The telescoped complete denture: A research report at the clinical level

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This article is a research report at the clinical level. It is also a description of a practical technique and a short, historical review of the sphere of telescoped crowns. It presents the use of telescoped crowns in the support of complete upper or lower dentures.

HISTORICAL REVIEW

As long ago as 1887, when *The American System of Dentistry* was published, telescoped "bridgework" was being reported. *Prothero's Prosthetic Dentistry* was published in 1916; in it are descriptions of the work of at least eight men who were responsible for the telescoped crown, the clip bar, and crowns which are retained by screws. F. A. Peeso started to publish in 1894; his system of removable bridgework, which was supported by telescope crowns as well as tubes and split pins, gave great impetus to this form of retention for removable partial dentures.

The Gilmore[1] attachment was also described in *Prothero's Prosthetic Dentistry:* "The appliance consisted of a U-shaped clip or clasp of rigid yet resilient metal, the flanges of which received a 14 gauge wire. The idea of a bar is not to afford support by its bearing against the tissue, but to unite widely divergent points of support by means of a light yet rigid structure and convert them into what has been termed multiple anchorage."

In 1944, Jerome M. Schweitzer telescoped a lower removable partial denture over eight vital lower natural teeth—six incisors and two bicuspids. This provided excellent resistance to vertical and horizontal masticatory pressures (Figs. 1 to 4).

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Fig. 1. The mouth of a patient in 1944. Note the deep vertical overlap and dental breakdown.
Fig. 2. Severe tooth destruction. All teeth are still vital.

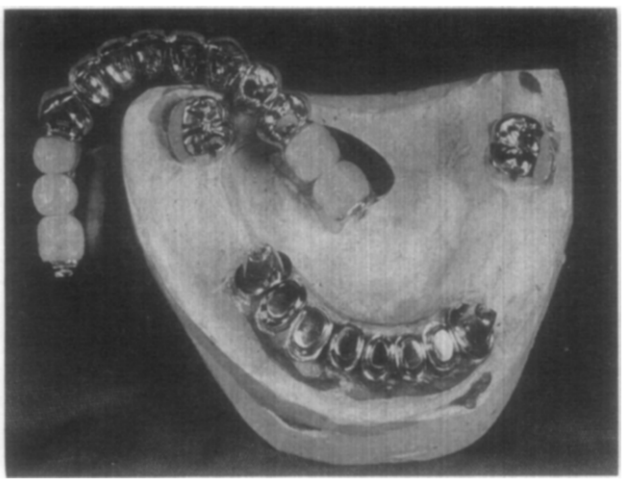

Fig. 3. The lower telescoped removable partial denture, and the copings and crowns over which it fits.

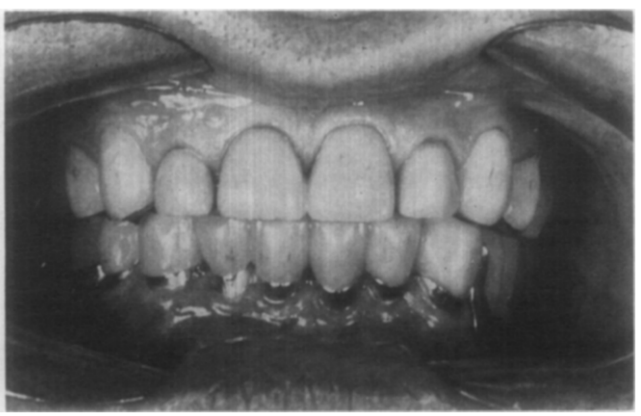

Fig. 4. The completed oral rehabilitation of the patient seen in Fig. 1.

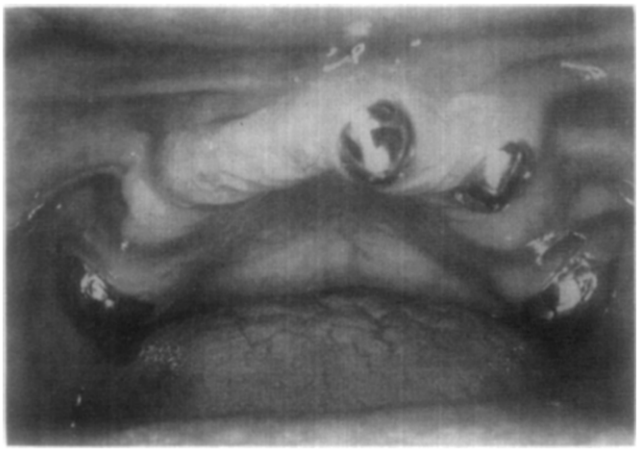

Fig. 5. Four natural teeth are retained to support an upper telescoped denture.

In 1948, Ralph Boos reported the use of an upper denture telescoped over a patient's natural teeth in making a facial rehabilitation. However, the principles involved were different from those used now by those who use telescoped complete dentures.

These references indicate that telescoped complete dentures have been known since 1880. That this knowledge is now being revived is to our credit because the mechanical and physiologic principles have proved to be sound.

THE PROBLEM

Many patients who have lost most of their natural teeth have still managed to retain a few. It is not uncommon to remove them and insert complete dentures when these teeth are few and periodontally involved.

We are all aware of the shortcomings of complete dentures—especially the mandibular denture. In 1958, Miller[2] described a telescoped upper denture which was supported by natural teeth. His ideas "project, into the complete denture field, the fixed partial denture principle of replacing missing teeth." Since the advent of the concept of telescoping dentures, the importance of the few remaining natural teeth is being re-evaluated because of their ability to withstand masticatory pressures.

