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Unilateral Maxillary Sinus Fungal Ball with Cellulitis Orbita in Geriatric Patient with Diabetes Mellitus Type II: 2-Case Report

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Abstract

Acute invasive fungal rhinosinusitis is a rare finding and almost only found in immunocompromised patients such as diabetes mellitus. Patients with diabetes mellitus have impaired immune function and it can become a medium for fungal growth to multiply. We report two cases of unilateral maxillary fungal ball sinus with orbital cellulitis in a geriatric patient diagnosed with type 2 diabetes mellitus. Both patients underwent FESS or Functional Endoscopic Sinus Surgery along with medical management. Both patients underwent postoperative observation to evaluate the patient's outcome. Early diagnosis and appropriate treatment will result in a better outcome in these patients.

Keywords: *Fungal Ball, Selulitis Orbita, FESS.*

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Introduction

Fungal rhinosinusitis classified based on histopathological findings into invasive and non-invasive forms. The non-invasive type of fungal sinusitis occurs mostly in immunocompetent patients, while Invasive forms are associated with high mortality rates and immunocompromised patients.¹

The "Fungal Ball" image is described as accumulation of non-invasive forms and compaction of fungal hyphae. "Fungal ball" often affects one sinus, usually the maxillary sinus, without involvement of the mucosa, submucosa, bony structures, or blood vessels. Acute invasive fungal rhinosinusitis is a rare finding and almost only found in immunocompromised patients such as diabetes mellitus.^{1,2}

In a retrospective series by Yu-Fang Huang et al found the incidence of diabetes mellitus in

all patients with orbital involvement. In the same study it is mentioned that several previous retrospective studies of rhino-orbito-cerebral mucormycosis or fungal orbital cellulitis showed a higher prevalence in patients with diabetes mellitus. Patients with diabetes mellitus have impaired immune function due to poor chemotaxis and phagocytosis by neutrophils, monocytes and macrophages.²

Fungal rhino-orbital cellulitis occurs mostly as a contagious infection from rhinosinusitis, which is a destructive disease with a high mortality rate. Orbital cellulitis mostly occurs when the infection spreads from the paranasal sinuses, especially from the ethmoid sinuses. Patient with suspicion of fungal ball must undergo paranasal CT-Scan, histologic, and mycologic evaluation.^{2,3}

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rhinosinusitis is combining surgical debridement with systemic antifungals. Surgical intervention significantly improves clinical outcome and survival for patients with fungal rhinosinusitis. If orbital cellulitis is diagnosed, conservative treatment can initially be given. Surgical treatment involved sinus drainage and subperiosteal abscess surgery. Anti-hyperglycemic management in patients with diabetes mellitus is important in relation to the higher risk of infections. ⁴

Case Report

Case 1) A 54-year-old woman presenting with facial pain for 1 week before admission. Pain begins with coughing and nasal congestion, initially the pain is felt only in the teeth and jaw area, then the pain radiates to the face, temples, middle of the eyebrows and behind the right eye. Sometimes there is a fluid that comes out of the patient's nose with a clear and watery fluid since 1 week before admission. Patient often complained of sneezing mainly when the patient was exposed to dust and cold, this complaint happened years ago. Patient also felt pain when chewing. The patient also complained of swelling of the right eyelid and difficult to open since 1 week before admission to the hospital. The patient has just been diagnosed with diabetes mellitus.

On physical examination, there was tenderness in the maxillary, frontal and right ethmoid sinuses. The patient's right eye had ptosis with edema and hyperemia, the visual acuity of the right eye was one per infinity while the left eye had normal vision. (Figure 1)



Figure 1. Clinical Pictures of the First Patient at Admissions

Laboratory examination results revealed anemia, leukocytosis, and hypokalemia. A CT scan has been performed and the conclusion is left optic neuritis and maxillary chronic sinusitis and right sphenoidal sinus. (Figure 2)



Figure 2. CT Scan of the First Patient

The patient undergoes FESS (Functional Endoscopic Sinus Surgery) procedure with General Anesthesia. During the procedure, a fungal component was found and macroscopically removed from the maxillary sinus. Currently the patient has received treatment in the form of Metronidazole drip, Ceftriaxone injection, Methylprednisolone injection, nasal wash with Flagusol, Levofloxacin eye drops, and Gentamicin ointment. The management of diabetes mellitus in this patient during treatment was insulin titration using a syringe pump with the Texas method.



Figure 3. Clinical Pictures of the First Patient after Treatment

Case 2) A 57-year-old woman with facial pain in the cheeks, nose, forehead in the last 3 days before admission to the hospital. Pain felt to appear suddenly, continuously, and the longer it gets worse. The patient also complained of clogged left nose since 1 week ago. Clogged appear especially when the weather is cold. Patients also feel that the nose often emit discharges clear and sometimes yellow-green fluid that is thick and smelly. Sneezing and itching in the nose appears occasionally mostly when patient exposed to dust
On physical examination, the left nasal cavity was found to be hyperemic and conchae hypertrophied. On palpation of the paranasal

sinuses, tenderness was found in the left maxillary sinus. In the left eye found ptosis and palpebral edema and tenderness. (Figure 4)



Figure 4. Clinical Pictures of the Second Patient at Admissions

On laboratory examination, no abnormalities were found. On investigation, CT scan of the paranasal sinuses, orbital cellulitis was found with left superior palpebrae attached to the orbit and bilateral maxillary pansinusitis, especially the left, accompanied by ethmoid and left frontal sinusitis. (Figure 5)

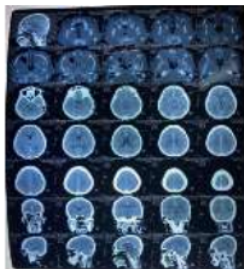


Figure 5. CT-Scan of the Second Patient

The patient underwent a FESS (Functional Endoscopic Sinus Surgery) procedure with General Anesthesia. During surgery, a fungal ball found in the left maxillary sinus. The patient received treatment of ceftriaxone injection, metronidazole injection, ketorolac injection, omeprazole injection, metamizole injection, and insulin injection.

