

# Impact of Preoperative HIV Serology on Postoperative Outcomes: A Prospective Cohort Study in Elective Surgery

Deepika Pandey<sup>1\*</sup>, Atul Kumar Saroj<sup>2</sup>, Rahul Paul<sup>3</sup>, Rama Saha<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Pathology, Dr Sonelal Patel Autonomous State Medical College, Pratapgarh, Uttar Pradesh, India

<sup>2</sup>Assistant Professor, Department of Orthopedics, Dr Sonelal Patel Autonomous State Medical College, Pratapgarh, Uttar Pradesh, India

<sup>3</sup>Assistant Professor, Department of Pathology, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur, West Bengal, India

<sup>4</sup>Associate Professor, Department of Pathology, All India Institute of Medical Sciences, Kalyani, West Bengal, India

**\*Address for Correspondence:** Dr. Deepika Pandey, Assistant Professor, Department of Pathology, Dr Sonelal Patel Autonomous State Medical College, Pratapgarh, Uttar Pradesh, India

**E-mail:** [pandey.deepika831@gmail.com](mailto:pandey.deepika831@gmail.com)

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## ABSTRACT

**Background:** Preoperative HIV serology is variably performed before elective surgery. The presence of HIV may influence postoperative infection risk, wound complications, length of stay (LOS), ICU admission, and 30-day mortality. This prospective cohort study evaluated the association between preoperative HIV seropositivity and postoperative outcomes.

**Methods:** We conducted a prospective cohort study of 600 adults undergoing elective surgery at a tertiary care centre. Preoperative HIV serology was performed for all participants. The primary outcome was postoperative infectious complications within 30 days. Secondary outcomes included wound complications, ICU admission, length of hospital stay, and 30-day mortality. Outcomes were compared between HIV-positive and HIV-negative patients, with logistic regression adjusted for age and ASA class.

**Results:** Among 600 patients, 60 (10%) were HIV positive. Postoperative infection occurred in 16.7% of HIV-positive patients compared to 6.5% of HIV-negative patients. Median length of hospital stay was longer in HIV-positive patients (7 days vs 5 days). HIV seropositivity was independently associated with higher odds of postoperative infection (adjusted OR 2.9). ICU admission and 30-day mortality were numerically higher among HIV-positive patients, though absolute numbers were small.

**Conclusion:** Preoperative HIV seropositivity was associated with increased postoperative infectious complications and prolonged hospital stay. Identification of HIV status may facilitate improved perioperative risk stratification and targeted preventive care. Further multicentre studies are required to optimize surgical outcomes in people living with HIV.

**Key-words:** HIV, Preoperative testing, Elective surgery, Postoperative infection, Surgical outcomes, Prospective cohort

## INTRODUCTION

Human Immunodeficiency Virus (HIV) infection remains a major global public health concern; however, widespread use of antiretroviral therapy (ART) has significantly improved survival.

Consequently, an increasing number of HIV-positive individuals now undergo elective surgical procedures, making perioperative management clinically important. Despite therapeutic advances, HIV infection continues to be associated with immune dysregulation that may influence surgical outcomes. <sup>[1]</sup> Preoperative evaluation seeks to identify conditions that increase postoperative morbidity and mortality. HIV infection affects both innate and adaptive immune responses, potentially impairing wound healing and increasing the risk of postoperative infections. Earlier pre-ART era studies reported higher postoperative complication rates among

