Review Article

Prosthodontic Rehabilitation of AIDS Patients: An Overview

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Abstract

Procurement for high standard of oral hygiene is a cardinal requirement for any individual and dentists constantly aim to provide optimal treatment to their patients. However, when it comes to treat patients with immunocompromised diseases, particularly those attached with social stigma like AIDS/HIV, there remain doubts and hesitations. This may lead the dentists to break the ethical responsibility by abjuring or not providing adequate treatment to these patients. Such situations can easily be avoided with absolute knowledge and awareness among the oral health-care providers including prosthodontist regarding the disease process, its connotations and measures to be taken during their treatment. This article summarizes the fundamental points in the prosthodontic management of immunocompromised patients which in the opinion of the author may be easily consolidated in dental practice.

Keywords: Dentures, oral health, temporomandibular joint disorders, universal precautions, Xerostomia

INTRODUCTION

HIV/AIDS is phenomenon which has been a part of the world since 1981 and is considered universal pandemic with cases reported virtually from every country. Despite the fact, AIDS still has no known cure, treatment with highly active antiretroviral therapy (HAART) suppresses HIV replication, thereby augmenting the life as well as improving the quality of life in such patients.

Joint United Nations program on AIDS in 2008, reported a guesstimate number of adults living with HIV as 31 million worldwide with 2.71 million people residing in Indian subcontinent.[1]

Thus, it is not astonishing that many people suffering from HIV/AIDS are pursuing routine dental care. Among the various dental treatment rendered, prosthetic rehabilitation is an essential part and although the prosthodontist are accosted with an increase of HIV patients, there remains an increasing number of HIV-infected patients, there remains uncertainty with regard to proper management protocol for them. The consecutive section gives a brief summary of the prosthodontics care for the people living with HIV/AIDS and some key points for the prosthodontist to improve oral health-care provision in such participants.

CLINICAL COURSE OF HIV

HIV is a Lentivirus that causes AIDS, a condition in humans in which the immune system begins to collapse, leading to life-threatening opportunistic infections. Infection with HIV occurs by the transfer of blood, semen, vaginal fluid, preejaculate, or breast milk. After primary infection with HIV, rapid virus replication and an early burst of viremia are often evident. During this early period, an estimated 50%–75% of infected persons develop an initial infection within 4–6 weeks characterized by flu-like symptoms, high level of HIV in the peripheral circulation, high levels of p24 antigens, and a significant drop in the number of circulating CD4 and T cells. This is followed by a dramatic decline in plasma viremia with resolution of acute syndrome and CD4 and T cells may rebound to 80%–90% of their original level. In numerous patients, the acute phase of HIV infection is commonly followed by a period of clinical latency that may last up to 10 years or more, during which time few cells in peripheral blood are infected with HIV and viremia is minimal or absent. During this period, disease symptoms are usually mild or not evident while immune

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How to cite this article: Singla YK, Bali A, Singh A. Prosthodontic rehabilitation of AIDS patients: An overview. Indian J Dent Sci 2018;10:51-5.

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deterioration progresses with gradual decrease in CD4 and T cells. The final phase of infection is characterized by increased virus expression and distribution and by the emergence of multiple disease symptoms indicative of AIDS. By this time, the patients have severely depleted levels of CD4 and T cells drops below 200 cells/µl of blood. The risk of developing life-threatening opportunistic infections and malignancies increases greatly.\[3\]

**Guidelines for Prosthodontic Management of Subjects with HIV/AIDS**

1. Conventional measures
   - Contribute sound and empathetic environment
   - Use authoritative precautions
   - Perpetuate confidentiality of patient’s information
   - Advise regular checkups
   - Provide aloof treatment
   - Diagnose and manage oral manifestations of AIDS.

2. Particular to prosthodontics
   - Assessment of periodontal status of existing dentition during fabrication of removable partial denture (RPD) and fixed partial denture (FPD)
   - Increased maintenance of dentures for prevention of candidiasis
   - Evaluation of temporomandibular joint (TMJ) disorders
   - Estimation and management of xerostomia
   - Precautions during preprosthetic and implant surgical.

