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CLINICAL RECORD

Cervical osteophytes causing vocal fold paralysis: case report and literature review

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Abstract

Objectives: To increase awareness of cervical osteophytes as an extremely rare cause of recurrent laryngeal nerve palsy; to outline the clinical approach to patients with unilateral vocal fold paralysis and to provide an update on the current management of osteoarthritis and osteophytes.

Case report: An elderly man presented with right unilateral vocal fold immobility and a small phonatory gap. By a diagnosis of exclusion, a cervical osteophyte at the level of the sixth and seventh cervical vertebrae was shown to be the cause. The patient responded to speech therapy and no further intervention was required.

Method: A literature review, using Medline, identified only one previously published case of vocal fold paralysis due to osteophytes secondary to osteoarthritis.

Conclusion: The aetiology of unilateral paralysis of the hemilarynx must be fully investigated, as the innervating system has a protracted course, particularly on the left side. Degenerative cervical spine disease, although rare, should be considered as part of the differential diagnosis.

Key words: Vocal Cord Paralysis; Osteophytes; Cervical Vertebrae; Osteoarthritis

Introduction

Dysphonia or hoarseness of the voice is a common referral to the otolaryngologist and can be a symptom of serious disease. A finding of vocal fold paresis or paralysis represents a diagnostic challenge for the clinician, given the complex underlying anatomy. The corticobulbar fibres from the cerebral cortex travel through the internal capsule to synapse in the nucleus ambiguus in the medulla and exit as a series of eight to 10 lower motor neurone rootlets, coalescing to form the vagus nerve, which in turn exits the skull base via the jugular foramen and descends within the carotid sheath giving three principal branches: the pharyngeal, superior laryngeal and recurrent laryngeal nerves. The recurrent laryngeal nerves travel with their respective vagus nerves but branch off and loop around the aortic arch in the thorax on the left and the subclavian artery on the right, before ascending in or just lateral to the tracheoesophageal groove to enter the larynx. The recurrent laryngeal nerves supply sensation below the glottis and innervate all the intrinsic muscles of the larynx except the cricothyroid.

In light of this complexity, reliable diagnosis of vocal fold paralysis requires full comprehension of the relevant neural anatomy. Dysfunction at the level of the brain, brainstem nuclei, vagus nerve or recurrent laryngeal nerve can all cause vocal fold palsy. Subsequently, there are a myriad of vocal fold palsy aetiologies, including neurological (e.g. cerebrovascular accident, Guillain–Barré syndrome and motor neurone disease), neoplastic (including skull base, thyroid, oesophageal and bronchial lesions), systemic (e.g. lupus, sarcoid and amyloid), pharmacological (e.g. the dose-related neurotoxicity of vinca alkaloids), traumatic, iatrogenic (e.g. intubation, anterior cervical discectomy, thyroid surgery and carotid endarterectomy) and idiopathic.[1–5] The commonest causes of unilateral paralysis are malignancy, iatrogenic injury and idiopathic.[3]

Given the range of causes, computed tomography (CT) or magnetic resonance imaging (MRI) is required, and needs to extend from skull base to chest.[6–8] Serological investigations can include tests for rheumatoid factor, lyme titres, erythrocyte sedimentation rate and antinuclear antibodies; however, a recent survey of US otolaryngologists found that most (80 per cent) did not recommend any serum testing.[6] Laryngeal electromyography is not routinely used in the UK, and there are conflicting reports on its utility in the diagnosis of vocal fold disorders. However, it has been shown to be valuable in ascertaining prognosis.[9,10]

Case history

A 91-year-old man presented with a two-month history of dysphonia. There was no preceding history of an upper respiratory tract infection. He was a non-smoker, had minimal alcohol intake, and no dysphagia, otalgia or weight loss. He also denied symptoms of chronic cough or aspiration.

His medical history included well controlled ischaemic heart disease, hypercholesterolaemia, epilepsy and osteoarthritis.

Flexible nasopharyngolaryngoscopy revealed a paralysed right hemilarynx, with the vocal fold in a mid-abducted

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position, a phonatory gap and no mucosal lesions. The remainder of the ENT examination was unremarkable; specifically, there were no palpable lymph nodes in the neck.

A CT scan including the skull base, neck and chest was organised, and the patient was referred to our speech and language therapists.

The CT (Figure 1) did not show any soft tissue lesions but, interestingly, did show an anterolateral cervical osteophyte impinging on the right recurrent laryngeal nerve. Further investigations to exclude a central cause and systemic disease were all negative (including MRI head, autoimmune screening, lyme disease and rheumatoid factor titres).

The patient responded well to speech therapy. Given his age and co-morbidities, surgery was deemed unnecessary. He was therefore discharged from clinic with ongoing speech therapy.

