AIDS 환자에서 대퇴골 두 무혈성 괴사증에 대한 인공 고관절 전치환술 치료
- 증례보고 -

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인간 면역 결핍 바이러스(HIV)에 감염된 환자에서 대퇴골 두 무혈성 괴사증의 발생이 증가되고 있다. HIV감염환자에서 무혈성 괴사증의 발생 원인은 다양하다. 항바이러스 제재, 코르티코스테로이드의 사용과 그로 인한 고지질혈증, 과다응고, 면역 대체, 알코올 중독 유병율의 증가 및 메가스테롤 아세테이트 등이 관련인자로 알려져 있다. HIV감염환자의 출현으로 수술장에서 경피적 손상이나 다른 혈액 노출에 관한 역학을 수술 의사들이 이해해야 할 필요성이 크게 높아졌다. 저작들은 대퇴골두 무혈성 괴사증의 HIV감염환자를 인공 고플절 전치환술로 치료하였으며, 특히 질환의 원인 및 수술장에서 HIV전파를 예방할 수 있는 방법에 대하여 보고하고자 한다.

색인단어 : 대퇴골두 무혈성 괴사증, 후천성 면역 결핍증, 인공 고관절 전치환술

The first case report of an association between HIV (human immunodeficiency virus) disease and osteonecrosis was published in the early 1990s. Since then, many investigators have attempted to find etio-pathology of osteonecrosis in AIDS (Acquired Immunodeficiency Syndrome) patient. Whether osteonecrosis is the complication of disease itself, or a consequence of its treatment, has been a major issue of discussion amongst them.

Despite the increasing number of patients with HIV infection, surgical experience in orthopedics with these patients remains limited in Korea. We are reporting a case of avascular necrosis (AVN) of femoral head in AIDS patient operated for total hip replacement at our institute. Pertinent literature is reviewed. The patient was informed that the data from the case would be submitted for publication, and gave his consent.

Case Report

A 41-year-old HIV-positive male was referred from internal medicine department with complaint of left hip pain of 1 month duration. He was diagnosed to be HIV-positive at other hospital 16 months ago, when he went there for dyspnoea and fever. He was diagnosed by ELISA test and the diagnosis was confirmed on Western blot test. After diagnosis, he took HAART (Highly Active Anti-Retroviral Therapy). The total duration of HAART before surgery was about 14 months. He had a history of generalized skin eruptions when HIV was diagnosed; he was treated by prednisolone 30 mg for 10 days. The patient also had a past history of asthma from his high school period; and has taken intermittent treatment for the same; but details of medications are not available.

On physical examination, the patient had limping gait and complained of severe groin pain and tenderness. The range of motion was restricted (flexion 100°, internal rotation 0°, external rotation 30°, abduction 35°, adduction 10°). There was no leg length discrepancy.

Anteroposterior and lateral radiographs were suggestive of avascular necrosis of left femoral head.
with mildly collapsed lesion (Fig. 1), which was confirmed by MRI (Fig. 2) and bone scan (Fig. 3). On laboratory examination, the CD4+ T-cell count at the first diagnosis of HIV infection was 90 cells/μL and 333 cells/μL before total hip arthroplasty. Lipid profile was normal and anti-cardiolipin antibody was negative, Protein-C and S were also in normal range.

Surgery was performed under general anesthesia. All the precautions published by AAOS (American Academy of Orthopedic Surgeons) were practiced. Operating surgeon, two assistants and one scrub nurse wore disposable impervious gown, helmet with facial shields and body exhaust system, double hand gloves and impermeable boots. Disposable impervious drapes were used for draping. THR was performed using modified two-incision technique developed by senior author. This technique, as such, is involved with minimal tissue damage and less blood loss. Scalpel was used only for skin incision and electrocautery was used for rest of the procedure. Uncemented prosthesis with ceramic-on-ceramic articulation was used. M/L-Taper (Zimmer, Winterthur, Switzerland) femoral stem with Delta PF acetabular cup (Lima-Lto, San Daniele del Friuli (UD), Italy) were inserted after adequate bone preparation. Reconstruction was stable with good range of motion with equal limb length, as tested intraperatively. Wounds were closed in layers with negative suction drainage. All the instruments were first disinfected by keeping in the solution of 0.5% sodium hypochlorite for 30 minutes, followed by autoclaving using standard protocol.

Postoperatively, intravenous antibiotics were given for two days and patient was mobilized with walking aid on second day. Wound healed well and patient

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**Fig. 1.** Anteroposterior radiograph of pelvis showing sclerosis of both femoral head. Crescent sign is seen on left side (black arrow).

**Fig. 2.** T1 weighted coronal image of MRI showing subchondral avascular lesion of increased signal intensity on both sides, surrounded by an area of low and intermediate signal intensity.

**Fig. 3.** Bone scan of both hips showing decreased uptake in antero-superior subchondral areas of both femoral head surrounded by areas of increased uptake, giving characteristic "cold in hot" appearance.
went home after ten days of surgery. Arthroplasty has been functioning well after 9 months of surgery.

Discussion

Annual incidence of osteonecrosis in HIV positive patients has been described in range of 0.08% to 1.33%, a much higher rate than that expected in general population\(^1\). In a recent cross-sectional study, 4% of 339 HIV-infected individuals were found to have evidence of asymptomatic osteonecrosis of the hip by magnetic resonance imaging; raising concerns on the potential magnitude of this condition in the future\(^3\).

