The effect of porcine dermal collagen membrane on the healing of bony defects in guided bone regeneration technique.

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Abstract

Collagen membrane extracted from porcine dermis (PDCM) was developed in Taipei Medical College, Graduate Institute of Pharmaceutical Science in 1992 for use in the study of drug releasing device. Although it was proved that PDCM is biocompatible and biodegradable in previous animal studies, it was torn down easily during operation. Owing to that, in the first part of this study,the production procedure of PDCM was modified, introducing crosslinks with three different concentrations of glutaraldehyde (GA) 0.01%,0.05%, 3%). Uncross-linked PDCM was used as the control group. The surface architecture was then observed under SEM. In the second part, the same treated PDCM groups were used to cover artifical bony defects in rats, on the lower broder of the mandible (5mm in width), in order to examine the healing effect of PDCM on guided bone regeneration (GBR). Under SEM observation,there were four different types of superficial structures fibrillar structures, open pores, channels, and sheet-like structures. In the GBR study,results showed no histologic evidence of new bone formation in all groups of rats three weeks after surgery. At six weeks, new bone formation was noted only in 3.00% GA cross -linked group, and the membranes of uncross-linked and 0.01% GA cross-linked groups were degraded completely by that time. At nine weeks, limited amounts of regenerated bone around the artificial defects were evident in most of the specimens, and only the PDCM condintioned with 3.00% GA was still kept in good shape. In conclusion, using PDCM modified with 3.00% GA, the surface architecture became denser and the rate of biodegradation was increased. It is possible that 3.00% GA conditioned PDCM may be of practical value for osteopromotion in clinical usage.