

OUTCOME OF SURGERY IN HIV-POSITIVE AND NEGATIVE
PATIENTS: A GENERAL COMPARATIVE STUDY

by

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A Project report submitted on partial fulfilment of
the requirements for the award of the MASTER OF
MEDICINE (SURGERY) degree of the University of Zambia.

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April 1991.

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ACKNOWLEDGEMENTS

I would like to acknowledge the help I received from the following people:

Messrs Elem, Krikor, Bem and Professor Jellis for their helpful comments and corrections. Mr L. Munkonge for the encouragement and support he gave me; Mr James Cairns for pains takingly going through the protocol; Mr David Watters for his interest in my work; Dr Patrick Haslett for those long hours of discussion devoted to this study; Mr Sylvester Hibajene for his help with statistics; Mr D. Kunda for allowing me to use his Word Processor ; Ms Theresa Mutale for typing the manuscript, the patients for their courage to undergo surgery.

Finally and most importantly to my wife Monde, my daughter Anchindika and my son Inaka for making all this worth doing.

INTRODUCTION

There have been anecdotal reports that patients who are infected with the human Immune Deficiency Virus (HIV) do not fare well when they undergo surgery (Okong 1988). Clinical experience in the University Teaching Hospital Lusaka seems to support this (Watters 1988), especially in orthopaedics where a rather high rate of late post operative infection has been noted; particularly in those patients with surgical implants (Jeillis 1988). Studies documenting the morbidity after surgery on asymptomatic HIV-positive people are, however, hard to come by (Greene 1990).

In Africa, changes in the presentation and behaviour of common diseases are being seen. Complication patterns are also changing due to infection with HIV. Entirely new syndromes are appearing. Several important changes are being recognised. (Bayley 1990) Some of these are;

- a. Increased incidence of sepsis arising spontaneously or as a complication of elective surgery: A study done by D.A.K. Watters in 1987 and 1988 showed; that out of 65 patients admitted to the I.C.U., 29 (44%) were HIV-positive in contrast to 13% of the 70 patients

admitted to the unit during the same period for obstetric problems (Watters 1988). The difference was statistically significant. The outcome of surgery was worse in the HIV-positive group, of whom 65% died compared to the HIV-negative group with a mortality of 42%. The difference was not however statistically significant.

- b. Impaired wound healing. This is largely an anecdotal observation, and not all surgeons agree that HIV disease impairs wound healing (Bayley 1990; Wakeman 1990). It has been noted however that HIV patients have a higher tendency to wound dehiscence and may develop pressure sores usually after a short period of confinement to bed (Bayley 1990).

In the United Kingdom, the most frequent reason for surgical referral of HIV-positive patients is anorectal disease (Miles 1990). In our setting the whole spectrum of surgery appears to be affected by HIV infection (Bayley 1990).

AETIOLOGY

The Virus

In 1981, the occurrence of severe, often fatal, pneumonia caused by the opportunistic pathogen pneumocystis carinii in apparently healthy homosexuals in the United States led to the recognition of the acquired immunodeficiency syndrome (AIDS) (Diurden 1986). In 1983 the agent causing this syndrome was identified by the French and American scientists. The French isolated it from a lymphnode from a patient with AIDS. At first it was called the Human T-Cell lymphotropic virus (HTLV III) by the Americans and lymphadenopathy associated virus (LAV) by the French. The agreed name today is the human immunodeficiency virus (HIV) (Diurden 1986). This is a R.N.A. virus belonging to the retro virus group (Diurden 1986). Two varieties are now recognised; the HIV1 and the HIV2.

HIV1 is the cause of the disease in the vast majority of AIDS cases reported, and is the most wide spread geographically. HIV2 is most prevalent in certain regions of West Africa, its transmission and pathogenesis mirrors that of HIV1. It is not known whether HIV2 victims progress to AIDS at the same rate as those of HIV1. Serological tests for HIV1 cannot

effectively detect HIV2 infection, so that it is assumed that the two viruses are different (Confronting AIDS Update 1988). The HIV1 and HIV2 viruses have, through morphologic and genetic analysis, been further defined as a sub-family of retroviruses known as lentiviruses (Coombs 1988; Confronting AIDS Update 1988). Lentiviruses are known to cause immune suppressive disease in other mammals such as monkeys (the simian immunodeficiency virus) cows (the bovine immunodeficiency virus) and in cats (the feline immunodeficiency virus). In 1988 scientists identified yet another lentivirus in chimpanzees in Gabon which is closely related to HIV1 (Confronting AIDS Update 1988).

Structure of the Human Immunodeficiency Virus (see figure 2)

The virus is spherical and about 100nm in diameter, it has an envelope studded with glycoproteins GP 120 and GP 41. These are type specific glycoproteins. The RNA has multiple copies of reverse transcriptase. These are surrounded by a capsid formed of several antigenic proteins; most important of which is protein 24 (P24), which determines group specificity (Confronting AIDS Update 1988).

Replication

The viral RNA replicates by reverse transcriptase. It converts its RNA into double strand DNA and incorporates itself into the host cells genome. Every time the host cell replicates, the virus also replicates (Redfield 1988).

Gene structure

All retroviruses have three genes.

1. GAG - Codes for core proteins.
2. POL - Codes for reverse transcriptase.
3. ENV - Codes for surface glycoproteins
(Confronting AIDS Update 1988)

The gene structure (see figure 3).

The HIV virus has a tropism for the T helper lymphocytes. The CD4 on the T helper cells is the specific receptor for the virus. This is a 62 kilodalton glycoprotein to which the GP120 on the HIV binds (Coombs 1988). The CD4 is not only found on T-helper cells, but also on brain cells B-lymphocytes, macrophages, endothelial cells etc., (Coombs 1988; Diurden 1986). The HIV is found in almost every

fluid of the body but the concentrations vary. For example, there are more viruses in blood than in saliva (Coombs 1988).

EPIDEMIOLOGY

The worldwide HIV infection surveillance is coordinated by the global programme on AIDS which reports that the number of AIDS cases reported to the World Health Organisation (WHO) continues to rise rapidly. As of 1st March 1989, 141,894 AIDS cases had been reported by the reporting countries and territories all over the world. From 1985 to 1989, the number of AIDS cases reported to WHO increased over fifteen fold. The number of countries reporting cases has also increased, indicating that HIV infection has become world wide. Large numbers have been reported from North America, Latin America, Oceania, Western Europe and Central, Eastern and Southern Africa, (WHO 1989; Appendix 1).

Africa represents 15% of the world's total, cases are mainly reported from Burundi, Congo, Kenya, Malawi, Uganda, Central African Republic, Tanzania and Zambia (WHO 1989).

Cases of AIDS were first officially reported from Africa in 1982. However the 17,566 (87%) of the cumulative figure of 21,322 cases recorded by 1989 have been reported since 1987. This may reflect better diagnostic and reporting systems or a very rapid increase or both (WHO 1989).

Modes of transmission (WHO Global Programme on AIDS
Progress report No5 May 1989)

Three modes of transmission of HIV have been recorded so far:

1. Sexual intercourse (heterosexual or homosexual) or receipt of donated semen (WHO 1989).
2. Exposure to blood, blood products, or donated organs and semen. This comes about by transfusion of unscreened blood, use of unsterilized needles and syringes or other piercing instruments (WHO 1989).
3. Mother to child before, during, or shortly after birth (perinatal transmission) (WHO 1989).