THE APPLICATION

As our experience with this type of stabilization and retention increases, so does our willingness to retain these few natural teeth. In fact, for mandibular dentures, the retention of even two or three pulpless teeth or roots may make the difference between success and failure. The broken-down teeth can be rebuilt, efficient endodontic treatment can be done, and the periodontal disease can be treated. These prepared teeth can be covered by primary gold copings and will then serve to withstand masticatory pressures on them.

If as many as four natural teeth in strategic positions could be salvaged (Fig. 5), there would be a decided advantage for mandibular complete dentures. These retained teeth will tend to retard the loss of the bony foundation. The oral tissues

cannot withstand the oral pressures produced by prostheses. This makes it desirable to retain the natural teeth wherever possible and thereby to delay the loss of the tissues that support them.

Many patients have teeth which would be very poor risks if they were to be included in extensive, rigid restorations. However, these teeth should not be sacrificed if it is possible to restore them. If they are periodontally involved, the reduction of their vertical height provides for a more favorable crown-root ratio, and gives them a better chance for survival. The substitution of intermittent pressure for sustained pressure frequently promotes a return to health of the teeth and increases their ability to act as stabilizing and retaining devices for telescoped dentures.

NATURAL TEETH VS. PRIMARY COPINGS

Because retained teeth may have a guarded prognosis, they may not be able to support the usual type of removable prosthesis. However, with a telescoped denture, these retained teeth are shortened, and this provides a mechanically more favorable crown-root ratio. These teeth should be used singly, not in groups, and used as stabilizers, not retainers. The occlusal end of the primary gold copings should be rounded so it is similar in form to a segment of a ball bearing. Thus, the secondary crown which telescopes over them and is a part of the removable denture will be free to rotate without binding on these primary copings. Yalisove[3] suggests that a self-releasing taper with an included angle of 16 degrees be incorporated in the primary copings.

The tooth to receive the primary coping is prepared so it resembles the upper half of a ball bearing or a cone with a rounded apex. The extent of the taper depends upon the required retention or stabilization. Because of the rounded nature of the preparation, it is advisable to make a key so that the insertion of the coping will be less problematical.

A copper-band modeling-compound impression is made of the prepared tooth together with a wax interocclusal record showing the alignment with the ridge and the remaining teeth. Copper-plated dies are constructed and seated in stone casts (any final impression material may be used). The wax pattern for the coping is made as thin as possible in order to produce the thin thimbles. Small, round concavities are placed below the surface of the gold on opposite surfaces of these gold copings to aid in their removal. Formerly, because of the thinness of the gold, accidental perforations were sometimes made. Now the holes are placed above the gold surface. After cementation, the added height of the coping is reduced and the prepared coping is highly polished.

THEORY OF CROWN AND SLEEVE COPINGS

In 1966, Schweitzer[4] discussed the theory of crown and sleeve coping retainers for removable partial dentures and made the following statements.

"Among the important benefits attributed to this theory and technique are: (1) Preservation of the bony structures (the ridges) is possible for much greater periods than was otherwise the case when these supporting tissues were subjected to vertical and horizontal pressure without the benefit of natural teeth to help counteract them. (2) Patients who were emotionally disturbed at the suggestion that all their teeth would have to be removed and complete den-

tures would have to be inserted now can take hope and receive comfort from the assurance that some of their natural teeth can be retained. Thus their ridges are preserved and the insertion of a complete denture is postponed. At the same time the patient is being conditioned in case he has to wear a complete denture eventually. (3) With the extended longevity of the population, and the alarming increase of complete denture wearers at a comparatively early age, this concept may provide us with the means of prolonging the retention of the natural teeth and thereby deferring to some later date the insertion of complete dentures. (4) The diversity of ways in which the principles and techniques can be applied where either complete or removable partial dentures are to be inserted is limited only by the ability and ingenuity of the dentist. (5) Splinting teeth together is an accepted procedure in all dental occlusal concepts. It divides the functional and nonfunctional pressures over a broader area ad protects the weak teeth. This method of crown and sleeve copings provides positive splinting because, when the secondary coping contacts the primary copings under vertical pressures, all abutment teeth are rigidly connected. The weak teeth are supported by the strong teeth."

ACHIEVEMENT OF BOTH STABILIZATION AND RETENTION

It has been very difficult to separate the stabilizing and the retentive effects of the removable prosthesis. Although stabilization is the primary achievement, retention is also accomplished. We are told by Yalisove[3] that the impression is taken in such a manner that intimate contact between the primary and secondary copings is avoided when the denture is not functioning. But when the denture settles, as it does, and the abutment teeth are not intruded far enough to compensate for this settling, the denture intimately contacts these copings and therefore permits the horizontal forces to exert their influences.

RETENTION OF LOWER ANTERIOR TEETH

In patients who have retained their lower anterior natural teeth but have lost their remaining teeth, the upper anterior ridge frequently has been resorbed and traumatized. This is especially so where the upper ridge has been exposed to vertical and horizontal masticatory pressures for a long time. The deformity often takes the form of spongy, displaceable hypertrophic tissue. If the patient has the habit of clenching and bruxing, the pressure may be sustained and the trauma will be severe. The lower incisors act as the hammer, while the upper anterior ridge acts as the anvil. The result will be destruction of bone of the residual ridge. These patients can be greatly helped by the retention of even two upper incisors. These teeth, acting as vertical struts, resist masticatory pressures and serve to preserve the ridges. They prevent resorption and can be real lifesavers to the residual hard and soft tissues (Figs. 6 to 8).

