Sarcoidosis is a chronic granulomatous inflammation of uncertain etiology that can involve any organ system in the body. Sinonasal and laryngeal involvement is rare, poorly understood, and difficult to diagnose. Additionally, the extent of the disease is variable, and the response to systemic corticosteroids is often poor. We report a case of a 55-year-old woman with prior cutaneous sarcoidosis who presented with chronic nasal congestion, difficulty breathing, dysphonia, and stridor, and biopsy of the nasal vestibule revealed non-caseating granulomatous inflammation.

Sinonasal and laryngeal involvement is a rare presentation of extrapulmonary sarcoidosis and occurs in about 1% of patients with sarcoidosis. Both types of involvement are clinically challenging, with unclear treatment options. Delayed diagnosis is common due to nonspecific upper respiratory presentation that can mimic several disorders. Laryngeal sarcoidosis can progress to severe airway obstruction and potentially life-threatening complications.

**CASE DESCRIPTION**

A 55-year-old black woman with a history of obstructive sleep apnea and cutaneous sarcoidosis on oral corticosteroids presented with nasal stuffiness and obstruction, nasal discomfort, hoarseness, and difficult breathing made worse by lying down and alleviated by sitting up. Her symptoms started several months earlier and increased in severity several weeks prior to presentation. She had no fever, chills, cough, or weight loss. Physical examination revealed audible stridor and dark-colored skin plaques involving the nose in a butterfly distribution, the nasolabial folds, cheeks, forehead, and right arm (Figure 1). Her oral cavity examination revealed tender swollen gums and loose premaxillary teeth. Her vital signs and laboratory results were essentially normal except for an elevated erythrocyte sedimentation rate of 55 mm/hr (reference range, <30 mm/hr) and C-reactive protein of 1.4 mg/dL (reference range, <0.5 mg/dL). Her serum calcium level was normal at 9.3 mg/dL. Computed tomography (CT) of the neck revealed complete opacification of the left maxillary antrum with outward expansion of the sinus walls, an 8 mm mucous retention cyst in the right maxillary sinus, bilateral maxillary erosions, and destruction of the premaxilla, palate, and floor of the nose suspicious for malignancy (Figure 2). Sinonasal endoscopy showed bilateral narrowed nasal vestibules with a cobblestone mucosa and extensive nasal crusting and obstruction; biopsy of the right nasal vestibule revealed chronic non-caseating granulomatous inflammation (Figure 3). CT of the chest revealed bilateral hilar lymphadenopathy and four pulmonary nodules <2 cm in size. The patient underwent a bronchoscopic examination, which revealed an edematous and pink epiglottis and aryepiglottic and ventricular folds and a subglottic nodular lesion (Figure 4). Diffuse yellowish endobronchial nodular lesions with underlying mucosal hyperemia involving the entire airway were present (cobblestone respiratory mucosa).

The patient was started on a high-dose systemic corticosteroid, oral methotrexate 12.5 mg once weekly, and azelastine-fluticasone 137 mcg–50 mcg nasal spray twice daily. However, she had multiple emergency department visits and readmissions

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The mortality rate is 1% to 5% and is mostly related to cardiac, pulmonary, and neurological complications (2).

Upper airway disease in sarcoidosis is uncommon and occurs in <2% of patients with sarcoidosis. Multiorgan involvement is uncommon in these patients. Benjamin et al reported that out of 5 patients with laryngeal involvement, only one had generalized disease (3). Neel et al found that only 7 of 13 patients with laryngeal sarcoidosis had other organ involvement (4). The clinical presentation of upper airway sarcoidosis varies from asymptomatic to severe. The main symptoms of sinonasal disease include nasal obstruction, crusting, and epistaxis (5). Laryngeal disease presents with hoarseness, dyspnea, dysphagia, chronic cough, obstructive sleep apnea, and airway obstruction, which could progress to upper airway obstruction and emergency cricothyrotomy (6). Flexerotic nasal fibroptic endoscopic examination of the nasal mucosa of patients with sinonasal sarcoidosis typically reveals pale, yellow nodular lesions and inflammation with mucus crusting (7). Our patient had these findings.

