

MOUTH PREPARATION FOR FULL DENTURES FROM A SURGICAL AND RESTORATIVE VIEWPOINT

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THE operation we have to consider is alveolar resection, following the recent removal of the natural teeth, where the teeth have been periapically or cervically infected. In connection with such an operation three distinct requirements or considerations present themselves: (1) a radiographic diagnosis, (2) certain surgical requirements, the technic of which can be discussed only with reference to the fundamental principles involved, since the necessary procedure cannot possibly be reduced to a mere routine; and (3) the consideration of the arch, ridge, labial, lingual and buccal forms of the case as a foundation for the restorative treatment.

Within this particular field of dentistry, the observations and experiences of the past five years alone have placed before us so many facts worthy of our most serious consideration that a fresh survey of the methods and processes and the fundamental principles involved seems not only useful but imperative. Not that I would criticize or belittle the work or teaching of any who have in the past contributed to this branch of dentistry; it is a comparatively new field, and all early contributions, just because of their pioneering character, must necessarily endure the most severe and thoro tests before it is possible to standardize the principles involved. When I speak of standardization, I refer of course only to fundamentals. Each case presents a different condition; but in order to deal

effectively with its individual peculiarities, it is all the more necessary to have available a thoro knowledge of the fundamental principles, and this not only from a surgical point of view but from the restorative standpoint as well.

A

The general *surgical* standards may be briefly summarized as follows: (1) the primary and fundamental requirement of a complete and unbroken chain of asepsis; (2) removal of all tooth roots, granulomata, detached spiculae; (3) thoro curettement of necrotic areas, including the circumferentially necrotic bone; (4) resecting with precision the excessive osseous developments, and the septal and jagged points of process.

B

The standard *restorative* principle must consist of the proper design of ridge form for the aesthetic and efficient adaptation of dentures, and take into account the absorption that may reasonably be expected, at least during the first six months. In each case the things that must be noted as having a bearing upon the form of the arch, the ridge and the amount of absorption, may be brought under the following eight heads:

1. The general systemic health of the patient.
2. The technic used in gaining access for curettement.
3. Amount, location and extent of necrosis.

4. Amount and nature of infection, pyorrhetic cases being the most extreme in resorption and of longer duration.

5. The extent of resection and the care used for the protection and formation of blood clots in the tooth sockets.

6. The age of the patient. The younger the patient the more favorable the restorative possibilities.

classes: for large, medium, and small structures, respectively (Fig. 1 A).

2. The next consideration should be the form of the arch, whether square, tapering, or ovoid, classes 1, 2 and 3, respectively (Fig. 1 B). The importance of these considerations is further enforced by the fact that a mouth may present a combination of different upper and lower classes, whether with respect to size, arch form or both. In all such cases proper design and preparation will

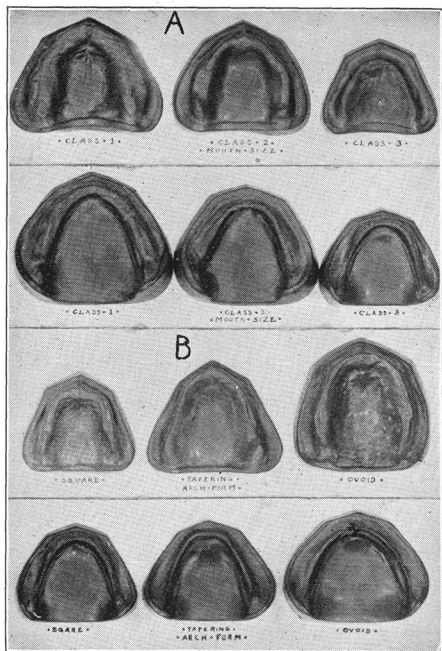


Fig. 1 shows classification: A, maxillary and mandibular size; B, maxillary and mandibular arch form.