Discussion

Unilateral vocal fold palsy can have a major effect on the patient's quality of life, with the potential for significant morbidity and mortality secondary to aspiration. Therefore, the aim of treatment is to improve the voice and prevent aspiration. Treatment can either be conservative (with speech therapy) or surgical.[2]

Surgical management of unilateral vocal fold palsy centres on methods to medialise the affected fold, and can be categorised into temporary or permanent procedures. Temporary procedures include injection (e.g. with Gelfoam® or hyaluronic acid), which must be repeated every few months.[11] Permanent procedures can be further subdivided into injections (e.g. fat or calcium hydroxylapatite) or laryngeal framework surgery (e.g. arytenoid adduction, thyroplasty procedures and, rarely, ansa cervicalis to recurrent laryngeal nerve transfer).[11–13]

In our patient, no other abnormalities were found and, by a process of exclusion, cervical osteophytes were diagnosed as the cause of his unilateral vocal fold palsy. This aetiology has been reported only once previously.[14] In addition, Burduk *et al.* have described diffuse idiopathic skeletal hyperostosis (a calcification and ossification of ligaments, tendons and joint capsules which most commonly affects the spine) associated with osteophytes leading to vocal fold paresis.[15] Diffuse idiopathic skeletal hyperostosis (also known as Forestier's disease) is often asymptomatic but can present with pain, stiffness, reduction in range of movement and complications including dysphagia (which occurs far more frequently than dysphonia, due to oesophageal compression).[15]

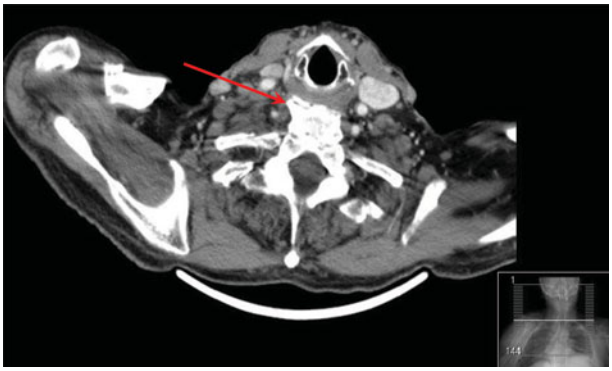

FIG. 1

Axial computed tomography scan of the neck at the level of the sixth and seventh cervical vertebrae (see inset for level), demonstrating a right anterolateral cervical osteophyte (arrow).

Osteophytes most commonly occur as a result of osteoarthritis, the most prevalent form of arthritis and the leading cause of disability in the elderly population in the Western world.[16] Cervical spine arthritis or spondylosis is defined as a chronic cervical disc degeneration with herniation of disc material, calcification and osteophytic outgrowths. Radiographic findings suggest that 80 per cent of people over the age of 75 years have evidence of cervical spine degeneration, although some may be asymptomatic.[17] Osteophyte formation occurs at sites where there has been repeated stress or damage (e.g. due to inflammation), which results in increased bone turnover, remodelling and calcification with concomitant new bone deposition (i.e. osteophytes).[18]

Cervical spondylosis causes a wide range of symptoms, including cervical pain, headaches, stiffness and, less commonly, postural symptoms (including dizziness and syncope). This can be further complicated by myelopathy or radiculopathy if the nerve tracts are affected, with symptoms and signs of shooting or burning pain, gait disturbance and objective neurological deficit. This typically occurs at the level of the fifth to seventh cervical vertebrae (as in our patient) due to the increased mobility and curvature of this region.[19]

The management of cervical spine arthritis is in keeping with that of osteoarthritis as a whole, with a focus on conservative measures comprising education, weight loss, mobilisation, functional aids, manipulation, physiotherapy and exercise, together with pain management.[19,20] Most patients respond to this regime satisfactorily, with surgery being required in only 8–33 per cent of those with nerve root pain.[21]

- **Unilateral hemilarynx paralysis is a common ENT referral**
- **Vocal fold palsy can be due to brain, brainstem nuclei, vagus nerve or recurrent laryngeal nerve dysfunction**
- **Computed tomography or magnetic resonance imaging (skull base to chest) is required**
- **The presented case had recurrent laryngeal nerve palsy due to a cervical osteophyte**
- **Osteoarthritis is common, and increasingly prevalent in an ageing population**
- **Neurosurgical intervention may be required for some patients**

Indications for surgery include progressive neurological deficit, intractable pain and documented compression of a cervical nerve root or the spinal cord. The aim of surgery is to relieve pain and neuronal structure compression. The two approaches are anterior, in the form of a discectomy (with or without a bone graft), or posterior, in the form of a laminectomy and foraminotomy or laminoplasty.[22,23] These produce effective symptom relief.[24] However, one randomised controlled trial found no real long-term difference (over one year) when surgical outcomes were compared

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with those of physiotherapy or immobilisation.[25] Other treatment options include cervical epidurals, the results of which are encouraging.[26] Surgical complications of significance, particularly with the anterior approach, consist of dysphagia and vocal fold palsy.[27]

In this report, the patient did not warrant any further treatment as he responded to conservative measures. However, in one published case, anterior cervical discectomy and osteotomy enabled complete recovery of the recurrent laryngeal nerve and larynx, despite the risk of surgery complications (as outlined above). This latter case probably involved a neuropraxic injury to the nerve, a reversible condition.[14]

It is worth noting that, in an ageing population with increasing levels of obesity, osteoarthritis will become escalating prevalent and the incidence of vocal fold palsy secondary to osteophytes may therefore rise. As Klaassen *et al.* describe in their anatomical review, cervical osteophytes can cause a wide range of unusual symptoms, from dysphagia and thoracic aorta pseudoaneurysm to compression of the bronchus and aspiration pneumonia.[28] We would add vocal fold paralysis to this list.

Conclusion

The cause of unilateral paralysis of the hemilarynx must be fully investigated as the innervating system has a protracted course, particularly on the left side. Degenerative cervical spine disease, although rare, should be considered as part of the differential diagnosis.

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