

Lower limb arthroplasties in HCV and HIV coinfectd patients: a matched retrospective cohort study

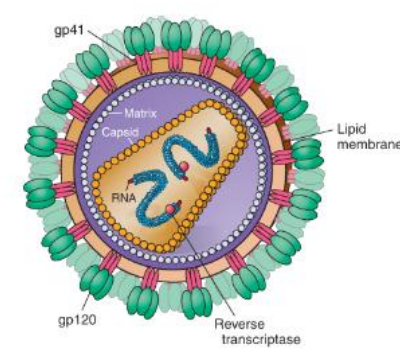
Manzotti A^{1,2}, Brioschi D¹, Moretti F¹, Senatore LG²

Sistema Socio Sanitario
Regione Lombardia
ASST Fatebenefratelli Sacco

¹ Az. Ospedaliera – Polo universitario ASST Fatebenefratelli - Sacco, Milano, Italy
Orthopaedics and Traumatology Dept. (Dir. A.Manzotti)
² Università degli Studi di Milano, Milano, Italy



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INTRODUCTION

About 1% of the whole population and 35 million individuals are respectively infected with HCV HIV worldwide and furthermore exists a significant overlap in patients between these two populations with a coinfection rate increased to 90% when a patient has a history of intravenous drug use.

Total hip and knee arthroplasty has become an increasingly common surgical procedure in patients with hepatitis C virus (HCV) and/or human immunodeficiency virus (HIV).

Thanks to therapeutic advances, particularly the introduction of highly active antiretroviral therapy (HAART) for HIV and direct-acting antivirals (DAAs) for HCV, the survival improved and consequently the need for elective orthopedic procedures.

Over this topic literature is still scarce, particularly defining the risk profile of HIV-HCV co-infected patients.

It is important to know the potential risks of these unique patients following joint arthroplasties compared to the already increased odds of mono-infection in order to design strategies and protocols to mitigate complications.