**Contrive Sound and Empathetic Environment**

Creating an empathetic environment for the treatment of HIV patients in dental clinic is an important task faced by the clinicians. The entire team in the clinic including the doctors, reception staff, assistants, dental hygienists, and nurses should contribute sufficiently to build a safe environment for the management of these patients. Regular meetings should be conducted and concerns and fears of the staff should be sufficiently addressed, facts should be provided regarding the risk of transmission, inform about precautions to be taken before and during treatment and provide an understanding of postexposure management and prophylaxis.

**Authoritative Precautions**

In all the healthcare settings, standard precautions (SP), the fundamental approach for the prevention of HIV transmission. SP is defined as a set of precautionary measures including good hand hygiene practices and use of protective barriers such as mask, gloves, face shield, eye protection, and gown during routine patient care carried out by healthcare workers. SP comprise precautions in the handling of sharps, all body fluids, secretions, blood, excretions, and avoidance of contamination of intact skin and mucous membrane. Patient care equipment soiled with blood, secretions, body fluids, excretions, and secretions should be checked in a manner that prevents skin and mucous membranes exposures. Use of disposable items should be followed and when reusable equipment is used, it has to be efficiently cleaned and reprocessed. Accidentally, bloodborne exposure is a common occurrence, but is very dicey under strict attachment to standard infection to control practice. Apart from SP, it is important to understand postexposure administration of health-care workers. Needlestick injury when working with a known cases and infection should be brought to HIV centers at the earliest. The provision of postexposure prophylaxis, including antiretroviral therapy, should follow absolute risk evaluation and counselling tailored to the need of the injured.\[3\]

In prosthodontics, disinfection of impression trays, spatulas, bowls, wax bites, impressions, stone models, occlusal rims, and pros thesis is an important aspect of universal precautions for infection control. The materials should be first thoroughly rinsed under running water to remove major contaminants such as saliva, food debris, blood, and superficial microbes from the surface. To remove the microbes from the body of the prosthesis, spraying or immersion technique of disinfection may be followed. The chemicals commonly used are glutaraldehyde, chlorhexidine, or iodophore. Ultraviolet light can also be used. Heat stable items such as pliers, metal impression trays, and face bows should be heat sterilized in comparison to disinfection. Impression should be disinfected in the same way before submitting to the laboratory. Alternative impression materials like autoclavable impression materials should be used. Dentures or other acrylic appliances that have been worn by patients and require repair should be handled throughout with wearing gloves as the porous nature of acrylic makes such materials hard to disinfect efficiently. Unglazed porcelain should not be exposed to any disinfectant as porcelain will suffice. Any device that has been immersed in a disinfectant should be thoroughly rinsed before handing over it to the patients. Irrespective of the immunocompetent or compromised condition of an individual, it is always advised that extreme care should be taken during the FPD procedures such as tooth preparation and gingival retraction. However, when dealing with HIV patients, it is more important as any trauma to the tissues may lead to infection and complications. Hence, it is wise to have supragingival margins, use simple gingival retraction methods, and avoid bleeding during dental practice.

**Provide Aloof Treatment and Perpetuate Confidentiality of Patients Information**

While providing oral care to patients with HIV infection due concern has to be given to the infectious nature and ethical perplexity due to social stigma of the illness is unethical to refuse to treat patients based on their HIV status. Furthermore, HIV-positive patients should always be subjected to the same treatment as HIV-negative patients. However, treatment may be provided more slowly and anxiously may involve greater protective measures.\[4\] It is appropriate for oral health-care
workers to provide relevant information and to get informed consent from patients before examination and treatment. Confidentiality, it is also a chief consideration as most individuals do not share their HIV status with either family or friends. Hence, information provided to dental professional must be kept with absolute concealment and should not be discussed in the presence of any other individual including staff in the clinic. It is better to converse the matters in a closed offices, examination rooms, and the information should be kept in a secret location. Any situation when dentist needs to share to share the information with consultants and other health-care professionals, a written consent must be obtained from the patients. Further, it is important to persuade the patients and the information collected would be used only to provide improved care without break in maintenance of confidentiality.