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HIV-positive patients, though their relevance in the current ART era remains uncertain. <sup>[2]</sup> The introduction of combination ART has substantially reduced HIV-related morbidity and mortality. Recent studies suggest that patients with well-controlled HIV infection may have surgical outcomes comparable to HIV-negative individuals; however, variability in immune status and treatment adherence continues to contribute to differing postoperative risk profiles. <sup>[3]</sup> Postoperative infectious complications are a major cause of prolonged hospital stay, increased healthcare costs, and adverse outcomes. HIV-associated immunosuppression, even in patients receiving ART, may predispose individuals to surgical site infections, delayed wound healing, and secondary infections. Consequently, preoperative identification of HIV serostatus may contribute to improved perioperative risk stratification and preventive strategies. <sup>[4]</sup> Routine preoperative HIV testing is not uniformly practiced. While some guidelines recommend risk-based testing, others support broader screening in regions with higher HIV prevalence. Ethical considerations, informed consent, stigma, and cost-effectiveness continue to influence institutional testing policies. <sup>[5]</sup> Although several post-2000 observational studies have evaluated surgical outcomes in HIV-positive patients, many are limited by retrospective designs, small sample sizes, or inadequate adjustment for confounding factors such as age, ASA physical status, and surgical complexity. <sup>[6]</sup> Prospective cohort studies offer a more robust approach to assessing the independent impact of HIV serostatus on outcomes, including postoperative infection, ICU admission, length of hospital stays, and short-term mortality. <sup>[7,8]</sup> Therefore, this prospective cohort study was conducted to evaluate the impact of preoperative HIV serology on postoperative outcomes among patients undergoing elective surgery, with particular emphasis on infectious complications, wound morbidity, length of hospital stays, ICU admission, and 30-day mortality. <sup>[9]</sup>

## MATERIALS AND METHODS

This prospective cohort study was conducted at a tertiary care teaching hospital and included consecutive adult patients undergoing elective surgical procedures. Approval was obtained from the Institutional Ethics Committee, and written informed consent was secured from all participants for study enrolment and

preoperative HIV testing in accordance with institutional and national guidelines.

### Inclusion Criteria

- ❖ Adults aged  $\geq 18$  years scheduled for elective operative procedures requiring general/regional anesthesia.
- ❖ Consent to preoperative HIV serology and participation in data collection.
- ❖ Ability to comply with 30-day postoperative follow-up (clinic visit or telephone contact).

### Exclusion Criteria

- ❖ Emergency or urgent surgery.
- ❖ Known active systemic infection at the time of surgery.
- ❖ Known immunosuppressive therapy for non-HIV indications (e.g., high-dose corticosteroids, chemotherapy within prior 6 weeks).
- ❖ Prior organ transplantation.
- ❖ Refusal of HIV testing or withdrawal of consent.

**Preoperative evaluation and HIV testing-** All participants underwent a standardized preoperative assessment, including demographic details, American Society of Anesthesiologists (ASA) physical status classification, and relevant comorbidities. HIV serological testing was performed using hospital-approved rapid/ELISA methods with confirmatory testing as per national algorithms. Appropriate pre- and post-test counseling and confidentiality were ensured. Patients were categorized as HIV-positive or HIV-negative based on confirmed serology.

**Perioperative Management-** Perioperative care, including antibiotic prophylaxis, skin preparation, and surgical techniques, was performed in accordance with institutional standard protocols. Decisions regarding continuation of antiretroviral therapy and other perioperative modifications were individualized and documented.

**Outcomes-** The primary outcome was the occurrence of any postoperative infectious complication within 30 days of surgery, including surgical site infection, pneumonia, urinary tract infection, or bloodstream infection.



Secondary outcomes included wound complications requiring intervention, ICU admission during index hospitalization, length of hospital stay, and 30-day all-cause mortality.

**Data collection and follow-up-** Baseline, intraoperative, and postoperative data were collected prospectively using standardized case record forms. Outcomes were assessed during hospital stay and at 30-day follow-up.

**Statistical Analysis-** Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as mean  $\pm$  standard deviation or median (interquartile range), as appropriate. Comparisons between HIV-positive and HIV-negative groups were performed using chi-square or Fisher's

exact test for categorical variables and Student's t-test or Mann-Whitney U test for continuous variables. Multivariable logistic regression was used to evaluate the association between HIV status and postoperative infection after adjustment for age and ASA class, with results reported as adjusted odds ratios and 95% confidence intervals. A  $p$ -value $<0.05$  was considered statistically significant.

