ガイドファイバーなしEr:YAGレーザーを用いて骨ブロック移植しインプラント埋入した症例

A case of implant placement with modified transplanted bone blocks using Fiber-less Er:YAG Laser

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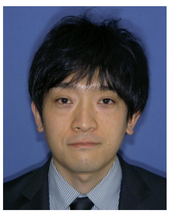

Background

Studies employing erbium laser wavelengths of 2.94 μm (Er:YAG laser) and 2.78 μm (Er,Cr:YSGG laser) found both systems to be efficient for dental hard tissue ablation. However, if we use laser for oral bone surgery, we need to consider the difficulty of using a laser handpiece in the mouth. The narrow space, many obstacles; tongue, teeth, dentures, implants, saliva , and abnormalities like large tonge, small mouth, lock jaw and TMJ will disturb instrument handling. Unconscious and sudden movement of the tongue, lips, cheek, head, neck, lower jaw by swallowing, biting, coughing, sneezing are liable to injure the mouth membrane. We need also to consider a long irradiation time for laser bone cutting. Laser takes a long time to cut, overheating occurs. Overheating of laser causes the fiber to break. Laser headpiece handling in a narrow mouth causes uneven movement during a long irradiation time. ***Toughness of laser and fiber is necessary for oral bone surgery.*** Recently, a new model of fiber-less Er:YAG laser was supplied by an Israel maker. In the fiber-less system , there is no loss of energy, high power, no fiber trouble and less maintenance fee. The new model is steady functionally. It can irradiate for a long period of time. a case of implant placement with modified transplanted bone blocks using the new model of a fiber-less Er:YAG laser was permitted to declare. In this study, the usefulness will be presented and the benefits will be discussed.

CASE REPORT

Case: No.651, female, 46 years, 162cm, 53kg.
First visit: February, 23rd. 2009.
Main complaint: Upper anterior bridge consisting of 7 teeth from No.13 to 24 fell out. She wanted a replacement.
General condition: normal. Oral hygiene: good.
Oral and X-ray findings: Four teeth from No.12 to 22 were missing. The alveolar ridge appeared to be high enough; however alveolar bone was insufficient in width for implant placement(Figure 1234) .
Surgical procedure: under IV sedation, the anterior alveolar ridge bone was exposed (Figure.5).Two rough surface titanium implants were placed(Figure.6). A bone block was harvested at the site of the mentum (Figure7). It was divided into two. They were modified and a screw hole was made with fiber-less Er:YAG laser (Lite Touch laser, Syneron Ltd. Israel) (Figure 89). They were transplanted at the anterior wall of the alveolar ridge using a titanium screw (Figure10). β-TCP granules and a titanium mesh were placed (Figure.11). A gingival flap was replaced and sutured (Figure.12). Six months later, a second surgery was carried out and provisional restoration was placed (Figure.13,14,15). Three months later, final restoration was set.

Figure.1 Oral view at the first visit

Figure.2 Panoramic radiograph at the first visit

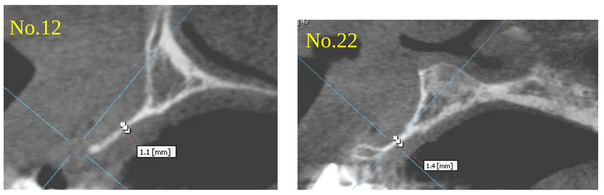

Figure.3 Pre operative CT scan(cross-sectional slice)
Alveolar bone at No.12 was 1.1mm in width and at No.22 was 1.4mm. Both sides showed the width was insufficient although the height was enough.

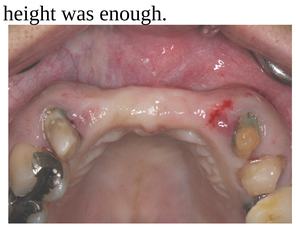

Figure.4 Preoperative view . Alveolar ridge appeared enough volume.

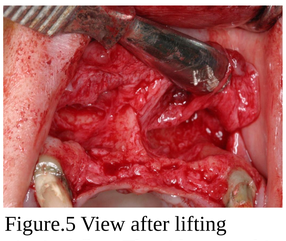

Figure.5 View after lifting gingival flap. The ridge was thin.

Figure.6 Implant beds were made using mechanical drilling. Implants were placed at No12 and NO22. Most surface of both implants were exposed.

Figure7
A bone block was harvested at the site of the mentum using piezoelectoric surgical device.

Figure8 A bone hole was prepared using the laser (6W; 200mJ×30Hz, full water spray, 1.3㎜×17㎜ sapphire tip).

Figure9 A bone hole was checked to penetrate. It was easy to hold the small block. Sharp corner was smoothed.

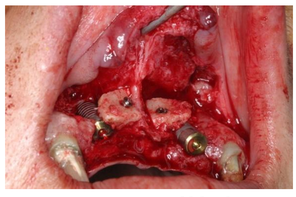

Figure10 2 pieces of blocks were transplanted at the anterior wall and fixed using a titanium screw.

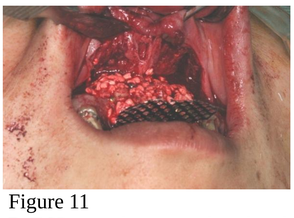

Figure 11
B-TCP granules were placed and a titanium mesh was covered.

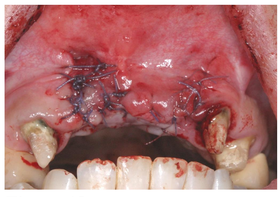

Figure.12
A gingival flap was replaced and sutured.

Figure 13 Post operative view at 2weeks.

Figure 14
A custom abutment was set.

Figure 15
provisional restoration was set

Results

Three years after the implant treatment, the bridge function was normal(Figure 16,17). However, the shrinkage of alveolar ridge was observed.

Figure.16
Panoramic radiograph 3years later after post operation

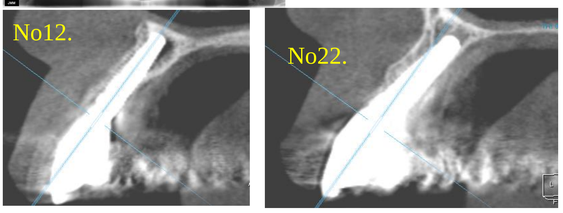

Figure.17 CBCT scan(cross-sectional slice) 3years later after post operation
A new bone was developed at the labial side of both implants at No12 And No.22.

Discussion and Conclusion

It is the reason why a new model of fiber-less Er:YAG laser was used to this case. This case was difficult to place implant because of the thin alveolar bone. Small bone block was planed to be transplanted to augment the alveolar bone.

The new model of fiber-less Er:YAG laser was used to modify it for making small hole and smoothing the sharp outline. Bone substitutes were used to add the volume of augmented space and titanium mesh was also placed to make the outline of the space. The shrinkage of the transplanted bone will be large. It is necessary to use it with non-resorvable substitutes for maintaining the volume.

The new model of fiber-less Er:YAG laser offers significant advantages over others like noncontact intervention, no mechanical vibration, free and elaborate cut geometries and aseptic effects. It also offers an attractive alternative drilling modality because it does not require physical contact with the bone in order to drill holes and allows precise control of bone cutting.

In conclusion, when a small bone block was shaved and holed, Er:YAG laser was useful in combination with conventional devices; drilling and piezoelectoric surgical device.