REFUAT HASHINAIM

The Journal of the dental association of Israel

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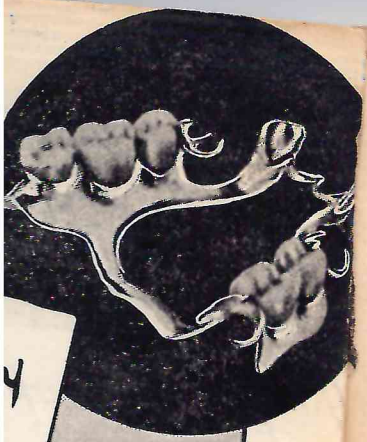
THE BULLETIN OF THE FEDERATION FOR THE ISRAEL DENTAL SCHOOL



REFUAT HASHINAIM

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Vol. IX, No. 3—4 **QUARTERLY** **December, 1955**

THE BULLETIN OF THE FEDERATION FOR THE ISRAEL DENTAL SCHOOL

Vol. II, No. 3—4 **December, 1955**

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Original Articles

The Metallic Implant for Full Dentures

by Dr. I. Landsberg, Rishon-Lezion

I. INTRODUCTION

Since their development in 1949, implant dentures have improved considerably and it can be stated that at the present time they are already removed from the realm of experimentation and have gained a definite place in dentistry. The purpose of this paper is to describe briefly the method of making a full lower vitallium implant denture and illustrate this with pictures from the first actual cases made in Israel by the author.

II. REVIEW OF THE LITERATURE

Dahl (1) was the first to try a sub-periosteal implant in 1943. He used a simple metallic structure with four projecting posts.

Goldberg & Gershkoff (2) in 1949 developed this principle further and used a metallic meshwork with four abutments, which they implanted sub-periosteally and fixed with screws to the bone. In order to obtain the outline of the bone, they measured the thickness of the mucosa by means of x-rays and trimmed the model accordingly.

Berman introduced the two-stage operation in 1951, in which a direct impression of the bone was first obtained, and the implant framework constructed on the cast thus obtained.

Contents:

Finally, Marziani (4) introduced the subperiosteal implantation of a tantalum meshwork in one single operation.

Furthermore, many improvements both in technique and rationale have taken place in the last few years (5—9).

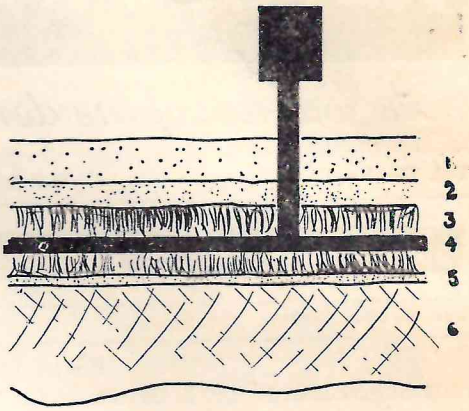
III. HISTOLOGY

Loechler (10) states: "The basis of success or failure of implant dentures is founded on the regeneration of periosteal fibers. Connective tissues enmesh themselves in the implant framework, due to a slight surgical irritation of the involved surgical field" — and thus the implant framework is fixed solidly to the bone.

The mucosa shows a close adaptation to the abutment-posts, but no physical union seems to exist in the opinion of Loechler (11). *Obl* compares the fixation to a permanent rubber band encircling the abutment. Nevertheless, experience has shown that normally no inflammatory reaction exists around the post.

Lately, Berman (12) has undertaken experiments trying to introduce such a physical union between tissue and abutment by interposing a plastic sponge.

Histopathological studies show that around a successful implant there develops a thick compressed type of fibrous tissue. The part which separates the implant from the bone, is generally known as the sub-implant membrane.



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IV. PROCEDURE

A. Preparations.

1. *General Preparations.* At the present time, the implant denture is to be regarded primarily as a solution for the full lower denture which remains chronically unsatisfactory and cannot be handled by any other means. Therefore only cases with complete alveolar atrophy should be chosen. (Fig. 1).