These modes of transmission seem to be universal and so far, no change in transmission has been noted (WHO 1989). There is no evidence to support any inherent racial or ethnic resistance to HIV infection or to the pathogenic effects of the virus (WHO 1989).

HIV has been isolated, from many body fluids of infected persons like saliva, tears, milk, however only blood, semen, vaginal and cervical fluids have been implicated in HIV transmission (WHO 1989). No evidence has been produced to show that HIV can be transmitted via the respiratory route or casual person

to person contact in any social setting (WHO 1989).

Global Epidemiologic Patterns: (Global programme on AIDS progress report No5 May 1989)

There are **three** such patterns:

Pattern I is mainly found in Western industrialised countries. Commonly occurs among homosexual or bisexual men and intravenous drug users. Heterosexual transmission is small but increasing. The male to female ratio is between 10:1 and 15:1. The prevalence rate in the general public is 1%. But in high risk groups it is as high as 50%.

Pattern II occurs mostly in Africa (sub Saharan regions), Latin America and some Caribbean Countries. The prevalence rate in some urban areas is said to be upto 25%. The mode of transmission is heterosexual and vertical, the male to female ratio is 1:1 (WHO 1989).

Pattern III is found in people who have received imported unscreened blood or people who have travelled to HIV/AIDS endemic areas and have come in contact with prostitutes or homosexuals abroad. These people are very few, but they may increase rapidly because of international travel (WHO 1989).

Diagnosis

The usual method of diagnosing HIV infection is by detection of circulating antibodies in the blood of those affected (WHO 1989), using several enzyme immunoassay methods. These methods are used for screening purposes because they are highly sensitive and specific, easily automated and reduce time and cost. They may however give false positive or negative results. False negatives occur when antibodies become diminished late in the disease or during the initial stages when there are no detectable antibodies. False positives will occur due to cross reactions with other circulating antibodies (Goldstein 1988).

Other tests such as Radioimmunoprecipitation (Western blot) and Immunofluorescence are used as confirmatory tests. These detect antibodies to specific individual viral proteins (Goldstein 1988).

In Zambia the enzyme linked immunoassay method (Wellcozyme) is used.

Treatment

No vaccine or cure for HIV infection has been found, and it is not expected that a vaccine will be

available in the near future (5-10 yrs). The main strategies for prevention or control of HIV infection are, education and information to reduce the risk of transmission by behavioral change, and information on training to reduce transmission by syringes and other skin piercing instruments (WHO 1989).

The Zambia Situation

Our population was 7 million in 1986. Fifty percent of our people live in urban areas and 45% are less than 15 years old. The transmission of HIV is heterosexual and vertical (pattern II). The prevalence rate is somewhere between 5% and 20% or more in the general public (Bayley 1990).

If one looks at patients who present with surgical pathology, the seropositivity rate is 24.3% with a range from 11% to 45% for individual hospitals (Bayley 1990).

It is also important to realise that 15% of patients with signs of HIV infection are actually negative for HIV antibodies (Bayley 1990).

PATHOLOGY

Once a person is infected with this virus the protein GP 120 on the viral envelope binds to the protein known as CD4 on the susceptible cell surface. The post infection sequence of events is as follows:

The virus merges with T4 cells and transcribes its RNA genome into DNA (by reverse transcriptase), the viral DNA gets incorporated into the cells genetic material and every time the T4 cells are activated to replicate, they produce new viral RNA and viral proteins - which combine to form new virus particles which infect other cells. The process is self propagating (Redfield 1988). Whenever the patient is exposed to infection; more viruses are formed and more T4 cell populations are infected and destroyed. It is not known how exactly these T4 cells are destroyed. They could be lysed by the virus, or they could be killed by other immunological responses. The infected T4 cells develop viral proteins including GP 120, which are expressed onto their surface. The GP 120 and CD4 have great affinity for each other, so that other uninfected T4 cells get attached to the infected cells forming a syncytium which cannot function and gets destroyed (Redfield 1988). Furthermore, the infected cells, are also vulnerable to standard antiviral activities of cytotoxic

antibodies and cells. Sometimes free viral GP 120 circulates and attaches to CD4 on uninfected T4 cells, thus making them susceptible to destruction (Redfield 1988).

The expected end result is a decline in the number of T4 cells from the normal value of about $1000/\text{mm}^3$ at a variable rate of approximately $40/\text{mm}^3$ to $80/\text{mm}^3$ per year (WHO 1990).

This deterioration of the immune system is initially manifested by mild to moderate clinical conditions such as generalised lymphadenopathy diarrhoea, weight loss and candidiasis. When the CD4 cell count reaches a level of less than $400/\text{mm}^3$ the AIDS defining conditions start appearing. These are opportunistic infections like pneumocystis carinii pneumonia, cerebral toxoplasmosis, cytomegalo virus disease and oesophageal candidiasis. Which occur at \sim CD4 $400/\text{mm}^3$ (Phillips 1991). HIV induced pathological conditions such as HIV encephalopathy can also occur. Associated malignancies are seen at CD4 count of $200/\text{mm}^3$ (Phillips 1991), and the common one in our setting is Kaposi's sarcoma but others like lymphomas also occur (Hughes-Devis 1991).

The rate of progression from being asymptomatic to being symptomatic has not been clearly delineated, but

few people develop AIDS within three years of infection, and by ten years approximately 50% of all HIV infected persons have AIDS (WHO 1990; Phillips 1991).

Function of the T4 Cell

The CD4 lymphocyte also known as the T4 or T helper lymphocyte detects antigens, stimulates cytotoxic lymphocytes and the production of antibodies by B-lymphocytes (Redfield 1988). With the development of AIDS, the CD4 lymphocytes become deficient. In addition, the mere presence of HIV also decreases the performance of CD4 lymphocytes despite having normal levels of the CD4 lymphocytes. Other abnormalities of immune function include decreased chemotaxis and impaired bactericidal capacity of the neutrophils (Redfield 1988).

Staging Systems

Several staging systems have been developed to define the stage of an infected person at any time of their downhill progression. These are based on clinical manifestations and immunological changes which show gradual deterioration of the immune system induced by the virus (WHO 1990).

The best known is the Walter-Reed System which is a clinical pathological system (Appendix 2). In this system, people classified as WR 0 to WR 3 are clinically normal looking carries. Those from WR 4 to WR 6 are symptomatic. There are however two criticisms of the Walter Reed System:

It needs laboratory facilities to count T4 cells. These facilities are not available in most third world countries, and the clinical conditions which are definitive to the diagnosis of HIV infection are many and only a few are included on the Walter Reed System (WHO 1989). Therefore WHO has proposed another system which is mainly clinical and can be used anywhere in the world: (WHO 1990; Appendix 4).

How do these patients fare when subjected to surgery? We know that surgical trauma itself causes a transient immune depression, particularly of T lymphocytes which return to normal only after 21 days (Lennard 1985).

The author therefore decided to conduct a prospective study of asymptomatic HIV infected people undergoing surgery to see how they would respond and to compare their response with HIV-negative people who also underwent surgery.

