

CASE REPORTS

Refer to: Schurman DJ, Aptekar RG, Burton DS: Infection in total knee joint replacement, secondary to tooth abscess. *West J Med* 125:226-227, Sep 1976

Infection in Total Knee Joint Replacement, Secondary to Tooth Abscess

DAVID J. SCHURMAN, MD
ROBERT G. APTEKAR, MD
DAVID S. BURTON, MD
Stanford

ALTHOUGH DELAYED INFECTION in total joint replacement is common, the cause of it has remained controversial. Charnley¹⁻⁴ maintains that delayed infections are not due to hematogenous infection from other sources of sepsis, but are the result of organisms introduced at the time of operation. Others maintain that patients in whom total joint replacement has been carried out are at risk from hematogenous infections which may occur elsewhere in the body.

In the case described here, bilateral knee infections occurred simultaneously in a patient a year and a half after hinge total joint replacement in both knees as a result of hematogenous spread from a persistent tooth abscess.

Report of a Case

A 61-year-old woman with rheumatoid arthritis and in whom there had been bilateral knee replacements entered Stanford University Medical Center in May 1975 with pain and swelling in both knees. Before this, in September and October of 1973, bilateral total knee replacements had been carried out utilizing the Guepar hinge, and cephalosporin prophylactic antibiotics had been given intravenously for four days at each operation. Before the knee replacement procedures,

she had bilateral knee flexion contractures of 80 degrees, and was confined to a wheel chair with continuous pain. The postoperative course was unremarkable, with an unusually good functional result, no pain and more than 120 degrees of motion in each knee; the patient was able to walk unlimited distances using a single cane part time.

In March 1975 pain and drainage developed in right lower incisor tooth. Treatments were begun by her dentist in an effort to save the tooth, and incision, drainage and root canal work were carried out. At this time, osteomyelitis of the mandible about this tooth was seen on an x-ray study, and the patient suffered from intermittent fever. A regimen of four tablets of tetracycline per day for five days was begun. Some weeks later, and five days before admission to hospital, there was considerable pain in the tooth, and a drainage procedure was carried out by her dentist. The following day pain developed associated with swelling and inflammation of the right knee. During the next four days, the pain and swelling increased and the overlying skin became erythematous. On the day of admission, pain in her left knee developed.

On physical examination, a temperature of 38.2°C (101.1°F) was noted. Both knees were swollen and painful, with motions limited to less than 30 degrees. Results of laboratory tests included a leukocyte count of 12,600 and a sedimentation rate of 61. On aspirates of both left and right knees, Gram-positive cocci were seen. Cultures of blood specimens drawn on admission and of aspirates from the left and right knee both grew *Staphylococcus aureus* with the identical penicillin-resistant tetracycline sensitive organism. Antibiotic sensitivities were identical for all organisms cultured in the blood and knees. Therapy was started with 1 gram of cloxacillin given intravenously every four hours. On x-ray studies of both knees only soft tissue abnormalities were seen and there were no findings indicative of osteomyelitis.

The day following admission, incision, drainage and debridement with closed tube irrigation of both knee joints were done. Approximately 400 cu cm of purulent material was found in each knee joint, as well as soft tissue inflammation and debris. Postoperatively, in addition to continua-

From the Department of Surgery, Division of Orthopedic Surgery, Stanford University Medical Center (Drs. Schurman and Burton); and the Children's Hospital at Stanford (Dr. Aptekar).

Submitted, revised, December 11, 1975.

Reprint requests to: David J. Schurman, MD, Division of Orthopedic Surgery, Stanford University Medical Center, Stanford, CA 94305.

CASE REPORTS

tion of intravenous administration of cloxacillin, each knee joint was irrigated with 50 cu cm of normal saline solution containing 100 mg of cloxacillin, administered over 30 minutes every three hours. The patient's temperature returned to normal three days postoperatively and symptoms subsided quickly, with little or no clinical effusion on either knee. The abscessed tooth was removed during the hospital stay, and cultures were negative although the patient had been treated with cloxacillin for four weeks.

Peak serum bactericidal tests on specimens drawn one hour after intravenous antibiotic administration, and 15 minutes before the next dose, showed average killing levels of 1:256, with valleys never below 1:8. After the fourth week, the patient's knees were passively exercised several times a day through a range of motion.

In the sixth week after intravenous administration of cloxacillin was begun, a saline wash-aspiration of both knee joints was done and cultures showed no growth of the organism. The patient was discharged from hospital and a regimen of orally given cloxacillin was begun. Twelve weeks postoperatively the range of motion was 0 to 85 degrees in each knee. The patient was free of pain and able to walk with a cane. There were no joint effusions, localized symptoms or evidence on x-ray studies of osteomyelitis.

