# Complication risks of invasive dental procedures in HIV/AIDS patients

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**ABSTRACT**

A total number of people living with HIV reached since it was first reported. Indonesia is on the brink of rapidly worsening AIDS epidemic. Oral health was frequent problem among HIV-infected person. Opportunistic oral lesions and infections were often one of the first manifestations of HIV. The aim of this literature review were to discuss complication risks and management undergoing invasive dental procedures. Thereby, dentists have been expected to increase awareness for dental treatment needs for HIV-infected patients by pay attention to applied standard procedure. The complications of HIV-infected patients were reported minor, self-limiting, non-life threatening and readily treated. Treatment planning for the patient with HIV follows the same sequences as with other patients priorities are to assuage pain, restore function, prevent further disease and consider esthetic results. We concluded that no different complication risks between HIV-infected and non-infected. Dentists can provide care for HIV-infected patients with assessing the current immunosuppresion stage, intake systemic medications, opportunistic infection potential and minimize contagion possibility to dental care professional or other patients.

**Key words**: HIV, AIDS, complication risk, dental invasive

## INTRODUCTION

The number of HIV patients in the whole world is reported as progressively increasing. A sharp increase is seen in East Europe, Middle Asia and East Asia with African Sub Sahara area as the globally largest area with HIV infected people.[1,2] HIV epidemic, according to the World Health Organization data in the end of 2007, is decreased compared to 2005.[1,3] Based on the report on Monitoring the AIDS Pandemic (MAP), up to June 2005, the number of HIV/AIDS patients in Indonesia is recorded as 7,098.[1,4,5] The cumulative number of HIV and AIDS cases up to 2008 March 31 according to the Directorate General of Infectious Disease Prevention and Environmental Health, Ministry of Health, Republic of Indonesia data released by Spiritia foundation, there are 6,130 HIV cases and 11.868 AIDS cases with 64 new HIV cases and 727 new AIDS cases.[6] From the total number of drug users who join free HIV test held by Pokdisus AIDS of the Faculty of Medicine, Universitas Indonesia/ Cipto Mangunkusumo Central Hospital/RSUPNCM), it is revealed that 33% of them have HIV.[7]

Oral health is a frequent problem in HIV patients.[8,9] This is supported by the fact that the opportunistic lesion and oral infection often become the first manifestation of HIV.[8] Due to its

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effect to the immune system, HIV develops into a disease that affect all health aspect leading to increase health care needs, including dental care.[8,10,11] In general, the awareness of HIV patients on their infection status also increase their awareness towards oral health which prompt their effort to improve their oral hygiene routinely and increase their frequency of dental or specialist visits.[10] The number of HIV patient visits in the Oral and Dental Functional Service Unit of Cipto Mangunkusumo Central Hospital during 2006 is 28 patients who need invasive dental treatment covering 100% scaling, 54% extraction, and 17,8% odontectomy.

Often the HIV patients do not receive routine dental treatment due to financial and social reasons.[9] Several studies stated that almost 70% of dentists refuse or reluctant to give dental and oral services to HIV patients.[12,13] This may be caused by the possibility of increased risk of HIV transmission and the HIV immunosupression condition that may increase potential complications in dental care.[12,14]

Based on the above facts, this paper will discuss the complication risks that may happen during invasive dental treatment procedure for HIV/AIDS patients and its management. Therefore, it is expected that the awareness of dentists towards the need of dental care of HIV patients will be increased by paying attention to the applicable standard procedure.

**Treament complication risk**

Dental care can be given to HIV patients without hospitalization.[15] Based on the consensus of ADA (American Dental Association) 1994, there is not specific treatment modification recommended except for advance AIDS patients who are found in the situation where modification is needed such as patients have low $CD4^+$ lymphocyte level, a platelet level of < 60,000 cells/$mm^3$, a neutrophil of < 500 cells/$mm^3$ that need antibiotic prophylaxis and the advance AIDS patients who need good treatment plan.[16,17] However, the complication risks of dental treatment may be found similar to immunocompetent people.[18] The risk of prolonged bleeding time after surgery, delayed treatment, alveolitis, oral infection or other organs may happen after a surgical procedure. It is thought that the complication risks will increase in immunocompromized patients such as hemophilia, liver cirrhosis, or immune system dysfunction that may increase bleeding risk and immune system disorders. Therefore, the immunosuppresion condition experienced by HIV patients will bring similar complication risks to those diseases.[18]

The tendency that HIV patients experience complications during invasive dental treatment is still controversial.[12] A retrospective study of 1,810 invasive dental treatments such as periodontal, restorative, endodontics, prosthodontics and surgical procedure performed by dentists to 331 HIV infected patients with substantial immunosuppresion with a $CD4^+$ less than 200 cells/mm2 shows that the complication is low, which is around 0.9%. Simple dental extraction shows 4.1% complications while surgical extraction shows 11.8% complication especially for dry socket.[12] Several studies show that prophylaxis reduces the risk of dry socket and HIV infected patients.[12,18]

Although in the study as specific complication risk of invasive dental surgery in HIV patients is not shown, in general HIV status is not a risk factor for complication.[19] Rose et al.[19] compared several surgical procedures including invasive dental surgery and suggested that the invasive dental surgery does not lead to mortality risk and that there is no significant difference between HIV-infected patients with those who are not infected by HIV.

