



Research Signpost
37/661 (2), Fort P.O.
Trivandrum-695 023
Kerala, India

Oral Health of the Elderly, 2012: 73-84 ISBN: 978-81-308-0501-6
Editor: Juliana O. Taiwo

5. Advanced restorations in the elderly

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Introduction

Elderly patients have diminished tolerance to complex restorative care. Whenever possible, a simple less stressful restoration that relieves the patient's symptoms and provides effective masticatory function may be all that is needed in elderly patients, instead of advanced complex prosthodontic restorations. Heroic treatments, that may ultimately threaten the preservation of remaining sound teeth, should be avoided. However, certain conditions may necessitate the provision of crowns and bridges, and other fixed restorations such as ceramic veneers, onlays/inlays and dental implants for an elderly patient. Furthermore, maintenance and repair of some fixed restorations that were placed when the patients were younger may also be a service needed from time to time.

Indications for fixed restorations (Carral & Troupel, 1970)

Crowns

1. Badly broken down teeth:- usually these teeth would have been restored previously, and may have suffered secondary caries or part of the tooth or the restoration may have broken off.

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2. Tooth wear lesions:-Extensive attrition in the elderly is common and may require full coverage.
3. Primary trauma to a tooth in which the pulps are unaffected.
4. Restoration of root-filled posterior teeth in which a significant amount of tooth structure is missing.
5. As part of another restoration: crowns serve as retainers in bridge work.
6. Cracked tooth syndrome: extensive cuspal fracture may require full coverage.

Contraindications

High caries rate: In the elderly, root caries is commoner than coronal caries. Patients who are predisposed to developing root caries are not suitable candidates for advanced prostheses.

Poor periodontal support: Uncontrolled moderate or advanced periodontal diseases are considered as contraindications for advanced restorative care because further breakdown may jeopardize any restorative treatment. Adequate periodontal assessment should be done; periodontal depth around a tooth to be crowned should be measured, gingival inflammation, tooth mobility, tenderness to percussion, pain/sensitivity should all be noted. Cigarette smoking is a major factor in periodontitis and cessation is strongly advised.

Teeth with short clinical crowns either arising naturally or due to severe attrition: It is very difficult to construct a crown on a shortened tooth without clinical crown lengthening surgery or subgingival placement of the crown margins.

Teeth with increased clinical crown due to gross gingival recession (which is very common among the elderly) or periodontal surgery.

In a patient that cannot be motivated to maintain good oral hygiene and generally uncooperative patients.

Other factors to consider when a tooth is to be prepared for a crown

Occlusal assessment

In many of the elderly, there may have been occlusal disharmony due to unreplaced tooth loss over the years and/or occlusal collapse due to extensive tooth wear especially on posterior teeth resulting in reduced occlusal vertical dimension. If there is less than 1mm of clearance, an onlay or a crown with a metal occlusal surface should be considered. The occlusal force to be borne by the restoration during function should also be considered.

Length of the clinical crown

Teeth with short clinical crowns either arising naturally or due to severe attrition may have to be given special consideration. If the length of clinical crown is short, the retention of the prosthesis to the prepared tooth will be poor after the tooth preparation. However, if the occlusal consideration is adequate even in spite of short clinical crown, retention may be increased by creation of slots, use of pins, dovetails etc. It is very difficult to construct a crown on a shortened tooth without clinical crown lengthening surgery or subgingival placement of the crown margins. Furthermore, placement of the margin of the crown close to the gingivae may be very difficult if not impossible, due to gingiva recession. However a satisfactory appearance may be obtained by placing the crown margin at cement-enamel junction. Also, periodontal disease in this age group may shorten the anticipated life of a crowned tooth (Leslie et al; 1995).

Pulpal and periapical assessment

Periapical radiographs can be useful in screening for evidence of periapical change and to assess existing root fillings. Vitality test should be undertaken of any teeth which are being considered to support crowns or bridges.

Veneers in the elderly

A veneer is a thin layer of restorative material placed over a tooth surface, either to improve the aesthetics of a tooth or to protect a damaged tooth surface. There are two main types of material used to fabricate a veneer, composite and dental porcelain. However metal veneers can be placed over the palatal surfaces of worn dentition in the elderly. A composite veneer may be fabricated directly by the clinician or indirectly in the dental laboratory by a technician and later bonded to the tooth, using resin cement such as Panavia. A Porcelain veneer can only be indirectly fabricated. If only the palatal surfaces are worn, palatal veneers fabricated in metal/porcelain can be used.