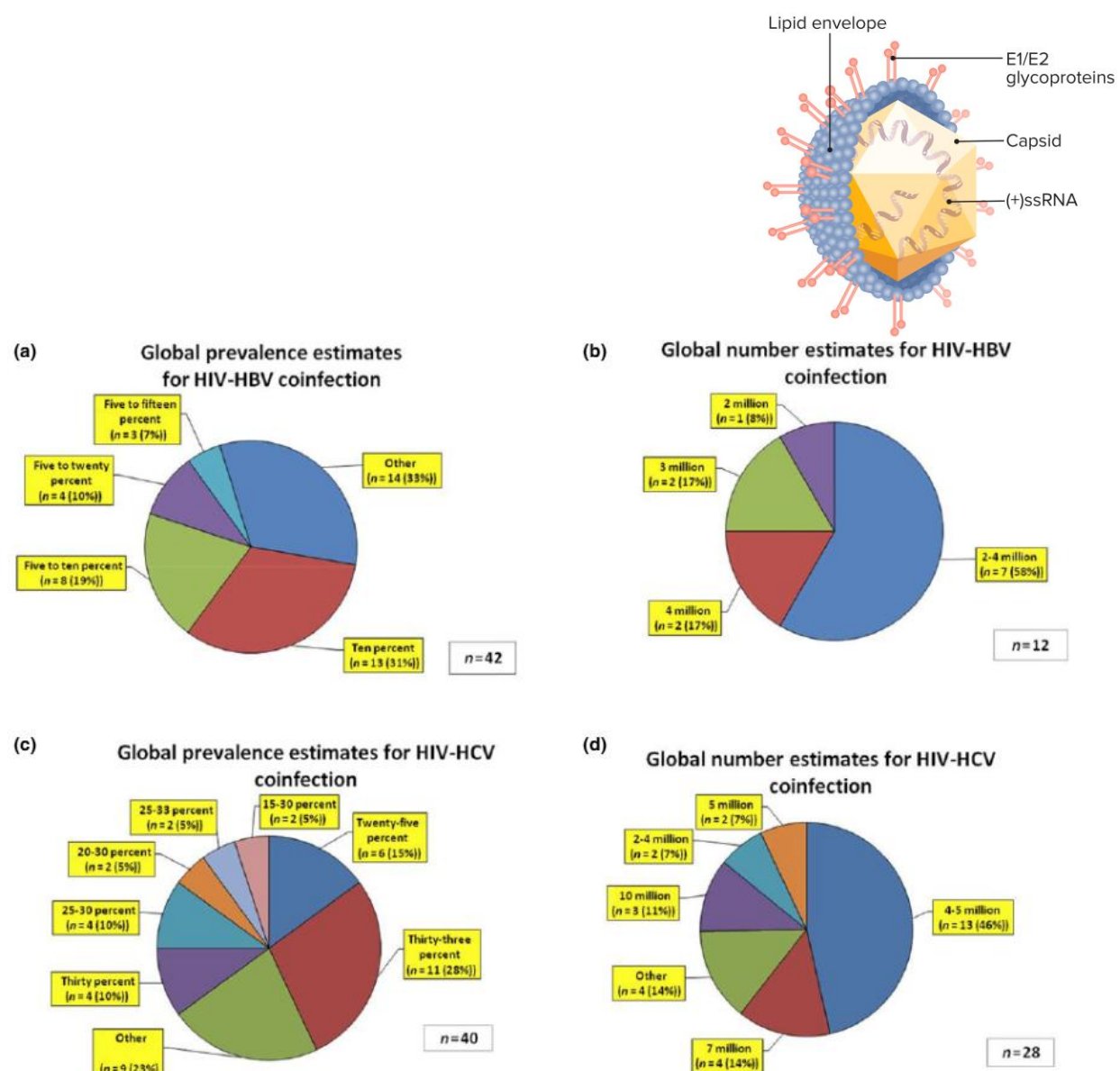


Fig. 3. Cited estimates of (a) global prevalence of HIV-chronic hepatitis B co-infection (b) global number of HIV-chronic hepatitis B co-infection (c) global prevalence of HIV-chronic hepatitis C co-infection (d) global number of HIV-chronic hepatitis C co-infection. a = number of estimates.

Basnayake, Surebhi & Easterbrook, P. (2016). Wide variation in estimates of global prevalence and burden and death estimates from chronic HBV, HCV and coinfection with HIV in literature. Journal of viral hepatitis. 23. 10.1111/jvh.12519.

OBJECTIVES

- Address if there would be increasing risk of post operative early complications in simultaneous co-infection of HCV and HIV viruses following lower limb joint arthroplasty.
- Compare HIV-HCV co-infected patients to single viral infection patients (HIV, HCV, HBV).



MATERIALS AND METHOD

- Retrospective cohort analysis of **72 patients** HIV and/or hepatitis positive who underwent JA in a single hospital between January 2011 and December 2024 divided in 4 groups: Group A (13 HIV and HCV positive), Group B (16 HIV positive), Group C (25 HCV positive), Group D (18 HBV positive).
- Between-group comparisons were performed using Fisher's exact test for categorical variables and Mann-Whitney U test for non-normally distributed continuous variables. The HIV-HCV coinfectd cohort was used as the reference group for all pairwise comparisons. A two-sided p-value < 0.05 was considered statistically significant.

	HIV-HCV (n=13)	HIV (n=16)	P	HBV (n=18)	P	HCV (n=25)	P
Age (yrs)	55,4	46	0,004	75,1	>0,0001	77,4	>0,0001
M/F	11 (85%) 2 (15%)	11 (68%) 5 (32%)	0,4	4 (22%) 14 (78%)	0,001	4 (16%) 21 (84%)	0,0001
Etiology: OA/AVN	7 (54%)	14 (87%)	0,09	13 (72%)	0,44	14 (56%)	1
Etiology: fractures	6 (46%)	2 (13%)	0,09	5 (28%)	0,44	11 (44%)	1
CCI	5,8	3,6	0,11	4,7	0,23	6,1	0,79
# CDC Classification	A: 8 pts B: 5 pts	A: 9 patients B: 7 patients	/	/	/	/	/
# Child Plug Clasification	A: 6 patients B: 7 patients	/	/	A: 8 patients B: 10 patients	/	A: 10 patients B: 15 patients	/

Age distribution: HIV-HCV coinfectd patients were significantly younger (mean 55.4 years) than those with HIV (46 years, p=0.004), HBV (75.1 years, **p<0.0001**), or HCV (77.4 years, **p<0.0001**).

Sex distribution: The proportion of males was higher in the HIV-HCV group (85%) than in the HIV (68%, p=0.04), HBV (22%, **p=0.001**), and HCV groups (16%, **p<0.0001**)

RESULTS

- **HIV-HCV coinfectd patients had a statistically significant longer LOS** compared to the other groups.
- Despite a higher number of post-opoperative blood transfusions in group A (coinfectd and HCV) there were no statistical significance among the 4 groups.
- **Cumulative complication rate was statistically highest in the coinfectd group (85%)**, significantly exceeding that of HIV (56%, p=0.013) and HBV monoinfected patients (61%, p=0.024), while remaining comparable to the HCV group (84%, p=1).

	HIV-HCV (n=13)	P	HIV (n=16)	P	HBV (n=18)	P	HCV (n=25)	P
LOS (days)	21,3	0,001	12	0,004	13,9	0,004	13	0,001
Transfusion rate	7 (54%)	0,072	7 (44%)	0,072	8 (44%)	0,072	15 (60%)	0,074
Hospital complications	11 (85%)	0,011	8 (50%)	0,011	9 (50%)	0,006	16 (64%)	0,026
Outpatient complications	8 (62%)	0,002	3 (19%)	0,002	6 (33%)	0,015	10 (40%)	0,03
Septic complications	7 (54%)	0,004	2 (13%)	0,004	5 (28%)	0,02	9 (36%)	0,03
Arthroplasty complications	6 (46%)	0,022	3 (19%)	0,022	2 (11%)	0,004	3 (12%)	0,004
All complications	11 (85%)	0,013	9 (56%)	0,013	11 (61%)	0,024	21 (84%)	1

DISCUSSION

In our study, we found **patients coinfectd with HIV and HCV** undergoing lower limb arthroplasties **have both a higher complication rate** than patients **associated to a longer hospital staying** compared to either HIV or HCV or HBV alone.