## RESULTS

A total of 600 patients undergoing elective surgical procedures were included in the study. Among them, 60 patients (10%) were HIV positive, while 540 patients (90%) were HIV negative. Baseline demographic and clinical characteristics of the study population according to HIV status are summarized in Table 1.

**Table 1:** Baseline Characteristics of Study Participants by HIV Status

Variable	HIV Negative (n=540)	HIV Positive (n=60)
Mean age (years)	44.8 $\pm$ 11.9	46.2 $\pm$ 12.4
Male sex	298 (55.2%)	33 (55%)
ASA Class III	96 (17.8%)	18 (30%)
Elective high-risk surgery	74 (13.7%)	11 (18.3%)

Baseline demographic characteristics were comparable between the two groups. However, a higher proportion of HIV-positive patients belonged to ASA class III,

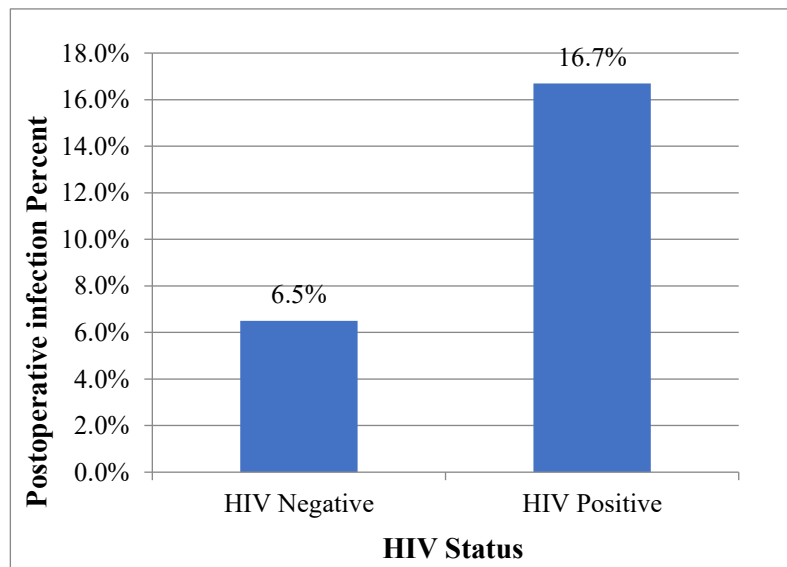
indicating greater preoperative physiological risk (Table 2).

**Table 2:** Postoperative Outcomes by HIV Status

Outcome	HIV Negative (n=540)	HIV Positive (n=60)
Postoperative infection	35 (6.5%)	10 (16.7%)
Wound complications	21 (3.9%)	8 (13.3%)
ICU admission	14 (2.6%)	5 (8.3%)
Median LOS (days)	5.0 (IQR 4–6)	7.0 (IQR 6–9)
30-day mortality	3 (0.6%)	2 (3.3%)

HIV-positive patients demonstrated significantly higher rates of postoperative infection and wound

complications. Length of hospital stay was also longer in the HIV-positive group (Fig. 1).



**Fig. 1:** Postoperative Infection Rate by HIV Status

After adjustment for age and ASA class, HIV positivity remained an independent predictor of postoperative infection (Table 3).

**Table 3:** Multivariable Logistic Regression for Postoperative Infection

Variable	Adjusted OR	95% CI	p-value
HIV-positive status	2.9	1.4 – 5.8	0.003
Age (per year)	1.01	0.99 – 1.03	0.18
ASA Class III	2.1	1.2 – 3.9	0.01

HIV-positive patients had a significantly prolonged hospital stay compared to HIV-negative patients (Table 4).

