Geriatric prosthodontics: An overview. Part II.
Treatment considerations

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This two-part paper discusses treatment considerations for geriatric patients—a population that is on the rise. The first part of this paper examined the effects of aging on general health and on the oral environment. The second part discusses restorative treatment options for geriatric patients with caries, tooth wear, or missing teeth. (Quintessence Int 1993;24:353-361.)

Introduction

In a previous paper we dealt with the psychological aspects of aging and considerations of age-related changes in the teeth, oral tissues, nutrition, and metabolism. This paper will focus on treatment of dental caries, tooth wear, and missing teeth in the geriatric population.

There are many elderly patients whose age and infirmity make access to a dentist difficult and whose tolerance of restorative procedures is very low. These factors demand some compromise in treatment. "Compromise" in dentistry suggests a failure to carry out satisfactory work, but this is only true if dentists make compromises to suit themselves. If a compromise is decided jointly by patient and dentist after a complete diagnosis has been made, it may represent a judgment of the patient's needs and how to best fulfill them. When the elderly are treated, the need for compromise may arise from the patient's health, wishes, tolerance of dental procedures, access to the dentist's office, or whether treatment is rendered at home or in a hospital.

The only area that should not give rise to compromise is that of the attitude of the dentist toward the elderly. High-quality restorative care is possible for the majority of elderly patients and the responsibility for this care rests with dentists. Inability or unwillingness to offer the time, kindness, patience, tolerance, and technical competence required for excellence in geriatric dentistry dictates referral of these patients.

Dental caries

In elderly patients, the effects of previous caries, restorations, attrition, abrasion, and erosion (now termed abfraction) may combine to present challenging situations. The number and types of restorations as well as areas of wear will give an indication of the patient's previous caries experience and may be useful in predicting the risk of further problem areas. New carious lesions in enamel are uncommon unless the patient suffers some change in medical status or adopts a diet conducive to caries. Dental caries in the elderly most commonly involves root surfaces or appears as secondary caries around previous restorations.

Location and appearance

Root caries occurs typically at the cementoenamel junction (probably because this is the first area exposed to the oral environment) but with further exposure of root surfaces via periodontal breakdown, lesions may be found at sites apical to this point. Initially, root caries appears yellow to light brown; the cementum and dentin become softened and there is no sharply
Three intracoronal materials can be used to restore teeth affected by root caries: amalgam, composite resin, and glass-ionomer cement. Amalgam is an excellent restorative material, but it has two main disadvantages for root restoration. First, it requires mechanical undercuts for retention, and, second, adequate condensation is essential for a restoration of good quality. Condensation is difficult if the interproximal area or furcation area is involved.

Composite resin is an excellent material when used in combination with acid etching of enamel. The marginal seal achieved is important for preventing microleakage, discoloration, pulpal damage, and secondary caries. Modern microfilled composites provide a smooth and highly polishable surface, which inhibits plaque accumulation. Mechanical retention poses the same problems that occur with amalgam, and the high coefficients of thermal expansion of composite resins allow microleakage to occur. Bonding of resin materials to dentin and cementum is still in its infancy, but recent advances with both the phosphate ester-sulfonate and calcium-hydroxyl systems have shown that bonding to both organic and mineral components is possible. Some older dentinal bonding agents have shown a tendency to undergo hydrolysis within the oral environment. It would seem prudent at present to use the newer materials for restorations on root surfaces because clinical trials that show no evidence of this type of breakdown have been completed.

Glass-ionomer cement is a fluoride-containing, ion-leachable aluminosilicate glass that is the result of a reaction between an aluminosilicate glass powder and various organic polyacids. The set material is capable of demonstrating true adhesion (via ionic and polar bonds) to both enamel and dentin (if the surfaces are clean). This is the material of choice for restorations of the root surface lesion. The cement is capable of producing a good marginal seal and mechanical undercuts are not essential. With newer dentinal bonding systems, composite resin materials can be overlaid for retention, and, second, adequate condensation is essential for a restoration of good quality. Condensation is difficult if the interproximal area or furcation area is involved.

