

Prosthodontic Management of HIV/AIDS Subjects: An Overview

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Received: 23 November 2012 / Accepted: 3 December 2012 / Published online: 20 December 2012
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Abstract Provision for high standard of oral health care is a fundamental requirement for any individual and dentists constantly strive to provide optimal treatment to their patients. However, when it comes to treating subjects with infectious diseases particularly those attached with social stigma like HIV/AIDS, there remains doubts and hesitations. This may lead the practitioners to breach the ethical responsibility by denying or not providing adequate treatment to these patients. Such situations can easily be avoided with thorough knowledge and awareness among the oral health care providers including prosthodontists regarding the disease process, its implications and measures to be taken during their treatment. This article summarises key points in prosthodontic management of HIV/AIDS patients which in the opinion of the author may be easily incorporated in routine dental practice.

Keywords Oral health · Universal precautions · Dentures · Candidiasis · Xerostomia

Introduction

Human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS) are phenomena which have been a part of world's experience since 1981 and are considered global pandemic with cases reported from virtually every country. Despite the fact that HIV/AIDS still has no known cure, treatment with highly active antiretroviral therapy (HAART) suppresses HIV replication

thereby prolonging the life as well as improving the quality of life in these patients. Joint United Nations program on HIV/AIDS (UNAIDS) in 2008, reported an estimate number of adults living with HIV as 31 million worldwide with 2.71 million people living in Indian subcontinent alone [1]. Thus, it is not surprising that many people with HIV/AIDS are seeking to obtain routine dental care. Among the various dental treatments provided, prosthetic rehabilitation is an integral part and although the prosthodontists are confronted with an increasing number of HIV infected patients, there remains uncertainty with regard to appropriate management protocol for them. The following section provides a brief summary of the prosthodontic care for the people living with HIV/AIDS and some key points for the prosthodontists to improve oral health care provision in these subjects.

Clinical Course of HIV/AIDS

HIV is a lentivirus that causes AIDS, a condition in humans in which the immune system begins to fail, leading to life-threatening opportunistic infections. Infection with HIV occurs by the transfer of blood, semen, vaginal fluid, pre-ejaculate, 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 antigenemia and a significant drop in the number of circulating CD4+ T cells. This is followed by a dramatic decline in plasma viremia with resolution of acute syndrome and CD4+ 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

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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 deterioration progresses with gradual decrease in CD4+ 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 a severely depleted level of CD4+ cells, leading to collapse of their immune system. As the patient's level of CD4+ T cells drops below 200 cells/ μ l of blood, the risk of developing life-threatening opportunistic infections and malignancies increases greatly [2].

Guidelines for Prosthodontic Management of Subjects with HIV/AIDS

General Measures:

1. Create safe and empathetic environment.
2. Maintain confidentiality of patients' information.
3. Use standard precautions.
4. Provide unbiased treatment.
5. Advise regular dental visits.
6. Identify and manage oral manifestations of HIV/AIDS.

Measures in Particular to Prosthodontics:

7. Evaluation of periodontal status of existing dentition during construction of removable and fixed dentures.
8. Evaluation and management of xerostomia.
9. Increased maintenance of dentures for prevention of candidiasis.
10. Evaluation of temporomandibular joint disorders.
11. Precautions during pre-prosthetic and implant surgeries.

Create Safe and Empathetic Environment

Creating an empathetic environment for treatment of HIV/AIDS patients in dental operatory is an important challenge 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 congenial environment for management of these patients. Regular meetings should be conducted and fears and concerns of the staff should be adequately 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 post exposure management and prophylaxis. A detailed discussion of this subject can be found elsewhere [3].