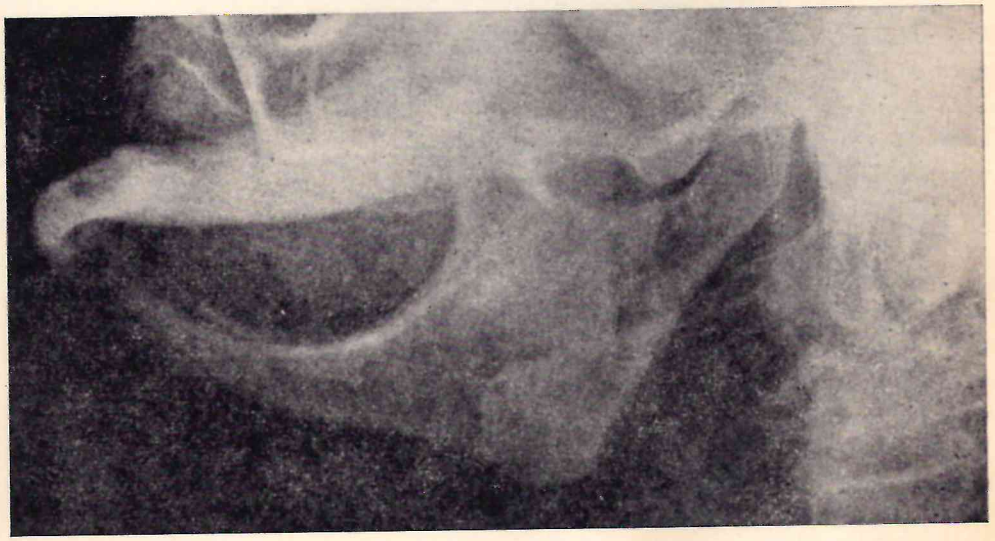

Fig. 1. X Ray of the mandible. Note the rate of resorption.

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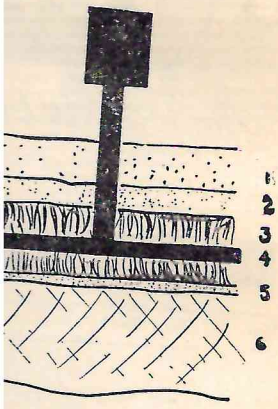

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The patient should receive full explanation of the procedure involved and should express his desire for this type of dental treatment, and his willingness to cooperate.

2. *Medical Work-Up.* A thorough general physical examination, which includes electro-cardiograms, complete blood picture and a search for debilitating disease, should be made by a physician. Age, in itself, is not a contra-indication, but patients with arteriosclerosis, cardiac changes, diabetes and other chronic diseases should be excluded.

A thorough examination of the mouth should be made in order to detect any deformities or diseased conditions of the tissues, complete intra- and extra oral x-ray examinations should be made to check the conditions of both jaws.

3. *Prosthetic Preparations.*

(a) *Conventional Dentures.* A new set of conventional upper and lower dentures are begun and carried through an acceptable try-in stage. It is especially important to keep the lower teeth over the crest of the ridge.

(b) *Surgical Impression Trays.* A compound impression is made of the lower jaw with cheeks and lips relaxed. This impression should be over-extended both buccally and lingually and should include the retro-molar area, the external oblique ridge, the mylohyoid ridge, the symphysis as well as the superior genial tubercle.

On the stone cast obtained from this impression the outline of the tray is traced. This should include 1/3 of the retro-molar triangle, ½ of the external oblique ridge, the anterior prominence of the symphysis and should terminate lingually just short of the mylohyoid ridge.

The tray can be made of any self-curing resin, and should be thick in its central part, and taper to a thin edge at the borders. A handle, as well as buttons in its posterior part help during insertion and removal. Several such trays should always be at hand.

