



Enhanced bone healing : Is there an alternative to autografts ?

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Bone substitutes have undoubtedly found their way to our operating rooms over the past few decades. Due to more complex skeletal reconstructions being undertaken, there is indeed an increasing need for “artificial” materials. Among the first, and still most widely used, are bone allografts, usually from bone banks. On the other hand, many osteoconductive materials and a limited number of osteoinductive substances have appeared, based on some scientific evidence and often limited clinical experience.

The better the environment, the better all these materials and substances appear to work, but it should not be forgotten that biological and mechanical parameters also interact with the process of bone healing, so that transposition of experimental data to clinical practice is not definitely warranted.

Bone substitutes and osteoinductive substances have a place in modern orthopaedic surgery but their application must be well balanced, and limitations to their use should be known, as many factors will interfere with the decision to bring them into clinical practice.

Will they be able to solve our problems ? We should not forget that an atrophic infected non-union with a 12-cm bone defect will benefit more from a bone transport than from whichever bone allograft or bone substitute !

Can bone substitutes and osteogenic proteins really obviate the need for autografts, so we do not have to inflict an extra trauma to the patient ? If bone allografts, bone substitutes or osteogenic proteins are used in combination with autogenous iliac crest grafts, the patient will find neither a physical benefit, nor a financial advantage, as some substitutes as well as osteogenic proteins are far more expensive than the procurement of autografts !

Are these bone substitutes and osteogenic proteins safe ? Can they easily be preserved so they are readily available when necessary ? Are they useful in infections ? Or in acute trauma ? And do they really behave *in vivo* as we are told from researchers in the laboratories ?

Many questions do not have clear cut answers yet, and these can only be found by objective research rather than by clinical case reports which sales representatives often use as arguments to promote their products. A better understanding of the basic mechanisms of bone formation and of the interaction of bone substitutes in this cascade seems mandatory, but this is far more the working field of the molecular biologist than of the orthopaedic surgeon. Nevertheless, fruitful collaborations between both can address complex problems and look for honest scientific answers, not driven by any economic perspective. It is their interaction that will lead to correct models and protocols for the study of bone healing as illustrated in two articles in this volume, using bone distraction as a tool to examine the newly formed bone tissue. This is an original – and clinically well established – way to create ‘*de novo*’ bone tissue that can be completely distinguished from pre-existing bone and allows a thorough analysis.

These are the kind of studies that should be supported by our orthopaedic community, a community which should encourage young surgeons to understand not only the metallurgy they are so familiar with, but also the bone biology.

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