

# REFUAT HASHINAIM

*The Journal of the dental association of Israel*

## CONTENTS

METALLIC IMPLANT FOR FULL  
DENTURES

REPLACEMENT OF MISSING TEETH  
BY IMPLANT & JACKET CROWNS

ADVANTAGES OF EARLY ORTHONTIC  
TREATMENT

EDITORIALS

NEWS OF THE FEDERATION

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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 vitalium implant denture and illustrate this with pictures from the first actual cases made in Israel by the author.

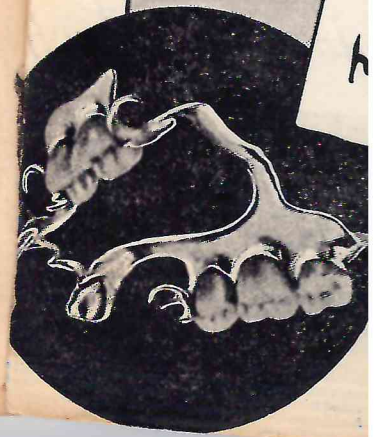
#### II. REVIEW OF THE LITERATURE

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

DR. I LANDSBERG: METALLIC IMPLANT FOR FULL DENTURES  
 DR. N. BEN-BASSAT: REPLACEMENT OF MISSING TEETH BY IMPLANT & JACKET CROWNS  
 DR. B. WEISBERG: ADVANTAGES OF EARLY ORTHONTIC TREATMENT EDITORIALS.  
 NEWS OF THE FEDERATION.



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

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

### III. HISTOLOGY

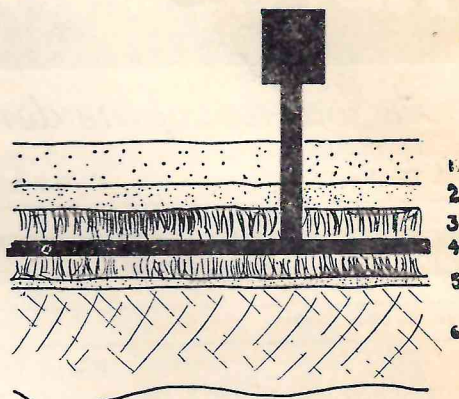
Loechler (10) states: "The basis of success or failure of implant dentures is founded on the regeneration of periosteal fibers. Connective tissues enmesh themselves in the implant framework, due to a slight surgical irritation of the involved surgical field" — and thus the implant framework is fixed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



1, MUCOSA 2, PERIOST 3, PROLIFERATING  
CONNECTIVE TISSUE 4, IMPLANT  
5, SUB-IMPLANT MEMBRANA 6, BONE

### 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).

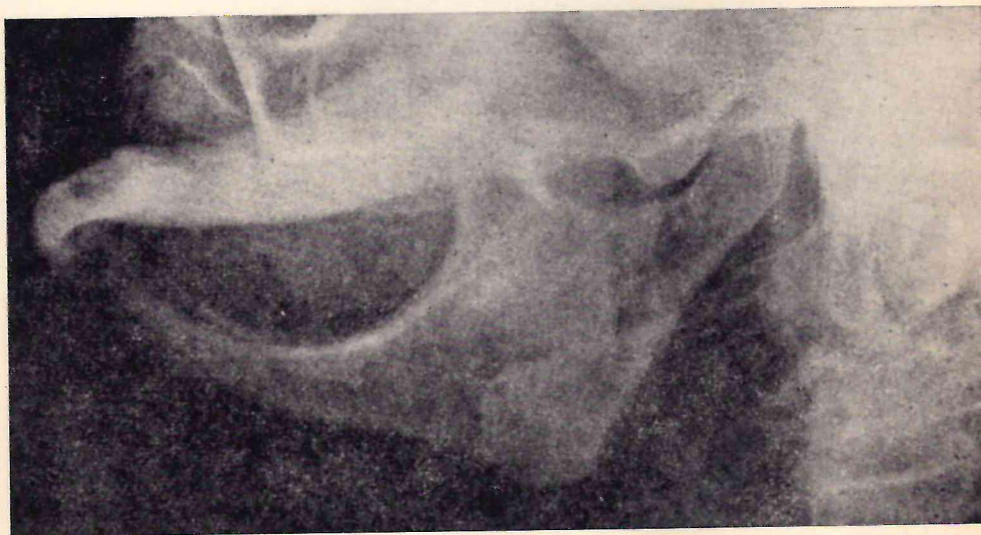


Fig. 1. X Ray of the mandible. Note the rate of resorption.

