

# A Rare Cause of Stridor in the Emergency Department: Multiple System Atrophy: A Case Report

## Acil Serviste Stridorun Nadir Bir Nedeni: Multipl Sistem Atrofi: Olgu Sunumu

 Ecem Naz Ertürk<sup>1</sup>,  Eylem Sercan Özgür<sup>2</sup>,  Serhan Sevim<sup>3</sup>,  Yusuf Vayısoglu<sup>4</sup>,  Rabia Hande Avcı<sup>5</sup>,  Merve Fidan Aşık<sup>6</sup>,  Ali Rıza Fatih Büyükkutlu<sup>7</sup>,  İsmail Sert<sup>8</sup>,  Sibel Naycı<sup>2</sup>

### Abstract

Multiple System Atrophy (MSA) is a less common degenerative disorder that impacts the autonomic functions of the body, such as bladder function, blood pressure, breathing and muscle control. Clinically, there are 2 types of MSA: Parkinsonian (MSA-P) and cerebellar (MSA-C). Laryngeal stridor is an important clinical finding that can aid in diagnosis and indicates a poor prognosis. We present here the case of a 53-year-old female patient who had been diagnosed with MSA-C two years earlier, and who presented to the emergency department with dyspnea.

**Keywords:** Multiple system atrophy, stridor, vocal cord dysplasia.

### Öz

Multipl Sistem Atrofi (MSA), kan basıncı, solunum, mesane fonksiyonu ve kas kontrolü dahil olmak üzere vücudun otonomik fonksiyonlarını etkileyen nadir, dejeneratif bir nörolojik hastalıktır. Parkinsoniyen (MSA-P) ve serebellar (MSA-C) tip olmak üzere iki klinik tipi vardır. Laringeal stridor, yüksek tanısal pozitif prediktif değeri olan ve aynı zamanda kötü prognoz göstergesi kabul edilen klinik bir bulgudur. Bu yazıda, acil servise nefes darlığı yakınması ile başvuran 2 yıldır MSA-C tanısı olan 53 yaşında kadın hasta incelenip sunulmuştur.

**Anahtar Kelimeler:** Multipl sistem atrofi, stridor, vokal kord displazi.

<sup>1</sup>Çubuk Halil Sıvgın State Hospital, Ankara, Türkiye

<sup>2</sup>Department of Chest Diseases, Mersin University Faculty of Medicine, Mersin, Türkiye

<sup>3</sup>Department of Neurology, Mersin University Faculty of Medicine, Mersin, Türkiye

<sup>4</sup>Department of Otorhinolaryngology, Mersin University Faculty of Medicine, Mersin, Türkiye

<sup>5</sup>Karabük Training and Research Hospital, Karabük, Türkiye

<sup>6</sup>Department of Chest Diseases, Gürsu Cüneyt Yıldız State Hospital, Bursa, Türkiye

<sup>7</sup>Department of Chest Diseases, Silifke State Hospital, Mersin, Türkiye

<sup>8</sup>Department of Chest Diseases Eskişehir City Hospital, Eskişehir, Türkiye

<sup>1</sup>Çubuk Halil Sıvgın Devlet Hastanesi, Göğüs Hastalıkları Kliniği, Ankara

<sup>2</sup>Mersin Üniversitesi Tıp Fakültesi, Göğüs Hastalıkları Anabilim Dalı, Mersin

<sup>3</sup>Mersin Üniversitesi Tıp Fakültesi, Nöroloji Anabilim Dalı, Mersin

<sup>4</sup>Mersin Üniversitesi, Kulak Burun Boğaz Hastalıkları Anabilim Dalı, Mersin

<sup>5</sup>Karabük Eğitim ve Araştırma Hastanesi, Göğüs Hastalıkları Kliniği, Karabük

<sup>6</sup>Gürsu Cüneyt Yıldız Devlet Hastanesi, Göğüs Hastalıkları Kliniği, Bursa

