



CONVENTIONAL ANTROSTOMY VERSUS MODIFIED DENKERS PROCEDURE IN DEBRIDEMENT OF MUCORMYCOSIS PATIENTS : A RETROSPECTIVE STUDY OF 200 PATIENTS

ENT

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KEYWORDS

INTRODUCTION:

Mucormycosis is a rapidly progressive fatal fungal infection caused by a group of molds called mucormycetes. It mainly affects immunocompromised host and those with co-morbidities. Risk factors include hematologic malignancies, uncontrolled Diabetes Mellitus, malnutrition, chemotherapy, desferrioxamine therapy and patients who received steroids for treatment of COVID-19. It causes angioinvasion, resulting in dissemination, tissue infarction and necrosis. Most common presentation is Rhino-orbito-cerebral Mucormycosis.

The disease originates in nasal sinus mucosa after inhalation of fungal spores and takes rapidly progressive course extending to palate, orbit, brain and CNS. The hallmarks of spread beyond sinuses are tissue necrosis causing destruction of turbinates, palatal necrosis, palatal eschars, erythema and involvement of facial skin overlying involved sinuses and/or orbit. Signs of orbital involvement include periorbital edema, proptosis, facial numbness due to involvement of trigeminal nerve. Most common symptoms in patients of Mucormycosis are necrosis of turbinates, facial or periorbital swelling, loosening of tooth, diminished vision, ophthalmoplegia, loss of vision, sinusitis and headache.

Diagnosis of Mucormycosis is by endoscopic evaluation of sinuses to look for necrosis and obtain specimen, fungal culture KOH and Tissue histopathology and tissue typing. Further diagnostic investigation imaging is needed to look for involvement of orbit and brain. CT scan to look for bony erosions. MRI to detect intracranial, intraorbital and cavernous sinus involvement and to look for areas like retroantrum and pterygopalatine fossa.

The basic principle of treatment involves elimination of predisposing factors, initiation of Antifungal therapy and prompt surgical debridement of involved tissues.

Role Of Surgery In Treatment Of Mucormycosis

Removal of necrotic dead tissue and debulking infected tissue is associated with improved survival. Surgical debridement is required for clearance of nasal sinuses and palatal involvement. Timely debridement, if possible of all devitalized tissue appears reasonable in order to decrease mass of infecting molds and prevents extension of Mucormycosis to adjacent structures. Depending on its extension, certain approaches are necessary.

Surgical approaches include Transfacial and Endoscopic approaches. Transfacial approach which includes Lateral rhinotomy and sublabial approach and Endoscopic approaches which include conventional maxillary antrostomy, Medial maxillectomy with section of lacrimal duct and Modified Denkers approach. Surgeons are always in a dilemma regarding which approach to be chosen between these two endoscopic approaches.

The surge in cases of Mucormycosis has given opportunity to make comparison between post operative outcomes and complications associated with conventional maxillary antrostomy as compared to Modified Denkers approach.

MATERIALS AND METHODS:

We studied retrospectively 200 mucormycosis operated patients at M.P Shah Medical College, Jamnagar. We followed up postoperative patients at interval of 2 week, 6 week, 6 months and 12 months. We collected data finally after all follow up and presented here in our study.

Inclusion Criteria:

1) Clinically obvious cases of Mucormycosis.

2) Radiologically proven cases of Mucormycosis

Exclusion Criteria:

1) Those patients not fit for surgery.

Method Of Study:

The retrospective study was done after approval of ethics committee. Out of 200 patients, 15 underwent conventional antrostomy while 185 underwent Modified Denkers procedure. The postoperative results obtained in patients operated with conventional antrostomy and modified Denkers operations were compared.

In conventional antrostomy, under endoscopic guidance, middle turbinate is gently moved medially with care to avoid fracturing the turbinate skull base junction. At first, Uncinectomy was done. The free edge of uncinate process was grasped with 90 degree upbiting forceps. The opening of maxillary ostium was located with ball point and widened. The posterior aspect of ostium and mucosa of ethmoid infundibulum were cleared.