7. The nourishment the patient receives following the operation, proper mastication being no small factor.

8. The arch forms and their relation to each other.

1. The first consideration in connection with the design and form of the mouth is the physical size of the bony structure precisely as the edentulous maxilla or mandible is considered and classified for purposes of denture prosthesis. We may recognize roughly three

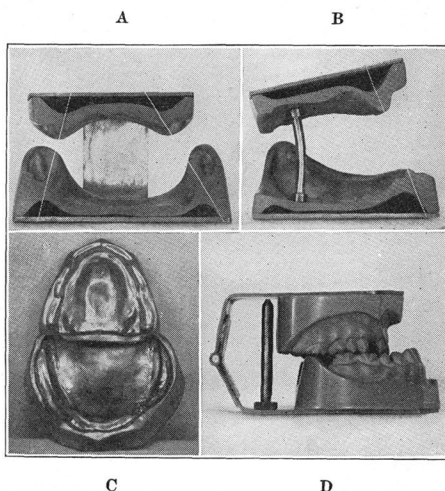


Fig. 2 shows prognathous type: A, cross-section maxillary cast small size, class 3; arch form tapering, class 2; mandibular cast large size, class 1; arch form ovoid, class 3. B, antero-medial section showing ridge relation. C, natural dentition or study casts of case before extraction. D, resection contra-indicated.

increase very materially the efficiency of the foundation for artificial dentures as regards stability and resistance to leverage. In this connection the operator will need a very thorough knowledge of applied physics, in so far as the theory of the lever is involved.

3. The relation of the two arches to each other should be carefully observed, whether normal, orthognathous or prognathous. In case of under-development of either arch, the matter should be made the subject of careful notation (Figs. 2 and 3).

4. After the above-named fundamental matters have been given their due measure of consideration, there should

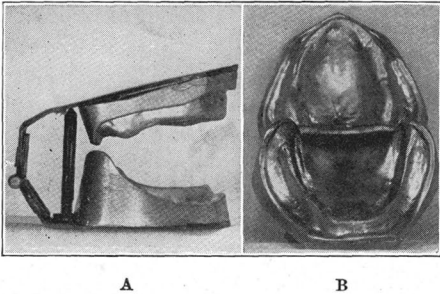


Fig. 3 shows orthognathous type: Maxillary cast large size, class 1; arch form tapering, class 2; mandibular cast medium size, class 2; arch form tapering, class 2.

come a careful weighing of the aesthetic factors. In order to prepare the mouth form to show as little of the artificial

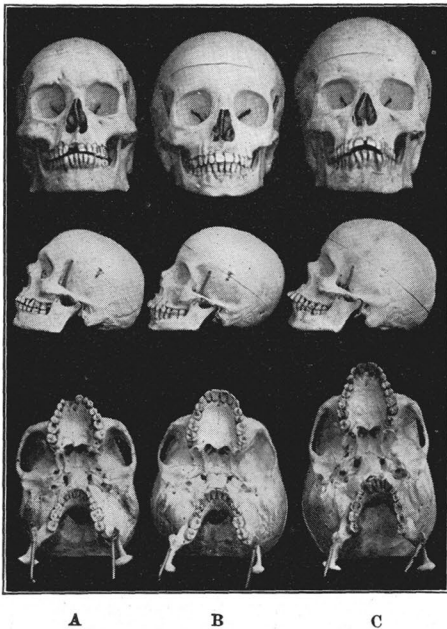


Fig. 4 shows three different conditions none of which indicate resection of the labial plate, tho C shows protrusion of the superior centrals and laterals. Occluded study casts are essential for proper diagnosis and design of all abnormal cases.

gum as possible, first observe the length of the lips, the alignment of the teeth in the arch, especially the amount of protrusion and thickness of the alveolar structure and the degree to which the gums are displayed when laughing (Figs. 4 and 5).

5. Of no less importance is the buccal and labial form of the ridges. It is essential that they should be so formed and smoothed that there will be no undercuts or abnormal bony developments acute enough to prevent the comfortable placement of a denture with properly molded muscle and tissue borders.

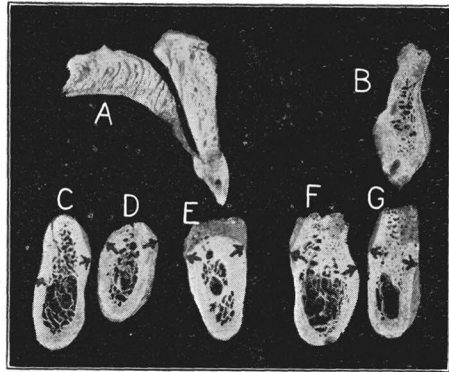


Fig. 5—A, anteromedian section of maxilla. Note thinness of alveolous and especially the location of anterior palatine canal and foramen. B, Anteromedian section of mandible. Note thinness of alveolous incisor region. C, D, and E, cross-sections of edentulous mandible first molar region after absorption; no resection. Note variation in size, form, also location of external and internal oblique ridges indicating muscle and tissue attachments. C shows good base for denture with buccal and lingual flanges. D, good base for denture with slight flange. E, good base for denture with no possibility of flanges. F, G, cross-sections of mandible first molar region teeth extracted. Note difference in the thickness of the alveolous, also size of the mandible.

