

# Unilateral Vocal Fold Paralysis in Parkinson Disease: Case Report and Review of the Literature

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**Summary: Objective.** The objective of this study was to report the first case of unilateral vocal fold paralysis in a patient with Parkinson disease (PD) and to review the literature.

**Methods.** This is a case report and literature review following PubMed search using the keywords “Parkinson,” “vocal fold paralysis,” “vocal fold palsy,” “vocal fold immobility,” “vocal fold adductor palsy,” “airway obstruction,” and “stridor.”

**Results.** A total of 18 subjects diagnosed with PD and vocal fold paralysis were described. In all cases, the vocal fold paralysis was bilateral and the main presenting symptoms were stridor and shortness of breath necessitating intubation and tracheostomy. This article describes the first case of PD presenting with dysphonia secondary to unilateral vocal fold paralysis (left). The management consisted of injection laryngoplasty for medialization of the paralyzed vocal fold.

**Conclusions.** Patients with PD can present with unilateral vocal fold paralysis. Early treatment is advocated in view of the advent of injection laryngoplasty as a safe office procedure.

**Key Words:** Parkinson–Vocal fold paralysis–Dysphonia–Airway obstruction–Stridor.

## INTRODUCTION

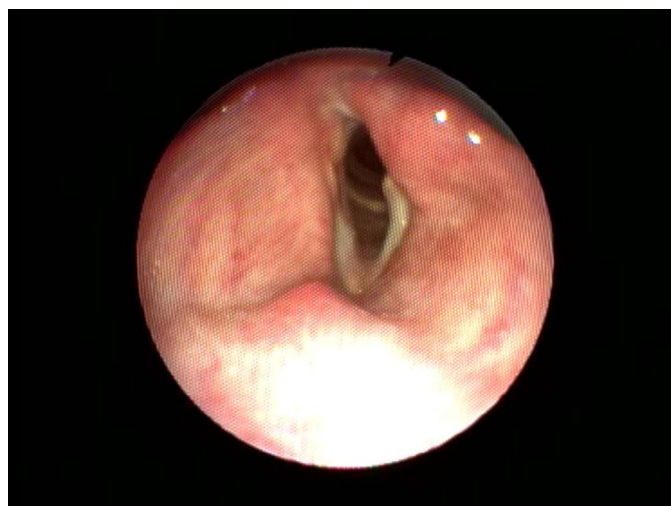
Parkinson disease (PD) is a neurodegenerative disorder affecting the central nervous system, specifically the motor system. It is the second most common neurodegenerative disorder after Alzheimer disease affecting more than 7 million worldwide.<sup>1</sup> PD causes a reduction in dopamine-secreting cells in the pars compacta region of the substantia nigra situated in the midbrain,<sup>2</sup> leading to a wide array of symptoms. These symptoms are divided into motor, neuropsychiatric, and autonomic, with the most apparent motor symptoms being tremor, hypokinesia, and rigidity, in addition to speech and swallowing disorders.<sup>3</sup> Laryngopharyngeal involvement manifests as dysphagia, obstructive respiratory symptoms, and vocal complaints, which include vocal fatigue, vocal breaks and tremor, breathiness, straining, and an inability to project the voice. These have been attributed to laryngeal movement alterations such as hypoadduction of the vocal folds during phonation and impaired mobility.<sup>4–6</sup>

A literature search using the PubMed database and the search terms “Parkinson” and “vocal fold paralysis,” “vocal fold palsy,” “vocal fold immobility,” “vocal fold adductor palsy,” “airway obstruction,” and “stridor” revealed 14 publications<sup>7–20</sup> of which 13 were identified after having omitted one, which was only available in the Japanese language.<sup>7</sup> In these publications, a total of 18 subjects diagnosed with PD and vocal fold paralysis were described. The male-to-female ratio was 2.6:1.0, with a mean age of 63.94 years and a mean duration of disease of 9.58 years. All patients presented with obstructive symptoms such as stridor and dyspnea as the main laryngeal complaint, along with hoarseness in only two patients. Laryngeal examination revealed bilateral vocal fold palsy in all 18 patients and laryngeal spasm in three patients.

The authors of this article report the first case of unilateral vocal fold paralysis in a patient with PD presenting with dysphonia as the main laryngeal symptom in the absence of airway obstruction.

