OVER DENTURES

The dental profession has expanded the preventive dentistry concepts into prosthodontics to bring about the prescription called “The Overdenture”. It is further buttressed by the fact that the alveolar bone with its overlying mucosa was never intended to receive the full force of a complete denture. So then, what is an over denture.

i) A complete or removable partial denture that covers and rests on one or more remaining natural teeth or roots.

(OR)

ii) A prosthesis that covers and is partially supported by natural teeth, tooth roots or dental implants.

(OR)

iii) A prosthesis covering the occlusal surfaces of the teeth

(OR)

iv) The overlay of artificial teeth on the surface of natural teeth to improve occlusion, arch form and/or esthetics – super imposed prosthesis.

SYNONYMS
Rational for the over denture concept.

Extraction of all natural dentition and replacement with a simple denture is not the most desirable treatment. Preventive prosthodontics emphasizes the importance of any procedure that can delay or eliminate further prosthodontics problems. The over denture is a logical method for the dental to use in preventive prosthodontics.

The sequelae after the extraction of all the teeth make complete denture progressively less effective. Among these sequelae are

a) The loss of discrete teeth proprioception

b) The progressive loss alveolar bone

c) The transfer of all occlusal forces from the teeth is the oral mucosa.

From a physiologic viewpoint the roots provide not only periodontal ligament support but also

a) Directional sensitivity
b) Tactile sensitivity to load

c) Dimensional discrimination

d) Capine response

e) Proprioception and salivary secretion

f) Decreased perception in older individuals

Manly and associates observed that the mean minimal threshold for detection of load was approximately 1 gm. For the incisal surface of natural anterior tooth in axial direction where as it was 8 to 10 gms on the occlusal surface of the 1st molar. Of the eight denture wearers tested for animal load threshold to forces applied to the occlusal surface of the 1st premolar of the mandibular denture, five were insensitive to a force of 125 gm two reacted to 80gm. And one reacted to 50gm. Therefore the average threshold for denture wearer was more than a hundred times that for an anterior natural the. The retention o natural teeth for an over denture preserves some of the sensory inputs from the periodontal receptors which is more precise than that is obtained from the oral mucosa.

Kawamura (1964) Grossman (1964) and Grossman and associates (1965) agreed that the sensitivity in the anterior part of the mouth, particulary the periodontal ligament of the anterior teeth, tongue tip and mucosa was acute. Nishiyama and others discovered that patients judgement of the loaded tooth in
localizing the stimulated tooth was better among anterior teeth than among posterior teeth. Though studies indicate that the natural anterior teeth exhibit more sensitivity and discrimination than posterior teeth, posterior teeth also should be retained for over dentures when feasible.

In comparing the dimensional perception, patients with natural dention could discriminate difference at the 2mm range better than those with artificial dentures. Manly and associates (1952) graded quantities of calcium carbonate suspended is bland pudding in various percentage. Almost all patients with natural dentition would detect 2.9% CaCoa or less while the majority of denture patients required more than 9 X CaCo3 for detection. Those findings emphasized the importance of conservative procedures and importance of the retention of natural teeth.

Studies of canine response indicate that canine may be the most important proprioceptive teeth with significant sensory activity and land support to their retention of over denture. Some lateral forces are transmitted by the over denture is the supporting tooth. It has been shown that teeth are more sensitive to lateral forces than those in long axis Alder (1947) This finding reinforces the importance of directional sensitivity.

Kapar & Collister (1970) in their studies concluded that the periodontal receptors played an indirect role in satisfactory salivary reflex by regulating the range and type of the satisfactory stroke. The muscle activity determined by
this masticatory stroke controlled the parotid gland secretion during mastication. The majority of natural teeth used to support over denture are devitalised and treated endodontically perceptual studies showed that vital and devitalised teeth have equal sensory input capabilities. Rannam found that after removal of all but a small portion of the root and extremely light pressure on the remaining portion still gave a neural response.