Neither should sharp spines or points of process be left to cause soreness from the wearing of a denture.

From still another standpoint it is important to preserve carefully as much of the perpendicular form of these borders as possible. I refer to considerations of adhesions, cohesion, and atmos-

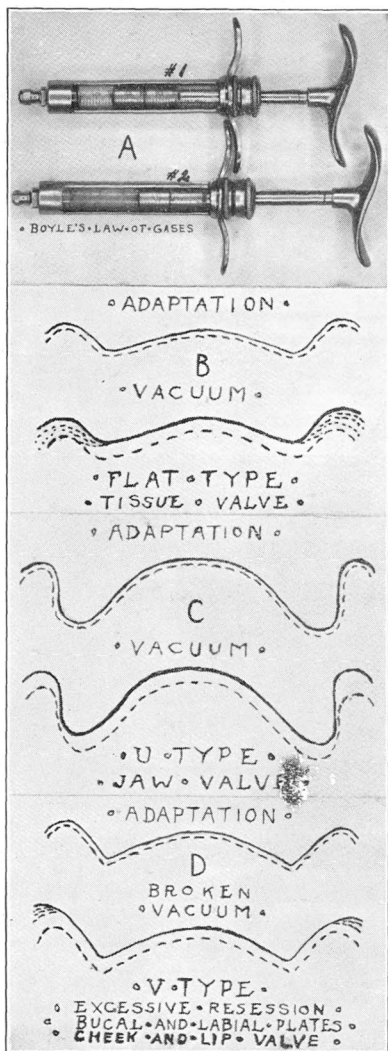


Fig. 6 illustrates Boyle's law of gases. A, syringe No. 1 with plunger set at 10 c.c. when unsealed is to represent one atmosphere of space within which is one atmosphere of gas; syringe No. 2 with plunger drawn from 10 c.c. to 20 c.c. when sealed illustrates two atmospheres of space and one-half atmosphere of gas, thereby creating a rarefaction of the gas or a partial vacuum. The larger the syringe the greater the vacuum illustrative of mouth size. B, C, and D, are drawings made from cross-sections of maxillary casts showing three types of border forms, C, being the best for stabilization of the denture and also for sealing out the ingress of air when the denture is partially displaced under stress. The three types of valves may be present in one case thereby forming an ideal class 1 condition.

pheric pressure. The physical principle known as Boyle's law, that the pressure of a given mass of gas varies inversely as the volume of the space within which it is confined, has an important application in this connection (Fig. 6). The best accounts of this subject which I have read are by George H. Wilson in recent editions of *Wilson's Prosthetic Dentistry* and a paper by Rupert E. Hall of Chicago, in the *Dental Review* of March, 1918, entitled "Retention of Full Dentures."

6. It is also essential to take into consideration the soft tissues, frena, and muscle attachments all of which are extremely important from the restorative point of view.

A. Consider first the tissues that are to form the crest of the ridge or proper bearing surface for the denture. Where the suturing technic has been used, present methods frequently result in two extreme conditions, both unfavorable. The first is the leaving of excessively long tissue flaps, which when sutured form soft rolling tissue ridges, over the thin edges of the palatal plates, thereby causing excessive pressure on the palate and borders of the maxilla and border pressure on the mandible, thus decreasing efficiency of incision and mastication. The other is that of suturing too short flaps, which draw the border tissues, frena and muscles into abnormally close relation to the crest of the ridge, thereby preventing freedom of movement of the lips and causing flat mouth form, V-shaped ridges, and short flange dentures, which will readily be recognized as a very unfavorable condition indeed. When no suturing has been resorted to, we nevertheless often find a correspondingly extreme condition in the cutting away of the labial, buccal, and lingual plates. This results in a mouth form equally bad, but the tissue thickness is usually more uniform. Not even this is true in all cases, however, for when tissues are left, due to faulty technic in

