

Bariatric surgery and HIV: Joint venture between family, primary care, and HIV physicians

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ABSTRACT

We report a case of a 49-year-old female with a history of HIV infection for 12 years. The patient had excellent compliance with antiretroviral medications, raltegravir 400 mg twice daily and truvada once daily for HIV. Over the years, she maintained an undetectable viral load with a CD4+ count >200 cells/ μ L. She has a history of type II diabetes, hypertension, bipolar manic depression, endometriosis, recurrent herpes simplex attacks, arthritis in both shoulders, irritable bowel syndrome (IBS), and nonalcoholic fatty liver disease (NAFLD). She weighed 148 kg with a body mass index (BMI) of 52.08 kg/m². Her medication included diltiazem 60 mg once a day, glyceryl trinitrate (GTN) spray, metformin 1 g twice daily, and linagliptin 500 mg once daily for her type II diabetes with glycated hemoglobin (HbA1c) of 8.4%. She has full capacity and elected to have bariatric surgery; 4 months postprocedure, she lost 28 kg with a reduced BMI of 38.62 kg/m² with no postoperative complications. Her diabetes control improved, and she no longer required linagliptin and metformin. Following the procedure, she was given supplements including ferrous sulfate, vitamin B12, vitamin D, and calcium. She was also prescribed lansoprazole. The case illustrates that bariatric surgery is an effective and safe operation for people living with HIV. Due to complex needs and the need for regular follow-up; primary care, family, and HIV physicians can all collaborate in the care of individuals living with HIV and who underwent bariatric surgery.

Keywords: Bariatric surgery, diabetes, HIV, obesity

Introduction

Bariatric surgery (BS) is becoming increasingly performed in morbidly obese-positive HIV patients. One of the leading non-AIDS-defining causes of mortality among people living

with HIV (PLWH) is cardiovascular disease (CVD). Over the past 2 decades, the global burden of CVD in HIV patients has tripled.^[1] Risk factors for CVD such as obesity, diabetes mellitus, and dyslipidemia are associated with higher mortality in PLWH.^[2] Given the detrimental effects of obesity on CVD risk, weight-management techniques are presently given increased importance in the routine care of PLWH.^[3]

Bariatric surgery restricts the volume of the food that can be ingested at one time while volume reduction of the digestive tract leads to malabsorption of consumed products. There are several types of bariatric surgeries, including Roux-en-Y Gastric

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Bypass surgery (RYGB), which causes food to bypass most of the stomach and the entire duodenum, hence food reaches the jejunum directly, which our patient has undergone.^[4,5] Sleeve gastrectomy and gastric banding are alternative types of bariatric surgeries. Sleeve gastrectomy involves removing 80% of the stomach, leaving a small sleeve. RYGB reduces absorptive surface area by bypassing intestinal transporters in the duodenum, which affects oral bioavailability as some drugs require a more acidic environment for drugs to be absorbed, uncoated, and activated.^[5,6] Thus, antiretrovirals (ARVs) like lamivudine, whose primary absorption sites are the duodenum and jejunum, have been demonstrated to have reduced absorption following bypass surgery. It was shown that there are lower serum levels of lamivudine following RYGB surgery compared with women living with HIV who had not undergone surgery.^[7,8]

In gastric banding, an obstructive band is placed around the proximal stomach to restrict the rate at which food can pass into the stomach. These procedures have restrictive features more than malabsorptive properties.^[4,5] Nevertheless, restrictive features can still have an adverse impact on drug absorption due to decreased apparent drug clearance with increased drug exposure as drugs get absorbed in more distal sites of the intestine with reduced intestinal metabolism.^[6] It is postulated that the absorption of ART specifically may be compromised in comparison with gastric sleeve.^[7] However, there remains limited data on the use of ART post procedure in gastric bypass. Our case showed a unique outcome as a known case of an HIV-positive patient treated with Raltegravir 400 mg and Truvada 200 mg/300 mg who underwent gastric bypass surgery, which may decrease the surface of absorption of ART from the intestine. Two years post procedure, the patient lost weight, had good glycemic control, reported good ART compliance, and maintained viral suppression.