THE ANVIL AND THE HAMMER

Sometimes the dentist must deal with a complete lower denture which has minimal stabilization and retention. In this situation, it hardly seems intelligent to provide maximum retention and stabilization of the upper denture. In this instance, the mandibular denture provides the anvil and the maxillary denture provides the hammer. With a weak anvil, a strong hammer will cause further lower ridge destruction and undesirable movement of the mandibular denture. To provide maximum stabilization and retention for the lower denture, and the greatest longevity for the retained lower natural teeth, one of the following two procedures may be

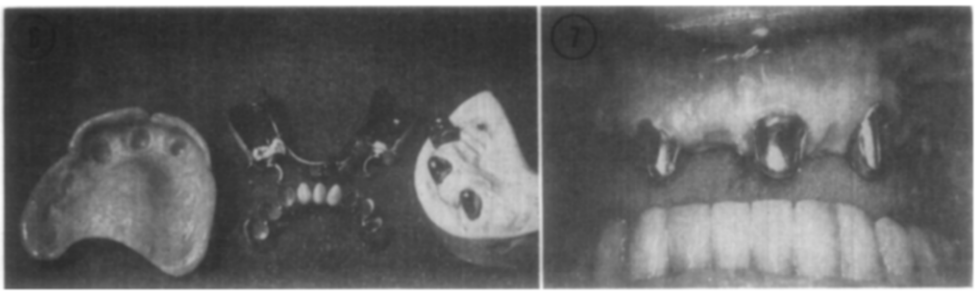

Fig. 6. The entire prosthesis before insertion. The three primary upper gold copings provide support for the telescoped denture and protect the bone of the residual ridge.

Fig. 7. Three upper teeth have been retained to support a telescoped denture. The lower anterior restoration is the 9 unit rigid fixed prosthesis shown in Fig. 6.

necessary: (1) The decision may be made to remove all or some of the upper natural teeth, if they are present. This immediately lessens the force of the blows on the lower denture. (2) Where the lower denture has been telescoped over a few weak natural teeth the dentist may decide either to eliminate all the upper natural teeth that could provide greater retention and stabilization for the maxillary denture or to reduce their number and their vertical height to such a degree that they are capable of delivering only a minimal force to the lower denture. By these means the lower denture can function better. The patient will usually protest the removal of his apparently healthy upper teeth. This should be carefully explained to the patient; success or failure may depend upon this decision (Figs. 9 to 13).

SPLINTED VS. INDIVIDUAL PRIMARY COPINGS

In this theory, in which the primary copings serve as individual teeth, the splinting effect is carried out "through the intimate contact of the occlusal two thirds of the secondary crowns and the individual sleeve copings."[3] In other concepts, splinting is accomplished by soldering the fixed abutment restorations together. In cross-arch splinting, round wire rods of fairly heavy gauge are soldered to the abutment castings at the gum margins, similar to the Gilmore technique or the Doldar bar. The partial removable denture telescopes this round wire with inserted clips.[5]

The problem of evaluating both forms of splinting and deciding which is more advantageous and why is a biomechanical one. Miller's concept of the individual primary copings can be generalized as follows: The individual tapered copings permit a telescoped complete denture to move vertically when intermittent pressure from the denture is applied in function. When horizontal pressures are applied, however, the short rounded form of these individual primary copings permits the telescope to rotate. Ideally, the telescoped denture delivers intermittent vertical forces to the primary copings. Because the circumference of the secondary crowns, which are part of the removable structure, is greater than the greatest circumference of the primary copings, the pressure is placed only upon the summit of the copings. Thus, horizontal forces should cause slight rotation of the removable prosthesis and take the noxious influence of this type of pressure off the primary copings. It is in order to permit this rotation that Miller advocates the use of individual natural

