

**Assessment Of The Effect Of Er,Cr:YSGG  
LASER Biomodulation On Bone  
Surrounding All-On-4 Implants  
Supporting Hybrid Immediately Loaded  
Prostheses**

Thesis

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# Introduction

Most patients are able to function effectively and comfortably with conventional maxillary complete dentures. They are quite satisfied with the outcomes. An exception to this situation is the patient with mandibular natural dentition opposing an edentulous maxilla.<sup>(1)</sup>

The dentist rehabilitating patients with this clinical pattern is confronted by many difficulties. Mal-posed, tipped or super-erupted teeth in the lower arch make it difficult to achieve harmonious balanced occlusion. Unfavorable occlusal relationships tend to displace the maxillary denture causing soreness, mucosal changes and ultimately ridge resorption if the occlusion of the denture is not properly balanced.<sup>(2)</sup>

The esthetic and phonetic placement of the maxillary teeth is difficult without introducing occlusal interferences in eccentric functional movements due to the fixed position of the mandibular teeth.<sup>(2)</sup>

To place implants in the maxilla complex procedures like grafting are required to fabricate a totally supported prosthesis. In order to help the problem the All-on-4 concept was developed. The tilting of distal implants makes it possible to use longer implants, gives better implant distance, helps in reduction of cantilever and bone anchorage is improved. “Paulo Malo” developed the All-on-4 treatment concept to provide the patient

with an immediately loaded fixed prosthesis on only four implants by the use of straight and angled multiunit abutments.<sup>(3)</sup>

The angled posterior implants help to avoid anatomical structures, allow longer implants anchored in better quality bone, reduce posterior cantilever and eliminate bone grafts in the edentulous maxilla and mandible in majority of cases.<sup>(4)</sup>

The All-on-4 is accompanied with high success rates because implants are well-spaced, have good biomechanics and are easier to clean. Immediate function and aesthetics can be obtained. Final restoration can be fixed or removable. The cost is reduced due to less number of implants and grafting in the majority of cases is avoided.<sup>(4)</sup>

Erbium Chromium Doped Yttrium Scandium Gallium Garnet (Er,Cr:YSGG) LASER has a wavelength of 2780nm, in the infrared spectrum. Its use has been investigated in bone ablation for implant bed preparation. Er,Cr:YSGG LASER is absorbed by water so it allows bone cutting. Advantages of Er,Cr:YSGG include absence of bone dust and vibration, enhanced visualisation of the surgical field due to hemostasis and improved patient comfort with less postoperative pain and edema. When ablating bone it has a bactericidal effect. Er,Cr:YSGG LASER provides straight, clean and precise bone ablation and causes minimal thermal damage to the adjacent tissue.<sup>(5-12)</sup>

The availability of cone beam computed tomography (CBCT) is also expanding the use of additional diagnostic and treatment

software applications. CBCT allows more than diagnosis; it facilitates image-guided surgery. Diagnostic and planning software assist in implant planning to fabricate surgical models to facilitate virtual implant placement and to create diagnostic or surgical implant guidance stents.<sup>(13)</sup>

Implant success can be effectively evaluated by the appearance of natural bone around it with bone apposition on the surface of the implant. Implant mobility correlates with the appearance of a thin radiolucent line around the implant outline. It predicts failure to osseointegrate.<sup>(14)</sup>

So this study was conducted to correlate the effect of Er,Cr:YSGG LASER versus conventional drilling alone on the marginal bone loss around the immediately loaded All-On-4 implants.