OBJECTIVE

To determine the general outcome of surgery on people who are asymptomatic HIV-positive according to Walter Reed/WHO criteria.

PATIENTS AND METHODS

1. This was a prospective study of patients admitted to the surgical and gynaecological services at St. Francis Hospital, Katete, from February to May 1989 and to the Surgical and Orthopaedic wards of the University Teaching Hospital, Lusaka, from June 1989 to October 1990. The author cared for but did not personally operate on all the patients.
2. This was a double blind study. The author did not know the HIV status of the patients and the person performing the HIV tests did not know the patients names or diagnoses. The only information given to him was a special number for identification of the patients later. The code was broken only if the clinical state of the patient required that the HIV status be known.

The Wellcozyme HIV test was performed to determine whether or not the patient was HIV-positive or negative.

3. Criteria for inclusion into the study was:

Patients having surgical conditions requiring moderate surgery like herniorrhaphy or

hydrocelectomy and major surgery like laparotomy or spinal decompression irrespective of whether the problem was acute or chronic were studied. But those who were overtly septic, moribund or symptomatic for AIDS (Beyond WR3 or Clinical Stage 2) were excluded.

4. The patients were followed up in the surgical wards during the postoperative period (only).
5. At discharge the patients were rated as follows:
 - a) The outcome was excellent if the patient was well after surgery and went home before the expected day of discharge for the type of surgery done.
 - b) The outcome was good if the patient went home around the expected day of discharge and there were no complications.
 - c) The outcome was fair if the patient's discharge was delayed a few days beyond the expected date of discharge and/or there was a minor complication.

- d) The outcome was poor if the patient had a prolonged stay in hospital far beyond what was expected or the patient was very ill following surgery and/or there was a serious complication.
6. All information about patients was entered on an information sheet().
7. The t-test and the P value were used to analyze the data.
8. The protocol was approved by the National AIDS Surveillance Committee and the University Teaching Hospital ethical committee.

RESULTS

1. PATIENTS STUDIED

One hundred and fourteen patients were studied. There were 71 males and 43 females (M:F;1.7:1) whose mean age was 39.8 years (range 7 years to 87 years). Thirty patients tested HIV-positive; 20 males and 10 females (M:F;2:1). Most (53.3%) of the HIV-positive patients were in the 21 to 30 years age group whereas the HIV-negative patients were evenly distributed between 11 years and 70 years old (Figure 1).

There were 84 HIV-negative patients; 33 females and 51 males (M:F;1.5:1).

2. PREVALENCE RATE

The prevalence rate of HIV positivity was 26.3% (30/114).

For the males: (20/71) it was 28.2%.

For the females: (10/43) it was 23.3%.

t-value was 0.05 + 0.14

p-value was > 0.50

There was no significant difference between the males and females in terms of the prevalence rates:

3. HOSPITAL STAY

This was defined as the period from the day of operation to day of discharge.

The HIV-positive females stayed between 6 and 70 days and those who were negative stayed between 6 and 107 days.

The mode was 30 days for the HIV-positive females and their mean stay was 23 days.

The mode for the HIV negative females was 10 days and their mean stay was 18.06 days.

The HIV-positive females stayed longer than the HIV-negative females but the difference was not statistically significant.

The HIV-positive males stayed between 3 and 162 days whereas the HIV-negative males stayed between 1 and 60 days.

The mode of those who were positive was 10 or 30 days and their mean stay was 37.60 days.

The mode for those who were negative was 10 days and their mean stay was 16.22 days.

The difference was statistically significant ($P=0.01$).

Among the males, the figures show that those who were HIV positive stayed longer in hospital than those who were HIV negative.

Among the females however, the length of stay was longer for those who were HIV positive, but the difference did not reach significant values.

4. TYPE OF SURGERY DONE

For purpose of this study the patients were placed in four groups according to the area of the body on which surgery was performed as follows (Table II).

- a) Abdominal surgery (denoting that the abdominal cavity was opened)
- b) Limb surgery
- c) Hernia, genito urinary and perineal surgery.

- d) Head and neck, chest and spinal surgery.

Each group was studied in terms of

1. Local complications:

- a. Whether there was wound infection (defined as presence of pus or redness and induration around the wound). Infection was further classified as being deep or superficial (Appendix 5).
- b. Whether there was wound dehiscence or not mild dehiscence denoted superficial parting of wound edges and severe dehiscence denoted complete disruption of the wound.
- c. The state of the wound when sutures were removed. In this case the average number of days sutures are removed for the particular region was considered. If the wound was not healed when the sutures were removed the patient was considered to have delayed wound healing?

2. The general condition of the patient (

3. The condition of the patient at discharge.

The spectrum of surgery done can be seen in table III.

1. ABDOMINAL SURGERY

a. Wound infection

Whereas only 9% of the HIV-negative patients had superficial infections, 27.27% of the HIV-positive patients had the same complication.

One HIV-negative patient had a deep infection and another had mild wound dehiscence. The differences were not statistically significant.

b. Wound healing

In patients who were HIV positive there was delay in wound healing when compared with those who were HIV-negative. Thus 97% of HIV -negative patients had healed wounds when the sutures were removed compared with 64% of the HIV positive patients. The differences were significant (Table IV)

c. General condition

The incidence of pyrexia in those who were HIV-positive was higher (82%) than in those who were HIV-negative (42%) and the difference was statistically significant. More HIV-positive patients were anaemic and more needed antibiotics than HIV-negative patients, but this did not reach significant values (Table V)

d. Condition of patients at discharge after abdominal surgery:

Although more HIV-positive patients had an excellent outcome (18%) than the HIV-negative (15%), the overall results showed that more HIV-negative patients (82%) had a better outcome than those who were HIV-positive (36%) and the differences were significant (Table VI).

Although more HIV positive patients (27%) died as compared to those who were HIV-negative, the difference was not significant (Table VI).

2. LIMB SURGERY

a. Wound infection

Superficial infection - No HIV-positive patient had superficial wound infection, but 13% (4/31) of the HIV-negative patients had superficial infection. Deep infection was present in both groups 9% for HIV-positive patients and 3% for the HIV-negative patients but the figures were not statistically significant. There was no wound dehiscence.

b. Wound healing

Seventy-three percent of the wounds in the HIV-positive patients were healed when the sutures were removed compared with 84% of those in the HIV-negative patients. The differences were not significant (See Table VII).

c. General condition

There was generally no difference in the frequency of pyrexia, chest infections or need for antibiotics, but (18%) of those who were HIV-positive were anaemic compared with 0.7% of those who were HIV-negative. The difference was noticeable but not significant (Table VIII).

d. Condition at discharge

At discharge, the difference between the condition of HIV-positive patients and those who were HIV-negative did not reach statistical significance. There was however, a tendency for HIV-positive patients to have only a fair outcome as opposed to being excellent or good at discharge. There were no deaths among the HIV-positive patients but 6% of the HIV-negative patients died (Table IX).

