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# MUCORMYCOSIS EFFECTS ON TURBINO SEPTAL COMPONENTS-OUR EXPERIENCE.

ENT

**Dr. B. Ganesh Kumar** M.S (E.N.T)., D.L.O., Associate Professor, Dept Of Ent And Head & Neck Surgery, Thanjavur Medical College, Thanjavur.

**Dr. Gerald Parisutham** M.S (E.N.T), D.L.O., Assistant Professor, Dept Of Ent And Head & Neck Surgery, Thanjavur Medical College, Thanjavur.

**Dr. Prince Peter Dhas** M.S (E.N.T), Assistant Professor, Dept Of Ent And Head & Neck Surgery, Thanjavur Medical College, Thanjavur.

**Dr. K. Ramesh Babu*** M.S ( E.N.T), Associate Professor, Dept Of Ent And Head & Neck Surgery, Thiruvarur Medical College, Thiruvarur. *Corresponding Author

## ABSTRACT

**Introduction:** Mucormycosis is a aggressive and most dangerous type of oppurtunistic Fungal infection. This disease starts commonly from Nose and Para nasal Sinuses. Many a times Middle Turbinate alone and some time both Middle and Inferior Turbinate are affected. This Fungi invades the Arteries more than the Veins and produce Thrombus and further reduces blood supply to concerned region and later on resulting in Necrosis of soft and Hard tissues , which was seen clinically as Black coloured " Eschar", the characteristic Endoscopic finding of Mucormycosis.

**Objectives:** To Study about the effects Mucormycosis in the Turbinate, Septum and Floor of Nasal Cavity and to know the Effect of Septal Deviation in development of Sinusitis and further development of Mucormycosis.

**Study Design:** Analytical Study, Retrospective Study.

**Materials And Method:** This study was conducted in Govt Thanjavur Medical College, in Department of E.N.T and Head and Neck Surgery, from May 2021 to July 2021. Total Number of cases taken for study was 81 cases. Cases with Orbital and Pterygo Palatine Fossae and Infra Temporal Fossae involvement and Intra cranial involvement are excluded from the study. All cases are subjected to DNE and classified according to findings. All cases under went Endoscopic Sinus Surgery and tissues sent for HPE and Fungal culture, followed by Systemic Amphotericin and Regular Post Operative Follow up for 4-6 weeks.

**Results:** Males are involved more in numbers (48) than Females. Commonest age group involved are 21 to 40years. Strong Positive association present between Post Covid-19 status and Diabetes. Middle Turbinate involved in more number (34cases), followed by Inferior Turbinate (21 cases) and Septum (18 cases). Most common Anatomical factor present are High Septal Deviation (60 cases) and Osteo Meatal Complex (OMC) crowding (56 cases).

**Discussion:** Mucormycosis is a Fulminant Fungal infection, which is common in Immunodeficient individuals. Patients with Uncontrolled Diabetes Mellitus, on Prolonged Steroid therapy and Post COVID_19 status are very much prone for this infections. Angio invasion to Arteries and the resultant formation of Thrombi and Gangrene of involved areas is characteristic of Mucor. Black coloured dead tissue is called as ESCHAR. Depending upon the Arterial involvement Anterior half of Middle Turbinate or Posterior half of Middle Turbinate is involved, Posterior half of septum or entire septum is also involved. High septal deviation gives indirect disturbances to Osteo Meatal Complex functions resulting in development of Sinusitis and further chances of developing Mucormycosis.

Early Surgical debridement of dead tissues followed by Inj.Amphotericin is very important in restriction of Disease spread. Proper management of predisposing factors and Postoperative Regular Weekly follow up and Endo Cleaning reduces the Recurrences.

**Conclusion:**In our Study Males are affected more in numbers. 21-40 years are affected more. High Septal Deviation and OMC crowding are present in more number of patients which was responsible for the development of Acute Sinusitis. Post Covid status and Uncontrolled Diabetes was the commonest Predisposing factor the development of Mucormycosis. Middle Turbinate was involved more in numbers followed by Inferior Turbinate and Septum.

Routine Examination followed by Nasal Septal Correction plays a major preventive role in development of sinusitis and further dreaded complications like Mucormycosis. Adequate Glycemic Control and Inj Amphotericin plays important role in the management of Mycormycosis. Regular Follow up with Endo Cleaning is reduces the chances of Recurrence.

## KEYWORDS

Mucormycosis, Middle Turbinate, Inferior Turbinate, Septum, Floor of Nasal Cavity, Anterior and Posterior Ethmoid Arteries.

