Fatal Pulmonary Sporotrichosis Caused by *Sporothrix schenckii* var. *luriei* in India

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The first case of fatal pulmonary sporotrichosis caused by *Sporothrix schenckii* var. *luriei* in a patient from the northeastern region of India is described. In the absence of cultures, the diagnosis was suspected by notation, in lung tissue, of large, thick-walled, hyaline fungal cells that divided internally by septation or a budding process. The thick-walled, internally septated cells often became muriform. The presence of an "eyeglass" configuration of incompletely separated cells characteristic of *S. schenckii* var. *luriei* in large numbers aided the diagnosis. The identity of the etiologic agent was confirmed by application of a fluorescent-antibody reagent specific for *S. schenckii*.

Sporotrichosis is a rare disease in India and occurs mainly in the northeastern states of Assam and West Bengal. According to Kini et al. (5), only 48 authentic Indian cases of sporotrichosis have been described in the literature in the last 50 years (1932 to 1982). Of these 48 cases, 45 (93.7%) were from the two states of Assam (39 cases) and West Bengal (6 cases). Of the remaining three cases that were diagnosed in other states, one was diagnosed in Chandigarh, Punjab, the northwestern region of India; another was from the southeastern region, namely Madras; and the third, in which the patient contracted the infection in the northwestern state of Uttar Pradesh, was described by Kini et al. (5).

Recently, Sharma et al. (7) reported five additional cases of sporotrichosis caused by *Sporothrix schenckii* var. *schenckii* from the northeastern states of Himachal Pradesh and Uttar Pradesh. In all 53 cases, the infection was of the lymphocutaneous type and was caused by *S. schenckii* var. *schenckii*. We describe here the first case of pulmonary sporotrichosis caused by *S. schenckii* var. *luriei*, the variety hitherto not known to occur on the Asian continent.

A 43-year-old Indian woman was admitted to the hospital on 7 July 1990, because of acute respiratory distress. Her clinical history dated from 1971, when she had had fever and several days of coughing. Subsequently, she continued to have episodes of wheezing and recurrent pneumonias. In 1972, she had a diagnosis of asthma. Since then she had been treated periodically with antibiotics and bronchodilators and had experienced temporary improvement of symptoms. She was taking steroids (unknown dose) for at least 2 years prior to her admission. In 1986, she was admitted to the hospital for exacerbation of dyspnea, purulent productive cough, and fever of 1.5 months duration. She had no history of diabetes, food allergy, allergic rhinitis, eczema, urticaria, or any other skin lesion. Investigations during that admission revealed leukocytosis and an erythrocyte sedimentation rate of 44 mm/h. Sputum culture grew *Candida tropicalis* but was negative for acid-fast bacilli. Several chest X-rays had reportedly shown right middle-lobe infiltrates in 1981 and possible cavitation in the right middle lobe with a bibasilar interstitial infiltrate in 1983. She was discharged after improvement of her symptoms following treatment with broad-spectrum antibiotics, aminophylline, and prednisone (30 mg/day for 14 days).

At the time of her final admission, she was cyanotic and in respiratory distress. Laboratory studies showed severe hypoxia, leukocytosis, azotemia, and hyponatremia. Urine and sputum cultures were negative. On the second hospital day, she experienced respiratory arrest and was intubated for mechanical ventilation. The patient died on 17 July 1990, despite treatment with broad-spectrum antibiotics, hydrocortisone (200 mg intravenously for 5 days, followed by 100 mg/6 h for 4 days), and ventilatory support.

**Autopsy findings.** Both lungs were heavy and weighed 1.5 kg together. Pleura was thickened over the lower lobes. The cut surface showed dilated, thin-walled bronchi, mostly in the mid and lower zones, and confluent abscesses in areas of consolidation. Microscopic examination of the lung tissue sections stained with periodic acid-Schiff stain and Gomori's methenamine-silver (GMS) was consistent with bronchiectasis surrounding areas showing fibrosis and lymphoid aggregates. Some of the bronchi showed ulceration of the lining epithelium. There was irregular enlargement of alveoli. In the areas of consolidation, abscesses, bronchopneumonia, and alveolar edema were present. The areas of acute inflammatory cell infiltration showed thick-walled, GMS-stained fungal cells. Many large cells, 12 to 19 by 14 to 25.0 μm, divided internally by septation or were in pairs. No lung tissue was saved for fungal culture. A GMS-stained slide and three unstained slides of the lung tissue were sent to the Mycotic Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control, Atlanta, Ga., for diagnosis.

Microscopic examination of the lung tissue sections stained with hematoxylin-eosin and GMS showed numerous oval, elongated, hyaline, thick-walled (walls up to 1.5 to 2.0 μm thick) fungal cells measuring 10 to 30 μm in diameter, many dividing by equatorial septations into two daughter cells. Mature daughter cells often separated by rupture of the cell wall on one side to give an eyeglass-
shaped appearance (Fig. 1) typical of *S. schenckii* var. *luriei*. In many cells, internal septation in different planes resulting in formation of muriform cells was also observed. Some of the larger cells were empty, being devoid of cytoplasmic contents, while some showed germ tubes (Fig. 2). A careful examination also revealed a few spherical to ellipsoidal budding cells that measured 2 to 6 μm in diameter, similar to those of *S. schenckii* var. *schenckii*. Based on the presence of thick-walled, septate cells and classical eyeglass-shaped cells (1), the possibility of the tissue form being *S. schenckii* var. *luriei* was considered.