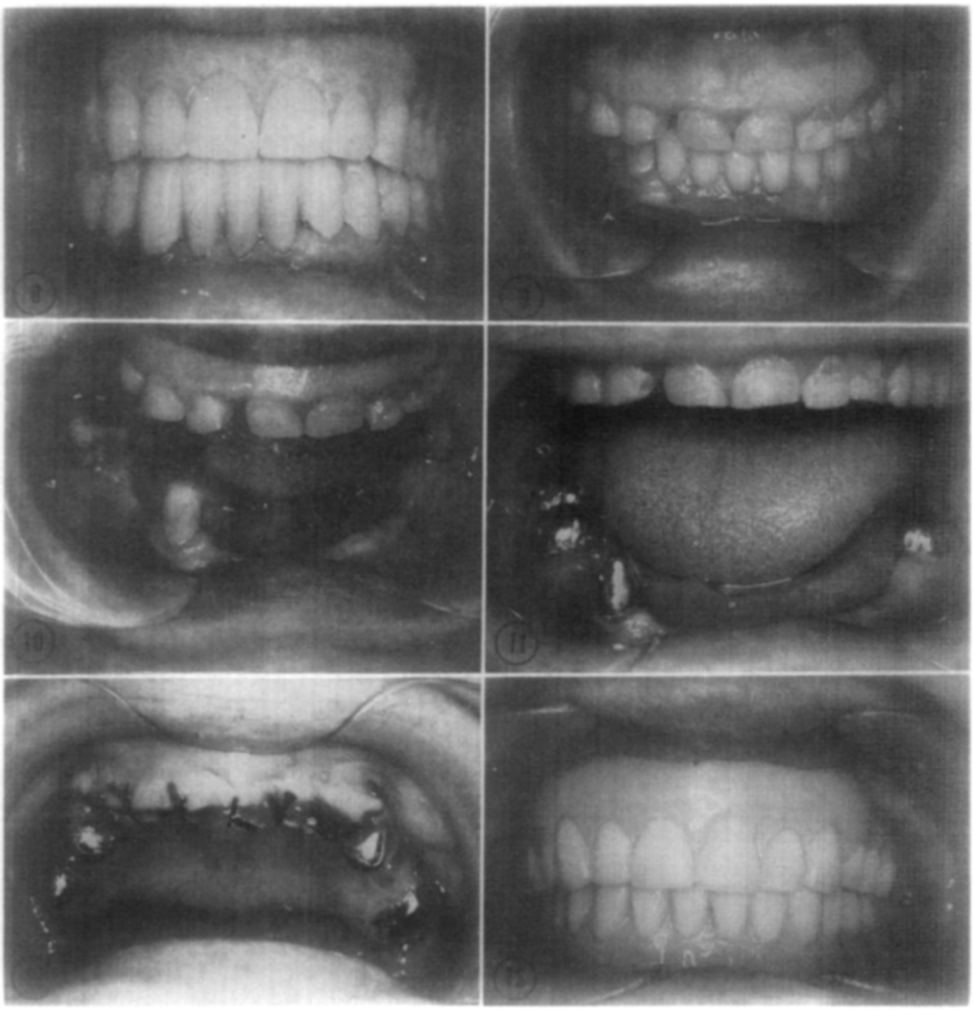

Fig. 8. The completed prostheses.

Fig. 9. At start of rehabilitation the maxillary teeth are strong. The four remaining mandibular teeth are weak.

Fig. 10. The four lower teeth before the copings were placed on them. The right cuspid is mobile.

Fig. 11. The four primary copings protect the lower natural teeth and will support a telescoped lower denture.

Fig. 12. The upper incisors have been removed. Four upper teeth have been retained to support an upper telescoped denture.

Fig. 13. Temporary telescoped upper and lower dentures are in place.

teeth rather than groups of two or three teeth which approximate each other. For the same reason, he does not recommend connecting natural teeth together to form a rigid splint or using a rigid bar to join two primary copings. If these were connected, the horizontal pressures would cause the natural teeth to move and the resulting continuing motion would subject these teeth to undesirable forces.

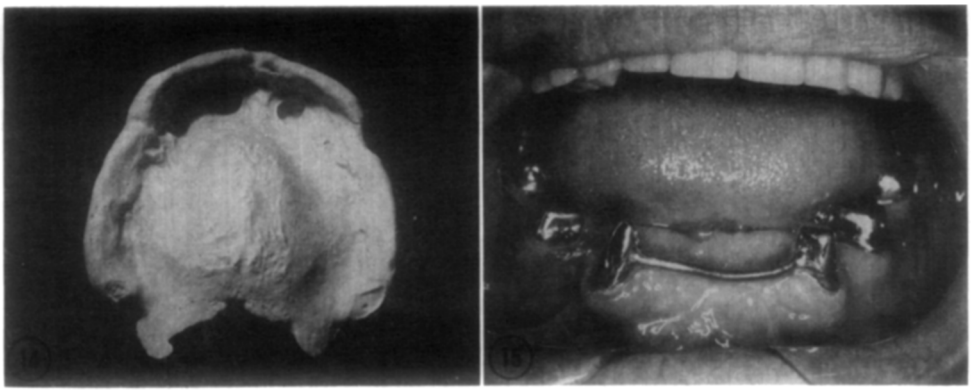

Fig. 14. An upper impression for making a telescoped denture. Note the borders and detailed contours to help retain the telescoped denture.

Fig. 15. Anterior cross-arch splinting. The cuspids are connected by a round wire similar to a Gilmore bar.

We cannot, however, concede the above to be the facts. The telescoped complete dentures have extended borders which engage and tend to displace the soft tissues (Fig. 14). This provides the retention which is necessary for complete dentures. When vertical and horizontal forces are applied, and the denture is well seated, it intimately contacts the hard and soft tissues of the basal seat. It also intimately contacts the primary copings and they must move both vertically and horizontally in function. To deny horizontal movement where the primary copings have visible vertical height, as is shown in both Miller's and Yalisove's photographs, does not seem to be mechanically possible. We will agree that rotation would be possible, but only if the pulps of the retained natural teeth were removed and their length reduced to the level of the gums, and then covered with more or less flat primary copings. This would permit no rocking of the primary copings under horizontal pressures, but it would still permit vertical motion or intermittent vertical functional pressures. In addition, it would strengthen the contention that these primary copings serve only as stabilizers and not as retainers.

RETENTION IS AS IMPORTANT AS STABILIZATION

Now the question arises as to why it is not permissible for these individual retained teeth to act as retainers as well as stabilizers. We feel that the biomechanical principles of this concept are conducive to greater stabilization and retention for the telescoped prosthesis. The longevity of the retained natural teeth is increased and their health is enhanced. The drastic reduction of the crown creates a crown-root ratio which lends itself to the most favorable biomechanical leverage. Adequate home hygiene, plus the ability to clean these small individual units because of their accessibility, may play an important role in the successful results. These patients, being aware of their problem, cooperate in order to retain their natural teeth as long as possible.

All of us are aware of the difficulty of obtaining satisfactory retention for lower dentures. The telescoped lower denture can provide this extra retention as well as

stabilization. If there is a choice as to whether to use (1) a clip bar (Gilmore; Doldar) or (2) two individual copings as with two lower canines, we would favor the gold bar (Fig. 15) with the denture telescoped over it. We believe that the splinting of these natural teeth gives them extra support. The amount of positive retention they are now able to supply for the support of the telescoped denture is superior to that which they could provide were they not united, even if the splinting effect of the superstructure is considered.

