VARIA

Simplified procedures of full mouth immediate loading endosseous implant

Hisaaki Ogasawara
Fukui, Japan

Summary

To perform a reduced-cost and prompt occlusal restoration by endosseous implant for more patients in a dental practice. In 1992, I found that the water coolant is not applicable in this situation as it causes post-operative pain and the delay of bony (osseous) healing of wounds. I improved Chercheve implants through the investigation of stress dispersal efficacy by top base theory, and then I named them *Oga implants.* I designed Surgitop motor system to avoid overheat, water coolant and vacuum sucking.
I have achieved a simplified procedure that is an incision-free, elevation-free of periosteum, water-coolant-free, sutureless and immediate loading procedure of endosseous implants.
Key words: Chercheve implant, Top Base theory, Pieso-Electric effect, Surgitop Motor System, bone mapping.

Introduction

To perform a reduced-cost and prompt occlusal restoration by endosseous implant for more patients in a dental practice. In general, a two-stage implant system is very usual today, but it requires a long period of time and a great deal of technique and surgical invasion and the physical, psychological and financial aspects on elderly patients.

Thus, more costs and risks could occur to both the operator and patient hindering accessibility of implant. In 1992, I found that the water coolant is not applicable in this situation as it causes post-operative pain and the delay of bony (osseous) healing of wounds.

Therefore, I tried to improve the routine procedures of implant surgery and devised an alternative concept for this operation [1-3]. Then I developed a simple, yet clinically effective concept and procedure [4, 5].

Materials

OGA Implants (Figures 1 and 2) which are made of pure Titanium, were originally invented and named Chercheve Implant, first used by Dr. Raphael Chercheve [6] in France, in 1961. There are three types, named *Thincrest Implant, Top Implant* and *Spiral Implant.*

Figure 1. Thincrest, Top and the tools

Figure 2. Spiral and the tools

These adopted so-called "Top base theory" [7, 8] in architectural science which could afford to disperse stress in epochal proportions to more than 100 times *(Figures 3 and 4).*

Therefore, it enables the acceleration of bone tissue to regenerate in a short period of time,

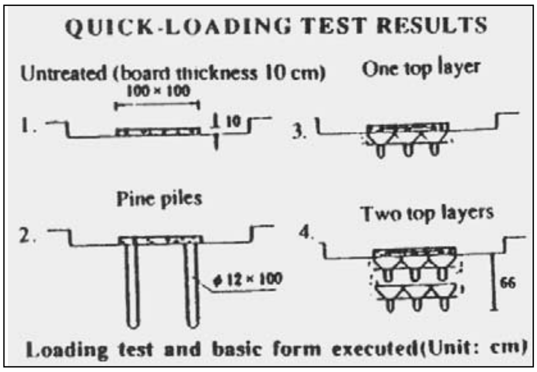


Figure 3

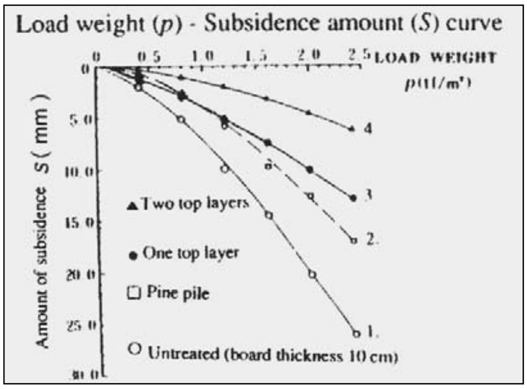


Figure 4

more than six times compared to a calm condition that is prevalent in contemporary two-stage implant system [9, 10, 11] *(Figures 5 and 6).*

I improved Chercheve implants in 1994, while conducting experiments on stress dispersal efficacy of implant design in the Department of Mechanical Technology of Fukui University, Fukui, Japan *(Figures 3, 4).*

After the successful completion of the experiments, I named them *OGA Implants (Figures 1, 2).*

Usually the drilling motor speed is 800 rpm (rounds per minute) to 1,200 rpm, so it causes frictional heat, which is dangerous for living tissue.

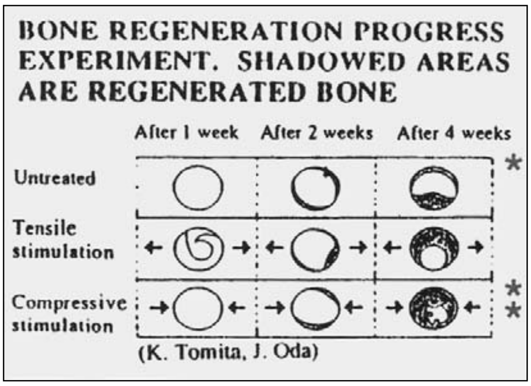
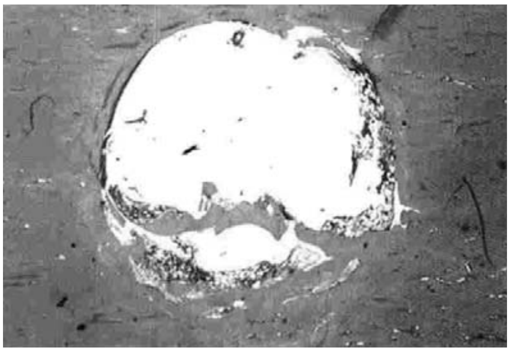
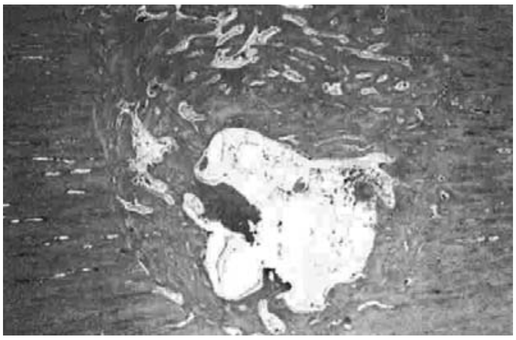