2. HERNIA, GENITO URINARY AND PERINEAL SURGERY

a. Wound infection

Superficial wound infections were more frequent in those who were HIV-positive. 67% as compared with 8% of the HIV-negative. The difference was significant ($P=0.05$). One HIV-negative patient had a deep wound infection.

b. Wound healing

In both groups the wounds healed without delay, except in two HIV-positive patients who had delayed wound healing.

c. General condition

Sixty-seven percent of the HIV-positive patients had a fever as compared with 31% of the HIV-negative patients, but the difference was not statistically significant.

d. Condition of the patient at discharge

The outcome was generally good for both groups of patients (Table X).

4. HEAD, NECK, CHEST AND SPINAL SURGERY

a. Wound infection

One HIV-positive patient had a deep wound infection. No HIV-negative patient had any wound infection, but the numbers were too few to make a meaningful analysis. Mild wound dehiscence occurred in one HIV-positive patient and in one HIV-negative patient.

b. Wound healing

Wound healing progressed well in both groups: 80% of the wounds were healed when the sutures were removed among the HIV-positive group as compared with 86% in the HIV-negative patients.

c. General condition

Pyrexia occurred in 60% of the HIV-positive patients and in 43% of the HIV-negative patients, but this did not make statistical significance.

Antibiotics were used in all the HIV-

positive patients but in only 43% of the HIV-negative patients. Anaemia occurred in 20% of the HIV-positive patients and in 14% of the HIV-negative patients.

d. Outcome at discharge

Of the seven HIV-negative patients, four had a good outcome compared with only one of five who were HIV-positive, but this was not significant. Four patients (80%) died in this group amongst HIV-positive patients but there were no deaths amongst the HIV-negative group.

e. Anterior spinal decompression patients.

It is worth noting that the three HIV-negative patients who had anterior spinal decompression did well, while all the four HIV-positive patients who had the same operation died. It is felt that this is a significant finding. The following are some details of these patients (a) In all but one patient Number 6, TB was suspected and therefore anti TB treatment was commenced before surgery. Patient 6 was suspected to have a tumour. In all these patients the

pre-operative state was deemed to be suitable to withstand such a major surgical procedure.

None of these patients had fever, pallor or cachexia. Those who were HIV-positive had not progressed beyond stage 2 (Appendix 4).

They were all operated on by consultants. Those who died, all had fever, two developed severe pressure sores, one had a massive haematemesis and melaena, one had proven urinary tract infection and probably died of septicaemia (Table XI).

Those who were HIV-negative were all much younger than those who were HIV-positive, and had a good outcome.

5. GENERAL OUTCOME OF ALL THE PATIENTS

When the general outcome of all the patients irrespective of the surgery done was looked at; the findings were as follows:

a. The HIV-positive patients:

Excellent and good outcome was present in 13.3% and 33.3% respectively a total of 46.6%.

26% had a fair outcome, 3.3% had a poor outcome and 23.3% died.

b. The HIV-negative patients:

Excellent and good outcome was present in 28.6% and 56% respectively, making a total of 84.5%.

9.5% had a fair outcome, no patients had a poor outcome and 6% died.

The differences were statistically significant (Table I).

These observations show that the HIV positive patients had a less satisfactory outcome compared to the HIV-negative patients. Secondly, more deaths occurred among those who were HIV-positive (Table I).

The fore-going was a general comparison but one would like to have a more specific comparison of similar types of surgery performed on patients of similar age. It was not possible to get a perfect match between the HIV-positive and HIV-negative because the trial was blind and surgery was done for many pathologies in comparatively few patients of various ages. The numbers involved being small, making firm conclusions would not be acceptable but important trends can be observed and noted.

Three groups of patients who underwent very major surgery (anterior spinal decompression), major surgery (laparotomy) and moderate surgery (hernia surgery) were compared. Minor surgery was excluded from the study. Each of these groups were compared for hospital stay, wound infection, wound healing, general condition and condition of the patient at discharge.

1. Anterior Spinal Decompression (n=7, 4 were HIV-positive and 3 were HIV-negative).

Hospital stay: All the HIV-positive patients died where as the HIV-negative patients stayed and average of 70 days.

For the rest of the parameters compared, see

table XIV and section 4,e of the study.

2. Bowel Surgery (n=12, 7 were HIV-positive and 5 were HIV-negative patients)

Seven positive patients had bowel surgery their mean age was 28.2 years (range 26-30). These were compared with five HIV-negative patients of mean age 29 years (range 23-35).

Types of surgery done

HIV-positive

1. Stoma surgery = 2
2. Colectomies = 2
3. Patch closures of perforated D.U. = 2
4. Intestinal obstruction untwisting of caecal volvulus = 1

HIV-negative

1. Truncal vagotomy and gastroenterostomy = 2
2. Celestin tube insertion = 1
3. Release of adhesions = 1
4. Sigmoid colectomy = 1

a. Hospital stay: The average length of stay for HIV-positive patients was 9.3 days. That for HIV-negative patients was 7.2 days although the HIV-positive patients stayed two days longer than the HIV-

negative patients the group is too small to draw any firm conclusions.

b. **Wound infection:** Two HIV-positive patients had superficial wound infections no HIV-negative patient had wound infection.

c. **Wound healing:** No patient in both groups had problems with wound healing. In all the patients the abdomen was closed en masse.

d. **General condition of the patients:** The following parameters were monitored. 1. fever, 2. chest infection, 3. anaemia. The HIV-negative patients had none of the above problems.

Of the seven HIV-positive patients, five had fever at least once after surgery (none had fever pre-operatively). None had a chest infection or anaemia.

e. **Condition of the patients at discharge:** four of the five HIV-negative had an excellent (2) or good (2) outcome as compared to only two of the seven HIV-positive patients?

There were no deaths among the HIV-negative patients but three of the HIV-positive patients died.

The three patients who died in this group of patients died as follows:

1. N.P., a female aged 30 years, had a transverse colostomy for a faecal fistula following previous surgery. Was well before colostomy was performed. She became depressed and developed diarrhoea and fever. Renal failure occurred and she died on the 24th day after surgery.
2. D.K., a male aged 30 years had a perforated duodenal ulcer. Had a patch closure of the perforation done and subsequently he developed septicaemia, confusion and coma. He died on the third day postoperatively.
3. A.C., a male aged 26 years, had an irreducible ileocolic intussusception protruding through the anus. A hemicolectomy was done. The patient developed diarrhoea, fever and wound infection. He lost a lot of weight and died on the 30th day after operation.

3. Hernia surgery (n=6; 3 HIV-positive, 3 HIV-negative).

There were three HIV-positive patients of mean age 32 years (range 30-33). One had an epigastric hernia and two had inguinal herniae.

There were three HIV-negative patients their mean age was 44 years (range 30-51). Two had bilateral inguinal herniae and one had a recurrent inguinal hernia.

a. **Hospital stay:** The HIV-positive patients stayed an average of 5.3 days compared with the HIV-negative patients who stayed an average of 4.6 days.

b. **Wound infection:** Two HIV-positive patients had wound infection (one had superficial infection and the other had deep infection). No HIV-negative patient had wound infection.

c. **Wound healing:** In HIV-negative patients there was no delay in wound healing, but one HIV-positive patient had delayed wound healing.

d. **General condition:** Among the HIV-positive patients, two had fever but there was no chest

infection or anaemia.

One HIV-negative patient had fever but there was no chest infection or anaemia.

e. Condition of the patients at discharge: All the three HIV-negative patients had either an excellent (1) or good (2) outcome whereas two HIV-positive patients had a good outcome and one had a poor outcome. There were no deaths.

