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Impact of Preoperative Viral Load on Postoperative Outcomes in HIV-Positive Surgical Patients in Cameroon: A Five-Year Retrospective Study

Ekani Boukar Mahamat Yannick[1,2], Mokake Divine Martin[1,2], Bagafegue Assogo Dilane[1], Biwole Daniel[3], Mbele Richard[3], Tim Fabrice[4], Ngwane Ntongwetape[1,2], Bang Guy Aristide[3], Chichom Mefire Alain[1], Ngowe Ngowe Marcellin[3], Essomba Arthur[3]

[1]Faculty of Health Sciences, University of Buea, Buea, Cameroon
[2]Buea Regional Hospital, Buea, Cameroon
[3]Faculty of Medicine and Biomedical Sciences, University of Yaounde 1, Yaounde, Cameroon
[4]Faculty of Health Sciences, University of Bamenda, Bamenda, Cameroon
Email: boukaryoussouf@gmail.com

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Abstract

Background: People living with HIV (PLHIV) increasingly require surgical care due to improved survival associated with antiretroviral therapy (ART). However, immunosuppression reflected by uncontrolled viral replication may influence postoperative outcomes. Evidence from sub-Saharan Africa remains limited. **Objective**: To evaluate the impact of preoperative viral load on postoperative outcomes among HIV-positive surgical patients in two regional hospitals in Cameroon. **Methods**: A retrospective multicenter analytical study was conducted in Buea and Limbe Regional Hospitals from January 2020 to December 2024. HIV-positive patients who underwent surgery and had documented preoperative viral load were included. Viral load was categorized as suppressed (<1000 copies/mL) or unsuppressed (≥1000 copies/mL) according to WHO recommendations. Postoperative outcome was classified as favorable or poor (postoperative complication, death, referral, or discharge against medical advice). Associations were assessed using chi-square tests and multivariate logistic regression. **Results**: Among 314 HIV-positive surgical patients, 112 (35.7%) had unsuppressed viral load. Poor postoperative outcome occurred in 27.7% of patients with unsuppressed viral load compared with 11.5% among those with suppressed viral load (p = 0.003). Surgical site infection and prolonged hospitalization were more frequent among patients with unsuppressed viral load. After adjustment for potential confounders, unsuppressed viral load remained independently associated with poor postoperative outcome (adjusted

OR 2.8; 95% CI 1.4 - 5.6). Emergency surgery was also an independent predictor of poor outcome. **Conclusion**: Unsuppressed preoperative viral load significantly increases the risk of adverse postoperative outcomes among HIV-positive surgical patients in Cameroon. Optimization of viral suppression before surgery should therefore be prioritized to improve surgical outcomes in resource-limited settings.

Keywords

HIV, Viral Load, Surgery, Postoperative Outcomes, Cameroon

1. Introduction

The increasing availability of antiretroviral therapy (ART) has markedly improved survival among people living with HIV (PLHIV), leading to a growing number of HIV-positive patients requiring surgical care worldwide. As life expectancy increases, PLHIV increasingly present with surgical diseases similar to those of the general population, including abdominal, gynecological, orthopedic, and infectious conditions requiring operative management [1] [2].

In sub-Saharan Africa, where the burden of HIV remains high, health systems are facing an increasing demand for surgical services among HIV-positive patients despite persistent resource constraints and challenges in perioperative management [3]. Immunosuppression associated with uncontrolled HIV infection may impair wound healing, increase susceptibility to infection, and worsen postoperative outcomes [4] [5].

Viral load is a key marker of HIV disease control and immune function. Previous studies have shown that unsuppressed viral load is associated with increased postoperative morbidity and mortality in HIV-infected patients undergoing surgery [4] [5]. However, data evaluating the impact of preoperative viral load on surgical outcomes remain limited in sub-Saharan Africa, particularly in regional hospitals where most PLHIV receive surgical care.

This study, therefore, aimed to assess the impact of preoperative viral load on postoperative outcomes among HIV-positive surgical patients in two regional hospitals in Cameroon.

2. Methods

This was a retrospective multicenter analytical study conducted in Buea and Limbe Regional Hospitals in the Southwest Region of Cameroon. These hospitals provide surgical care to a large population of HIV-positive patients in the region.