**Regular Check Ups**

It is well known that regular dental checkups are keys to early analysis and management of oral problems in any individual. In HIV-infected patients, regular visits to dentists are necessary because of the possible complications due to oral manifestations and its complex management requirements. Choromańska and Waszkiewicz evaluated prosthetic status and needs of HIV-positive patients. Comparison of 49 HIV-infected patients and 49 noninfected controls revealed heavy losses in all anatomical groups of teeth and treatment structure index in the group of HIV-infected patients reaching a value of 71.27%. This was facile treatment over conservative reconstructions despite young age of examined participants leading to affliction of mastication organ. Hastreiter and Jiang determined if visiting a dentist regularly affected the oral health services provided to HIV patients when financial barrier to access and found that regular patients were found to have been provided more diagnostic and preventive care, and less restorative, endodontic, periodontics, removable prosthodontic, and oral surgical treatment than infrequent visitors. The investigators concluded that using only emergency dental aid by HIV-infected people and lack of conservative treatment approach results in momentous loss of dentition, particularly in participants infected for an extensive period of time, and this teeth loss results in increased requirement of prosthetic treatment.

**Diagnose and Manage Oral Manifestations of HIV**

Investigators have proclaimed the frequency of oral lesions in HIV-infected persons to range from 40% to 70%.[5] It includes viral, fungal, bacterial infections, neoplasms, neurological problems, and manifestations due to unknown reasons such as recurrent aphthous stomatitis, progressive necrotizing ulceration, toxic epidermolysis, delayed wound healing, idiopathic thrombocytopenia, and xerostomia. An understanding of the signs and symptoms may help the prosthodontist to diagnose them at the earliest and seek proper referral to oral medicine experts for further management. However, since periodontitis, xerostomia, and oral candidiasis occurring in HIV patients intensely affect prosthodontics management.

**Assessment of Periodontal Status of Existing Dentition during Fabrication of Removable Partial Denture and Fixed Partial Denture**

It is well known that the prevalence of HIV gingivitis and periodontal disease among HIV-infected individuals is high which at times get difficult with necrotizing stomatitis. Although these patients are treated with HAART therapy, the level and extent of periodontal diseases among them remains higher than those negative for HIV infection. Numerous factors have been associated in the increased occurrence of periodontal attachment loss in HIV infection such as candida infection, increased cytokines and defective lymphocyte response. Thus, prosthodontics management for HIV patients is complicated as the periodontium of the remaining teeth is compromised. Interdisciplinary approach is very important for careful analysis, prognostication, daily treatment, adequate maintenance, and follow-up. Periodontists generally manage the disease with scaling and root planning, strict oral hygiene measures, and adjuvant broad-spectrum antibiotics such as tetracycline (500 mg 4 times/day) and metronidazole (400 mg 3 times/day), chlorhexidine gluconate (0.12%) mouth rinses, and antifungal medications when necessary. Metronidazole should be used with care in patients taking lopinavir and ritonavir.

Most clinicians indicate that RPD are associated with increased gingivitis, periodontitis, and abutment mobility. In spite of this fact, if basic principles of RPD designs are followed (rigid major connector, simple design, and proper base adaptation), periodontal health of the surviving dentition can be maintained. However, since most research is mainly done on immunocompetent patients and not abundant literature focuses on HIV-infected participants, it is better to abstain the use of RPDs in these patients who are already prone for the periodontal diseases. Use of high-risk design FPDs is beneficial and adherence to strict plaque control by the doctors and patients before and after treatment is essential in such patients. Implant therapy is also successful in these periodontally compromised individuals provided oral infection is effectively eradicated before installation and daily maintenance is emphasised after the procedures. However, implant therapy should be reconsidered if oral infection cannot be satisfactorily controlled.

