

Review on Antiretroviral Considerations in HIV-Infected Patients Undergoing Bariatric Surgery

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ABSTRACT

Bariatric surgery is a widely accepted method for promoting weight loss in individuals with obesity, including those who are living with HIV. However, there are specific challenges and factors to consider when it comes to managing antiretroviral therapy (ART) for HIV-infected patients undergoing bariatric surgery. This comprehensive review aims to provide a detailed overview of the current evidence and recommendations regarding the use of antiretroviral drugs in this population. Obesity is prevalent among people living with HIV, and bariatric surgery has proven to be an effective approach for achieving long-lasting weight loss and improving metabolic parameters. Nevertheless, it is crucial to carefully evaluate how bariatric surgery may affect the absorption, distribution, metabolism, and interactions of antiretroviral drugs. The changes in the gastrointestinal anatomy and physiology that result from bariatric surgery can impact drug absorption, potentially leading to insufficient exposure to antiretroviral medications and treatment failure. This review specifically examines the pharmacokinetic considerations for commonly used antiretroviral drug classes in HIV management, such as protease inhibitors, non-nucleoside reverse transcriptase inhibitors, and integrase inhibitors. It discusses the potential changes in drug absorption, distribution, and metabolism that can occur after bariatric surgery and provides guidance on adjusting therapy based on individual patient characteristics, the type of surgical procedure, and possible drug interactions. Effective management of HIV-infected patients undergoing bariatric surgery requires close collaboration among HIV specialists, bariatric surgeons, and pharmacists. Monitoring virological and immunological markers, such as viral load and CD4 cell count, is essential to ensure treatment effectiveness and detect possible treatment failure. Further research is necessary to establish evidence-based guidelines for optimizing ART in this unique patient population. In conclusion, this review underscores the importance of considering the management of antiretroviral therapy in the context of bariatric surgery for individuals living with HIV. It highlights the significance of tailoring treatment approaches to individual patients and fostering interdisciplinary collaboration to achieve the best treatment outcomes and long-term health for this population.

Keywords: HIV, bariatric surgery, antiretroviral therapy, drug absorption, drug interactions, dosing strategies, weight loss, pharmacokinetics.

INTRODUCTION

The increasing coexistence of obesity and HIV infection presents a notable healthcare concern, as both conditions present significant challenges to patients' overall health. Obesity has become a global epidemic, and its prevalence is even higher among individuals living with HIV

compared to the general population (1). Bariatric surgery has emerged as an effective intervention for achieving sustained weight loss and improving metabolic parameters in individuals with obesity, including those who are also living with HIV (2). However, managing antiretroviral therapy (ART) in this specific

population undergoing bariatric surgery requires careful consideration due to potential changes in drug absorption, pharmacokinetics, and drug-drug interactions.

The advent of highly active antiretroviral therapy (HAART) has significantly transformed HIV infection from a life-threatening illness to a chronic condition with improved life expectancy and enhanced quality of life. However, the long-term use of antiretroviral therapy (ART) has been linked to metabolic complications such as dyslipidemia, insulin resistance, and an elevated risk of cardiovascular disease (3). Obesity compounds these metabolic disturbances, underscoring the importance of addressing weight management in individuals living with HIV. By addressing weight-related issues, we can reduce the risk of comorbidities and optimize treatment outcomes for HIV-infected individuals.

Bariatric surgery encompasses various procedures like gastric bypass, sleeve gastrectomy, and adjustable gastric banding, and it has shown notable and long-lasting effects on weight reduction in individuals with obesity (4). The advantages of bariatric surgery in the general population are widely recognized, as it leads to enhanced metabolic control, decreased cardiovascular risk factors, and reduced overall mortality rates (5). Consequently, there is increasing interest in offering bariatric surgery to HIV-infected individuals who also have obesity, as it holds promise as an effective approach to managing both obesity and the metabolic complications associated with HIV.

Nevertheless, there are several distinctive factors that necessitate careful consideration when managing antiretroviral therapy (ART) in the context of bariatric surgery. Bariatric procedures can bring about modifications in the gastrointestinal tract, including changes in gastric capacity, anatomy, and motility, which may affect the absorption and availability of orally administered medications, including antiretroviral drugs (6). Additionally, alterations in drug distribution and

modifications in hepatic metabolism caused by changes in liver blood flow can influence the pharmacokinetics of antiretrovirals (7).

The potential for drug-drug interactions is another crucial aspect to consider. Many individuals living with HIV requires complex antiretroviral regimens consisting of multiple medications to achieve virological suppression and prevent the development of drug resistance. These regimens may interact with medications commonly prescribed during the perioperative and postoperative periods, such as analgesics, antibiotics, and proton pump inhibitors, which are frequently used after bariatric surgery (8). These interactions can impact the effectiveness and safety of both antiretroviral and non-antiretroviral medications, necessitating thorough evaluation and adjustment of drug therapies (9).

