DECODED BLACK FUNGUS

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What is mucormycosis / Black Fungus?

Mucormycosis (previously called zygomycosis) is a serious but rare fungal infection caused by a group of molds called mucormycetes. These molds live throughout the environment. **Mucormycosis** mainly affects people who have health problems or take medicines that lower the body's ability to fight germs and sickness.

Also Known As BLACK FUNGUS

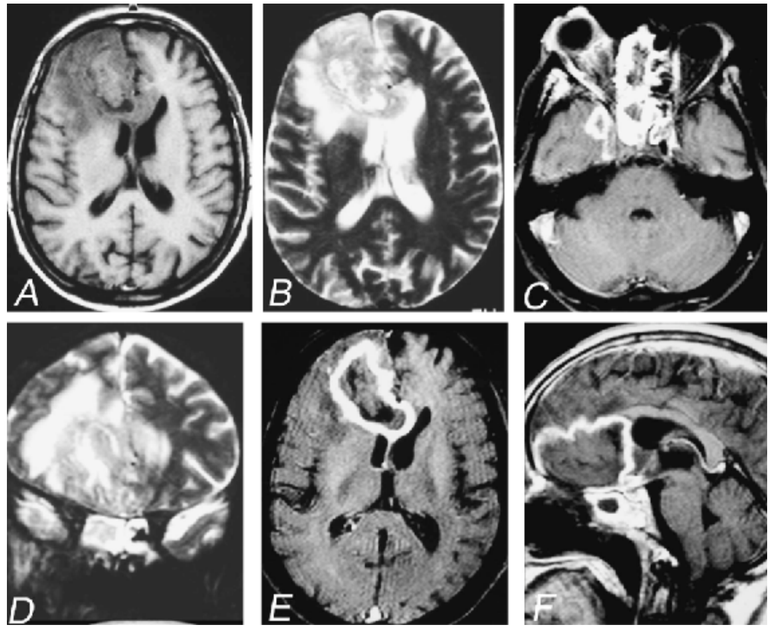
Symptoms of Mucormycosis

The symptoms of mucormycosis depend on where in the body the fungus is growing. Contact your healthcare provider if you have symptoms that you think are related to mucormycosis.

Symptoms of rhinocerebral (sinus and brain) mucormycosis include:

- One-sided facial swelling
- Headache
- Nasal or sinus congestion
- Black lesions on nasal bridge or upper inside of mouth that quickly become more severe
- Fever

