Guest editorial

Bank bone, infections and HIV

The use of frozen allogeneic bone grafts has lately become everyday practice in orthopedics, and many hospitals in the Nordic countries now store their own frozen femoral heads. The article by Allan J Aho et al. in this issue (pp. 559–565) shows that he was one of the pioneers in bone banking and that the bone bank in Turku (Åbo), Finland, is unique in the Nordic countries. Massive bone grafts have mostly been used after tumor resections, and although this technique has saved many limbs, it has been hampered by non-union, resorption, fracture and infection (Ortiz-Cruz et al. 1997). When it was introduced, there were fewer alternative treatments than at present. Vascularized bone transplantation, segmental transport according to Ilizarov or custom-made mega prostheses are now valuable alternatives. It is likely, therefore, that the use of massive allografts for tumor indications will decrease in the future. On the other hand, impaction grafting at revision surgery has increased dramatically the use of femoral heads from living donors. Compaction grafting at hip revisions has shown unexpectedly good results and is fully established (Gie et al. 1993). In the past, bone banking was performed by a few persons with a special interest also in the biological aspects of bone grafting, but when impaction grafting has become common, there may be a risk that its value is overestimated and indications unduly widened. So far, bank bone must be considered as merely an implant material, valuable mostly for its mechanical properties and its ability to allow some new bone ingrowth. Although bone matrix contains growth factors, bone morphogens, etc, there is no clear evidence that these factors play a practical role in bank bone. Impacted grafts appear to behave differently from unimpacted grafts. The biological aspects of this difference are unknown. Synthetic materials, together with growth factors, have been tried for decades, but there has never been any breakthrough, probably because it is difficult to produce materials with sufficient mechanical properties. Porous hydroxyapatite, for example, is too brittle for most indications. However, growth and differentiation factors, such as BMP-2 or OP-1, are being used in clinical trials, and may become new alternatives or adjuncts to bank bone.

By far the largest problem with bank bone is bacterial infections. Bacterial infection of a bone graft after limb-sparing surgery is common and means a high risk of loss of limb and even of life. An infected hip revision is also a serious threat to an elderly patient. With femoral heads from living donors, Aho et al. had an infection rate of 3%. Hirn and Krusius in this issue (pp. 566–569) report a risk of HIV transmission which is about 100,000 times lower, even without a repeat HIV test. This figure is based on data from blood donors. In other countries, the risk of HIV transmission might be higher, as for example in the USA. On the other hand, femoral head donors probably represent a population with a lower HIV prevalence than blood donors. For a patient receiving a femoral head, the risk of dying from a bacterial infection is surely much higher than the risk of dying from HIV transmission. The mortality in hip prosthetic surgery in general is about 3/1000 (Murray et al. 1996). For revisions it is probably higher. If one assumes that re-revision and other hazards caused by bacterial infection account for a 3 times higher mortality than hip prosthetic surgery in general, that would be 1/100. Then, one could estimate that about 3/10 000 primary revision patients would die of bacterial infections that are to some extent related to the grafts. Compare that to the risk of HIV transmission without a repeat HIV-test: Even if HIV transmission led to immediate death, it would still cause a 1,000 times lower mortality (3/10,000,000) than bacterial infections. It would appear, therefore, that resources consumed by retesting for HIV would save more lives if they were used to minimize further bacterial contamination.

With this information, just one HIV antibody test at the time of donation may be sufficient in a femoral head bone bank, at least in the Nordic countries and if a good history can be obtained from each donor. Indeed, the risk of HIV transmission would still not be higher than in a routine blood transfusion. As with nuclear power plants or environmental hazards, psychological factors are important for the perception of being at risk, and familiar dangers, such as bacterial infections, attract less attention than new, albeit very small risks.

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