Provide Unbiased Treatment and Maintain Confidentiality of Patients' Information

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

Standard Precaution

In all the health care settings, standard precaution (SP) is the fundamental concept 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 like disposable gloves, mask, eye protection or face shield, and gown during routine patient care carried out by health care workers. SP encompasses precautions in the handling of sharps, blood; all body fluids, secretions and excretions; and avoidance of contamination of non-intact skin and mucous membrane. Patient care equipment soiled with blood, body fluids, secretions, and excretions should be handled in a manner that prevents skin and mucous membrane exposures. Use of disposable items should be followed and when reusable equipment is used, it has to be properly cleaned and reprocessed. Accidental bloodborne exposure is a common occurrence, but is less hazardous under strict adherence to standard infection control practice. Apart from SP, it is important to understand post exposure management of health care workers. Needle stick injury when working with a known case of infection should be reported to HIV centres at the earliest. The provision of post exposure prophylaxis, including

antiretroviral therapy, should follow thorough risk assessment and counselling tailored to the need of the injured [5].

In prosthodontics, disinfection of impression trays, bowls, spatulas, impressions, wax bites, occlusal rims, stone models and prostheses is a crucial aspect of universal precautions for infection control. The materials should be first thoroughly rinsed under running water to remove gross contaminants like saliva, blood and food debris and superficial microorganisms from the surface. To remove the microorganisms from the body of the prosthesis, spraying or immersion technique of disinfection may be followed. The chemicals commonly used are chlorhexidine, glutaraldehyde or iodophor. Ultraviolet light may also be used for this purpose. Heat stable items like face bows, pliers, and metal impression trays should be heat sterilized rather than disinfected. Impression should be disinfected in the same manner before submitting to the laboratory. Alternative impression materials like autoclavable impression materials may also 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 difficult to disinfect adequately. Unglazed porcelain should not be exposed to any disinfectant as porcelain firing/glazing will suffice. Any device that has been immersed in a disinfectant should be thoroughly rinsed before delivering it to the patients [6–9].

Irrespective of the immunocompetent or compromised status of an individual, it is always advocated that extreme care be taken during the fixed partial denture procedures like tooth preparation and gingival retraction. However, while dealing with HIV/AIDS patients, it is more so important as any trauma to the tissues may lead to infection and complications. Hence it may be wise to have supra-gingival margins, use simple gingival retraction methods and avoid bleeding during procedures.

Regular Dental Visits

It is well known that regular dental checkups are key to early detection and management of oral problems in any individual. In HIV infected subjects, regular visits to dentists is required more so because of the possible complications due to oral manifestations and its complex management requirements. Hastreiter and Jiang [10] determined if visiting a dentist regularly affected the oral health services provided to HIV subjects when financial barriers were eliminated as an impediment to access and found that regular patients were found to have been provided more diagnostic and preventive care, and less restorative, endodontic, periodontic, removable prosthodontic and oral surgical treatment than infrequent visitors. Choromańska and Waszkiel [11] evaluated prosthetic status and needs of HIV-positive subjects. Comparison of 49 HIV infected subjects and 49

non-infected control patients revealed heavy losses in all anatomic groups of teeth and treatment structure index in the group of HIV infected subjects reaching a value of 71.27 %. This was possibly because extraction of teeth was the preferred treatment over conservative reconstructions, despite young age of examined subjects leading to damage of mastication organ. The investigators concluded that using only emergency dental aid by HIV infected people and lack of conservative treatment approach results in significant loss of dentition particularly in subjects infected for a longer period of time and this teeth loss results in increased need of prosthetic treatment.

Identification and Management of Oral Manifestations in HIV/AIDS

Investigators have reported the prevalence of oral lesions in HIV infected persons to range from 40–70 % [12]. It includes bacterial, viral, fungal infections, neoplasms, neurological problems and manifestations due to unknown cause like recurrent aphthous stomatitis, progressive necrotizing ulceration, toxic epidermolysis, delayed wound healing, idiopathic thrombocytopenia and xerostomia. An understanding of the clinical features may help the prosthodontists to identify them at the earliest and seek appropriate referral to oral medicine experts for further management. Discussion of each of these lesions is out of scope of this article. However, since periodontitis, xerostomia and oral candidiasis occurring in HIV/AIDS patients drastically influence the prosthodontic management, these have been dealt in detail in the further sections.