Symptoms of Mucormycosis



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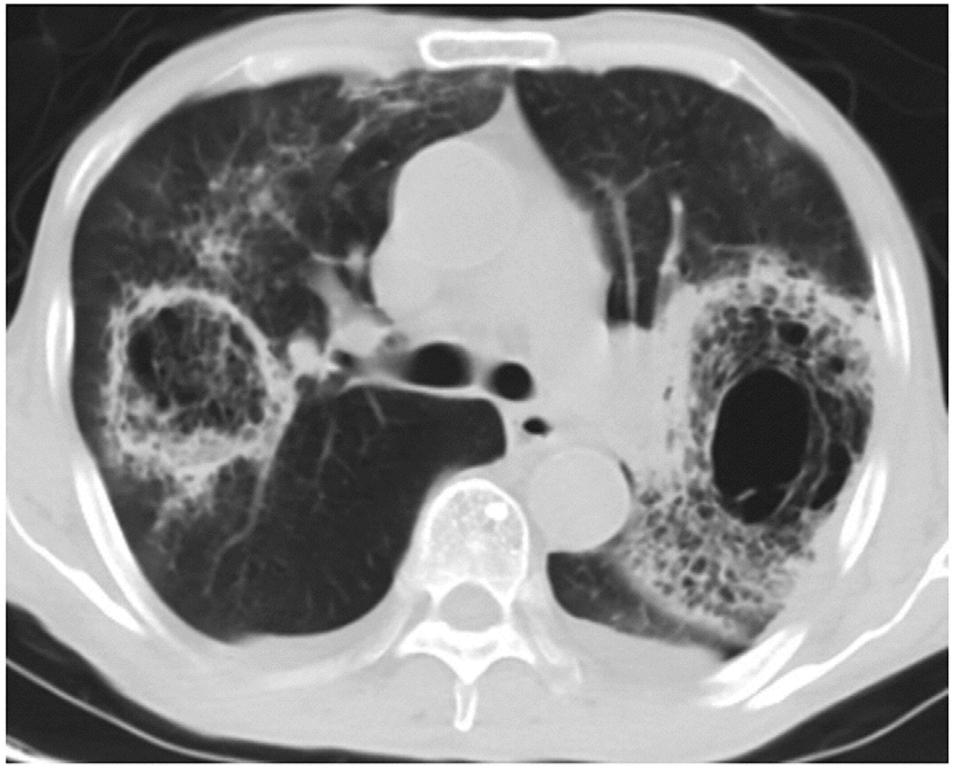
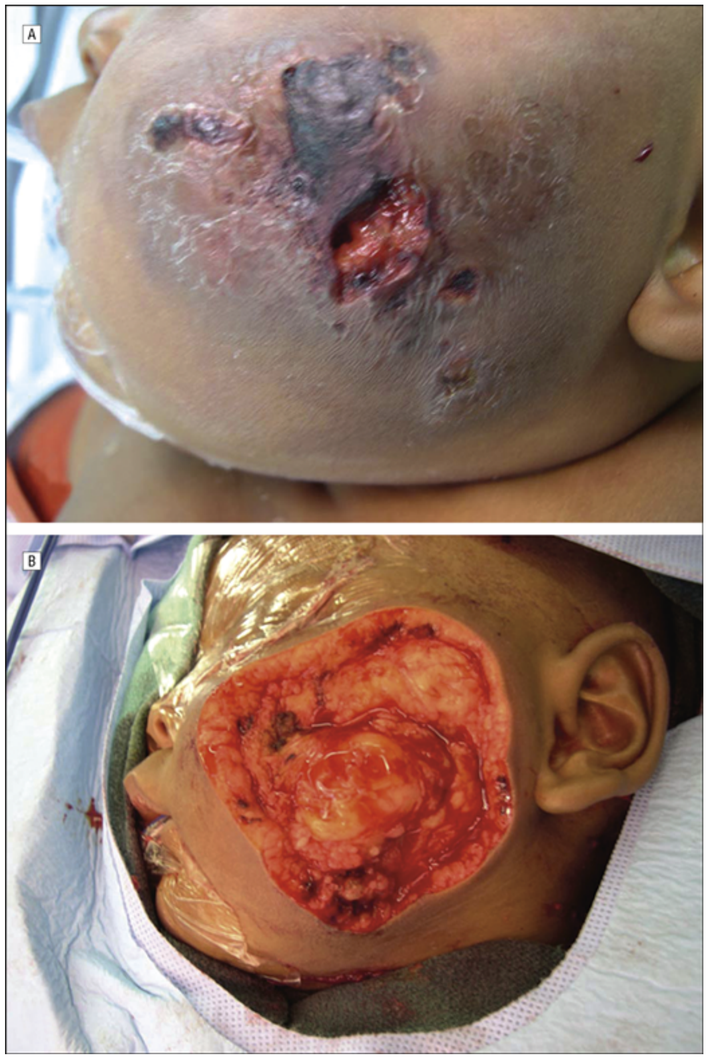


Symptoms of pulmonary (lung) mucormycosis include:

- Fever
- Cough
- Chest pain
- Shortness of breath

Symptoms of Mucormycosis



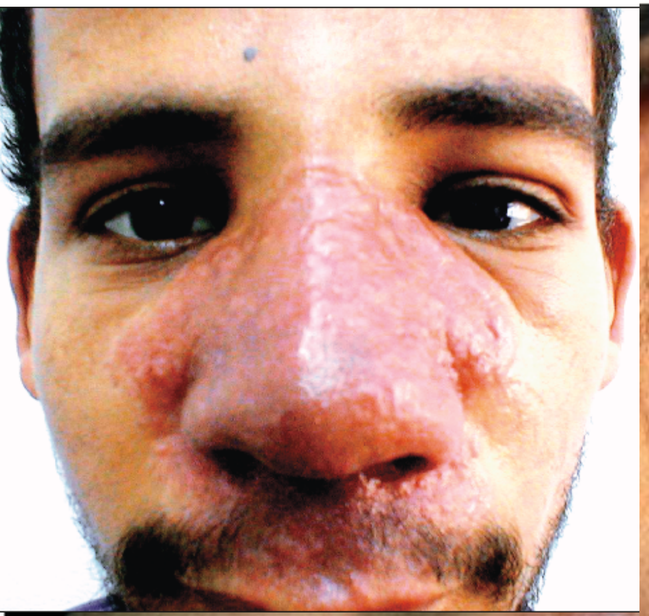
Cutaneous (skin) mucormycosis can look like blisters or ulcers, and the infected area may turn black. Other symptoms include pain, warmth, excessive redness, or swelling around a wound.