**Increased Maintenance of Dentures for Prevention of Candidiasis**

Oral candidiasis is the strongly related lesions to HIV and is associated with reduced CD4+ lymphocyte count and high viral load. RPDs can further act as source of candida species
which can not only delay dental treatment but also predispose them to denture-related stomatitis and improper control of oral lesions leading to disseminated infections. Hence, treatment of oral mucosa as well as the dentures with antifungal to control the spread of fungal infection and improved maintenance of dentures in HIV patients is of utmost importance. Treatment of dentures is done with Nystatin powder (50 million U) sprinkled on the tissue contact area of the denture or clotrimazole cream applied on the undersurface of the dentures 4–5 times in a day. Severe lesions are treated with systemic antifungal such as fluconazole (200 mg/day, 100 mg daily for next 7–14 days), itraconazole (100–200 mg/100 ml once a day for 1–2 weeks), and ketoconazole (200–400 mg/day as a single dose for 7–14 days). Necker antifungal (e.g.; echinocandins, second generation triazoles) and natural products are also being used.

As in vivo investigation comparing the oral candida population between heat-cured acrylic resin and nickel-chromium-beryllium alloy in maxillary complete dentures in HIV-infected patients demonstrated significantly higher colony counts under the acrylic bases although apparent clinical manifestations were not present. This study determined that metal base CD provide an important alternative for edentulous HIV positive, particularly among those prone to higher incidences of fungal infections.10 Further, it is better to avoid the use of denture adhesives and reliners as these may anchor the fungal elements to larger extent and contribute to candida infections.

EVALUATION OF TEMPOROMANDIBULAR JOINT DISORDERS

Literature reveals that antiretroviral therapy, particularly protease inhibitors (PIs) are related to TMJ arthralgia. Florence et al.11 were the first to report a case of temporomandibular dysfunction associated with the use of indinavir. In this case, stomatologists attributed the temporomandibular disorder (TMD) to problem with dentures and advised change of dentures. However, the problem did not subside until alternative medications were prescribed suggesting association of PIs with TMD. Thus, it is necessary for the prosthodontist dealing with HIV-infected subjects to aware of such a possibility.

ESTIMATION AND MANAGEMENT OF XEROSTOMIA

The occurrence of xerostomia in HIV patients is commonly reported due to effect of viral infection on salivary glands or as a side effect of antiretroviral therapy and other medications used. It causes important morbidity as it is implicated in rapid and widespread dental decay, fungal infections and ulceration of oral mucosa. It also leads to difficulties in speech, swallowing, mastication, and discomfort and pain during use of partial or complete dentures. Irritation and ulcerations of the compromised mucosa are commonly seen as a consequence of chronic denture movement. This problem is farther complicated in elderly HIV patients as both the infection and age changes contribute significantly to decrease salivary flow and resultant impediments. Furthermore, CD in these patients are challenging because retention and stability are difficult to gain. Successful prosthodontic management of such patients requires control of the xerostomia, carefully planned methods of prevention of complications and modifications of partial or CD. Change of xerostomia causing drugs or their dosage, saliva substitutes (artificial saliva), salivary stimulation with chewing of sugar free gums/lozenges, and systemic salivary stimulants (bromhexine, pilocarpine HCl, cevimeline HCl, Anethole trithione, and Bethanechol) are most commonly used methods to increase salivary flow. This aspect of treatment planning needs opinion from physician and competent oral medicine practitioners.