<sup>7</sup>Silifke Devlet Hastanesi, Göğüs Hastalıkları Kliniği, Mersin

<sup>8</sup>Eskişehir Şehir Hastanesi, Göğüs Hastalıkları Kliniği, Eskişehir

**Submitted (Başvuru tarihi):** 27.01.2023 **Accepted (Kabul tarihi):** 22.05.2023

**Correspondence (İletişim):** Ecem Naz Ertürk, Çubuk Halil Sıvgın State Hospital, Ankara, Türkiye

**e-mail:** [ecemerturk00@gmail.com](mailto:ecemerturk00@gmail.com)



Multiple System Atrophy (MSA) is a less common and quickly progressive neurodegenerative disease with characteristic findings of Parkinsonism or cerebellar ataxia with autonomic failure (1). The estimated annual incidence of MSA in the general population in the United States is 0.6 cases per 100,000 people, resulting in approximately 1,900 new cases per year (2). There is a lack of definitive data on its prevalence in Türkiye. The peak onset varies between the ages of 30–90, with no difference between sexes, but occurs primarily between 55 and 60 years. The effect on autonomic functions may lead to orthostatic hypotension, bladder dysfunction, sleep disorders, sexual dysfunction, body temperature imbalances due to a deterioration in sweating balance and cardiovascular problems, while bilateral vocal cord paralysis, central respiratory failure, and central or obstructive sleep apnea syndromes in patients with multisystem atrophy are among the clinical pictures that can be seen related to respiration (3). Clinical symptoms progress rapidly, and average survival ranges from 6 to 9 years (4), while death usually results from respiratory problems, infections or pulmonary embolism (5).

Stridor is a clinical finding with a high diagnostic positive predictive value for the diagnosis of MSA, the definition of which was decided upon at the MSA International Reconciliation Conference in Bologna in 2017, and its emergence in the early period is considered an indication of short survival.

Stridor is a respiratory sound that is high-pitched and tense, and is usually heard during inhalation. It is caused by a narrowing of the rima glottis in the larynx and can occur while the patient is both asleep and awake. A laryngoscopy is advised for the elimination of the possibility of mechanical damage or functional issues in the vocal cords that may be linked to various neurological conditions. Continuous positive airway pressure and tracheostomy are recommended for the treatment of stridor as a symptom, although the impact on patient survival is unknown, and so advanced studies are needed (1).

We present here the case of a 53-year-old female with an MSA-C diagnosis to raise awareness of the possibility of this rare etiology in patients who presented to the emergency department with shortness of breath and stridor in clinical examination findings.

## CASE

A 53-year-old female patient with no smoking history presented to the emergency department with a reported increase in dyspnea symptoms that had persisted for a month. Her history included an etiology of demyelinating disease and ataxia that was investigated in the neurology outpatient clinic to which she had applied with gait disturbance in 2015, and a “hot cross bun” appearance

seen on cerebral Magnetic Resonance Imaging (MRI) in 2017. She was diagnosed with MSA-C, in which the cerebellar ataxia clinic is at the forefront.

When questioned in detail, the patient reported long-term constipation and orthostatic hypotension. She was started on Levodopa 125 mg 3x1 but did not use it regularly and did not attend control visits. The family history was unremarkable. The patient's body temperature was 36.8°C, heart rate was 92/min, arterial blood pressure was 130/80 mmHg, respiratory rate was 32/min, and room air oxygen saturation was 85%. A physical examination revealed no abnormal findings other than inspiratory and expiratory stridor.

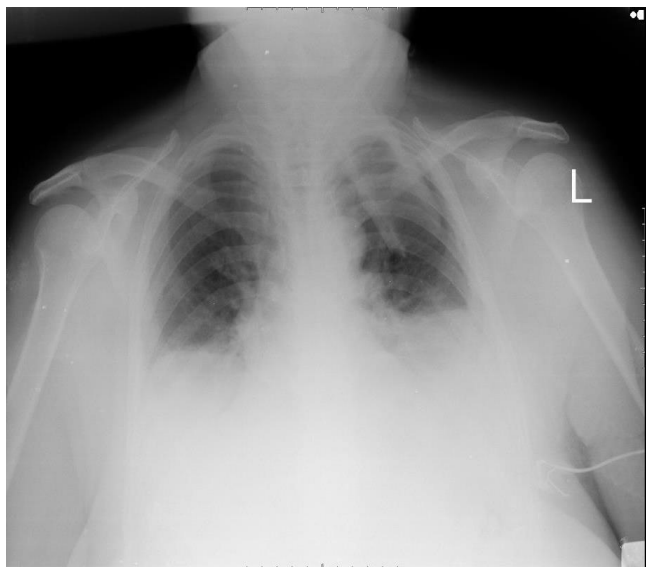
A posteroanterior chest X-ray revealed the diaphragms to be elevated due to insufficient inspiration, but no other significant findings (Figure 1). No major airway stenosis was observed on head, neck or thorax computed tomography imaging.

An otolaryngology examination revealed vocal cord movement to be significantly reduced but not fully paralytic, and the patient was started initially on 1 mg/kg methylprednisolone, with a recommendation for emergency intubation and tracheostomy if a decrease in saturation values was detected. The head and neck tomography findings were within normal limits.

