Antibiotic-loaded Bone Allograft: Personal Experience

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Introduction

In 1996 a new method for the production of morcellized bone allograft (MB) was described by Ullmark and Hovelius [3]. According to the clinical research of Ullmark [4] new bone formation surrounding the bone allograft was histologically demonstrated after 4 weeks. After 6 months allograft chips were still evident and surrounded by large quantity of growing bone tissue and vessels; after 4 years, the histological sections of stemmed proximal femur in revision hip prosthesis showed a normal bone tissue in the site of the bone loss stock: allograft chips were not evident anymore, and only new bone tissue growth with plenty of regenerated blood vessels were present. It was also demonstrated that defatted graft reduces bone-integration time and homologous tissue bio-compatibility [2].

Following these experiences, since 1998 the Musculoskeletal Tissue Bank of the Rizzoli Institute [1] produces morcellized defatted bone allograft in conformity with Ullmark and Hovelius experience. The bone allograft is utilized for different pathological lesions to replace bone loss stock. Witso [7, 8] and Winkler [6] experience showed that morcellized bone allograft is a good antibiotic carrier in vitro. We used antibiotic-loaded morcellized bone graft (AMB) to refill debrided septic bone loss stock. In such cases, a surgical debridement was always performed in the first stage to eradicate infection, whereas in the second stage the restoration of bone loss was performed with ABM (Figures 1a, b, c). Recurrence of a deep local infection with chronic fistula, without a septic involvement of the bone graft, was observed in some cases (Figures 1d, e). In some cases it has been possible to see significant roentengraphic growth into a solid bone mass and satisfactory remodelling of bone allograft into new bony tissue (Figures 1f).

ABM has shown to be a promising composite for the treatment of septic bone loss stock even in presence of chronic infection. Nonetheless, the poor mechanical strength of this composite has led us to study in vitro and in vivo the pharmacological and mechanical behaviour of ABM mixed with PMMA cement (CAMB).
**Fig. 1a.** Septic non-union of the distal femur. Patient BS IV (UTMB Stage System). Fistula

**Fig. 1b.** X-ray after surgical debridement of septic tissue and stabilization with an Ilizatov frame. The original length of the femur is restored. Fistula