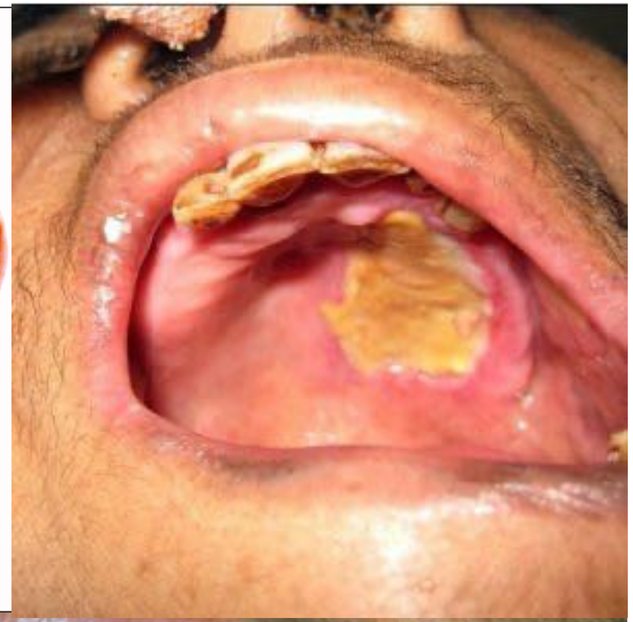
Symptoms of Mucormycosis

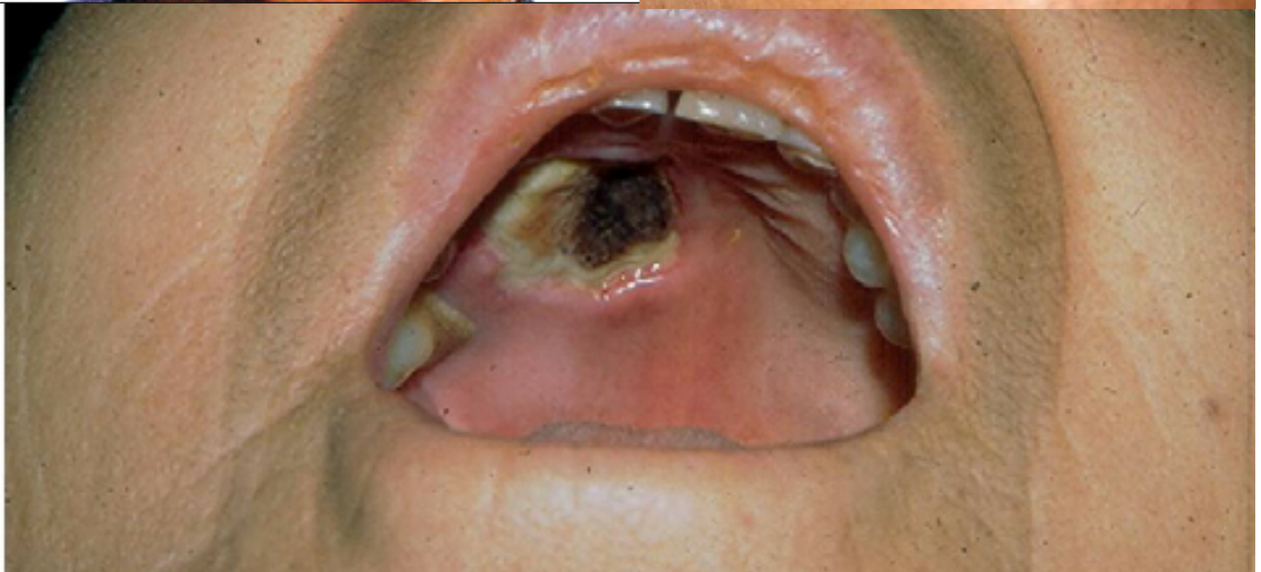
Symptoms of gastrointestinal mucormycosis include:

- Abdominal pain
- Nausea and vomiting
- Gastrointestinal bleeding

Symptoms of Mucormycosis







Disseminated mucormycosis typically occurs in people who are already sick from other medical conditions, so it can be difficult to know which symptoms are related to mucormycosis.
Patients with disseminated infection in the brain can develop mental status changes or coma.