Figure 5



**** 4 weeks after untreated in a calm condition of a rabbit tibia***



***** 4 weeks after compressive stimulation of 300-500μ strain one hour a day***

Figure 6. Pieso-electric effect for acceleration of bone regeneration

Figure 7. Surgitop Motor System

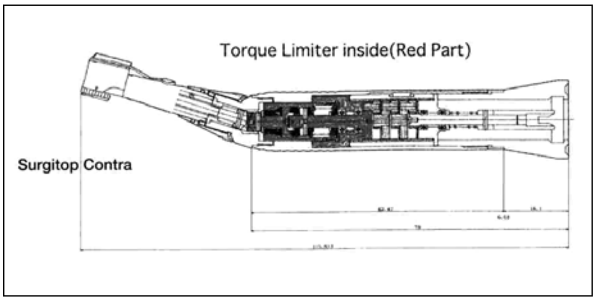


Figure 8. Surgitop Contra handpiece

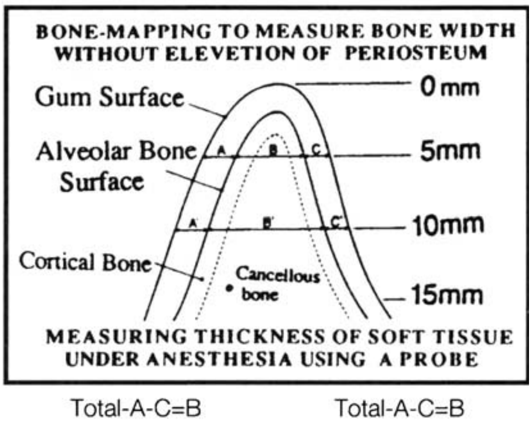


Figure 9. Bone mapping keeps injury to the minimum

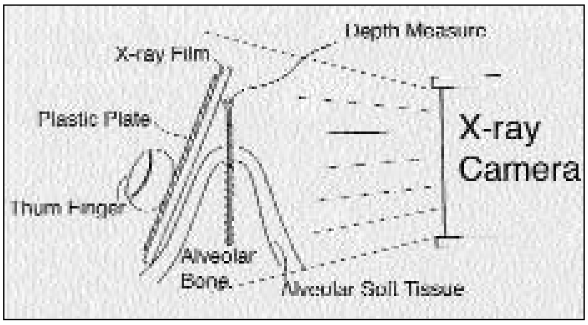


Figure 10. The use of depth measure

I drilled at 100 rpm. This means 1/10 speed, which does not cause frictional heat without cooling.

A standard surgical motor exerts usually 30 N/cm to 50 N/cm torque, and exerts the strongest torque only at its highest speed, then they use speed reduction contra-angle handpieces and use about 1,000 rpm.

But, if we drill at a low speed like 100 rpm, water coolant becomes unnecessary.

For this reason, I designed a special implant motor named *Surgitop Motor (Figure 7)*, which exerts a 65 N/cm torque at any speed, and can drill bone without frictional heat on condition of not using water coolant, and a special 1/256 speed reduction contra-angle handpiece named *Surgitop Contra (Figure 8)*, which contains a 45 N/cm torque limiter inside to avoid breaking of drill, tap and handpiece.

The Surgitop has an electrical current safety stop and is equipped with A/B motor jacks and a foot switch pedal for forward and reverse rotation.

I also designed the bone drills and taps to cut bone tissue more efficiently.

This, the Surgitop motor system, has been used for eight years since 1995, and the safety and durability has been proven and confirmed.

Methods

1. This is due in large part to a method for determining the correct bone width, that is called "Bone-Mapping" measuring at intervals of about 5 mm under local anesthesia, and it reduces bone injury to the minimum *(Figure 9)*.

That means it is possible to relieve post-operative pain, to lessen the amount of bleeding, to prevent post-operative swelling and infection, and to avoid deformation and recession of soft tissue.

It also shortens the time required for the operation, which makes implantation easy for both the operator and the patient. This procedure is also extremely profitable in terms of time-efficiency as well as financially.

2. Under local anesthesia, at first the phi 1.2 mm (1,2 mm in diameter) twist drill pierces through the soft tissue onto the surface of the cortical bone, without motor rotation. No incision or elevation of

soft tissue is required. Then the drill takes a right angle to the bone surface to make a niche.