Thus in this small group of patients undergoing very major, major and moderate surgery the HIV-positive patients had more complications and their general outcome following surgery was not as good as that of the HIV-negative patients. These differences may not be of statistical significance, but it is important to take note of them.

DISCUSSION

Trauma, surgical or otherwise does have a depressive effect on the immune system of an individual. T lymphocytes are known to get suppressed after trauma and return to normal levels only after twenty-one days (Lennard 1985). With this background knowledge one may ask what happens to people whose T cells are already being destroyed? Are they at risk after trauma. Do their wounds heal well?

Barbul et al (1989) have shown that not every component of the spectrum of T cells plays a part in wound healing. It is the T suppressor/cytotoxic cells that affect wound healing when they are depleted. If the T-helper cells are depleted the general morbidity of the patient should be high because of an associated liability to infection following T4 cell depletion. What is needed therefore is a holistic approach to the patient; which looks into all the aspects of surgical responses and not only at wound healing. Prospective studies are better in this situation because one is able to monitor all the parameters as they are happening. These are yet to come (Greene 1990) and most works on this subject have been retrospective (Wakeman 1990; Okong 1988).

This prospective study was designed to monitor wound healing and other parameters as shown on the data sheet (. . .). It was a clinical study with a very small laboratory component.

1. The Patients

The patients studied ranged in age from 7 years to 87 years (average of 40 years). Most of the HIV-positive patients were between 21 and 30 years old. Thus they were within the group of persons who are sexually active 20% to 30% of who have been found to be HIV infected (Harries 1990). This observation is therefore well within the expected findings. The HIV negative patients were evenly distributed between 11 and 70 years old (Figure 1).

2. HIV prevalence rates

The prevalence rate of 26.3% is higher than the estimated national prevalence of between 5 and 20%. If patients with surgical pathology are considered however Bayley's (1990) figure of 24.3% is very close to the prevalence rate found in this study.

3. Hospital stay

The average postoperative hospital stay for females was 23 days for those who were HIV-positive and 18 days for those who were HIV-negative. The difference was not statistically significant. Among the males the mean stay was 38 days for those who were HIV-positive and 16 days for those who were HIV-negative. The difference was statistically significant. Generally those patients who were HIV-positive stayed longer, particularly the males. This is important to know because it indicates that HIV-positive patients will cost more because they will stay longer in the wards. This adds more to the already high expense of caring for HIV infected people (Fineberg 1988).

4. Types of surgery done

The types of surgery done were grouped in this fashion because the study looked at the general outcome of wound infection, wound healing and general condition of the patients after surgery

irrespective of the operation done. This brings in a variable because particular pathologies can affect the outcome of surgery. This was however, a general study, not directed at particular surgical procedures or pathologies which will be the subjects of future studies.

5. Wound infection

among the patients who had abdominal surgery, wound infection occurred more in patients who were HIV-positive than in those who were HIV-negative although the differences were not statistically significant. The situation was similar in patients undergoing limb surgery. In HIV-positive patients undergoing hernia, genitourinary and perineal surgery the superficial infection rate was significantly higher than in those who were HIV-negative. It could have been so because this area is prone to infection (Brook 1990), but the fact that the rate was higher in HIV-positive patients is an important observation. Amongst the head, neck and spinal surgery patients, one HIV-positive patient had deep infection and subsequently died.

Overall, there was a tendency towards wound infection amongst HIV-positive patients.

6. Wound healing

This is an area of great controversy (Bayley 1990). Wakeman in 1990 found wound haematoma and wound infection to be the only complications among HIV-positive patients. Wound healing was not affected except in some patients who had ano-rectal lesions. This is not surprising as the T4 cells do not play any significant role in wound healing (Barbul 1989). In this study, however, only those patients who had abdominal surgery and were HIV-positive had a significant delay in wound healing, those in other groups had normal wound healing.

7. General condition of the patients

Patients who were HIV-positive and underwent abdominal surgery had a significantly higher occurrence of pyrexia than those who were HIV-negative. Similarly there were more pyrexias in the patients who underwent hernia, genitourinary and perineal surgery, and in those who had head and neck, chest and spinal surgery, although not to significant values. Anaemia was noted in patients who underwent limb surgery and were HIV-positive although not to significant values. In the rest of the patients anaemia was not a

problem. Antibiotics were used in all patients who were HIV-positive and underwent head neck, chest and spinal surgery whereas only 43% of their HIV-negative counterparts received antibiotics. This was significant and means that the cost of treating HIV-positive patients is higher (Fineberg 1988). Again, patients who were HIV-positive tended to have more problems than those who were HIV-negative.

8. General outcome at discharge

Generally, there was higher morbidity among the HIV-positive patients compared to the HIV-negative patients and their outcome was less satisfactory. Despite the findings of other workers like Wakeman (1990) who found a low complication rate among his patients, and Greene (1990) who found no altered outcome after operation on HIV-positive haemophiliac patients, this study shows that patients who are HIV-positive and undergo surgery have a less satisfactory outcome than those who are HIV-negative. Our complication rate tended to be higher for each category in HIV-positive patients particularly in patients who underwent anterior spinal decompression.