Several studies indicate that dentists now tend to give dental care to asymptomatic HIV patients compared to AIDS patients although there are not many studies have shown the relationship of disease status and dental care. There are also contrast differences in the form of discrimination for HIV patients where 70% of dentists are not interested to manage an HIV infected patients. If the HIV severity is related to the increased complication incidence after treatment then the dentists should show greater attention when taking care of patients in advance state.[12]

A study that by Glick et al.[12] involves 331 HIV infected patients from different cities who were observed for 1 year with a $CD4^+$ cells of < 200 cells/mm3 to assess complications related to dental treatment. It turns out that there is no significantly different complications between HIV patients and non HIV patients. In addition, in this study the types of complication are reported that include bleeding complained by patients and those

conditions that need medical attention such as post surgical pain, dry socket, delayed healing after surgery or dental extraction.[12] Most other studies on dental care complication risk in HIV patients only discuss the risk of dental extraction.[20,23]

Several studies on post dental care complication that have been reported include studies on dental extraction which is a minor surgery that needs wound healing in soft tissue and hard tissue that may increase the risk for complication. However, the HIV positive patients generally receive post surgery antibiotics compared to non-HIV patients although the use of antibiotics here is not clear yet.[24] Porter et al.[21] suggested that routine prophylaxis in dental extraction HIV patients is not indicated. This opinion is supported by Dodson et al.[24] who stated antibiotics utilization is not related to post extraction complication and the complication is not significantly different with non HIV patients because HIV patients get antibiotics therapy as prophylaxis for other infections.

Another complication is dry socket (3.7%), post dental extraction bleeding, prolonged bleeding time and delayed healing but those complications have similar frequency as the non HIV patients.[21,23] Viremia is an indicator of active virus replication that causes continual re-infection and damages $CD4^+$ lymphocyte. It is believed that HIV positive patients have poor surgical results compared to non HIV patients due to immunosuppresion status and poor viral control.[25] Average complication, based on Dodson et al.[24] study, does not show any significant difference based on its HIV severity.

Until this moment, there is not much known about the complication risk of dental implant procedure in HIV patients. Several case studies show successful implant with a result of a stable implant and healthy surrounding soft tissue, no bleeding in periodontal probing and no dental bone support abnormality in X-ray image.[25,27] Implant usage is considered because patients who use conventional dental prosthetic experience difficulty in adapting to the prosthetic. They shift to implant to get more comfort, stability, function and masticatory efficiency with better retention and support especially in complete mandibular-maxillary overdenture usage.[28] The success of implant depends on implant location, patient cooperativeness, surgeon skills and consideration and the type of implant to be placed.[29]

A study done by Stevenson et al.[28] in 29 HIV patients who are > 18 years old with a criteria of hemoglobin of > 8g/dL, absolute neutrophil of > 750 cells/$mm^2$, platelet count of > 75,000/$mm^3$, AST (aspartate transaminase) < 5 times ULN (the Upper Limit of Normal), billirubin < 2.5 times ULN, alkaline phosphatase < 5 times ULN, creatinine < 2.5 mg/mL, then implants using two osseointegrated dental implants were applied. It is stated that after 6 month evaluation all implants are successful and there is no difference between HIV patients and non HIV patients based on the clinical response and bone integration with the dental implants measured using standard parameter.

The complication that has been reported after endodontic procedure is flare-up that makes up 3.2% of the cases. A study made Quesnell et al.[31] which is supported by Suchina et al.[32] compared the effect of endodontic treatment in HIV and non HIV patients that show similar cure rate and prognosis. Therefore, endodontic treatment can be used as an alternative in preventing dental loss and a standard treatment for HIV/AIDS patients with irreversible pulp diseases.

Complications reported after scaling and curettage are bacteremia with an incident of 7 out of 22 and fever in 5 of 22 patients.[33] HIV patients may experience increased gingivitis risk and rapidly progressive periodontal disease with a therapeutic response that depends on the last HIV status, systemic medication intake for managing HIV itself, antibiotic intake and bad habits related to health.[34,35]

**Complication predisposing factors**

The immunocompromised status of HIV patients becomes a reason for inability of support, control and effective immune response towards exogene trauma making it highly risky for complication development after a surgery.[10] Patton[36] stated that HIV patients show increased hematological abnormality risk increase where the risk for trombocytopenia, neutrophenia, lymphopenia, and anemia becomes the biggest in high average viral replication and/or immune deficiency consequence leading to opportunistic infection. Scully et al.[37] stated that 20% of HIV patients with hemophilia experience post invasive

dental care complication with insignificant difference with non HIV hemophilic patients.[37]