The handpiece starts to rotate the drill at 100 rpm without water coolant to drill a niche at the position of the slanted bone surface on the prepared site.

Secondly, the phi 1.2 mm twist drill is pulled out and inserted in the appropriate direction again. Then phi 1.2 mm twist drill starts to rotate to make an initial bony hole to 2/3 depth of projected hole.

At last, the phi 1.2 mm twist drill is pulled out and a 30 mm length depth measure of the phi 1.2 mm pure Titanium marked every four mm is inserted into the hole for X-ray inspection *(Figures 10 and 11).*

3. Regarding Top and Thincrest implants, the regular length of Top is 17 mm, and of Thincrest is 23 mm under the surface of soft tissue.

The effective length of the phi 1.2 mm standard twist drill is 20 mm. Then we exchange the phi 1.2 mm twist drill with a 27 mm long size drill to drill up to 23 mm in depth.

After inspecting by X-ray and confirming the site, direction and depth of the initial hole, the hole is then gradually deepened by wiping off bone chips in the grooves of bone drill with disinfected cotton gauze every two to three mm of drilling, only when using initial φ 1.2 mm drill, and confirm the results by X-ray inspection.

After using a proper drill of thickness, the decided depth of the hole is widened with a suitable Mooser drill (a taper drill) likewise.

As for insertion of regular size Thincrest implants, 23 mm is suitable. Regular size Top implant is 17 mm in length. Thincrests or Tops are screwed in up to the shoulder line mark of the implant head, to touch the surface of soft tissue; then it is properly inserted.

4. Regarding Spiral Implants, the regular length is 16 mm under the surface of soft tissue. The initial hole is made likewise in Thincrest. The decided depth of the hole is widened with phi 1.5 mm, 1.8 mm and 2.4 mm drills gradually.

The phi 4.0 mm guide tapping and final tapping at 40 rpm are done without water coolant and vacuum suction. Finally, OGA Spiral implants are inserted at 40 rpm, or by hand key.

5. After X-ray confirmation, the implant head is bent to satisfactory parallel and the length

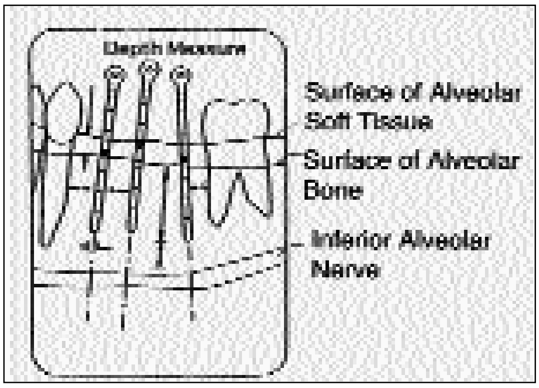


Figure 11. Depth measure and X-ray image

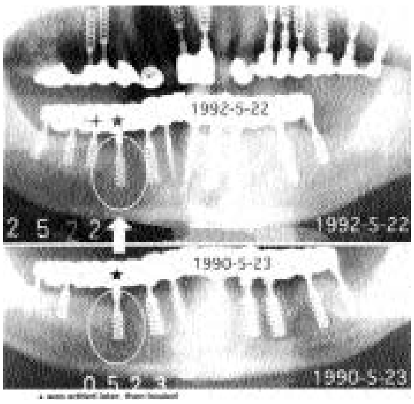


Figure 12. Bone absorption caused by overloading and traumatic occlusion, and the recovery.

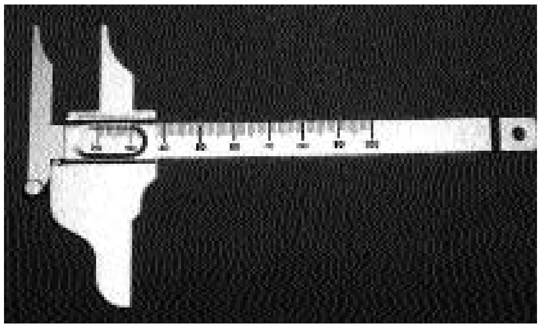


Figure 13. Tsubone Bite Gauge

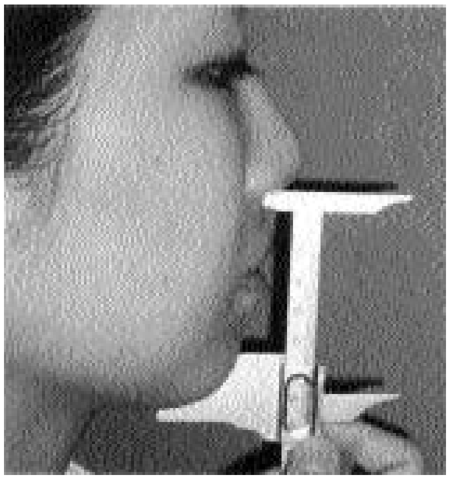


Figure 14. Vertical dimension

is adjusted with an OGA cutter. Then the cut edge is smoothed over with a number 20 Shofu carborundum point and silicone rubber cup.