Achieving optimal management of antiretroviral therapy (ART) in HIV-infected patients undergoing bariatric surgery necessitates a multidisciplinary approach involving various healthcare professionals such as HIV specialists, bariatric surgeons, pharmacists, and nutritionists (10). Collaborative efforts and effective communication among these providers are essential to develop individualized treatment plans that take into account both HIV control and weight loss goals. Additionally, close monitoring of virological and immunological markers, as well as drug levels, is vital to ensure the maintenance of viral suppression and immunological stability throughout the surgical process.

Despite the increasing interest in utilizing bariatric surgery for individuals living with HIV and obesity, there is a current lack of substantial evidence and clear guidelines regarding the optimal management of antiretroviral therapy (ART) in this specific population. Limited studies have specifically investigated the impact of bariatric surgery on the absorption, pharmacokinetics, and drug-drug interactions of antiretroviral drugs, with

most of the existing literature consisting of case reports and small observational studies (11). As a result, the objective of this review is to comprehensively summarize the available evidence, offer practical recommendations, and identify areas that require further research to inform clinical decision-making when managing ART during the perioperative and postoperative periods of bariatric surgery in individuals living with HIV.

AIMS AND OBJECTIVES

The main objective of this comprehensive review is to extensively analyze the existing evidence and recommendations concerning antiretroviral considerations in HIV-infected patients who undergo bariatric surgery. It will specifically address the challenges associated with drug absorption, distribution, metabolism, and drug-drug interactions in this unique population. Moreover, the review will delve into specific antiretroviral drug classes commonly used in HIV management and offer valuable insights into individualized therapy adjustments to optimize treatment outcomes. By examining these crucial aspects, the review aims to provide healthcare professionals with valuable guidance and knowledge for managing antiretroviral therapy in HIV-infected individuals undergoing bariatric surgery.

MATERIALS & METHODS

To gather relevant information for this review, a systematic search was performed across various databases to identify studies and guidelines specifically related to antiretroviral considerations in HIV-infected patients who undergo bariatric surgery. The search encompassed articles published from 2000 to 2023. The selected studies were carefully reviewed and analyzed to synthesize the data, enabling the development of evidence-based recommendations and clinical insights for the management of this unique patient population. By employing this systematic approach, the review aims to provide

reliable and up-to-date information to support clinical decision-making in this area.

RESULT AND DISCUSSION

Upon reviewing the existing literature on antiretroviral considerations in HIV-infected patients undergoing bariatric surgery, several significant findings and considerations were identified. These include the impact of bariatric surgery on drug absorption, alterations in drug distribution, modifications in dosing strategies, and the potential for drug interactions. Understanding and addressing these factors are crucial for optimizing the effectiveness and safety of antiretroviral therapy in this distinct patient population. By recognizing these key findings and considerations, healthcare providers can make informed decisions and develop tailored treatment approaches to ensure optimal outcomes for HIV-infected individuals undergoing bariatric surgery.

Drug Absorption:

Bariatric surgery procedures can have a notable impact on drug absorption as a result of anatomical changes in the gastrointestinal tract. The reduction in gastric capacity and the bypassing of certain parts of the digestive system can influence the absorption of antiretroviral drugs administered orally. Multiple studies have provided evidence of altered pharmacokinetics of specific antiretroviral medications, including protease inhibitors (PIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs), following bariatric surgery (12). These alterations may necessitate dose adjustments or the use of alternative formulations to ensure that therapeutic drug levels are maintained. It is crucial to consider these changes and make appropriate adaptations in the administration of antiretroviral therapy for individuals undergoing bariatric surgery to optimize treatment effectiveness.

Drug Distribution:

Bariatric surgery-induced changes in body composition and modifications in liver blood flow can have an impact on the distribution of antiretroviral drugs. With increased hepatic blood flow and a reduction in total body weight, the distribution of these drugs may be altered, potentially affecting their concentrations in the body. Consequently, close monitoring of drug levels and appropriate dosage adjustments may be required to ensure adequate drug exposure. By carefully assessing drug distribution changes and regularly monitoring drug levels, healthcare providers can optimize the effectiveness of antiretroviral therapy in individuals who have undergone bariatric surgery.

Dosing Strategies:

Achieving optimal dosing of antiretroviral medications is vital for maintaining virological suppression and preventing the emergence of drug resistance (13). Considering the impact of bariatric surgery on drug absorption, distribution, and metabolism, adjustments in dosing strategies may be necessary. For drugs that undergo extensive first-pass metabolism, alternative routes of administration such as intravenous or subcutaneous administration may be considered to bypass the gastrointestinal tract and ensure sufficient drug exposure. Furthermore, the timing of antiretroviral administration in relation to meals may need to be modified to optimize drug absorption and minimize potential drug-drug interactions. By carefully evaluating these factors and making appropriate dosing adjustments, healthcare providers can enhance the effectiveness of antiretroviral therapy in HIV-infected patients who have undergone bariatric surgery.

