

Lack of Transmission of HIV Through Human Bites and Scratches

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Summary: To examine the relative risk of transmission of the human immunodeficiency virus (HIV) through bites and scratches, we studied 198 health care workers, 30 of whom were traumatized in this fashion while caring for an aggressive AIDS patient. This violent patient frequently bit or scratched others, his mouth had blood and saliva, while his fingernails were at times soiled with semen, feces, and urine. He was HIV antibody and antigen positive. Although HIV was recovered from his peripheral blood lymphocytes, after 2.5 years of serial follow-up, all traumatized personnel were clinically normal, no HIV was cultured from their blood, and all were HIV antibody and P24 antigen negative. We conclude that this viremic AIDS patient, while producing copious amounts of body fluids, failed to infect those caring for him through bites and scratches. The risk of transmission of HIV through this route under similar conditions should be low. **Key Words:** Transmission—HIV—Bites.

The presence of HIV in human saliva has raised concerns over the possible oral transmission of HIV. Isolated reports of seropositive individuals biting others have suggested the possibility that such transmission may occur (1). Human bites occur as intentional or unintentional acts of violence. Although random in occurrence, such bites may on rare occasions be inflicted by persons who are mentally impaired as a result of HIV encephalopathy or other medical or psychiatric conditions.

An opportunity to assess the possibility of HIV transfer due to bites arose when a man with AIDS and an organic brain syndrome bit and traumatized numerous health care professionals. This report represents a 2.5 year serial follow-up on the recipients of bites and scratches by this individual.

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PATIENTS AND METHODS

Case Report

A 32-year-old man with severe classic hemophilia was severely injured in an automobile accident in 1981. Because of posttraumatic severe diffuse cerebral dysfunction, he was unable to look after himself and required constant nursing care. In July 1983, he was admitted to a chronic care hospital where he was frequently disoriented, confused, uncooperative, hostile, and combative. Because of his aggressive behavior, it was difficult to cut his nails. He had poor dental hygiene and developed periodontal disease resulting in inflamed and bleeding gums. He masturbated frequently and was incontinent of urine and feces. In 1984, he was diagnosed as having AIDS-related complex.

Examination of stored frozen serum samples of the patient had revealed that he was HIV antibody

positive by ELISA and Western blot assays as early as September 1983. In June 1985, HIV was isolated by a coculture technique from his peripheral blood lymphocytes with H9 cells.

Between December 1983 and July 1985, he had serially traumatized 30 health care providers. In August 1986, he died of non-Hodgkin's lymphoma (diagnostic of AIDS by the revised CDC criteria) (2).

Cohort Studied

A study of 198 health care personnel that had cared for this patient was undertaken in 1985. The health care professionals were divided into two groups: group 1 (n = 168), those that had only casual contact with the patient, and Group 2 (n = 30), those that were traumatized, i.e., suffered bites (n = 7) and/or scratches (n = 23) from that individual. The majority of the health care staff that were assaulted were orderlies, nurses, and nursing aides. Initially, all traumatized personnel were evaluated by the staff health service of the institution and referred to a physician for examination. All bites and scratches were documented by the health service nurse. Of the traumatized health care workers, all 30 had sustained scratches to an arm, wrist, or hand. Eight individuals, however, were also bitten: six on the forearm, one on the neck, and one on an ear lobe. In at least three cases, the skin was broken, leaving small scars from puncture wounds that bled. In one instance, the wound became infected.

Following the initial clinical examination of the subjects, an extensive immune evaluation was carried out, by methods previously described (3).

Sera were tested for antibodies to HIV-1 and screened in duplicate by a commercially available test kit (DuPont Biotechnology Systems, Markham, Ontario, Canada). Sera that were repeatedly reactive by screen test were confirmed by immunoblot using whole viral lysate (Organon Technika) as the antigen source. To be considered as HIV antibody positive, sera must have contained antibodies to both envelope (gp 160, 120, or 41) and core (p24) determinants. Peripheral blood lymphocyte cocultures were carried out on the patient as well as all group 2 individuals using an assay previously described (4). A p24 antigen assay using a p24 antigen capture kit was carried out on all group 2 individuals at initial evaluation and 30 months later.

