Transmission of human T-cell lymphotrophic virus type 1 by a deep-frozen bone allograft

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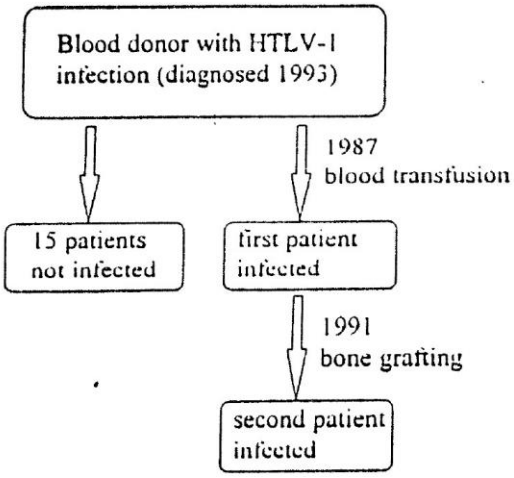
Transplantation of bone using frozen allografts implies a risk of transmitting viral infections like human immunodeficiency virus type 1 (HIV-1) and hepatitis C (Simonds et al. 1992, Conrad et al. 1995). Human T-cell lymphotrophic virus type 1 (HTLV-1) infections are endemic in some parts of the world—for example, Japan and the Caribbean—but have also been observed occasionally in many other countries. Breastfeeding is a major mode of transmission in endemic areas (Goldfarb 1993). This virus is associat-



were no signs of any HTLV-1-associated disease, but blood tests were seropositive for HTLV-1 antibodies. During surgery, he received 0.7 L of banked erythrocyte concentrate. His 2 blood donors, also tested, were both seronegative for HTLV-1.

Further studies of the records of the femoral head donor showed that he had been admitted to the department of infectious diseases in Malmö 1 month after the blood transfusions in 1987 because of fever, a rash and a transient right-sided radial nerve palsy. An analysis of frozen sera collected during this postoperative febrile disease showed HTLV-1 seroconversion during that period. At a recent follow-up, there were no signs of any HTLV-1-associated disease.

Flow chart illustrating the transmission of HTLV-1 virus from a blood donor to a bone graft recipient.

ed with adult T-cell leukemia and myelopathy, tropical spastic paraparesis, and it has an incubation period of up to 3 or 4 decades. However, the virus can also spread by blood transfusions from HTLV-I positive donors (Weber et al. 1992). We describe a case of HTLV-1 transmission through transplantation of a fresh-frozen unprocessed femoral head allograft.

Case history (Figure)

During 1993, a retrospective analysis was performed on 16,000 sera from blood donors in the south of Sweden. One blood donor was found to be seropositive for HTLV-1. All 16 recipients of his blood were traced and tested for HTLV-I antibodies and only one had seroconverted. This blood transfusion was performed in 1987 when the recipient was operated on with revision of a total hip prosthesis at the age of 62 years. The prosthesis had been inserted 10 years earlier for arthrosis. 1.3 L of banked concentrated erythrocytes were transfused during surgery and a further 1.3 L postoperatively.

After confirmation of HTLV-I transmission from this blood donor, the patient record showed that the recipient 4 years later, in 1991, had his left arthrotic hip joint replaced by a total hip prosthesis. The femoral head was donated to the bone bank, where it was kept deep-frozen at –80 °C. Blood tests for hepatitis B and C and HIV-1 were negative. 1 month later, the femoral head was used.

From the bone bank records the recipient of the bone allograft was identified. He was a 76-year-old man with a severe socket loosening of a hip prosthesis. The banked femoral head was used as a block graft and fixated with screws to reinforce the acetabular wall. At a 4-year follow-up, the graft had healed to the iliac bone and the hip was functioning well. There

Discussion

This case shows that HTLV-I virus can also be transmitted by transplantation of a solid bone allograft that has been deep-frozen. Although blood from the seropositive blood donor infected only 1 of 16 patients, a deep-frozen bone graft, collected 4 years after a primary HTLV-I infection in a secondary case, contained enough viable virus particles to induce the development of HTLV-I antibodies. It is known from 2 reports on HIV-1 and 3 reports on hepatitis-C virus transmissions with bone grafts that deep-freezing alone does not inactivate virus (Tomford 1995). Processing of bone by irradiation and freeze-drying reduces or eliminates the risk of viral transmission, but it also reduces new bone formation and the strength of bone allografts (Tomford 1995). Donor selection and appropriate testing are important factors to reduce a small risk of spreading viral diseases by bone allografts. However, as in this case, there is always a risk of spreading a virus, for which no test method is available. In these 2 elderly patients, the risk of a clinical disease caused by HTLV-I is small. In younger patients, this risk is much larger and the possibility of transmitting a HTLV-I infection should be considered. Whether processed bone can be used instead of fresh frozen allograft depends on the demands made on the graft. To reduce the risk of viral transmission during surgical correction of bone defects in the future, it will be important to find alternatives to human unprocessed bone grafts.

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