AGE DISTRIBUTION OF HIV+ & HIV- PATIENTS

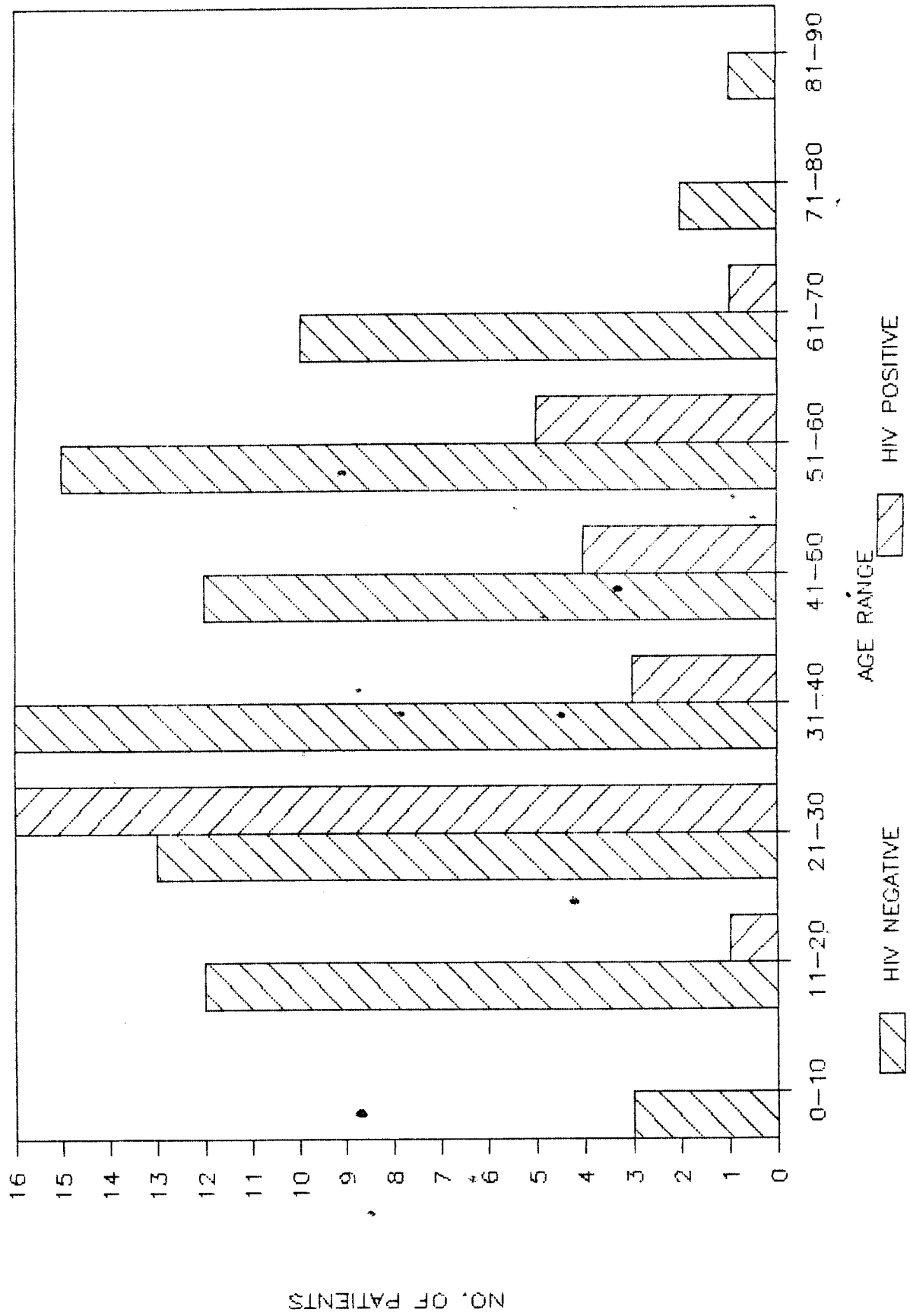


FIG. 1

HUMAN IMMUNODEFICIENCY VIRUS

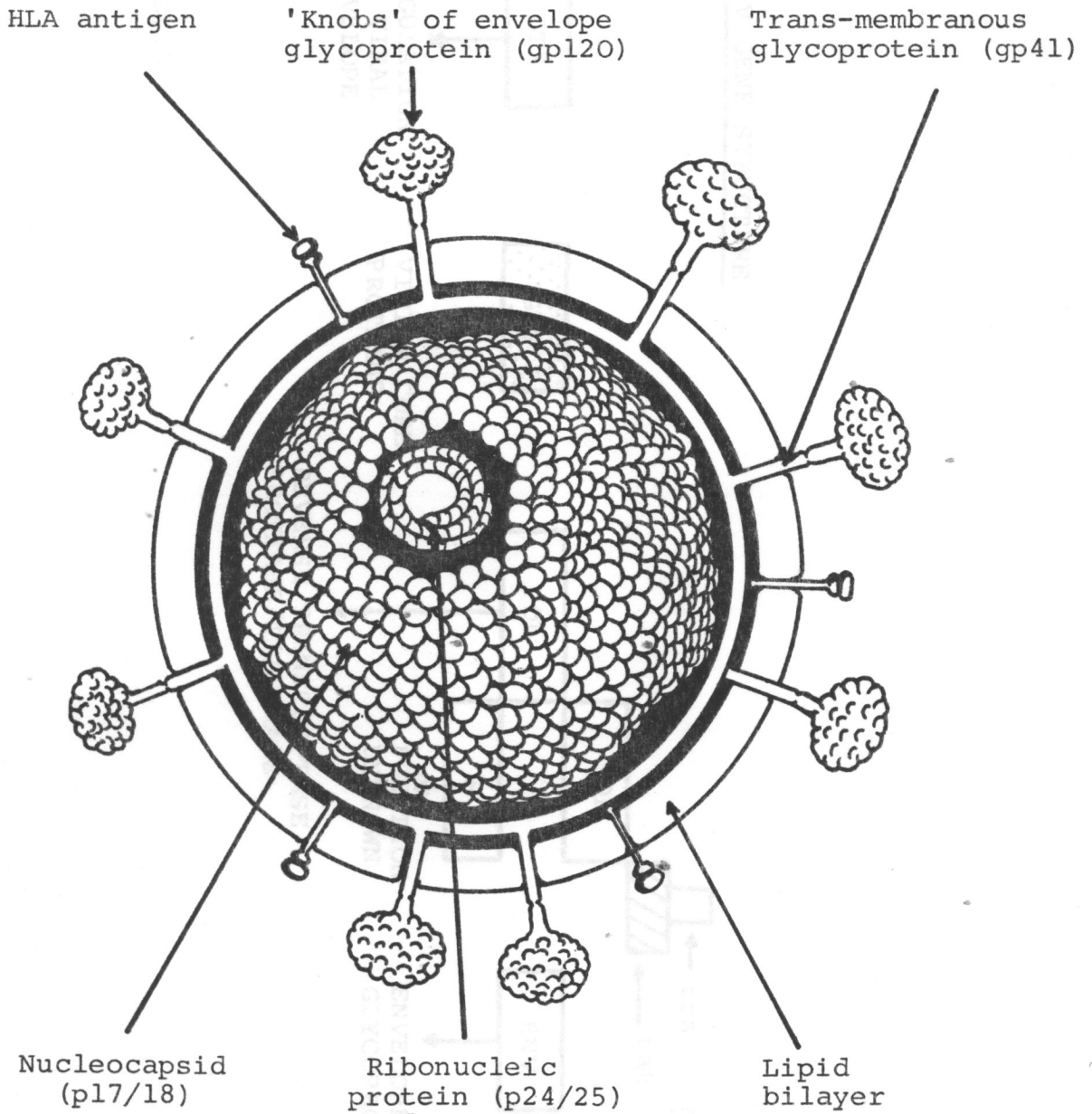


FIG. 2

HIV GENE STRUCTURE

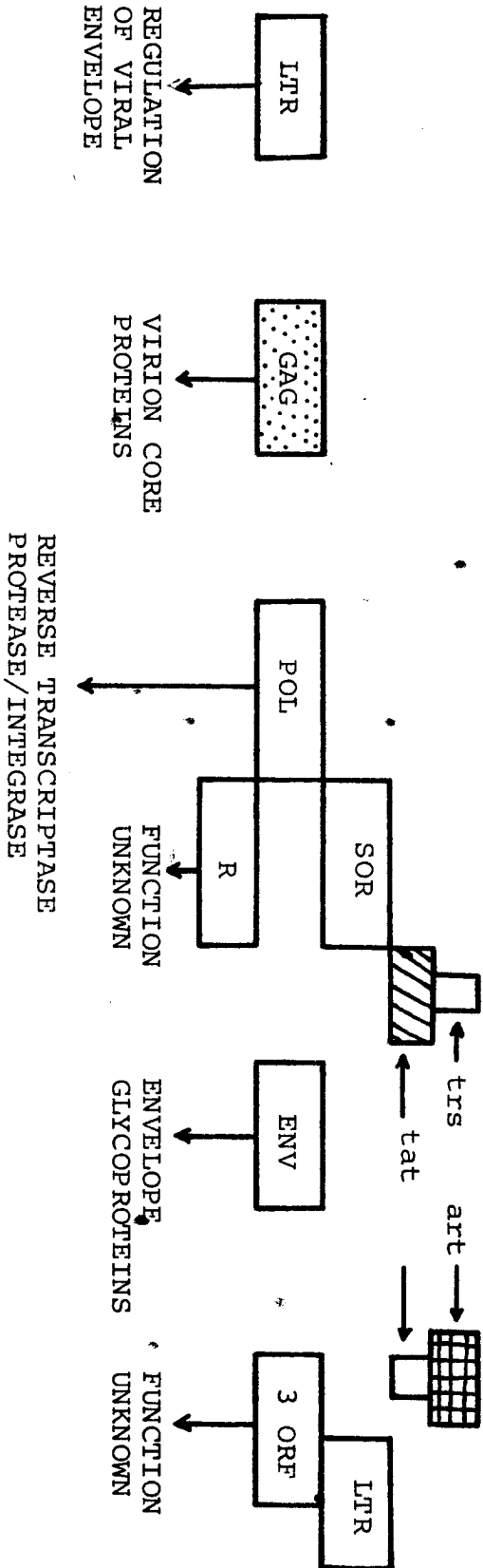


FIG. 3

TABLE I CONDITION OF ALL THE PATIENTS AT DISCHARGE:

	HIV+VE n=30	HIV-VE n=84	t-value	p-value
Excellent	4(13.33)	24(28.57)	0.15±0.13	=0.10
Good	10(33.33)	47(55.95)	0.23±0.17	<0.050
Fair	3(26.67)	8(9.52)	0.17±0.14	<0.050
Poor	1(3.33)	0(00)		
Death	7(23.33)	5(5.95)	0.17±0.14	=0.050

TABLE II CLASSIFICATION OF PATIENTS ACCORDING TO THE
AREA OF THE BODY ON WHICH SURGERY WAS
PERFORMED:

GROUP	HIV+VE	HIV-VE	TOTAL
a. Abdominal surgery	11	33	44
b. Limb surgery	11	31	42
c. Hernia, genito urinary & perineal surgery	3	13	16
d. Head, neck, chest & spinal surgery	5	7	12
Totals	30	84	114

TABLE III SURGERY DONE ON ALL THE PATIENTS:

GROUP	DESCRIPTION	No OF PATIENTS
a. Abdominal surgery	1. Small & large bowel surgery	14
	2. Ovary and ectopic pregnancy surgery	08
	3. Hysterectomies	06
	4. Vagotomy & drainage	06
	5. Perforated D.U. patch closure	03
	6. Celestin tube insertions	03
	7. Appendicectomies	02
	8. Splenectomies	02
	Subtotal	44
b. Limb surgery	1. Austin Moor prosthesis insertion	07
	2. K-nail insertion	07
	3. Open reduction of fractures	05
	4. Girdle stone pseudo arthroplasty	03
	5. Arthrodesis	03

GROUP	DESCRIPTION	No OF PATIENTS
	6. Pinning of fractured femoral heads	03
	7. Excision of tumours	03
	8. Osteotomies	02
	9. Bone grafting	02
	10. Sequestrectomies	02
	11. Knee surgery	01
	12. Amputation	01
	13. Ligation of varicose veins	01
	14. Removal of plates	01
	Subtotal	42
c. Hernia, genital urinary & perineal surgery	1. Herniorrhaphies	06
	2. Prostatectomy	03
	3. Repair of prolapse of uterus	02
	4. V.V.F repair	01
	5. Hydrocele repair	01
	6. Hypospadias repair	01
	7. Exploration of testis	01

GROUP	DESCRIPTION	No OF PATIENTS
	8. Urethrotomy	01
