Efficacy of Different Modalities of Treatment in Management of Different Types of Fungal Sinusits

Meta analysis / systemic review

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List of Abbreviations

Abb.	Full term
AFRS	Allergic fungal rhinosinusitis
AFS	Allergic fungal sinusitis
AIFRS	Acute invasive fungal rhinosinusitis
AIT	Allergen immunotherapy
CRS	Chronic rhinosinusitis
CT	Computed tomography
FESS	Functional endoscopic sinus surgery
FB	Fungal ball
H&E	Hematoxylin-eosin
ICMJE	International Committee of Medical Journal association
IFS	Invasive fungal sinusitis
IM	Inferior meatus
IT	Inferior turbinate
MM	Middle meatus
MOOSE	Meta-analyses Of Observational Studies in Epidemiology
MT	Middle turbinate
OCS	Oral corticosteroids
OMC	Ostio meatal complex
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SAUP	Superior attachment of uncinate process
SB	Skull base
SOT	Solid organ transplant
SR	Sphenoethmoid recess
UP	Uncinate process

INTRODUCTION

Fungal infections of the sinuses have recently been blamed for causing most cases of chronic rhinosinusitis. The evidence, though, is still controversial. Most fungal sinus infections are benign or noninvasive, except when they occur in individuals who are immunocompromised. Several reports are available that have shown invasive fungal infections in immunocompetent individuals. Distinguishing invasive disease from noninvasive disease is important because the treatment and prognosis are different for each ***(Scharf et al., 2004).***

Fungal sinusitis is generally classified into invasive and non invasive fungal sinusitis based on histological features, invasive fungal sinusitis divided into acute, chronic and chronic granulomatous invasive fungal sinusitis. While non invasive fungal sinusitis include saprophytic fungal infestation, fungal ball, and fungus-related eosinophilic ***(Chakrabarti et al 2009).***

The incidence of invasive fungal sinusitis (IFS) has been increasing due to the increasing number of immunosuppressive patients with diabetes, hematologic malignancies and prolonged use of steroids. IFS can also occur in immunocompetent hosts ***(Ferguson, 2000).***

Noninvasive fungal rhinosinusitis includes fungal ball (‘sinus mycetoma’) and allergic fungal sinusitis (AFS). In fungal ball, multitudes of fungal hyphae are compressed into a

thick exudate within a sinus lumen. This may occur in patients with previous sinus surgery, DM, oral-sinus fistula, history for cancer chemotherapy or those without any known predisposing factor. AFS is the other form of noninvasive fungal rhinosinusitis. It represents more of a hypersensitivity response to the presence of extramucosal sinus fungal hyphae, with a prominent element of fungal-specific type I immediate hypersensitivity although the disease appears complex and likely involves the interplay of various inflammatory modalities ***(Schubert, 2004).***

In contrast to the non-invasive type which usually has a good prognosis, IFS is considered a potentially lethal condition. Moreover, invasive fungal sphenoiditis is more aggressive than invasive fungal infection of the other paranasal sinuses. This is due to the involvement of important surrounding structures such as the orbital apex, cavernous sinus, optic nerve, internal carotid artery, pituitary gland, and cranial nerves. Patients with early stage sphenoid sinus lesions are usually asymptomatic, thus, the diagnosis is often delayed until they are presented to ear, nose and throat specialists. Because advanced invasive fungal infection of the sphenoid sinus carries significant mortality, early diagnosis and appropriate treatment are crucial for the improvement of patient survival ***(DeShazo et al., 1997).***

Immunity to fungal infections is of interest to a wide range of disciplines. It is of particular interest in terms of therapy of immuno-compromised individuals, such as patients

with cancer, HIV infection or individuals who have received transplants. Understanding the nature and function of the immune response to fungi, is an exciting challenge that might set the stage for new approaches to the treatment of fungal diseases, from immunotherapy to vaccines. The past decade has witnessed the development of a wide range of new approaches to elucidate events that occur at the host fungus interface ***(Garcia et al., 2000).***

The kingdom of Fungi comprises many species that are associated with a wide spectrum of diseases in humans. The clinical relevance of fungal diseases has increased enormously in the second half of the twentieth century, mainly because of an increasing population of immuno-compromised hosts ***(Marianne and O'Connor, 2002).***

No standardized vaccines exist for preventing any of the human infections caused by fungi, a situation that is attributable to both the complexity of the pathogens and their sophisticated strategies for surviving in the host and evading immune responses ***(Romani, 2004).***

The first step in treatment for any AFS patient is paranasal sinus surgery to both remove all obstructing inspissated allergic mucin and resect all diseased hypertrophic sinus mucosa. Failure to adequately surgically remove all diseased hypertrophic sinus mucosa leads to higher AFS relapse rates ***(Schubert, 2004).***

The addition of postoperative oral corticosteroids (OCS) in AFS play an important role to reduces overall disease activity, including decreasing both symptoms and surgical recurrence rates ***(Kuhn et al., 2000).***

A retrospective analysis showed that AFS patients fared better on allergen immunotherapy to aeroallergens. We have advocated allergen immunotherapy to all relevant aeroallergens, including the etiologic mold if known, in an attempt to reduce sinonasal allergic reactivity to the lowest possible levels. The rationale is that any treatment that can realistically reduce the allergic inflammatory milieu felt to be conducive to AFS relapse and need for continued OCS and sinus surgery should be considered. Topical nasal steroids, antihistamines, and even antileukotrienes should be considered ***(Marple et al., 2002).***

Invasive fungal sinusitis is a relatively rare disease and can be divided into acute fulminant, chronic, and granulomatous invasive fungal sinusitis. The conventional treatment is radical surgery combined with systemic amphotericin B administration, but the poor prognosis and unestablished treatment options require a better therapeutic strategy. New line of treatment of chronic invasive fungal sinusitis successfully treated with a combination of surgery and voriconazole, a new antifungal agent, with good responses Voriconazole administration could form the basis for a new standard treatment for invasive fungal sinusitis ***(De Sarro et al., 2008).***

AIM OF THE WORK

- A systemic review of effective and safe method in management of different types of fungal sinusitis either by medical or surgical approaches or even combined.
- Be up to date with the different upcoming new modalities in treatment of allergic fungal sinusitis.

Chapter 1

ANATOMY OF NOSE AND PARA NASAL SINUSES

The lateral nasal wall and paranasal sinuses:

The lateral part of the nasal cavity is subdivided by the turbinates into four meati. The inferior meatus is the space between the lateral side of the inferior turbinate and the medial wall of the maxillary sinus. It contains the distal opening of the nasolacrimal duct, covered by a mucosal valve (Hasner's valve). The middle meatus is the space lateral to the middle turbinate, and is often functionally referred to as the ostiomeatal complex. It contains the drainage pathways for the anterior ethmoids, the maxillary and the frontal sinuses. The superior meatus is the lateral space below the superior turbinate. It drains the posterior ethmoid cells. The supreme meatus is the area above the superior turbinate, which drains the most posterior ethmoid cells. The superior part of the nasal cavity is divided into the olfactory cleft anteriorly and the sphenoethmoid recess posteriorly ***(Sargi and Casiano, 2007).***

Middle Meatus and Osteomeatal Complex

Middle meatus space lies below the middle turbinate. It is present in the posterior half of the lateral wall. The ostiomeatal complex (OMC) includes uncinate process,