Drug Interactions:

HIV-infected patients commonly receive complex antiretroviral regimens consisting of multiple drugs, each with its own unique pharmacokinetic profile. It is important to

be aware that these regimens can potentially interact with medications commonly prescribed before and after bariatric surgery (14). Clinicians should exercise caution regarding drug-drug interactions, particularly with medications such as analgesics, antibiotics, and proton pump inhibitors, which are frequently utilized during the perioperative and postoperative periods. Close monitoring of potential drug interactions and considering adjustments in antiretroviral therapy are essential to maintain both the efficacy and safety of the treatment regimen. By being vigilant and proactive in monitoring and managing drug interactions, healthcare providers can optimize treatment outcomes for HIV-infected individuals undergoing bariatric surgery.

Specific Antiretroviral Classes:

Different classes of antiretroviral drugs have distinct considerations when it comes to bariatric surgery. For instance, protease inhibitors are highly protein-bound and can be affected by changes in drug absorption and distribution following bariatric surgery. As a result, dose adjustments or alternative formulations may be necessary for optimal therapeutic levels. Non-nucleoside reverse transcriptase inhibitors, on the other hand, may require modifications in dosing strategies due to their potential interaction with gastric acid-reducing agents commonly prescribed after bariatric surgery (15, 16). Integrase inhibitors, generally, have minimal interactions with bariatric surgery procedures and may require fewer adjustments. Nevertheless, it is crucial to consider individual patient factors, such as renal function, when managing specific antiretroviral drug classes in the context of bariatric surgery. By taking into account these factors and tailoring treatment approaches accordingly, healthcare providers can ensure the effectiveness and safety of antiretroviral therapy for HIV-infected patients undergoing bariatric surgery.

Multidisciplinary Approach:

Optimizing antiretroviral therapy in HIV-infected patients undergoing bariatric surgery necessitates a collaborative approach involving various healthcare providers. Close collaboration and communication among HIV specialists, bariatric surgeons, pharmacists, and nutritionists are essential for developing individualized treatment plans and ensuring effective management (17). Regular monitoring of virological and immunological markers, as well as drug levels, is crucial to evaluate treatment efficacy and safety. By working together and maintaining ongoing monitoring, healthcare providers can tailor treatment approaches, address any potential challenges or complications, and optimize antiretroviral therapy outcomes for HIV-infected patients undergoing bariatric surgery.

Obesity in HIV-Infected Individuals:

Obesity has emerged as a major health issue worldwide, impacting both the general population and individuals living with HIV. Over time, the prevalence of obesity has risen among people living with HIV due to various factors, including improved survival rates, long-term use of antiretroviral therapy, and changes in lifestyle. The coexistence of obesity in HIV-infected individuals not only leads to heightened morbidity and mortality but also presents additional obstacles in managing their HIV infection and related comorbidities. Addressing the challenges posed by obesity in this population is crucial for optimizing their overall health outcomes and improving their quality of life.

Individualized Therapy Adjustments:

The management of antiretroviral therapy in HIV-infected patients undergoing bariatric surgery requires a personalized approach, taking into account various factors such as the specific bariatric procedure, patient characteristics, and potential drug interactions (18, 19). Collaboration among

HIV specialists, bariatric surgeons, and pharmacists is essential to ensure optimal treatment outcomes and minimize the risk of virological failure and drug toxicity.

It is important to acknowledge that the current evidence base regarding antiretroviral considerations in this population is limited. Most studies in this field are observational or based on case reports with small sample sizes, and standardized guidelines are lacking. Therefore, the management of antiretroviral therapy in HIV-infected patients undergoing bariatric surgery often relies on clinical judgment and individualized approaches.

Further research is needed to establish evidence-based guidelines and optimize the management of antiretroviral therapy in this specific population. Prospective studies with larger sample sizes are necessary to explore the specific pharmacokinetic changes associated with different bariatric procedures and antiretroviral drug classes. Additionally, studies assessing long-term virological and immunological outcomes are warranted to determine the effectiveness and safety of antiretroviral therapy in the context of bariatric surgery.

While there are challenges and limitations in managing antiretroviral therapy in HIV-infected patients undergoing bariatric surgery, a personalized and interdisciplinary approach can help tailor treatment plans and optimize outcomes. Continued research efforts are crucial to provide more comprehensive guidelines and evidence-based recommendations in this evolving field.

CONCLUSION

In summary, the management of antiretroviral therapy in HIV-infected patients undergoing bariatric surgery is a complex process that requires careful consideration of various factors. Changes in drug absorption, distribution, metabolism, and potential drug interactions necessitate individualized treatment plans. Close collaboration between healthcare providers, including HIV specialists, bariatric

surgeons, and pharmacists, is essential to ensure optimal treatment outcomes. Regular monitoring of treatment efficacy and safety, along with ongoing research, is needed to establish evidence-based guidelines for managing antiretroviral therapy in this unique patient population. By addressing these considerations and promoting interdisciplinary collaboration, healthcare providers can strive to optimize the care and outcomes of HIV-infected patients undergoing bariatric surgery.

Declaration by Authors

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