Prevention and maintenance

Diet and plaque control are essential elements of root caries prevention. Studies suggest that fluoride can be effective in the management of root surface caries.

Good home care, regular professional prophylaxis, and dietary control can effect remineralization of early root carious lesions and may arrest more extensive and active lesions. Arrest of root caries is indicated by a change in color to a dark brown or even black appearance. If fluoride is to be used, it should not be in the form of acidified gels whose low pH is likely to decalcify the root surface. A more suitable choice would be a fluoride-containing varnish or an aqueous solution of sodium fluoride.

Patients should be encouraged to use a fluoride-containing mouthrinse on a regular basis (0.05% aqueous solution of sodium fluoride for daily use or 0.20% for weekly use).

Restoration

The nature and site of root caries make restoration difficult. On the root surface, the margins of cavities will exist in either cementum or dentin. Compared with enamel, this tissue is relatively soft and well defined; thus smooth margins are difficult to create. There is usually little dentin available in which to prepare restorative features. For a restoration to be successful, it must not only replace missing tooth structure and provide a good marginal seal, but also conform to the anatomy of the tooth. In the root area, this is especially critical for periodontal health and response. The complicated anatomy of the root surface around furcation and interproximal areas presents a special challenge. The problem is further complicated by inaccessibility of lesions in these areas.

Materials

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The major problems with glass-ionomer cement can arise in its handling. As with any cement, the powder-liquid ratio is critical, and strict adherence to the manufacturer’s instructions is important if optimal physical
properties are to be achieved. This powder-liquid ratio will vary, depending on the intended use of the cement (liner, luting agent, or final restoration). The setting reaction takes place in two stages. The initial set occurs within 3 minutes of mixing and the second stage is complete after 7 minutes. Final maturation of the cement does not take place for at least 1 hour and, during this time, the cement is very vulnerable to moisture contamination. To this end, manufacturers provide resin-based varnishes for application after placement of the restoration. However, research has indicated that these varnishes are generally ineffective and, at present, there appears to be no proven alternative. Current materials under examination include medical-grade ethyl cyanoacrylate, which is flowed as a thin film from the tip of an instrument onto the restoration, and an alky-alkoxy-silane marketed as a dentinal desensitizing agent (Tresiolan, Kerr), which has been shown to provide a relatively water-resistant film. Most recently, unfilled light-curing resin has been shown to be effective in preventing water sorption during the initial 5 minutes after placement and water loss during the first 2 weeks thereafter.

Carious lesions involving the root surface are generally close to the free gingival margin. The use of a rubber dam to gain control of the operating field provides great advantages. Carious tissue should be removed carefully. It is recommended that, where vital dentin has been cut or where the lesion is in close proximity to the pulp (which, on anatomic grounds, applies to virtually all root caries lesions), a protective base be applied. Any of the proprietary hardsetting two-paste calcium hydroxide preparations is adequate. This base should not be thicker than 0.5 mm. In addition to pulpal protection, the base will prevent exudation of fluid from the cut dentinal tubules; this fluid may interfere with both the setting reaction and adhesion of glass-ionomer cement. The remaining exposed tooth tissue within the cavity is then conditioned with a 50% aqueous solution of citric acid to provide a clean surface for adhesion of the cement. Glass-ionomer cement is then mixed and placed into the cavity with a syringe. This allows placement under positive pressure, which permits easier handling, reduces voids and porosities, and facilitates incremental addition and condensation. It is important that a matrix be used to allow improved adaptation and permit the cement to set without being disturbed. Suitable matrices are the commercially available cervical foils, which may be readily burnished to conform to the contours of the tooth.

After the second stage of the setting reaction, the restoration can be finished with a lubricated (unset, unfilled composite resin) white stone used at very low speed (overheating will damage the cement). The cement is trimmed parallel to the margins of the cavity to prevent the cement from being pulled away from the cavity walls. A protective coat of cyanoacrylate cement or unfilled light-curing composite resin is applied to the restoration and allowed to dry. The rubber dam is then removed and the patient is dismissed.