The patient should receive information of the procedure involved, express his desire for this treatment, and his willingness to undergo the procedure.

2. *Medical Work-Up.* A thorough general physical examination, electro-cardiograms, complete blood count and a search for debilitating conditions should be made by a physician. Age should not be a contra-indication, but patients with arteriosclerosis, cardiac changes, diabetes, and chronic diseases should be carefully examined.

A thorough examination of the jaws should be made in order to determine any deformities or diseased conditions. Complete intra- and extra-oral examinations should be made to determine the condition of both jaws.

#### 3. *Prosthetic Preparation*

(a) *Conventional Denture.* The preparation of conventional upper and lower dentures should be begun and carried through in the usual manner.

(b) *Surgical Impression.* The impression should be made with cheeks and lips relaxed. The impression should be over-extended lingually and should include the external oblique ridge, the symphysis and the genial tubercle.

On the stone cast of the impression the outline of the denture should include  $\frac{1}{3}$  of the external oblique ridge,  $\frac{1}{2}$  of the external oblique prominence of the symphysis and terminate lingually just short of the ridge.

The tray can be made of wax, resin, and should be thin and taper to a thin edge. A handle, as well as a locking part help during insertion.



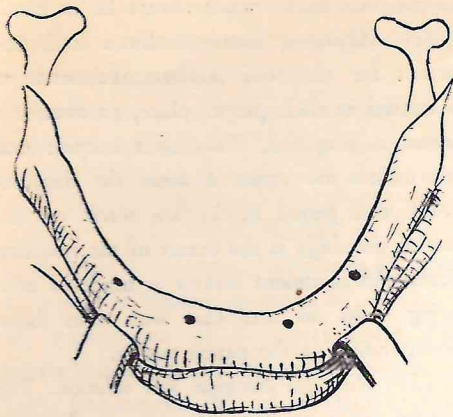


Fig. 2. Pencil marks for the abutments made by the locator.

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).

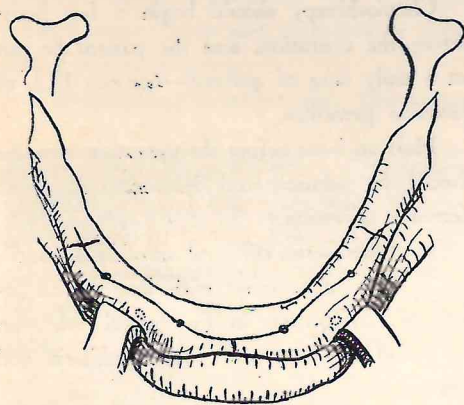


Fig. 3. Incision line.

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).

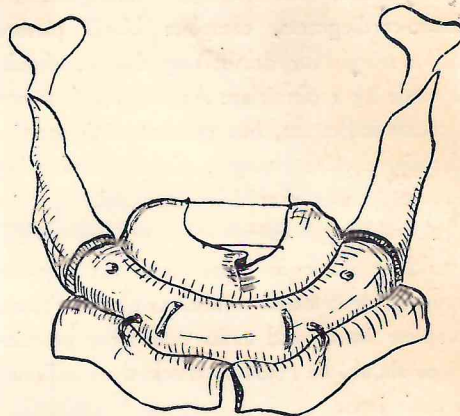


Fig. 4. Bone exposure and flap fixation.

*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 countersunk 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-



Fig. 5. Surgical impression.

pression. Care should be taken to seat it firmly and excess compound being removed. One of the new rubber impressions should be used in the procedure the bone should be moist with sterile saline.

*Surgical end impression.* The occlusion rim is inserted with the soft impression. The impression closes into centric, until it keyes with accurate centric relation. The vertical dimension, the surgical cast be mounted to the conventional.

*Sutures.* The flaps are sutured with continuous sutures.