Retention of dentures can be bolstered by spraying entire undersurface of dentures with saliva substitutes soaking the denture in water or may be modified with reservoir to funnel the saliva substitutes to prolong its action. However, such modified dentures are not very effective and are often too heavy, interfere with phonetics and are difficult to clean. Better characteristics have achieved with various other methods like construction of reservoir in existing dentures advocated by Vissink et al.10 “split dentures” suggested by Mendoza and Tomlinson,11 dentures with intercommunicating chambers proposed by Branchi et al.12 and mandibular reservoir denture with increased capacity designed by Sinclair et al.13 Good stability of dentures can be attained with a well-constructed base plate and carefully arranged artificial teeth. When patients are partially edentulous, cast partial dentures are preferred because of increased wettability and possibility of careful designing before processing. These dentures should be fully tooth supported with minimal tissue coverage. It is better to avoid gingivally approached clasps as they tend to irritate and ulcerate buccal mucosa and gingiva. Use of a combination of both fixed and removable prostheses to rehabilitate partially edentulous patients beneficial to xerostomic patients as it allows the RPD design to be simplified and tissue coverage minimized. However, the literature in prosthodontics management of HIV patients with xerostomia is rare and therefore further studies in the field are a crucial requirement for better understanding and care.

PRECAUTIONS DURING SURGICAL INTERVENTION

Many patients with HIV infection may need preprosthetic surgeries for successful RPD/CD. These processes can safely be carried out in HIV-positive individuals as most studies indicate no difference in the postoperative complications such as infection, prolonged bleeding, and delayed wound healing when compared to healthy individuals. Studies have suggested that variations in viral load, CD4 cell count, or antiretroviral medication regiments do not impact surgical healing. Campo et al.14 studied the risk of oral complications after invasive and noninvasive dental procedures in HIV patients and assumed that presence of oral lesions, smoking habit, or HIV clinical stage B may be predictive factors for oral complications in HIV patients.
**Implant Therapy in HIV Patients**

**Successful implant therapy in HIV subjects**

Most prosthodontists when encountered with medically compromised cases are apprehensive about the success of implant therapy. Implant therapy is not contraindicated in HIV and it can be successfully carried out with proper and thorough evaluation and treatment planning. Achong et al.\(^\text{[16]}\) did 3 cases of implant therapy on HIV-infected patients, 2 of whom were on HAART therapy indicating that implant surgery may not carry an increased risk for the HIV-infected patients, particularly when the viral load is low. Further, it was advocated that CD4 cell count levels at the time of implant placement appear to have no effect on the success of implants. Thus, if the patients are immunologically stable with low viral loads, there is no need of change in implant therapy in patients with HIV infection. Adequate attention should be given to rule out peri-implantitis and HIV associated oral lesions with regular follow-up. Thus, an increased consent level of the patients is principally necessary.

**Implant site evaluation**

Osteopenia and osteoporosis are common side effects of HAART therapy. However, this has no negative effect on implant therapy. The investigators carried a 6-month follow-up study to analyze clinical and radiographic sequelae of endosseous oral implants placement in HIV-positive patients under PIs and non-PI-based HAART. There was no affirmation of infection, bone loss, or implant mobility, and the implant success rate was 100% for both groups. Patients should put an effort to give up smoking, since smoking is an important risk factor for osteoporosis and implant failure.

**Xerostomia and implant therapy success**

As discussed earlier, xerostomia is the most common complaint among HIV-infected individuals and can clog the management protocol. However, only few studies have been carried out on success of implant therapy in these cases, and this is confined data revealing that these patients can be successfully treated with osseointegrated implants. Beikler and Flemming\(^\text{[16]}\) recommended fundamental guidelines to be followed before placing implants such as diagnosis and treatment of cause of xerostomia, elimination of bacterial and fungal infections, and follow-up at shorter intervals. However, there are no evaluative studies on the implant success in HIV patients with xerostomia, and thus is a field which needs research.

**Conclusion**

Prosthodontic management of HIV-infected patients is made easy by following simple guidelines suggested. However, research in this field is confined and it is recommended that additional clinically relevant information must be acquired with randomized controlled trials on greater number of patients. Based on the evidence acquired, more detailed and improved guidelines can be developed that may facilitate in better patient care.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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