**Table 4:** Comparison of Length of Hospital Stay

Group	Median LOS (days)	p-value
HIV-Negative	5.0	<0.01
HIV-Positive	7.0	

## DISCUSSION

In this prospective cohort study, preoperative HIV seropositivity was associated with a significantly higher risk of postoperative infectious complications among patients undergoing elective surgery. Even in the contemporary antiretroviral therapy era, HIV-positive status remained an independent predictor of postoperative infection after adjustment for age and ASA physical status, indicating that HIV infection continues to have clinical relevance in surgical risk assessment. <sup>[10]</sup>

These findings are consistent with several post-2000 studies reporting increased surgical site infection rates in HIV-positive patients compared to HIV-negative individuals. Persistent immune dysregulation, chronic inflammation, and incomplete immune reconstitution despite antiretroviral therapy have been proposed as underlying mechanisms contributing to increased susceptibility to postoperative infections. <sup>[11]</sup> While some studies suggest that patients with well-controlled HIV infection and adequate CD4 counts may have outcomes comparable to the general population, such detailed

immunological parameters are not always readily available during routine preoperative evaluation. In this context, HIV serostatus itself may serve as a pragmatic marker to identify patients who may benefit from enhanced perioperative monitoring and preventive strategies.<sup>[12]</sup> The higher incidence of wound-related complications observed among HIV-positive patients in this study aligns with previous literature demonstrating impaired wound healing in HIV infection. Alterations in collagen metabolism, endothelial dysfunction, and delayed inflammatory responses may collectively impair tissue repair and predispose patients to wound infection and dehiscence.<sup>[13]</sup>

Length of hospital stay was significantly prolonged among HIV-positive patients in the present study. Prolonged hospitalization has been consistently reported in HIV-infected surgical patients and is often attributable to higher complication rates, delayed wound healing, and cautious postoperative observation. Increased length of stay has important implications for healthcare resource utilization and patient quality of life.<sup>[14]</sup> Although ICU admission and 30-day mortality were more frequent in HIV-positive patients, these differences were not statistically robust due to the low absolute number of events. Similar observations have been reported in recent studies, suggesting that while HIV infection increases postoperative morbidity, short-term mortality following elective surgery may not be markedly elevated in the ART era.<sup>[15]</sup> The clinical relevance of routine preoperative HIV testing remains debated; however, the findings of this study support its role in perioperative risk stratification. Knowledge of HIV serostatus allows clinicians to optimize antiretroviral therapy adherence, strengthen infection prevention measures, and plan appropriate postoperative surveillance, thereby potentially reducing adverse outcomes.<sup>[16]</sup> The strengths of this study include its prospective design, standardized data collection, and focus on elective surgical procedures. Nonetheless, certain limitations must be acknowledged. The absence of CD4 count, viral load, and ART adherence data limits the ability to assess the impact of HIV disease severity on postoperative outcomes. Additionally, the single-centre design may limit the generalizability of the findings.<sup>[17]</sup> Future studies should incorporate immunological markers and multicentre designs to define risk stratification among HIV-positive surgical patients. Interventional research

evaluating targeted perioperative optimization strategies may further clarify whether the excess postoperative morbidity associated with HIV infection can be effectively reduced.<sup>[18]</sup>

## CONCLUSIONS

Preoperative HIV seropositivity was independently associated with increased postoperative infectious complications and prolonged hospital stay among patients undergoing elective surgery. Identification of HIV status enables improved perioperative risk stratification, enhanced infection prevention, and closer postoperative monitoring. Further prospective studies are required to refine perioperative management and improve surgical outcomes in people living with HIV.

## ACKNOWLEDGMENTS

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## CONTRIBUTION OF AUTHORS

**Research concept-** Deepika Pandey, Atul Kumar Saroj

**Research design-** Deepika Pandey, Atul Kumar Saroj, Rahul Paul

**Supervision-** Rama Saha

**Materials-** Atul Kumar Saroj, Rahul Paul

**Data collection-** Deepika Pandey, Rahul Paul

**Data analysis and interpretation-** Rama Saha

**Literature search-** Atul Kumar Saroj, Rahul Paul

**Writing article-** Deepika Pandey, Rahul Paul

**Critical review-** Rama Saha

**Article editing-** Deepika Pandey, Atul Kumar Saroj

**Final approval-** Rama Saha

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