Perceptive ability appears to decrease with age the Donald & August (1970) found that he ability to identify forms in the mouth remained stable in young adults and the decreased with age. Use of the over denture is an attempt to retain every possible sensory element at the time the patient may experience a generalized decrease in sensory capacity. Rissin and co-workers (1978) compared masticatory performance in patients with natural dentition. Complete denture and over denture. They found that the over denture patients had a chewing efficiency one third higher than the complete denture patients.

Crum and Rooney (1975) in a 5 years study found that the retention of mandibular canines for over denture led to the preservation of alveolar bone using. Comparative cephalometric radiographs and study costs they found an average of .6 mm vertical loss of alveolar bone in the anterior part of the mandible in the over denture patients. The same in case of mandibular conventional denture was an average of 5.2mm (or) 8 times as much bone loss as in patients with over denture. It was also observed that the use of the over denture preserved the alveolar bone between canines in both height and width. The over denture patient also exhibited less alveolar bone loss in the area
immediately posterior to the canines. The study showed the presence of roots of the teeth in the alveolar bone was important for its preservation.

GOAL OF THE RATIONALE:

1) Maintains teeth as part of the residual ridge

2) Reduced rate of resorption

3) Increased in manipulative skills of handing the dentures

INDICATIONS

It may be of partial or complete type,

1) For patients who face the loss of the remaining natural adult dentition. Therefore younger the patient greater the indication.

2) Causes where the retention is difficult to obtain.

   a) Xerostomia or sialorrhea

   b) Absence of alveolar residual ridge
c) Loss of maxilla and partial loss of mandible

d) Cognetial deformity leg cleft palate

3) For patients with a poor prognosis for complete dentures.

a) High palatal vault and ridge slope

b) Poorly defined sublingual fold space

c) In class III tongue position

d) Knife edged ridge that will provide inadequate support.

4) When pronounced vertical overlap of the anterior teeth is required to produce good esthetic results.

5) Unilateral over denture can be given to provide a good function and esthetics a large amount of bone and soft tissue have been lost on one side of the arch.

6) Patients with badly worn out teeth.

7) When complete denture will be opposed by retained mandibular anterior teeth preventing (combination syndrome).
8) Thexapeutics in the form of insitu irradiation (Mobermott & Rosenberg (1963)

CONTRA INDICATIONS

a) Un co-operative and under motivated patients who insists on removal of his remaining teeth. Any indication of patient who will not co-operate in oral hygiene and regular office procedures, require for adjustments which is required to maintain the remaining teeth and the supporting tissue in a state of health.

b) Psychologically some patients cannot accept any type of removable denture.

c) Mentally and physically handicapped patients for whom plaque control and good oral hygiene are difficult.

d) When a patient cannot economically afford.

Periodontal Consideration:

Periodontal inflammation, pocket formation, bony defects, and poor zone of attached gingiva must all be eliminated before commencing the treatment. The deleterious effect of the over denture on the periodontium can be minimized of the over denture on the periodontium can be minimized if one begins with an optimum state and the patient follows a meticulous home care programme with frequent recall.
A common periodontal requisite with over denture abutment teeth is that an adequate zone of attached gingiva is mandatory. This can be accomplished through periodontal surgery utilizing either a free gingival graft or apically repositioning a split thickness flap. This results in a band of attached gingiva adjacent to the abutment tooth.

The ideal teeth should present minimum mobility have acceptable bone support and amenable to periodontal therapy. It should be understood that the reduction of clinical crown root ratio will be favorable in reducing any existing mobility.

Contraindications for using periodontally involved teeth.

i) Class III mobility due to the loss of alveolar bone at cannot be corrected.

ii) Soft tissue and osseous defects which are not correctable by surgery.

iii) Failure to establish a sufficient zone of attached gingiva by mucogingival or grafting procedure.

iv) Excessive reduction of the adjacent residual alveolar ridge as a result of elimination of osseous defects for the establishment of normal architecture.

Endodontic Consideration
There are 3 main advantages of treating the abutment teeth endodontically.

i. The crown root ratio can be made more favourable.

ii. Reduction of the clinical crown provides an interocclusal distance more favourable for the placement of the artificial tooth in an esthetically acceptable position and in more favourable relation to the opposing teeth.

