The Effects of Sinus Mucosal Removal during Orbital Wall Reconstruction in an Experimental Model

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Background: Various kinds of implants have been used for reconstruction of blowout fracture, but they have the possibility of infection. Although infection after orbital reconstruction is not common, it could leave serious sequelae to the patients. For this reason, some surgeons routinely removed the sinus mucosa during the repair of the blowout fracture. In this study, we evaluated the effect of mucosal removal to the healing process with implant and inflammatory reaction, using histopathologic analysis of the rabbit model.

Methods: Studies were performed with fifteen "New Zealand White Rabbits". A 1.5 cm x 1.5 cm sized bone window was made at the maxillary sinus wall. One side of the maxilla was chosen randomly as an experimental group(n=15), and the other side became the control group(n=15). The sinus mucosa of the experimental group was totally strapped and that of control group was left intact. Bioabsorbable poly-L-lactide-conglydolida plate(Rapidorsorb, synthes) was inserted to cover the bony defects. Total maxillectomy including implant at 3 weeks, 6 weeks, and 9weeks after implantation was conducted and composition of tissue was analyzed. The grade of inflammatory reaction, the proportion of woven bone, the amount of fibrovascular proliferation(b-FGF,CD31) and capsule thickness around the implant were assessed.

Results: The early inflammatory reactions around the implant were grade 1.13(mean value, experimental group) and 2.2(mean value, control group) in 3 weeks. Woven bone formation was more prevalent in the experimental group. Calculated area of woven bone formation was 16.27 % in 3 week, 22.20 % in 6 weeks, and 36.16 % in 9 weeks. In the control group, more fibrotic connective tissue change rather than woven bone formation was observed(p=0.011)(Table. 1). Also, the thickness of capsule around the implants were thinner in experimental group(p=0.04)(Table. 2).

	Control group	Experimental group
3 weeks	5.72%	16.27%
6 weeks	12.03%	22.20%
9weeks	29.13%	36.16%

Woven bone/Total tissue chamber(%)

Table. 1. The proportion of woven bone formation.

	Control group	Experimental group
3 weeks	27.59	19.76
6 weeks	25.22	17.37
9weeks	10.05	8.71

Thickness of implant capsule(um)

Table. 2. The thickness of capsule around the implant

Conclusions: This study suggests that less inflammatory reaction not only stimulates formation of woven bone but also reduces the fibrosis around the absorbable implant. Therefore, removal of sinus mucosa during the orbital reconstruction can be accepted as an effective option to achieve faster bone healing process with less inflammatory reaction.

References

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