.1177/2192568216687547.
- Sanapala A, Nagaraju M, Rao LN, Nalluri K. Management of bilateral recurrent laryngeal nerve paresis after thyroidectomy. *Anesth Essays Res.* 2015; 9(2):251-253. PMID: 26417137; PMCID: PMC4563973, doi: 10.4103/0259-1162.152419.
- Jaruchinda P, Jindavijak S, Singhavarach N. Radiation-related vocal fold palsy in patients with head and neck carcinoma. *J Med Assoc Thai.* 2012; 95 Suppl 5:S23-28. PMID: 22934441.
- Carpenter TJ, Rosenzweig KE. Vocal cord paralysis after stereotactic body radiation therapy to the left lung apex. *J Thorac Oncol.* 2014; 9(11):e80-81, doi: 10.1097/JTO.0000000000000208.
- Paniello RC, Martin-Bredahl KJ, Henkener LJ, Riew KD. Preoperative laryngeal nerve screening for revision anterior cervical spine procedures. *Ann Otol Rhinol Laryngol.* 2008; 117(8):594-597. PMID: 18771076, doi: 10.1177/000348940811700808.
- Curry AL, Young WF. Preoperative laryngoscopic examination in patients undergoing repeat anterior cervical discectomy and fusion. *Int J Spine Surg.* 2013; 7:e81-83. PMID: 25694909; PMCID: PMC4300976, doi: 10.1016/j.ijsp.2013.05.002.