Clinical features

There are five major clinical forms of mucormycosis; of these, rhinocerebral and pulmonary infections are the most common.

A classic clinical sign of mucormycosis is the rapid onset of tissue necrosis with or without fever. Necrosis is the result of invasion of blood vessels and subsequent thrombosis.

Rhinocerebral mucormycosis is the most common form in patients with diabetes and with renal transplants. It also occurs in neutropenic cancer patients and hematopoietic stem cell transplant or solid organ transplant recipients. Symptoms may include unilateral facial swelling, headaches, nasal or sinus congestion or pain, serosanguinous nasal discharge, and fever. As the infection spreads, ptosis, proptosis, loss of extraocular muscle function, and vision disturbance may occur. Necrotic black lesions on the hard palate or nasal turbinate and drainage of black pus from eyes are useful diagnostic signs.

Clinical features

Pulmonary mucormycosis generally occurs in patients with hematologic malignancy or profound neutropenia. The symptoms are non-specific and include fever, cough, chest pain, and dyspnea. Angioinvasion results in tissue necrosis, which may ultimately lead to cavitation and/or hemoptysis

Clinical features

Cutaneous mucormycosis may be primary or secondary. Primary infection is usually caused by direct inoculation of the fungus into disrupted skin and is most often seen in patients with burns or other forms of local skin trauma, and can occur in patients who are not immunosuppressed. Primary infection produces an acute inflammatory response with pus, abscess formation, tissue swelling, and necrosis. The lesions may appear red and indurated and often progress to black eschars. Secondary cutaneous infection is generally seen when the pathogen spreads hematogenously; lesions typically begin as an erythematous, indurated, and painful cellulitis and then progress to an ulcer covered with a black eschar.

Clinical features

Gastrointestinal mucormycosis is less common than the other clinical forms and is believed to result from ingestion of the organism. It typically occurs in malnourished patients or premature infants. The stomach, colon, and ileum are most commonly affected. Non-specific abdominal pain and distension, nausea, and vomiting are the most common symptoms, and gastrointestinal bleeding can occur. It is the most common form of mucormycosis among neonates and is challenging to diagnose partly because of its clinical resemblance to necrotizing enterocolitis, a far more common disease.

Disseminated mucormycosis may follow any of the forms of mucormycosis described above but is usually seen in neutropenic patients with a pulmonary infection. The most common site of spread is the brain, but the spleen, heart, skin, and other organs can also be affected.

Diagnosis

A definitive diagnosis of mucormycosis typically requires histopathological evidence or positive culture from a specimen from the site of infection. Specimens from sterile body sites offer stronger evidence of invasive infection compared to colonization. Culture of non-sterile sites (e.g., sputum) may be helpful in patients with infection that is clinically consistent with mucormycosis.

Mucormycetes may be difficult to differentiate from other filamentous fungi in tissue; experienced pathological and microbiological assistance is often helpful. No routine serologic tests for mucormycosis are currently available, and blood tests such as beta-D-glucan or Aspergillus galactomannan do not detect mucormycetes. DNA-based techniques for detection are promising but are not yet fully standardized or commercially available.

People at Risk & Prevention

Who gets mucormycosis?

Mucormycosis is rare, but it's more common among people who have health problems or take medicines that lower the body's ability to fight germs and sickness. Certain groups of people are more likely to get mucormycosis, including people with:

- Diabetes, especially with diabetic ketoacidosis
- Cancer
- Organ transplant
- Stem cell transplant
- Low number of white blood cell
- Long-term corticosteroid use
- Injection drug use
- Too much iron in the body (iron overload or hemochromatosis)
- Skin injury due to surgery, burns, or wounds
- Prematurity and low birthweight (for neonatal gastrointestinal mucormycosis)

How does someone get mucormycosis?

People get mucormycosis through contact with fungal spores in the environment.

For example, the lung or sinus forms of the infection can occur after someone inhales the spores from the air.
A skin infection can occur after the fungus enters the skin through a scrape, burn, or other type of skin injury.

How does someone get mucormycosis Post Covid ?

- Who are using steroids for longer time and high dose
- Very high sugar & poorly controlled.
- On oxygen support at home, **NOT** using properly & keeping the oxygen instruments in goods conditions,
- **NOT** cleaning the oxygen mask in timely intervals
- Poorly technique for using steam inhalation,
- Using improper steam inhalation,
- Using the poorly cleaned water in Humidifiers,
- Using improper oxygen or using oxygen without humidifier,
- Or using oxygen concentrator with heavy flow of oxygen where moisture is coming very very high along with O2,

Is mucormycosis contagious?