(c) *Abutment Locator.* Since it is important for the four implant abutments to be located in their proper place, an abutment locator is prepared. The lower cuspids and first molars are removed from the denture-set-up, and pencil marks are made on the crest of the ridge in the center of the resulting spaces. An abutment locator is made of self-curing resin on this cast with four holes corresponding to the pencil marks.

(d) *Rims for Surgical Jaw relation.* The original occlusion rims are preserved, maintaining the correct vertical dimensions and centric relation. The base of the lower rim is trimmed until it is smaller than the impression tray, and should be easily inserted under the elevated mucoperiosteum. A 2—3 mm layer of soft impression wax covers the inner side of this rim.

B. First Operation.

1. *Pre-operative treatment.* A barbiturate should be administered prior to the operation for sedation — Seconal or Nembutal being the drugs of choice.

Chemotherapy should begin a few hours before the operation, and the patient be put on a daily dose of 400.000—600.000 I.U. of procaine penicillin.

Half an hour before the operation atropine should be administered intra-muscularly, to decrease salivation.

2. *Anaesthesia.* Bilateral mandibular blocks are performed together with long buccal injections. Infiltration in the buccal fold can be added for more effective anaesthesia and hemostasis.

3. *Locating the abutments.* With the aid of the abutment locator, the place of the future implant abutments are marked with indelible pencil on the mucosa. The thickness of the mucoperiosteum at these points is measured and marked. The purpose of this operation is to determine how high the posts

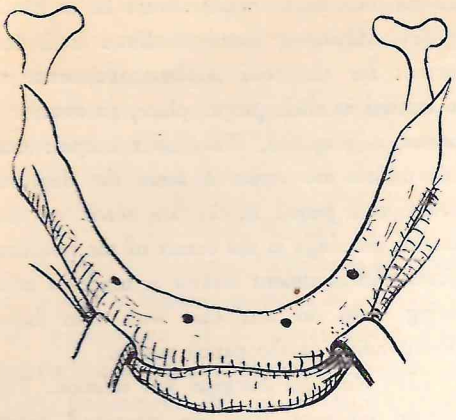

Fig. 2. Pencil marks for the abutments made by the locator.

which connect abutment to the base of the implant are to be made. With a No. 6 round bur, these marks are transferred to the bone, by drilling holes through the mucoperiosteum and into the bone. (Fig. 2).

4. *Exposing the Bone.* Incision. The incision is made along the crest of the ridge, directly through the line of the proposed abutments and extending to the end of the retro-molar pad. (Fig. 3).

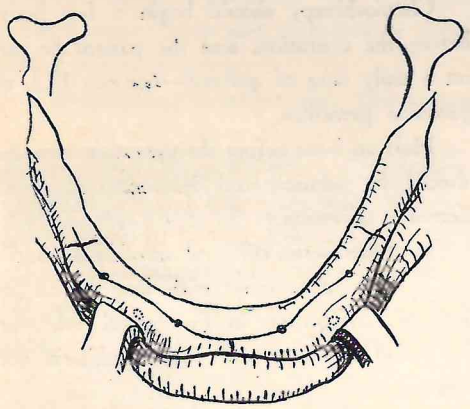

Fig. 3. Incision line.

Cross incisions can be made at right angles to this one at its terminal ends, and buccally at the mid-line.

Retraction. The mucoperiosteum is retracted, care being taken not to tear it. All the external oblique ridges as well as the prominence of the symphysis are exposed on the buccal side, while lingually the tissue is reflected too, but not beyond the mylohyoid ridge. (Fig. 4).

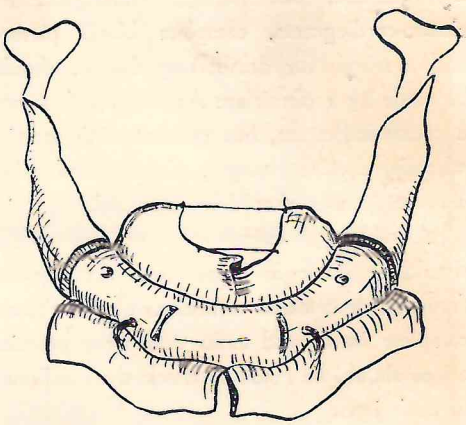

Fig. 4. Bone exposure and flap fixation.