Secondary caries

The diagnosis of secondary caries is easy when a new lesion is obviously associated with an existing restoration, but is often more difficult. Discoloration of tooth structure adjacent to a restoration is not an absolute diagnostic criterion. Proper diagnosis requires a thorough clinical examination of dry teeth under good illumination. Radiographs are essential, and intraoral bitewing views are more informative than are periapical radiographs. Care must be taken when these films are interpreted. Carious lesions in the gingival third of the tooth or on proximal surfaces can be erroneously interpreted as "cervical burnout."

Loss of marginal integrity of the restoration provides grounds for removal and assessment. However, when amalgam is involved, it may be prudent to leave the restoration in place and reevaluate at a later visit. Loss of marginal integrity and "ditching" of amalgam margins are extremely common. Despite small marginal fractures and loss of integrity, the restoration tends to maintain its overall seal and prevent microleakage through the deposition of corrosion products at the tooth-restoration interface. Thus, if no signs of secondary caries (such as discoloration of tooth structure, soft areas to a sharp explorer, or radiolucency) are present other than a ditched margin, the dentist may choose to do nothing and reevaluate at a later date.

If posterior teeth with amalgam restorations exhibit recurrent caries in the root area, it may be reasonable to remove the existing restoration via an occlusal approach to gain access to the carious lesion. Such cavities are suitable for restoration with amalgam, because mechanical retention is easily produced and straight-line access for condensation is possible. However, care must be taken with matrix placement and adaptation. A proximal wedge should be used and, because of the tooth's long clinical crown, the matrix may have to be adapted further by the use of softened brown stick compound forced into the proximal area. If an occlusal approach is deemed too destructive, an
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approach can be made from the facial or lingual aspect via a slot preparation. This slot preparation is then best restored with glass-ionomer cement as previously described.

Tooth fracture

Elderly patients commonly suffer tooth fracture without trauma. Fracture may range from chipping of the incisal edge of an anterior tooth to loss of a cusp from a posterior tooth to complete loss of the clinical crown of a tooth. Excluding acute external trauma, the factors responsible for tooth fracture are related to age changes in the dental tissues, the effect of previous restorations and caries, and occlusal disharmonies. Clinical observation suggests that the incidence of tooth fracture is increasing as people retain their teeth for longer periods. It is now felt, with justification, that teeth need not be lost as the patient ages. This change in the pattern of dental disease places more responsibility on the clinician to create restorations that do not predispose the teeth or supporting structures to failure.

Restoration of fractured teeth in the elderly involves some special considerations, especially in regard to pins and occlusion. The introduction of self-threading pins has made the use of pins relatively straightforward and common. However, these pins create stresses within tooth structure. Dentin in the elderly has increased brittleness, and pins must be used with extreme caution and in minimal quantity (maximum of one pin per missing cusp). Strenuous attempts must be made to produce maximal retention and resistance form through such features as boxes and grooves. When teeth are particularly brittle or weakened, pins should be avoided. In the case of endodontically treated teeth the root canal area should be used to gain retention. When pin retention is unavoidable in brittle teeth, cemented pins, which do not create installation stresses, should be used.

Selection of the appropriately sized pin is important. Most elderly patients show increased clinical crown length, so the most likely area in which to place pins often lies at or apical to the cementoenamel junction. There is only a small bulk of dentin between the periodontal ligament and the root canal of the tooth in this area, so pins of smaller diameter must be used to avoid periodontal or pulpal perforation. A pin of approximately 0.6 mm is suitable for most posterior teeth.

Occlusion

Occlusal considerations are very important to the success of restorations. The forces produced by mastication are sufficient to fracture even the strongest available restorative material. Heavy contacts on closing or in excursive movements of the mandible cause fracture. Natural dentition should demonstrate multiple, even contacts between the posterior teeth when the patient closes. In a protrusive movement, the posterior teeth should separate. In lateral excursions of the mandible, non-working-side contacts (interferences) should not exist. Following these basic principles reduces tooth and restoration fracture. In the elderly, it is common to see an opposing cusp that is overerupted relative to the occlusal plane of the arch. Such "plunger cusps" are frequent causes of non-working-side interferences and should be aggressively reduced. This reduction not only eliminates occlusal interferences but also allows an increased bulk of material to be incorporated into an opposing restoration.

