

CASE REPORT

# Diagnosis of human immunodeficiency virus following femoral head harvest post-total hip arthroplasty

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## Abstract

Elective total hip arthroplasty (THA) is a routine procedure. Intraoperative harvesting of excised femoral heads for the purpose of donation during this procedure has become standard practice, in response to increasing bone allograft demand. Robust patient screening and femoral head analysis typically occurs, to minimize the risk of disease transmission to any potential recipient. Screening for human immunodeficiency virus (HIV), a virus normally first diagnosed through serological testing, makes up part of this process. This case describes a 43-year-old male who underwent elective THA, with subsequent analysis of the excised femoral head at time of screening revealing a diagnosis of HIV, a condition previously never detected in the donor. First diagnosis of HIV from bone is exceedingly rare, with this case illustrating an unusual diagnostic pathway of a well-understood condition, as well as representing an unfamiliar outcome following a common surgical intervention.

## INTRODUCTION

Total hip arthroplasty (THA) for treatment of advanced hip osteoarthritis is a common surgical procedure, with an estimated 166.4 per 100 000 population of 34 OECD (Organisation For Economic Cooperation and Development) countries undergoing this procedure in a single year [1]. Intraoperative harvesting of excised femoral heads from suitable patients has become routine to satisfy the increasing need for bone supplementation in fracture fixation, joint revision or spinal surgery [2].

Eligible femoral head donors typically undergo extensive screening and stringent analysis [2], so to minimize the risk of associated disease transmission. Screening for human immunodeficiency virus (HIV), an acquired retrovirus that can lead to acquired immunodeficiency syndrome and subsequent immunocompromise, makes up part of this process [2].

First diagnosis of HIV from living bone donor samples is exceedingly rare, with none of 34 750 UK donors over a 9-year period being found to be diagnostic for the virus [2]. In cases of

HIV, initial diagnosis is almost exclusively made via serum analysis [3].

## CASE REPORT

A 43-year-old male social worker was referred to an elective orthopaedic clinic following an incidental finding of degenerative changes in his left hip on X-ray undertaken during a previous admission for management of a renal calculus. His background history was otherwise significant only for smoking and hypertension.

On presentation, the gentleman described ongoing symptoms related to his left hip, namely intermittent discomfort becoming more severe in the preceding year, not precipitated by any trauma or injury and worst at night. This subsequently limited his ability to walk prolonged distances, climb stairs and dress himself.

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On examination, the patient had a high BMI, weighing 138 kg. There was evidence of an antalgic gait, and both external and internal rotation of his left hip was poorly tolerated. Hip examination was otherwise unremarkable.

X-ray (Fig. 1) showed severe loss of joint space, subchondral cyst formation and sclerosis, confirming the clinical findings of advanced left hip osteoarthritis. Additionally, concomitant femoral head flattening was detected on X-ray, consistent with possible osteonecrosis.

The patient was initially reluctant to undergo surgery, and thus had a trial of conservative treatment including weight loss advice. However, his symptoms continued to worsen, and the patient was listed for elective THA.

Surgery was subsequently undertaken using hydroxyapatite-coated cementless femoral implant and corresponding modular acetabular component. (Fig. 2). The surgery was uneventful, peri-operative course without complication, and post-operative review showed a successful resolution of his symptoms. Intraoperatively, the excised femoral head was sent for screening for bone harvest.

Antibody immunoassay of the harvested sample, performed as part of routine bone harvest screening, found evidence of active HIV-1. Subsequent serological immunoassay

investigations confirmed ongoing HIV infection. Additional CD4 testing showed suppressed levels of 230 cells/microlitre.

This was the patient's first instance in which any evidence of HIV was detected. The patient had never previously exhibited any signs of an acute retroviral syndrome and denied other risk factors such as tattoos, intravenous drug use or multiple sexual partners. By consequence of this, the patient was exceedingly distressed by the diagnosis, requiring initial extensive counselling as well as anti-retroviral therapy which he continues to this day.

