Hip and Knee Replacement in the HIV positive patient

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Abstract

Arthroplasty is used to relieve pain associated with degenerative or inflammatory joint disease, some post-traumatic joint problems, and avascular necrosis. Avascular necrosis, inflammatory and post-traumatic problems are seen on a regular basis in areas of high HIV seroprevalence. Degenerative arthritis is rare in younger HIV patients, however. Historically the only group of HIV patients in which arthroplasty has been common is that which received contaminated factor VIII transfusions in the 1980's. Haemophiliacs get a haemophilic arthropathy from repeated bleeds into joints and so is an additional complication.

Much of the previous literature on this topic has focused on haemophiliac patients. This review examines the success of arthroplasty in HIV positive patients, with an emphasis on non-haemophiliac patients. We conclude that arthroplasty can be a safe procedure for HIV positive individuals if the surgery is carried out in good conditions, and early results are encouraging.

Introduction

Arthroplasty, the process of joint replacement, is used to relieve pain associated with degenerative or inflammatory joint disease, some post-traumatic joint problems, and avascular necrosis. Whilst degenerative arthritis may be relatively rare in HIV patients who are predominantly of a younger age group, avascular necrosis, inflammatory and post-traumatic problems are seen on a regular basis in areas of high HIV seroprevalence. The appropriateness or otherwise of arthroplasty in such patients is therefore a pertinent question.

There are a number of concerns regarding outcome of arthroplasty surgery in HIV patients including anaesthetic issues, early and late sepsis, and aseptic loosening in cases of long-term survivors. Additionally the implantation of precisely engineered joints is an expensive procedure requiring advanced technical skills and aseptic operating environment not commonly available in developing countries, where HIV is most common. The only group of HIV patients in which arthroplasty has been common are those with haemophilia who received contaminated factor VIII transfusions in the early 1980's. Such patients reside in developed countries where arthroplasty is freely available. As a result there is far more literature on arthroplasty in haemophiliac HIV patients than there is on non-haemophiliac patients.

Most developing countries now have at least one centre undertaking regular lower limb arthroplasty. Patients with HIV disease now commonly access antiretroviral therapy, and have an extended life expectancy. As a result of these factors, such patients now regularly present to be considered for arthroplasty, and clinicians need to appreciate the issues and evidence to date. This review aims to focus on these issues.

HIV positive patients suffer progressively deteriorating immunity, as their CD4 count falls, and are consequently prone to opportunistic infections.[1]Studies have shown that HIV positive haemophiliacs tend to have a higher risk of infection after joint replacement.[2] The plight of HIV positive non-haemophiliacs on the other hand is relatively unknown. There have been retrospective and inconsistent reports on HIV positive patients undergoing surgery, but in this review we will focus on the existing evidence for the use of arthroplasty in HIV positive patients, with a particular focus on non-haemophiliacs.

Review of literature

Arthroplasty in HIV positive haemophiliacs

Hicks et al showed in a multicentre, retrospective study[3] there was an increased risk of sepsis after joint replacement in HIV-positive haemophiliacs. This involved 102 arthroplasties in 73 HIV-positive patients who were available for detailed study. There were 74 replacements of the knee (72.5%), 27 of the hip (26.5%) and one of the elbow (1%). Of these, 91 were primary and 11 were revision procedures. The rate of deep sepsis was 18.7% (17/91) after primary procedures and 36.3% (4/11) after revision procedures. A number of other studies support the finding of an increased sepsis risk in HIV-positive haemophiliacs.

Wiedel et al[4] in 1989 reported a higher risk of acute infections in the haemophiliac HIV positive patients amongst the 76 patients undergoing a total of 97 Total knee arthroplasties.

Norian et al[5] reported 53 total knee arthroplasties that were carried out between 1976 and 1998 to treat haemophilic arthropathy in 38 patients (29 were HIV positive), and results confirmed that TKA has a high risk of failure associated with infection (frequently Staphylococcus epidermis)

Gregg Smith and Pattinson[6] recorded cases of Septic arthritis in haemophilia patients: 6 patients were treated for haemophilic haemarthrosis over a period of two years. Four of the six patients were seropositive for anti-HIV, and the authors of the study reported that septic arthritis can develop in subjects who are in otherwise good health, without obvious symptoms of HIV infection. They have suggested that the high risk of secondary infection is reason to perform joint replacement in haemophiliac patients with special care and in a very carefully selected group.

Ragni et al[7] reviewed 66 haemophilic patients undergoing 74 orthopaedic procedures, each of whom had CD4 counts of less than 200 cells, and found that the post operative infection rate for arthroplasty appears to be increased 10-fold compared with other procedures.

Thomason et al[8] published results of 23 total knee arthroplasties in 15 haemophiliac patients, and found 2 early and 2 late deep infections, all occurring in HIV seropositive patients.

Operating on haemophiliacs presents particular problems as we pointed out[2] previously and so the reported success rates and methods of arthroplasty on these patients cannot be necessarily translated to non-haemophiliac patients. Haemophiliacs are especially prone to bleeding around their joints and may suffer bacteraemia due to regular factor VIII transfusions2. HIV-negative haemophiliacs suffer an increased risk of infection following arthroplasty[4,9], and so the increased risk of infection found in HIV-positive haemophiliac patients may be due to their haemophilia rather than HIV. However, the literature is generally concurrent with the view that total hip replacement is of value in HIV positive haemophilic individuals, because of the improved quality of life such an operation can produce.