5. *Post-operative.* The old conventional splint, a surgical splint,

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.

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It should be rigidly constructed and increased in thickness around the abutments in order to provide the necessary strength to resist masticatory stresses.

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 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.

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

*C. Design and Confection of Implant.*

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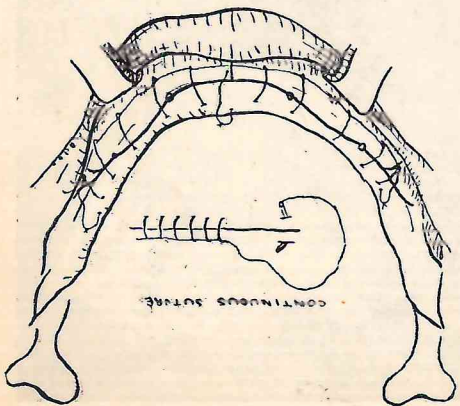
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*C. Design and Confection of Implant.*

Fig. 6. Suture line.



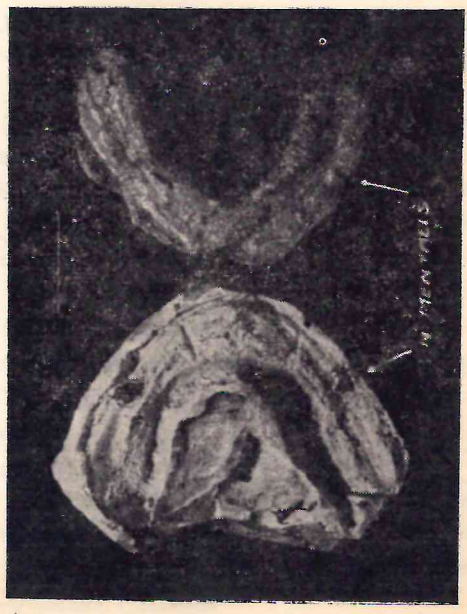
5. *Post-operative Treatment.* The old conventional denture is inserted as a surgical splint, and an extra-oral elastic

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

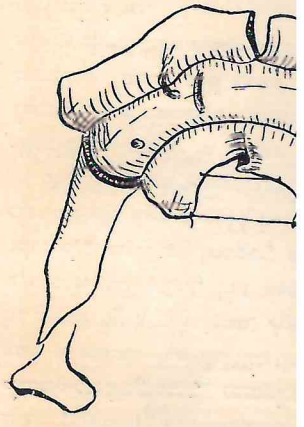
Surgical end relation. The upper occlusion rim is inserted and then the lower closes into centric, the lower rim is adjusted until it keys with the upper. Thus a fairly accurate centric relation is recorded, and a vertical dimension, by means of which the surgical cast be mounted in its correct relation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

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

Fig. 5. Surgical impression.



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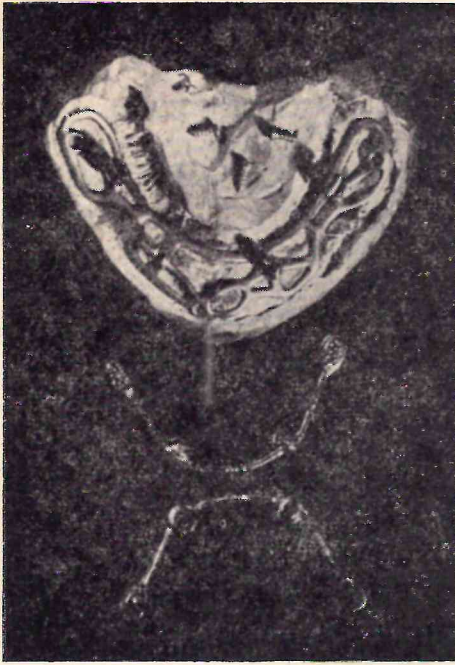


Fig. 7. The implant in situ: note the sutures.

