Bone Repair in the Spine

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Introduction
Bone repair and bony healing in the spine are requested in order to get a durable stable situation of one or several motion segments; this so-called spinal fusion remains one of the most important procedures in spine surgery. Estimation goes for about 2 Mio fusion procedures per year [1]. Since the first spinal fusion procedures that were performed 100 years ago [2] the principles remain the same, however several bone substitutes are used in order to provide and support spinal fusion [3,4]. The most potent mean for spinal fusion except autologous bone graft appears BMP II and to a lesser extend BMP 7. They are in clinical use for lumbar fusion for several years [5]. However its use shows also limitations and needs critical observation [6].

Methods
This is not a scientific paper but a report on the experience of the use of different fusion materials at the lumbar spine focusing on lumbar interbody fusion.

Results
Based on a case series of 32 cases with anterior interbody stabilization and fusion using the Synfix®-Cage in combination with autologous bone graft (23 cases) or demineralized bone matrix (DBM) 4 cases (or BMP II (5 cases) shows a reliable fusion within 6 months using autograft or BMP. Both materials show to be very potent for spinal fusion. The case series is including the L5-S1 level only and show a similar behavior. For DBM the time for fusion appears far longer, only after 2 years bone formation in the cage is visible.

Interbody fusion by the so-called extreme lateral approach (X-LIF) using a cage (ORACLE®) for the stabilization and different bone graft substitutes shows a more variable outcome. On the one hand one can recognize the impact of the mechanical stability with better fusion in a stable environment and on the other hand a longer fusion time with the increasing number of levels treated. Again autologous bone and BMP show similar behavior in favor of BMP and DBM is not showing any bony reaction within a one year period.

Conclusion
These observations are interesting as the monitoring of the interbody fusion (by CT) is more reliable and allows a more precise assessment of the bony healing. The limited availability of autologous bone graft and its donor site morbidity show a clear need for bone graft substitutes. DBM appears not an optimal solution as a stand-alone substitute, BMP II has shown to be very effective, however it is very expensive and side effects need to be taken into consideration. Other alternatives (CaP, Nanoparticles, etc.) need to be assessed carefully – the benchmark is set by the ALIF procedure with autologous bone graft and the Synfix-Cage.

References