The effect of HIV infection on the surgical, chemo-and radiotherapy management of breast cancer: A prospective cohort study

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Highlights

- We prospectively evaluated the management of patients with breast cancer.
- We compared HIV-infected to –noninfected patients.
- There were no excess surgical complications in the patients with HIV infection.
- The two patient groups tolerated courses of radio- and chemotherapy equally.

Abstract

Introduction

Breast cancer is the most common cancer of women in the world. Twenty-five percent of people living with the human immunodeficiency virus (HIV) reside in South Africa. The coincidence of breast cancer and HIV infection is therefore common in South Africa. There is a perception that systemic and local surgical complications are more common in HIV-infected patients, and that these patients tolerate chemo- and radiotherapy poorly.

Aim

The aim of the study was to determine the effect of HIV infection on the management of breast cancer by comparing HIV-infected to -noninfected patients. The outcomes of surgery and adjuvant/neoadjuvant therapy were examined in these groups.

Method

The study was peformed at the Steve Biko Academic Hospital, Pretoria, South Africa, during 2009-2014. Patients scheduled for surgery for breast cancer were recruited prospectively and their HIV status was determined. All patients were managed according to standard guidelines for breast cancer. Patients were followed up for 30 days and local and systemic surgical complications documented. Completion or non-completion of courses of chemo- and radiotherapy, and reasons for non-completion were documented. HIV-infected and -noninfected patients respectively were grouped, and compared statistically.

Results

One hundred and sixty patients (31 HIV-infected) were included. The frequency of surgical complications did not differ significantly between HIV-noninfected and infected patients ($p = 0.08$), more occurring in the HIV-noninfected patients. The risk ratio of HIV infection for surgical complications was 0.20 and the odds ratio 0.23. The completion of courses of chemo- and radiotherapy did not differ between the HIV-infected and –noninfected patients. Twenty-five of 27 HIV-infected patients (93%) and 100 of 113 HIV-noninfected patients (94%) completed their courses of chemotherapy ($p = 0.68$). Twelve of 14 HIV-infected patients (86%) and 40 of 41 HIV-noninfected patients (98%) completed their courses of radiotherapy ($p = 0.16$).

Conclusion

These results suggest that HIV-infected patients with breast cancer do not experience more treatment-related complications and can be treated according to standard guidelines.

Keywords

Breast cancer management; Effect of HIV infection;

Introduction

Breast cancer is the second most common cancer in the world. While the incidence in the developing world is less than in the developed world, the incidence is increasing in sub-Saharan Africa.[1] The estimated age standardised rate is 38.9 cases per 100 000 for the Southern Africa region, and 74.1 for the more developed world.[2] Breast cancer is the most frequent cause of cancer death among women in both the developed and developing world.

Seventy-one percent of people living with human immunodeficiency virus (HIV) live in sub-Saharan Africa, 25% in South Africa.[3] Fifty-eight percent of these patients are women. The population of South Africa is 54 million. Approximately 10.2% of the total population and 16.8% of adults aged 15-49 years are infected with HIV.[4] Breast cancer seems to occur less frequently in patients infected with HIV than in noninfected women. It certainly does not occur more frequently in HIV-infected patients and is classified as non-AIDS-defining.[5] The use of effective antiretroviral drugs (ARVs) has created a large population living with HIV which is susceptible to non-AIDS-defining malignancies.[5] The coincidence of breast cancer and HIV infection in the same patient is therefore common, especially in South Africa.

Curative treatment for early breast cancer is surgical combined with adjuvant chemotherapy and radiotherapy when indicated. The same three modalities are used for advanced disease with different intent. The common surgical complications of breast surgery are wound infection and seroma formation. Complications are not as common or as devastating as in open visceral surgery, but are important because of interference with commencement of adjuvant therapy and because of marring of cosmetic results. The effects of HIV infection on wound healing and surgical site infection are varied and equivocal in published studies. These effects have not been extensively studied in patients undergoing treatment for breast cancer.