Although it is rare, bleeding expansion may happen despite the normal hemostasis. Immune trombositopenia is known as HIV complication making patients who undergo extensive surgical procedure may experience increased bleeding tendency that makes complete hemostatic function assessment before surgery necessary. Dental extraction in HIV patients who have a platelet count of >50,000/mm$^2$ and an Hb level of ≤ 7 g/dL should be delayed. If the assay is impossible and extraction is really needed due to emergency situation, a simple bleeding time test can be performed by the dentist to see whether the hemostatic function is acceptable. Increased bleeding time (> 9 minutes) indicate the need for quantitative and qualitative platelet function assays.[35]

Several causes of immune trombositopenia in HIV/AIDS are: (1) opportunistic infection and fever that contribute to increased platelet change; (2) increased HIV viremia triggering immune complex deposition on the platelet surface and trigerring release by liver and lymph; and (3) hematopoesis disorder that reduces compensation ability towards increased platelet damage.[36]

**Possible/previously performed complication management**

Treatment provided may trigger several complications including hemostatic dysfunction that can be anticipated using platelet count, prothrombin time, partial thromboplastin time assays before an invasive procedure. In addition, antibiotic prophylaxis can be provided if necessary.[12] Several authors recommend routine prophylaxis before dental extraction in AIDS patients. Other authors stated that patients with CD4$^+$ count of < 100 cells/mm$^3$ and long antiretroviral chemotherapy patients should undergo neutropenia evaluation. Patients should be given antibiotic prophylaxis before dental treatment management only when the absolute neutrophil count is less than 500 cells/mm3, where patients do not get antibiotic prophylaxis for pneumonia or tuberculosis.[10] Besides the above management measures, the treatment procedure should be modified based on financial factors, medical condition and patient's emotional state.[12]

**DISCUSSION**

The complication found in invasive dental treatment for HIV patients can be considered as only a few with a self limiting nature, rapidly managed and does not threaten the life of patients without coagulopathy and severe neutropenia.[24,38] The complications may include dry socket, infection, post operation pain, prolong bleeding time and delayed healing that may be found in the dental practice.[38] The presence of oral lesion, smoking habit or B clinical status of HIV can be used to predict the occurrence of complication but it cannot be made into excuses for delaying dental treatment.[10] A study by Campo et al.[10] indicates that a dentist can perform dental care to adult HIV patients without severe immunosuppresion condition. It is not always necessary to give pre-surgical antibiotics routinely to all patients except for patients with neutropenia of < 500 cells/ml or IDUs (Intravenous Drug Users) since they need it as a prophylaxis against bacterial endocarditis. Although the relationship between the immunosuppresion status with bacterial endocarditis development is not clear yet, some studies show high average bacterial endocarditis among IDU HIV patients compared to non IDU HIV patients. There is also an inverse relationship between the occurrence of bacterial endocarditis and lymphocyte CD4$^+$ count. The use of HAART (Highly Active Anti Retroviral Therapy) reduces morbidity, mortality and hospitalization related to HIV infection.[39]

HIV patient treatment plan follows the same order as the general patients with a priority of diminishing the pain, returning restorative function, preventing further disease and considering esthetic results.[35] Although there is no justification of dental treatment modification based on the HIV status, there are unique treatment considerations in HIV population by paying attention to the general oral health that affect systemic health. The treatment modification of HIV patients is almost the same with other medically compromised patients and proactive behavior in HIV patient dental treatment is recommended by emphasizing preventing effort. Besides, the dental treatment planning and priority is important and individual judgment is needed. Dentists should also emphasize good oral hygiene maintenance. [16,35]

With limited evidence-based data to support the routine needs of antibiotic protection to prevent bacterimia and septicemia in routine dental treatment and based on the advisory statement form ADA (American Dental Association) and AAOS (American Academy of Orthopedic Surgeons), it is stated that antibiotic prophylaxis is not a routine indication for most dental patients.[17,39] The use of routine antibiotics is a contraindication and may become a predisposition for superinfection and drug resistance towards microorganism even though for patients with immunocompromized condition and/or have commorbidity such as prosthetic bone surgical infection, HIV, type 1 diabetes or malignancy may have high risk. For various conditions above, the American Heart Association, the American College of Cardiology Foundation and American Heart Association Task Force on Practice Guidelines recommend the use of antibiotic prophylaxis.[15,39,40]

Individual examination by considering the additional medical commorbidity, immuno suppresion condition, the length of working time, and hospitalization that may increase wound infection risk is needed in treating HIV patients.[39,41] Indications for antibiotic prophylaxis do not only include the number of lymphocyte $CD4^+$ but also in the case where the number is less than 200/µl, patient's history should be reviewed. Antibiotic prophylaxis for invasive action is recommended for patients with PMNL count (Polymorphonuclear lymphocyte count) < 500/µl. Neutropenic condition often becomes HIV infection complication and also attack 35-75% of AIDS patients. Decreased neutrophil count may disturb immune mechanism against invasive bacteria making neutropenia a significant risk factor for bacterial infection.[17]

## CONCLUSION

Dentist can give oral and dental care to HIV/AIDS patients by considering the immunosuppresion level, medication therapy used, potential opportunistic infection and minimizing the possibility of HIV transmission from patient to dentist, staff or other patients because the risk of invasive dental care complication for HIV/AIDS does not different significantly to the non HIV/AIDS patients.

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