If individual gold copings were used, these teeth might have to be reduced to their gum levels in order to resist horizontal forces. This reduction, especially for lower dentures, would eliminate the retention which would be possible if a small crown were present.

There is yet another topic on which we disagree with the theory of Miller and Yalisove, namely, the use of individual natural teeth in separate sections of the arch. Where two or more adjacent teeth have been used and covered with primary gold copings, either splinted together or as individual units, we have frequently met with success in both retention and stabilization of the telescoped denture. This area is still open to clinical research.

GOLD VS. RESIN SECONDARY CROWNS

In telescoping complete dentures over individual natural teeth which have been covered with primary gold copings, we are given the opportunity of using secondary crowns made of either acrylic resin or gold. These crowns become a part of the removable denture.

When gold secondary telescopes are used, they are waxed-up either directly over the gold primary copings or over dies made of these copings, finished, and attached to the denture (Fig. 16). Their circumference at the base is slightly greater than that of the primary coping which they cover, which permits slight rotation without binding. When the taper of the primary coping is taken into account, it becomes clear that positive contact is possible at the apex of the coping.

Resin secondary crowns are cured over the final stone casts which contain accurate impressions of the primary copings. When the denture is completed, the circumference of the secondary crowns is widened to produce the same effect as is produced by the gold copings.

We have used resin secondary crowns more often than gold for the following reasons. (1) The degree of stabilization and retention can be controlled by the dentist upon the insertion of the removable prosthesis. (2) Where two or three teeth which approximate each other are being used as primary copings, either splinted or individually, it is sometimes impossible to use gold secondary crowns because of the lack of space, whereas it is often possible to use the resin secondary crowns because they can be made very thin and the interproximal resin can be removed. Because of difficult occlusal factors, this also often applies to individual primary copings. (3) When either gold or resin secondary crowns are used, it is sometimes difficult to seat the denture over the primary copings. When resin is used, the entire inside surface of the crown can be removed, a small perforation can be drilled into the palatal surface of the resin (Fig. 17), and a new secondary crown can be made with cold-curing resin directly in the mouth. At the point where the resin is only

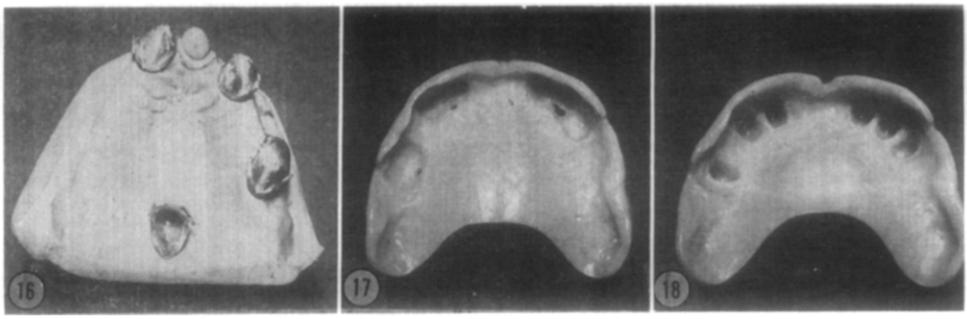

Fig. 16. Gold secondary copings are made to fit over the stone cast of the gold primary copings. The secondary copings will become part of the telescoped denture.

Fig. 17. The denture is cut away to enlarge the holes formed over the primary gold copings. Holes have been cut through to the palatal side. Cold-curing acrylic resin will be placed into these concavities and the denture placed in the mouth over the primary copings to develop the desired fit and retention.

Fig. 18. This telescoped complete denture fits over and is supported by six natural teeth. Cold-curing acrylic resin has been used to readapt the denture to the primary copings in the mouth.

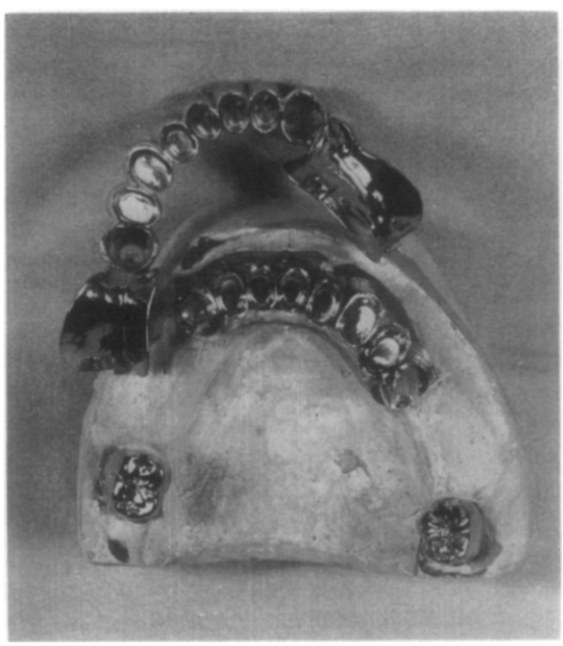

Fig. 19. A lower telescoped removable partial denture. There is no labial flange.

partially cured, the denture may be removed and inserted several times until it has finally cured (Fig. 18). The excess resin which extrudes through the perforation can be removed and the palatal surface can be repolished. This provides a simple method for determining the areas of premature (interceptive) occlusal contact. The stabilization and retention of the denture can be adjusted by the dentist using this

method because, after the resin has completely cured, each secondary crown may be relieved until the desired amount of retention and stabilization is obtained.