No. Mucormycosis can’t spread between people or between people and animals.

How can I lower the risk of mucormycosis?

It’s difficult to avoid breathing in fungal spores because the fungi that cause mucormycosis are common in the environment. There is no vaccine to prevent mucormycosis. For people who have weakened immune systems, there may be some ways to lower the chances of developing mucormycosis.

- Protect yourself from the environment. It’s important to note that although these actions are recommended, they haven’t been proven to prevent mucormycosis.
- Try to avoid areas with a lot of dust like construction or excavation sites. If you can’t avoid these areas, wear an N95 respirator (a type of face mask) while you’re there.
- Avoid direct contact with water-damaged buildings and flood water after hurricanes and natural disasters.
- Avoid activities that involve close contact to soil or dust, such as yard work or gardening. If this isn’t possible
- Wear shoes, long pants, and a long-sleeved shirt when doing outdoor activities such as gardening, yard work, or visiting wooded areas.
- Wear gloves when handling materials such as soil, moss, or manure.
- To reduce the chances of developing a skin infection, clean skin injuries well with soap and water, especially if they have been exposed to soil or dust.

How can I lower the risk of mucormycosis?

If you are at high risk for developing mucormycosis (for example, if you've had an organ transplant or a stem cell transplant), your healthcare provider may prescribe medication to prevent mucormycosis and other mold infections.

Doctors and scientists are still learning about which transplant patients are at highest risk and how to best prevent fungal infections.

Treatment

Early recognition, diagnosis, and prompt administration of appropriate antifungal treatment are important for improving outcomes for patients with mucormycosis.

Amphotericin B, posaconazole, and isavuconazole are active against most mucormycetes. Lipid formulations of amphotericin B are often used as first-line treatment. Medications active against Aspergillus such as voriconazole are not active against mucormycetes, and there is some evidence to suggest that pre-exposure to voriconazole may be associated with increased incidence of mucormycosis in some patients.

In addition, surgical debridement or resection of infected tissue is often necessary, particularly for rhinocerebral, cutaneous, and gastrointestinal infections.

Control of the underlying immunocompromising condition should be attempted when possible. The efficacy of other treatments such as hyperbaric oxygen therapy is uncertain but have been useful in certain situations.

Transmission

Transmission occurs through **inhalation, inoculation, or ingestion of spores** from the environment. Although most cases are sporadic, healthcare-associated outbreaks have been linked to adhesive bandages, wooden tongue depressors, hospital linens, negative pressure rooms, water leaks, poor air filtration, non-sterile medical devices, and building construction.

Community-onset outbreaks have been associated with trauma sustained during natural disasters.

Sequelae

The overall prognosis depends on several factors, including the rapidity of diagnosis and treatment, the site of infection, and the patient's underlying conditions and degree of immunosuppression. The overall mortality rate is approximately 50%, although early identification and treatment can lead to better outcomes.

Risk groups

Risk groups for mucormycosis include persons with uncontrolled diabetes; malignancy; hematopoietic stem cell transplant or solid organ transplant; persistent neutropenia; prolonged corticosteroid therapy; skin trauma, burns, or surgical wounds; iron overload; intravenous drug use; malnourishment; and premature infants.

How common is mucormycosis?

Mucormycosis is rare, but the exact number of cases is difficult to determine because no national surveillance exists in the United States. Population-based incidence estimates for mucormycosis were obtained from laboratory surveillance in the San Francisco Bay Area during 1992–1993 and suggested a yearly rate of 1.7 cases per 1 million population.[1]

Mucormycosis outbreaks

Healthcare providers who are concerned about an unusual number of new cases should contact their state or local public health agency.
Although most cases of mucormycosis are sporadic (not part of an outbreak), outbreaks of mucormycosis have occured. In healthcare settings, it can be difficult to determine whether mucormycosis is healthcare-associated or whether the infections were acquired somewhere else. Some examples of sources implicated in healthcare-associated mucormycosis outbreaks include adhesive bandages, wooden tongue depressors, hospital linens, negative pressure rooms, water leaks, poor air filtration, non-sterile medical devices, and building construction.[7-14] Community-onset outbreaks have been associated with trauma sustained during natural disasters.[15]