## CASE REPORT

An 83-year-old man diagnosed with PD 10 years ago presented with a history of dysphonia, an inability to project the voice, and aspiration of a few months' duration. The patient was classified as stage 4 as per the Hoehn and Yahr scale. The patient's medical history was positive for hypertension, Alzheimer disease, and benign prostatic hypertrophy. Perceptual evaluation of the patient's voice revealed grade 3 dysphonia with severe breathiness. Laryngeal endostroboscopic examination revealed a fixed left vocal fold in the paramedian position with an incomplete closure of the vocal folds during phonation (Figure 1). The maximum phonation time was 3 seconds. A computerized tomography of the neck and chest was requested to rule out any laryngeal or extralaryngeal malignancies. The report indicated



**FIGURE 1.** Fiberoptic laryngeal endoscopy with evidence of left vocal fold bowing and atrophy.

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**TABLE 1.**  
**Reported Cases of Vocal Fold Paralysis in Patients with PD**

Study	Subjects	Sex	Age (y)	PD Duration (y)	Laryngeal Presentation	Type of Laryngeal Examination	Laryngeal Findings	Management
Vas et al <sup>10</sup>	2	M	37	4	Respiratory distress, severe stridor	N/A	Bilateral VF palsy, laryngospasm, no pooling of secretions	Tracheostomy (permanent), spasmolytics
Plasse and Lieberman <sup>11</sup>	2	F	62	3	Choking attacks, severe inspiratory and expiratory stridor	Laryngoscopy (type unspecified)	Bilateral VF palsy, laryngospasm	Tracheostomy, IV methyl phenidate
		M	55	5	Stridor	Indirect laryngoscopy	Bilateral VF paralysis	Tracheostomy (still in place 3 years postop)
Read and Young <sup>12</sup>	1	M	65	6	Stridor	Indirect laryngoscopy	Bilateral VF paralysis, laryngospasm	Tracheostomy
		F	72	0.5	Salivation, marked inspiratory and expiratory stridor (worse on exercise), hoarseness, lethargy	Laryngeal tomography, indirect laryngoscopy	Bilateral VF palsy, folds fixed in a paramedian position	Tracheostomy (permanent)
Takayama et al <sup>9</sup>	1	M	66	20	Severe dyspnea and stridor	N/A	Bilateral VF paralysis, laryngeal cancer	N/A
Palesse et al <sup>13</sup>	2	M	60	10	Dyspnea, severe stridor, inspiratory recession of the chest wall (symptoms worse at night)	N/A	Bilateral VF abductor paralysis	Tracheostomy
		M	58	2	Dyspnea, nocturnal stridor, attacks of asphyxia	N/A	Bilateral VF abductor paralysis	Tracheostomy (emergency)
Isozaki et al <sup>14</sup>	3	M	68	12	Severe inspiratory stridor	Fiberoptic laryngoscopy	Severe VF abductor paralysis with paradoxical bilateral VF movement	Tracheostomy
		M	78	6	Inspiratory stridor (while awake and asleep)	Fiberoptic laryngoscopy	Severe bilateral VF abductor paralysis	Tracheostomy
		M	69	9	Difficulty in swallowing, severe respiratory failure (1 year later)	Fiberoptic laryngoscopy	Bilateral VF abductor paralysis	Tracheostomy (permanent)
Nakane et al <sup>9</sup>	1	F	60	30	Dyspnea, inspiratory stridor, respiratory distress	Indirect laryngoscopy	Bilateral VF abductor paralysis, folds in the midline or paramedian position	N/A
Qayyum et al <sup>15</sup>	1	F	78	4	Hoarseness, shortness of breath	Nasal endolaryngoscopy	Bilateral VF abductor paresis, active VF adduction on phonation, folds in a paramedian position	Tracheostomy, laser arytenoidectomy (decannulation 6 weeks later)
Kim and Jeon <sup>16</sup>	1	F	49	19	Aspiration pneumonia (initially), severe inspiratory stridor (while awake and asleep), oxygen desaturation, intermittent hypercapnea	Fiberoptic laryngoscopy	Bilateral VF paralysis	Tracheostomy
Gan et al <sup>17</sup>	1	M	73	7	Tachypnea, stridor	Nasal endolaryngoscopy	Bilateral VF paralysis, folds in paramedian position, pooling of secretions	Tracheostomy (self decannulated 2 months postop)
Lee et al <sup>18</sup>	1	M	73	3	Progressive dyspnea and inspiratory stridor	Flexible laryngoscopy	Bilateral VF fixed in paramedian position	Urgent tracheotomy (permanent)
Tsai et al <sup>19</sup>	1	M	77	22	Stridor, oxygen desaturation	Flexible laryngoscopy	Bilateral VF palsy	Levodopa up-titration
Arocho-Quinones et al <sup>20</sup>	1	M	51	10	Noisy breathing, dysphagia, speech difficulties	Nasal endolaryngoscopy	Bilateral VF fixed in paramedian position	Tracheostomy (still in place 11 months postop)

