CASE REPORT

A rare manifestation of a multisystemic disease: a case of vocal cord palsy secondary to sarcoidosis

Saleem Mastan,¹ Rajeev Advani,¹ Nicola Stobbs,¹ Nirmal Kumar²¹Royal Albert Edward Infirmary, Manchester, Manchester, UK²Department of ENT, Royal Albert Edward Infirmary, Wigan, UK**Correspondence to**Dr Saleem Mastan,
s.mastan@doctors.org.uk

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SUMMARY

We describe a rare case of recurrent laryngeal nerve neuritis secondary to sarcoidosis. A 40-year-old woman presented with persistent dysphonia. This was her first episode of dysphonia with no reports of laryngeal trauma. Fibre-optic laryngoscopy revealed a normal nasal passage, nasopharynx and pharynx. The supraglottic structures were all unremarkable; however, inspection of the true vocal cords revealed a left vocal cord palsy that was identified as being in a paramedian position. Radiological investigation showed mediastinal adenopathy that measured up to 20 mm in the short axis diameter. Histological examination showed granulomatous lymphadenitis of the lymph node with a central area of sclerosis surrounded by discrete, non-caseating granuloma. Stains for acid-fast bacilli were negative. The morphological features were suggestive of sarcoidosis. The lymphadenopathy distribution and size did not suggest left recurrent laryngeal nerve compression, giving a subsequent diagnosis of recurrent laryngeal nerve neuritis secondary to sarcoidosis.

BACKGROUND

Dysphonia is a common reason for referral to the otolaryngology specialist. The aetiology of this symptom can be a diagnostic challenge due to the variety of potential differential diagnoses. These range from benign and malignant processes to neurological, inflammatory and metabolic conditions. A thorough history, clinical examination and systematic work up are key to accurate diagnosis.

Vocal cord paralysis is a rare complication of the multisystemic inflammatory disease, sarcoidosis.¹ Sarcoidosis initially presenting with hoarseness due to vocal cord paralysis has been rarely reported.²

This case highlights a rare presentation of a multisystemic disease, the need for a breadth of clinical knowledge by specialists and the importance of a multidisciplinary team (MDT) approach to patient care.

CASE PRESENTATION

A 40-year-old woman was referred to the otolaryngology clinic with a 3-month history of persistent dysphonia. She was otherwise fit and well with no history of gastro-oesophageal reflux disease, no other significant medical comorbidities and she was not taking any regular medications. She was a non-smoker and teetotal, and gave no significant family history of medical diseases.

Associated with her hoarseness of voice, she had a diagnosis of anterior uveitis, for which she was under the care of an ophthalmologist. This was her

first episode of hoarseness of voice and she had not sustained any form of laryngeal trauma. She did not report any other symptoms of upper aerodigestive tract disease and there were no associated red flag symptoms of dysphagia, odynophagia, haemoptysis or referred otalgia. In addition, she had no symptoms of respiratory disease, arthralgia or systemic B symptoms (fever, night sweats or unintentional weight loss).³

Fibre-optic laryngoscopy revealed a normal nasal passage, nasopharynx and pharynx. The supraglottic structures were all unremarkable; however, on inspection of the true vocal cords, a left vocal cord palsy was identified and found to be in a paramedian position. The right true vocal cord, although moving adequately, was not fully compensating for the left vocal cord palsy, leading to incomplete glottic closure on phonation.

A CT of the head, neck and thorax scan was arranged to identify any underlying pathological process. This paid particular attention to the entire course of the left vagus nerve. This was unremarkable apart from bilateral hilar and mediastinal lymphadenopathy, which prompted referral to the respiratory physician.

Pulmonary function tests revealed a restrictive defect on spirometry. Bronchoscopy and mediastinoscopy were arranged for further evaluation and for the attainment of tissue for diagnosis. Histological assessment revealed granulomatous lymphadenitis with morphological features suggestive of sarcoidosis.

Under the care of the rheumatologists, the patient was treated for sarcoidosis and was initially started on a 6-week course of oral prednisolone, and a reducing regime of prednisolone followed this. However, the patient unfortunately suffered from systemic side effects and therefore the steroid therapy was stopped. Other treatment included speech and language therapy. This helped to improve voice quality and reduced the risk of aspiration.

One year following initial diagnosis, the patient's sarcoidosis is stable with no new or active symptoms. While her left vocal cord palsy persists, her dysphonia is not very troublesome and she communicates well.

INVESTIGATIONS

Assessment of dysphonia by the otolaryngology specialist includes a minimum work up of clinical history, clinical examination and fibre-optic laryngoscopy. In addition, imaging modalities such as CT, ultrasound scanning and MRI may be used to

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evaluate the aetiology. Stroboscopy can sometimes be used to further evaluate dysphonia, especially in the specialised setting of an MDT voice clinic, run alongside speech and language therapists.

