HIV INFECTION IN DENTAL PRACTICE

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INTRODUCTION

HIV infection is gaining a lot of importance and recognition as many National and International agencies are involved in planning for its diagnosis, treatment, prevention and rehabilitation. Though standard precautions need to be observed in all cases but knowledge of clinical features and associated infections in HIV can help the clinicians treat the patients in such a way that infection transmission is minimal.The quantum of exposure to blood and body fluids of patients is high among the dentists. This article therefore aims to reinforce theknowledge on HIV infection, diagnosis, treatment and prevention in dental patients.

VIROLOGY

Human Immunodeficiency Virus (HIV) is a member of family Retroviridaehaving reverse transcriptase enzyme (RT)[1]. It is a spherical, enveloped virus, about 90-120 nm in size. Its nucleocapsid has two parts, outer icosahedral shell and an inner cone shaped core which enclose the ribonucleoproteins. The genome is composed of two identical single stranded positive sense RNA copies. The major antigens of HIV comprise of envelope proteins (spike antigen gp120, transmembrane pedicle protein gp41), shell antigen (nucleocapsid protein p18), core antigens (p24, p15, p55) and polymerase antigens (p31, p51, p66).

EPIDEMIOLOGY

In India, annual incidenceof HIV infection has decreased by 56% over the past decade. HIV prevalence has declined among adults from 0.41% in 2000 to 0.36% in 2006 and 0.31% in 2009. Decrease is especially noticed among young population of 15-24 years because of strong referral services along with improved Information, Education and Communication (IEC) system. The southern and north-eastern parts of the country are highly infected pockets in India. The primary factors which have contributed to large HIV-infected population in India include extensive labour migration and low literacy levels of rural areas[2].

MODES OF TRANSMISSION

HIV can be transmitted by sexual exposure to an HIV infected person, mucocutaneous or parenteral exposure and from an HIV infected mother to her child. Dentists should be aware of transmissionof blood borne pathogens (HIV, HBV, HCV) through blood and other potentially infectious body fluids (OPIM) especially nasal secretions, saliva, sweat, tears and vomitus. Tears, sweat and saliva have been found to contain very low quantities of HIV but should not be overlooked as possible sources. There is reasonable risk to dental HCWs of skin, eye, mucous membrane or parenteral contact or OPIM when protective attire is not used.

A brief review of such cases is discussed in **table 1**.

Pathogenesis of HIV Infection:It is a multistage process which takes placesequentially **(Figure 1)**. HIV replicates millions of times in a day, thus destroying the host immune cells leading to disease progression[11].

Clinical Features:

Most patients develop flu like illness two to six weeks of infection which includes malaise, headache, lethargy, myalgia, arthralgia, diarrhoea, depression, sore throat and lymphadenopathy. After an asymptomatic period of about 10 years, patients may develop various constitutional symptoms and opportunistic infections when CD4 levels fall below 400/µl.

Dental surgeons should be aware of HIV related co-morbid conditions so that they can recognize these conditions while doing dental procedures;make the patients aware, counsel them to undergo HIV testing and protect themselves from occupational exposure. The following conditions may be noticed while examining HIV infected dental patients[12]:

A) Microbial Infections:

Candidiasis is the most frequent oral infection in HIV patients. It may present as erythematous or yellowish white patches which may bleed on removal. There may be angular cheilitis due to Staphylococcus aureusinfection. Patients may present with periodontal infections like gingivitis or stomatitis.

Other systemic infections with oral manifestations can occur in bacterial infections like tuberculosis or syphilis or viral infections with herpes simplex virus (HSV 1 and 2), varicella zoster virus, cytomegalovirus, human papilloma virus subtypes, Epstein-Barr virus, molluscumcontagiosum virus andhuman herpesvirus8 (HHV8).

Because of these infections, xerostomia and dental caries may develop. If

oral hygiene is not maintained, aerobic and anaerobic oral flora can cause dental infections to develop.

B) Other Conditions:

• Oral neoplasia: Kaposi's sarcoma may present as reddish, purple or brown coloured macules, papules or nodules. Non Hodgkin's lymphoma (NHL) may present as diffuse, rapidly proliferating nodules.

• Neurological conditions: sensory or motor peripheral neuropathy, AIDS related dementia.

• Hyperpigmentation of skin

• Aphthous ulcers

When to suspect HIV in dentistry patients?