Fluorescent-antibody staining. The deparaffinized, unstained sections were stained with a specific fluorescein-labeled *S. schenckii* var. *schenckii* antiglobulin and examined with a Leitz Ortholux II indirect light fluorescence microscope (1, 4). Previous investigations (1, 4) revealed that this conjugate specifically stained both varieties of *S. schenckii* in vitro and in vivo and was nonreactive with 21 heterologous fungal species representing 12 different genera. The fluorescent-antibody reagent stained various fungal cells in the tissue sections, confirming the diagnosis of the first case of sporotrichosis in India caused by *S. schenckii* var. *luriei*. None of the fungal elements stained with control fluorescein-labeled preimmune rabbit globulin.

This report describes not only the first human pulmonary infection caused by *S. schenckii* var. *luriei* but also the first

![FIG. 1. Classical eyeglass-shaped form (arrow) produced by the incomplete separation of a septate cell and partial dissolution of the parental cell wall and a muriform cell of *Sporothrix schenckii* var. *luriei*, with GMS stain. Magnification, ×875.](image1)

![FIG. 2. Germinating tissue form cells of *S. schenckii* var. *luriei*, with GMS stain. Magnification, ×560.](image2)
case in an Asian country. Because of nonrecognition of the causal agent, the patient never received the proper treatment with potassium iodide, amphotericin B, or itraconazole. Furthermore, her prolonged treatment with corticosteroids may have helped to disseminate the infection, which eventually proved fatal. Two cases of sporotrichosis due to S. schenckii var. luriei have been described to date. The first infection was of a fixed type of sporotrichosis characterized by development of a tumor on the forehead in the left frontal region in a native from South Africa. Bone erosion had occurred, creating a connection with the skull cavity. Clinical improvement was achieved with potassium iodide therapy (1). The second infection was described 20 years later, in 1989 (2), for a patient living in Piacenza, Italy. In the absence of culture, the diagnosis was considered on the basis of demonstration of characteristic hyaline, thick-walled cells dividing by septation or budding and the striking characteristic eyeglass configuration of incompletely separated cells. The diagnosis was subsequently confirmed by staining the fungal cells with an S. schenckii-specific fluorescent-antibody reagent.

This report once again emphasizes the diagnostic challenge S. schenckii var. luriei poses to histopathologists. Not only is its morphology strikingly distinct from the well-known tissue form of S. schenckii var. schenckii, but also its exhibition of polymorphism causes it to mimic other mycoses. The present case, when originally submitted to the Centers for Disease Control, was suspected to be either adiaspiromycosis, blastomycosis, or coccidioidomycosis. According to Ajello and Kaplan (1), the infection diagnosed and described as cutaneous blastomycosis in Spain by Mercadal-Peyri et al. (6) in 1965 might actually have been sporotrichosis caused by S. schenckii var. luriei since the photomicrographs in their report show hyaline cells resembling eyeglass-shaped forms.

In both cases, namely, the infection described by Alberici et al. (2) and the present case, no one originally suspected the disease as being sporotrichosis. No attempt was made to isolate the etiologic agent from the tissue before the tissue was fixed in formalin. Except for the original isolate of S. schenckii var. luriei (1) (ATCC 18616), no other living culture of S. schenckii var. luriei exists. S. schenckii var. luriei differs from S. schenckii var. schenckii not only in its tissue form, but also in its mycelial anamorph (ATCC 18616), which exhibits subtle and stable differences. The sympodial conidiogenous cells produce elliptical to navicular conidia measuring 3.5 to 10 by 1.5 to 2.0 μm, which are distinctly longer than those of S. schenckii var. schenckii. The pigmented sclerotium-like structures originally produced by ATCC 18616 on oatmeal agar are no longer produced. Sleeves of lateral conidia produced by many clinical isolates of S. schenckii var. schenckii are not produced by ATCC 18616. In vitro, it converts to yeast form when grown on brain heart infusion agar at 37°C. Microscopically, unicellular, elliptical, oval to fusiform cells multiply by budding and are indistinguishable from those of S. schenckii var. schenckii. The natural habitat of S. schenckii var. luriei is not known. A comparative study of ATCC 18616 with some of the environmental isolates of Dixon et al. (3) might reveal the natural habitat of this elusive variety of S. schenckii. When eyeglass-shaped forms are observed in histologic slides, attempts should be made to culture the etiologic agent. The availability of such cultures provides opportunities for in vitro and in vivo testing of new antifungal agents against S. schenckii var. luriei and allows comparison of isolates obtained from different geographic areas and clinical forms of the disease.

REFERENCES