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Stress Analysis of Clasps Made of Glass Fiber-reinforced Composite Material Using Three-dimensional Finite Element Method: Influence of Shape in Cross and Longitudinal Sections of Circumferential Clasp Arms

Hiromi MARUYAMA[1)], Tohru HAMANO[1)2)], Chie KISHITA[2)], Yasuhiro NISHI[2)], Shinichiro KAWAMOTO[1)] and Eiichi NAGAOKA[1)2)]

1) Department of Oral and Maxillofacial Prosthodontics, Field of Oral and Maxillofacial Rehabilitation, Course for Advanced Therapeutics, Kagoshima University Graduate School of Medical and Dental Sciences
2) Denture Prosthodontics Restoration, Advanced Dentistry Center, Kagoshima University Medical and Dental Hospital

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Abstract:
The purpose of this study was to investigate the effects of different cross-sectional shapes and presence of taper on stress distribution in clasp arms made of glass fiber-reinforced composite (FRC) material. Stress analysis of clasps was performed under a constant load (5 N) using a three-dimensional finite element method with due consideration to the anisotropy of unidirectional FRC material. Results were then compared with clasp arms made of metal—an isotropic material. It was found that both FRC clasps and metal clasps yielded similar results. As for the displacement of clasp arms with a basic cross-sectional shape under a load of 5 N, the amount of displacement showed that FRC clasps provided sufficient retentive force required for clinical application.

Key words:
Glass fiber-reinforced composite, Clasp arm shape, Finite element method

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