Early Stage

- Oral Hygiene and timely treatment help in case of sinus and para sinus involvement

- Patient who are using steroid are become easy target for these disease as it rapidly progress

Late Stage

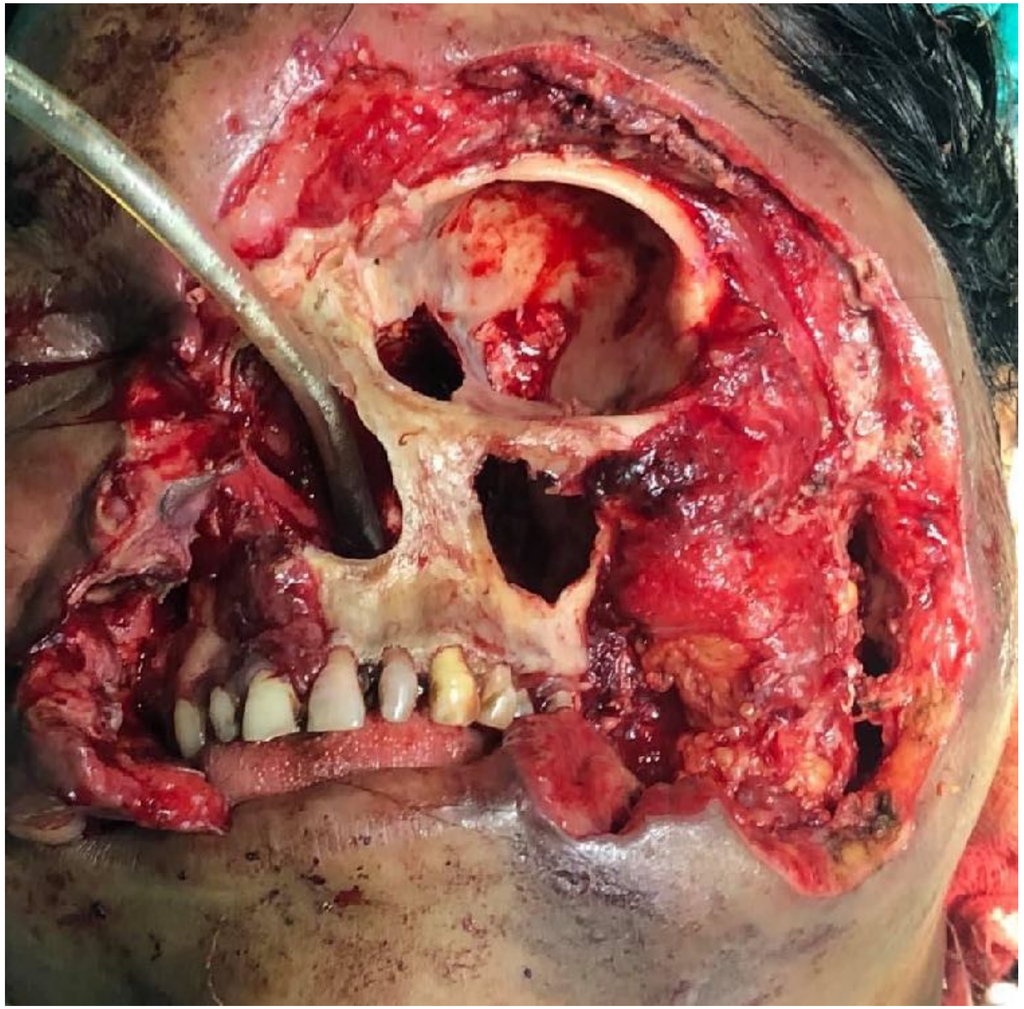


Image Courtesy Dr Rajendera Mayura

- Extensive surgery and highest medical care needed

Deaths due to mucormycosis

Mucormycosis is frequently a life-threatening infection. A review of published mucormycosis cases found an overall all-cause mortality rate of 54%.

The mortality rate varied depending on underlying patient condition, type of fungus, and body site affected (for example, the mortality rate was 46% among people with sinus infections, 76% for pulmonary infections, and 96% for disseminated mucormycosis).