Case Report

We report a case of a 49-year-old female with a history of HIV infection diagnosed in 2011. The patient had excellent compliance with antiretroviral medications, raltegravir 400 mg twice daily and truvada once daily for HIV. Over the years, she maintained an undetectable viral load with a CD4+ count >200 cells/ μ L. She has a history of type II diabetes, hypertension, bipolar manic depression, endometriosis, recurrent herpes simplex attacks, arthritis in both shoulders, irritable bowel syndrome (IBS), and nonalcoholic fatty liver disease (NAFLD) diagnosed in 2022. She weighed 148 kg with a body mass index (BMI) of 52.08 kg/m². Her medication included diltiazem 60 mg once a day, GTN spray, metformin 1 g twice daily, and linagliptin 500 mg once daily for her type II diabetes with glycated hemoglobin (HbA1c) of 8.4%. She has full capacity and elected to have bariatric surgery (RYGB); 4 months post procedure she lost 28 kgs with a reduced BMI of 38.62 kg/m² with no postoperative complications. Her diabetes control improved, and she no longer required linagliptin and metformin. Following the procedure, she was

given supplements including ferrous sulfate, vitamin B12, vitamin D, and calcium. She was also prescribed lansoprazole.

Despite bariatric surgery, her HIV infection status was not affected. With viral load remaining undetectable (HIV RNA < 1.30), she maintained a CD4 count of >200 cells/ μ L after the operation. Postoperatively, her viral load continued to be undetectable with a CD4 count of 770 cells/ μ L, 940 cells/ μ L, and 880 cells/ μ L at 6 months, 12 months, and 24 months, respectively [Table 1 and Figure 1]. A DEXA scan was performed in November 2022, which revealed a normal bone density score, with a lumbar spine T-score of 2.2, and a femoral neck T-score of -0.7. The FRAX score revealed a 10-year risk of osteoporotic fracture score of 3.2, and the risk of hip fracture in 10 years is 0.1%. The patient gave consent for the publication of the case report. Milton Keynes University Hospital always endorses and approves scientific publications of this kind of manuscript.

Discussion

We present a case of an HIV-positive female patient who underwent bariatric surgery and achieved significant weight loss and improvement in glycemic control. She maintained an undetectable viral load count with excellent compliance with ARVs.

In this case, this patient was taking raltegravir and truvada, which is a combination treatment of tenofovir disoproxil fumarate (DF) and emtricitabine. Raltegravir is normally absorbed in the ileum, thus, bypass surgery would not impact its reabsorption as demonstrated by this patient.^[9] Furthermore, raltegravir is considered to have increased exposure in higher gastric pH,^[10] therefore, its pharmacokinetics are not negatively impacted by PPIs given postbariatric surgery.

Tenofovir DF and emtricitabine are presumed to be reabsorbed in the small intestine, as detailed evidence of their pharmacokinetics is not currently available. Studies have shown that the exposure of tenofovir and emtricitabine DF undergoes a transient decrease with the maintenance of virological suppression.^[11,12]

Bariatric surgery may have a significant impact on antiretrovirals that require an acidic environment, fatty meal administration, prolonged dissolution times, and enterohepatic recirculation for absorption.^[3] Absorption of certain antiretrovirals could be impacted negatively by interacting with common medications prescribed postbariatric surgery, such as proton pump inhibitors, which are given to prevent gastric complications. However, this may reduce the absorption of ARVs that depend on low-pH solubility, for instance, atazanavir and rilpivirine.

Given the physiological changes following bariatric surgery, many studies explored the efficacy of ART in patients with morbid obesity living with HIV. The most recent study published^[13] showed that 94% of patients who underwent RYGB and SG maintained an undetectable viral load with no significant changes

in baseline CD4+ cell count 12 months after the surgery. One patient who underwent gastric sleeve developed virological failure following vitamin deficiency for 6 months post surgery. Other studies in support of bariatric surgery as a safe treatment modality in patients with HIV.^[14]

The general concern of HIV management after bariatric surgery is due to the reduced efficacy of ARVs secondary to decreased exposure and compliance with ARTs. In this case report, our patient living with HIV and having undergone gastric bypass surgery did not show any evidence of virological failure within 2 years post procedure; viral load remained undetectable and CD4+ T count >200 cells/mm³ as shown in Figure 1d. The postprocedure parameters showed evidence of resolved type II diabetes with a significant reduction in HbA1c and BMI, thus no longer requiring antidiabetic medications. The weight status of this patient's 1-year postprocedure shows a weight decrease from 137 kg to 105 kg over a period of a year as shown in Figure 1. This may be due to multiple factors, including exacerbating psychiatric symptoms given the patient's history of bipolar manic depression.

