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A RARE CASE OF MUCORMYCOSIS OF MEDIAN STERNOTOMY WOUND CAUSED BY RHIZOPUS ARRHIZUS

*R Chawla, S Sehgal, S Ravindra Kumar, B Mishra

Abstract

We describe a case of mucormycosis of median sternotomy wound caused by Rhizopus arrhizus. The patient, a known diabetic and a case of coronary artery disease underwent coronary artery bypass surgery. In the postoperative period, patient developed infection of the median sternotomy wound, from which R. arrhizus was isolated on culture. Patient succumbed in spite of being treated with surgical debridement and amphotericin B. To the best of our knowledge, this is the first reported case of mucormycosis of median sternotomy wound from India.

Key words: Median sternotomy wound, mucormycosis, Rhizopus arrhizus

Zygomycosis is a progressive infection caused by one of the phycomycetes. These are large, thin-walled and nonseptate fungi. Zygomycetes consist of two orders Mucorales and Entomophthorales, which contain genera and species of medical importance. Fungi of the order mucorales are distributed into six families (Mucoraceae, Cunninghamellaceae, Saksenaea, Thamnidiales, Syncephalastaceae and Mortierellaceae) and cause mucormycosis. Species belonging to the family Mucoraceae are more commonly isolated from patients with mucormycosis than of any other family. Among the family Mucoraceae, Rhizopus arrhizus (Rhizopus oryzae) is by far the most common cause of infection.

Fungi of the order Mucorales are ubiquitous organisms often found in decaying vegetation. Based on clinical presentation and site of infection, mucormycosis can be divided into six clinical categories: (i) rhinocerebral, (ii) pulmonary, (iii) cutaneous, (iv) gastrointestinal, (v) disseminated and (vi) miscellaneous. These categories of invasive mucormycosis tend to be associated with metabolic acidosis, hyperglycaemia, corticosteroid therapy, immunosuppressive therapy for organ transplantation, neutropenia and desferoxamine therapy. We report here a case of mucormycosis of median sternotomy wound.

Case Report

A 48-year-old male patient, resident of New Delhi, presented in the Cardiology outpatient department of G.B. Pant Hospital, New Delhi, with complaints of recurrent chest pain and dyspnoea on exertion for the past two months. Patient admitted to smoking on an average 10 cigarettes a day for the past 25 years and also consumed alcohol regularly for the same duration. Patient was a known case of type 2 diabetes mellitus and had been on insulin therapy for the past 14 years due to poor glycaemic control on oral hypoglycaemic agents. On echocardiography, ejection fraction was found to be 25-30%. Patient was taken up for coronary angiography and was found to have triple vessel disease with 90, 100 and 100% blockage in left anterior descending, circumflex and right coronary artery, respectively. In view of the persisting symptoms, the patient was taken up for coronary artery bypass graft through median sternotomy. The patient was on broad-spectrum antibiotic prophylaxis during the postoperative period. In spite of being on insulin therapy during the postoperative period, patient’s blood sugar level was high; however, there was no ketoacidosis. On the seventh post-operative day, oedema and induration were noted at the incision site. Over the next three days there was spread of induration, blistering of skin and a gaping of the median sternotomy wound. A fluffy cottony growth was observed on the surface of the wound. The excised skin along with the underlying tissue was sent for bacteriological culture, fungal culture and histopathological examination. Ten percent potassium hydroxide (KOH) and lactophenol cotton blue (LPCB) mount of the specimen showed the presence of broad, hyaline, asceptate hyphae. On Gram stain, no bacteria were seen. For bacterial culture, specimen was inoculated on 5% sheep blood agar, MacConkey’s agar and glucose broth and incubated at 37 °C. For fungal culture, Sabouraud dextrose agar (SDA) with and without cycloheximide was inoculated in triplicate, one set was incubated at 25 °C, while the second and the third set were incubated at 37 and 46 °C, respectively. Microscopic characterization of the fungal isolate was carried out by preparing LPCB mount from the growth and by microslide culture technique.