Recently Morrow and associates[6] presented a new method of supporting telescoped complete dentures. They prefabricated bearings, reversing the conventional form and placing the female part on the abutment and the male part of the telescope crown in the removable denture. Although this technique has advantages, it still requires the correct placement of the chrome-cobalt bearings, and these bearings account only for the apex of the abutment tooth. The remainder of the tooth consists of plastic denture base material that may be readily contoured to the desired shape for correct retention and stabilization, but if the bearings are incorrectly set, it is difficult to change their positions.

We concede that it is necessary to use gold telescoped secondary crowns when no labial flange is being used on the telescoped denture. The gold secondary crowns which cover the incisor teeth terminate at the cervical margin of the primary gold copings (Fig. 19), but they are actually full gold veneer crowns and are stronger when constructed as such. With no labial flange, the telescoped denture must be provided with greater retention by means of a less tapered primary coping. We continue to experiment with this problematic labial region, but this division of telescoping really belongs in the category of a partial removable denture.

FULL-VENEERED CROWNS AND SPLINTS VS. PRIMARY COPINGS AND TELESCOPED DENTURES

It is frequently difficult to choose between primary copings which help to support a telescoped complete denture and full-veneered gold or porcelain crowns which have been splinted together to support a removable partial denture. If the patient wishes to avoid wearing the traditional complete denture, and if four maxillary incisors remain in good health, either method may be used. If these retained natural teeth are splinted by means of full crowns, they may be able to provide sufficient support for the partial removable denture to enable it to function for several years. If, on the other hand, the four remaining maxillary incisors are weak and have a guarded prognosis, the telescoped maxillary complete denture should be favored.

COMPLETE VS. PARTIAL PALATAL COVERAGE

It is possible, when using primary copings and an upper telescoped denture, to omit a section of the palatal coverage. While the usual full palate coverage is more desirable, a denture with partial palatal coverage is sometimes favored by the patient. If possible, both types should be constructed for the same patient and he should be permitted to make his own choice, but he should be strongly guided by the dentist's preference for full palatal coverage (Fig. 20).

Evaluation must be more critical when we are considering mandibles. Retention of even a few weak mandibular teeth with a guarded prognosis provides much greater comfort for most patients. A telescoped lower denture usually has better stabilization and retention than does a complete lower denture. It would not be advisable to fully crown and splint lower questionable teeth in the usual manner if the telescoped denture can be used. Should the weak teeth have to be removed, it usually means the destruction of the entire prosthesis. With telescoped mandibular

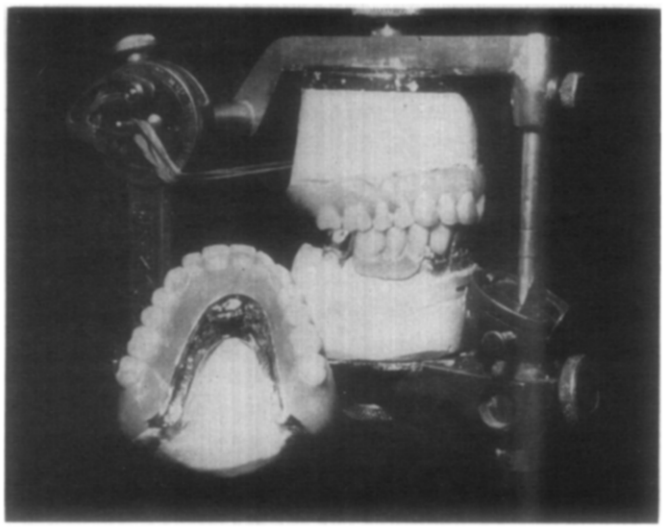

Fig. 20. Two upper telescoped dentures for the same patient. The one on the articulator has full palatal coverage.

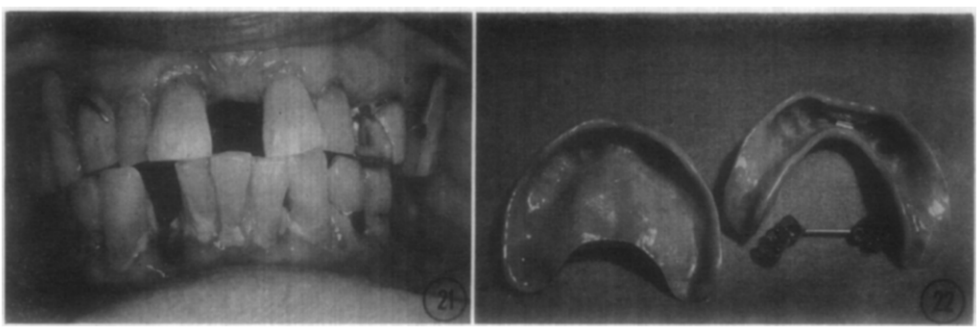

Fig. 21. The mouth to be rehabilitated.

Fig. 22. The upper denture has been made to telescope over copings on four teeth. The lower denture has been made to telescope over five lower teeth. The cuspids are splinted by a bar. A clip fits over the bar to provide extra retention.

dentures, however, if any of the remaining weak teeth have to be removed, the secondary crowns in the telescoped denture can have their concavities filled with resin and the denture will still function. This is another good reason for recommending this type of prosthesis. The patient may eventually have to wear a complete denture, but he will have been led into accepting it in gradual stages (Figs. 21 to 24).