Temporary restoration is instantaneously made with self-curing acrylic resin, and cemented immediately.

The theory of gnathological occlusion or so-called disclusion is always adopted. Patients can use the temporary restorations immediately.

Final restoration of composite resin faced 18-K platinum gold alloy cast occlusal crown is done on the same day to six months using a hydrocolloid impression method.

The restoration is made in three parts: one anterior part and both posterior parts.

Results

In both insertion techniques, the clinical results were excellent in their remarkable osseous integration and fine clinical prognosis.

In normal cases, good results can be obtained. However, in case of a reduced number of implants or shallow bone cases, the results will be unsatisfactory *(Figure 12).*

Discussion

1. Case studies confirm that endosseous implants, with their excellent stress dispersal characteristics (based on "Top Base Theory" [7, 8] *(Fig. 3, Fig. 4)* promote bone regeneration or formation by piesoelectric effect.

Even if the healing period is not regarded as the unloading period, recovery is remarkable.

Collaborative research and experimentation conducted at Kanazawa University in the department of technology by Prof. Oda's team, and in the medical department by Prof. Tomita's team, proved experimentally that bone is regenerated much more rapidly by loading intermittent compressed stress, rather than by spontaneous recovery leaving the bone as it is [4] *(Fig. 5, Fig. 6).*

2. Usually, most edentulous patients tend to request completion of one (right or left) side of posterior implant restoration at first, and afterwards patients wish to restore the other side in six months to a year. But in these circumstances, we cannot achieve a gnathologically idealistic occlusion with just one-sided posterior support.

Then, overloading and traumatic occlusion occur, resulting in failure. This phenomenon possesses serious time constraints, requiring to place implants on both sides within two weeks of each other. Otherwise, the case fails in obtaining osseo-integration of implant from occlusal trauma. I call it "Time limit theory".

3. Unless the clinical implant head's length is longer than five mm, the crown form would not be suitable to sustain the occlusal force and could not make a good contour of the crown form to maintain a good oral prophylaxis.

4. Moreover, sufficient space for the tongue is a very important factor to stabilize the dental arch of the final restoration. Then the vertical dimension of the appropriate occlusal height is effectively decided by Tsubone's bite gauge *(Figures 13 and 14)* using Willis's theory. Consequently, occlusal raise and orthodontic treatment become indispensable to regain proper incisal guidance [12].

Conclusion

1. The important matter of oral implants is a wider indication, rapid placement and a quick healing period, excellent results, easy procedures, safe aftercare and an economical charge to the patient.

By using the above mentioned methods, such procedures as incision, elevation of periosteum, water-cooling and vacuum suction, suturing and hospitalization, GTR or GBR, bone transplantation, plastic surgery of interdental papillae, and stent making in order to gain a secure parallelism due to unbendable implant heads, are entirely unnecessary.

OGA implants require no elevation of the periosteum, and they are usually placed right after tooth extraction, so the recession or deformation of interdental papillae does not occur, and aesthetic abutment is useless.

I found that incision, elevation of the periosteum, and coolant are unnecessary; they torture the patient fruitlessly, delay healing, and do "more harm than good".

Consequently, I developed the first incision-free, water coolant-free, sutureless, elevation free (of the periosteum), immediately freestanding procedure in the world (see case presentations).

That is safe, bloodless, clean, rapid, postoperatively painless and swelling-free.

2. The number of spiral implants should be the same or more than the number of natural tooth roots to prevent the overloading of surrounding bone tissue and to avoid the breaking of implant from metal fatigue after several years of use.

3. It is very important to gain sufficient occlusal vertical dimension to ensure the stability of restoration and a good prognosis.

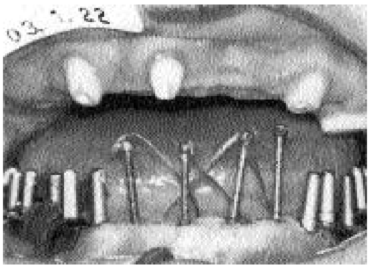
Case presentation

Case 1: Female patient, 51 years old and 150 cm tall

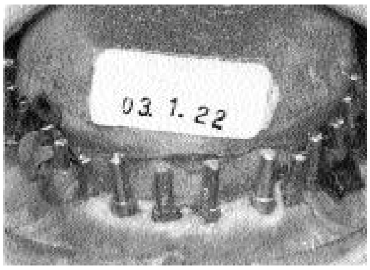
a. The thin alveolar ridge of edentulous mandible is remarkable

b. Right posterior implants and left posterior site

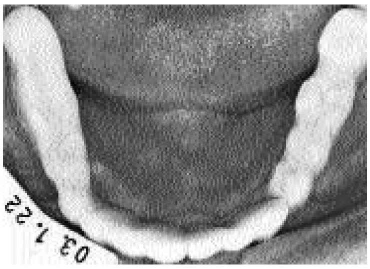
c. Implant placement of right and left molar site



d. Four depth measures are standing in the incisal implant holes

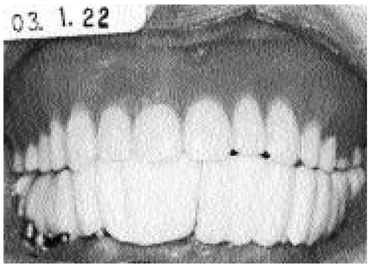


e. Mandibular implants were placed in three steps. Rubber sheets protect the attachment areas around the implant heads