In laryngeal disease, the supraglottis region, mostly the epiglottis, is typically involved, followed by the arytenoids, aryepiglottic folds, and false vocal folds (8). The subglottis can be involved in 24% of the cases of laryngeal sarcoidosis. However, the glottis is very rarely affected (9). Flexible fiberoptic laryngoscopy often shows pale pink, edematous, and nodular thickening of the epiglottis, arytenoids, and aryepiglottic folds, a classic pattern of supraglottic involvement. Vocal cord involvement can lead to dyspnea, hoarseness, stridor, and immobility (9). Fiberoptic examination in our patient revealed edematous and pink aryepiglottic and vestibular folds with a subglottic nodular lesion; no epiglottic lesion was noted. Imaging with CT scans in sinonasal sarcoidosis reveals turbinate or septal nodularity/thickening (21%), osteoneogenesis, and bony erosions (15%–20%) (10). It is important to exclude other granulomatous diseases, such as fungal infections and polyangiitis with granulomatosis. Direct bone involvement in sarcoidosis is relatively uncommon and occurs in <15% of patients; rarely the disease can extend from sinuses into intracranial structures (11).

Sarcoidosis of the upper respiratory tract is associated with lower rates of spontaneous remission and often requires systemic for worsening shortness of breath, nasal obstruction, and stridor. Oral prednisone was difficult to reduce due to rebounds in her respiratory symptoms. A rheumatologist then started her on a weekly subcutaneous injection of methotrexate 25 mg and oral hydroxychloroquine 400 mg daily. She reported improvement of nasal obstruction and stuffiness. Two months later, subcutaneous injections of 250 mg (2 mg/kg) of golimumab (Simponi®; Janssen Biotech, Horsham, PA) were started. She reported more improvement in her nasal symptoms and shortness of breath but no change in her hoarseness. The prednisone dose was decreased to 10 mg daily, and she has not recently required hospitalization.

**DISCUSSION**

Sarcoidosis is a chronic multisystemic disease of unclear etiology; it has a prevalence of 10 to 20 per 100,000 persons in the United States and is more common in women (1). Sarcoidosis typically affects patients under 40 years, with a peak among those in their 20s. The clinical course of sarcoidosis is variable; 60% to 70% of patients have a spontaneous remission, and 30% of patients have prolonged courses of more than 5 years.

![Figure 2](image1.png)

**Figure 2.** CT of the neck revealing (a) thick nasal lining with obstructed nasal vestibules (arrow); (b) bilateral maxillary erosions (arrow); and (c) destruction of the premaxilla, palate, and floor of the nose and complete opacification of the left maxillary sinus (arrow).

![Figure 3](image2.png)

**Figure 3.** Nasal biopsy demonstrating a granuloma next to a hair follicle in the dermis, which has an extensive inflammatory infiltrate (hematoxylin and eosin, 200×).
treatment (8, 12). Spontaneous remission occurs only in about 10% of cases of laryngeal sarcoidosis (13). The role of corticosteroids in the clinical management of sarcoidosis is well established through its effects on lymphocyte-macrophage function. The lack of a response after 3 months of corticosteroid treatment suggests irreversible fibrotic disease, nonadherence to therapy, or an inadequate dose of prednisone. Inhaled corticosteroid therapy provides simple and safe drug delivery to sites of inflammation. Some studies have demonstrated that nasal steroids in the clinical management of sarcoidosis is well established through its effects on lymphocyte-macrophage function. No cases of laryngeal sarcoidosis were included in the study, but recent studies have demonstrated that sarcoidosis patients with high levels of spontaneously released tumor necrosis factor–alpha (TNF-α) in bronchoalveolar lavage had a significantly greater risk of disease progression and corticosteroid resistance than those with a normal TNF-α level (43.8% vs 8.3%, respectively) (17). Randomized controlled trials have shown favorable results with TNF-α antagonists for the treatment of chronic active sarcoidosis (18). Judson and Baughman studied the effectiveness of infliximab therapy in chronic sarcoidosis. No cases of laryngeal sarcoidosis were included in the study, but a few cases of nasal sarcoidosis were included. At 24 weeks, the total score of extrapulmonary sarcoidosis severity was decreased by >40% in the infliximab group compared to the placebo group (19). Clinicians should consider alternative therapies, such as anti–TNF-α inhibitors, early in the course when the response to usual therapy is poor.

Minimally invasive endoscopic surgery with intranasal corticosteroid injection improves symptoms with minimal morbidity and reduces the need for systemic corticosteroids in most patients. Surgical excision using cold instruments, CO₂ lasers, or microdebriders has been reported with good results (20). In sinonasal sarcoidosis, minimally invasive surgeries, including endoscopic sinus surgery, can significantly improve the quality of life, especially in those with severe nasal obstruction. Frequent saline nasal irrigation is recommended in all patients with sinonasal disease to eliminate nasal crusting.