## INTRODUCTION:

Sino Nasal Mucormycosis is a Fulminant Oppurtunistic Fungal infection. It was first described by Paultauf in 1885. It belongs to Zygomycetes Class and Mucorales Order. This group consists of Mucor, Absidia, Rhizopus, Rhizomucor, and Cokeromyces as Genera. Fungal infection of the Head and Neck region was commonly by Rhizopus family. This Eugonic fungi shows Rapid growth, and it was commonly seen in Spoiled Foods, Compost and Soil [1].

This fungi invades the region adjacent to Internal Elastic lamina of Arteries and reduces its blood flow and results in Thrombus formation and leads to the dead tissue. Once Angioinvasion is occurred it will spread to Orbital and Intra Cranial structures. Commonly this infection presents as acute infections and manifests as Various forms like Rhino-Orbital, Rhino-Cerebral, Pulmonary, Cutaneous, and Disseminated form[2].

This fungi affects the human being only if they are in Immunocompromised status like Uncontrolled Diabetes, On prolonged Steroid therapy, patient in Neutropenic State, On treatment for Organ transplantation, on Prolonged Improper use of Antibiotics. Penicillin can reduce Bacterial Population of Gastro Intestinal Flora, Especially Lacto Bacillus which inhibits the growth of Candida leads to Aggregation of Candida in GIT [3].

Augmentin ( Amoxycillin and Clavulanic acid) also aggravate the growth of Candida infection of Oro- Gastro Intestinal tract, by its bactericidal effects against Streptococci which is a Common normal Sinus Flora, and could inhibit the growth of fungi. So the Augmentin destroys Ecosystem of Sinus and favours the growth of Mucor like Fungal infections [4].

Incident rate of Mucormycosis Globally was 0.005 to 1.7% per million Population. Prevalence of Mucormycosis in India was 0.14% per 1000 which was 80 times higher than Developed countries. Mortality rate was 40% in Immunocompetent individuals and it may rise up to 80% in Immunocompromised cases.

Clinical Symptoms are Nasal Obstruction, Dryness or Mucopurulent discharge from the Nasal Cavity, Numbness over the Infra orbital region, Headache and varies with the extension of disease intra Orbitally or Intra Cranially.

Diagnostic Nasal Endoscopy is very useful to identify the classical findings such as Crusting and congestion in Early stage, Whitish discolouration of nasal mucosa due to ischaemia during Intermediate stage and blackish discolouration due to tissue necrosis in late stages [5]. Granulation and Ulceration of nasal mucosa also present. These changes are commonly present in the Order of Middle Turbinate, Septum, Palate and Inferior Turbinate [6].

During Diagnostic Nasal Endoscopy, Tissue biopsy can be taken from the involved structures like Middle Turbinate, Septum and send it for Culture and also for Histo pathological Examination. Since there is Arterial involvement, there won't be much bleeding, we can do it in OPD itself.

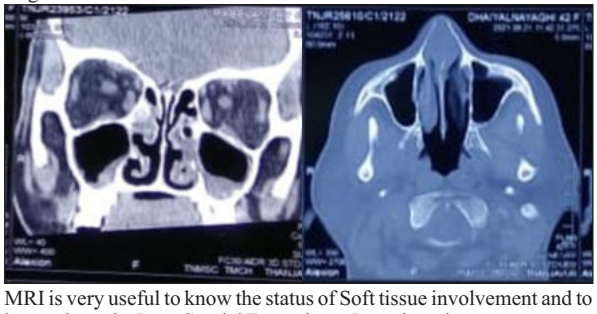
Persistence of Fever Of Unknown Origin of more than 48hours, even after appropriate Antibiotic and in the presence of Localised Nasal Symptoms in Immunodeficient patients, needs Immediate Nasal Endoscopy and Radiological Imaging to rule out Mucormycosis [7].

Nasal Swabs for Fungal stain with KOH ( Pottasium Hydroxide with Colcoflour white method) was highly sensitive method to detect the Fungal Hyphae very quickly. KOH dissolves the human tissue and the Colcoflour white is an Optic brighter binds to cell wall of Fungal Hyphae and helps it's identification in Florescent Microscopy.

Beyond Haematoxylin and Eosin Stains, Periodic- Acid Schiff (PAS) and Gomori-Methenamine Silver (GMS) stains are used to differentiate the Species. Gomori-Methenamine stain is Most Sensitive one and Negative reports should not be given without GMS stain [8].

