

Original Research Article

Wound healing rates in HIV patients - Correlation with CD4 and CD8 counts

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Abstract

Background: Human immunodeficiency virus (HIV) constitutes one of the most difficult challenges facing the healthcare profession today. A few studies showed the CD4 count to be a weak surrogate end point of clinical outcome in HIV infected patients, while three studies found that low CD4 count was a predictor of a poor outcome. There is no conclusive evidence regarding the association between CD4 counts, CD8 counts and wound healing in HIV infected patients.

Materials and methods: This was a prospective study of 50 consecutive patients who were HIV positive and underwent emergency surgery at Gandhi Hospital from July 2013 to August 2015.

Results: Out of the 50 patients surgical wounds of 13 patients were infected. Wounds of 37 patients were healthy. Of the 13 patients infected 7 patients had CD4 count less than 200 and 6 patients had CD4 count more than 200. Out of the 37 patients whose wounds were healthy 16 patients had CD4 counts less than 200 and 21 patients had more than 200. Out of the 37 patients whose wounds were healthy 16 patients had CD4 counts less than 200 and 21 patients had more than 200. Of the 13 patients infected 7 patients had CD4 count less than 200 and 6 patients had CD4 count more than 200.

Conclusion: CD4 count does not correlate with healing of wound and severity of wound complication as test of significance is not proved. CD8 count has some correlation with wound healing but does not correlate with severity of wound complication. CD4 or CD8 count does not correlate with type of wound complication. CD4/CD8 ratio cannot be taken as a predictor of wound complication and assessing its severity.

Key words

HIV, Wound healing, CD4 and CD8 count.

Introduction

Human immunodeficiency virus (HIV) constitutes one of the most difficult challenges facing the healthcare profession today. It is estimated that HIV infects over 40 million people in the world and 14 million have died from the disease so far.

The prevalence of HIV infection is rising at an exponential rate. Surgical experience with this disease however, remains limited. Increasingly, surgeons are called upon to evaluate HIV-infected patients and perform a variety of procedures both elective and emergency [1]. The HIV patient presents with a variety of abdominal conditions some of which are frequent amongst the immune competent population while others are due to immune suppression caused by HIV infection.

The correlation between HIV infection and surgery began to be highlighted only two years after the publications concerning the identification of the virus by Luc Montagnier and Robert Gallo appeared on "*Science*" in 1983; in 1985 Kaiser, et al. [2] published their surgical considerations regarding the treatment of immune suppressed patients; one year later Canino, et al. [3] reported their experience concerning surgical problems in patients presenting with HIV, acquired immunodeficiency syndrome(AIDS) and AIDS related syndromes.

As the prevalence of the HIV infection continues to rise, healthcare workers in all geographic regions can expect greater clinical exposure to patients with HIV/AIDS. Thus HIV/AIDS infected individuals may present with surgical problems common to the general population.

A few studies [4-7] showed the CD4 count to be a weak surrogate end point of clinical outcome in HIV infected patients, while three studies [8-10] found that low CD4 count was a predictor of a poor outcome. There is no conclusive evidence regarding the association between CD4 counts,

CD8 counts and wound healing in HIV infected patients.

Against this background we took up this study to evaluate the spectrum of diseases presenting for surgeries in HIV infected patients and to correlate the CD4 counts and CD8 counts to the wound healing of these patients.

Review of literature

Davis P.A, Corless D.J, Gazzard B.G, Wastell C [11] published a study titled "Increased Risk of Wound Complications and Poor Healing following Laparotomy in HIV-Sero positive and AIDS Patients". This study reviews the incidence of wound complications following laparotomy. There was a significantly greater incidence of wound complications and wound breakdown in the HIV group following laparotomy than in the non-HIV control group.

Iturburu IM, Ortiz J, Mendez JJ Emparan C [12] published in 1998 in world journal of surgery "Infective complications after abdominal surgery in patients infected with human immunodeficiency virus: role of CD4+ lymphocytes in prognosis" they concluded that The group of patients with CD4 counts of < 200 cell/ml had an increased incidence of surgical infection, regardless of the type of surgery ($p = 0.002$). Thus the surgical infection rates with HIV patients undergoing abdominal surgery are dramatically increased.