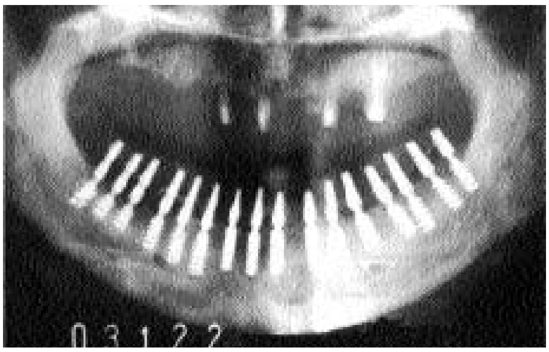


f. The temporary restoration was made and set immediately

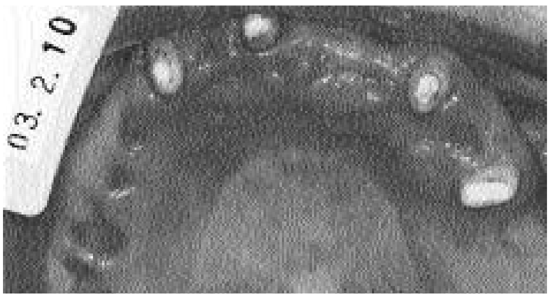
g. Maxillary immediate overdenture right after setting on 6th Dec. 2002



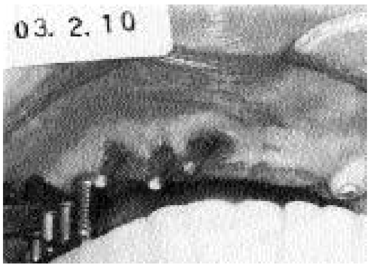
h. Front view right after mandibular implant placement and temporary restoration



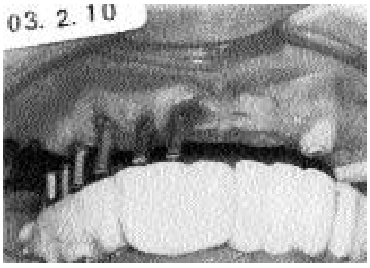
i. Dental panoramic radiograph right after the placement of mandibular spirals and top implants and the temporary restoration. Four stump teeth were vital pulp amputated on 6th Dec. 2002



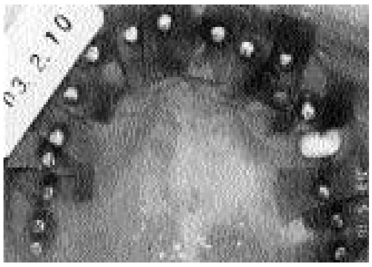
j. Occlusal view of maxilla just before implant placement



k. Implant placement of right side. Two anterior stumps were extracted

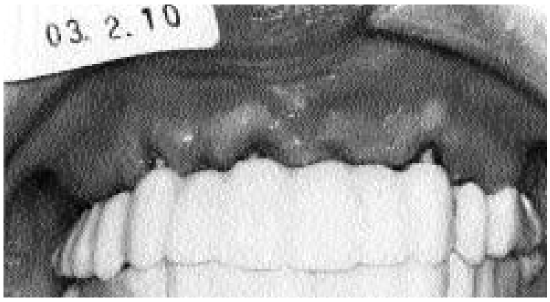


l. Three anterior implant heads were bent in proper parallel direction and cut

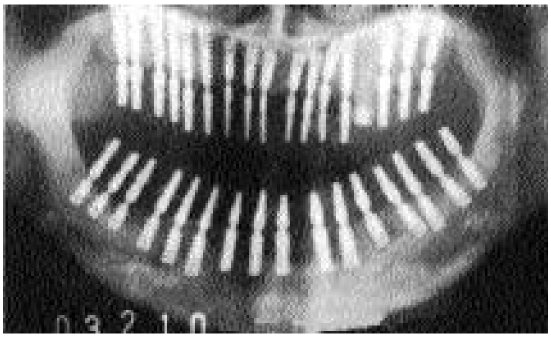


m. All implants were placed in at once

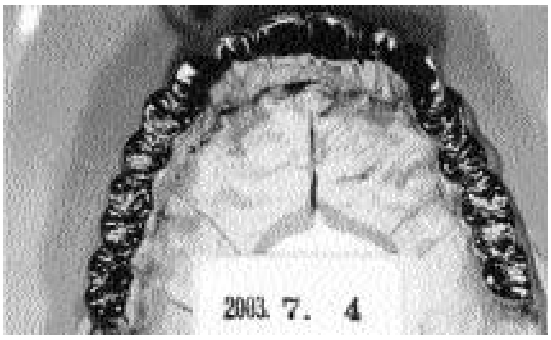
n. Occlusal view of maxillary temporary restoration