Evaluation of the Periodontal Status of Existing Dentition

It is well known that prevalence of HIV gingivitis and periodontal disease among HIV infected individuals is high which sometimes gets complicated with necrotizing stomatitis. Though these patients are treated with HAART therapy, the level and extent of periodontal diseases among them remains higher than those negative for HIV infection [13, 14]. Various factors have been implicated in the increased occurrence of periodontal attachment loss in HIV infection like candida infection, increased cytokines and defective lymphocyte response [15]. Thus, prosthodontic management for HIV patients is complex as the periodontium of the remaining teeth is compromised. Interdisciplinary approach is very important for careful evaluation, prognostication, regular treatment, adequate maintenance and follows up. Periodontists generally manage the disease with scaling and root planning, strict oral hygiene measures and adjuvant broad spectrum antimicrobials such as tetracycline (500 mg four times a day) and metronidazole (400 mg three times a

day), chlorhexidine gluconate (0.12 %) mouth rinses and antifungal medications when required. Metronidazole should be used with caution in patients taking lopinavir and ritonavir.

Most investigators indicate that removable partial dentures are associated with increased gingivitis, periodontitis and abutment mobility. In spite of this fact, if basic principles of RPD designs are followed (rigid major connectors, simple design, proper base adaptation), periodontal health of the remaining dentition can be maintained [16]. However, since most research is mainly done in immunocompetent patients and not much literature focuses on HIV infected subjects, it is best to avoid use of RPDs in these patients who are already prone for the periodontal diseases. Use of high risk design fixed partial dentures is beneficial and adherence to strict plaque control by the doctors and patients before and after treatment is indispensable in such patients [17]. Implant therapy is also successful in these periodontally compromised individuals provided oral infection is effectively eliminated before installation and regular maintenance is emphasised after the procedures. However, implant therapy should be reconsidered if oral infection cannot be satisfactorily controlled [18].

Evaluation and Management of Xerostomia

The occurrence of xerostomia in HIV individuals is commonly reported in HIV/AIDS patients due to effect of viral infection on salivary glands or as a side effect of antiretroviral and other medications used. It causes significant morbidity as it is implicated in rapid and widespread dental decay, ulceration of oral mucosa and fungal infections. It also leads to difficulties in speech, mastication, swallowing and discomfort and pain during use of partial or complete dentures. Irritation and ulcerations of the already compromised mucosa are commonly encountered as a consequence of chronic denture movement [19]. This problem is further complicated in elderly HIV subjects as both the infection and age changes contribute significantly to reduced salivary flow and resultant impediments. Also, complete dentures in these patients are challenging because retention and stability are hard to achieve. Successful prosthodontic management of these patients requires control of the xerostomia, carefully planned methods of prevention of complications and modifications of partial/complete dentures. 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, anethole trithione, pilocarpine HCl, cevimeline HCl and bethanechol) are most commonly used methods to counter decreased salivary flow [20]. This aspect of treatment planning requires opinion from physician and expertise of oral medicine practitioners.

Retention of dentures can be improved by spraying entire under surface of dentures with saliva substitute, soaking the denture in water or may be modified with reservoir to carry the saliva substitutes to prolong its action [21–23]. However, such modified dentures are not very effective and are often too bulky, interfere with speech and are difficult to clean. Better characteristics have been achieved with several other methods like construction of reservoir in existing dentures advocated by Vissink et al. [24], 'split denture' suggested by Mendoza and Tomlinson [25], dentures with inter-communicating chambers proposed by Branchi et al. [26], mandibular reservoir denture with increased capacity designed by Sinclair et al. [27]. Good stability of dentures may be attained with a well-constructed baseplate and carefully arranged artificial teeth. When patients are partially edentulous, cast partial dentures are preferred because of superior wettability and possibility of careful designing before processing. These dentures should be entirely tooth-supported with minimal tissue coverage. It is best to avoid gingivally approaching 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 is advantageous to xerostomic patients as it allows the removable partial denture design to be simplified and tissue coverage minimized [28]. However, the literature on prosthodontics management of HIV/AIDS patients with xerostomia is scarce and hence further studies in the field are a crucial requirement for better understanding and care.