In Modified Denkers approach, at first the inferior turbinate is removed. Then a mucosal incision was made along pyriform aperture along the lower border of upper lateral cartilage. The incision was extended inferiorly with unipolar electrocautery at the junction of nasal floor and lateral nasal wall. A subperiosteal dissection was performed with a suction freer elevator to expose the anterior wall of maxilla.

Then, anterior maxillotomy was done endoscopically taking care not to damage the anterosuperior alveolar nerves and infraorbital nerves. The nasolacrimal duct was cut sharply at the level of its origin once it is exposed.

The Following Differences Were Seen Between The Two Procedures. (Table-1)

	Modified Denkers approach	Conventional antrostomy
Anaesthesia required	General	Local/general
Inferior turbinate	Sacrificed	Preserved
Examination of maxillary sinus floor	Possible	Difficult
Injury to Infraorbital nerve	Possible	Unlikely
Retroantrum and PPF exposure	Possible	Not possible
Post operative cleaning	Easy and better	Difficult

RESULTS:

Our study includes 200 patients of which 185 underwent Modified Denkers procedure and 15 underwent conventional antrostomy.

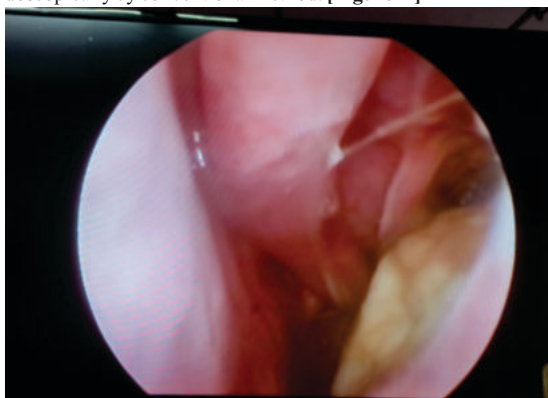
The occurrence of post operative complications in the two groups were compared for a 12 months period.

Comparison Between Two Approaches On Follow Up Patients Given In Below Table (Table-2)

Post operative complications	Modified Denkers approach Total n=185		Conventional antrostomy Total n=15	
	Number	Percentage	Number	Percentage
Paresthesia over cheek region	50	27.02%	0	0%
Epiphora	1	0.54%	0	0%
Adhesions	0	0%	5	33.33%
Recurrence	2	1.08%	7	46.66%
Revision surgery	5	2.70%	5	33.33%

Despite recent advances in endoscopic techniques the antero-inferior and anterolateral corners of maxillary sinus may be inaccessible

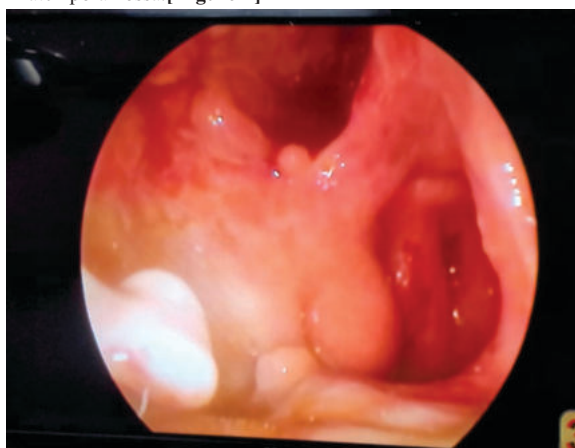
endoscopically by conventional method. [Figure-1]



[Figure-1] Figure shows the maxillary sinus ostium after conventional endoscopic approach.

Caldwell luc approach was required for recurrence of mucormycosis in conventional antrostomy operated patients.