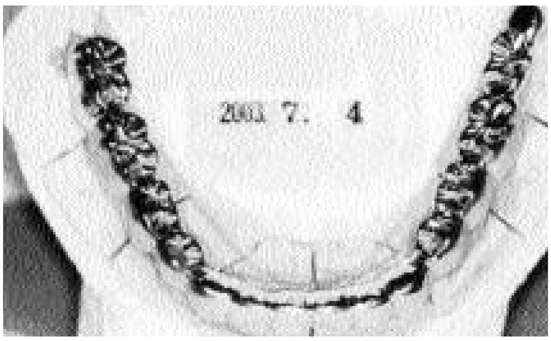
o. Front view of temporary restoration right after maxillary implant placement



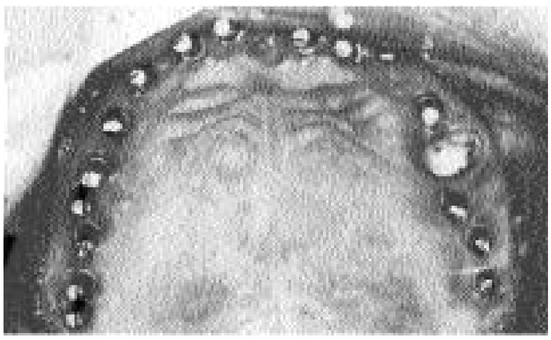
p. Panoramic radiograph right after maxillary spiral implant placement



q. Maxillary prosthesis in three pieces made of composite resin faced 18-K PGA crowns



r. Mandibular prosthesis in three pieces made of composite resin faced 18-K PGA crowns

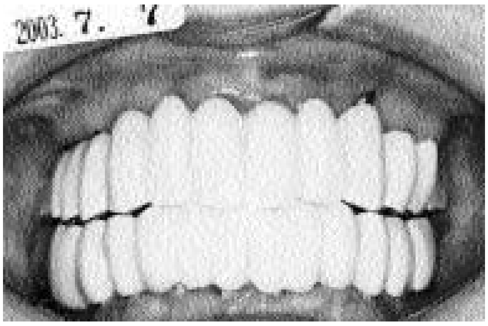


s. Occlusal view of maxilla just before setting the final restoration

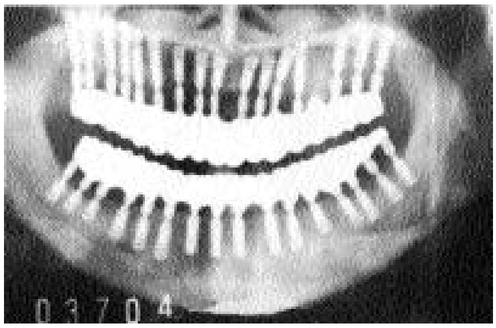
t. Occlusal view of mandible just before setting the final restoration

u. Occlusal view of maxilla of three pieces three days after setting

v. Occlusal view of mandible of three pieces three days after setting



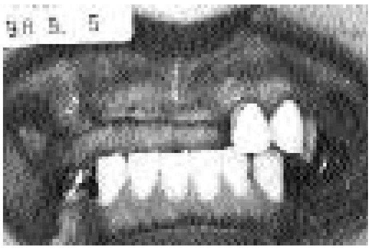
w. Front view of the final restoration three days after setting. Sufficient recovery of occlusal height is very important to keep a good occlusal prognosis



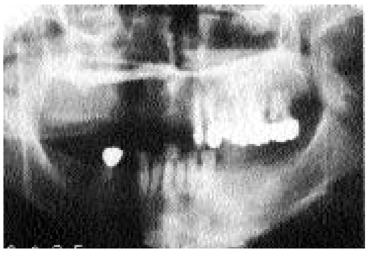
x. Panoramic radiograph right after the completion of final restoration

Case presentation

Case 2: 37 year old female



a. Pre-operative front view. Only #22 and #23 can contact



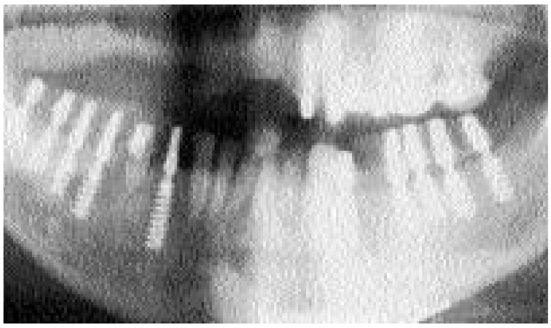
b. Pre-operative dental panoramic radiograph

c. Five spiral implants were placed in right posterior mandible

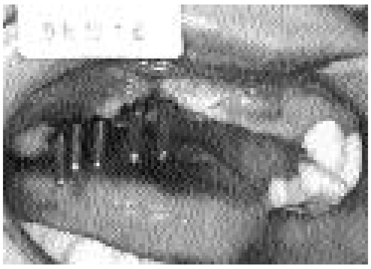
d. Five spiral implants were placed in left posterior mandible next

e. The implant heads were bent in proper parallel direction and cut

f. Occlusal view of mandible right after implant placement. Patient became free from mandibular denture immediately



