CASE REPORT

Laser arytenoidectomy and posterior cordotomy in a patient with bilateral vocal cord paralysis due to multiple system atrophy

Ayesha Mahmud,¹ Lucy H A Strens,² Miroslav Tedla^{1,3}

¹ENT Department, University Hospital Coventry & Warwickshire, Coventry, UK

²Neurology Department, University Hospital Coventry & Warwickshire, Coventry, UK

³ENT University Department, Medical School of Comenius University, Bratislava, Slovakia

Correspondence to

Dr Ayesha Mahmud,
dramahmud@yahoo.com

Accepted 10 April 2015

SUMMARY

Bilateral vocal cord paralysis leading to stridor is a known but rare complication of Parkinson's disease (PD) and a recognised complication of multiple system atrophy (MSA). Tracheostomy is a commonly offered treatment, leading to substantial adaptations and lifestyle changes for the patient. Patients can struggle to manage a tracheostomy due to the tremor and bradykinesia associated with their parkinsonism. We report a case of bilateral vocal cord paralysis leading to significant stridor in a patient with atypical parkinsonism (probable MSA). To avoid tracheostomy, our patient underwent successful right-sided laser arytenoidectomy and posterior cordotomy as a day-case procedure. At follow-up, he had a weaker voice but complete recovery from the shortness of breath and stridor. He was very satisfied with the outcome. We conclude that, despite resulting in a weaker voice, this procedure offers an option to the patient that improves quality of life.

BACKGROUND

Parkinsonian disorders are debilitating, progressive, neurodegenerative conditions. Multiple system atrophy (MSA) in particular is associated with respiratory dysfunction, including sleep apnoea, respiratory dysrhythmia and laryngeal stridor. Bilateral vocal cord paralysis is a recognised complication of MSA and, rarely, of Parkinson's disease (PD). A treatment often provided is to perform a tracheostomy. Tracheostomy entails the formation of an external opening in the throat and is a major undertaking for the patient, requiring adaptation at many levels. Patients need training from specialist nurses and Speech and Language therapists in order to manage the stoma and the tubing. The tremor associated with PD and MSA results in this becoming an even greater challenge.¹ The treatment offered to our patient helped him avoid a tracheostomy and maintain his quality of life.

CASE PRESENTATION

We report a case of a 66-year-old man with a 3-year history of parkinsonism. A clinical diagnosis of probable MSA was made following poor response to dopaminergic medication (levodopa, rasagiline, entacapone), relatively quick disease progression with the development of inspiratory stridor and the presence of rapid eye movement (REM) sleep behaviour disorder. In addition, this patient had psoriatic arthropathy and chronic inflammatory

demyelinating polyneuropathy (CIDP; responsive to intravenous immunoglobulin therapy).

After 2 years of parkinsonism illness, he developed breathlessness on exertion, orthopnoea and moderate inspiratory stridor, worsening over a few months and causing great anxiety to him and his family. He was seen in the otorhinolaryngology clinic 5 months after the onset of stridor. An outpatient flexible nasal endoscopy showed bilaterally adducted vocal cords with an approximately 2 mm gap (figure 1A). There was no clinical evidence of other cranial nerve involvement. He was not dysphagic. His CIDP was quiescent, the limb weakness having resolved following intravenous immunoglobulin infusions. Extensive investigations for other autoimmune and systemic diseases were negative (see below).

Neither clinical examination nor CT of the skull base, neck and thorax revealed any other cause for the vocal cord paralysis. Treatment options at this stage were discussed with the patient, including tracheostomy and laser arytenoidectomy/cordotomy. The surgeon option was given of performing a cordotomy first and, if the outcome was not satisfactory, following this with a laser arytenoidectomy. However, the patient was not keen on a staged procedure and chose to have laser arytenoidectomy and cordotomy performed together. This choice was made in the knowledge that this procedure is irreversible and would lead to weakness of the voice.