Comments

This case shows that hematogenous spread of infection to a prosthetic joint can occur. It is important for physicians and dentists to be aware of this fact when a patient with a prosthetic joint replacement is seen.

There are only a few case reports^{5,6} which show hematogenous spread of infection to a prosthetic joint; however, postoperative infection does occur for an indefinite period of time.² Hall⁵ reported a late infection of a total knee prosthetic implant secondary to a urinary tract infection five years postoperatively. Amstutz⁷ pointed out that most postoperative hip replacement infections in one series were associated with simultaneous urologic infection. Although there are very few case reports of hematogenous spread of infection to orthopedic implants, the rate of delayed infections varies from 0.5 to 5 percent. Surely at least some of these are of hematogenous origin.

The incidence of late sepsis in orthopedic implants seems to be similar to that found after valvular replacement in cardiovascular surgical

procedures.⁸⁻¹¹ Approximately 40 percent of the infected cardiac prosthetic implants are clinically apparent two or more months after operation. The types of bacteria found in infected orthopedic prosthetic devices are similar to those that cause infection in cardiac prosthetic implants⁸⁻¹² and are, coincidentally, the same bacteria that can be cultured from the operating room.¹² In one series,¹² 30 percent of 658 routine cultures taken at the time of total hip replacement were positive. Of 14 patients in whom there were later infections, only in one patient was the same organism present at the time of infection as found during the routine culture taken at the time of operation. The incidence of infection in patients with rheumatoid arthritis is unusually high, whether spontaneous¹³ or after orthopedic procedures.^{14,15} It is well-known that patients treated with corticosteroids are at risk to infection, while the presence of a rheumatic disease itself may predispose to infection.¹⁶

Summary

A 61-year-old woman presented with pain and swelling in both knees a year and a half after bilateral knee joint replacements. Aspiration showed the presence of infection, which was linked to a prolonged tooth abscess. This case illustrates a hematogenous spread of infection to prosthetic joints.

REFERENCES

1. Charnley J: Postoperative infection after total hip replacement. *Clin Orthop* 87:167-187, 1972
2. Charnley J, Cupic Z: The nine and ten year results of low friction arthroplasty of the hip. *Clin Orthop* 95:9-25, 1973
3. Charnley J, Eftekar N: Postoperative infection in total prosthetic replacement arthroplasty of the hip. *Br J Surg* 56:641-649, 1969
4. Charnley J: *Acrylic Cement in Orthopedic Surgery*. Edinburgh and London, E. and S. Livingston, 1970
5. Hall A: Late infection about a total knee prosthesis. *J Bone Joint Surg* 56B:144-147, 1974
6. Burton D, Schurman D: Case report of delayed infection of bilateral total hip arthroplasties of probable hematogenous origin. *J Bone Joint Surg* 57A:1004, Oct 1975
7. Amstutz H: Prevention of operative infections. *Cleve Clin Q* 40:125-131, 1973
8. Block P, De Sanctis R, Weinberg A, et al: Prosthetic valve endocarditis. *J Thorac Cardiovas Surg* 60:540-548, 1970
9. Okies J, Viroslav J, Williams T Jr: Endocarditis after cardiac valvular replacement. *Chest* 59:198-202, 1971
10. Goodman J, Schaffner W, Collins H, et al: Infection after cardiovascular surgery—clinical study including examination of antimicrobial prophylaxis. *N Engl J Med* 278:117-123, 1968
11. Sande M, Johnson W Jr, Hook E, et al: Sustained bacteremia in patients with prosthetic cardiac valves. *N Engl J Med* 286:1067-1070, 1972
12. Fitzgerald R Jr, Peterson L, Washington J II, et al: Bacterial colonization of wounds and sepsis in total hip arthroplasty. *J Bone Joint Surg* 55A:1242-1250, 1973
13. Gristina A, Rovere G, Shoji H: Spontaneous septic arthritis complicating rheumatoid arthritis. *J Bone Joint Surg* 56A:1180-1184, Sep 1974
14. Garner R, Mowat A, Hazelman B: Wound healing after operations on patients with rheumatoid arthritis. *J Bone Joint Surg* 55B:134-144, 1973
15. Lidgren L: Orthopedic infection with rheumatoid arthritis. *Scand J Rheum* 2:92-96, 1973
16. Glass D: Report of symposium: Infection in immunology and rheumatic diseases. *Ann Rheum Dis* 33:485-488, 1974