Zhang L, Liu BC, Zhang XY, Li L, Xia XJ, Guo RZ [13] published a study "Prevention and treatment of surgical site infection in HIV-infected patients' in biomed central infectious diseases 2012 wherein the results were suggestive that patients undergoing abdominal surgery with lower preoperative CD4 counts were more likely to develop SSIs. The incidence increased from 2.6% in clean wounds to 100% in dirty wounds.

HIV and surgeon

When assessing the acute abdomen in the HIV patient, the surgeon must consider illnesses

common in non- HIV patient groups, such as appendicitis. A recent report emphasized that only 11% of HIV- positive patients with acute abdominal pain had a cause associated with HIV/AIDS. Of the 8%of HIV-positive patients who required surgery, only 1% (0.9%) had an opportunistic infection. Hence, conditions such as appendicitis, diverticulitis, cholecystitis, pancreatitis, hepatitis, peptic ulcer disease, ischemic bowel disease, unrelated to the immunocompromised state, and will occur with the same frequency as in non- HIV patients.

Risks and Responsibility

We believe that health professionals who are privileged to be members of the surgical team have a professional responsibility to provide the highest possible quality of care for their patients. If the surgeon weighs the risk and benefits to the patient and believes the procedure will have a positive effect on the patient's life.

Factors influencing healing of a wound

- Site of the wound
- Structures involved
- Mechanism of wounding
 - Incision
 - Crush
 - Crush avulsion
- Contamination (foreign bodies/bacteria)a
- Loss of tissue
- Other local factors
 - Vascular insufficiency (arterial or venous)
 - Previous radiation
 - Pressure
- Systemic factors
 - Malnutrition or vitamin and mineral deficiencies
 - Disease (e.g. diabetes mellitus)
 - Medications (e.g. steroids)
 - Immune deficiencies [e.g. chemotherapy, acquired immunodeficiency syndrome (AIDS)]
 - Smoking

Aims of the study

- To study the impact of CD4 counts on wound infection in HIV infected patients undergoing surgery.
- To study the impact of CD8 counts on wound infection in HIV infected patients undergoing surgery.
- Assessment of wound infection in HIV infected patients undergoing surgery.

Materials and methods

Study Design

This was a prospective study of 50 consecutive patients who were HIV positive and underwent emergency surgery at Gandhi Hospital from July 2013 to August 2015.

Informed consent was obtained from all patients who required emergency surgery for inclusion into the study.

Inclusion criteria

- All patients who were HIV positive and underwent emergency surgery at Gandhi Hospital from July 2013 to August 2015.

Exclusion criteria

- Patients whose CD4 CD8 counts could not be obtained.
- Poly trauma.

Data collection

Data was collected prospectively according to a definite proforma which included:

- Patient's demographics
- Clinical details
- Co-morbidities like diabetes, tuberculosis.
- HIV specific variables (screening HIV positive or known HIV positive, whether on Anti-Retroviral Therapy or not, CD4 CD8 counts)
- Final diagnosis
- Type of operation
- Intra operative findings
- Laboratory investigations
- Wound complications

- Seroma
- Hematoma
- Acute wound failure
- Purulent discharge.

HIV status was determined by ELISA. CD4 and CD8 counts were done in the post-operative period (within 7 days after surgery) and follow up was done for a minimum of 1 month. Variation in the clinical course and outcome within these patients was assessed by stratification according to CD4 counts. Statistical analysis was done by using Chi-square test and Student t-test.

Results

Total number of patients: 51

Number of patients excluded: 1

Total number of patients included in the study: 50

Patient's demographics

Sex distribution

Out of 50 patients included in the study, 26 patients were males and 24 were females. Male to female ratio is 1.08: 1. The study population had no significant difference in distribution of males and females.

Age distribution

Out of 50 patients 21 patients were in age group 21-30 years, 16 patients were in age group 31-40 years, 11 patients were in age group 41- 50 years, 3 patients were in 51- 60 years age group. Spectrum of cases was as per **Table – 1**.

Table - 1: Spectrum of cases.