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 accurately, 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

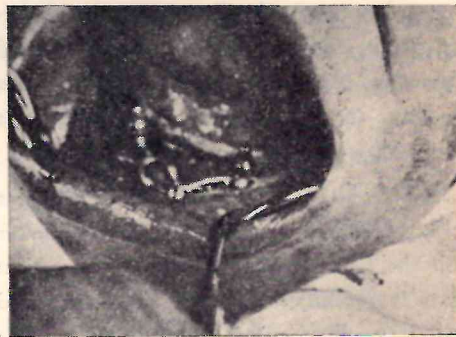


Fig. 8. Insertion of framework.

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

the greatest area of raw surface thus aiding healing by primary intention. Purse-string sutures are used between the abutments, which ensure close approximation of the mucoperiosteum around the abutments. (Fig. 9).

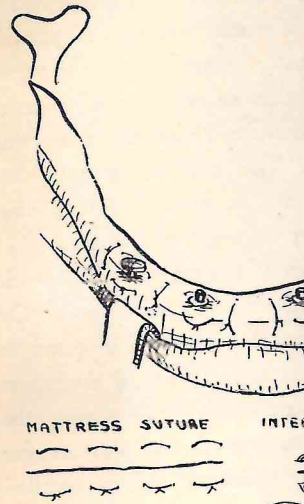


FIG. 9.

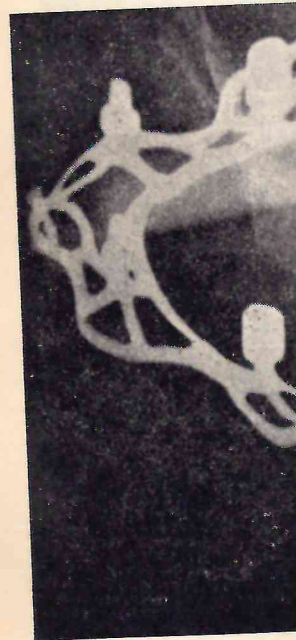


Fig. 11. Right wing X Ray of Implant in place.

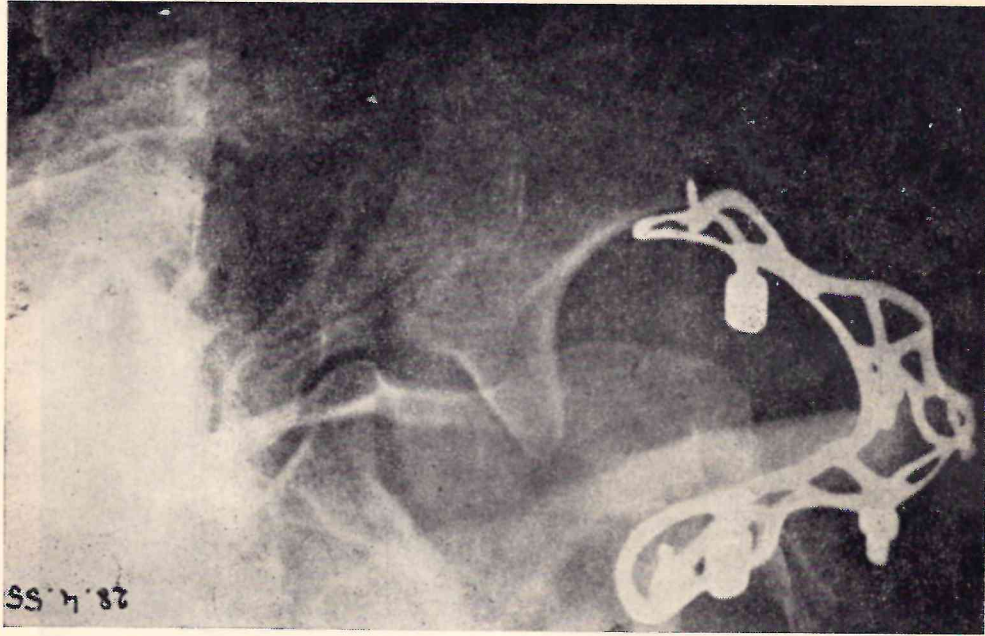
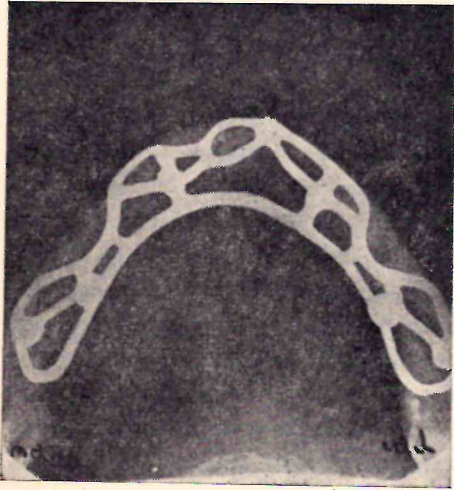
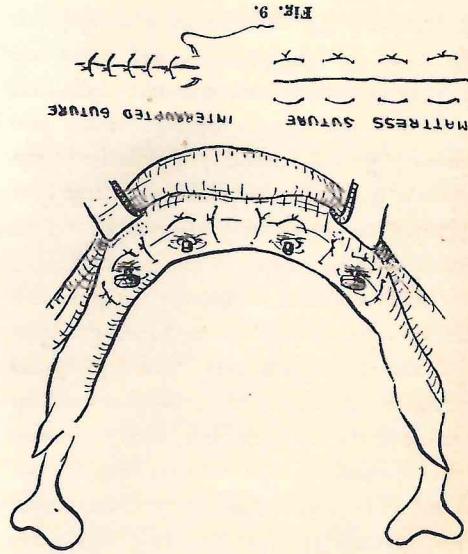