Examination of bony Surface. The exposed bone is then examined, and smoothed, if necessary. This however, should be done very sparingly, since it is desirable to preserve an intact bone cortex.

Grooves are made in the region of the cuspids at the sites of the previously made bur-marks in the bone. These are about 2 mm thick and will permit the primary cross struts of the implant to be countersuck flush with the bone — and thus aid in the close adaptation of the mucoperiosteum around the implant.

In the molar regions these grooves should only be made if there is no danger of entering the mandibular canal.

Surgical Impression. For better access and visibility, both lingual flaps are loosely sutured together over and under the tongue, the buccal flap is tied to a piece of surgical silk on each side and can thus be retracted from the mandible during the impression.

Low-fusing compound is used in the specially prepared tray in making the im-

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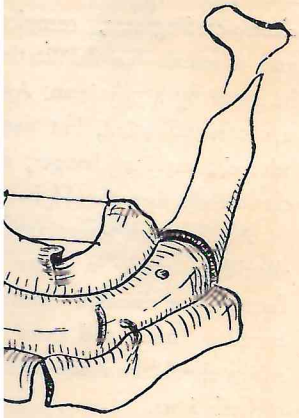

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Fig. 5. Surgical impression.

pression. Care should be taken to center the tray and seat it firmly on the bone — the excess compound being forced under the flaps. One of the new rubber-base impression materials can be used as a wash. At least two good impressions should be obtained. During this procedure the bone should be constantly kept moist with sterile saline solution. (Fig. 5).

Surgical end relation. The upper occlusion rim is inserted and then the lower with the soft impression wax. As the patient closes into centric, the lower rim is adjusted until it keyes with the upper. Thus a fairly accurate centric relation is recorded, and a vertical dimension, by means of which the surgical cast be mounted in its correct relation to the conventional upper cast.

Sutures. The flaps are approximated and sutured with continuous sutures. (Fig. 6).

5. Post-operative Treatment. The old conventional denture is inserted as a surgical splint, and an extra-oral elastic

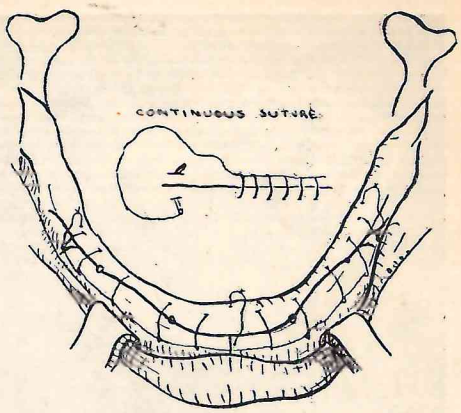

Fig. 6. Suture line.

bandage is applied to combat swelling and maintain occlusion.

The patient is kept in bed for 72 hours on a liquid diet, chemo-therapy analgesics and ice packs.

After that, the bandage is removed and the diet modified. Sutures are removed on the 7th day.

C. Design and Confection of Implant.

The surgical impressions are boxed and poured; the cast that shows the most detail is selected and mounted by means of the surgical jaw relation in the adjustable articulator.

1. *Design of Framework.* A wide-spread, open-spaced framework of Vitallium is now preferred to the previously used fine meshwork. It should be rigidly constructed and increased in thickness around the abutments in order to provide the necessary strength to resist masticatory stresses.

The buccal periphery of the framework is placed on the external oblique ridge and its surrounding horizontal area; it should further cross anteriorly the superior portion of the symphysis. Lingually, it should terminate a millimeter short of the mylohyoid ridge. While the framework is kept as thin as possible, consistent with adequate strength on the lingual side, the buccal side should be reinforced.