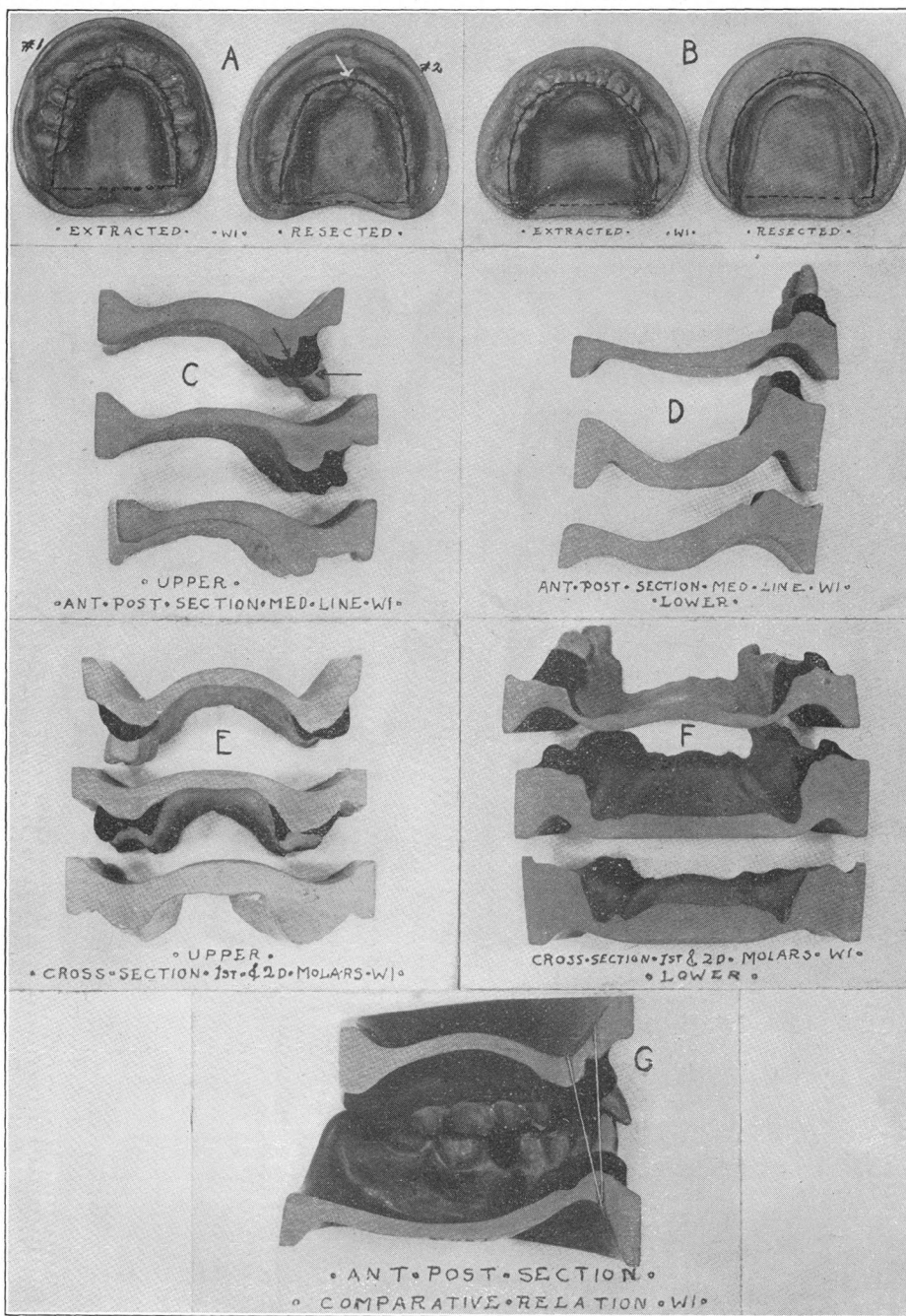


Fig. 7 shows a case of radical resection, impressions all taken at the same sitting. Extensive pathology in upper right lateral region only. In A, note reduction in the size of arch (cast No. 2). Nasopalatine nerve and blood supply are in the center of the ridge (indicated by arrow). In C, dark area shows amount resected. Note change in the center of the crest of the ridge (indicated by arrow). In E, note amount resected to get sufficient tissue flaps for suturing. G, anteromedian section. Note change from normal ridge relations to prognathous type. Extreme case of surgical deformity for life, impossible to restore artificially.

trimming the tissue margins and the portions forming the interseptal gum, excessive unattached papillae are formed, which interfere seriously with the comfortable wearing of the denture.