Abbreviations: F, female; IV, intravenous; M, male; N/A, not applicable; PD, Parkinson disease; VF, vocal fold.

an enlargement of the left laryngeal ventricle and pyriform sinus, bilateral subcentimetric benign-looking cervical nodes, fibrotic changes in the left lower lobe of the lung, and an absence of any enlarged thoracic lymph nodes. There was no evidence of mediastinal tumor, enlarged lymph nodes, or aortic arch abnormalities. Given the lack of recent history of endotracheal intubation or endolaryngeal manipulation, the author did not suspect any cricoarytenoid joint ankylosis, and hence no laryngeal electromyographic study was ordered.

The patient underwent injection laryngoplasty using the transoral fiberoptic injection technique as an office procedure. An intramuscular injection of 200 µg/mL of glycopyrrolate was given before the procedure to reduce the amount of secretions. Under local anesthesia after having applied lidocaine gel to the tongue, the modified Guedel oral airway piece was inserted through which the fiberoptic endoscope with a working channel (Ref 11001UD1 by Karl Storz) was introduced until the laryngeal inlet was visualized. After having dripped 2 cc of Xylocaine 2% on the vocal folds during phonation, a 19-gauge needle was inserted through the working channel of the fiberoptic scope and then engaged posterolateral to the vocal process of the paralyzed fold. An amount of 0.7 cc of Restylane (cross-linked hyaluronic acid) was injected until the vocal fold assumed the phonatory position. The patient was asked to phonate during the procedure and afterward to ensure optimal vocal quality. The patient tolerated the procedure well and was informed not to eat or drink for 1 hour afterward to ensure the phasing out of the local anesthetic that was applied.

## DISCUSSION

PD is a progressive neurodegenerative disease that disturbs the substantia nigra in the basal ganglia affecting dopamine production. As a result, patients suffer from various neurologic disorders that encompass the laryngopharyngeal complex. Affected patients may suffer from swallowing and articulatory and phonatory symptoms. These latter are often masked by the speech disturbances and the systemic manifestations of the disease. The most commonly reported vocal complaints are vocal tremor, vocal fatigue, and pitch breaks. On laryngeal examination, laryngeal tremor, vocal fold bowing, and hypoadduction of the vocal folds during phonation are often observed.<sup>21–24</sup> Only a few cases of vocal fold paralysis in patients with PD have been reported in the literature, all of which were bilateral with airway obstructive symptoms.<sup>7–20</sup> Refer to [Table 1](#) for a summary of all the reported cases.

In all these reports, the paralysis was bilateral and the main presenting symptoms were stridor, shortness of breath, and difficulty in breathing, necessitating intubation and tracheostomy. This article describes the first case of PD presenting with dysphonia and found to have unilateral vocal fold paralysis and not bilateral. The patient had no respiratory symptoms such as shortness of breath or stridor unlike all the 18 previously reported cases. The management consisted of a medialization procedure, namely, injection laryngoplasty. The main theory behind the paralysis is dopaminergic dysfunction within the neural pathway to the intrinsic laryngeal musculature. This latter has been previously described by several authors in the understand-

ing of laryngeal symptoms and findings in patients with neurogenic and neurodegenerative diseases such as Multiple System Atrophy.<sup>17,25–27</sup> The nucleus ambiguus located in the medulla gives rise to motor fibers of the vagus, whereas the basal ganglia through supranuclear pathways directly influences the glossopharyngeal nerve. Proponents of this theory, namely, the neural pathway dysfunction, have reported improvement in laryngeal symptoms, namely, stridor or spasm following medical treatment of the underlying disease.<sup>10,16</sup> This finding was further substantiated by temporary reversal of their symptoms by pharmacologic treatment of PD, which was dubbed as the non-paralytic type of vocal fold abductor paralysis.<sup>14</sup> This type of paralysis is thought to be due to over activity or hypertonicity of the laryngeal muscles as it is manifested in other areas in the body in a patient with PD.<sup>14</sup> In accordance with the aforementioned, laryngeal electromyographic studies failed to report evidence of laryngeal musculature neurogenic atrophy.<sup>25,26</sup>

## CONCLUSIONS

The treating physician should be alerted to the possibility of unilateral vocal fold paralysis in patients with PD, which mandates laryngeal endoscopy for proper diagnosis. Early treatment is advocated in view of the advantage of injection laryngoplasty as a safe office procedure.

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