Tooth wear

The problem of tooth wear in the elderly dentition may require certain preventive and restorative considerations. Wear that is slight in proportion to the patient's age and is not causing any symptoms requires no active treatment. However, the patient should be examined at recall appointments to determine whether any significant change has taken place. It is helpful to make impressions for study casts, which can be retained for comparisons at subsequent visits. Patients with slight to moderate wear can usually be managed in a relatively conservative manner. This may involve restorations (intracoronal or extracoronal) together with the provision of an occlusal splint to be worn at night to protect the teeth when clenching and grinding habits are involved. Such occlusal appliances must provide stable occlusal contacts for all opposing teeth so that no supraeruption occurs. Prevention of tooth wear is preferable to extensive treatment.

It is important that restorations themselves do not induce wear. Unfilled composite resins are considered unsuitable for the restoration of occlusal surfaces of posterior teeth, because they abrade rapidly. Macr

filled resins exhibit much better wear characteristics, but occlusal surfaces should, whenever possible, be restored with metal. Porcelain is highly abrasive to opposing teeth and restorations. Amalgam or gold produce relatively little wear of each other or opposing tooth structure. In addition, laboratory waxing
techniques for cast-gold restorations permit greater accuracy of occlusal form than can generally be achieved with porcelain.

Elderly patients should routinely be assessed for the degree of tooth wear relative to their age. Attempts should be made to modify parafunctional habits or improper tooth-brushing techniques (horizontal “scrubbing” methods), which will cause advanced tooth wear.

Cast restorations

Cast restorations are often the treatment of choice for elderly patients. For some, this may be the finest service the dentist can provide. Nothing provides as much protection for remaining tooth structure as a cast metal veneer. This is especially important for endodontically treated teeth, which may have been retained to avoid the need for a prosthetic replacement, to avoid the difficulties of a distal extension removable partial denture, or to provide the foundation for an overdenture. All such endodontically treated teeth should receive restorations that provide cuspal coverage, and these restorations should be castings. The margins of cast restorations should, wherever possible, lie clear of the gingival tissues. If margins are placed close to the marginal gingiva, particular care must be taken to produce correct or somewhat flattened axial contours to allow the patient good access for plaque control. In addition, periodontal health demands that preparations and castings be confluent with such features as furcations and root grooves.

Management of missing teeth

Management of missing teeth in the elderly often requires some type of denture service, because of compromising factors such as periodontal health, tolerance of dental procedures, systemic health, and ability to pay. In many instances, fixed prosthodontics and/or implants may be used. In these cases, the same principles that are used for younger patients are employed because proper case selection has assured a predictable response. Implants in the elderly require an extra 3 to 4 months for osseointegration to take place.

Partial denture design for the elderly should meet the following requirements: (1) replacement of teeth should be as near as possible to the position of their natural predecessors, (2) the existing intercuspal position of the mandible should be retained unless there is obvious harmful displacement of the mandible on closure to the intercuspal position, (3) coverage of marginal gingiva by the denture base should be avoided, and (4) muscle adaptability to the prosthesis must be facilitated by proper contour of the denture base. The design itself remains orthodox except that wrought wire retainers are often used instead of cast metal. Stainless steel is often used and the length of the retainer is increased by incorporation of a double coil where the wire emerges from the acrylic resin base. This increases flexibility. Acrylic resin bases are preferred to cast metal to ease the achievement of extension into areas of displaceable mucosa and fixation of wrought retainers. Acrylic resin is also faster and easier to work with, less expensive, and amenable to repair or alteration.

There are some unique partial denture designs that may help to solve the special problems in some elderly patients. The “two-part” denture was first described more than 30 years ago. This type of design provides comfort and stability where tilted teeth adjacent to the saddle area make denture insertion difficult. The teeth are set in their desired positions with a space of at least 5 mm between their necks and the supporting mucosa. This part of the denture, including retainers and other saddle areas, is then processed and completed. The gingival support segment is then manufactured separately so that its path of insertion is from the facial aspect. The facial insert is placed first, followed by the remainder of the denture, which is inserted from the occlusal direction. The two segments then lock together via a hinge mechanism that permits slight movement between the two parts. Care must be taken to avoid loss of the insert, and it is advisable to make a spare.

