

## ORTHOPAEDIC SURGERY

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# Seroprevalence of Blood Borne Transmissible Diseases in Trauma Orthopaedic Surgical Patients

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**Objective.** The purpose of this study is to determine the seroprevalence of blood borne transmissible diseases of the orthopaedic trauma surgical patients who deny or did not have knowledge of having disease or risk factors, but are positive for either human immunodeficiency virus, hepatitis B virus, and hepatitis C virus.

**Background.** Orthopaedic surgeons practicing in areas with a high prevalence of HIV infection may expect that up to 7% of their patients who undergo emergency procedures and 1% to 3% of those who undergo elective surgery will be HIV-positive.

**Method.** All conscious adult patients consecutively admitted for surgical management by the orthopaedic service were evaluated. A detailed questionnaire was completed asking the patient of knowledge of having a transmissible disease and documenting certain risk factors. Blood samples were taken to test for HIV, HBV and HCV and all positive patients were sent to a follow up clinic.

**Results.** Out of 100 patients the following results were found: 7% were positive for HIV, 12% positive for HBV, 12% positive for HCV, 19% were positive to at least one test, and 9% were positive in more than one test. Of the one hundred patients, 6% had a positive test in spite of denying having a disease or any risk factors. None of the patients with HBV and/or HCV knew they were positive and three (43%) of the seven with HIV were also unaware of their condition.

**Conclusions.** This study suggests that a worrisome number of patients are seropositive for a blood borne transmissible disease, even though they had no knowledge of such disease and claimed they had no risk factors. In order to protect orthopaedic surgeons from the unreliability of some patients' histories, all trauma orthopaedic surgical patients should be managed with universal precautions. *Keywords:* Blood borne transmissible diseases, HIV, Hepatitis, Orthopaedic surgery.

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**T**he growing incidence of blood borne transmissible diseases is a serious threat to all health care professionals. What is even more alarming is that nearly one third of the patients with HIV infection will not be suspected of having this condition by their clinician (1).

The seroprevalence of human immunodeficiency virus (HIV) is fairly similar between the continental United States and Puerto Rico (P.R.). It has been estimated that 0.47% of the general Puerto Rican population is seropositive for HIV (2) compared to 0.5% of the general U.S. population (3). On the other hand the seroprevalence of hepatitis B virus (HBV) differs between the U.S. and P.R.. In P.R. it is 0.02% (2) and in the U.S. it is 0.11% (4). It has been documented that the trauma population has a higher prevalence of blood borne transmissible diseases. Kaplan et al.(5) found that 18% of the patients in a level I trauma center population, had at least one transmissible disease (HIV, HBV or hepatitis C virus). Orthopaedic surgeons practicing in areas with a high prevalence of HIV infection may expect that up to 7% of their patients who undergo emergency procedures and 1% to 3% of those who undergo elective surgery will be HIV-positive (6).

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The distribution of risk factors of transmissible diseases is important because it may help identify which specific population is more susceptible to becoming infected. The most common form of transmission of HBV in P.R. is through heterosexual contact with 27.7% followed by intravenous drug abuse (IVDA) with 9.67% (2). The distribution of HIV in P.R. differs between males and females (2). In males, the most common form of transmission is through IVDA with 57.2% followed by homosexual and bisexual relations with 21.4%. In females the most common form of transmission is through heterosexual relations with 54.5% followed by IVDA with 39.9%

Another common form of distribution of transmissible diseases is through blood transfusion. One in every 50,000 units of blood is contaminated with HIV, one in every 200,000 units of blood is contaminated with HBV and one in every 3,000 units is contaminated with HCV (7).

The assessment and treatment of orthopaedic trauma patients pose a great risk of transmission of blood borne agents to orthopaedic surgeons because of the urgency of the situation, the multiple injuries, the presence of "sharps", bone spiculae and foreign bodies, the condition of the patient, and the lack of prior knowledge of the patient's status. In addition, the association of trauma and use of alcohol, as well as other illegal drugs has been well documented (8, 9).

Surgery on the HIV-positive patient, whether elective or emergent, involves special risks. These risks can be divided into two categories; risk to the patient and risk to the health care personnel. HIV-positive patients may be more susceptible to complications because they might have an impaired cellular and humoral immunity (10). They are susceptible to early complications such as local infection, sepsis and impaired wound healing (6) and late complications such as hematogenous implant infection (11, 12).

A risk to the health care worker includes acquiring the infection after being exposed to blood of a HIV-positive patient. Seroconversion after a single percutaneous exposure to an HIV-positive patient is 0.3% (13). Orthopaedic procedures had a 4% percutaneous injury rate; 89% sustained by the surgeon, 77% related to suturing and 63% in the non-dominant hand (14).

When pertaining to blood exposure, there are some factors that increase the risk of seroconversion after a percutaneous injury. The larger the blood quantity, the larger the risk. It increases if the patient has a terminal illness and if the patient was not on Zidovudine (AZT). It also increases if the procedure lasts more than three hours, when more than 300 ml of blood are lost and in vascular and/or intra-abdominal surgeries (15-17).

The purpose of this study is to determine the seroprevalence of blood borne transmissible diseases of the orthopaedic trauma surgical patients who deny or did not have knowledge of having disease or risk factors, but are positive for either HIV, HBV, and/or HCV.

## Materials and Methods

All conscious adult patients (twenty-one years or older) consecutively admitted for orthopaedic trauma surgical management were considered until 100 candidates were reached between August 1, 1996 and October 1, 1996. The number of 100 candidates was chosen because it is the average number of trauma patients admitted to our service for surgery, during a two month period. Patients who refused to be part of the study and patients who were unconscious were excluded (unconscious patients were excluded because of the legal complications of an informed consent). The total number of patients excluded was 9 (3 who refused to be part of the study, 6 who were unconscious and 4 whose lab results were not found).

A detailed history of every patient was recorded. The questionnaire was designed to emphasize the possibility that the patient was infected with a blood borne transmissible disease. The first question involved a simple inquiry of knowledge of having a blood borne transmissible disease. It was followed by the documentation of risk factors such as IVDA and sharing of needles, blood transfusion or any other of its products, how many different sexual contacts in a year, sexual contact with a person known to be positive to any of the previously mentioned blood borne transmissible diseases, and homosexual relations. It also documented the age and the type of fracture that the patient had sustained at the moment of admission.

The patients were informed that their participation in the study was totally voluntary and that their treatment was not influenced by their decision to be part of the study. If a patient agreed to be part of the study, he or she was asked to sign an informed consent which had received institutional review board approval. Blood was drawn and the following tests were ordered: Repeated Reactive Screening test for HIV antibody (e.g. ELISA) and serologic test for HBV and HCV. All patients that tested positive to HIV with ELISA were confirmed by Western Blot.

Patients who were positive to any of the blood borne transmissible diseases were informed of the results. Then they were sent to a follow up clinic known as Latin-American Center of Sexually Transmitted Diseases for further management.

## Results

The average age was forty-seven with a distribution of 71% male and 29% female. Seroprevalence revealed that out of 100 patients, 7% were HIV-positive, 12% were HBV-positive and 12% were HCV-positive. It also revealed that 19% were positive to at least one test and 9% were positive in more than one test. All of the twelve patients positive for HBV and twelve positive for HCV denied having knowledge of being infected with such diseases. Three of the seven (or 43%) that were positive to HIV claimed that they were unaware of their condition.

A total of 6% of all the patients (or 31.6% of all positive patients) had a positive test in spite of denying having a disease or any risk factors. Out of these 6% who denied everything, one was positive to both HIV and HBV, two were HIV-positive, one was HBV-positive and two were positive for HCV. These six patients were later confronted to try to figure out what risk factor they had denied or might have forgotten. Only one of the six admitted that he or she had deliberately excluded information, and revealed that he or she had sexual relations with a person who was known to be positive.

Of the thirteen who were positive to at least one test and admitted risk factors, seven were IVDA (six admitted to sharing needles), seven had a history of blood transfusion, three had sex with an HIV-positive person, five had three or more different sexual contacts in a year and three had homosexual relations.

Of the eighty-one patients who tested negative for all tests, thirteen had a history of blood transfusion, ten had three or more different sexual contacts in a year and two had homosexual relations but none admitted to IVDA nor had sex with someone who was known to be positive. The most common diagnosis in both positive and negative patients was open tibio-fibular fractures (37% of positive patients and 34% of negative patients) followed by fractures to the femur (21% of positive patients and 17% of negative patients).

## Discussion

It is beneficial for patients who are not aware of being positive to be tested because the earlier they are informed, the earlier they can receive treatment. By identifying positive cases, infected persons and persons at risk, can be counseled to prevent further transmission of the infection. Also, identification of positive patients might help diminish the potential toxicity of prophylaxis treatment that the health care worker would receive when they have a percutaneous injury. Although testing of all patients has been proposed as a measure to minimize risk

of HIV infection for surgical teams<sup>1</sup>, studies have not demonstrated the efficacy of testing for this purpose (14, 18).

In 1987, the CDC first recommended universal precautions to prevent contact with blood, certain other body fluids and tissues of all patients (19). These recommendations accompanied by the AAOS recommendations published in 1989, are the subsequent blood borne pathogen standards of the Occupational Safety and Health Administration and have become an important component in the overall strategy to prevent occupational blood contact among orthopaedic surgeons (20). The use of universal precautions by health care workers has been shown to be efficacious in preventing blood contacts (21).

This study suggests that a worrisome number of patients are seropositive for a blood borne transmissible disease even though they had no knowledge of such disease and claimed they had no risk factors. Therefore, all orthopaedic trauma surgical patients should be managed with universal precautions.

## Resumen

El propósito de el estudio es determinar la seroprevalencia de enfermedades transmisibles por sangre en pacientes quirúrgicos, con trauma ortopédico; quienes niegan o no tienen conocimiento alguno de dicha enfermedad o factores de riesgo, no obstante son positivos para virus de inmunodeficiencia humana, y/o virus de hepatitis B y C. Se evaluaron pacientes adultos consientes, hospitalizados consecutivamente por el servicio de ortopedia para algún procedimiento quirúrgico. Los pacientes fueron entrevistados utilizando un cuestionario detallado en donde se les preguntó si tenían conocimiento de padecer alguna enfermedad transmisible o sus factores de riesgo. Se les tomó muestras de sangre para identificar si eran positivos a VIH o a hepatitis B y C. Los positivos a alguna enfermedad transmisible, se refirieron a la Clínica de Enfermedades Transmisibles Sexualmente. De los cien pacientes estudiados, seis por ciento resultaron ser positivo, a pesar que negaron tener una enfermedad transmisible o algún factor de riesgo. Ninguno de los pacientes positivos con hepatitis B o C tenían conocimientos de estar infectados. De los siete quienes fueron positivos al VIH, tres no estaban al tanto de su condición. Este estudio sugiere que es preocupante el número de pacientes que fueron positivos a una enfermedad transmisible por sangre, a pesar de que negaron tener conocimiento de la misma o de sus factores de riesgo. Nuestra conclusión es que para proteger a los cirujanos ortopedas de pacientes con historiales

desconfiables, todo paciente quirúrgico con trauma ortopédico se debe de manejar con las precauciones universales.

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