

Aspects of Melting Zone of Dental Metals in Laser Welding

Michio SHIMAKURA¹, Misao TAKEUCHI² and Koki MIURA²

Laser welding is now applied to connecting metal frames as a substitute for soldering in dentistry. However, the change of mechanical properties in the connecting area welded by laser irradiation is still not clear. The purpose of this study is to investigate the change of properties of dental metals after laser irradiation. As experimental materials, pure titanium, Co-Cr alloy and Au-Ag-Pd alloy were used. Board-shaped specimens were fabricated by casting and laser was irradiated to the surface of the specimens. After laser irradiation, the diameter of the melting zone on the surface and the depth of the melting zone in the cross section were measured with stereomicroscope. Furthermore, the Vickers hardness in the melting zone and the original casting zone was measured.

The results were as follows :

1. Under the same irradiation condition of laser, in the diameter and the depth of melting zone, pure titanium was shown the maximum value with Co-Cr alloy, Au-Ag-Pd alloy following in that order.
2. When the laser power was strengthened, the diameter and the depth of melting zone was increased in all the experimental metals. However, slight change was shown in Au-Ag-Pd alloy.
3. The value of Vickers hardness in the melting zone was larger compared with the original casting zone in all the experimental metals. However, a small amount of change was shown in Au-Ag-Pd alloy.

Key words : laser welding, melting zone, mechanical property, Vickers hardness

Department of Crown-Bridge Prothodontics, Ohu University Graduate School of Dentistry¹
Department of Prosthetic Dentistry, Ohu University School of Dentistry²