B. Consider in the second place (and this is a matter of vital importance) the palatal nerve and blood supply of the soft tissues. Excessive resection of the labial plate and the smoothing of the margin of the palatal plate frequently leave the anterior palatine foramen directly in the center of the crest of the ridge, especially after absorption has taken place. This is due to the fact that absorption of the labial and buccal plates of the maxilla is much more extensive than that of the palatal plates, whereas the labial buccal and lingual plates of the alveolus of the mandible absorb equally, due to their uniform thickness and blood supply. The result is that the arch of the upper jaw decreases in size, while that of the lower jaw increases. Excessive resection of the palatal plates in the molar and bicuspid regions is fraught with no little danger, because of the presence of the posterior foramen and groove in this region for the protection of the nerve and blood supply. For the protection of the nasopalatine nerve and blood supply, nature has provided the raphe and rugae. These considerations show how necessary is a thoro knowledge of the anatomy, location and proper preparation of each case, for protection of the same from undue pressure under dentures.

The lingual alveolar process should never be resected but merely smoothed or trimmed slightly at its interseptal aspects in order to relieve the spines of osseous protrusion between the approximating teeth. It is very true that upon the prosthodontist lies the responsibility for locating these points of entry for the nerves and the vascular supply and that he should provide for their proper relief when constructing the denture. But I have in my experience found a number of cases

where this is exceedingly difficult of accomplishment, due to excessive resection, which removes the osseous protection and makes for constant pressure under the dentures. This condition prevents a normal circulation of the blood, creates an unbearable burning sensation in the tissues, causes a rapid osseous resorption, and if not relieved, produces in a very short time hypertrophy of the soft tissues, which means inefficient mastication (Fig. 7 A, Fig. 8 A).

7. The ideal preparation is to preserve all the sound plates of bone that do not form excessive undercuts or sharp spines, taking into consideration also the aesthetic features of the case, especially when there is a short lip. Perpendicular or slightly undercut labial and buccal borders, with smooth ridges, are the ideal. In cases of large areas of osseous destruction at the apices of the roots and extending beyond them, requiring a great amount of curettement, it is practical to raise a buccal or labial flap of tissue, and cut an opening thru the osseous plate, in order to give direct access to the neurotic area; in such cases this is the procedure of choice. It permits leaving a sufficient arch of bone near the cervical margin to allow for the formation and protection of a blood clot in the socket for the regeneration of bone (Fig. 9).

An impression may be taken twelve days after the operation, and the points of raised plaster where the sockets have not completely filled in can be scraped down to proper rounded form for the ideal ridge. When the denture is completed and placed in the mouth, a partial vacuum is formed where these points have been scraped from the impression, and the newly formed tissues in the sockets are drawn down into perfect adaptation to the plate, thereby forming a smooth ideal ridge (Fig. 8 E).

The standards of remuneration now prevailing in the profession of dentistry are such as to justify the devotion of proper care and adequate time for a