Increased toxicity and default rates have been reported for chemotherapy for breast cancer in patients with HIV infection. In a case-matched study, 55% of 52 HIV-infected patients with breast cancer treated with chemotherapy experienced adverse events compared to 30% of HIV-noninfected patients.[6] In a study of 18 HIV-infected patients with breast cancer, 4 of the 10 patients treated with chemotherapy did not complete the course due to toxicity.[7] In an older report (1988-2000) on 20 HIV-infected patients with breast cancer (of whom 10 were suffering from AIDS), 7 of 9 patients tolerated chemotherapy very poorly.[8]

Very little has been published on radiotherapy tolerability in breast cancer patients with HIV infection. In Hurley et al's series HIV-infected patients tolerated local palliative radiotherapy for breast cancer well, but details were not supplied.[8] Other reports describe single cases of radiotherapy for breast cancer.[9, 10]

We hypothesised that HIV-infected patients with breast cancer would experience more short-term surgical complications and would be less likely to complete adjuvant or neoadjuvant cytostatic chemotherapy and radiotherapy courses than HIV non-infected patients. In this study we prospectively compared these parameters in two groups of patients with and without HIV infection. As secondary objectives we evaluated the effect of CD4 cell counts in HIV-infected patients on these parameters, as well as the effect of patient age and stage of disease on the occurrence or otherwise of surgical complications. The biomarker status of cancers were not evaluated in this study which focussed on operative and early postoperative outcomes.

Patients and methods

A prospective observational cohort study of patients undergoing treatment for breast cancer was performed. Specific objectives were to document the occurrence of surgical complications and the completion or noncompletion of courses of chemo- and radiotherapy in patients with or without HIV infection.

Consecutive patients scheduled for primary surgery or surgery after neoadjuvant chemotherapy for breast cancer of all stages were recruited for the study. After registration, patient data were recorded prospectively. Patients whose HIV status was unknown were requested to submit to HIV testing. Patients who refused HIV testing were excluded from the study. All patients were evaluated clinically before commencement of treatment. Specifically any indications of HIV disease such as generalised lymphadenopathy, or of AIDS-associated infection were sought. Clinical management and outcomes were gleaned from case files, as recorded by treating physicians. Demographic data, histological type and stage of disease, and the confirmed HIV status of patients were recorded. In patients with HIV infection a CD4 count was performed and information on ARV drug treatment obtained. Patients not taking ARVs were started on treatment. Data were captured on an Excel spreadsheet.

Patients were treated by standard surgery, chemo- and radiotherapy protocols which are applicable in the three departments, and which comply with international standards. Single dose cefazolin 1-2gm was administered as surgical prophylaxis to all patients, whether HIV-infected or not. Surgery included breast conservation surgery or mastectomy, with or without sentinel lymph node biopsy and/or level 2 axillary block dissection. After surgery patients were followed up during hospitalisation, at the surgical outpatient clinic and at a dedicated multidisciplinary breast cancer clinic. The following local surgical complications were recorded: wound sepsis, wound dehiscence, seroma, haematoma, lymphoedema of the arm, and the need for re-operation. Death within 30 days of surgery was classified as a presumptive surgical complication. The following systemic complications of surgery were recorded: deep venous thrombosis, sepsis and pneumonia. The threshold for follow-up for surgery complications was 30 days. This follow-up encompassed peri-operative events, outpatient clinic observations and any event at home within the first 30 days after surgery.

The files of patients undergoing chemo- and/or radiotherapy were studied weekly and data recorded continuously. The follow-up period for adjuvant therapy extended until the completion or discontinuation of treatment (i.e. until the therapist abandoned treatment of a patient). Completion or non-completion of treatment was documented as well as the reasons for not completing the course.

Statistical Analysis

For the purposes of analysis, patients were grouped as HIV-infected or HIV-noninfected. Data analysis was done in STATA 13. The age of the HIV-infected and –noninfected groups was compared using an unpaired Student's t-test. Categorical variables were compared using the 2-sided Fisher exact test. Risk ratios of surgical complications were calculated for stage of disease (categorical) and patient age (continuous) variables from the incidence, using the effects command in STATA with a chi-square p value. The risk was also adjusted for patient age as a continuous variable by logistic regression yielding an odds ratio. The significance threshold for all calculations was set at 0.05. The study was considered to be exploratory in nature and no formal study sample size calculation was done. We aimed to recruit about 150 patients.