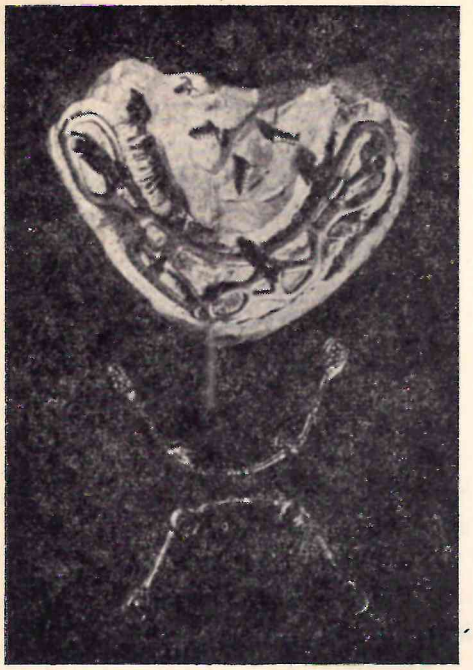

Fig. 7. The implant in situ: note the sutures.

The ridge area under the line of incision should be left free and not be crossed by metal. (Fig. 7).

The abutments are located above the grooves previously prepared in the bone, while the cross-struts lie in the grooves themselves.

2. *Design of Superstructure.* The superstructure consists of four removable attachments — made to fit the implant abutments — which are united by heavy connectors. Though the superstructure should fit the abutments accuratly, yet it should be easily removed. The lower teeth will then be bonded to this framework by means of acrylic resin.

A Temporary Superstructure is also constructed at this time. It should fit loosely in the implant abutments and occlude with the old denture. A space of 4—5 mm should remain between implant framework and this temporary superstructure in order to allow for the mucoperiosteum as well as some post-operative swelling.

D. Second Operation.

The surgical insertion of the implant takes place some 3--6 weeks after the first operation.

Preoperative management of the patient is similar to the one described earlier.

The incision retraces exactly the previous line and thus keeps exactly in the middle of the metal free part of the implant.

The mucoperiosteum is elevated only enough to permit slipping in the framework. The latter is seated on the bone and tested for proper fit. If necessary, adjustment can be made either to the bone or the framework. (Fig. 8).

Three screws are used for fixation, one each in the molar area, and one at the midline. The holes for the screws are started with small round burs and the screws seated with a specially constructed screw-driver. Care should be taken not to enter the mandibular canal. The value of this mechanical fixation is greatest only in the first few months, until the

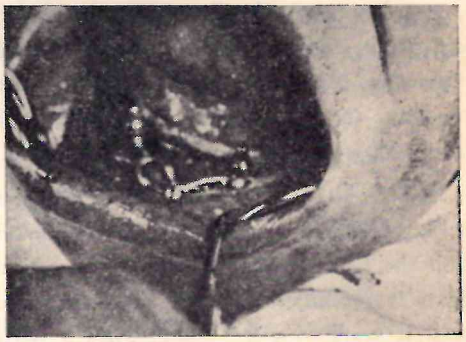

Fig. 8. Insertion of framework.

periosteum grows through the framework and thus fixes it solidly to the bone.

Suturing following the insertion, is of great importance since any breakdown of the suture line might lead to eventual exposure of the implant.

Interrupted sutures are placed between the abutments and an attempt is made to bring

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Purse-string sutures are use
abutments, which ensure close
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abutments. (Fig. 9).