The “locking denture” uses the locking principal to join a two-part denture on a hinge running between the abutment teeth. A metal tube is processed into the main part of the denture and a sliding bolt is incorporated into the rotating facial insert. The technique has proved successful as long as the patient can manage the bolt (the patient’s fingers must still have adequate dexterity and mobility).

The “rotational-path-of-insertion” denture consists of a cast-metal framework with an angle of insertion at an axis of rotation that is determined by a surveyor and usually is in the anterior region. The casting is then rotated to place, where a minor connector engages the undercut below the survey line and provides retention. Advantages include the utilization of proximal undercuts, a reduction in the number and display of retainers, and less exposed surface for plaque deposit.
The “every denture” is a denture of simple design that has no retainers but conforms strictly to certain principles for retention and soft tissue coverage.\textsuperscript{10,22} Retention is derived from secure contact between the denture teeth and abutment teeth at their greatest convexities. A surveyor analysis of the cast is important to develop a design wherein (1) short lengths of steel wire inserted into the denture teeth adjacent to the abutment teeth at their greatest convexities maintain the security of the contact and (2) there is accuracy of adaptation of the denture base to the mucosa and there is no coverage of free gingival margins around natural teeth. This denture is best suited for the maxillary arch, where a post-palatal seal can be achieved.

Overdentures rest on two or more prepared root surfaces, usually rounded but not necessarily covered by metal, and almost always receiving endodontic therapy.\textsuperscript{21} Overdentures should always be considered in the mandible, where loss of all remaining teeth can create the “floating lower denture.” The retention of a few teeth, even those treated with endodontics and that have lost their clinical crowns, gives the patient a degree of security derived from proprioception through the periodontal membrane receptors and from maintenance of residual alveolar ridge around and between abutment teeth.

Four factors critical to success of overdenture abutments are periodontal health, caries activity, endodontic prognosis, and position of the roots within the arch. Periodontal health implies at least 6 mm of healthy bone around the roots, minimal pocket depth (no more than 4 mm), and proper home care (not always assured in the elderly).\textsuperscript{21} Caries activity should be minimal or arrested. Endodontic prognosis is based on the ability to achieve proper fill and seal in teeth that may have calcified pulp chambers and root canals. The roots to be retained should be sandwiched between two solid plates of cortical bone (roots with obvious dehiscence should not be used). Abutment teeth should be selected carefully and retention of both mandibular canines is optimal. Incisors and premolars are seldom successful, but molars, especially if one is retained on each side of the arch, can be effective. A recent contribution to the retention of overdentures is the use of magnets via incorporation of separate parts into the denture base and within the abutment tooth.\textsuperscript{21,25}

The management of a prosthesis is made easier if the muscle activity required to support it is younger rather than older. This advice can be given to a 70-year-old patient, who is told that it will be easier to manage dentures now than 5 years down the road. This is especially true when the removal of teeth can be followed by the insertion of a “fixed” immediate denture in which the artificial teeth are placed in the position of their natural predecessors and where the denture is permanent.\textsuperscript{10} This operation is best limited to the maxillary incisor and canine teeth.

After standard procedures for the construction of an immediate denture have been completed, the teeth are extracted. The incisal and lingual cortical plate of bone is collapsed against the lingual plate. Resorbable sutures are placed to permit healing by first intention. Postoperative swelling will provide a close fit between denture and tissue. New bone is subsequently deposited from the cortical plate inward and the denture remains closely fitted. The operation is not indicated in the mandibular arch, where both labial and lingual cortical plates are thicker and will not fracture in the same manner as will the maxillary bone. This type of denture is successful because the muscles of the lips and tongue, acting in established patterns, will tend to stabilize the artificial teeth because they are in the same position as the predecessors.