The study was performed at the Steve Biko Academic Hospital in Pretoria, South Africa in the Departments of Surgery, Chemo- and Radiotherapy, during the period of 2009-2014. The hospital is the tertiary referral state hospital for 1 ½ of the 9 provinces of South Africa, and treats mainly non-insured patient. Permission to conduct the study was obtained from the Research Ethics Committee of the Faculty of Health Sciences of the University of Pretoria.

This work is reported in line with the STROBE criteria.[11]

Results

One hundred and sixty-six patients were recruited for the study. The study population is representative of patients referred for comprehensive treatment for breast cancer to state hospitals

in South Africa. All consecutive patients complying with the inclusion criteria were approached for recruitment. The HIV-infected figure of 19% is similar to the 19.7% of 765 breast cancer patients tested in Soweto, Johannesburg.[12] In 6 cases the HIV status could not be determined for various reasons, and these patients were excluded from the study, leaving 160 for analysis (Table 1). All the patients were female and the mean age was 56 (range 29-84) years. There were 82 African patients, 65 white patients, 12 of mixed race and 1 of Indian extraction. The white population group is over-represented: 41% vs 9% of the general population. This is probably due to the higher incidence of breast cancer in whites, older age and to easier access to tertiary medical care by the somewhat more affluent.

Thirty-one patients (19%) were HIV-infected and 129(81%) were HIV-noninfected, reflecting the consecutive recruiting method (Table 1). More black patients were HIV-infected ($p = 0.0004$). Of the 31 HIV-infected patients, 5 had CD4 counts below 200. They were all on ARVs when entered into the study, whereas only 12 (44%) of the 27 patients with CD4 counts above 200 were on ARVs. Two patients were newly-diagnosed with HIV infection when entered into the study. None of the HIV-infected patients were suffering from any AIDS-defining diseases at the time of recruitment.

There was a highly significant difference in the ages of HIV-infected (mean 41 years) and HIV-noninfected patients (mean 55 years) with a p-value of 0.0001 (Table 1). Infiltrating ductal carcinoma accounted for 145 (91%) of histological diagnoses, 29 of 31 (94%) of the HIV-infected and 116 of 129 (90%) of the HIV-noninfected patients ($p = 0.74$). The distribution of cancer types and cancer stages are depicted in table 1. The 7 lobular carcinomas all occurred in HIV-noninfected patients. There was a similarly skewed distribution of the variant ductal carcinomas. However, there was no statistically significant difference in the occurrence of the main groups of cancer, viz infiltrating ductal, non-infiltrating ductal and infiltrating lobular carcinoma between HIV-infected and –noninfected patients ($p = 0.51$, Table 1). There was no statistically significant correlation between the stage of cancer and HIV status. This applied for all stages ($p = 0.36$) as well as when grouping

Table 1. Age, racial group, cancer type and cancer stage of 160 HIV-infected and -noninfected patients.

Variable		HIV-infected patients (n = 31, 19%)	HIV-noninfected patients (n = 129, 81%)	*p*-Value
Age (years): mean (SD)		41 (8.6)	55 (13.9)	0.0001
CD4 Cell count: mean (SD)		406 / μL (206)	—	
Race				
African	82 (51%) □	25	57	□ Black vs White = 0.0004
Mixed race	12 (7%) □	2	10	
White	65 (41%) □	4	61	
Indian	1 (1%)	0	1	
Cancer type				
Infiltrating lobular n 7		0	7	0.51
Ductal Ca# in situ n 8		2	6	
Infiltrating ductal n 145		29	116	
Variant infiltrating ductal carcinomas				
Mucinous		0	4	
Metaplastic		0	3	
Medullary		0	1	
Papillary		0	1	
Cribriform		1	0	
Cancer stage				0.36
0		2	6	
I		2	18	
II		10	45	
III		15	55	
IV		2	5	
0 + I + II	*	14	69	0.43
III + IV	*	17	60	

Ca = Carcinoma

* Cancer stages grouped, earlier and more advanced

□ Black = African + mixed race

earlier stages (0, I, II) and more advanced stages (III, IV), p = 0.43 (Table 1). HIV-infected patients therefore did not present with more advanced cancer.

