PERIOPERATIVE MANAGEMENT OF HIV-INFECTED PATIENTS

I. INTRODUCTION

Effective antiretroviral therapy (ART) for people living with HIV has resulted in a life expectancy that approaches that of the general population.[1] Both urgent and elective surgical procedures are a common part of HIV medical care. Although the relative risk of surgery in HIV-infected patients has been debated in the literature, retrospective studies have indicated favorable outcomes despite HIV serostatus and regardless of extent or duration of surgery.[2-4]

Overall health, particularly the presence or absence of organ failure, and nutritional state (albumin <2.5g/dL) have been found to be more reliable predictors of surgical outcome than CD4 count or viral load in HIV-infected patients.[5-8] Some studies have shown poorer surgical outcomes for individuals with low CD4 counts, although this has not been a consistent finding.[9,10] Viral suppression also has not been conclusively shown to improve surgical outcomes; however, in the setting of elective surgery, it is still recommended that ART be optimized preoperatively (see *Antiretroviral Therapy*).

Key Point:
Neither CD4 cell count nor HIV viral load should be used as sole determinants of a given patient's surgical risk.[5]

This chapter addresses the perioperative management of HIV-infected individuals undergoing necessary surgical procedures. Surgical risk assessment for HIV-infected individuals is highly individualized, and all aspects of the HIV-infected patient's clinical profile, including the indication for surgery, should be evaluated and discussed with the patient.[5]

II. RISK TO THE SURGICAL TEAM

RECOMMENDATION:
Universal surgical precautions that apply to all patients should be followed. (AIII)

Data regarding HIV transmission risk through various types of non-surgical exposures suggest that risk to the surgical team is theoretically lower when patients have undetectable viral loads. However, universal surgical precautions that apply to all patients should be followed, regardless of an HIV-infected patient's viral load.

III. PREOPERATIVE EVALUATION FOR HIV-INFECTED PATIENTS

RECOMMENDATIONS:

The preoperative evaluation of HIV-infected patients should be the same as that for non-HIV-infected patients; however, clinicians should carefully assess for the following conditions that are more prevalent in the HIV-infected population (AIII)**:**

- **hepatic and renal dysfunction**
- **coronary artery disease and cardiac risk**
- **coagulopathy, thrombocytopenia, and neutropenia**
- **active alcohol or substance use, including both prescription and non-prescription drug use**
- **history of prior infection/colonization with methicillin-resistant *Staphylococcus aureus* (MRSA), particularly in men who have sex with men (MSM)**
- **drug allergies**

Clinicians should obtain urine toxicology, with patient consent, if the substance use history is unreliable and there are concerns about substance use. Elective surgery should be deferred until active substance use has been addressed. (AIII)

Individuals with a history of MRSA colonization or infection should receive vancomycin instead of cefazolin for prophylaxis when indicated. (AIII)

Preoperative evaluation of the HIV-infected patient is similar to that of the general population; however, comorbidities, active substance use, and MRSA may be more prevalent in the HIV-infected population (see Table 1).

Table 1 **Surgical Management Considerations for HIV-Infected Patients with Comorbidities and Other Conditions**	
Comorbidity Risks	**Pre- and Perioperative Recommendations**
Hepatic Dysfunction • *Increased prevalence of hepatic dysfunction from ART or from preexisting liver disease.* Surgical Risk: • Co-infection with HBV or HCV may predispose to increased bleeding risk due to coagulopathy or thrombocytopenia. Related Guidelines: *Hepatitis A Virus*, *Hepatitis B Virus*, *Hepatitis C Virus*, *Antiretroviral Therapy: Hepatic Impairment Dosing*	**Recommendations:** • Assess for hepatic dysfunction preoperatively because of the possible impact on dosing or selection of anesthetics, perioperative antibiotics, and other medications.
Renal Dysfunction • *Increased prevalence of renal dysfunction from HIV-associated nephropathy (HIVAN) and other causes.*[11] Related Guidelines: *Kidney Disease in HIV-Infected Patients*	**Recommendations:** • Assess for renal dysfunction preoperatively because of the possible impact on dosing or selection of anesthetics, perioperative antibiotics, and other medications. • If there are renal function changes in the perioperative period, review ART regimen for agents that may require renal dose adjustment.
Coronary Artery Disease and Cardiac Abnormalities • *Increased prevalence of CAD from metabolic dysfunction due to HIV infection and/or ART.*[12-14] • *QT prolongation or other cardiac abnormalities may occur in advanced HIV infection or in patients receiving certain medications.*[a]	**Recommendations:** • Assess for coronary artery disease preoperatively. • Perform careful review of preoperative EKG results.
Respiratory Complications • *Prevalence of underlying pulmonary disease is increased due to the increased risk for bacterial pneumonia*[15,16] *and high prevalence of smoking*[17,18] *in HIV-infected patients.* Surgical Risk: • Risk for postoperative pneumonia is increased in HIV-infected patients. For interventions to promote smoking cessation, see *Smoking Cessation in HIV-Infected Patients*	**Recommendation:** • Carefully evaluate for respiratory complications in the perioperative period.