Mucor Hyphae are Large (6-50m), Irregular, Non septate with Right angle Branching and shows Obliterative Endarteritis. But the Aspergillous Hyphae are Narrower (2.5-5m), Septate with Branching at 45 degrees with Non Obliterative Vasculitis. Name of the Classification of Fungal Sinusitis based on Histopathology was proposed by deShazo et al [9].

CT PNS shows Thickened Nasal and Sinus Mucosa with or without Periantral Fat Plane Involvement in early stage. Air Fluid levels within the Sinuses, Bony Erosion, Soft Tissue Infiltration can be seen in later stages.



MRI is very useful to know the status of Soft tissue involvement and to know about the Intra Cranial Extension. Iso to hypointense pattern on TI and Variable Intensity in T2 weighted images. Commonly T2 shows Hypo Intense lesion in Fungal Diseases due to the ability of concentration of Iron and Manganese by fungal elements. Because of Tissue necrosis produced by Angio invasion, involved Turbinates are seen either Heterogenous or Completely Hypointense area, also called as Black Turbinate Sign [10].

All cases are underwent Endoscopic Sinus Surgery and the Devitalised tissues are removed and send for HPE and Fungal Culture. Systemic Amphotericin and Proper management of underlying predisposing factors plays crucial role in the Success rate of Mucormycosis management.

Regular Post Opertive Weekly Follow up with Endocleaning and Oral Posaconazole also very important to reduce the Recurrence.

## OBJECTIVES:

To Study about

1. Mucormycosis involvement in Turbinates, Septum and Floor of Nasal Cavity ,
2. The Effect of Septal Deviation in development of Sinusitis & Vulnerability for Mucormycosis development.

**Study Design:**

Analytical Study, Retrospective Study.

## MATERIALS AND METHOD:

This study was conducted in Government Thanjavur Medical College, in Department of E.N.T and Head and Neck Surgery, from May 2021 to July 2021.

Total Number of cases taken for study was 81 cases. Cases with Orbital and Pterygo Palatine Fossae and Infra Temporal Fossae involvement and Intra cranial involvement are excluded from the study.

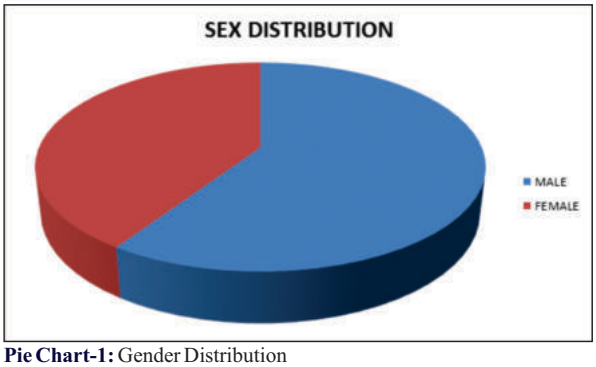
Early clinical signs and symptoms are taken for consideration. All cases are subjected to Diagnostic Nasal Endoscopy and the Definitive finding of Black coloured ESCHAR was identified. Later on Radiological investigations like CT PNS and followed by MRI PNS was done and the Disease extension was confirmed.

All cases underwent Endoscopic Sinus Surgery, or Endoscopic Assisted Surgery and Necrosed Turbinate or the Septum was debrided and sent for HPE and Fungal culture. Systemic Amphotericin was initiated immediately without waiting for HPE or Fungal Culture report. Proper Glycemic Control plays vital role in the management of Mucormycosis. After Discharge, Regular Weekly Follow up for 4-6 weeks with Solvage Therapy with T.Posaconazole is very effective in reduction of Recurrence.

## RESULTS:

**Table-1.Gender Distribution:**

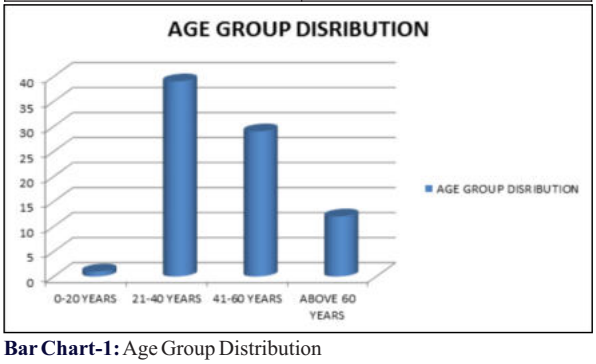
| SEX | NUMBER OF PATIENTS |
|---|---|
| MALE | 48 |
| FEMALE | 33 |




