Histological analysis of regeneration of temporomandibular joint discs in rabbits by using a reconstituted collagen template.

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Abstract

The aim of this study was to design a biodegradable implant, in the form of a reconstituted collagen template in order to promote and support regeneration of the temporomandibular joint disc. Bovine collagen (Major Type I) was pepsinized, reduced by beta-mercaptoethanol, and reconstituted by glutaraldehyde. The reconstitution of the collagen increased the resistance to biological degradation by collagenase, optimized the pore size and possessed maximum biological activity for tissue regeneration. Forty-four New Zealand rabbits underwent either sham surgical procedures or partial temporomandibular joint discectomy. In animals that underwent partial discectomy, the discs were replaced by either reconstituted collagen templates or subdermal grafts. Some of the surgerized animals did not receive any type of implant or disc substitute. Gross and histological examination of the surgerized temporomandibular joints was carried out at 1-, 2-, and 3-month intervals after surgery on the selected groups of animals. Marked arthritic changes were observed after 3 months in the partially discectomized joints without implantation. In contrast, the discs, which received a reconstituted collagen template or subdermal graft exhibited regeneration and nearly normal morpology. No foreign body response was observed in experimental groups 3 months after implantation. This study demonstrated that the reconstituted collagen did as well as subdermal grafts in supporting and facilitating regeneration of the disc and the former was found to have some advantages over the latter.