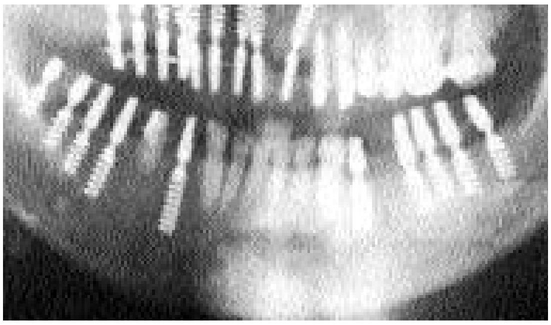
g. Panoramic radiograph after mandibular implant placement



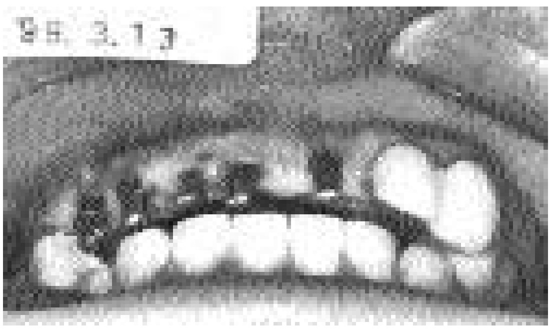
h. Three day after mandibular implant placement, maxillary implants were placed

i. Punched rubber sheets protect epithelial attachment area of implant heads

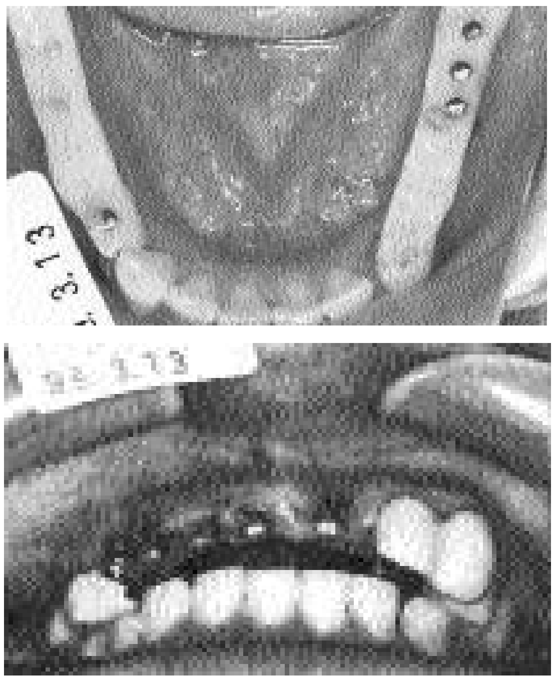
j. Occlusal view of maxilla right after implant placement and temporary restoration. Patient became free from maxillary denture immediately



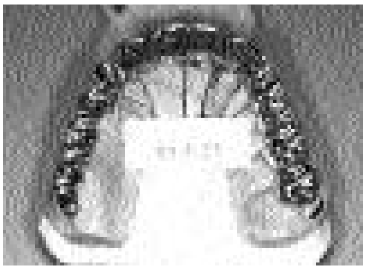
k. Panoramic radiograph after maxillary implant placement



n. Mandiblar occlusal exposure of implant heads were covered by bite raise



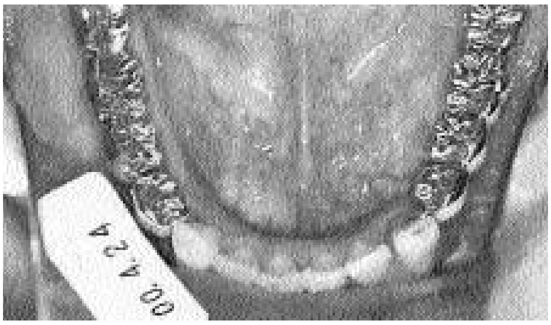
l.m. Bite was raised gradually in centric relationed occlusion, and implant heads were bent lingually under anesthesia



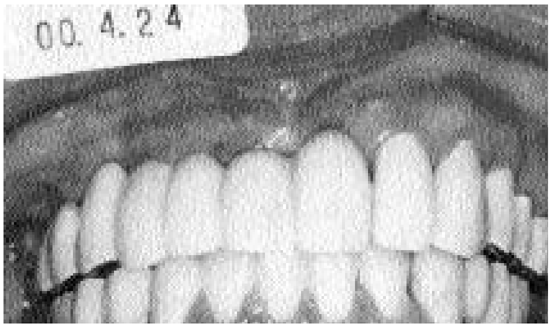
o. Final restorations were made by sequentially guidanced occlusion on SAM articulator. Occlusal view of maxillary final restoration

p. Occlusal view of mandibular final restoration

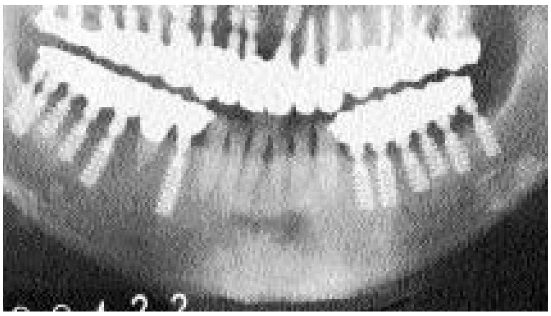
q. Occlusal view of maxilla right after setting