INVESTIGATIONS

The patient was extensively investigated for autoimmune and systemic disease, and diagnosed as unusual combination of comorbidities (MSA, CIDP and psoriatic arthropathy). Neurophysiological studies showed a demyelinating sensorimotor neuropathy affecting the limbs and cerebrospinal fluid analysis was normal except for a raised protein (findings consistent with CIDP). Normal or negative blood tests included acetylcholine receptor antibodies, serum electrophoresis, antiganglioside antibodies, antiglutamic acid decarboxylase antibodies, double-stranded DNA antibodies, antineutrophil cytoplasmic antibodies, rheumatoid factor, anticyclic citrullinated peptide antibodies, syphilis serology, HIV, vitamin D, erythrocyte sedimentation rate, creatine kinase, thyroid-stimulating hormone, vitamin B₁₂ and folate. Extractable nuclear antigen profile showed a very slight non-significant rise in anti-Ro antibodies. Pulmonary

CrossMark

To cite: Mahmud A, Strens LHA, Tedla M. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-206156

Figure 1 (A) Preoperative laryngoscopic view showing adducted vocal cords with a 1.5 mm gap. (B) Intraoperative picture following the right arytenoidectomy. (C) Laryngoscopy at 6 months postoperatively showing adequate space in the posterior larynx.

function tests were performed and the flow volume loop was consistent with upper airway obstruction predominantly affecting inspiration. This suggested an extrathoracic airway obstruction. Detailed radiological imaging of the skull base, neck and thorax showed no obvious structural cause for the vocal cord palsy.

TREATMENT

Manual palpation of the arytenoid joints was performed under general anaesthesia, followed by right-sided laser medial arytenoidectomy and posterior cordotomy. The right vocal cord was chosen as it appeared to be more rigid when palpated. Continuous superpulse carbon dioxide laser (5–10 W) was used to perform the procedure. Cordotomy was performed with an intensity of 5 W and arytenoidectomy with 8–10 W (figure 1B). Eight milligrams of intravenous dexamethasone was given during the procedure. There were no immediate postoperative complications, such as oedema, in the laryngeal cavity and the patient was discharged home the same day. He was contacted by telephone on days one and two postoperatively and there was no early increase in stridor or symptoms suggestive of sleep apnoea.

OUTCOME AND FOLLOW-UP

The patient was reviewed 4 weeks and 6 months post-operatively. He was extremely satisfied with the outcome. His breathing had improved considerably, the inspiratory stridor had completely resolved and he no longer had orthopnoea. The GRBAS (grade, roughness, breathiness, asthenia and strain) score was 2, 1, 2, 2 and 1 and maximum phonation time was 6 s. No aspiration was observed on bedside testing with a swallow test using 30 mL of water. As expected, his voice was much quieter and he continued with speech therapy to help with this. Endoscopic examination at the follow-up appointments showed no evidence of cord swelling or granulation. The gap between the vocal cords 6 months post-operatively was 7 mm. Figure 1C shows the adequate space in the posterior larynx at the 6-month follow-up appointment. Further follow-up has been hampered by the progression of the patient's parkinsonism and subsequent difficulty getting to hospital appointments.

DISCUSSION

This case describes a patient with MSA who developed new breathlessness on exertion, and orthopnoea and moderate inspiratory stridor 2 years into his parkinsonian illness. Given the unusual combination of comorbidities, he was extensively investigated for other autoimmune and systemic disease with negative results. However, he was found to have bilateral vocal

cord paralysis and subsequent detailed radiological imaging of the skull base, neck and thorax showed no obvious structural cause. He chose to have surgical intervention to treat the stridor, and a satisfactory outcome was achieved.

We acknowledge the relatively short 6-month follow-up period and also the fact that sleep studies (polysomnography) were not performed in this patient. The sleep history was consistent with REM sleep behaviour disorder, a commonly associated condition in MSA, rather than with sleep apnoea, although we appreciate history alone may not exclude this. The worsening severity of the stridor and the subsequent discovery of bilateral vocal cord adduction led to the decision to proceed with surgical intervention. We decided to perform a medial arytenoidectomy with the posterior cordotomy, rather than starting with a cordotomy alone, as the patient chose not to have a staged procedure. A cordotomy alone can, rarely, lead to temporary swelling and airway compromise. Our aim and the patient's wish was to avoid a tracheostomy, and we felt that laser arytenoidectomy with posterior cordotomy might be the appropriate option.

The development of vocal cord paresis leading to life-threatening stridor is recognised in parkinsonian disorders, and more often seen in MSA but also, rarely, in PD. In 2002, Blumin and Berke² described a series of seven patients with a neurodegenerative condition plus dysphonia, all found to have vocal cord paresis. The authors suggested that patients with parkinsonism should be investigated for sleep disorders and that the suspicion of vocal cord paresis should be high. Confirmation of vocal cord paresis should prompt consideration of a diagnosis of MSA. In this series, it was suggested that first-line treatment should be with nocturnal continuous positive airway pressure (CPAP), followed by tracheostomy, if not successful. Shiba and Isono,³ in 2006, suggested that patients with MSA developed paradoxical vocal cord movement due to damage in the pontine respiratory centres. Tracheostomy was discussed as a treatment option to overcome this complication. Jin *et al*⁴ argued that tracheostomy might exacerbate sleep-disordered breathing in MSA. In response, Silber⁵ recommended that first-line treatment for mild stridor in MSA is probably CPAP, with tracheostomy recommended for patients with daytime stridor, immobile vocal cords on laryngoscopy or stridor unresponsive to CPAP.