Careful evaluation of the possibility of F.P.D. of R.P.D. must be done. Since there are many disadvantages of an overdenture that can be easily avoided if F.P.D. of R.P.D. is utilized.

Contra indications for Endodontic Treatment:

i. Vertical fracture of the root (or) roots.

ii. Mechanical preparation of the root canal.

iii. Internal resorption that has perforated through the side of the root.

iv. Broken instrument in the root canal.

v. Horizontal fracture of the root below the bony crest.

Teeth that are grossly malposed will be difficult to use especially posterior teeth that are tilted more than 25°.

Single rooted teeth with only one canal that is easily negotiable are the best candidates although multirooted teeth can also be used. A2 to 4 week interval
before commencing further treatment on the tooth is helpful to determine endodontic complication if any.

Types of Over Denture

The type of overdenture depends primarily on the status of the patient’s dentition at the start of treatment.

1. Immediate Over Denture :

An immediate over denture is constructed for insertion immediately after the removal of some natural teeth of which many hopeless abutment teeth. Are, treated and the over denture is inserted as an immediate replacement. The immediate over denture modified as required. Can be worn for several years under favourable circumstances.

II. Transitional over / Additive denture :

A Transitional over denture is obtained by converting an existing removable partial denture to over denture.

III. Remote over denture :

A remove over denture is an over denture other than transitional or immediate. It is usually constructed for insertion at some time “remote” from the removal of hopeless. Natural teeth.

Classification:

Heartwel’s :
Based on the method of abutment preparation.

1. Non coping with simple tooth modification with endodontic treatment without endodontic treatment.

2. Coping.

3. Attachments


1. Non coping: (After endodontic treatment selected abutments are reduced to a coronal height of 2mm to 3mm and then contoured to a convex or dome shaped surface. Most teeth require endodontic therapy and the final step is prepared conservatively to receive an amalgam or composite restoration.

Without endodontic therapy: The remaining teeth are merely reshaped to eliminate undercuts and reduce the vertical height if necessary to create more inter-ridge space for the over denture. For these techniques to be possible, oral hygiene must be exquisite with a low caries index. This technique is often used in partially anodontic patients of minimal preparation prior to final impression which makes it totally reversible.

Abutment with cast coping: Cast metal coping with a dome shaped surface and chamfer finish line at the gingival margin are fabricated and cemented. There are 2 distinct types of copings:

1. The short coping, 2. The long coping
The short coping: These are 2 to 3mm long and normally require endodontic therapy since the required coronal tooth reduction would expose the pulp. Attached to the coping is a post, fitted to the canals. For this reason canals should be obturated with soft Gutta-Percha rather than metal points.

Long coping: These are normally 5 to 8mm long. An attempt is made to circumvent endodontic therapy by a conservative reduction with a cellsopidal shaped coronal coping and an increased crown root ratio which require greater level of osseous support. Adequate inter occlusal distance must exist to allow for encroaching on the available inter ridge space or a visualization of vertical dimension is liable to occur with poor esthetics and failure because of patient intolerance.

Abutments with Attachments:

Most attachments are secured to the abutment by a cast coping. The objective of any attachment is to improve retention of the denture base. Because of the factors like time, cost and risks the procedure should reserved for patient with a favourable prognosis. The attachment does not reduce the crown root ratio significantly as does the cast coping. Here the low caries index proper home care. Periodontal health and inter ridge distance are absolutely necessary.

Submerged vital roots: This is of current research interest, it attempts to obviate some basic problem associated with the more conventional over denture abutments. In these cases selected vital roots are transected and reduced to 2mm below the crestal bone and then covered by mucoperiosteal flap.
The major problem associated are development of dehiscences and pulpal pathosis. It is not recommended as it is still in a state of infancy. When this is done several advantages of the over denture are lost.

1. Support from direct contact of the denture base to the abutment tooth.

2. Attempts to gain retention from the teeth through some form of attachment is no longer possible.

3. The loss of proprioception.

Treatment planning:

This includes:


2. Periodontal condition.

3. Caries management.

4. Location and distribution of abutment.

5. Economics.

The 1st and 2nd conditions have already been discussed.