RESULTS

The status of the health care workers was analyzed by group. The immune parameters of both groups were normal. There were no statistically significant differences between groups 1 and 2 in any of the cellular or humoral immune parameters. In August 1985, none of the 30 traumatized persons had antibodies to HIV by Western blot analysis.

On initial evaluation, all 30 had cocultivation of their lymphocytes. None was positive, although the patient had been HIV culture positive. At the time of initiation of the study, the interim between trauma and testing ranged from 6-24 months. Because of a possible long latency period for the development of antibodies (5), all of those that had been bitten and 16/22 that were scratched were re-evaluated in August 1987, over 2.5 years after having been traumatized. All have remained clinically well. The repeat immune testing did not reveal any significant change from the initial assessment. On repeat testing, all were HIV antibody negative by Western blot analysis and all were P24 antigen negative by antigen capture assay.

DISCUSSION

Salivary transmission of HIV has been suggested as a potential means of spread of this virus, in part because of existing animal models of retroviral salivary transmission. Feline leukemia virus (another retrovirus) has been found in high levels in the saliva of cats and is transmitted through the mutual grooming of these cats (6).

Although kissing, as a means of transmission of HIV by the exchange of saliva, has been suggested as the sole source of infection in at least one case (7), it is generally thought that the low rate of seropositivity among spouses and children of infected heterosexuals (8) indicates a low risk of salivary transmission.

Human bites are known to transmit infectious agents; however, the transmission of HIV by this means remains controversial. On occasion, as has been described in this paper, HIV encephalopathy has been associated with aggressive behavior and the risk of transmission through bites is a real concern, in particular to law enforcement officers and mental health care professionals. With the increase in number of pediatric HIV-infected children in recent years, the question of HIV transmission

through bites in the schoolyard has also become important. In one study of HIV-infected hemophilic children living in a private school with uninfected children, no transmission of HIV occurred after a mean casual contact period of 25 months (9).

Isolated reports of HIV-infected individuals biting others have not demonstrated a clear risk of transmission (10). Multiple studies of health care workers have shown that the occupational risk of infection with HIV is low (11-15). Health care workers are exposed to this virus through needle stick injuries, splashes of body fluids and contamination of mucus membranes, epidermal abrasions, and open wounds. Oral lesions are common among AIDS patients (16). Gingival bleeding may occur from ulcerations, cheilitis, or Kaposi's sarcoma. Oozing of blood from gingival tissue also may occur as a result of periodontal disease, HIV-related thrombocytopenia, or posttraumatic bleeding among hemophiliacs with AIDS, as was the case with the patient described herein.

Bites and scratches from the patient described in this paper should have constituted a high risk of HIV transmission through skin trauma because of the frequent presence of blood, pus, and copious amounts of saliva in his mouth as well as the presence of semen, blood, and fecal material coating his fingernails. Despite these risks, we did not find any evidence of acquired immune dysfunction or transmission of HIV to those health care workers who were scratched, cut, or bitten by this HIV carrier, who subsequently developed AIDS and died of the disease. Furthermore, the lack of antibodies to HIV among all 198 health care workers is consistent with the low prevalence of this virus noted in other nosocomial studies.

Although this study indicates that the risk of transmission through bites and scratches is small, nevertheless, health providers should, obviously still take adequate measures to prevent such trauma from occurring.

Acknowledgment: We acknowledge the technical help of Donna Warfield in carrying out the HIV cultures, and

the help of Dr. P. Gold, Dr. J. P. Gelinás, and Dr. G. Rivard in reviewing the manuscript. This manuscript was typed with the assistance of Mrs. Gail Pucci. This work was supported by a grant from the Medical Research Council of Canada.

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