0654 Pilot Study of a Hydrogel in Pig TMJ Degeneration

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Objectives: This study was designed to determine the feasibility of using an enhanced biological polymer hydrogel formulation to alter progression of temporomandibular joint (TMJ) degeneration in a porcine surgical model. Methods: TMJ defects were surgically induced in 6 sexually mature minipigs; standardized defects were made arthroscopically on the temporal bone and in the meniscal disk. One week later, the pigs were randomized into 2 groups, a saline-placebo and a polymer-treated group. Each animal in the saline group was injected with 1 mL saline weekly for 5 weeks. Each animal in the polymer group was injected with 1 mL polymer hydrogel weekly for 5 weeks. The polymer gel comprised 15 mg/mL of avian sodium hyaluronate (molecular weight of >1 million) and 15 mg/mL of bovine collagen type I with some type III, in physiological saline, having resulting viscosity >6,000 cps. The polymer hydrogel was aseptically formulated, pre-filled into syringes, and stored at <10°C. Animals were monitored daily. Analyses at 8-9 weeks included CT-Scan and histology. Results: One pig showed local post-operative inflammation that resolved before randomization. All 3 saline-treated TMJs showed degeneration by CT-Scan, gross evaluation upon dissection, and histology. Degeneration consisted of erosion of the temporal bone, through the meniscal disk, and into the mandibular condyle. In contrast, 2 of the 3 polymer-treated TMJs showed little evidence of degradation. Masked histological specimens were scored for degeneration of temporal and mandibular bones with 0 as normal and 42 as maximum disorganization: values for the saline group were 25, 19, and 24 and for the polymer were 10, 11, and 33. Conclusion: This pilot study shows feasibility of treating experimental TMJ defects with a biological polymer hydrogel as evidenced by no adverse reactions to the formulation and reduction in disease progression in the animal model. Study was supported by NIDCR grant 1-R43-DE014504-01A2.

Seq #84 - Oral & Maxillofacial Surgery
3:00 PM-4:00 PM, Thursday, 9 March 2006 Dolphin Hotel Pacific Hall

Back to the Oral & Maxillofacial Surgery Program
Back to the ADEA/AADR/CADR Meeting & Exhibition (March 8-11, 2006)

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