Diagnosis	No. of cases
Acute appendicitis	10
Appendicular perforation	02
Ileal perforation	07
Gastric perforation	06
Acute Intestinal Obstruction	12
Blunt injury abdomen	03
Obstetrics	13

CD4 counts of patients

Of the 50 cases 22 patients (44%) had CD4 count <200 cells/cu mm and 28 patients (56%) had CD4 count >200 cells/cu mm.

CD8 Counts Of Patients.

Out of the 50 patients CD8 counts of 13 patients were more than 1000. 37 patients had CD8 counts less than 1000. All 13 patients who were having more than 1000 had their wounds infected.

Wound infection

Out of the 50 patients surgical wounds of 13 patients were infected. Wounds of 37 patients were healthy. Of the 13 patients infected 7 patients had CD4 count less than 200 and 6 patients had CD4 count more than 200. Out of the 37 patients whose wounds were healthy 16 patients had CD4 counts less than 200 and 21 patients had more than 200. Out of the 37 patients whose wounds were healthy 16 patients had CD4 counts less than 200 and 21 patients had more than 200. Of the 13 patients infected 7 patients had CD4 count less than 200 and 6 patients had CD4 count more than 200.

Wound complications

Out of the 13 patients whose wounds were infected, 5 patients had seroma, 6 patients had purulent discharge and 2 patients had wound failure.

Discussion

Out of 50 patients included in the study, 26 patients were males and 24 were females, with males being 52% and females being 48%. Male to female ratio is 1.08: 1.

In our study 42% of patients were in the age group of 21-30 years, 32% of patients were in the age group of 31-40 years, 22% of patients were in the age group of 41-50 years and 6% of patients were in the age group of 51-60 years. This showed that majority of the patients are in the age group of 21-40 years of about 75%.

In our study, surgery was done for most of emergency indications for 4% appendicular perforation, 6% for blunt injury abdomen, 11% gastric and 13% ileal perforations, 19% acute appendicitis, intestinal obstruction in 23% and obstetric indications in 24%.

In our study of 50 cases, 22 patients (44%) had CD4 count <200 cells/cu mm and 28 patients (56%) had CD4 count >200 cells/cu mm. Mean CD4 count is 264.3, median CD4 count is 223.

Out of the 50 patients CD8 counts of 13 patients (26%) were more than 1000. 37 patients (74%) had CD8 counts less than 1000. All 13 patients who were having more than 1000 had their wounds infected. Mean CD8 count in our study is 805.92 and median is 646.

Out of the 50 patients surgical wounds of 13 patients (26%) were infected. Wounds of 37 patients (74%) were healthy.

In the present study Of the 13 patients infected 7 patients (53%) had CD4 count less than 200 and 6 patients (47%) had CD4 count more than 200 (**Table – 2**). CD4/CD8 ratio in infected wounds is 0.163.

Table – 2: Comparison of CD4 counts.

	Healthy wound	Infected wound
CD4 <200	n=16(43%)	n=7(53%)
CD4 >200	n=21(57%)	n=6(47%)

Chi square value is 0.4354, degree of freedom is 1, p value is 0.5, hence statistically not significant (p value > than 0.05).

In the present study, out of the 13 patients who had wound complications, surgical site infections accounted for 46% which was similar to the incidence of surgical site infections in the study “Prevention and treatment of surgical site infection in HIV-infected patients” by Zhang L, Liu BC, Zhang XY, Li L, Xia XJ, Guo RZ [13].

Mawalla, et al. also observed that rate of surgical site infections among HIV patients was significantly higher with CD4 count below 200 cells/ μ L [14]. Out of the six patients (46%) who had surgical site infections 4 patients had CD4 count below 200 cells/ μ L in the present study. But a statistical correlation could not be derived between the CD4 count and type of wound complications.

Conclusion

- CD4 count does not correlate with healing of wound and severity of wound complication as test of significance is not proved.
- CD8 count has some correlation with wound healing but does not correlate with severity of wound complication.
- CD4 or CD8 count does not correlate with type of wound complication
- CD4/CD8 ratio cannot be taken as a predictor of wound complication and assessing its severity.

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