Thrombocytopenia and Neutropenia • *Idiopathic thrombocytopenic purpura may occur at any stage of HIV infection.* • *Neutropenia is common in HIV-infected individuals with severe immunosuppression.*[b]	**Recommendations:** • Consult with hematologist prior to surgical procedure when platelet counts approach 50,000 per µl. • Routine use of G-CSF not recommended[19] but in perioperative period may consider G-CSF[c] use to maintain absolute neutrophil count >1,000 cells/mm^3 (CIII).[20,21]
Hemophilia	**Recommendation:** • Coordination between surgical team and hematologist is recommended for transfusion of factor replacement in anticipation of surgery.
Substance Use (SU) • *SU disorders are more prevalent in HIV-infected individuals than in the general population.*[22,23] Surgical Risks: • Increased risk for complications from surgery and anesthesia, notably cardiac complications associated with cocaine use. • Increased risk for withdrawal symptoms in the postoperative period for unrecognized alcohol, benzodiazepine, or heroin use.[d] Related guidelines: *Care of the Hospitalized HIV-Infected Substance User*	**Recommendations:** • Obtain detailed history of substance use. • Consider obtaining urine toxicology screen, with patient consent. • For elective surgery, observe appropriate period of abstinence with the use of substitute medications such as methadone or benzodiazepines as appropriate.
Methicillin Resistant *Staphylococcus aureus* (MRSA) • *Community-acquired MRSA infection is more common in MSM than in the general population.*[24] For additional information, see the IDSA standard guidelines for patients with infection caused by MRSA	**Recommendations:** • Assess for a history of previous MRSA infection/colonization, particularly in MSMs. • Use vancomycin instead of cefazolin for prophylaxis when indicated in patients with positive history of MRSA.
Drug Allergies • *HIV-infection is associated with a higher incidence of medication allergies.*	**Recommendation:** • Obtain a careful history of allergies.

HBV, hepatitis B virus; HCV, hepatitis C virus; MSM, men who have sex with men; PI, protease inhibitor; ZDV, zidovudine.
[a] Anti-arrhythmics, methadone, PIs, antipsychotics, or macrolide antibiotics can cause QT prolongation or other cardiac abnormalities, especially if more than one such agent is administered concurrently.
[b] Neutropenia may be caused by medications (e.g., ZDV, TMP-SMX), HIV infection itself, bone marrow infiltration from malignancy or systemic infection.
[c] G-CSF is recommended over GM-CSF due to theoretical concerns regarding potential stimulation of HIV replication by the latter, although the possible mechanism by which GM-CSF might affect HIV-1 replication remains unclear.[20]
[d] Alcohol withdrawal may be life-threatening if symptoms are not recognized early.

IV. Perioperative Medication Management for HIV-Infected Patients

Recommendations:

Clinicians should continue ART in the perioperative period with as little interruption as possible, particularly for patients co-infected with hepatitis B virus (HBV) who are receiving an ART regimen that also has activity against HBV. When ART interruption is necessary, all components of the regimen should be stopped and clinicians should consult with a provider who has experience in management of ART. (AI)

For patients who require prophylaxis for *Pneumocystis jirovecii* (PCP) and are unable to receive oral medications for more than 1 week, TMP/SMX should be administered intravenously. If there is a contraindication to TMP/SMX, pentamidine should be administered intravenously or by inhalation. (AIII)

Patients with a history of MRSA colonization or infection should receive vancomycin instead of cefazolin for prophylaxis when indicated. (AIII)

Clinicians should assess for potential drug-drug interactions before new medications are introduced. (AIII)

A. Continuation of ART During the Perioperative Period

ART should be continued through the perioperative period with as little interruption as possible. This is particularly important for patients who are co-infected with HBV and receiving an ART regimen that also has activity against HBV; discontinuation of these medications may lead to a flare of the underlying hepatitis.[25] For patients who are unable to receive medications orally (NPO), a period of withholding ART will be necessary. When ART is withheld, all components of the regimen should be stopped.