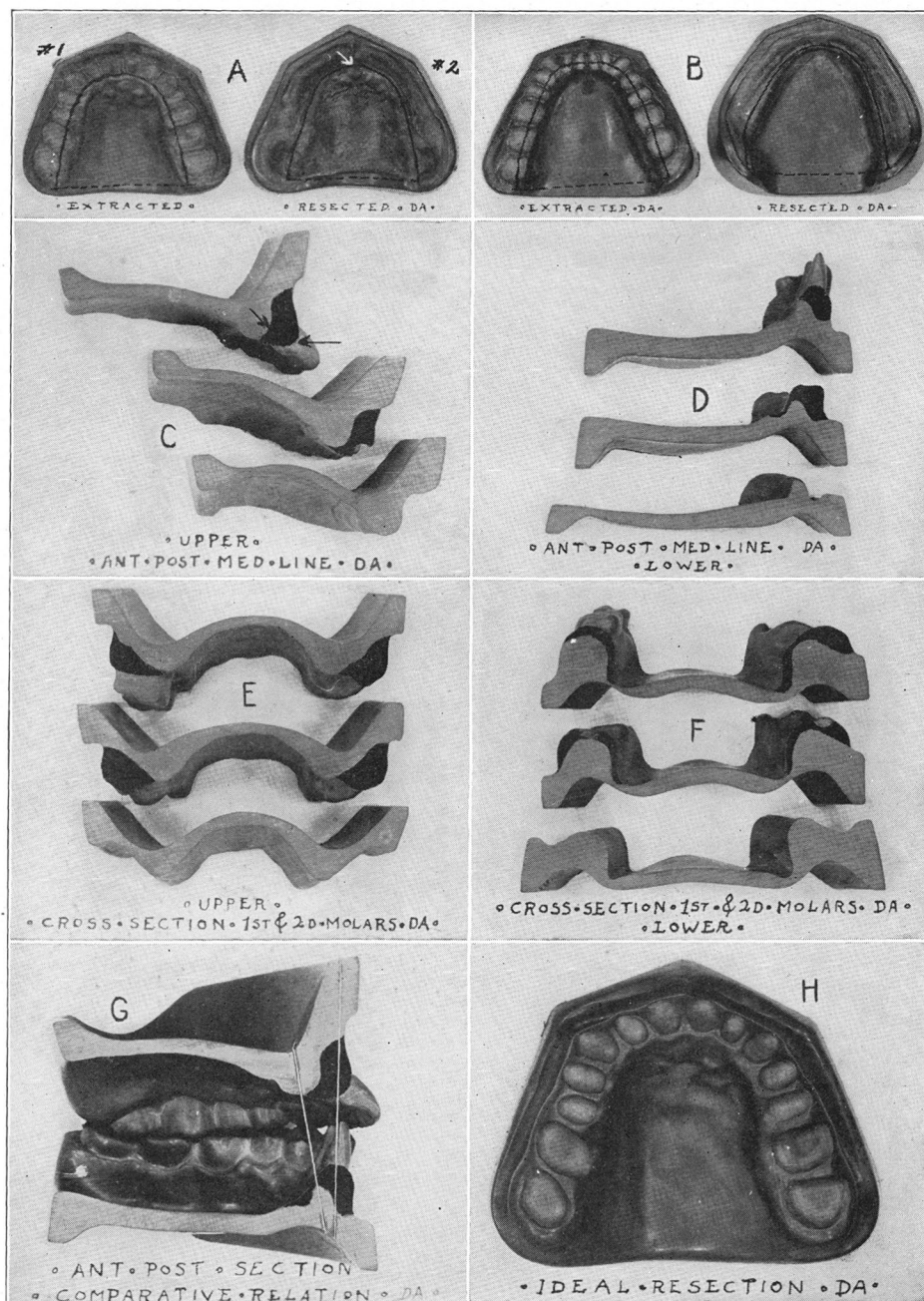


Fig. 8—Radical resection. Note carefully the same points as in Fig. 7.

thoro preparation of all cases. There should be a thoughtful consideration of all phases of each case for no routine procedure can furnish a satisfactory solu-

accurate and minute diagnosis, for which study models of the patient's mouth before the teeth were extracted are used, together with carefully tabulated radiolog-