**Pie Chart-1:** Gender Distribution

**Table-2: Age Group Distribution**

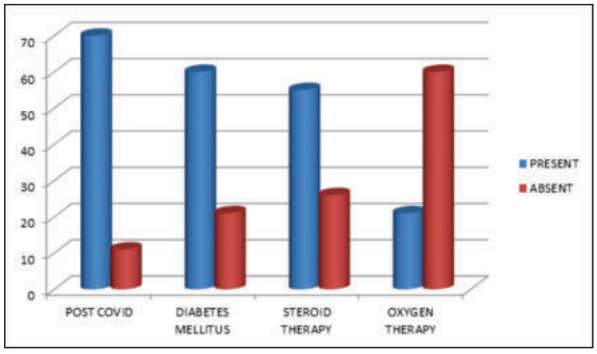
| AGE GROUPS | NUMBER OF PATIENTS |
|---|---|
| 0-20 YEARS | 1 |
| 21-40 YEARS | 39 |
| 41-60 YEARS | 29 |
| ABOVE 60 YEARS | 12 |




**Bar Chart-1:** Age Group Distribution

**Table-3 Predisposing Factors**

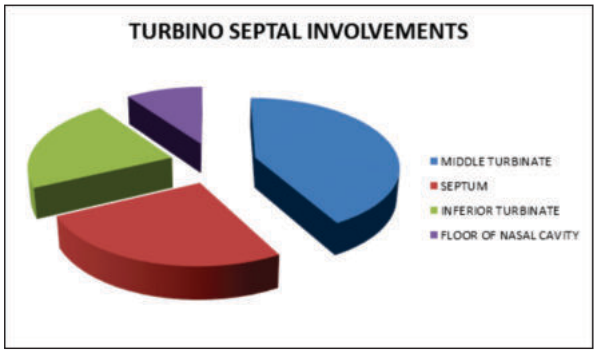
| FACTORS | PRESENT | ABSENT |
|---|---|---|
| 1. POST COVID | 70 | 11 |
| 2.DIABETES MELITTUS | 60 | 21 |
| 3.STEROID THERAPY | 55 | 26 |
| 4.OXYGEN THERAPY | 21 | 60 |




**Bar Chart-2:** Predisposing Factors

**Table-4: Turbino Septal Involvements**

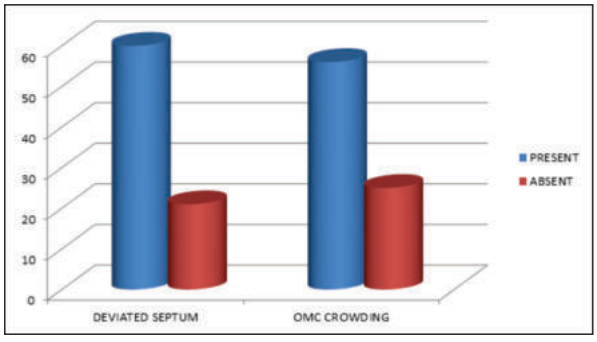
| COMPONENTS | NUMBER OF PATIENTS |
|---|---|
| MIDDLE TURBINATE | 34 |
| SEPTUM | 21 |
| INFERIOR TURBINATE | 18 |
| FLOOR OF NASAL CAVITY | 8 |




**Pie Chart-2:** Turbino Septal Involvements

**Table-5: Anatomical Factors In Nasal Cavity**

| FACTORS | PRESENT | ABSENT |
|---|---|---|
| DEVIATED SEPTUM | 60 | 21 |
| OMC CROWDING | 56 | 25 |




**Bar Chart-3:** Anatomic Factors In Nasal Cavity

Table -1 and Pie Chart-1 shows that Males are Involved more in numbers (48 cases) than Females(33 cases). Age group distribution was displayed in Table-2, and Bar Chart-1. 39 cases are belonged to 21-40 years of age group followed by 41-60 years (29 cases)

Table-3 and Bar Chart-2 reveals the association of Predisposing factors in development of Mucormycosis. Except Oxygen therapy, Post Covid, Diabetes and Steroid therapy are positive relationship.

Table-4 and Pie-Chart-2 gives the details of Turbino septal involvements in our study. Middle Turbinate involved in more (34 cases), followed by Septum (21 cases), Inferior Turbinate (18 cases) and Floor of nasal Cavity( 8 cases).

Table-5 and Bar Chart-3 shows that Deviated Nasal septum (60 cases) and OMC crowding (56 cases) are commonly present in our study.

## DISCUSSION:

Fungal infection of Nose and Para Nasal Sinus was a rare clinical entity but it was very high incidence in this Corona Pandemic. Mucormycosis commonly affects in patients with Uncontrolled Diabetes Mellitus. Hyperglcemia and Acidosis provide ideal conditions for growth of Mucormycosis. Ketoacidosis affects the Phagocytic activity of host and favours the growth of fungus [11].

