Prosthodontics Aspect of Post Covid Treatment: Black Fungus Offshoot: A Review Article

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Abstract

SARS-CoV-2 is one of the seven types of corona virus, which includes the ones that cause severe diseases like Middle East respiratory Syndrome (MERS) and Sudden Acute Respiratory Syndrome (SARS). As India is fighting with a deadly second wave of covid-19, cases of rare fungal infection called "Mucormycosis" are being reported across the country, adding to the worries. Mucormycosis, also known as black fungus is a serious fungal infection, usually seen in immune compromised patients, which spreads rapidly from nose and sinuses to face, jaw, eyes and brain. The management of such complication is by complete surgical debridement of orosinonasal, orbit facial, sin nasal and palate. Rehabilitation of such defects aims to restore the lost function, as well as psychological factor that present a challenge situation for the maxillofacial prosthodontist. Prosthodontic rehabilitation of such patients presents a significant challenge in restoring speech, deglutition, mastication, and respiration. Comprehensive management of these defects follows combination prosthesis comprising of orbital, nasal and obturator. The optimum retention for the prosthesis is usually retained by combination of anatomical, mechanical and functional factors. This paper is intended to highlight basic prosthodontic techniques for management of post Covid cases seen in mucormycosis.

Keywords: Covid19, Mucormycosis, Maxillofacial prosthesis, maxillofacial retention.

Introduction

In the post-COVID-19 scenario, oral fungal infections were being increasingly reported. of such infections, the most reported were the mucormycosis, aspergillosis, and candidiasis. Mucormycosis is an aggressive fungal infection which commonly involves the nose and paranasal sinuses of the head and the neck region. This is caused by saprophytic aerobic fungi of the class Phycomycetes and hence this disease is also called as Phycomycosis. Of this, the former two are pathological entities whereas the latter is a normal oral commensally. The cause for the spurt of fungal infection has been attributed to use of steroids, possibility of altered blood sugar levels, and persistent increased pro inflammatorily markers, such as interleukin (IL)-1, IL-6, and tumor necrosis alpha in COVID-19 patient. Also they have relatively less CD4 interferon-gamma expression, fewer CD4 and CD8 cells. Together owing to the reduced immune suppression and ease of noso-comial spread of such infection, these infections turn severe.[1]

Immuno compromised patients are highly prone to develop this disease and its complications, where in the spores colonize in upper respiratory tract, germinate, develop hyphen and invade blood vessels and surrounding tissues. The devitalized tissue due to thrombosis and tissue necrosis results in continued fungal growth thus making it aggressive. Once the fungal growth is established in par nasal sinus, the infection easily spreads and enters the orbit through nasolacrimal duct and may spread to brain. The objectives of maxillofacial prosthetics includes the following important objectives as in restoration of esthetics or cosmetic appearance of patient, restoration of function, protection of tissue, therapeutics or healing effect, psychological therapy. When these objectives are met in a patient during the rehabilitation, then it can be concluded that the treatment is totally successful.[2] Mucormycosis is common in insulin dependent diabetes mellitus patients who are ketoacidotic. Ketoacidosis inhibits the binding of iron to transferring allowing serum iron levels to rise. The growth of these organisms is enhanced by iron. 60% of the cases have oral, cranial, or facial involvement. The palate which separates the oral cavity form the nasal cavity can be subjected to malignant and infectious lesions (fungal, viral, and bacterial) where surgical intervention like alveolectomy and palatectomy becomes inevitable. Maxillary bone maintains the esthetics of the nose, cheeks, and hemi-face. Hence, restoring its function

and aesthetics is the treatment goal.[3] Mid-facial defects are defects located in the middle third of the face in horizontal plane with intraoral communication. These defects are classified as: midline mid facial defects, which include the nose and/or upper lip, and lateral mid facial defects that include the cheek and orbit contents. Combinations of these two categories also exist. Mid facial defects involving the maxilla, hard palate, and para nasal sinuses require intra-oral and extra-oral prostheses for rehabilitation. Post-surgical outcomes of combination defects are often prosthetic ally unfavorable due to the location of the defects, deficiency of remaining hard and soft tissues, inadequate number and alignment of abutment teeth, and quality of existing soft tissue. The use of magnet attachment to enhance retention, stability, and support for combination of obdurate and facial prosthesis in large defects can be considered. The use of craniofacial implant for prosthetic rehabilitation is a useful and predictable treatment modality. Hereby, this review is planned for maxillofacial prosthesis of intra and extra oral defects due to mucormycosis. [4]