The patient was admitted to the intensive care unit and started on 80 mg of methylprednisolone IV. After a consultation with a neurologist, levodopa 125 mg 3x1, which she had used irregularly, was added to the treatment.

The patient experienced rapid clinical improvement with a decrease in stridor and symptom severity after starting the treatment. Oxygen therapy was halted on the third day of treatment after the need declined, and room air oxygen saturation values remained static at 94–95%. The patient was transferred to the neurology clinic after the respiratory distress was relieved, and was returned to the ward with room air saturation values of 94–95% on the sixth day of treatment. A pulmonary function test was requested on the seventh day of treatment, but the patient could not cooperate. By the seventh day of methylprednisolone treatment, the patient's complaints had regressed significantly. The tracheostomy decision was postponed following an otolaryngology consultation, and she was subsequently discharged from the neurology clinic on oral and systemic steroid therapy.

The patient underwent a tracheostomy after presenting with hypoxemic respiratory failure 3 weeks after discharge due to paralysis of the two vocal cords and limitations in the passage opening, after which a significant increase in lung aeration was noted on a chest X-ray when compared to the previous image (Figure 2). In the 2-year follow-up of the patient, other symptoms related to MSA-C were followed and no respiratory distress or shortness of breath were noted.



**Figure 1:** Chest X-ray of our case at the time of first admission (elevated diaphragms due to insufficient inspiration)

## DISCUSSION

The present study reports on a case of MSA-C with dyspnea in a female patient who presented to the emergency department. There are multiple findings associated with MSA, including autonomic failure, cerebellar ataxia and Parkinsonism (1). It is a synucleinopathy that generally starts at around the age of 50 and occurs sporadically (6). There are two subtypes of MSA disease, which are clinically dominated by autonomic and urogenital insufficiency. The cases were divided into two groups, of which 80% had MSA-P (MSA-parkinsonian) with Parkinson's findings that were unresponsive to levodopa (L-dopa), and 20% had MSA-C (MSA-cerebellar) with cerebellar ataxia findings (7). Postural (orthostatic) hypotension, urinary-bladder dysfunction (incontinence), sleep disorders, sexual dysfunction (Libido loss - impotence), sweating balance, body temperature imbalance and cardiovascular problems can be seen (5). Our case had rarer MSA-C subtypes featuring groove disorders, orthostatic hypotension and constipation autonomic dysfunction.

Cerebral MRI is the optimum imaging method for the diagnosis of MSA. Findings such as atrophy in the putamen, pons and middle cerebellar peduncle, hypointensity in the lateral putamen on T2 sequences, and cruciform hyperintensities referred to as "hot cross bun" signs in the pons can help support the diagnosis (8). In our case, clarification secondary to atrophy in the cerebellar folia on cerebral MRI and the "hot cross bun" sign, which results typically from an increase in intensity in the T2W sequence, played an essential role in the diagnosis.

MSA often involves various sleep-related respiratory conditions, such as stridor and central and obstructive sleep apnea (OSA), among which Stridor can be helpful in the diagnosis of MSA due to its high positive predictive value.

A previous study identified early onset of stridor as a predictive factor for shorter survival (9). The authors also noted that the prognostic value of stridor is a point at issue. Our case was still alive two years after the onset of stridor. The two main options for the treatment of stridor are tracheostomy and continuous positive airway pressure (CPAP). When the stridor is severe due to advanced disease or immobile vocal cords during wakefulness, tracheostomy is the preferred option (10). CPAP is a non-invasive treatment approach that can be utilized for the management of mild to moderate sleep-related stridor and OSA (9). Experts from various fields convened for a conference in Bologna in 2017 to agree on the criteria for a diagnosis of stridor, to clarify its association with MSA, to identify the prognostic value of stridor on MSA survival, to agree on therapeutic options for the management of stridor, and to systematically review the evidence so as to identify gaps for future research.

Stridor is difficult to diagnose clinically as patients are often unaware of its presence during sleep, and so a nighttime witness is often required to determine its occurrence. Manifestations such as high-pitched sounds or heavy snoring can also point to the development of stridor. Given the prevalence of snoring and obstructive sleep apnea syndrome in patients with MSA, differentiating these conditions from stridor is essential. In the present case, no polysomnography was performed prior to hospital admission, despite the patient's report of shortness of breath for a month. To exclude other potential diagnoses and to confirm vocal cord dysfunction, laryngoscopy while the patient is awake is vital in MSA for those who present with stridor (1). A study of 136 patients with MSA revealed the development of stridor in the early period to be a negative indicator of survival.