Bilateral vocal cord paralysis occurs most often as a complication following thyroid surgery due to damage to the recurrent laryngeal nerves. The efficacy of two alternative surgical approaches in managing this complication, namely laser arytenoidectomy with posterior cordotomy and laterofixation, are discussed in a recent review of 57 patients by Misiolek *et al*⁶ in 2012. Both procedures were well-tolerated and allowed

successful decannulation in patients who had previously undergone tracheostomy.

There is very little in the literature with regard to these techniques being used in parkinsonian patients with stridor due to bilateral vocal cord paralysis. Single case reports describe laser arytenoidectomy in a patient with MSA⁷ and in a patient with PD.¹ However, in both these cases, a tracheostomy was performed simultaneously. Once it was established that the patient could maintain the airway adequately, the tracheostomy was removed. Use of laterofixation is described in a patient with MSA,⁸ but due to slippage of the ligature, the patient went on to have laser arytenoidectomy.

Previous studies have shown that tracheostomy reduces the quality of life for patients who have had this procedure.⁹ Our

case is unique in that the patient underwent laser arytenoidectomy with posterior cordotomy without performing a tracheostomy. We feel that this procedure not only offers a good alternative treatment option to tracheostomy or CPAP but also results in better quality of life. It is relatively non-invasive and can be carried out as a day-case procedure.

Contributors The case was first seen by LHAS and referred to MT. The case report was written by AM. It was edited by LHAS and MT. MT provided the photographs and obtained consent from the patient. The final version is being submitted by AM after approval of LHAS and MT.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Learning points

- ▶ Parkinsonian disorders are progressive and disabling neurodegenerative conditions with detrimental effects on quality of life. Bilateral vocal cord paralysis leading to stridor is a known but rare complication in Parkinson's disease (PD) but is seen more typically in multiple system atrophy (MSA). Owing to their bradykinesia, rigidity or tremor, patients with parkinsonian disorders can find tracheostomy and continuous positive airway pressure both difficult to manage.
- ▶ Laser arytenoidectomy and cordotomy offer the patients a safe treatment option that avoids the need for tracheostomy.
- ▶ Laser treatment is routinely used for patients who develop bilateral vocal cord palsy following thyroid surgery. It should also be considered for patients with PD or MSA who develop this complication.

REFERENCES

- 1 Qayyum A, Mierzwa K, See M, *et al.* Laser arytenoidectomy for bilateral vocal fold palsy in Parkinson's disease. *J Laryngol Otol* 2005;119:831–3.
- 2 Blumin JH, Berke GS. Bilateral vocal cord paresis and multiple systems atrophy. *Arch Otolaryngol Head Neck Surgery* 2002;128:1404–7.
- 3 Shiba K, Isono S. Tracheostomy abolishes paradoxical activation of the vocal cord adductor in multiple system atrophy. *Auris Nasus Larynx* 2006;33:295–8.
- 4 Jin K, Okabe S, Chida K, *et al.* Tracheostomy can fatally exacerbate sleep-disordered breathing in multiple system atrophy. *Neurology* 2007;68:1618–21.
- 5 Silber MH. Tracheostomy can fatally exacerbate sleep-disordered breathing in multiple system atrophy. *Neurology* 2008;70:980–2.
- 6 Misiolek M, Klebukowski L, Lisowska G, *et al.* Usefulness of laser arytenoidectomy and laterofixation in treatment of bilateral vocal cord paralysis. *Otolaryngol Pol* 2012;66:109–16.
- 7 Chitose S, Kikuchi A, Ikezono K, *et al.* Effect of laser arytenoidectomy on respiratory stridor caused by multiple system atrophy. *J Clin Sleep Med* 2012;8:713–15.
- 8 Umeno H, Ueda Y, Mori K, *et al.* Management of impaired vocal fold movement during sleep in a patient with Shy-Drager syndrome. *Am J Otolaryngol* 2000;21:344–8.
- 9 Gilony D, Gilboa D, Blumstein T, *et al.* Effects of tracheostomy on well-being and body-image perceptions. *Otolaryngol Head Neck Surg* 2005;133:366–71.

Copyright 2015 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow