

Research Article

Wound Complications in HIV-Positive Male Patients with Fractures after Operation

Xin Li, Qiang Zhang*, Changsong Zhao and Rugang Zhao

Department of Orthopedics, Beijing Ditan Hospital, Capital Medical University, Beijing, China

*Corresponding author: Qiang Zhang, Department of Orthopedics, Beijing Ditan Hospital, Capital Medical University, No.8, Jingshun East Street, Chaoyang District, Beijing, 100015, China, Email: zhangqwte@sina.com

Received: August 19, 2014; Accepted: September 11, 2014; Published: September 15, 2014

Abstract

Objective: The aims of our study were to evaluate wound healing in human immunodeficiency virus (HIV)-positive male patients with fractures and make a comparison with HIV-negative patients.

Methods: Thirty HIV-positive male patients who underwent surgery for fractures were reviewed in this consecutive study. HIV-negative patients were chosen as controls. According to the CDC criteria, wounds were classified and reviewed, including surgical site infection (SSI) and other wound complication.

Results: Seven of the 30 HIV-positive patients suffered wound complications, including 1 SSI, whereas 1 HIV-negative patient had wound complications with 1 SSI. The incidence of wound complications was significantly increased in the HIV-positive patients compared to the HIV-negative patients; however, the difference of SSI was not significant.

Conclusion: HIV-positive male patients with fractures exhibited a higher incidence of wound complications compared to HIV-negative patients. However, all patients achieved satisfactory outcomes through correct management. Prompt interventions such as debridement, antibiotic and nutritional support, should be emphasized to minimize wound complications once any problem was recognized.

Keywords: Wound complication; Surgical site infection; HIV; AIDS; Fracture

Introduction

By 2012, approximately 35.3million people globally were living with human immunodeficiency virus (HIV). About 2.3 million new HIV infections were noted in 2012 worldwide [1]. By September 2013, 43,400 people were living with HIV in China, 70,000 new infections were found meanwhile [2]. However, the number of AIDS mortality is declining annually due to highly active antiretroviral therapy (HAART), so that patients are leading longer lives [3]. The opportunity of surgery in HIV-positive patients increased at the same time. However, the misunderstanding and fear surrounding HIV made it difficult for surgeons to perform operations on HIV patients in China. HIV-positive patients without surgery may suffer from malunion, nonunion or limbs dysfunction.

HIV patients who suffered from immunosuppression carry an increased risk of wound complications. An increased incidence of perioperative complications, such as infection, poor healing, and mortality, was reported in HIV patients previously. The complications may cause increased morbidity, hospitalization expenses and stays, sepsis, and reoperation. Thus, wound healing is essential for achieving a satisfactory outcome. The aims of our study were to observe wound healing in HIV-positive male patients with fractures and make a comparison with HIV-negative patients.

Materials and Methods

HIV-positive male patients with fractures who were admitted to a single institute, Beijing Ditan Hospital, Capital Medical University, from June 2012 to June 2013 were included in this

study. Data were gathered by reviewing electronic patient records and relevant images. An equal number of HIV-negative patients were selected as the controls, matched by disease, age and gender in the same period. Diseases that may impact wound healing, such as diabetes, tuberculosis, liver or kidney disease, chronic infection, malignant tumor, and connective tissue disease were excluded. Written informed consent was obtained from all patients before study enrollment. This study was performed and approved by the Institutional Ethics Committees at Beijing Ditan Hospital, Capital Medical University and conducted in accordance with the ethical guidelines of the Declaration of Helsinki.

HIV infection clinical stage was graded according to the clinical category and grading system drew by the U.S. Centers for Disease Control and Prevention (CDC) [4]. Surgical site infection (SSI) was diagnosed according to the CDC criteria [5]. Wound complications appeared such as SSI, swelling, exudation, dehiscence, hematoma, and fat liquefaction during the hospital stay.

All data were analyzed with SPSS software (version 17.0, SPSS, Chicago, USA). Fisher's exact tests were used for count data. Significance was set at $P < 0.05$.

Results

In total, thirty HIV-positive male patients fulfilled the study criteria. The mean patient age at the time of admission was 38 years (range, 19-60 years). The patients were from 12 different provinces. The mean in-patient stay was 21.5 days (range, 8-42 days). Half of the patients were transferred to our institution after diagnosed

HIV. Twenty-three patients had acquired HIV infection through sexual contact, whereas the others acquired the virus through blood transfusions and intravenous drug use. None had the history of trauma and surgery. No wound complications had been previously reported. Upon admission, 10 of the patients were previously administered HAART. Fifty-six HIV-negative patients were included. The difference in age between two groups was not significant ($P>0.05$).

All diagnoses were traumatic fractures. There were 11 cases of upper extremity fractures, 15 cases of lower extremity fractures, 3 cases of spinal fractures, and 1 case of pelvic fracture. Twenty-six cases received plate and screw fixation, 1 case of intramedullary nailing, and 3 cases of pedicle screw fixation. No patients suffered sepsis, opportunistic diseases, wasting syndrome, or HIV encephalopathy during hospitalization and follow-up.

Wound complications were observed in 7 of the HIV-positive patients, including 1 case of SSI. In 56 HIV-negative patients, 1 case of wound complications and 1 case of SSI were noted. No significant difference was noted in the incidence of SSI between the HIV-positive and HIV-negative patients ($P>0.05$). The difference in wound complications between the HIV-positive and HIV-negative patients was statistically significant ($P<0.05$) (Table 1). In the HIV-positive patients with wound complications, several types of complications were observed, including 4 cases of swelling, 2 cases of exudation, 1 case of wound dehiscence, 1 case of SSI, 1 case of hematoma, 1 case of fat liquefaction, and 1 case of delayed healing. The ratio of CD4: A CD8 cell in the patient with SSI was 0.38.

The patients with HIV clinical category B/C had a significantly increased incidence of wound complication compared to the category A patients ($P<0.05$). The CD4 T-cell category 3 patients exhibited a significantly increased incidence of wound complication compared to the category 1/2 patients ($P<0.05$) (Table 2).

Second-generation cephalosporin was typically administered to all patients within two hours prior to the skin incision. In 4 patients with cephalosporin allergies, including 2 HIV-positive and 2 HIV-negative patients, clindamycin served as an acceptable alternative. Antibiotics were administered intravenously for 3 days; then, the decision to continue was made based on the incision condition, body temperature, WBC, ESR, CRP, and bacterial culture. Intravenous or oral amino acids and albumin were routinely administered as nutritional supplementation to improve nutrition and treat hypoalbuminemia. If necessary, suspension red blood cells and plasma were infused. Once any wound complication was recognized, interventions such as debridement, antibiotic and nutritional supporting was taken promptly.

Discussion

HIV-positive patients are given conservative treatment due to the

Table 1: Comparisons of wound complications and SSI between HIV-positive and HIV-negative patients.

Items	HIV-positive patients	HIV-negative patients	P
No complications	23	55	0.001
Wound complications	7	1	
SSI	1	1	0.597
No SSI	29	55	

Table 2: Comparison of HIV category in HIV-positive patients.

	No wound complication	Wound complication	P
Clinical category			
A	21	3	0.016
B+C	2	4	
CD4 T-cell category			
1+2	22	3	0.006
3	1	4	

risk of complications and occupational exposure typically. Regardless of HIV infection, satisfactory wound healing is critical. Otherwise, adverse consequences may result in SSI, sepsis, reoperation, increased hospitalization expense and stay, and even death [6]. These problems are even more apparent in HIV-positive patients because of immunocompromised status and decreased resistance of infection [7].

Statements reported in the literature concerning wound complications in HIV-positive patients are inconsistent. Since the development of HAART in the mid-1990s, HIV morbidity and mortality have decreased significantly [8]. Harrison analyzed HIV-positive patients with open fractures. The wound infection rate was up to 42% [9]. O'Brien conducted a study of 15 patients with open tibial fractures. Three HIV-positive patients acquired postoperative infections, 2 of these patients developed chronic osteomyelitis for an approximately 67% incidence rate [10]. Horberg concluded that infections were linked with a significantly increased mortality risk in HIV-positive patients [11]. Bates reported that there was no significant difference in the rate of infection between HIV-positive and HIV-negative patients undergoing internal fixation, neither clean nor contamination surgery [12]. This is the same as our study. The incidence of SSI was not as high as that previously reported. The HIV-positive patients can achieve satisfactory wound healing finally, as same as the HIV-negative. However, the incidence of other wound complications, such as swelling, exudation, dehiscence, hematoma, and fat liquefaction appeared to be higher than the HIV-negative.

CD4 T-cell counts are an important and direct indicator of immune function, which is associated with the risk of infection [13,14]. Decreased CD4 T-cell counts indicate declining immune function. The possibility of suffering from various infections increases with higher incidences of complications, such as wound infection, severe sepsis, and even death [15]. Parvizi suggested that HIV-infected patients should have a CD4 T-cell count >400 cells/ mm^3 prior to surgery [16]. Weinstein suggested that HIV-positive patients carried a significantly greater risk of infection than HIV-negative patients, likely due to decreased CD4 T-cell counts [17]. Arasteh reported that infection increased approximately 2.5-fold with a CD4 T-cell count <40 cells/L [18]. Abalo reported that 39% of HIV patients experienced surgical site infections in his study. CD4 T-cell category 3 and HIV clinical category B and C patients demonstrated a high rate of wound infection [19]. In our retrospective study, HIV-positive patients did not have a significantly increased wound infection compared to HIV-negative patients due to the strengthening perioperative management. However, the incidence of poor wound healing was significantly greater. The patients with HIV clinical category B/C had a significantly increased incidence of healing

complications compared with patients with category A. The patients with CD4 T-cell category 3 had a significantly increased incidence of healing complications compared with the patients with category 1/2. These findings implied that the HIV clinical category and CD4 T-cell category are proportional to wound healing. Therefore, applying the category system is instructive for assessing immune function, surgery risk, and prognosis.