Importantly, several studies showed the beneficial benefit of RYGP surgery. For instance, Kaip *et al.*^[13] showed that in

18 patients (7 patients underwent RYGB and 11 underwent SG), 17 of 18 patients (94%) maintained virological suppression within 12 months postsurgery and satisfactory CD4+ count apart from one patient who underwent sleeve gastrectomy surgery. Piso *et al.*^[15] showed that dolutegravir plasma levels did not change after gastric bypass surgery with durable viral suppression. Amouyal *et al.*^[16] showed that sleeve gastrectomy was associated with significant weight reduction but variable responses in terms of viral load in 6 months follow-up after the operation (12 patients had undetectable viral load, 4 displayed detectable viral loads along with a significant decrease in raltegravir and atazanavir treatment exposure, leading to ART change with subsequent undetectable viral load; and 1 had persistent detectable viral load despite ART change). Sleeve gastrectomy was also shown to lead to remission of diabetes, excellent glycemic, weight reduction, and suppression of viral load.^[14,17]

It has been increasingly acknowledged that procedures such as SG and RYGB can adversely affect skeletal health, with an increased risk of developing malabsorption and osteoporosis.^[18] However, a DEXA scan performed 24 months after the procedure revealed that she is at low risk for osteoporosis with a normal bone density score. Her 10-year risk of osteoporotic fracture score was 3.2, and her 10-year risk of hip fracture was 0.1%, indicating a low

Table 1: Baseline changes following surgery, 1 year, and 2 years postsurgery

Test	Preprocedure	Postprocedure	1 yr postprocedure	2 yr postprocedure
Viral load	undetectable	undetectable	undetectable	undetectable
CD4+ count (cells/mm ³)	1030	770	940	880
BMI (kg/m ²)	51.6	38.6	37.2	39
Weight (kg)	137	120	105	112
HbA1c %	8.4	5.5	5.1	6%
Vitamin B12 (ng/L)	161	214	906	467
Vitamin D (nmol/L)	54	91	51.5	68
Folate (ng/mL)		9.5	7.7	
Ferritin (µg/L)		25	38	

BMI = Body mass index

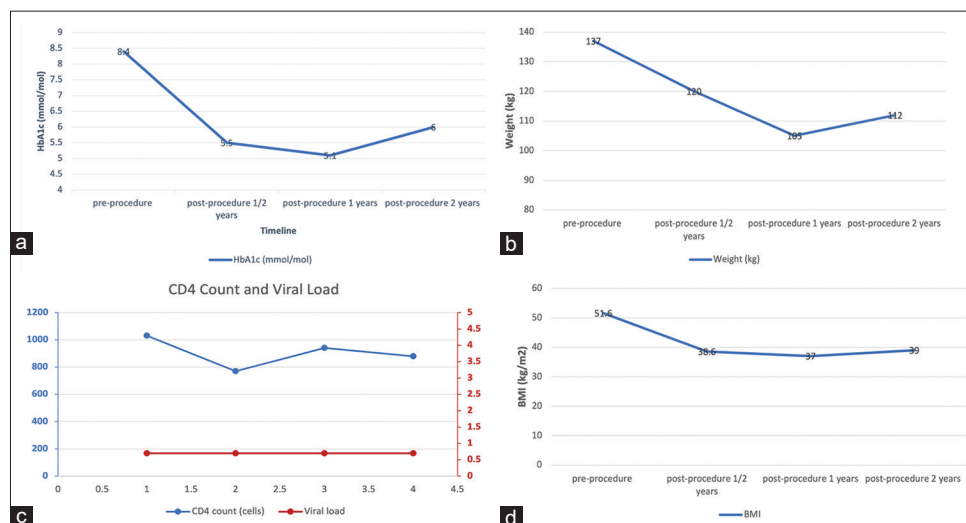


Figure 1: Illustrating a line graph of change in clinical parameters preprocedure, postprocedure ½ years, postprocedure 1 year, and postprocedure 2 years. (a) HbA1c, (b) weight (kg), (c) BMI (kg/m²), and (d) CD4 cell count and viral load

risk for osteoporosis.^[19] Osteoporosis is highly prevalent among individuals living with HIV.^[20]

Limitations of this study: this is a single-patient focus study and there is a need for further studies to generalize the findings. Long-term follow-up studies for 10 years are needed to look at the long-term impact of bariatric surgery on HIV medication, mortality, morbidity, and impact on the micro and macro nutritional substances. It is worth mentioning that the safety and efficacy of bariatric surgery among individuals living with HIV need to be studied in large-scale or randomized clinical trials.

Conclusion

In conclusion, this case report illustrates the effectiveness of bariatric surgery in patients with HIV. This patient has maintained excellent HIV control and achieved good metabolic outcomes. Due to complex needs and the need for regular follow-up and the unpredictability of variation of response of viral loads; primary care, family, and HIV physicians can all collaborate in the care of individuals living with HIV and undergoing bariatric surgery.

Presentation

The case report is presented as an oral presentation in the clinical update meeting (April 2022-Birmingham, UK) of the Society of Endocrinology and a copy of the abstract can be accessed from <https://www.endocrine-abstracts.org/ea/0082/ea0082wg2>.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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