Osteonecrosis in this population may be caused by an increased prevalence of risk factors, including the use of corticosteroids and megesterol acetate, hypertriglyceridemia, alcohol abuse, local trauma and hypercoagulable states\(^1\). The relationship between osteonecrosis and HAART has been challenged because cases of osteonecrosis were reported before availability of this group of anti-retroviral drugs and even in patients without any treatment\(^4\).

Corticosteroids are used in the management of many conditions related or not related to HIV infection. Several studies suggest that the use of corticosteroids is the most common factor related to osteonecrosis in HIV positive patients\(^7\). Megesterol acetate, a synthetic prostegastational steroid used in patients with wasting syndrome, can act like a glucocorticoid, binding DNA glucocorticoid response elements and predisposing patients to osteonecrosis\(^1\). Two studies have reported a positive association between alcohol abuse and the development of osteonecrosis in HIV disease\(^7\). Numerous vasculitides have been reported in association with HIV infection and these inflammatory states have been shown to cause subacute swelling and disruption of the vascular endothelium, insidiously resulting in luminal occlusion. This vascular blockage may then lead to necrosis of bone. Even though the anticardiolipin antibody was absent in this case, it is estimated that anti-cardiolipin antibodies are present in 50~86% of all HIV-infected patients and in addition to their potential for endothelial disruption: they have been linked to platelet aggregation and vascular thrombosis\(^1\).

Total hip replacement in HIV positive patients has remained relatively uncommon until now, but with increasing incidence of AVN in HIV positive patients it is going to become more frequent. One of the major concerns of orthopedic surgeon, treating an HIV positive patient, is postoperative wound infection. Lehman et al\(^5\) examined rate of periprosthetic infection after total joint arthroplasty in patients with HIV and IVDU (Intravenous Drug Use). Out of 28 HIV positive patients undergoing joint replacement, 4 developed infections, Parvizi et al\(^9\) also noted a higher incidence of complication in diverse group of HIV-positive hip and knee arthroplasty patients. Mahoney et al\(^8\) however had only one infection in a series of 40 HIV patients undergoing 54 total hip replacements. Guth et al\(^2\) examined the relationship between the CD4+ T-cell count, injury severity score and bacterial infection in HIV positive trauma patients and found that only the injury severity score was associated with infection.

In our patient, osteonecrosis was detected relatively early after diagnosis of AIDS. Symptomatic osteonecrosis usually presents late in the course of HIV disease. In one series, median time from HIV diagnosis to osteonecrosis was 6.2 years\(^3\). Our patient had a history of chronic alcoholism; he received anti-retroviral therapy and corticosteroids. Several factors would have contributed to the development of AVN and we were not able to identify a direct and definite cause. His lipid profile was normal and anti-cardiolipin antibody or anti-protein S antibody was not found. In spite of relatively low CD4+ T-cell counts, he recovered well after surgery without any complications.

There are several known methods for the treatment of early stage, precollapsed lesions of femoral head, including core decompression, nonvasculized bone graft, vasculized bone graft, osteotomy in general. The size of necrotic segment, whether it has collapsed, influences the success rate of femoral head preservable procedures\(^10\). In our patient, his symptoms were severe and radiographic findings showed rapidly progressive collapse. He wanted early ambulation and recovery and was considering surgery of the contralateral hip as well. In view of his HIV-positive status, we wanted to minimum the number of surgical procedure to be performed, and
therefore reduce the risk of HIV transmission to surgical and nursing staffs. Theses were the reasons why THR was performed in young patient with mildly collapsed AVN (ARCO stage III).

A number of precautions to be applied universally, were recommended by the CDC (Center for Disease Control) in 1987, and also published by AAOS in 1989 and 1996, to prevent contact with blood and other body fluids and tissues. In addition to ‘standard precautions’ to be followed for all patients, ‘transmission-based precautions’ are advised for patients documented as or suspected to be infected with highly transmissible or epidemiologically important pathogens. An effective barrier between the patient and the surgical team requires appropriate protective draping and garments of non-woven, impervious materials. Towel clips should not be used. Masks, surgical hoods, glasses or facial shields and impermeable boots are also recommended. Double gloving reduces the risk of contact from 29% to 18%, but outer pair should be changed every two hours, or every hourly for trauma surgery. Simple methods of disinfection are adequate in killing HIV. Instruments contaminated with blood can be adequately handled by sterilization methods which are routinely used, such as autoclaving. 0.5% sodium hypochlorite solution is useful for cleaning the blood spills.

REFERENCES

Avascular Necrosis of Femoral Head Treated by Total Hip Replacement in AIDS Patients - A Case Report -

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The incidence of osteonecrosis of the femoral head is increasing in patients infected with the human immunodeficiency virus (HIV). The etiology of osteonecrosis in HIV positive patients is multifactorial. The factors considered responsible include antiretroviral therapy, corticosteroid use and resultant hyperlipidemia, hypercoagulability, immune reconstitution, the increased prevalence of alcoholism in this population and megesterol acetate. The emergence of the HIV has highlighted the need for surgeons to understand the epidemiology of percutaneous injuries and other blood exposure in a surgical setting. We report a case of avascular necrosis of the hip treated with a total hip replacement, with particular focus on the etio-pathology of the disease and preventive measures for its transmission in an orthopedic surgery setting.

**Key Words:** Avascular necrosis, Human immunodeficiency virus, Total hip replacement