Indications

The general indications for veneers are;

They are used to mask intrinsic stains or surface defects as seen in tetracycline/fluorotic stains, enamel hypoplasia etc.

Multiple veneers can be used to close spaces.

To lengthen teeth that have been shortened by wear, to provide a uniform colour, shape and symmetry and make the teeth appear straight.

Anatomically malformed teeth.

Trauma to anterior teeth resulting in fracture.

Esthetically compromised anterior teeth.

Indicated when sufficient enamel is available for bonding.

Contraindications for Porcelain Veneers:

Severely rotated or overlapped.

Gross loss of substantial amounts of tooth structure.

Gross loss of labial enamel.

Occlusal disharmonies, parafunction/severe attrition.

Severely discolored teeth.

Periodontal disease.

Teeth with existing large restorations.

Advantages of Porcelain Veneers

It is painless. There's usually only minor drilling involved, so there is no need for a local anesthesia.

Esthetic stability.

It cost a lot less than crowns.

It is stronger and more stable than composite resin veneers.

It mimics the natural translucency.

Disadvantages of Porcelain Veneers

Bonding treatment doesn't last as long as crowns.

It is more expensive than composite and longer time spent.

It is technique sensitive.

Advantages of Composite Veneers

Single visit procedure.

Repair potential.

Chairside control of anatomy.

Minimal irreversible loss of tooth structure- more conservative prep

Disadvantages of composite Veneers

Tends to discolor.

Wear out more quickly.
Often require repair or replacement.
Marginal staining.

Preparation techniques for veneers;

- i. No preparation
- ii. Minimal preparation

No preparation ceramic veneers: latest technique to emerge
Advantages

- a. No anesthesia is required.
- b. Less patient fear because no local anesthesia, no drilling.
- c. Highly conservative.
- d. Possibility of reversal.

Disadvantages

- a. Overcontoured appearance.
- b. Possible need for more veneers.
- c. Opaque monotone appearance.
- d. Limited translucency.
- e. Possible overcontouring of margins and inadvertent alteration of occlusion.

Palatal veneers (Chadwick RG and Linklater KI, 2004)

These are used for the management of tooth wear that is mainly affecting the palatal surfaces of upper anterior teeth. Tooth wear of this kind can often be due to acid erosion and can occur in illnesses such as bulimia and acid reflux. It is vital that the cause of the tooth wear is diagnosed and treated effectively before treatments such as palatal veneers are provided. Palatal veneers are often constructed in gold but can also be made from both porcelain and composite.

Replacing missing teeth in the elderly

Elderly people frequently encounter the problem of tooth loss, affecting their quality of life. Functional and esthetic replacement of missing teeth should therefore form an important aspect of oral care in an elderly. The options available for the replacement of the missing teeth are a removable

partial denture, tooth supported fixed partial denture and implant retained prosthesis. The selection of an appropriate prosthesis for a particular case will depend on biomechanical, periodontal aesthetic and financial factors.

In some cases however, simple restorative procedures may be more beneficial to the elderly than a more technical idealized treatment. In other cases, no replacement option may be considered. No replacement option is considered in the elderly if the masticatory function or esthetics is not compromised or the structural integrity of the dental arch is not so badly affected. Occasionally, the patient does not see the need to fill an edentulous space.

The indications for fixed prostheses are listed below (Shillingburg et al 1997);

1. Short straight edentulous span.
2. Periodontally sound abutment teeth.
3. Heavily restored abutments that require crowning.
4. Adequate length of clinical crown
5. Highly motivated patients with good OH
6. Low caries risk.
7. Mandibular tori.
8. Unfavorable attitude toward removable partial denture
9. Affordability
10. Patient's wish.

Contraindications

1. Xerostomia resulting in increased caries risk.
2. Long edentulous span.
3. Bruxism.
4. Poor oral hygiene.

Providing a bridge for an elderly patient may require very critical assessment of the indications for such prosthesis. Some specific problems of the elderly such as gingival recession, poor status of the abutment, dry mouth resulting from different causes, may make the restorative dentist think twice before providing such prosthesis.

Dental implants in the elderly

A dental implant is a device specially designed and put in place surgically within or on the mandibular or maxillary bone as a means of resistance to displacement of dental prostheses. It can be trans-gingival or fully embedded under the gingival so that it acts to support the removable prostheses.