Infection of this Zygomycetes can be acquired by Inhalation into the Paranasal Sinus. After Germination it will spread inferiorly to Palate, Posteriorly to Sphenoid sinus and Cavernous sinus, Laterally into Orbits, Superiorly into Brain. Mucormycosis lesions are due to the resultant vascular invasion, especially in arteries followed by veins.

Mucor has the propensity to grow along the Internal Elastic Lamina of arteries and Dissecting the lamina from the Media. This will produce Extensive Endothelial Damage, resulting in Thrombus formation and Ischemia later become Gangrenous. Infarcted tissue favours the further growth of Fungus [12].

In our study more number of cases presented with Necrosis of Middle turbinate. Among these half of the cases involving the Anterior part of Middle Turbinate indicates that Thrombosis of Anterior Ethmoidal Artery. Rest of the cases presented with Posterior Ethmoidal Artery involvement and shows the Necrosis of Posterior part of Middle Turbinate.

Ethmoidal Artery involved cases are more prone for Orbital and Cranial complications because of it's course. It was traversing in a Bony canal called Orbito Cranial Canal. From the orbit as a branch of Opthalmic Artery, it enters into Anterior cranial Fossa and return back into nasal cavity at the junction of Bony and Cartilaginous frame work of External nose. In this condition Resection of Middle Turbinate is Mandatory leaving the Axilla of Middle Turbinate which will be used as a Surgical Landmark for Revision Surgery.

Necrosis of Nasal Septum is common in our study. Especially Posterior End Of septum (Bony Part) is involved more than the Anterior Cartilaginous Part. It is due to the Involvement of Posterior Septal branch of Sphenoplalatine Artery involvement. Posterior Septectomy is treatment of choice for this condition.

Inferior Turbinate Necrosis is due to the involvement of Posterior Lateral Nasal branch of Sphenopalatine artery. Resection of the involved portion or some occasions need total removal of Inferior Turbinate. Many times this will be associated with Osteomyelitis of adjacent bone and the involved bone will be curetted untill the fresh bleeding comes.

Involvement of Floor of Nasal Cavity always associated with Osteomyeltic changes of underlying Palatal bone. Removal of Necrosed mucosa and curetting the involved bone is mandatory.

Most of the cases in our study are presenting with Deviated Nasal Septum and Especially as High Septal Deviation, at the level of Middle Turbinate. This will indirectly affects the main functions of the Sinus, such as Ventilation and Drainage. So Correction of High Septal Deviation plays a major role. If the patients under went previous Septal correction Surgery, the chances of development of Sinusitis and further Mucormycosis was very minimal one. So During Mucormycosis debridement procedure also, Septal correction is very important.

Osteo Meatal Complex (OMC) or Osteo Meatal Unit is the basic unit for Sinuses. It was bounded Medially by Middle Turbinate, Laterally by Lamina Papyracea, Anterirly by Uncinate Process and Posteriorly by Bulla Ethmoidalis. Anatomical variations of the above leads to OMC crowding and favours the development of sinusitis. Common variations are, Pneumatised Middle Turbinate (Concho Bullosa), Paradoxical Middle Turbinate, Medialised Uncinate Process, Prominent Bulla Ethmoidalis. So the chances of developing Mucormycosis was less common in those underwent previous Endoscopic Sinus surgery than the others.

So Adequate control of Predisposing Factors and Previous Septal Correction and Previous FESS done patients are less chances for the development of Fulminent fungal sinusitis. Post Opertive Amphotericin and Regular Endocleaning at least once a week for 4-6

weeks is mandatory. Salvage therapy with Oral Posaconazole also having vital role to reduce the recurrence of the fatal disease.

## CONCLUSION:

In our Study Males are affected more in numbers. 21-40 years are affected more. High Septal Deviation and OMC crowding are present in more number of patients which was responsible for the development of Acute Sinusitis and further development of mucormycosis. Post Covid status and Uncontrolled Diabetes was the commonest Predisposing factor the development of Mucormycosis. Middle Turbinate was involved more in numbers followed by Septum and Inferior Turbinate.

Routine Examination followed by Nasal Septal Correction plays a major preventive role in development of sinusitis and further dreaded complications like Mucormycosis. Adequate Glycemic Control and Inj Amphotericin plays important role in the management of Mycormycosis. Regular Follow up with Endo Cleaning is reduces the chances of Recurrence.

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