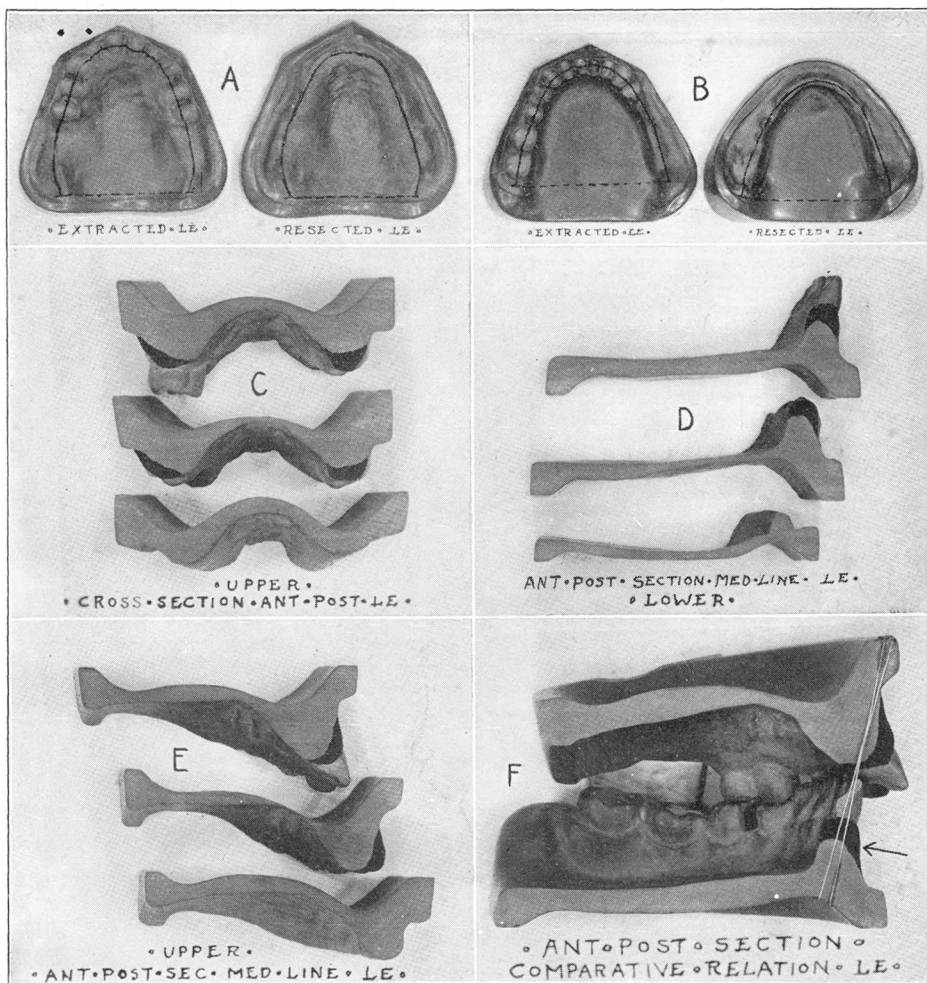


Fig. 9—Upper protrusion, short lip case, etc. Note slight amount of resection required to make an ideal condition. In F, note slight change in ridge relation; mandibular resection slightly more than necessary.

tion, but every case must be considered on its individual merits. In any event, it is clear that surgical intervention should be based only on the most careful study of mouth conditions, including an

ical findings. Upon the basis of such a study it will be possible to plan a careful surgical procedure for the ultimate welfare of the patient who is to wear the dentures, both from a practical and an

aesthetic standpoint. Incidentally, such a procedure will also be a boon to the prosthodontist, tho it goes without saying that the interests of the patient are predominant and decisive.

The phase of our work described here in this paper has already passed the experimental stage. There are individual cases where suturing is advisable, while at other times excessive preparation would be required to make suturing possible. Too many operators seem to have adopted suturing as a routine procedure, having considered the matter solely from the surgical standpoint, to the exclusion of the restorative considerations involved. Hence my plea is for a careful, thoro, conscientious self-preparation, thru study and observation, before embarking farther upon this adventure, so full of risks for the patient and of pitfalls for the dentist. The more remote considerations of what will happen when the patient is handicapped thru the soft food and soup diet forced upon him by surgical deformity and loose plates, to say nothing of social and physical embarrassment, are no less vital to the patient and the profession than the immediate surgical considerations which have hitherto received too exclusive an attention. In this day of specialties we need to be especially on our guard against isolating ourselves from the collateral branches of our art. If the Roman orator could say that all the arts are bound to one another by a common chain, how much truer is this of the various modern ramifications of the single art of dentistry. The ultimate consequences of all the professional specialties center in the patient and are united in him, and in justice to those who place themselves under our care it is necessary to remember that we are still dependent upon one another.

DISCUSSION

Chalmers J. Lyons, Ann Arbor, Michigan:
I wish to say that this is a most timely paper. There never was an operation originated in either medicine or dentistry that has been so abused as this operation

that we elect to call alveolar resection. The thing that appealed to me in Dr. House's paper was the fact that he lays much emphasis on the welfare of the patient. That is something that has not been done in the past. I firmly believe that many operations of alveolar resection have been done simply because it could be classed as a surgical operation.

One thing that has not been studied in this operation and which should be more carefully looked into is the fundamental principles of surgical repair. Unless we know the principles of surgical repair we have no right to perform so extensive an operation as that of alveolar resection. And in the study of these principles we must take into consideration the formation of the cicatricial tissue; we must try to operate so as to restore normal conditions in the mouth; otherwise the prosthodontist will have no opportunity of doing his work as it should be done.

Dr. House says: "I should standardize the surgical process as primary and fundamental requirements of a complete and unbroken chain of asepsis, removal of all tooth roots, granulomata and detached spiculae and thoro curettement of necrotic areas." It is possible in many of these cases to go too far. We must look upon these necrotic areas as conditions similar to the condition of osteomyelitis, and in some of these cases I believe the best that we can do is to remove the gross infection. It is not possible for any man, even tho he has his tissues exposed in full view, to know when he has removed all of the necrotic tissue, and when he has removed all of the infection.