Complete dentures for the elderly retain the basic principles of construction, but demand some special considerations. Patients should be made aware that there are real problems in their mouths and cautioned not to be too optimistic. Flat or flabby ridges (support problems) should be demonstrated and habits should be considered. Radiographs of both residual ridges should be shown to the patient, and retained roots, exposed nerves, residual infection, or unevenness should be indicated. Improved appearance and comfortable eating are the chief expectations of the patient and these must form the clinical requirements.\textsuperscript{10,21,26} The function of comfortable eating requires posterior teeth with cusps that meet in balanced contact on closure and are free from interfering contacts during lateral and protrusive gliding movements. If this can be performed bilaterally, mastication can often be fully restored to the patient’s satisfaction (the patient will be unaware of the teeth when the mouth is open and the teeth will be effective shredders and grinders when food is eaten). The skill of providing balanced occlusion and free articulation while retaining opposing cusps and fossae is not easily achieved (proper use of the rules of occlusal adjustment). Cusps are often flattened in attempts to create balance; this will result in food being squashed without penetration so that mastication is impaired. Balanced occlusion and free
articulation are also important because they allow equal force to be directed on both sides of the supporting residual ridges, giving greater stability and retention to the dentures. They also prevent the development of parafunctional habits. These habits are very damaging to teeth, muscles, joints, and tissues that support denture bases. Cuspal interferences promote clenching in denture wearers.\(^{27}\) It is not always necessary to supply 28 teeth. Many patients have managed with fewer in their natural dentition, so why should 28 teeth suddenly be taking up space where the tongue had previously been free to move? Consideration should be given to omitting the second molars. This makes protrusive balance easier to achieve, and the tongue will be given more freedom and greater ability to extend on top of the mandibular denture, aiding stability.\(^{21}\)

The patient should be warned that new dentures are like new shoes and will require a period of adjustment (the length of the adjustment period is highly variable and depends on the patient). The patient should also be advised on the proper use and care of dentures (both written and oral). Unfortunately, these instructions are often overlooked. The most salient points are: (1) cut food into small pieces; (2) place the food under the tongue and let it get wet with saliva; (3) divide the food into equal portions and load both sides; (4) use the cheeks and sides of the tongue to keep the food loaded on the back teeth; (5) eat on both sides at the same time; (6) chop, rather than chew, on the back teeth; (7) avoid letting the teeth touch while eating; (8) close on the teeth only to swallow; (9) when not eating, keep the teeth apart; (10) keep the tip of the tongue touching the backs of the mandibular front teeth at all possible times and especially when eating; and (11) remove the dentures at night and keep them in a cleansing solution.

Denture hygiene deserves special consideration. Dentures with base metal retainers or connectors and/or with wrought wire clasps should not be immersed in any harsh proprietary cleansers. There have been numerous reports of adverse reaction and alteration of physical properties of the metal.\(^{28}\) There is also evidence of the deleterious effects of these preparations on acrylic resin denture bases.\(^{29}\) A safe and effective solution can be made with distilled water and sodium hypochlorite (2.0%). A recently developed denture soak solution (Oral Safe, Great Lakes Orthodontic Laboratories) that uses benzoic acid as the active ingredient has also been shown to be safe and effective.\(^{28}\) Dentures steeped in these solutions overnight will remain clean and calculus free. An ultrasonic cleaning bath will also help to remove heavy deposits, if patients can bring or send their dentures to the office.

The last thing that should be mentioned about denture service for the elderly is the problem of unsatisfactory dentures. This is the most common problem expressed by elderly patients consulting a new dentist.\(^{26}\) Patients should be allowed to describe the problem in their own words. The objective is to then determine whether the cause of the trouble is one of support (condition of the denture-bearing tissues), retention (fit of the denture bases and clasps), stability (fit of the dentures during function), or appearance. There is usually more than one problem.

The examination should begin before the dentures are removed. An assessment is made of the appearance while the patient is smiling and speaking. Displacement of the dentures or unfavorable forces that are being exerted by the tongue, lips, or cheeks on the denture surfaces should be noted. Vertical dimensions (occlusion and rest positions), interocclusal rest space, and centric relation are evaluated. The borders of the dentures are examined for contact with displaceable mucosa and for proper extension. Then the dentures are removed and the residual ridges are checked for soreness and problems of support.