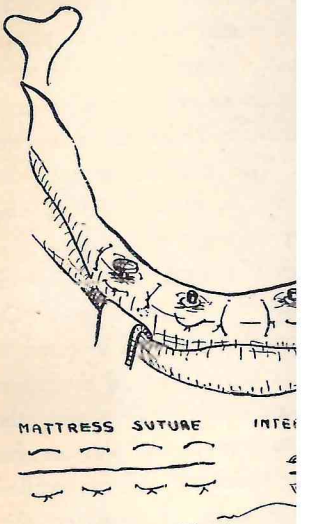
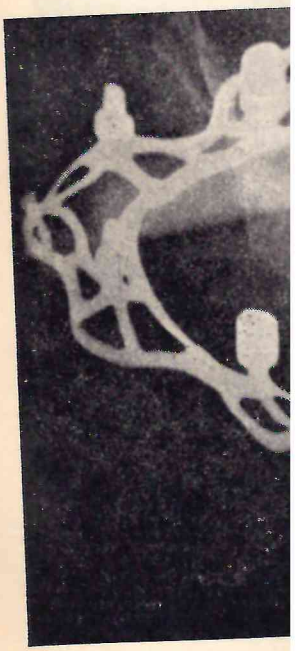


Fig. 9.



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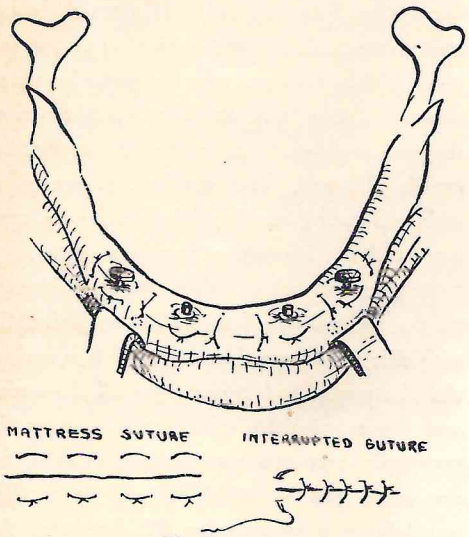

Fig. 9.

The Temporary Superstructure is now inserted and serves as a splint. Care should be taken for adequate clearance of the tissue, and proper occlusal adjustment. The elastic bandage around the head should be repeated now.

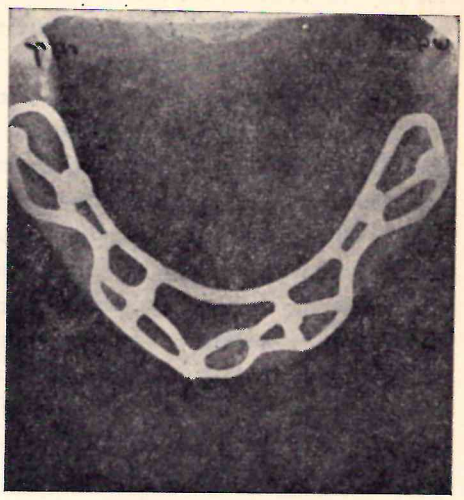

Fig. 10. Occlusal X Ray of implant (in place).