One hundred and fifty-three patients (96%) underwent breast surgery (Table 2). There were similar proportions of HIV-infected (29 of 31, 94%) and-noninfected (124 of 129, 96%) patients, p = 0.62. The other 7 patients either refused surgery, were not considered for surgery because of the discovery of metastatic disease or died after neo-adjuvant chemotherapy. No instances of pneumonia, sepsis or venous thromboembolism occurred after surgery. Surgical complications occurred in 23 patients, of whom 22 were HIV-noninfected. Fourteen of the complications were wound infections. All were superficial incisional surgical site infections according to the Centres for Disease Control definition.[13] The other local complications (chest wall and axilla) were seromas (3) and haematomata (2). Two patients developed lymphoedema of the arm. No patients required re-operation for complications. The only HIV-infected patient classified with a surgical complication died unexpectantly at home after 3 weeks. There was a large difference in surgical complications between the HIV-noninfected and HIV-infected groups, the occurrence being greater in the HIV-noninfected group, but the difference was not significant (p = 0.08). This applied also to wound infection as depicted in table 2.

The risk ratio of HIV infection of patients for the occurrence of surgical complications was 0.20, 95% CI (0.03 to 1.45). When adjusted for the ages of the patients the ratio was 0.26, 95% CI (0.03 to 1.95), p = 0.11 and when adjusted for the stage of the cancer it was 0.195, 95% CI (0.03 to 1.38), p = 0.10. When adjusted for both patient age and cancer stage the ratio was, 0.24 (0.03 to 1.82), p = 0.17. The effect of patient age, which differed significantly between the groups, on the occurrence of complications was also determined by logistic regression. The odds ratio was 0.23, 95% CI (0.03, 1.93). Analysis of the relationship of CD4 count and surgical complications was not performed as only one complication occurred in the HIV-infected group.

Table 2. Treatment and treatment outcome of HIV-infected and -noninfected patients.

	HIV-infected patients (n = 31, 19%)	**HIV-noninfected patients (n = 129, 81%)**	***p*-Value**
Surgery n 153	29	124	0.62
No Complications	28	103	
Complications (n = 23)	1	21[a]	0.08
Wound infection	0	14	
Haematoma	0	2	
Seroma	0	3	
Lymphoedema	0	3	
Death < 30 days	1	0	
Chemotherapy n 140	27	113	1.0
Completed (n, %)	25 (93)	106 (94)	0.68
CD4 cells/µL: mean (SD)	*416 (211)*	–	
Not completed	2	7	
CD4 cells/µL: mean (SD)	*292 (33)*	–	
Radiotherapy n 55	14	41	0.23
Completed n, %	12 (86)	40 (98)	0.16
CD4 cells/µL: mean (SD)	*471 (67)*	–	
Not completed	2 (14)	1	
CD4 cells/µL: mean (SD)	*345 (41)*	–	

[a]1 patient experienced 2 complications.

Irrespective of HIV status, those patients who experienced local surgical complications were older than those with uncomplicated surgery, mean 58 vs 51 years. The difference was not statistically significant, p = 0.06 (Table 3). Also, considering all patients, 12 complications occurred in patients with stages 0, I and II disease and 9 in patients with stages III and IV disease. This difference too was not significant, p = 0.78. The same was true for the racial group of patients (p = 0.63). Thus, for the whole group of patients, surgical complications were not correlated with patient age, the stage of the cancer or race.