**Figure 2:** Chest X-ray taken after tracheostomy opening (significant increase in lung aeration observable)

In the presented case, a significant decrease was noted in vocal cord movement during a laryngoscopy performed by an ENT specialist, although the paralysis was not total. Accordingly, the patient was started on systemic methylprednisolone and was prepared for a tracheostomy informing the patient's relatives in cooperation with the neurology and otolaryngology department. Under close observation, however, the tracheostomy decision was not made immediately due to the dramatic clinical response of the patient to the methylprednisolone treatment. A tracheostomy was subsequently performed three weeks after discharge upon the re-development of dyspnea and stridor. There were 2 months between the initiation of steroid therapy and the opening of the tracheostomy. With this treatment, it is thought that the opening of the tracheostomy is delayed. More research and data are needed for the correct timing of tracheostomy. In conclusion, MSA patients require close follow-up, and treatment should be planned based on a multidisciplinary approach. The recognition of stridor as a poor prognostic marker and early diagnosis and treatment in a patient presenting with dyspnea can positively affect the prognosis in this progressive patient group.

## CONFLICTS OF INTEREST

None declared.

## AUTHOR CONTRIBUTIONS

Concept - E.N.E., E.S.Ö., S.N., S.S., Y.V., R.H.A., M.F.A., A.R.F.B., İ.S.; Planning and Design - E.N.E., E.S.Ö., S.S., S.N., Y.V., R.H.A., M.F.A., A.R.F.B., İ.S.; Supervision - E.N.E., E.S.Ö., R.H.A., S.S., M.F.A., S.N., Y.V., İ.S., A.R.F.B.; Funding - E.N.E., E.S.Ö., S.S., A.R.F.B.; Materials - E.S.Ö., A.R.F.B., İ.S.; Data Collection and/or Processing - E.N.E., E.S.Ö., M.F.A., R.H.A., S.N.; Analysis and/or Interpretation - E.N.E., E.S.Ö., S.S., Y.V., A.R.F.B.; Literature Review - E.N.E., E.S.Ö., Y.V.; Writing - E.N.E.; Critical Review - E.N.E., E.S.Ö., S.S., Y.V., R.H.A., M.F.A., İ.S.

## REFERENCES

1. Cortelli P, Calandra-Buonaura G, Benarroch EE, Giannini G, Iranzo A, Low PA, et al. Stridor in multiple system atrophy: Consensus statement on diagnosis, prognosis, and treatment. *Neurology* 2019; 93:630-9. [\[CrossRef\]](#)
2. NORD Access date: 5 February 2023 Place of Access: <https://rarediseases.org/rare-diseases/multiple-system-atrophy/?filter=complete-report>
3. Vetrugno R, Liguori R, Cortelli P, Plazzi G, Vicini C, Campanini A, et al. Sleep-related stridor due to dystonic vocal cord motion and neurogenic tachypnea/tachycardia in multiple system atrophy. *Mov Disord* 2007; 22:673-8. [\[CrossRef\]](#)
4. Damon-Perrière N, Tison F, Meissner WG. L'atrophie multisystématisée [Multiple system atrophy]. *Psychol Neuropsychiatr Vieil* 2010; 8:179-91. doi:10.1684/pnv.2010.0212
5. Mayo Clinic Multiple System Atrophy (MSA). Access date :23/10/22 Place of access: <https://www.mayoclinic.org/diseases-conditions/multiple-system-atrophy/symptoms-causes/syc-20356153?p=1>
6. Stefanova N, Bücke P, Duerr S, Wenning GK. Multiple system atrophy: an update. *Lancet Neurol* 2009; 8:1172-8. [\[CrossRef\]](#)
7. Wenning GK, Colosimo C, Geser F, Poewe W. Multiple system atrophy. *Lancet Neurol* 2004; 3:93-103. [\[CrossRef\]](#)
8. Albuquerque AV, Freitas MR, Cincinatus D, Harouche MB. Clinical-radiological correlation. Report of two cases. *Arq Neuropsiquiatr* 2007; 65:512-5. [\[CrossRef\]](#)
9. Giannini G, Calandra-Buonaura G, Mastrolilli F, Righini M, Bacchi-Reggiani ML, Cecere A, et al. Early stridor onset and stridor treatment predict survival in 136 patients with MSA. *Neurology* 2016; 87:1375-83. [\[CrossRef\]](#)
10. Ozawa T, Sekiya K, Aizawa N, Terajima K, Nishizawa M. Laryngeal stridor in multiple system atrophy: clinicopathological features and causal hypotheses. *J Neurol Sci* 2016; 361:243-9. [\[CrossRef\]](#)