For the elderly population, many faulty dentures can be improved by adjustments to borders, occlusion, and tooth and denture base surfaces.\(^{10,15,21,26}\) Retention can normally be improved by adding to the borders of denture bases without altering the fitting (supporting) surfaces. The border areas most likely to benefit from these additions are the "vibrating line" in the maxillary denture and the anterior-posterior lingual and retromolar pad areas in the mandibular denture. A fast-setting acrylic resin is best suited for this application. Appearance can be improved by thinning or shortening the teeth (pre-extraction photographs may prove helpful). Stability can be improved through occlusal adjustment and reshaping of the muscle (polished) surfaces of the dentures. Reshaping of the polished surfaces of the denture base deserves special consideration. In elderly patients whose muscle activities have deteriorated, these surfaces act as levers for displacement. Creation of hollows or concavities can aid stability by engaging certain muscles and structures: (1) the orbicularis oris muscles above and below the lips, (2) the modiolus muscles opposite the mandibular canines and premolars, (3) the triangularis muscles opposite the maxillary premolars, (4) the buccinator muscles.
above and below the necks of the maxillary and mandibular posterior teeth, and (5) the tongue on the lingual aspect of the retromylohyoid area, the lingual surfaces of the mandibular incisors, and the palatal-cervical aspect of the maxillary posterior teeth and denture base.

There are times when it is necessary to reline a denture with a soft lining. Well-fitting acrylic resin bases can cause bruising to mucosa supported by sharp residual ridges (in spite of balanced occlusion and free articulation). A softer base material may be indicated if surgery is not an option. Existing soft lining materials may be classified as silicone elastomers and soft acrylic resins. Soft acrylic resin consists of a polymer powder (usually polyethyl methacrylate) and a monomer liquid with a phthalate plasticizer. While such materials have good adhesion to hard methacrylate, they tend to have poor elastic properties and harden rapidly because the plasticizer leaches out. Silicone soft liners polymerize at room temperature and have good elastic properties but adhesion to the methacrylate is poor. They also tend to deteriorate in the mouth and support the growth of Candida albicans. Therefore, there is a need to confer good adhesion on silicone polymers or use a soft acrylic resin with a nonleachable plasticizer. Any of the commercially available branched silicone polymers with methacrylate groups are a good compromise. They react with the methacrylate polymer and adhere to it. Work has been done on polymerizable plasticizers and a powdered elastomer with a higher molecular weight methacrylate ester has been developed. This obviates the need for an external plasticizer, and the material has responded favorably to peeling, shearing, and tearing tests.

Soft linings are not as soft as some patients would like nor as well retained as some would expect. They also tend to harbor food debris and odors. However, they do provide comfort to many elderly mouths. Care must be taken to remove enough of the existing denture base to allow for adequate thickness of the relining material. Care must be taken not to alter the occlusion while the procedure is performed.

Summary

Many geriatric patients have complex dental problems and compromising factors involved in their dental needs. They naturally wish to maintain and restore a youthful appearance and may demand dentistry more suited to the middle aged. Dentists may find that their appointment books are full enough without having to care for this neglected population. Some of these patients give up the struggle of trying to find a dentist who will care for them and accept limited oral function as part of becoming old. Others are tireless in their quest for improved eating efficiency, comfort, and appearance. These factors are so important to survival and morale that the needs of the elderly must be served.

References

Bonded Ceramic Inlays
Jean-François Roulet and Stefan Herder

Ceramic inlays have become an important treatment modality in modern dental practice because of the increasing demand for esthetic posterior restorations and the evolution of more complex ceramic systems. This book serves as both textbook and manual to present important principles and procedures on the adhesive technique used with ceramic inlays. The first part covers the scientific fundamentals of the dental materials used in the ceramic inlay technique and forms the theoretical base on which the subsequent procedures are built. The second part of the book describes the techniques necessary to produce and seat a glass-ceramic inlay. Preparation and impression techniques can be used for all ceramic inlay systems and so can the adhesive technique. Bonded Ceramic Inlays should be required reading for any student, dental laboratory technician, or dentist who gains satisfaction and pride from esthetics and precision in creating posterior restorations.

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