Conclusion

The HIV-positive patients with fractures exhibited an increased incidence of wound complications compared with the HIV-negative patients. However, all patients experienced satisfactory outcomes through correct management. HIV infection or AIDS should not influence the decision to choose between conservative and operative therapies. To minimize wound complication, prompt and systematic interventions such as debridement, antibiotic and nutritional support, should be undertaken to address any wound complications after recognizing a problematic wound.

Acknowledgement

This work was supported by grants from (1) the Capital Health and Development Projects: the Perioperative Protection in HIV/AIDS Patients with Orthopedic Diseases (NO.2011-2017-01) and (2) the Fund for Capital Clinical Characteristics and Application: Orthopedic Operation & Therapy Standards in HIV/AIDS Patients with Orthopedic Diseases (NO. Z131107002213063).

References

- UNAIDS. Report on the global AIDS epidemic 2013.
- National Health and Family Planning Commission of the People's Republic of China. The Background of HIV/AIDS Prevention and Control.
- UNAIDS. Protect the most vulnerable to build healthy societies free from HIV. 2014.
- 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. *MMWR Recomm Rep.* 1992; 41: 1-19.
- Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. *Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol.* 1999; 20: 250-278.
- Henriksen NA, Meyhoff CS, Wetterslev J, Wille-Jørgensen P, Rasmussen LS, Jørgensen LN; PROXI Trial Group. Clinical relevance of surgical site infection as defined by the criteria of the Centers for Disease Control and Prevention. *J Hosp Infect.* 2010; 75: 173-177.
- Namba RS, Inacio MC, Paxton EW. Risk factors associated with deep surgical site infections after primary total knee arthroplasty: an analysis of 56, 216 knees. *J Bone Joint Surg Am.* 2013; 95: 775-782.
- Palella FJ Jr, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. *N Engl J Med.* 1998; 338: 853-860.
- Harrison WJ, Lewis CP, Lavy CB. Wound healing after implant surgery in HIV-positive patients. *J Bone Joint Surg Br.* 2002; 84: 802-806.
- O'Brien ED, Denton JR. Open tibial fracture infections in asymptomatic HIV antibody-positive patients. *Orthop Rev.* 1994; 23: 662-664.
- Horberg MA, Hurley LB, Klein DB, Follansbee SE, Quesenberry C, Flamm JA, et al. Surgical outcomes in human immunodeficiency virus-infected patients in the era of highly active antiretroviral therapy. *Arch Surg.* 2006; 141: 1238-1245.
- Bates J, Mkandawire N, Harrison WJ. The incidence and consequences of early wound infection after internal fixation for trauma in HIV-positive patients. *J Bone Joint Surg Br.* 2012; 94: 1265-1270.
- Guild GN, Moore TJ, Barnes W, Hermann C. CD4 count is associated with postoperative infection in patients with orthopaedic trauma who are HIV positive. *Clin Orthop Relat Res.* 2012; 470: 1507-1512.
- Santos AC, Almeida AM. Nutritional status and CD4 cell counts in patients with HIV/AIDS receiving antiretroviral therapy. *Rev Soc Bras Med Trop.* 2013; 46: 698-703.
- Greenberg JA, Lennox JL, Martin GS. Outcomes for critically ill patients with HIV and severe sepsis in the era of highly active antiretroviral therapy. *J Crit Care.* 2012; 27: 51-57.
- Parvizi J, Sullivan TA, Pagnano MW, Trousdale RT, Bolander ME. Total joint arthroplasty in human immunodeficiency virus-positive patients: an alarming rate of early failure. *J Arthroplasty.* 2003; 18: 259-264.
- Weinstein MA, Eismont FJ. Infections of the spine in patients with human immunodeficiency virus. *J Bone Joint Surg Am.* 2005; 87: 604-609.
- Arastéh KN, Cordes C, Ewers M, Simon V, Dietz E, Futh UM, et al. HIV-related nontuberculous mycobacterial infection: incidence, survival analysis and associated risk factors. *Eur J Med Res.* 2000; 5: 424-430.
- Abalo A, Patassi A, James YE, Walla A, Sangare A, Dossim A. Risk factors for surgical wound infection in HIV-positive patients undergoing surgery for orthopaedic trauma. *J Orthop Surg.* 2010; 18: 224-227.