A rapid, white, fluffy growth was observed after 24 h on blood agar and on the surface of glucose broth. Similar growth was seen after 48 h on SDA without cycloheximide, incubated at 25 and 37 °C. However, no growth occurred on the above mentioned medium when incubated at 46 °C. The colonies were initially white but on continued incubation became grey in colour (Fig. 1).
Wide, hyaline, aseptate hyphae were seen. Sporangiophores, approximately 1500 µm long and 18 µm wide, smooth-walled, non-septate, were seen originating singly or in groups from stolons directly above the rhizoidal tufts. Rhizoids were brown and branched. Sporangiophores were unbranched, terminating in round, greyish black sporangia measuring 100-200 µm in diameter. The columella and apophysis together were globose and up to 130 µm in height. Collapsed columella resembling umbrella were seen. Greyish-green coloured sporangiospores (3-8 µm in length) were produced in abundance and were angular, subspherical to ellipsoidal with ridges on the surface (Figs. 2, 3). The fungal isolate was identified phenotypically as *Rhizopus arrhizus* by comparing the abovementioned characteristics with standard descriptions given by Ribes et al.¹

Haematoxylin and eosin; periodic acid-Schiff; and Gomori’s methenamine-silver staining (Fig. 4) of the tissue showed broad, aseptate, ribbon-like hyphae with irregular branching along with necrotic tissue.

Two blood specimens were collected from the patient for fungal and bacteriological culture; however, both were found to be sterile. Based on the above findings, a diagnosis of mucormycosis of median sternotomy wound was made and the patient was treated with wound debridement and intravenous liposomal amphotericin B. However, patient’s condition continued to deteriorate and on the thirteenth postoperative day, patient developed hypotension and congestive cardiac failure, which did not respond to inotropic support and died due to cardiac arrest.

**Discussion**

In a review of 929 cases of zygomycosis by Roden et al, cutaneous zygomycosis was found to be the
third most common (19%) form after sinus (39%) and pulmonary (24%) zygomycosis. Primary mucormycosis of the skin and wounds has been associated with burns, traumatic disruption of skin, persistent maceration of skin and with use of contaminated elasticized surgical bandages. Cutaneous mucormycosis can be invasive locally and penetrate from the cutaneous and subcutaneous tissues into the adjacent fat, muscle, fascia and even bone. Secondary vascular invasion may lead to haematogenously disseminated infection of the deep organs. However, isolated cutaneous mucormycosis has a favourable prognosis and a low mortality if aggressive surgical debridement is done promptly.

Though elasticized surgical bandage was not used, our patient was a known diabetic and this could have been an important risk factor for development of mucormycosis of the median sternotomy wound. Similar to our case, Abter et al. reported mucormycosis of the median sternotomy wound in a diabetic patient who had undergone coronary artery bypass surgery and mitral valve replacement. Their case had a rapid downhill course and died due to invasive sternal mucormycosis inspite of extensive surgical debridement and amphotericin B therapy. Our patient also had a rapid deterioration and was lost. However, in absence of autopsy (declined by family) we could not determine whether the patient died due to invasive spread of sternal wound mucormycosis to the deeper tissues and involvement of the graft leading to graft failure. In a retrospective analysis of cases of cardiac mucormycosis, Virmani et al. reviewed four cases of cardiac mucormycosis occurring after cardiac surgery. The surgical procedures included valve replacement, coronary artery bypass graft and repair of coarctation of aorta. Chaudhry et al. reported a case of prosthetic mitral valve mucormycosis caused by Mucor spp. after mitral valve replacement in New Delhi. To the best of our knowledge, this is the first case of mucormycosis of median sternotomy wound being reported from India.

As no effective chemoprophylactic regimen is available for the prevention of mucormycosis, preventive strategies include limiting the sources of contamination in the environment of patients at risk and careful monitoring of diabetic patients. Finally, prompt diagnosis and aggressive treatment of a potentially fatal condition like mucormycosis can only be achieved with heightened awareness and better cooperation between clinicians, microbiologists and pathologists.

References


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