Surgical Treatments for Orbital Cases

- Surgical Treatment for Orbital & Rheno orbital Cases
- Surgery involvement of team of professional ENT, Ophthalmologist, Oculoplasty Surgeon, Maxillofacial Surgeon, Anaplastologist

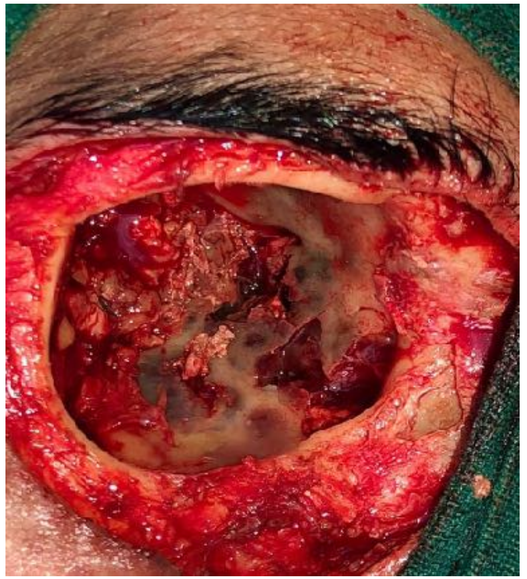


Image Courtesy Dr Rajendera Mayura

Surgical Treatments

- Typical done by irrigating, deberments of Orbital and sinus and all effected area, and treated with Antifungal Rx,