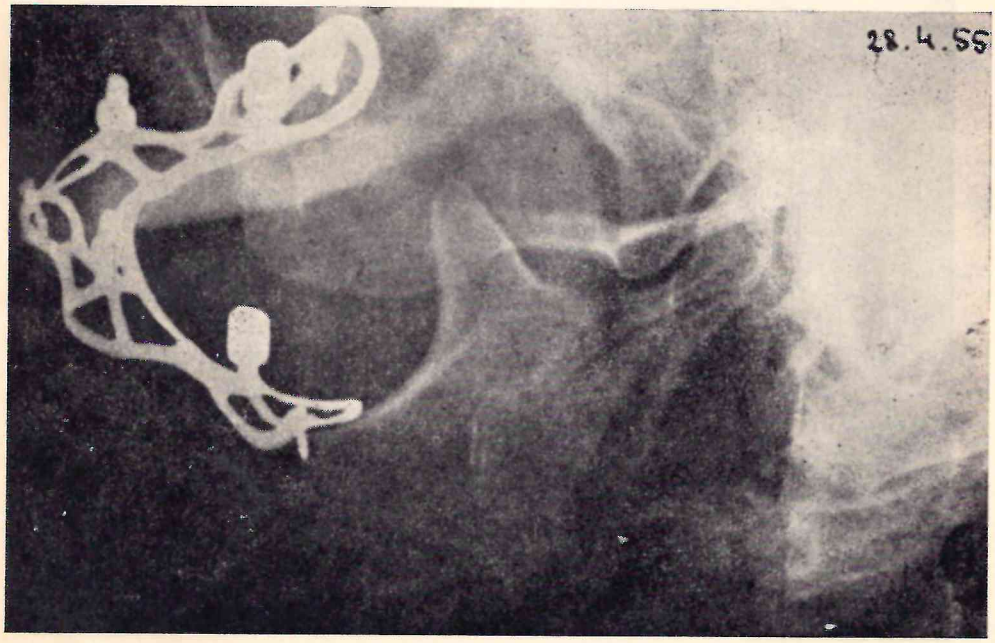

Fig. 11. Right wing X Ray of implant in place.

Post-operative care is the same as after the first operation.

E. Completion of the Superstructure. The superstructure should be completed only after complete healing has taken place; this is usually about 6 weeks after the insertion of the implant; however, the use of a temporary superstructure obviates the need to hurry and more time can elapse, if necessary.

While most attention is usually centred on the surgical part of the implant technique, the prosthetic phase deserves much more attention than it usually gets. After all, this is the end-result and its good appearance and comfort will spell both physical and psychological well-being of the patient. Furthermore, it is through this superstructure that pressure will be transmitted to the bone, and any offense against sound prosthetic procedure might result in deleterious effects on the bone and finally even threaten the result of the whole treatment.

As mentioned previously, the superstructure framework consists of four rigidly connected attachments, which fit the implant abutments and are retained either by frictional retention, clasps or precision attachments.

The superstructure frame is seated on the implant, and an impression in a tough hydrocolloid material is made, which — if possible — should be removed together with the superstructure frame, thus an exact reproduction of the mucous membrane under the connecting bar is obtained. The attachments are filled with self-curing acrylic, reinforced with steel pins, and the impression poured in stone.

A narrow block of self-curing resin is made on the occlusal side from cuspid to molar. On each side the frame thus prepared is seated on the abutments and correct vertical dimention and jaw relation are established — using the previously prepared conventional denture for the upper jaw — which as will be recalled was left in a try-in stage. If necessary, this

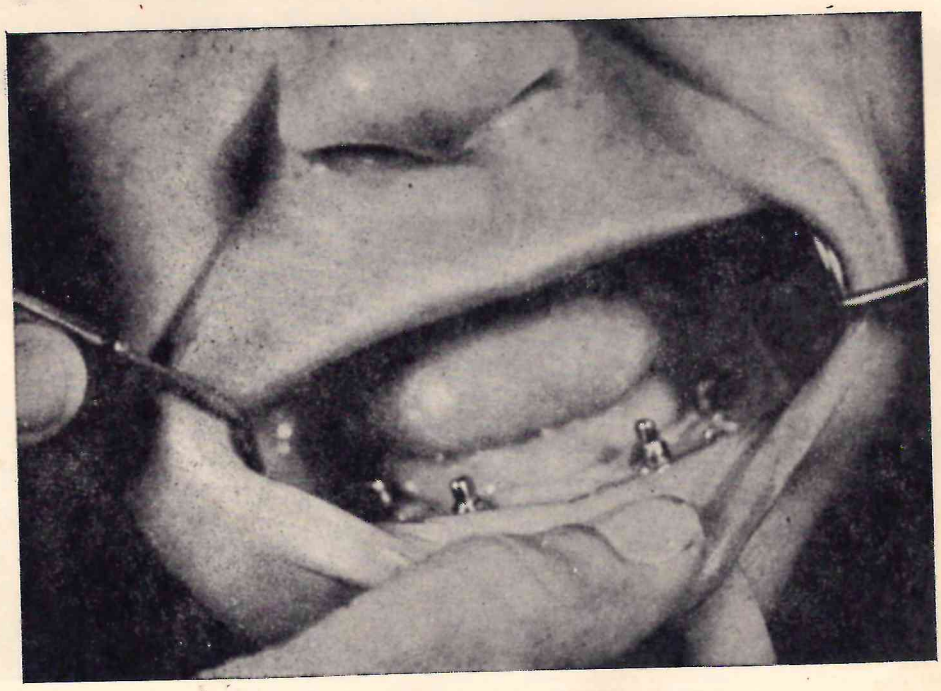

Fig. 12. Implant in place immediately after operation.