Arthroplasty in HIV-positive non-haemophiliacs

Despite arthroplasty in non-haemophiliac HIV-positive patients being previously rare there are reported incidences of it. A study by Brijlall1 found no incidences of infection at a six year follow-up despite 3 out of the 14 patients having a CD4 count of less than 200 cells/mm3. The mean pre-lymphocyte analysis of these patients showed: TLC – 2.24 mm3, CD4 – 425/mm3, CD8 – 873/mm3, CD4/CD8 – 0.52. Mean post-lymphocyte analysis at 6 years: TLC – 1.98, CD4 – 350 mm3, CD8 – 724 mm3. 3 patients declined to an average of 113.6/mm3 and are consequently receiving HAART (Highly Active Antiretroviral Therapy - zidovudine, didanosine, lopanivir).

A National Joint Registry study by Lubega et al10 at this institution found no difference in early infection between the 14 patients (18 hips) who were HIV-positive and the 28 patients who were HIV-negative. 2 We also reported our early experience with 4 total hip replacements in two patients with bilateral avascular necrosis, one of whom had a CD4 count of less than 100 cells/mm3, but no sepsis was seen in a mean 2-year follow up period.

Patients with avascular necrosis on the other hand have experienced a higher incidence of aseptic loosening. Both aseptic loosening and osteonecrosis are independent risk factors for late sepsis.[11] As the immunity of HIV positive patients declines, the risk of late sepsis around implants increases, some resulting from activation of latent bacteria, others from late haematogeneous seeding. Such observations have been made following trauma implants and arthroplasties[12].

Criteria for Choosing surgery

Arthroplasty is primarily a pain-relieving therapy. In so doing it often also improves function.

The patient having a diagnosis of HIV disease should not necessarily deter arthroplasty. Early outcomes after trauma implant surgery were good if the skin is intact and the conditions ideal[13]. The limited literature on arthroplasty is also encouraging in the short-term. There are no reports of medium or long-term outcomes of arthroplasty in non-haemophiliacs with HIV disease.

5-10% of HIV-infected individuals are described as "rapid progressors", with progression from infection to AIDS taking as little as 2 years as a result of declining CD4 counts, and non-cytolytic CD8 activity[14]. The characteristics of "rapid-progressors" have been described by Brijlall as those with persistent inguinal lymphadenopathy, dermatological abnormalities, hyperpigmentation and minor symptoms such as fatigue and myalgia. Primary infection in rapid progressors will tend to be far more severe and symptomatic than in other patients and so such individuals require special consideration before opting for surgery. An absolute CD4 count is therefore not the best indicator of whether to offer surgery. Thus Brijlall suggests ascertaining whether an individual is a rapid progressor or long-term non-progressor, as well as the stage of the disease, is more important[1].

The outcome of total arthroplasty is also likely to be dependent on factors such as nutritional status, disease stage, and co-morbidity.

HAART's and impact upon arthroplasty in HIV positive patients

Whilst non-haemophiliac HIV positive patients are not often sufferers of degenerative arthropathy, as they are too young, they do, however, suffer from inflammatory arthropathy and avascular necrosis. Harrison and Brijlall[13] have both suggested a possible association of avascular necrosis with highly-active anti-retroviral therapy (or HAART). There are patients without any other risk factors for avascular necrosis who develop AVN, and a current hypothesis is that protease inhibitors may cause hyperlipidaemia [15]. However, Brijlall suggests that in some patients, the AVN may have developed before the anti-retroviral therapy, and that HIV or other factors may increase the risk of AVN, despite antiphospholipid antibodies (APLA) being found in HIV positive patients: the importance of this is unclear[16]. Within Brijlall's cohort with osteonecrosis, many of the patients had multiple risk factors for AVN including corticosteroid use (1 eczema patient), alcohol abuse (6), smoking (10), hypercholesterolaemia (2), and antiviral therapy (3), and thus defining particular reasons for AVN was difficult.

Antiretroviral therapy is, of course, highly beneficial to the HIV positive patient and whilst there may be some associated risk in terms of avascular necrosis, these therapies do elevate CD4 counts relative to patients not receiving therapy, and the question of whether the therapy reduces the risk of early and late sepsis in HIV positive patients by raising the CD4 count has yet to be answered[10]. In order to determine whether deep infection occurs as immunity declines, it is necessary to carry out further long-term follow-up studies. It is hoped that the Malawi National Joint Registry will be ideally placed to assess this.

Conclusion

Arthroplasty can be rewarding for the HIV positive patient, provided the correct criteria are used to ascertain whether a patient is suitable for surgery: in summary a patient who has severe pain, and has not progressed to stage IV (AIDS-defining disease, according to WHO) is likely to experience benefits from arthroplasty, but a risk: reward ratio analysis is certainly necessary before any operation is performed. Both Lubega et al and Brijlall in separate studies have confirmed that arthroplasty in HIV positive patients is a safe procedure and can proceed with minimal early complications , so long as the skin is intact and conditions ideal9, and provided patients are not rapid-progressors and/or have progressed to clinical stage IV (WHO), or the AIDS-defining stage. As regards medium and long-term outcomes, only time will tell.

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