Oral lesions may be present at all stages of HIV infection but these oral lesions are not pathognomonic, as it is possible to find the conditions in immunocompetent people without HIV infection.The oral lesions presenting during HIV infection are more likely to occur with a high viral load or a reduced CD4 cell count[13, 14].These may include opportunistic infections like oral ulcers, candidiasis, herpes and tonsillitis, and uncommonly gingivitis and stomatitis[15, 16].Failure of normal immune surveillance throughout the course of HIV infection also increases the risk of neoplasia. Neurological conditions associated with HIV infection may also be evident.

S.No	Study	Year of Study	Patients Infected	Molecular Analysis	Probable Causes
1.	THE FLORIDA DENTIST CASE				
A.	CDC[3]	1990	1	Same As Dentist	Tooth Extraction Cauterisation Sharps Anaesthesia Sexual Contact I/V Drug Abuse
B.	MMWR[4]	1991	3	1 Same 2 Different	Dental Procedure Other Risk Factors
C.	SCIENCE[5]	1992	2	Same As Dentist	Invasive Dental Procedure
2.	ANNALS OF INTERNAL MEDICINE[6]	1992	8	5 Same 3 Different	Invasive Dental Procedure Breaches In Infection Control
3.	LANCET[7]	1992	3	2 Same 1 Different	Devices Used In Drilling & Cleaning of Teeth
4.	JAMA[8]	1993	10	Different	Dental Procedure
5.	PUBLIC HEALTH[9]	1993	Not Reported	-	-
6.	AIDS POLICY[10]	1995	28	Different	Other Risk Factors

Diagnosis of HIV

The patients should be subjected to a pre-test counselling. NACO guidelines for testing are followed[17] and three different kits with different antigen system and / or different principles of tests are required to follow the tests. If the sample gives reactive result with two tests and non reactive with the third, it is reported as "indeterminate" and patient is called back for repeat testing after 2-4 weeks. The test used as the screening test is one with the highest sensitivity (may give high number of false positives) and the supplementary second and third tests used are with the highest specificity (to minimize false positive reactions. If all the 3 tests are reactive, post-test counselling is done and then the patient is referred to ART centre for treatment.

Diagnosis of HIV infection is done by detection of the following markers:

1. Antibody detection-This is done by performing initial screening test, which if positive, is followed up by supplemental tests to confirm the diagnosis.

Screening tests-ELISA

Supplement tests- ELISA, Western blot (WB)

WB is expensive, time consuming and requires expertise to perform. This is mostly done to confirm the diagnosis on samples which given discordant results in E/R and in legal cases.

2. Antigen detection- detection of p24 antigen is done

• To detect infection in the newborn (not reliable)

• To resolve equivocal Western Blot results

• To detect infection during early window phase

• To diagnose CNS (central nervous system) disease

• Late stage of disease (immune collapse)

• For research purposes

• To monitor response to anti-retroviral therapy (quantitative assay)

3. Virus isolation

This can be done by viral culture or by PCR to detect proviral DNA during window period. It can differentiate between latent and active infection and also between HIV-1 and HIV-2 infections.