	Subtotal	16
d. Head, neck chest & spinal surgery	1. Anterior spinal decompression	07
	2. Laminectomies	02
	3. Thyroidectomies	02
	4. Removal of malignant submandibular tumour	01
	Subtotal	12
	Grand total	114

TABLE IV ABDOMINAL SURGERY:

STATE OF WOUND WHEN SUTURES WERE REMOVED

	HIV+VE	HIV-VE	t-value	p-value
Healed	7(63.64)	32(96.97)	0.33±0.25	0.05
Not healed	3(27.27)	1(3.03)	0.24±0.23	0.10
Died before wound healed	1(9.09)	0(00)		

TABLE V ABDOMINAL SURGERY:
GENERAL CONDITION

	HIV+VE	HIV-VE	t-value	p-value
PYREXIA	9(81.82)	14(42.42)	0.39+0.24	0.010
CHEST INFECTION	0(00)	01(3.03)		
ANAEMIA	4(36.36)	7(21.21)	0.15+0.27	0.20
USE OF ANTIBIOTICS	6(54.54)	11(33.33)	0.21+0.28	0.20

TABLE VI CONDITION OF ABDOMINAL SURGERY PATIENTS AT DISCHARGE

	HIV+VE n=11	HIV-VE n=33	t-value	p-value
Excellent	2(18.18)	5(15.15)	0.03±0.22	0.50
Good	2(18.18)	22(66.67)	0.48±0.29	0.002
Fair	4(36.36)	3(9.09)	0.27±0.25	=0.10
Poor	0(00)	0(00)		
Death	3(27.27)	3(9.09)	0.18±0.24	0.20

TABLE VII STATE OF WOUND WHEN LIMB SURGERY SUTURES WERE REMOVED

	HIV+VE	HIV-VE	t-value	p-value
Healed	8(72.72)	26(83.87)	0.11±0.25	>0.50
Not healed	3(27.27)	5(16.13)	0.11±0.25	>0.50

TABLE VIII GENERAL CONDITION - LIMB SURGERY

	HIV+VE	HIV-VE	t-value	p-value
PYREXIA	2(18.18)	7(22.58)	0.04±0.23	>0.50
CHEST				
INFECTION	0(00)	0(00)		
ANAEMIA	2(18.18)	3(0.68)	0.09±0.25	>0.50
USE OF				
ANTIBIOTICS	6(54.54)	15(48.39)	0.06±0.29	>0.50

TABLE IX CONDITION OF LIMB SURGERY PATIENTS AT
DISCHARGE

	HIV+VE	HIV-VE	t-value	p-value
Excellent	2(18.18)	12(38.71)	0.20±0.27	>0.10
Good	5(45.45)	15(48.39)	0.03±0.28	>0.50
Fair	3(27.27)	2(6.45)	0.21±0.24	>0.10
Poor	1(9.09)	0(00)		
Death	0(00)	2(6.45)		

TABLE X CONDITION OF HERNIA, GENITO URINARY AND
 PERINEAL SURGERY PATIENTS AT DISCHARGE

	HIV+VE	HIV-VE	t-value	p-value
Excellent	0(00)	5(38.46)		
Good	2(66.67)	6(46.15)	0.21±0.53	>0.50
Fair	0(00)	2(12.38)		
Poor	1(33.36)	0(00)		
Death	0(00)	0(00)		