A 70 year old patient with teeth 31 and 41 missing and periodontally weak teeth 32 and 42.



Missing teeth replaced with a six unit porcelain fused to metal bridge in the patient.

Osseointegrated implants were developed by Branemark (Branemark 1969). These implants are said to have a direct structural and functional connection between ordered living bone and the surface of the load carrying implant.

Advantages of implants

1. Better retention and stability when compared with a fixed prosthesis such as a bridge.
2. Better load transfer, masticatory load is transmitted directly to the alveolar bone like in normal teeth. It is therefore less destructive to periodontal tissues, particularly the alveolar bone.

3. It is less destructive to tooth tissue (unlike in crown preparation where the abutments have to be prepared) especially in situations where an edentulous zone is surrounded by unrestored adjacent teeth.
4. It occupies less space because it occupies the space where the missing tooth was.
5. Better support because the load is transmitted directly down the implant i.e there is lack of functional stress imposed on the underlining mucosa.
6. Implants provide a natural emergence profile.
7. Preservation of bone- implants stimulates bone like a natural tooth thereby preventing progression of bone resorption.

Disadvantages of implants

1. It is quite expensive.
2. Requires expertise.
3. Cannot be used in medically compromised patients who cannot undergo surgery.

Indications for implantology

1. To improve retention of removable prostheses e.g full-full denture patients with difficulty in wearing dentures (the elderly) such as in;
 - a) Patients with poor oral muscular coordination.
 - b) Low tissue tolerance in which there is more alveolar mucosa than the attached gingival.
 - c) Parafunctional habits that compromise prosthesis stability.
 - d) Unrealistic patients' expectation for complete denture.
 - e) Hyperactive gag reflexes.
2. Improvement of retention in partially edentulous patients with a history of difficulty in wearing removable partial denture, especially in the lower jaw.
3. Patients with missing dentition requiring a long span fixed partial denture.
4. For retention of maxillofacial prosthesis and obturators especially when so much of the tissue is lost. Implants now go into the maxilla so that such obturators will be retained carrying the whole upper teeth.

5. In Kennedy class 1 or 11 edentulous ridge
6. Single tooth replacement.

Contraindications to implant placement in the elderly are;

Absolute:

Uncontrolled diabetic mellitus
Psychosis leading to unrealistic expectations
Patient undergoing renal dialysis
Drug and alcohol abuse.

Relative:

Systemic hematological disorders.
Irradiation of the jaws.
Osteoporosis/low bone mineral content.
Liver/ kidney disorders.

Outline of Procedure (Richard Johns, 1994)

Assessment

A careful assessment must be made of the texture and volume of bone available. This is perhaps the cornerstone of the procedure and demands skill and experience.

Preparation of implant site

When the mucoperiosteal flap has been raised, the intrabony implant site must be delicately prepared, particular attention being made to keeping the temperature of the bone below that which would interfere with healing process.

Placement of implant

A commercially pure titanium implant must be used, the surface oxide layer of which is uncontaminated by any other metal or by protein. The first "contaminant" of the oxide layer must be patient's own blood. The implant must exert some pressure on the bone into which it is placed but, initially must not be subjected to functional loading. The length of time allowed for osseointegration, following this first surgical phase of the procedure will vary according to the character of the bone. Four months period is allowed for



A



B

A - Periapical radiograph showing missing tooth 11 in a 74 year old patient.
 B- Periapical radiograph showing implant and abutment in space of tooth 11.



Clinical picture of the 74 year old patient with implant in place in preparation for implant retained crown replacing tooth 11.



Tooth replaced with implant retained crown.

lower jaw and six months in the upper. During this period, no more than a minimal load should be exerted on the implant by any denture that may be resting upon the overlying mucosa.

Exposure of the implant and connection of an abutment

The second surgical phase of the procedure is the exposure of the osseointegrated implants and the attachment of an abutment. This established a permanent connection between the mouth and the underlying bone. It is on this abutment that a prosthesis may now be attached.

Provision of the prosthesis

Following removal of the sutures at the beginning of the second surgical phase, construction of the prosthesis may be started. The design of the prosthesis must take account of the length of each implant and the character of the bone in which it is placed.

Requirement for success

1. High level of oral hygiene
2. Co-operation of the patient
3. Good health

Factors responsible for implant failure are infection, overheating of the bone, habitual smoking, systemic disease especially uncontrolled diabetes mellitus, transmucosal overloading and excessive surgical trauma.

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