4. Indirect predictors of HIV infection

• Decreased CD4 cells

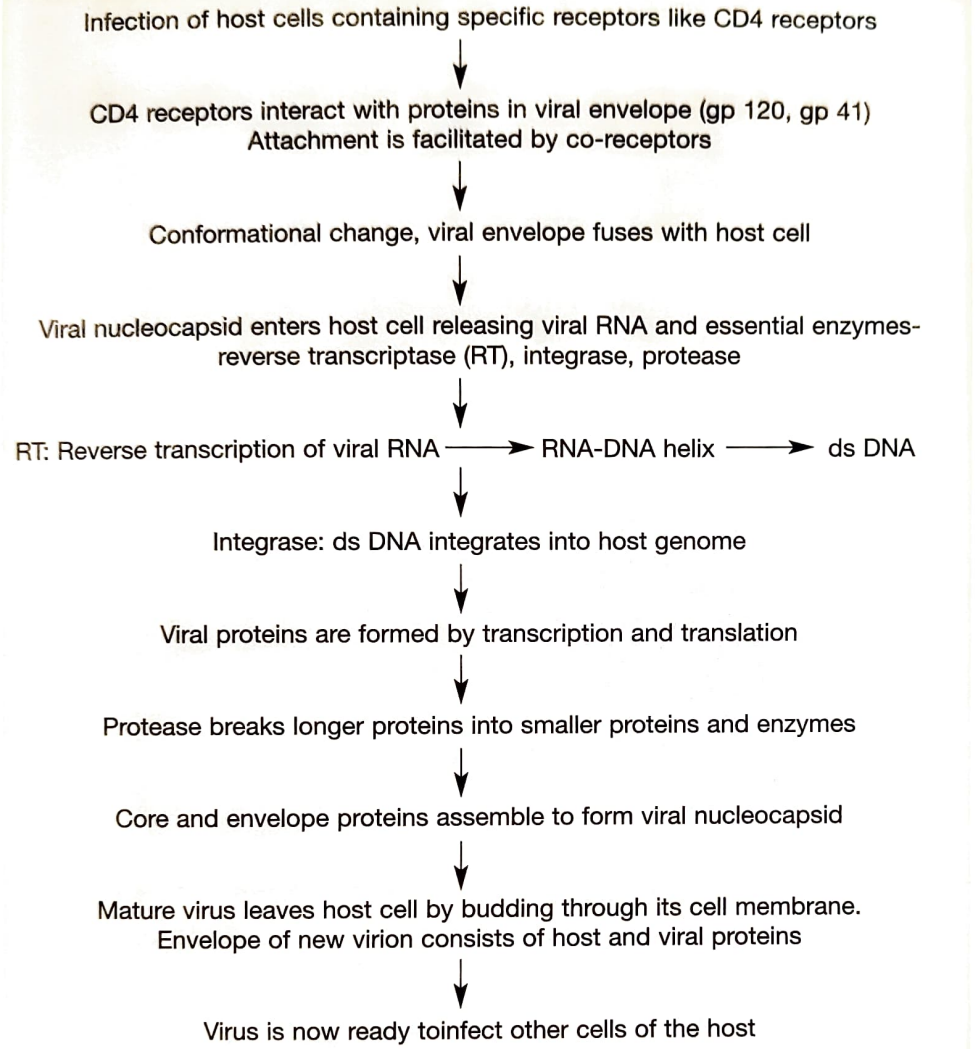
• Increased β2 microglobulin

• Increased serum neopterin

• Increased IL-2 receptors

• AIDS defining illnesses

Figure 1: Flowchart showing HIV pathogenesis



Treatment:

HAART (Highly active antiretroviral therapy)[18] is available free of cost at all the ART centres. Treatment is initiated depending upon the stage of infection. People living with HIV AIDS (PLHA) with less than 200 CD4 (white blood cells/mm3) require treatment irrespective of the clinical stage. For PLHA with 200-350 CD4, ART is offered to symptomatic patients. Among those with CD4 of more than 350, treatment is deferred for asymptomatic persons. If CD4 is between200-250, this should be repeated in four weeks and treatment to be considered in asymptomatic patients.

Infection-Control Practices for Dentistry to prevent HIV transmission

Based on principles of infection control, specific recommendations have been made related to protective attire and barrier techniques; hand washing and care of hands; the use and care of sharp instruments and needles; sterilization or disinfection of instruments; cleaning and disinfection of the dental unit and environmental surfaces; disinfection of the dental laboratory; use and care of handpieces, antiretraction valves, and other intraoral dental devices; single-use disposable instruments; handling of biopsy specimens; use of extracted teeth in dental educational settings; disposal of waste materials,etc.[19] When implemented, infection control practices can reduce the risk of transmission of blood borne pathogens such as HIV in the dental environment, from patient to dental health-care worker (DHCW), from DHCW to patient, and from patient to patient.

Occupational Exposure:

Health care workers (HCW) are at high risk of occupational exposure from blood-borne pathogens like HIV.[20] Available information indicates that the risk of HIV transmission in the dental office is very low. Transmission of HIV from three healthcare workers to patients has been confirmed, including a dentist who infected six patients. There are >300 reports (102 confirmed) of occupational transmission to healthcare workers, including nine dental workers (unconfirmed). Exposure to HIV has been reported by 0.5% dentists/year. The risk of HIV infection after percutaneous exposure (0.3%) can be reduced by 81% with zidovudine PEP. However, risk assessment is required to assess the need and appropriate regimen.

All exposure incidents should be reported immediately to facilitate prompt referral for medical evaluation. Postexposure prophylaxis against HIV should preferably be initiated 1-2 hrs but no longer 24-36 hr after the exposure incident. If an occupational exposure incident occurs, the exposure site should be immediately washed with soap and water; mucous membrane should be flushed with water. The circumstances and post exposure management should be recorded. This record should include the date and time of exposure, date of procedure performed, how injury occurred and type of injury; details of exposure, including type and amount of fluid or material, depth of injury and details about counselling, prophylaxis and follow up.

To conclude, occupational exposure is likely in dental practice. With knowledge of transmission, diagnosis and post exposure prophylaxis of HIV, the risk of infection can be minimised.Dental prac-

titioners should strictly follow infection control measures in all cases so that infection is prevented.

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