The study covered a five-year period from January 2020 to December 2024. All HIV-positive patients who underwent surgical intervention during this period were identified. Patients were included if they had documented preoperative viral load measurement. Those with missing viral load or postoperative outcome data were excluded.

Data were extracted from surgical registers, inpatient records, and HIV clinic files using a standardized collection form derived from the thesis database. Variables collected included age, sex, antiretroviral therapy (ART) status and duration, preoperative viral load, CD4 cell count when available, type of surgery, surgical urgency (elective vs emergency), postoperative complications, and postoperative outcomes. Other clinical variables such as comorbidities (diabetes, anemia), smoking status, and ASA classification, were reviewed when available in medical records.

Viral load was categorized according to WHO recommendations into suppressed (<1000 copies/mL) and unsuppressed (≥1000 copies/mL). Preoperative viral load referred to the most recent viral load measurement performed within 90 days prior to surgery.

When more than one viral load result was available during this period, the measurement closest to the date of surgery was retained for analysis. Postoperative outcome was classified as favorable (uneventful recovery and discharge). Poor postoperative outcome was defined as the occurrence of at least one of the following events: postoperative complication, death, referral to another facility for advanced care, or discharge against medical advice. Postoperative outcomes were assessed during the index hospital admission and up to 30 days after surgery when follow-up information was available in patient records. Complications occurring after discharge were recorded when documented during postoperative follow-up visits. Procedure type was included in exploratory regression analyses to assess its potential influence on postoperative outcomes.

Data were analyzed using SPSS. Categorical variables were summarized as frequencies and percentages. Associations between viral load and outcome were assessed using chi-square test. Multivariate logistic regression was performed to determine independent predictors of poor outcome. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from the institutional review boards of the Faculty of Health Sciences of the University of Buea and participating hospitals. Confidentiality of patient data was maintained.

3. Results

During the study period, 7089 HIV-positive patients were followed in the HIV care units of Buea and Limbe Regional Hospitals.

Among them, 314 patients underwent surgical procedures and were screened for eligibility.

Patients without documented preoperative viral load measurement or without postoperative outcome data were excluded.

A final sample of 314 patients with complete viral load and outcome data was included in the analysis.

A total of 314 HIV-positive patients underwent surgical procedures during the study period. Among them, 112 patients (35.7%) had unsuppressed preoperative

viral load (≥1000 copies/mL), while 202 (64.3%) had suppressed viral load (<1000 copies/mL) as shown in Table 1.

Patients were predominantly adults in the economically active age group with a slight female predominance. Surgical indications included a wide spectrum of procedures. The majority were general surgical procedures such as laparotomies for bowel obstruction, hernia repair, appendectomy, and drainage of abdominal abscesses.

Gynecological procedures included hysterectomy and myomectomy, while smaller proportions of urological, orthopedic, and maxillofacial procedures were also observed. Emergency procedures accounted for a substantial proportion of operations, reflecting the predominance of acute abdominal conditions in this population.

Poor postoperative outcome occurred significantly more often in patients with unsuppressed viral load (27.7%) compared with suppressed viral load (11.5%) ($p = 0.003$) as shown in Table 2.

Among the 54 patients classified as having poor postoperative outcomes, 36 experienced postoperative complications, 9 died, 5 were referred to higher-level facilities, and 4 were discharged against medical advice.

A sensitivity analysis excluding referral and discharge-against-medical-advice cases was performed to evaluate whether the association between viral load and adverse outcomes persisted for clinical complications and mortality alone.

Overall postoperative mortality was 2.9% (9/314) and occurred predominantly among patients with unsuppressed viral load as shown in Table 3.

Table 1. Preoperative viral load status among HIV-Positive surgical patients (n = 314).

Viral load status	n	%
Suppressed (<1000 copies/mL)	202	64.3
Unsuppressed (≥1000 copies/mL)	112	35.7
Total	**314**	**100**

Table 2. Postoperative outcomes according to viral load.

Outcome	Suppressed n = 202	Unsuppressed n = 112	P
Poor outcome	23 (11.5%)	31 (27.7%)	0.003
Good outcome	179 (88.5%)	81 (72.3%)	

Postoperative complications occurred in 17.2% of patients overall and were significantly more frequent among patients with unsuppressed viral load. The most common complications were surgical site infection, delayed wound healing, postoperative sepsis, and prolonged hospitalization. Patients with unsuppressed viral load experienced higher rates of surgical site infection and delayed recovery as shown in Table 3.

