



# Total hip arthroplasty in HIV-infected patients: what are the risk factors?



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## Background

There are an estimated 34 million people infected with HIV worldwide. Prior to treatment, the virus is associated with severe immunocompromise, opportunistic infections and malignancies. Since the introduction of highly active antiretroviral therapy (HAART), life expectancy for those with HIV infection has increased considerably. However, there has been an emergence of previously unrecognised long term complications of HIV infection and its treatment. A range of rheumatic manifestations have been documented, including an increased incidence of avascular necrosis (AVN) and osteoporosis. In a UK-based HIV Rheumatology clinic, it was observed that there were a number of HIV-infected subjects who were requiring hip resurfacing or total hip replacement in their 40s and 50s. Given this young age, we investigated the risk factors that might have predisposed to the need for hip surgery.

## Aims

The aim of this case-control study was to identify risk factors for undergoing hip resurfacing or total hip arthroplasty (THA) within the HIV infected population.

## Methods

This study was carried out in an NHS Teaching Hospital Centre providing care for a cohort of 1900 HIV-infected patients in the South-East of England. All HIV-infected patients who were awaiting or had undergone hip resurfacing or THA were identified by a comprehensive search of the HIV clinic database. For each subject, five controls were identified, matched by age, (+/- 5 years), gender and ethnicity. For each subject and each control, a case note and database review was carried out eliciting information onto a pre-defined proforma. Data were collected about: clinical diagnosis prior to surgery including relevant imaging investigations (plain X-ray and magnetic resonance imaging (MRI)) where available, demographic factors, risk factors for osteoarthritis (OA), risk factors for AVN including exposure to glucocorticoids, smoking, alcohol intake, comorbidities, testosterone, chemotherapy, radiotherapy, and parameters of HIV activity including viral load, CD4 nadir and current and exposure to HAART. Statistical analysis was performed using SPSS v.18.0 for all cases and controls, and then subset analysis performed for OA and AVN subgroups

## Results (1)

In total, 13 subjects (12 male and 1 female) were identified as cases who were awaiting or had undergone hip surgery. Mean age at time of surgery was 47.7 years. 11 subjects were caucasian and two black African (Table 1).

Table 1: Demographics of HIV infected cases and controls

Variables	Cases	Controls	p value
Age (years)	47.7	48.2	0.97
Gender			
Male	12 (92%)	60 (92%)	1.0
Female	1 (8%)	5 (8%)	1.0
Ethnicity			
Caucasian	11 (85%)	55 (85%)	1.0
Black African	2 (15%)	10 (15%)	1.0
Transmission			
MSM	11 (85%)	52 (80%)	1.0
Other	2 (15%)	8 (20%)	1.0
Ever smoked	10 (77%)	33 (54%)	0.13
Alcoholic	1 (8%)	4 (6%)	1.00
Duration of known HIV infection (years)	12.5	9.0	0.07
CD4+ nadir	187	217	0.33

\*statistically significant, MSM men who have sex with men

## Pre-operative diagnoses

Using the pre-operative case notes and X-rays and MRI scans (where available), 9 of the cases appeared to have OA as their principal clinical diagnosis pre-operatively and four had evidence of predisposing AVN.

Table 2: Variables recorded for HIV infected cases and controls

Variables	Cases	Controls	p value
Change in BMI (maximum ever BMI – minimum ever BMI)	4.8	3.1	0.06
Maximum cholesterol	7	6	0.06
Maximum HDL	1	1	0.69
Statin use	6 (46%)	14 (22%)	0.08
Chemotherapy	2 (15%)	1 (2%)	0.07
Testosterone use	3 (23%)	4 (6%)	0.09
Systemic steroid use	12 (92%)	7 (11%)	<0.001*
Clinical stage of HIV infection			
Stage 1	2 (16%)	30 (46%)	0.07
Stage 2	4 (31%)	13 (30%)	0.27
Stage 3	7 (54%)	23 (35%)	0.33

\*statistically significant, BMI body mass index, HDL high density lipoprotein

Table 3: Odds ratios and 95% confidence intervals for all cases and controls

Variable	Odds ratio	95% CI
Steroid use ever	99.4	11.2, 884.5
Testosterone use	4.6	0.9, 23.6
Statin use	3.2	0.9, 10.8
Chemotherapy ever	11.6	1.0, 139.5
Clinical stage of infection		
Stage 1	0.2	0.0, 1.0
Stage 2	1.8	0.5, 6.7
Stage 3	2.1	0.6, 7.1

Table 4: Odds ratios and 95% confidence intervals for the OA subgroup

Variable	Odds ratio	95% CI
Steroid use ever	43.4	4.7, 403.8
Testosterone use	4.0	0.6, 28.4
Statin use	3.7	0.8, 16.9
Chemotherapy ever	5.5	0.3, 97.2
Clinical stage of infection		
Stage 1	0.4	0.7, 2.1
Stage 2	4.3	0.9, 20.3
Stage 3	0.7	0.2, 3.1

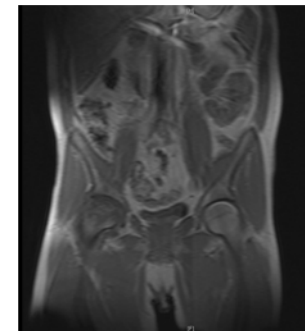


Image 1: Magnetic resonance imaging showing AVN of right femoral head

## Results (2)

The single most significant risk factor for elective hip surgery was a history of systemic steroid use (p<0.001). Similarly, analysis of the subset of patients 'diagnosed' with

OA showed the same highly significant association (p<0.001), as did the subset with clinical AVN (p<0.001). Significant associations were also seen with hyperlipidaemia. No significant associations were found with smoking, alcohol, testosterone use, chemotherapy, radiotherapy, statin use, CD4+ cell count, viral load, duration of HIV since diagnosis or duration of HAART

## Conclusions

This is the first epidemiological study exploring risk factors for elective hip surgery in HIV-infected patients which, given their age, seems common. The single most important risk factor was exposure to systemic glucocorticoids. This is a well-known and important risk factor for AVN but it is interesting that this risk factor is also highly significant amongst those presenting with what is radiographically OA. The findings suggest that the likely mechanism of OA in these young patients is also AVN. If elective hip surgery is to be avoided in HIV patients, prevention will need to focus on avoidance of risk factors for AVN, including systemic glucocorticoids, the effects of which can be potentiated by some HAART, notably Ritonavir.