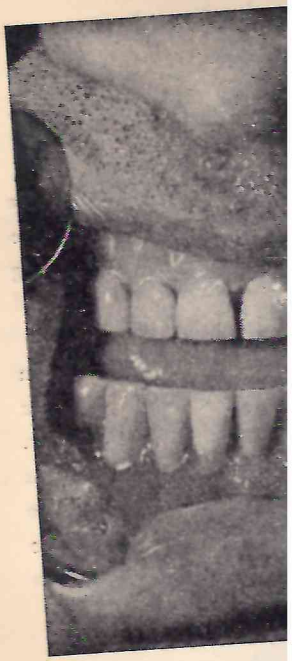

Fig. 13. End result. Lowe denture i

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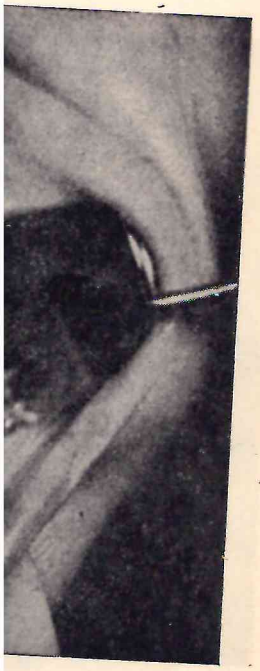

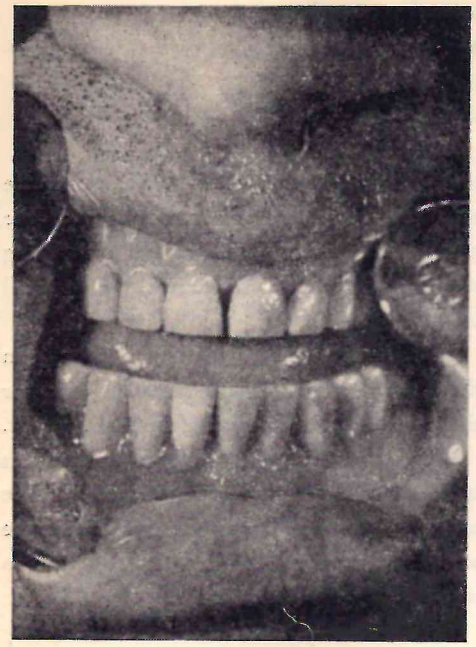

Fig. 13. End result. Lower Implant and upper full denture in place.

set-up may be altered now in order to produce full harmony.

The two dentures are now finished in accordance with good established prosthetic practice, the lower one being finished first in cold-cured acrylic, care being taken that the acrylic in no way impinges on the gums, but clears them by up to 1 mm. After further checking 2 try-ins, the upper dentures is processed in the routine way.

After the two new dentures have been worne for 3—4 days, the centric relation is checked and the occlusion is balanced in centric and excentric positions. The importance of carrying out this part by a painstaking technique cannot be overemphasized.

Before dismissal, the importance of thorough oral hygiene and massage of the gums around the implant abutments, should be impressed upon the patient and his cooperation be enlisted. He should further be recalled for periodic checkups, in order to verify the state of the implant and recheck the occlusion.

V. Conclusions.

The sub-periosteal full lower implant denture is without doubt the greatest advance in the field of prosthetic dentistry in recent years.

Though the whole procedure is still relatively new and a lot more must be learned about it before it could be advocated for routine use, yet it has already found a definite place in dentistry,by giving new hope to those unhappy full denture patients who could not adjust themselves to conventional dentures.

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