Review of literature

Caxias and coworkers presented a classification system for maxillofacial prostheses, while explaining its types and aims to describe their origin and development, currently available materials, and techniques, predicts the future requirements, and subsequently discusses its avenues for improvement as a restorative modality and discussed the history, types, materials, fabrication techniques, clinical implications, and future expectations related to maxillofacial prostheses and reconstruction were included. Silicones and acrylic resins are the most commonly used materials to fabricate customized prostheses. Maxillofacial prostheses not only restore several types of or facial defects but also improve the patient's quality of life.[5] Bhola RD et al. combined intra and extra oral defects can be stated as those facial defects which have an intraoral communicating route. Mid facial defects which were acquired present themselves often with severe disfigurement of structures and hence show impaired function. It was a meticulous task to rehabilitate the defects which are caused as a result of cancerous lesion resection as they are huge. Such post resection lesions frequently are rehabilitated by a facial prosthesis to maintain function as well as the appearance in the normal form. In adjunction to the facial prosthesis, an intraoral prosthesis which constitutes of an obturator is also required to regain the natural speech and pattern of swallowing.[2] Gupta AD and colleagues presented a maxillofacial disfigurement which can be congenital, developmental, traumatic or because of ablative surgery. Such defects compromise's appearance, function and render an individual, incapable of leading a relatively normal life and affect his\her psyche. As the patient's quality of life is altered; social integration becomes difficult and the expectation to return to "normalcy" collapses. Prosthetic rehabilitation over the years has proven its mettle when it comes to such situations. It has considerable advantages; for example, observation for recurrence of disease, esthetic superiority, technical simplicity, and inexpensive care.[6] Nilanonth S and co workers reviewed a large maxillofacial defects from malignant tumor treatment are rarely rehabilitated by surgical reconstruction alone. Ameloblastic carcinoma, a rare aggressive odontogenic malignant tumor, requires wide surgical excision to gain a tumor-free margin. In the post-surgical defect, prosthetic rehabilitation was the treatment of choice to restore function and esthetics. Moreover, an intra-oral prosthesis such as an obturator restores speech, mastication and deglutition. Retention of the obdurate was a major problem while rehabilitating large defects. The existing anatomical structures from the defect with the help of magnet attachments are suitable to enhance retention, stability and support of the prostheses.[7] Naveen S and coworkers reviewed article to discuss a case report of palatal mucormycosis and its post-surgical management and to add another case in point to the existing literature. This was an interesting case report of a 47-year-old male who reported to their clinic with the complaint of ill-fitting denture. On edifying history, he was a known case of uncontrolled diabetes that was surgically treated by partial maxillectomy for palatal mucormycos is a year back. On examination, the patient presented with a large oro-nasal communication with an ill-fitting obturator. He was managed by replacement of the old obturator with a new denture bearing self-stabilizing obturator.[8] Gowda M and colleagues reviewed article mucormycosis is a rapidly progressing and invasive form of fungal infection involving the nose and paranasal sinuses of head and neck region with high mortality and morbidity. Compromised immunological conditions like uncontrolled diabetics mellitus, Leukemia, prolonged use of steroids are the most common predisposing factors for this disease. Aggressive surgical debridement including resection of involved maxillofacial structures like orbit, maxilla and/or nose was the commonly used treatment protocol in such conditions. Rehabilitation of such large maxillofacial defects was a Prosthodontic challenge and many problems were encountered in rehabilitation like lack of retention

due to dislodging forces exerted by scarred post-surgical soft tissues, lack of bony base, lost structures of the posterior palatal seal area, multiple defect sites and compromised medical status due to co morbidities that also affected healing rate of the defect.[9]

Discussion

During the rehabilitation of cases with mucormycosis the following guidelines need to be considered and followed. Effective management of mucormycosis depends on early detection, diagnosis and extensive surgical resection of the involved tissues. Prompt correction of co morbidities such as uncontrollable diabetes mellitus reduces mortality and morbidity. Maxillofacial rehabilitation is a multidisciplinary task and pre-surgical discussion with operating surgeon is essential to explore the possibility of creating favorable tissue undercuts to retain the prosthesis. Prosthesis retention is achieved through teeth or tissue undercuts. Preventive and restorative dentistry needs to be emphasized upon to salvage as many teeth as possible. Incorporation of non-rigid retentive attachment between obturator bulb and the extra oral prosthesis helps reduce the movement during function. Regular frequent follow-ups of the patient to rule out recurrence and to evaluate retention and stability of the prosthesis. The challenges in these cases were the extensive resection making it difficult to assess the optimum position of the iris and achieving adequate retention. [3] Prevention always remains a gold standard. Maintenance of immune balance especially in immune compromised patients plays an important role in preventing this fulminate infection. Dental extraction in diabetic patients should be done cautiously under close observation and regular follow-up. Large maxillofacial defects that have or onasofacial communications require intraoral and extra oral prosthesis for rehabilitation. However, large communication defects are not favourable because they affect the size and weight of the prostheses and they have limited retention that can be gained from the anatomical structure of the defect. Retention of the prostheses can be provided from anatomic undercuts, attachments, medical adhesive and implants. Fungal colonization that is commonly reported in silicone prostheses is caused by moisture, warmth, and silicone surface porosity. In addition, this condition causes permanent black discoloration and silicone deterioration. [6] Or facial defects can be acquired or congenital. The acquired defects are a result of either trauma or surgical resection. These or facial defects with bigger size lead to severe functional impairment, disability to speak, leads to improper mastication and disturbed swallowing patterns. Along with all these problems, the mid facial deformity also has a significant psychological impact due to its aesthetic considerations. Also successful aesthetic results can still be obtained but the retention of such prostheses poses a severe problem. With a proper knowledge and a comprehension of the anatomic elements which are remaining, intraoral and extra oral prostheses combination that can retain each other with mutual effort is possible to fabricate. Hence for the aid other means of auxiliary retention for facial prostheses have been illustrated in the literature; they include eye patches, eyeglasses, extensions from the denture that engage tissue undercuts, magnets, adhesives, combinations of the above and osseo integrated implants.[10]

Conclusion

The algorithm for dental management of post-COVID-19 cases has been reported. The chance of having significant, undiagnosed medical, physiological, and neurological residual effects or effects of long COVID-19 has to be borne in mind before the patient with history of COVID-19 is taken. Non healing tooth socket or bare bone of maxilla in a immune compromised patient should be considered highly suspicious of mucormycosis. Dentist should be alert and suspicious in cases of Maxillofacial defects which will be of great benefit to the patient in terms of preventing wide spread surgical resection, post-surgical complications and loosing physiologic functions. The prosthesis thus fabricated was economical, biocompatible, esthetic, and comfortable to use, easy to fabricate and clean and provided optimum functional and aesthetic rehabilitation of the patient.

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