TABLE XI ANTERIOR SPINAL DECOMPRESSION PATIENTS

<u>PATIENTS</u>	<u>AGE/SEX</u>	<u>DIAGNOSIS</u>	<u>HIV</u>	<u>OUTCOME OF SURGERY</u>
1. HM	31 M	Paraparesis collapsed T ₉	-ve	Walked with crutches at 10 weeks.
2. MM	20 M	Paraparesis collapsed T ₉	-ve	Wound healed well, never recovered from paraparesis.
3. KM	17 M	Paraparesis collapsed T ₅	-ve	Walked with crutches at 6 weeks, had mild wound dehiscence.
4. WM	69 M	Paraparesis collapsed L ₂	+ve	Had fever on day 3 which settled. Initially good neurological recovery, development paralytic ileus subsequently he had ascites. On

<u>PATIENTS</u>	<u>AGE/SEX</u>	<u>DIAGNOSIS</u>	<u>HIV</u>	<u>OUT OF SURGERY</u>
				30th day he had melaena and heamatemesis and died.
5. FL	47 M	Paraparesis collapsed T ₂	+ve	Well until 12th day when he had fever, which settled. He developed severe pressure sores due to weight loss. Died on 20th day.
6. AM	40 M	Paraparesis collapsed T ₆	+ve	Wound healed well, had fever on days 4-6 never recovered neurologically had severe bed sores. Died at 10th week.
7. GP	60 M	Paraparesis	+ve	Had wound infection

<u>PATIENTS</u>	<u>AGE/SEX</u>	<u>DIAGNOSIS</u>	<u>HIV</u>	<u>OUT OF SURGERY</u>
				fever and UTI - Klebsiella pneumonia died after 5 weeks.

APPENDICES

APPENDIX 1AIDS CASES REPORTED TO WHO IN MARCH 1989 AND AUGUST 1990

<u>CONTINENT</u>	<u>NO OF CASES</u>		<u>NO OF REPORTING COUNTRIES</u>	
	<u>1989</u>	<u>1990</u>	<u>1989</u>	<u>1990</u>
Africa	21,322	66,978	51	55
America	99,752	167,014	44	45
Asia	338	665	38	40
Europe	19,196	36,635	30	30
Oceania	1,286	2,133	14	16

APPENDIX 2THE WALTER REED SYSTEM OF STAGING HIV PROGRESSION

STAGE	HIV	CHRONIC	T4	CELL	DELAYED	THRUSH	OPPORTUNISTIC
			ANT	LYMPHAD	COUNT	HYPERSE	ORAL
			BODY	ENOPATHY		NSITIVITY	INFECTION
WR 0	-	-	>400	Normal	-	-	-
WR 1	+	-	>400	Normal	-	-	-
WR 2	+	+	>400	Normal	-	-	-
WR 3	+	±	400	Normal	-	-	-
WR 4	+	±	<400	Partial	-	-	-
WR 5	+	±	<400	Oral thrush	-	-	-
WR 6	+	±	<400	P/C	±	±	±

APPENDIX 4 PROPOSED CLINICAL STAGING SYSTEM FOR
HIV INFECTION AND DISEASE (WHO WEEKLY
EPIDEMIOLOGICAL RECORD: 20TH JULY 1990)

Clinical Stage 1

1. Asymptomatic.
2. Persistent generalised lymphadenopathy (PAL)
performance scale 1 asymptomatic abnormal
activity.

Clinical Stage 2

3. Weight loss less than 10% of body weight.
4. Minor mucocutaneous manifestations (seborrhoeic
dermatitis, prurigo, infection, recurrent oral
ulceration, angular dermatitis).
5. Herpes zoster within the last 5 years.
6. Recurrent upper respiratory tract infection
and/or performance scale 2:- Normal activity,
asymptomatic.

Clinical Stage 3

7. Weight loss more than 10% of body weight.
8. Unexplained chronic diarrhoea for more than one
month.
9. Unexplained prolonged fever (intermittent or
continuous) for more than one month.

10. Thrush.
11. Oral Hairy Leucoplakia.
12. Pulmonary TB within the past year.
13. Severe bacterial infection (pneumonia, pyomyositis) and or performance scale 3:- bed ridden less than 50% of the day during the last month.

Clinical stage 4

14. HIV-wasting syndrome as defined by CDC.
15. Pneumocystis carinii pneumonia.
16. Cerebral toxoplasmosis.
17. Cryptosporidiosis diarrhoea more than one month.
18. Cryptococcus infection - extra pulmonary.
19. Cytomegalo virus disease of any organ other than liver, spleen or, lymphnodes.
20. Herpes simplex virus - infection - mucocutaneous for more than one month.
21. Progressive multifocal leukoencephalopathy (PML).
22. Any disseminated endemic mycosis (i.e. histoplasmosis).
23. Candidiasis of oesophagus, lungs trachea or bronchi.
24. Atypical mycobacteriosis.
25. Non typhoid salmonella septicaemia.
26. Extra pulmonary TB.
27. Lymphoma.

- 28. Kaposi sarcoma (KS).
- 29. HIV encephalopathy as defined by CDC and or performance scale 4- bed ridden more than 50% of the day during the last month.

To this should be added a laboratory axis where facilities permit. This is to link to the clinical axis as shown:

<u>Laboratory</u>		<u>Clinical</u>	
Axis		Axis	
<u>Lymphocytes or</u>	<u>CD 4</u>	<u>Asymptomatic</u>	<u>Early</u>
A >2000	>500	1A	2A
B 1000-2000	200-500	1B	2B
C <1000	<200	1C	2C
<u>Intermediate</u>		<u>Late</u>	
3A	4A		
3B	4B		
3C	4C		

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BACKGROUND INFORMATION

Date of Admission:

Date of discharge:

Age:

File No:

Hospital SFH/UTH

Address; Village:

Chief:

Box No/H/No:

Town/Township:

Sex:

Presenting symptoms:

Duration (Days, Weeks, Months):

Systems review:

1. General Weight loss yes/no Estimated % body weight loss *

2. R/S a) Cough Yes/No

b) Productive Yes/No

c) Haemoptysis Yes/No

d) Dyspnoea Yes/No

3. G.I.T. a) Diarrhoea Yes/No

b) Constipation Yes/No

c) Melaena Yes/No

d) Haematemesis Yes/No

4. G.U.S. a) Painful Micturition Yes/No

b) Poor stream Yes/No

c) Haematuria Yes/No

d) Nocturia Yes/No Number of times:

e) Urethral discharge Yes/No

5. Past history of:

1) T.B. Yes/No

2) Herpes Zoster Yes/No

3) S.F.D. Yes/No

4) Itch or rash Yes/No

5) Other major illnesses

6) Surgery

7) Bloodtransfusions Yes/No

6. Social History:

PROCEDURE CARRIED OUT

Date:

Title:

Indication:

Length of operation:

Anaesthesia: a) Type -

b) Complications -

Description of what was done:

Pre-operative antibiotics used/not used

Drainage Yes/No

If yes, state type (e.g. tube drain, corrugated rubber drain, suction drain and others.)

E. CONDITION AT DISCHARGE

Date of discharge:

Assesment - Excellent/good/fair/poor/death

Details of problems:

Summary to include details of all events, modes of treatment, including drugs, physiotherapy, occupational therapy, lenght of stay in the Hospital.

Date reviewed:

Comment on wound: Healed/not Healed/Infected

General Condition Excellent/good/fair/poor/signs of ABC.