Increased Maintenance of Dentures to Prevent Oral Candidiasis

Oral candidiasis is among the strongly related lesions to HIV and is associated with reduced CD4+ lymphocyte counts and high viral load. Removable partial dentures can further act as reservoir of *candida* species which can not only impede dental treatment but also predispose them to denture-related stomatitis and inadequate 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 subjects is of critical importance [29, 30]. 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 four to five times in a day. However, these drugs interact with antiretroviral drugs like zidovudine, nevirapine and ritonavir which should be deliberated before prescription. Severe lesions are treated with systemic antifungal like fluconazole (200 mg on a day 1, 100 mg daily for next 7–14 days), Itraconazole (100–200 mg/10 ml once a day for 1–2 weeks) and ketoconazole (200–400 mg/day as a

single dose for 7–14 days). Newer antifungal (e.g., echinocandins, second-generation triazoles) and natural products are also being tried.

An *in vivo* investigation comparing the oral candidal 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 resin bases although overt clinical manifestations were not present. This study established that metal base complete dentures provide an important alternative for edentulous HIV-positive particularly among those prone to higher incidences of fungal infections [31]. Further it is best to avoid the use of denture adhesives and reliners as these may harbour the fungal elements to larger extent and contribute to candida infections.

Possibility of TMD

Literature reveals that antiretroviral therapy particularly protease inhibitors are associated with temporomandibular joint arthralgia. Florence et al. [32] were the first to report a case of temporomandibular dysfunction associated with the use of indinavir. In this case, stomatologists attributed the TMD to problem with dentures and advised change of dentures. However, the problem did not resolve until alternative medications were prescribed suggesting association of protease inhibitors with TMD. Thus, it is imperative for the prosthodontists dealing with HIV infected subjects to aware of such a possibility.

Precautions During Surgical Interventions

Many patients with HIV infection may require preprosthetic surgeries for successful removal partial or complete dentures. These procedures can safely be carried out in HIV-positive individuals as most studies indicate no difference in the post-operative complications such as delayed healing, infection or prolonged bleeding when compared to healthy individuals. Further, studies have suggested that variations in viral load, CD4 cell count or antiretroviral medication regimens do not impact surgical healing [33, 34]. Campo et al. [35] studied the risk of oral complications after invasive and non-invasive dental procedures in HIV subjects and concluded 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 Subjects

Successful Implant Therapy in HIV/AIDS Subjects

Most prosthodontists when confronted with medically compromised cases are apprehensive about the success of

implant therapy. Implant therapy is not contraindicated in HIV/AIDS and can be successfully carried out with careful and thorough evaluation and treatment planning. Achong et al. [36] reported 3 cases of implant therapy on HIV infected patients, two 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 suggested 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 modification of implant therapy in patients with HIV infection. Careful attention should be given to rule out peri-implantitis and HIV associated oral lesions with regular follow up. Thus a high compliance level of the patients is principally required.

Implant Site Evaluation

Osteopenia and osteoporosis are common side effects related to HAART therapy. However, this has no negative impact on implant therapy as suggested by Oliveria et al. [37]. The investigators conducted a 6 month follow up study to evaluate clinical and radiographic outcome of endosseous oral implants placement in HIV-positive individuals under Protease inhibitors (PI) and non-PI based HAART. There was no evidence of infection, bone loss or implant mobility and the implant success rate was 100 % for both groups. Patients should attempt to give up smoking, since smoking is an important risk factor for osteoporosis [38] and implant failure [39, 40].

Xerostomia and Implant Therapy Success

As discussed earlier, xerostomia is a common complaint among HIV infected individuals and can complicate the management protocol. However, only few studies have been carried out on success of implant therapy in these cases and this limited data reveal that these patients can be successfully treated with osseointegrated implants. Beikler and Flemming [41] recommended basic guidelines to be followed prior to placing implants like 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 requiring research.

Conclusion

Prosthodontic management of HIV infected subjects is made easy by following simple guidelines suggested here.

However research in this field is limited and it is recommended that additional clinically relevant information should be acquired with randomized controlled trials on large number of patients. Based on the evidence obtained, more detailed and improved guidelines can be developed that may facilitate in better patient care.

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