Among the several things that is necessary to take into account in each case (a point that Dr. House makes, and it is a good one) is that of the age of the patient. We all know that the older the patient, the much less rapid is the repair of bone. Even tho we realize that in the mouth we have a fine blood supply, at the same time in the repair of bone there is a condition existing in the aged that makes such repair very slow.

In many of these cases the operation is one bordering upon major surgery, and I believe that rest for the patient will be a big factor in the process of repair. Do not send your patients home and expect them to do the things that they have been doing in the past.

The essayist has described most beautifully the ideal requirements of post-operative results. Closer co-operation between the exodontist and the prosthodontist is absolutely necessary if we are to expect the best results.

The diagnosis of the case will play a very important part in the procedure. Study models, radiograms and attention to facial expressions are all necessary to success.

I am very glad that Dr. House brought out the point of leaving the lingual alveolar proc-

ess alone, or nearly so. The lingual alveolar process is a heavy plate of bone, and usually there is very little resorption from that plate. Furthermore, we cannot take any chances on the impingement of sensory nerves or interference with the blood supply.

Relative to suturing each case represents different conditions. There are many cases that cannot be sutured, and there are many cases that it will be absolutely necessary to suture to secure the best results. Therefore it is necessary to diagnose the case. Dental diagnosis has been weak in the past. And in this particular operation it is more necessary than in any other to study the case and make the diagnosis first. If a surgical operation is necessary, perform it with the least amount of shock to the patient, and the least amount of traumatism to the tissues.

Boyd S. Gardner, Rochester, Minnesota: The essayist has demonstrated to us that it is an easy matter to remove too much process and that without a doubt many mouths have been ruined by such a procedure. He emphasized the necessity of full mouth radiograms and the use of study models. I am sure that any operator can benefit by the use of both. In all the cases which Dr. House has demonstrated the teeth have been extracted first and then the process treated afterward. In our work we reverse this procedure; the process is removed before teeth are extracted. By laying back the soft tissues one is able to make a study that will enable him to proceed much better than when the teeth are first extracted. By removing the process, which is directly buccal or labial to the teeth in question or doing what is now termed an alveolotomy, we find that we are able to extract the teeth with a minimum of trauma and certainly we are very much concerned in so doing when the patient's resistance is low. Not only are we able to extract the teeth with a minimum of trauma but we are able to remove all of the teeth rather than leave the apices. This open view operation also enables the operator to remove the pathologic condition and he is able to visualize his work in such a way that it spells the best results for the patient.

I believe that our work is a great deal like that of the industrial surgeon. When he amputates a leg on account of a severe injury and has in mind that the patient must wear an artificial leg, he amputates primarily to eliminate the injured foot, yet he works in

such a way as to leave the stump in a condition that the patient will receive the maximum results of the artificial leg in the minimum of time. So it is in the work that the oral surgeon is called to perform. The teeth are to be extracted with a minimum of trauma, pathologic conditions removed and the process left in such a way that the greatest good is to be received from the denture. Dr. House has also emphasized the importance of asepsis in our work and too much emphasis cannot be put on same. That many cases have been oversutured there is no question. Suturing in the hands of many dentists is a new procedure. I have observed many cases where the process has been sacrificed in order to approximate the soft tissues by sutures and this is not necessary. During the past year we have made use of what we term a trial suture which has worked out very satisfactorily. In our hands the interrupted catgut suture has been the suture of choice and we start by placing one suture in the midline and after tying the first knot we retract the lip to such an extent as to ascertain whether we are shortening the lip line. In other words are we pulling in the soft tissues at the expense of a good fitting plate? Many times one cannot approximate the tissues and there is no harm when this is impossible; while on the other hand, in a very few instances one has surplus soft tissue to remove. A few interrupted sutures appear to be all that is necessary and their early removal no doubt is indicated.

In cutting away process, the use of narrow sharp chisels enables us to minimize our trauma and leaves the process in a much better condition than is left by the rongeur. On one hand you have traumatized the process left; on the other hand with the chisel the process is left in a much better condition. We do not encourage the use of files or stones and by so doing adhere more closely to well-established surgical principles.

While there should be an attempt made to standardize this operation, yet as both Drs. Lyons and House have emphasized, we can never say that a certain technic will fit all of our patients. Study the case carefully, make use of study models and co-operate with the prosthodontist. Do the work in such a manner that all pathologic conditions will be eliminated, all root tips as well as all roots removed and finally dismiss your patient in such a condition as will enable him to get the greatest amount of good from his denture.