TMP-SMX should be administered intravenously in individuals who require prophylaxis for *Pneumocystis jirovecii* pneumonia (PCP) but are NPO for more than 1 week. If TMP/SMX is contraindicated, pentamidine should be administered intravenously or by inhalation; however, aerosolized pentamidine may not be readily available and may be difficult to administer to patients who are intubated.

For patients who are able to receive liquids but not solids for more than 1 week, consideration should be given to converting the patient to an ART regimen that is available in liquid formulation. To ensure that the new regimen is fully suppressive, any changes to the ART regimen should only be done in consultation with a provider who has extensive experience in management of ART.

B. Potential Drug-Drug Interactions

RECOMMENDATION:
Clinicians should consult a reliable drug interaction resource to identify potential interactions with antiretroviral medications, even for routine administration of commonly used medications in the perioperative period.

Potential for drug-drug interactions in patients receiving ART is increased due to the extensive cytochrome P450 interactions with both PIs and NNRTIs. Clinicians should assess for potential interactions before new medications are introduced.

In particular, caution should be used with anxiolytics and sedative/hypnotics, many of which have interactions with PIs that may be severe enough for their use to be contraindicated. For example, the common anesthesia medicine midazolam is contraindicated in combination with ritonavir. General anesthetics, such as halothane and enflurane, however, do not have significant interactions. Proton pump inhibitors, and to a lesser extent antacids and H2 blockers, may adversely affect the absorption of the PI atazanavir.

The following online resources provide information on antiretroviral drug interactions:

- *HIV-Drug-Drug Interactions*, available at: www.hivguidelines.org/clinical-guidelines/adults/hiv-drug-drug-interactions
- Department of Health and Human Services *Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents*, available at: www.aidsinfo.nih.gov
- Johns Hopkins Poc-IT Center, available at: http://hopkins-hivguide.org
- University of Liverpool drug interactions site, available at: www.hiv-druginteractions.org
- PDR Network, available at: www.pdr.net
- Eprocrates medical software, available at: www.epocrates.com

C. Wound Healing

Data are insufficient to determine whether wound healing is different in HIV-infected individuals receiving effective ART compared with non-HIV-infected individuals. At this time, standard recommendations should be followed for the use of perioperative antibiotics in the non-neutropenic HIV-infected patient.

V. Postoperative Management of HIV-Infected Patients

Recommendations:

HIV-infected patients should be mobilized postoperatively as soon as medically feasible because of increased risk of thromboembolic complications. (AII)

Clinicians should consider spontaneous pneumothorax in the differential diagnosis of acute onset dyspnea in patients with active PCP or a history of PCP. (AIII)

Clinicians should not withhold treatment for pain solely because a patient has a history of substance use. Rather, standard pain assessment and treatment protocols should be followed. (AII)

HIV-infected patients are at increased risk for hypercoagulability[26] and may be at increased risk for thromboembolic complications in the postoperative period. Appropriate implementation of prophylactic protocols and prompt mobilization as soon as medically feasible is particularly important in the HIV-infected population.

Spontaneous pneumothorax should be considered in the differential diagnosis of acute-onset dyspnea. HIV-infected patients with active PCP or a history of PCP are at increased risk for spontaneous pneumothorax; individuals at highest risk include those with obvious cystic lesions on chest x-ray and those undergoing mechanical ventilation.[27]

Patients who are receiving methadone replacement therapy or who chronically use opiates may require increased doses of pain medication during the postoperative period. Management of pain in patients receiving buprenorphine/naloxone may be more challenging and should involve consultation with a pain management specialist. See *Pain in the HIV-Infected Substance User*.

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