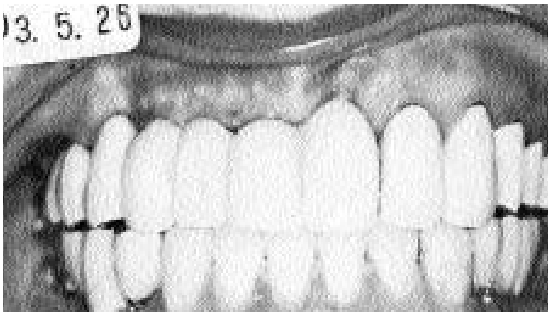
r. Occlusal view of mandible two days later



s. Front view of the final restoration two days after setting

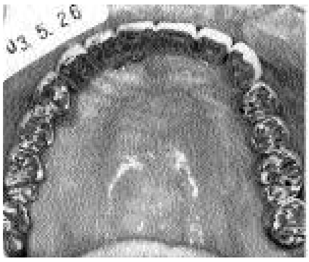


t. Panoramic radiograph right after the final restoration

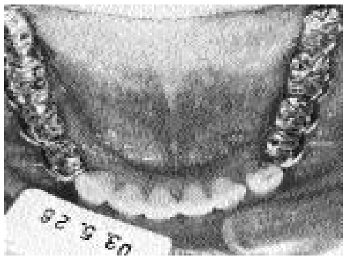


u. Front view of the final restoration three years one month after setting

v. Panoramic radiograph three years one month after setting



w. Occlusal view of the maxilla three years one month after setting



x. Occlusal view of the mandible three years one month after setting

References

1. Ogasawara H. Incision-free and Dry Method of Chercheve Implants and The Single Standing and Immediate Restoration, and it's long term prognosis. Proceeding of 3rd Int. Conf. on Oral Implants For Dentistry. Osaka, 1993, pp. 247-264.
2. Ogasawara H. Long Term Clinical Observation of Immediate Occlusal Restoration of Freestanding Endosseous Implants Employing A Sutureless, Irrigation-free Method. Proceeding of 3rd World Congress for Oral Implantology. Yokohama, 1994, pp. 230-231.
3. Ogasawara H. The concept and procedure of OGA implant. *Nippon Dental Review*, 1997, Tokyo; Vol. **651** to Vol. **656:** 13-15, in Japanese.
4. Ogasawara. H. Long term clinical observation of occlusal restoration cases with freestanding Chercheve endosseous implant, dental aspect. *Daiichi Shika Shuppan,* 1988, Tokyo; **2(2):** 134-143.
5. Ogasawara, H. The concept and procedure of Chercheve endosseous implant, 1st ed. Hakusui Co. Ltd., Osaka, 1989, pp. 17-33.
6. Chercheve R., Tamaki T., Sasaki H. and Iwanaga K. Oral Implantology, 1st ed., Ishiyaku Publishers Inc. Tokyo, 1987, pp. 14-34.
7. Japan civil engineering institute: Top base engineering method, Japan Maikoma-seven Engineering Association, Tokyo, 1990.
8. Arai K., Ohnishi Y., Horita H. and Yasukawa I. Measurement and interpretation of loading test of concrete top block on soft ground. Proc. of 2nd Int. Symp. on Field Measurement in Geomechanics, Kobe, 1987, pp. 919-926.
9. Acceleration of bone regeneration by stimulation. Chunichi Newspaper, Nagoya; June 24, 1994.
10. Ogasawara H. Acceleration of Bone Regeneration around Implants due to Immediate Loading and Bio-Mechanic Aspects. Program and Abstracts of XXV Int. Meeting on Dental Implants and Transplants. Bologna (Italy), 1995, pp. 82-83.
11. Ogasawara H. Bone Regeneration around the Implant Neck. Program and Abstracts of 4th World Congress for Oral Implantology, Tokyo, 1998, p. 165.
12. Ogasawara H. A Simple Orthodontic Approach to Regain Incisal Guidance after Occlusal Elevation of the Collapsed Vertical Dimension Case and the Edge-to-edge Occlusion Case. *Japan Academy of Gnathology and Occlusion,* Tokyo, 1998; **19(3):** 377-384.

Correspondence to: Dr. Hisaaki Ogasawara, D.D.S., President of Ogasawara Dental Office, OGA Gnathological Laboratory, OGA Implant Institute affiliated to Japan Formal Dentistry Corporation, Director of D-tech Co., Ltd. Address: 2nd Fl. of Oooka Bldg., Chuo, Fukui-City 910-0006, Japan.
E-mail: oga@h-oga.co.jp