Table 3. Occurrence of surgical complications and wound infection in 153 patients by age and stage of disease (Irrespective of HIV status).2

	Complications (21)	Wound Infection (14)	*p*-Value
Age (years, mean)	Yes 58 } *	Yes 55.1 } ϕ	0.06
	No 55.4 } *	No 51.8 } ϕ	0.4
Stage 0 + I + II (n 82)	12 } *	7 } ϕ	*0.82
Stage III + IV (n 71)	9 } *	7 } ϕ	ϕ0.79
Black□ (n94)	11 } *	7 } ϕ	*0.63
White (n65)	10 } *	7 } ϕ	ϕ0.57

Comparison of surgical complications* and wound infection ϕ for age, earlier and advanced disease, and race respectively.
□Black = African + mixed race

Chemotherapy was administered to 140 (88%) patients (Table 2). The proportions of HIV-infected (27 of 31, 87.1%) and –noninfected (113 of 129, 87.6%) were similar, p = 1.0. Twenty-five (93%) and 106 (94%) of these patient groups respectively completed the course. There was no statistically significant difference between these proportions (p = 0.68, Table 2). In all cases chemotherapy consisted of standard regimens of combination 5-fluorouracil, doxorubicin and cyclophosphamide (FAC). Of the 9 patients who did not complete the course, 2 were HIV-infected. In both these cases chemotherapy was curtailed because of severe neutropaenia. One patient later completed a course of radiotherapy; the other died during the course of radiotherapy because of advanced disease. Of the 7 HIV-noninfected patients who did not complete chemotherapy, 2 defaulted, 2 died, 1 had

severe neutropaenia, 1 had severe neuropathy and 1 was lost to followup. Twenty patients (4 HIV-infected) did not receive chemotherapy for various reasons: 1 had favourable *in situ* carcinoma, 3 had heart disease, 4 died while awaiting treatment, 7 refused chemotherapy or absconded and 5 patients were referred too late (after 84 days).

Fifty-five patients (34%) were treated with radiotherapy (Table 2). The proportions of HIV-infected (14 of 31, 45%) and –noninfected (41 of 129, 32%) patients were similar, p = 0.23. Twelve (86%) and 40 (98%) of HIV infected and –noninfected patients respectively completed the course (Table 2). This difference was not statistically significant (p = 0.16). One HIV-infected patient had progression of disease and the other died while on radiotherapy treatment.

The CD4 cell counts of the HIV-infected patients in this study were not particularly low. The mean count for the whole group was 406 cells/μL. The mean CD4 cell counts of patients who did and did not complete adjuvant therapy courses were: chemotherapy 416 and 292 cells/μL, and radiotherapy 471 and 345 cell/μL, respectively. However, statistical analysis was not performed because of the small numbers of patients in the groups not completing therapy (Table 2).

Discussion

To our knowledge this is the first prospective study to address the issue of the influence of HIV infection on the outcome of the management of breast cancer. The study was conducted because of a general perception of poor healing, sepsis and intolerance to chemo- and radiotherapy in HIV-infected patients. HIV infected patients were compared to non-infected patients with regard to surgical complications and the ability to complete their courses of adjuvant therapy. We did not find a significant difference in any of these parameters between the two groups. The apparently poorer outcome of surgery was in the HIV-noninfected patients, although the difference was not statistically significant. However, the single case of a surgical complication in an HIV-infected patient and a wide risk ratio confidence interval, made the significance of this finding uncertain.

Older studies published in the 1980s and 1990s indicated higher rates of poor wound healing and sepsis in HIV-infected patients subjected to surgery.[14, 15] There was much pessimism about treating cancer in HIV-infected patients then. It was felt that "Patients achieving remission from their cancer are destined to die from AIDS.....".[16] More recently, effective ARVs are available and patients are living with HIV without debilitating AIDS-defining diseases. Current literature reflects healthier patients with HIV infection who have better outcomes from surgery.[17] Certain factors may still be associated with increased infective complications in these patients. Su et al recently analysed pre-operative risk factors for postoperative sepsis in HIV-infected patients.[18] They found that low serum albumin, a low CD4 count, major surgery, abdominal surgery and dirty wounds were associated with sepsis. Horberg et al in a retrospective, paired-patient study found that only pneumonia occurred at a greater frequency in HIV-infected patients undergoing surgery.[17] They also reported that, in the HIV-infected patients, only a higher HI viral load and a CD4 cell count less than 50/μL was associated with more surgical complications. These two studies included many different types of surgery, both major and minor, whereas ours was on breast surgery only.