Only a combination of careful evaluation, serious discussion with the patient, and the experience of the dentist will provide the answer to whether or not to use full crowns splinted together in conjunction with a removable partial denture or primary copings with a telescoped complete denture. Sometimes it is possible to add Gilmore attachments to single primary copings and have the metal clip on the secondary crowns, which immediately provides positive retention. However, the

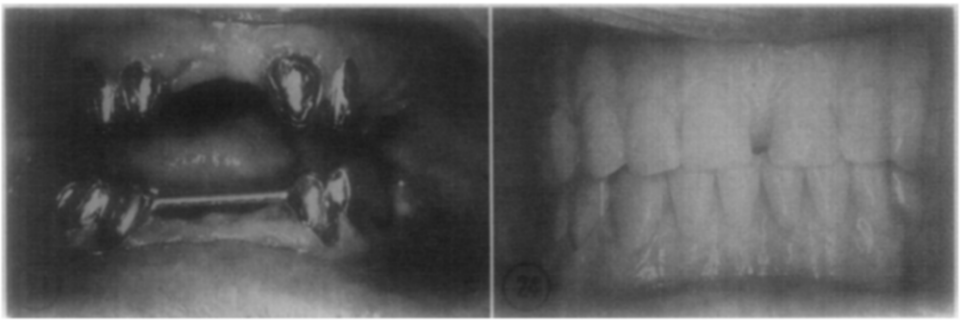

Fig. 23. The copings and bar for the support of the dentures. The pulps have been removed from the lower teeth and the root canals have been filled.

Fig. 24. The telescoped complete dentures.

retained natural teeth must be strong enough to be able to withstand the additional pressures (Figs. 25 to 27).

FAILURES

Not all attempts to telescope a final denture are successful. When the teeth that are retained to be used as abutments have a guarded prognosis, a certain percentage of failures must be expected. However, when the offending teeth require removal, it is necessary only to fill in the concavity these primary copings occupied and the prosthesis may still be used. Eventually the denture may have to be replaced, but considerable time may elapse before this becomes necessary (Figs. 28 to 32).

AGE AND ATTITUDE

For young or middle-aged patients, and for elderly patients who are mentally alert and in good physical condition, any mechano-physiologic therapy which can improve function and increase longevity, as well as preserve structure, deserves our careful consideration and meticulous application. Now that so many patients are living longer, they want their stomatognathic system maintained in a state of good repair so that they can continue to have adequate function and have their supporting tissues in reasonably good health. This is almost an impossibility in patients who have been edentulous for many years. The bone of their residual ridges has continued to resorb because of the masticatory pressures exerted upon tissues which were not intended by nature to support complete dentures. For these patients, the telescoped dentures offer relief. On the other hand, for the elderly who are no longer either mentally alert or physically able, the soft-tissue–borne dentures must still be used. These people are not able to withstand the necessary additional treatment and the additional financial involvement is not justified.

SUMMARY

1. The retention of a few natural teeth over which a complete denture may be telescoped provides better retention and stabilization than is possible with the usual complete dentures.

2. The reduction of the length of the crowns of the teeth being retained pro-

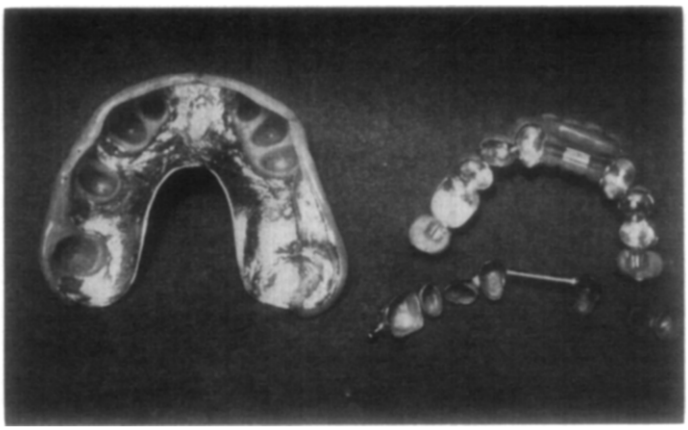

Fig. 25. Upper and lower telescoped dentures. The lower primary copings have distal rods which receive clips in the telescoped mandibular denture.

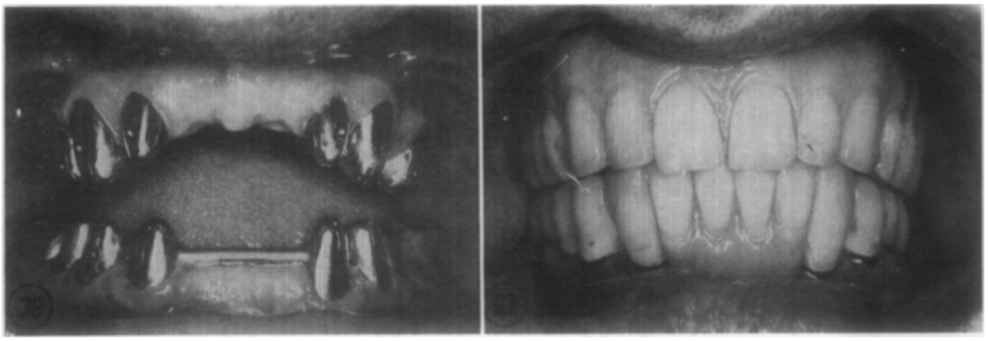

Fig. 26. The copings which will support the telescoped complete dentures. The periodontal tissues required extensive treatment before the prostheses were constructed.

Fig. 27. The telescoped dentures in position over their copings.