## DISCUSSION

To our knowledge, the first diagnosis of HIV following elective THA has never been described. Generally, the most common portrayal of the relationship between HIV and elective THA has been in the context of causality. Contraction of HIV has been found to have a significant association with the development of hip osteonecrosis [4] and osteoarthritis [5], with the ensuing symptomatology making up valid indications for THA. Indeed, it could be postulated that an underlying HIV infection may have one of the predisposing factors in this patient developing osteonecrosis and requiring a THA.

The relationship between HIV and elective THA has been discussed in regards surgical outcomes. HIV-associated immunodeficiency has been thought to be associated with inferior operative outcomes [6], and the associated risk of infection has been shown to contribute to increased length of stay, technical and systemic complications following THA in this patient cohort [7].

An increasingly important issue, however, has become the detection of HIV in the context of potential femoral head harvesting. The increased drive for bone allograft, due to primarily the increase in revision arthroplasty surgery [8], has necessitated the emergence. Femoral head retrieval after primary THA has been found to be responsible for over half of bone allograft supplies [8].

Given the established risk of viral disease transmission to bone allograft recipients [2], robust bone bank screening techniques to identify patients appropriate for femoral head donation at time of THA have been created [9], with up to 95% of patients undergoing THA not being selected for bone banking [8].

While the detection of HIV in THA patients has become important to protect the allograft recipient, the diagnosis of the virus in the donor following harvest is very rare. One may postulate that the reason behind this is two-fold; namely that HIV is traditionally primarily a serological diagnosis [3], and that screening techniques have entailed that patients deemed to be at any risk of transmission of HIV infection generally do not proceed to bone banking [8].

The above case, however, illustrates the case of a gentleman who satisfied pre-operative screening criteria for femoral head donation, due to his lack of significant potential HIV exposure criteria in his background history. Given the paucity of risk factors, as well as existing evidence describing the rarity in which HIV is detected on donated femoral head screening [2], the diagnosis of HIV from the sampled bone was in this patient was both unlikely and unexpected.

In summary, this case illustrates an exceedingly unfamiliar sequelae of a commonly performed elective orthopaedic procedure. Its occurrence supports the importance of thorough bone harvest screening to protect potential recipients, as well as raising awareness of an unusual diagnostic pathway for HIV.



Figure 1: Pre-operative AP pelvis radiograph.



Figure 2: Post-operative AP pelvis radiograph.

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None.

**CONFLICT OF INTEREST STATEMENT**

None declared.

**REFERENCES**

1. OECD. *Health at a Glance 2017: OECD Indicators*. Paris: OECD Publishing, 2017; [http://dx.doi.org/10.1787/health\\_glance-2017-en](http://dx.doi.org/10.1787/health_glance-2017-en).
2. Lomas R, Chandrasekar A, Board T. Bone allograft in the UK: perceptions and realities. *Hip Int* 2013;**23**:427–33.
3. Fearon M. The laboratory diagnosis of HIV infections. *Can J Infect Dis Med Microbiol* 2005;**16**:26–30.
4. Yombi J, Vandercam B, Wilmes D, Dubuc J, Vincent A, Docquier P. Osteonecrosis of the femoral head in patients with type 1 human immunodeficiency virus infection: clinical analysis and review. *Clin Rheumatol* 2009;**28**:815–23.
5. Compston J. HIV infection and osteoporosis. *BoneKEY Rep* 2015;**4**:36.
6. Graham S, Lubega N, Mkandawire N, Harrison W. Total hip replacement in HIV-positive patients. *Bone Joint J* 2014;**96-B**:462–6.
7. Naziri Q, Boylan M, Issa K, Jones L, Khanuja H, Mont M, et al. Does HIV infection increase the risk of perioperative complications after THA? A Nationwide Database Study. *Clin Orthop Relat Res* 2014;**473**:581–6.
8. Abbas G, Bali SL, Abbas N, Dalton DJ. Demand and supply of bone allograft and the role of orthopaedic surgeons. *Acta Orthop Belg* 2007;**73**:507–11.
9. Traore A, Yombi J, Tribak K, Cornu O. Risk of virus transmission through femoral head allografts: a Belgian appraisal. *J Clin Orthop Trauma* 2013;**4**:119–22.