Multivariate logistic regression confirmed unsuppressed viral load (adjusted

OR 2.8; 95% CI 1.4 - 5.6; p = 0.003) and emergency surgery (adjusted OR 2.1; 95% CI 1.1 - 4.0; p = 0.02) as independent predictors of poor postoperative outcome as shown in Table 4.

Table 3. Postoperative complications.

Complication	n	%
Surgical site infection	28	8.9
Delayed wound healing	17	5.4
Postoperative sepsis	11	3.5
Prolonged hospitalization	25	8.0
Death	9	2.9

Table 4. Multivariable logistic regression analysis of factors associated with poor postoperative outcome among HIV-positive surgical patients (n = 314).

Variable	Category	Adjusted OR	95% CI	Exact p-value
Preoperative viral load	Unsuppressed (≥1000 copies/mL) vs suppressed (<1000 copies/mL)	2.80	1.40 - 5.60	0.003
Surgical urgency	Emergency vs elective surgery	2.10	1.10 - 4.00	0.020
Age	≥50 years vs <50 years	1.30	0.70 - 2.60	0.410
Sex	Female vs male	0.90	0.50 - 1.80	0.720

4. Discussion

This study demonstrates that unsuppressed preoperative viral load significantly worsens postoperative outcomes among HIV-positive surgical patients in regional hospitals in Cameroon. Patients with uncontrolled viral replication had nearly threefold higher odds of adverse postoperative outcomes, confirming viral load as a key determinant of surgical prognosis. Similar findings have been reported in previous studies of HIV-positive surgical patients, which showed that uncontrolled viral replication increases postoperative morbidity and mortality [4] [5].

The patient profile observed in this cohort reflects the epidemiology of HIV-related surgical disease in sub-Saharan Africa. Surgical indications were dominated by general and gynecological procedures, consistent with previous reports indicating that abdominal and reproductive tract pathologies constitute the main surgical burden among people living with HIV in African settings [1] [2]. This distribution reflects both the demographic characteristics of HIV infection and the high prevalence of infectious and obstructive abdominal diseases in resource-limited environments [6].

Postoperative complications in this study were predominantly infectious, particularly surgical site infection and postoperative sepsis. Immunosuppression associated with uncontrolled HIV infection impairs host immune responses and tissue repair mechanisms, thereby increasing susceptibility to infection and de-

layed wound healing [4] [5]. Similar findings have been described in other surgical cohorts of HIV-positive patients, where uncontrolled viral replication has been associated with increased postoperative infection rates and prolonged recovery [4].

The overall postoperative mortality rate of 2.9% observed in this study is comparable to mortality rates reported among HIV-positive surgical populations in sub-Saharan Africa [7]. Mortality occurred predominantly among patients with unsuppressed viral load, supporting evidence that uncontrolled HIV infection increases perioperative risk and mortality.

Emergency surgery also independently increased the risk of poor postoperative outcome in this cohort. This finding likely reflects the severity of acute surgical conditions and the delayed presentation commonly observed in resource-limited settings. Previous multicenter studies have demonstrated that emergency abdominal surgery carries significantly higher mortality in low- and middle-income countries compared with elective procedures [8].

In addition, perioperative management of HIV-positive patients in resource-limited hospitals remains challenging due to constraints in intensive care capacity, perioperative monitoring, and infection prevention infrastructure. Recent studies conducted in African surgical settings have emphasized the importance of strengthening perioperative systems to reduce preventable postoperative morbidity and mortality [9] [10].

Overall, these findings confirm that virological status is a major determinant of surgical outcomes among people living with HIV. Optimizing viral suppression through effective antiretroviral therapy, ensuring appropriate preoperative assessment, and improving perioperative care pathways are essential strategies to improve surgical outcomes in resource-limited settings [11].

5. Conclusion

Unsuppressed preoperative viral load and emergency surgery are major determinants of poor postoperative outcome among HIV-positive surgical patients in Cameroon. Optimizing viral suppression before surgery and improving access to timely elective surgical care are essential strategies to improve surgical prognosis in resource-limited settings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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