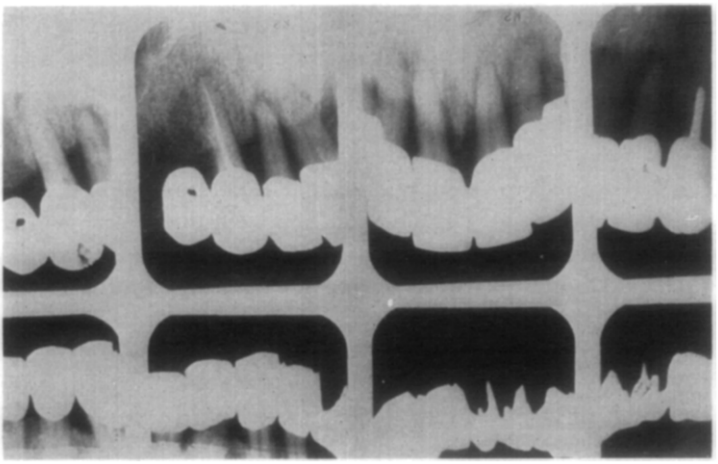

Fig. 28. The radiographs made before treatment show the deep periodontal disease. Only the cuspids and one upper right molar were retained. The cuspids were pulpless.

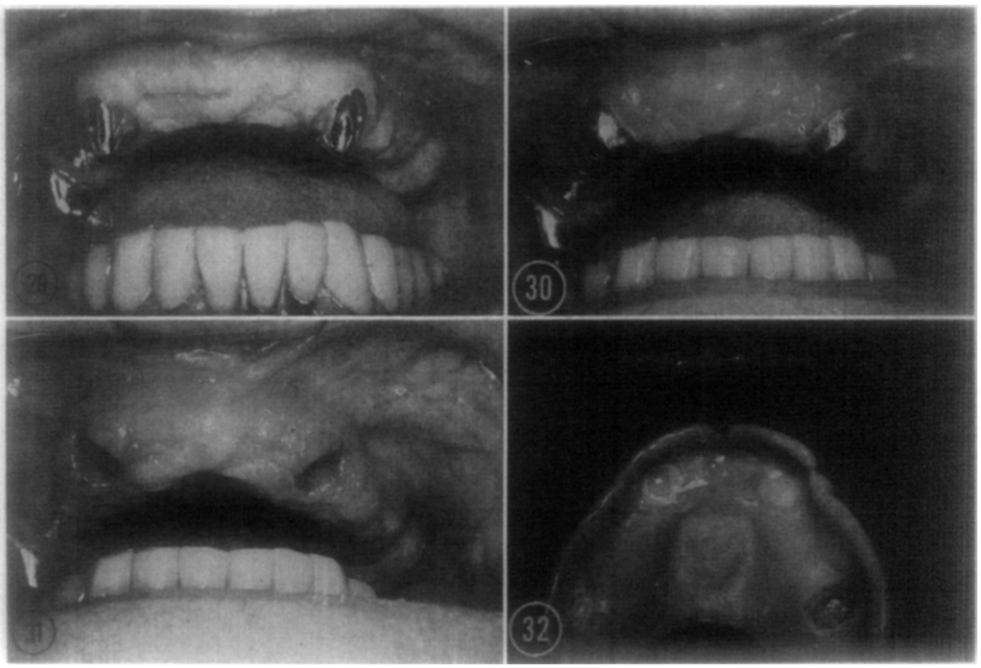

Fig. 29. The length of the crowns of the cuspids was reduced to create a favorable crown-root ratio.

Fig. 30. Since the mobility of the cuspids could not be reduced enough, the crowns were further shortened.

Fig. 31. It was impossible to eliminate the periodontal disease. Eventually the cuspids were removed. The molar was removed later.

Fig. 32. The concavities once occupied by the primary cuspid copings were filled in with cold-curing acrylic resin so the denture could continue to serve the patient.

vides a more favorable crown-root proportion and frequently results in the elimination of periodontal disease.

3. Where lower natural anterior teeth exist, the retention of even two or three upper incisors provides the bony support in the anterior part of the upper ridge with protection against traumatic vertical and horizontal pressures from the lower teeth. Ridge resorption has become a national tragedy; any method of preventing it should be welcomed.

4. The retention of two or more lower natural teeth over which a full mandibular denture is telescoped provides a means of better retention and stabilization than is otherwise possible.

5. The psychologic impact of having all the teeth removed may be ameliorated and the patients may be conditioned to expect the eventual need for complete dentures.

6. Regardless of the theories stating that stabilization is all that is essential, both stabilization and retention are achieved in telescoped complete dentures.

7. The telescoped complete denture acts as a removable splinting device for the abutment teeth.

8. When individual teeth are joined together by a gold bar they provide greater stabilization and retention than if they were not splinted together, e.g., as with two lower cuspids.

9. With only a few lower teeth remaining to support a lower prosthesis, it is wise to consider the removal of the upper natural teeth in order to increase the longevity of the lower teeth.

10. While we advocate the use of metal secondary crowns in telescopes in fixed and removable partial dentures, acrylic resin seems more practical for use in telescoped full dentures. The exception occurs where there is no labial flange. In this situation gold telescoped veneer crowns are used. However, we consider these as removable partial dentures rather than telescoped complete dentures.

CONCLUSION

Starting with a short, historical review, this report on the use of telescoped crowns in restorative dentistry combines both a research report and a practical technique. It demonstrates that by the use of telescoped crowns restorative dentistry could be markedly improved. Our patients can be made happier because of our ability to retain their teeth longer in health and function.

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