No cases of systemic sepsis or pneumonia occurred in any of our patients with or without HIV infection. This is partly due to the low rate of systemic complications that is expected in breast surgery. A large review by El-Tamer et al of data from the National Surgical Quality Improvement Program (NSQIP) of the American College of Surgeons reported higher surgery complication rates for mastectomy than breast conservation surgery.[19] The survey found that cardiac and pulmonary complications, while more frequent in patients undergoing mastectomy than lumpectomy, were nevertheless uncommon. In fact, in their report no cardiac or pulmonary complications occurred in 1441 patients undergoing lumpectomy. There is an increased risk of venous thromboembolism in HIV-infected patients and several clinical studies have demonstrated this.[20] However, Horberg et al found no greater risk in HIV-infected than noninfected patients undergoing surgery in the antiretroviral therapy era.[16] In their study of 332 pairs of HIV-infected and -noninfected patients they found no excess of "cardiopulmonary" events in the HIV-infected group. Venous

thromboembolism is not specifically reported. In the current study no instances of deep venous thrombosis or pulmonary embolism were recorded, although the cause of death in the patient who died at home after surgery is unknown.

There is some animal experimental evidence that lymphocyte depletion may delay wound healing.[21] This would therefore be a theoretical reason for poor wound healing in HIV-infected patients. This has not been demonstrated clinically. Much of the human wound healing studies in HIV infection have been done on circumcision. Rogers et al found no difference in healing time between 108 HIV-infected and 108 age-matched HIV-noninfected men after circumcision.[22] Postoperative infection delayed wound healing equally in both groups. Delayed healing in HIV-infected patients undergoing haemorrhoidectomy has been reported.[23] In our study no instances of deficient wound healing or dehiscence occurred, admittedly in a more hospitable surgical environment.

The spectre of wound sepsis looms over surgery performed on HIV-infected patients.[24, 25] However, in the current study the 14 cases of wound infection all occurred in HIV-noninfected patients. The absence of excess wound infection rates in HIV-infected patients has also been reported in comparative studies in orthopaedic[26], cardiovascular[27] and various other types of surgery.[17] In the latter study wound infection occurred in 3.9 and 4.8% in HIV-infected and non-infected patients respectively. Our study extends these findings in patients undergoing breast surgery.

The HIV-infected patients in this study did not experience more surgical complications than the noninfected patients. In fact, the risk ratio of HIV-infection for complications was 0.20, and the odds ratio 0.23, albeit with a wide 95% confidence interval. The higher rate of surgical complications in the HIV-noninfected patients is difficult to explain. The affected patients were significantly older than the HIV-infected patients. This age difference was not unexpected as HIV infection occurs in younger people.[4] It is, nevertheless, a plausible explanation for the excess of surgical

complications. However, this excess is unlikely to apply in these patients, whose mean age was only 55 years. Also, when adjusted for patient age, neither the risk ratio nor the odds ratio of HIV-infection for surgical complications revealed statistical significance. Surgical complications including sepsis and haemorrhage have been reported to occur more frequently in breast cancer surgery in patients with more advanced disease.[28] However, in our study the stage of disease did not differ between the groups with and without surgical complications. Furthermore, the risk ratio of HIV infection for surgical complications did not reveal statistical significance when adjusted for the stage of the cancer. In addition, irrespective of HIV status, surgical complications were not statistically correlated with patient age ($p = 0.06$), the stage of the cancer ($p = 0.78$) or race ($p = 0.63$). The difference in wound sepsis may possibly be explained by different peri-operative anti-infection measures. However, the patients in this study were all managed according to the same standard departmental protocols. The mean CD4 count of the HIV-infected patients who did not experience surgical complications was 411 cells/µl and that of the patient who did was 179 cells/µl (Table2). While it could be speculated that the latter patient was more immunosuppressed than the other HIV-infected patients, this was not analysed statistically because of the single patient involved.