Surgical Treatments

- Survived patient usually left with large facial Deformities

Post Orbital Exentetration

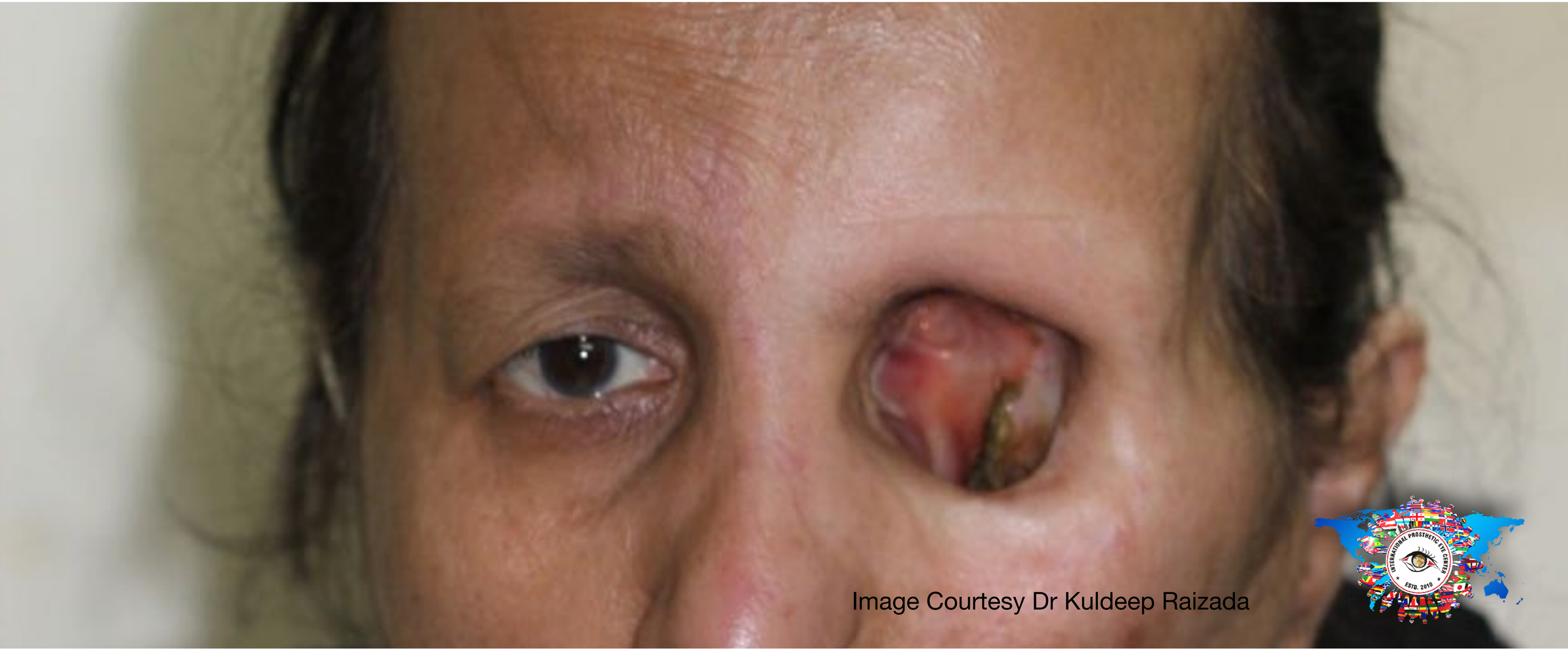


Image Courtesy Dr Kuldeep Raizada

Final Treatment with Prosthesis


Image Courtesy Dr Kuldeep Raizada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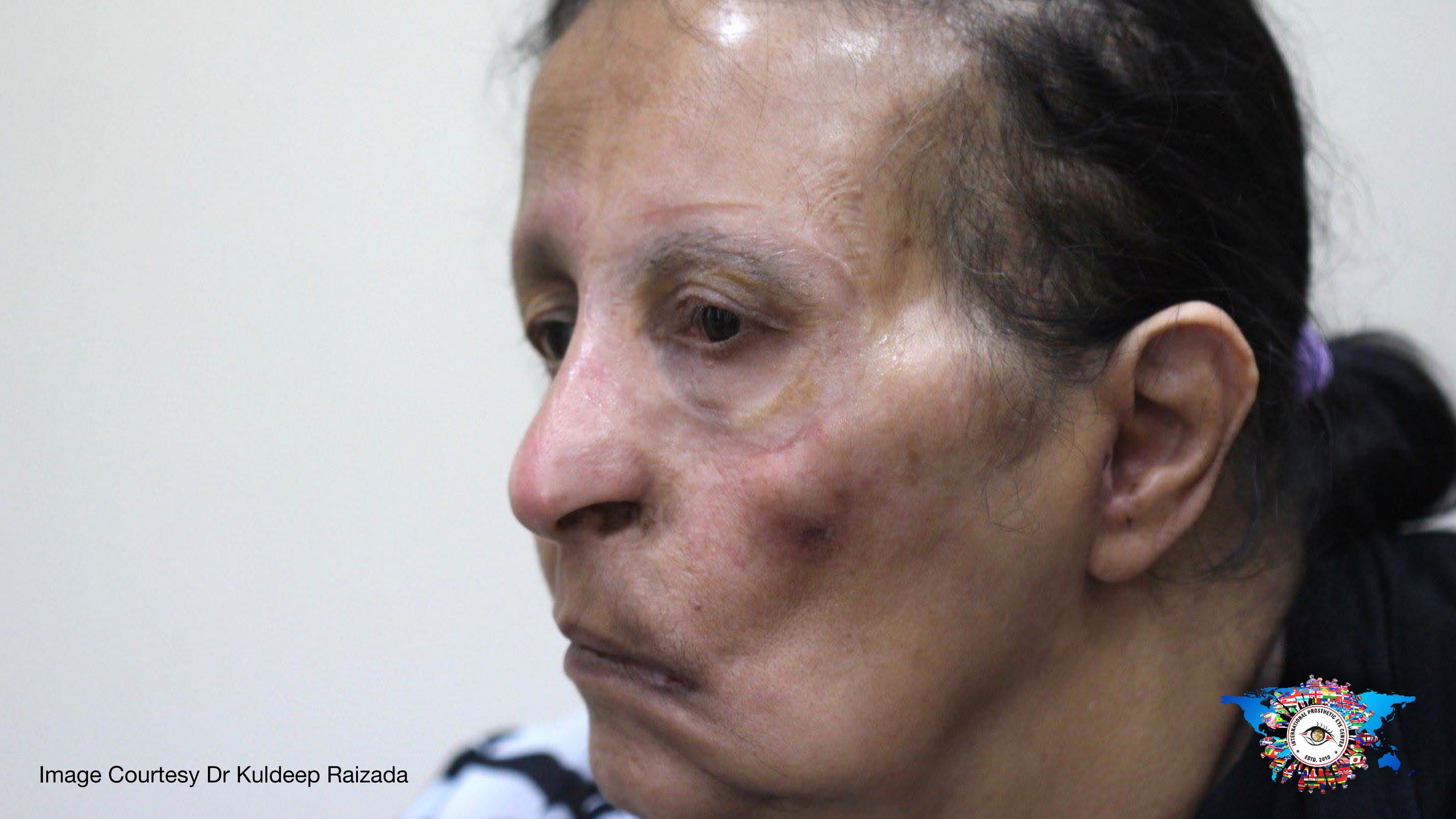

Image Courtesy Dr Kuldeep Raizada

Thank you

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