Discussion

The "Fungal Ball" image is described as accumulation of non-invasive forms and compaction of fungal hyphae. And often affects one sinus, usually the maxillary sinus. Fungal ball are characterized macroscopically by a green, yellow, brown, or black brittle cheese-like appearance that peels easily from the mucosa. The CT scan findings for fungal balls are metallic calcification or density with a radioopaque sinus appearance. Histologic and mycological assessment is still required to confirm the diagnosis. Histological examination can only recognize hyphae in fungal balls and cannot distinguish which

species causes fungal balls.^{1,3}

Orbital cellulitis occurs mostly when infection spreads from the paranasal sinuses, especially from the ethmoid sinuses through the thin lamina papyracea on the medial orbital wall. There are two ways of spreading: direct invasion through the osteitis or by infective embolism along the ethmoid vein. This invasive manifestation of rhinosinusitis occur mostly in immunocompromised patient.²

The prevalence of Diabetes Mellitus in patients aged >65 years is around 22-33%. DM in the elderly is associated with an increase in DM complications, both acute and chronic. Patients with diabetes mellitus have impaired immune function due to poor chemotaxis and phagocytosis by neutrophils, monocytes and macrophages, there are several disorders of the immune system in diabetic patients such as the complement system, pathogen recognition, cellular dysfunction, adaptive immunity, cytokine signaling, as well as mucosal and skin barriers. An environment of low oxygen pressure, hyperglycemia, and ketosis provides an excellent medium for fungi to thrive.^{2,5,6}

The primary treatment for fungal rhinosinusitis is combining surgical debridement with systemic antifungals. Systemic antifungal therapy is an important part of the management of fungal rhinosinusitis. Surgical intervention significantly improves clinical outcome and survival for patients with fungal rhinosinusitis. Since the "Fungal ball" is not invasive, systemic or topical treatment is not recommended. Thus, fungal rhinosinusitis is managed by functional endoscopic sinus surgery (FESS). Management should be targeted at the affected sinus and any contributing factors. The fungus should be removed macroscopically and the sinuses cleaned. It is also important to take a sample of the surrounding mucosa, to rule out invasive fungal sinus disease. However, other approaches, such as the osteoplastic approach (endoscopic surgery through the anterior wall of the maxillary sinus) have been described in the literature.^{4,7}

In orbital cellulitis, visual acuity, color vision, pupillary reactions, and extraocular motility were assessed. If orbital cellulitis is diagnosed, conservative treatment can initially be given with application of eye drops containing topical quinolones to the eyelids, levofloxacin eye drops, and gatifloxacin eye ointment in

combination with broad-spectrum systemic antibiotic therapy. Surgical indications of cellulitis orbital are CT evidence of abscess formation, visual acuity of 20/60 (or worse) on initial evaluation, severe orbital complications (eg, blindness or afferent pupillary reflex) on initial evaluation, worsening of orbital signs and symptoms with therapy. Surgical treatment involved sinus drainage and subperiosteal abscess surgery.^{8,9}

Anti-hyperglycemic management in patients with diabetes mellitus is important in relation to the higher risk of infections. Based on the literature by Zhou et al, there are two types of antihyperglycemic with a significantly reduced risk of infection, namely insulin and metformin. Administration of insulin can improve immune disorders in patients with DM because T cells require insulin in the intake of nutrients needed for the production of cytokines as an inflammatory response. In addition, insulin administration also improves chemotaxis function in PMN. Metformin has shown the ability to increase the number and action of CD8+ cells and the production of cytokines.⁶

Conclusion

Invasive acute fungal rhinosinusitis is a rare finding and found in immunocompromised patients such as diabetes mellitus. The "Fungal Ball" image is described as accumulation of non-invasive forms and compaction of fungal hyphae. And often affects one sinus, usually the maxillary sinus.²

Fungal rhino-orbital cellulitis occurs mostly as a contagious infection from rhinosinusitis, which is a destructive disease with a high mortality rate. Orbital cellulitis mostly occurs when the infection spreads from the paranasal sinuses, especially from the ethmoid sinuses. Patient with suspicion of fungal ball must undergo paranasal CT-Scan, histologic, and mycologic evaluation.^{2,3}

The primary treatment for fungal rhinosinusitis is combining surgical debridement with systemic antifungals. Surgical intervention significantly improves clinical outcome and survival for patients with fungal rhinosinusitis. If orbital cellulitis is diagnosed, conservative treatment can initially be given. Surgical treatment involved sinus drainage and subperiosteal abscess surgery. Anti-hyperglycemic management in patients

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