Fibre-optic laryngoscopy revealed that the left vocal cord was paralysed with no movement on phonation and was lying in a paramedian position. This indicates complete left vocal cord paralysis. The right vocal cord was moving normally. However, despite some degree of compensation from the right vocal cord to close the glottic inlet, there still remained a phonatory gap. Fibre-optic laryngoscopy has been shown to have high specificity in identifying vocal cord paralysis.⁴

In the absence of an obvious structural cause for the patient's vocal cord palsy, a CT scan of the head, neck and thorax was conducted to visualise structures lying in close proximity to the left vagus nerve, which branches into the recurrent laryngeal nerve and innervates the left vocal cord. The use of CT scanning in the investigation of vocal cord paralysis has been widely described⁵ and a lesion within or compressing the vagus nerve anywhere along its complex course can cause dysphonia.

The CT of the neck and thorax showed mediastinal adenopathy with enlarged prevascular, pretracheal, precarinal and subcarinal as well as right paraoesophageal nodes (figure 1). The mediastinal lymph nodes measured up to 20 mm in the short axis diameter. There were also bilateral enlarged hilar lymph nodes. This scan indicated an initial differential diagnosis of sarcoidosis, lymphoma and tuberculosis, although the latter was less likely. The left recurrent laryngeal nerve loops underneath the aortic arch, yet there was no significantly large lymphadenopathy here, which would otherwise compress the left recurrent laryngeal nerve (figure 2). The arrow points to the aortopulmonary bay lymph nodes, which are not significantly large enough to cause direct compression.

Baseline spirometry measurements showed that forced vital capacity (FVC) was reduced and the forced expiratory volume in 1 s/FVC ratio was increased. This is consistent with a

restrictive defect, which is consistent with a diagnosis of sarcoidosis. Lung function tests are additionally used for the monitoring of disease progression and assessment of resolution in sarcoidosis.⁶

To confirm the diagnosis, our patient was referred to the cardiothoracic surgery department for a bronchoscopy, mediastinoscopy and mediastinal lymph node biopsy. Histological examination showed granulomatous lymphadenitis of the lymph node with a central area of sclerosis surrounded by discrete, non-caseating granuloma. Stains for acid-fast bacilli were negative. The morphological features were suggestive of sarcoidosis, and this combined with clinical and radiological correlation confirmed our diagnosis. The size and location of the lymphadenopathy made the likelihood of direct compression of the recurrent laryngeal highly unlikely. Therefore, a subsequent diagnosis of recurrent laryngeal nerve neuritis secondary to sarcoidosis was made.

DIFFERENTIAL DIAGNOSIS

Dysphonia is a common presenting symptom to the otolaryngology outpatient department. Although acute laryngitis is the most common transient cause of dysphonia, there is a vast array of pathologies that can give rise to this symptom. The aetiology of dysphonia can be broadly classified into laryngeal and extralaryngeal pathology.

With regard to laryngeal pathology, these causes can be classified into benign and neoplastic. Benign conditions include laryngitis, muscle tension dysphonia, laryngopharyngeal reflux (LPR) or benign vocal cord lesions; and the most common neoplastic condition is squamous cell carcinoma. Symptom duration lasting for less than 2 weeks is more likely to be due to an infectious cause. However, the possibility of malignancy has to be ruled out. This is carried out with a good history and clinical examination, searching for potential red flag upper aerodigestive tract symptoms (referred otalgia, haemoptysis, dysphagia, odynophagia, neck lump, smoking history). This may be combined with histological evidence via biopsy to rule out malignancy, as was performed in this case.

Viral upper respiratory tract infections are the most common causes of laryngitis, but it can also be due to fungal and bacterial infections, although these are less common.⁷ Variable hoarseness in the absence of a vocal cord lesion is likely due to muscle tension dysphonia.⁸ Whereas LPR presents as intermittent hoarseness associated with coughing and throat clearing among other variable symptoms. Unilateral benign vocal cord lesions include vocal polyp, granuloma and papilloma, whereas bilateral

Figure 1 CT scan showing precarinal lymphadenopathy—in keeping with sarcoidosis. The arrow points to the aortopulmonary bay lymph nodes.

Figure 2 CT scan showing the absence of significant large lymphadenopathy underneath the aortic arch—the route taken of the left recurrent laryngeal nerve. The arrow points to the aortopulmonary bay lymph nodes.

benign vocal cord lesions include vocal cord nodules, papilloma and Reinke's oedema.⁸ Persistent hoarseness lasting more than 6 weeks that is progressive in nature and is associated with red flag upper aerodigestive tract symptoms is suggestive of laryngeal cancer.

Multisystemic extralaryngeal disease may also cause dysphonia although this is much less common than laryngeal pathology. Hypothyroidism and acromegaly are endocrine disorders associated with hoarseness. Rheumatoid arthritis, an inflammatory disorder, can affect the larynx and cause hoarseness. Sarcoidosis (a multisystemic granulomatous disorder) and amyloidosis (a multisystemic haematological disorder of protein deposition) are even rarer causes of dysphonia.