Little information is available on the outcome of cancer chemotherapy for breast cancer in HIV-infected patients. Older literature reflects status before the advent of effective ARVs. Hurley et al reported poor tolerance of chemotherapy in 7 of 9 patients.[8] Ten of the 20 reported patients however, were suffering from AIDS. In a matched, retrospective cohort study of patients treated between 1996 and 2011, Parameswaran et al found that the HIV-infected patients experienced more adverse events while on chemotherapy treatment than the non-infected patients.[6] This was largely due to protracted neutropaenia and may have been partly due to the use of zidovudine (AZT), a known myelosuppressant, by several of the HIV-infected patients. The authors suggest that changing anti-HIV regimens to non-protease inhibitor (PI) and non-AZT-based treatment should be considered in HIV-infected patients. A similar pattern is described by Singh et al in a report on 18 HIV-infected patients treated for breast cancer.[7] In that study 4 patients could not complete their

chemotherapy course. The most common toxicity was neutropaenia. Four of the 5 patients requiring delay in treatment were on PI based ARV regimens. Severe neutropaenia occurs in about one fifth of patients on FAC.[29] Therapy had to be discontinued in 3 patients in the current study due to neutropaenia, including only 2 of 27 HIV-infected patients.

Very little data is available regarding the use of radiotherapy in HIV-infected patients. There is a perception that increased radiosensitivity in these patients leads to more severe skin and mucosal toxicities.[30] This idea has however been disputed.[31] Epithelial toxicities have especially been reported in the treatment of AIDS-defining malignancies. Although the literature is scanty, radiotherapy seems to be well-tolerated by HIV infected patients with breast cancer.

Irradiation has an effect on peripheral lymphocyte counts. CD4 cells have been shown to decrease during radiation treatment of breast[32] and lung cancer.[33] This may be expected to enhance the effect of HIV on CD4 cells but has not been reported to affect the incidence of infection in HIV-infected patients treated by irradiation.[30] Our study did not show an increase in acute infection in the HIV-infected group. The study followup was too short to demonstrate the infections in which cell-mediated immunity is protective and that are common in patients with low CD4 counts.

Two HIV-infected patients did not complete their course of radiotherapy in our study. The majority therefore tolerated standard treatment courses. No dermal or mucosal toxicity was experienced by the patients in this study.

The study has some limitations. Only age and the stage of the cancer, which the authors considered to be the most apposite, were considered as possible contributing factors in the causation of surgical complications. It is possible that the prevalence of other factors such as diabetes mellitus, smoking and obesity could have differed between the two groups. The study was exploratory in nature and it is possible that a larger sample size would have been required to reject the null hypothesis. Type II errors may therefore have occurred in analysis of the data. The statistical analysis was nevertheless

performed and is presented. The trend is clearly towards HIV infected patients being able to tolerate standard treatment for breast cancer.

Conclusion

This study supports the proposition that HIV-infected patients subjected to surgery for breast cancer do not experience more surgical complications than HIV-noninfected patients. Similarly they are also able to tolerate and complete the courses of chemo- and radiotherapy as do HIV-noninfected patients. In the current era of ARV use, HIV-infected patients are not generally afflicted with AIDS-defining diseases and low CD4 cell counts, and these results suggest that they can tolerate most forms of treatment for cancer well.

Ethical approval

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Author contribution

1) B.P. Phakathi. Design, Collection of data, writing of paper, final approval.
2) G. Basson. Design, Collection of data, writing of paper, final approval.
3) V.O.L. Karusseit. Concept, design, analysis of data, writing of paper, revisions, final approval.
4) S.A.S. Olorunju. Statistical planning, statistical interpretation of data, revision of statistics, writing description of statistics, final approval.
5)T Mokoena. Study design, Intellectual input, Revision of paper.

Conflicts of interest

No conflicts of interest.

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Guarantor

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