With Endoscopic Denkers approach complete exposure of entire maxilla is attained enabling access to pterygopalatine and infratemporal fossa. [Figure-2]

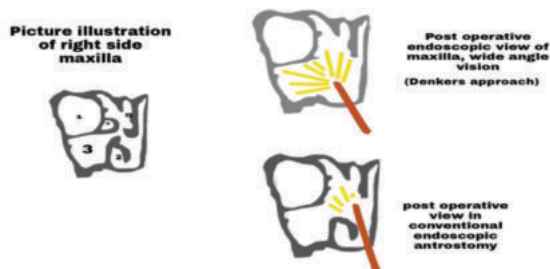


[Figure-2] Figure shows the post operative maxilla and nasopharynx after Denkers approach.

Maxillotomy may be extended depending on extent of disease. Retroantrum and pterygopalatine fossa can be easily approachable with Denkers approach which is involved in 50% of recurrence mucormycosis cases.

Epiphora being seen due to fibrosis of cut end of Nasolacrimal duct in Denkers approach. Paresthesia over cheek region may be seen due to involvement of Infraorbital and anterior superior alveolar nerves.

Adhesions and crusting could be easily removed in patients operated by modified denkers than those operated by conventional antrostomy.



[Figure-3] Represent the pictorial representation of the paranasal sinuses and orbit. 1. Orbit 2. Inferior turbinate 3. Maxillary sinus 4. Ethmoid sinuses 5. Middle turbinate

DISCUSSION:

In past there is no much research data about comparison between this conventional endoscopic approach and modified denkers approach. Talking about the comparison specifically in mucormycosis debridement there was no such data present. In recent year emerging of mucormycosis fungal infections incidence, we had opportunity to compare this approach in large patients.

According to study by Cesar Alfonso^[5] endoscopic Denkers was effective as adequate access of anterolateral and posteroinferior recess of maxillary sinus could be obtained and can be used for neoplasms, infectious and inflammatory diseases. Weber et al.^[6] recommended medial maxillectomy with preservation of the inferior turbinate to treat patients with inverted papilloma of the maxillary sinus.

According to study by Jivianne T Lee et al^[7] Modified Denkers is effective for surgical resection of primary and recurrent Inverted papillomas involving the anterior wall providing complete access to maxillary sinus. In our study recurrence and revision surgery was less common (3.70%) in modified denkers approach than the conventional antrostomy method (79.99%).

In a study by Lee et al^[8] there were no cases of post operative epiphora in patients operated with modified Denkers approach. In our study too, there were 1 patients who presented with epiphora (0.54%) during the 12 months period of follow up.

In a study by K. Joe Jacob, Shibu George and S. Preethi^[11] it was seen that post operative nasal obstruction was seen in patients operated by FESS (conventional method) and complications that occurred included crusting, synechia formation and polyp in middle meatus was seen in patients who had undergone conventional antrostomy. In our study, synechie more common present in conventional antrostomy (33.33%) than the modified denkers approach (0%).

Though post operative complications like epiphora and paresthesia more common in denkers approach about (27.56%) whereas there were no such complications in conventional antrostomy (0%)

CONCLUSION:

Modified Denkers approach provides adequate access of anterolateral and posteroinferior recess of maxillary sinus which is utmost necessary for nearby complete removal of the disease. Recurrence and need for revision surgery was seen commonly in patients who have undergone conventional antrostomy due to narrow and unapproachable maxillary sinus wall area. Crusting was more commonly seen in patients operated by conventional method due to confined postoperative cavity difficult to clear by douching.

Whereas in modified Denkers approach the post operative cavity is wide, easily examined and assessed with endoscope for recurrence and repeated debridement.

The only drawback in patients operated by Denkers method is paraesthesia over cheek due to injury to infraorbital nerve.

Thus, Denkers approach is more preferable than Conventional antrostomy in highly invasive and mortal fungal mucormycosis infected patients for proper exposure of retroantrum and for complete removal of disease and also for post operative douching and regular surveillance of the disease.

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