In this case, the dysphonia was due to unilateral vocal cord paralysis. Unilateral paralysis is most commonly iatrogenic following thyroid, neck or cardiothoracic surgery.^{9–11} Although cerebellar vascular accident, trauma, inflammatory conditions or mediastinal and lung tumours can have the same effect. If dysphonia is due to vocal cord paralysis, malignancy must be ruled out by thorough radiological examination of the course of the vagus and recurrent laryngeal nerve, paying particular attention to the mediastinum and left lung apices. Bilateral vocal cord paralysis is extremely rare and is most commonly iatrogenic following surgery.

OUTCOME AND FOLLOW-UP

The patient was treated for her diagnosis of sarcoidosis. Steroid treatment is the mainstay of treatment for sarcoidosis and she was initiated on a 2-week course of 40 mg oral prednisolone, with a subsequent reducing dose of 20 mg to follow for 4 weeks. However, this patient started to suffer from weight gain and acne due to the steroids, and therefore treatment was stopped after 4 weeks. To improve the dysphonia, in addition to the systemic steroid treatment, speech and language therapy was started with the aim of improving the quality of her voice, and reducing the risk of aspiration. The therapy aimed to improve right vocal cord compensation, and therefore glottic closure and synchronisation of the vocal cord vibrations during phonation. It is a common conservative method that is often supported by physical procedures. Surgical intervention was not suggested at this stage, as surgery is not usually indicated unless there has been no improvement after 6–12 months and the patient remains symptomatic.

At 1-year follow-up her sarcoidosis is under control and is in remission, and her dysphonia is improving.

DISCUSSION

The recurrent laryngeal nerve is a myelinated nerve. It is a branch of the vagus nerve. As the vagus nerve leaves the medulla, the fibres of the recurrent laryngeal nerve are situated anteriorly to it. The nerve fibres rotate medially until they separate from the vagus. The left recurrent laryngeal nerve arises from the vagus just below the aortic arch and loops underneath the aortic arch before ascending up the tracheo-oesophageal groove. It then enters the larynx deep to the inferior constrictor muscle and posterior to the cricoarytenoid joint.

Sarcoidosis is a multisystem disease and has a multitude of clinical manifestations. It is a disease involving abnormal collections of inflammatory cells or granulomas that can form as nodules in multiple organs, usually affecting the lung and associated lymph nodes, but can affect any organ.¹² Furthermore, the severity of sarcoidosis can range from relatively asymptomatic to life threatening. Its initial presentation also varies, presenting as either an acute illness with a relatively sudden onset,

or as a subacute disease with an insidious onset. This case amply shows a subacute insidious presentation of sarcoidosis.¹³

The literature search strategy was conducted via the NHS ATHENS evidence website, and an advanced healthcare database search was conducted. The search included the following databases: Cochrane, TRIP, MEDLINE, PubMed and DARE Centre for Review and Dissemination. The search was conducted on 6 September 2014.

We used the following search terms: sarcoidosis, vocal cord palsy and vocal cord paralysis.

We found a total of five cases of mediastinal lymphadenopathy associated with recurrent laryngeal nerve causing vocal cord paralysis. Vocal cord paralysis is usually left sided or bilateral due to the increased lymphatic drainage on the left side.^{1 14–17} The left recurrent laryngeal nerve has a distance of 12 cm, compared with 6 cm for the right recurrent laryngeal nerve. Owing to its longer course, it is more susceptible to damage compared with the right recurrent laryngeal nerve. Reports of unilateral left vocal cord palsy are more common probably due to compression by the bulky mediastinal nodes on the left recurrent laryngeal nerve at the level of the arch of the aorta.¹

There have been two reported cases of bilateral vocal cord paralysis due to sarcoidosis. One case resulted from bilateral mediastinal adenopathy. The other case reported how cranial polyneuritis coupled with bilateral paratracheal mediastinal adenopathy resulted in bilateral vocal cord paralysis.^{2 14 18}

There were two more unusual presentations in the reported literature. The initial case was of a pulmonary sarcoid node causing extrinsic pressure on the patient's left main pulmonary artery and recurrent laryngeal nerve, which subsequently resulted in a decreased parenchymal pulmonary perfusion and left vocal cord paralysis. The second case reported of a vocal fold mass, which showed histological evidence of sarcoidosis. This also presented with hoarseness.^{19 20}

From the above reported literature, it is clear that recurrent laryngeal nerve compression secondary to a diagnosis of sarcoidosis is a rare but important differential diagnosis for dysphonia. In sarcoidosis, compression of the nerve by mediastinal lymph nodes is more likely to cause unilateral vocal cord palsy, but this case highlights that sarcoidosis associated mononeuritis is also a potential sequelae of this disease. Knowledge about this unusual sarcoidosis complication needs highlighting and should be considered by clinicians in cases that may initially appear to be idiopathic in nature.

Learning points

- ▶ Dysphonia is usually due to a laryngeal pathology, but rarer systemic causes must be considered once malignancy and structural pathology have been ruled out.
- ▶ This case illustrates the importance of a multidisciplinary team approach to patient care.
- ▶ Sarcoidosis can present as a subacute disease with an insidious onset. Dysphonia is a rare but important initial presentation.

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