Because more widespread indications to joint arthroplasty procedures, even in this vulnerable patient population it is essential to appreciate the distinct risk profile.

Limitations: it is a **retrospective** study with **limited numbers** making impossible subgroups analisys as comparing subcategories (knee versus hip, primaries versus revisions JA). Further limitations include potential heterogeneity in age, different therapies and comorbidities across study groups and all these bias may influence complication rates and should be considered when interpreting the findings.

The patients key metrics included:

- **Charlson Comorbidity Index (CCI)**
- **length of hospital stay (LOS)**
- Short term postoperative complication rates: divided in medical and surgical according to **Carpintero et al. classification** and compared.

Comorbid conditions ^{a,b}	CCI weights	uCCI weights
Myocardial infarction	1	0
Congestive heart failure	1	2
Peripheral vascular disease	1	0
Cerebrovascular disease	1	0
Dementia	1	2
Chronic pulmonary disease	1	1
Rheumatic disease	1	1
Peptic ulcer disease	1	0
Mild liver disease	1	2
Diabetes without chronic complication	1	0
Diabetes with chronic complication	2	1
Hemiplegia or paraplegia	2	2
Renal disease	2	1
Any malignancy without metastasis	2	2 ^c
Leukemia	2	
Lymphoma	2	
Moderate or severe liver disease	3	4
Metastatic solid tumor	6	6
AIDS (included asymptomatic infection)	6	4
Maximum comorbidity score	33	24

Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987;40(5):373-83. doi: 10.1016/0021-9681(87)90171-8. PMID: 3558716.

Medical complications	Preoperative incidence	Intervention/recommendation ^a
Capsitis and neurological	Capsitis: 10% Postoperative infection: 13%-35%	Preoperative intervention in high-risk patients Preoperative risk of antipseudomonal (Pseudomonas)
Cardiac and vascular	Cardiac: 35%-42% Heart failure/Myocardial ischemia: 27% (4%-73%)	Evaluation and care of patients with previous heart alteration Isolation of fluid status to avoid fluid overload (diuretics)
Pulmonary	PE: 4% Chronic pulmonary disease: 15%-35% PE: 10%-20% Hospital-acquired pneumonia: 7%	Thromboembolic prophylaxis Early mobilization Evaluation and care of patients with previous lung disease Adequate preoperative fluid balance and postoperative monitoring
Gastrointestinal	GI: 15% GI: 15% GI: 15% GI: 15%	Thromboembolic prophylaxis Timely diagnosis, adequate antibiotic treatment and accurate monitoring Adequate postoperative fluid, diet, pain and medication management
Urinary tract	UTI: 15% UTI: 15% UTI: 15% UTI: 15%	Urinary catheter should be taken out as soon as possible, preferably within 24 h after insertion Timely diagnosis and adequate antibiotic treatment Preoperative identification of pre, peri or postoperative medical or surgical risk factors
Hematologic	AKI (prevalent, renal or postoperative): 15% AKI: 15% AKI: 15% AKI: 15%	Timely diagnosis, adequate treatment and accurate monitoring Preoperative identification of pre, peri or postoperative medical or surgical risk factors Correct hemoglobin levels (> 7 g/dL, before surgery) In anticoagulated patients, correct international normalized ratio to < 1.5 preoperatively
Endocrine/metabolic	Diabetes: 15% Diabetes: 15% Diabetes: 15% Diabetes: 15%	Timely diagnosis, adequate treatment and accurate monitoring National guidelines to preoperative period Monitor glucose levels between 18 and 18 mg/dL Vitamin D supplementation
Other	Other: 15% Other: 15% Other: 15% Other: 15%	Early surgery (within 24 h) to avoid infection Alternating pressure mattresses, pressure-relieving beds and equipment Adequate skin care and proper catheter, prosthetic/vascular dressing

DVT/PE: Deep vein thrombosis/pulmonary embolism; PE: Postoperative pulmonary embolism; GI: Gastrointestinal complications; AKI: Acute kidney injury; Preop: Preoperative; Postop: Postoperative; Fluid: Fluid balance; Diet: Diet; Pain: Pain management; Med: Medication management; Mob: Mobility; Risk: Risk factors; IQR: Interquartile range; LOS: Length of stay; Mort: Mortality.

Carpintero P, Caeiro JR, Carpintero R, Morales A, Silva S, Mesa M. Complications of hip fractures: A review. World J Orthop. 2014 Sep 18;5(4):402-11. doi: 10.5312/wjo.v5.i4.402. PMID: 25232517; PMCID: PMC4133447.