Fig. 10. Occlusal X Ray of implant (in place).



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.

the greatest area of raw surface into contact, thus aiding healing by primary intention. Pursue-string sutures are used around the abutments, which ensure close adaptation of the mucoperiosteum around the projecting abutments. (Fig. 9).



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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 dimension 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

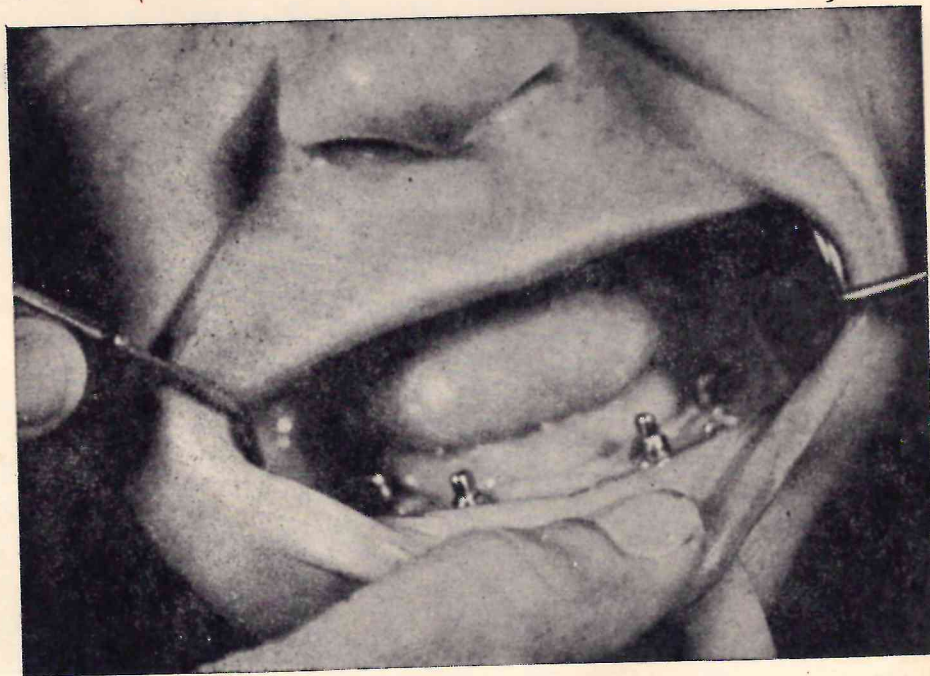


Fig. 12. Implant in place immediately after operation.



Fig. 13. End result. Lower denture in place.

set-up may be altered to achieve full harmony.

The two dentures in accordance with good practice, the lower one cold-cured acrylic, car acrylic in no way imp clears them by up to checking 2 try-ins, processed in the rou

After the two r worn for 3—4 day checked and the occlt and excentric positi carrying out this pa nique cannot be ove

Before dismissal ough oral hygiene