Caries management: The presence of high caries index and the situation that will create a carious environment are the devastating sequelae to improper over denture patient selection. Choice of abutment is teeth, that have a healthy clinical crown. Caries activity in a protected abutment is undesirable for
reasons other than the technical problems of restoration, an active caries process can lead to a recurrence in protected abutment teeth or gingival to the coping margin.

Frequent recall check up and treatment of the abutment with periodic fluoride application to insure against any further break down. 0.4 and Stannous Fluoride gel is brooted on abutment teeth for 1 minute once daily and expectorated.

Location and distribution of abutment:

1. Preference for anterior over posterior teeth therefore the alveolar ridge appears to be more vulnerable to reduction than the posterior alveolar ridge.

2. Two teeth in each quadrant presents an ideal situation in which stress is distributed, over a rectangular area. Eg : Cuspid 2nd premolar and/or 2nd molar in each quadrant.

The tripod is the next most favourable form for support and stability.

The use of two teeth in each arch or one tooth in one arch has met with satisfactory results.

Marrow recommends that it is better to use isolated teeth as abutments rather than adjacent teeth because they return to a state of good health more readily and are easier for the patient to maintain hygiene.

3. The upper anterior teeth should be retained if opposed by natural lower anterior teeth to prevent the destruction of the anterior ridge when utilized in a maxillary over denture.
4. Mandibular cuspids are most often utilized since they are usually the last tooth to be lost.

When we consider endodontics, especially on several teeth, the possibility of casts coping, internal attachments and the over denture itself, the cost of this mode of treatment may work cut to be costly. Therefore we should evaluate the situation as it exists. The teeth that already have been endodontically treated, teeth perhaps could be reduced without endodontics, single rooted than multirooted teeth, minimum number of teeth needed to achieve support and bone preservation should be kept to hold so that this form of treatment can be a viable alternative to conventional complete denture.

Advantge:

1. Preservation of alveolar bone.

2. Improved denture retention, stability and support.

3. Provides a vertical definite stop.

4. Physiological acceptances hence better patient co-operation.

5. Preservation of masticatory proprioception.

6. Fewer post insertion problems.

7. Convertability.

8. Harmony of arch form.

9. Ideal occlusion.
10. Open palate possible.

11. Less trauma is supporing tooth.

12. Esthetics.

13. Ease in construction and maintenance.

14. Low cost when compared to R.P.D.

Disadvantages:

1. Over denture treatment is more expensive than conventional denture because of periodontal and endodontic therapy and the subsequent restoration of teeth with gold coping.

2. Bulkier than F.P.D. (or) R.P.D.

3. If oral hygiene is not maintained properly caries and periodontal disease may still progress.

4. Bony under cuts may cause either over contouring or under containing of the denture.

5. Encroachment of inter occlusal distance.


7. In many cases, owing to lack of available space sections of the over denture base are quite thin. If metal reinforcement is not used, fracture of the base and prosthetic teeth is common.
An over denture that fulfils all of its specific requirements must also fulfill these requirements of any conventional denture. Therefore matters such as adequate tissue coverage, proper extension, of bases, law records. Harmonious occlusion and esthetics cannot be compensated because an over denture is being contracted. A sound prosthodontic approach to the appliance must always be carried out.

Over Denture Attachments

Attachments Classification.

I. According to shape, design and primary area of use.

Coronal :

a. Intra coronal.

b. Extra coronal

   i. Resilient.

   ii. Non resilient

Radicular :

a. Telescope stud attachments.

b. Bar attachments.

   i. Joints
ii. Units

Accessory: Auxiliary attachments

a. Screw units.

b. Pawl connectors.

c. Bolts.

d. Stabilizers/balancers.

e. Interlocks

f. Pins/screws.

g. Rests.

Magnets:

a. Permanent magnet.

b. Induced magnet.

c. Induced magnet.

d. Open field.

e. Cwsem field.

Extra Coronal                 Intra radicular
1. Gerber attachments
2. Dalbo attachment.
3. Ceka attachment
4. Rothermann attachment.
5. Infrofix attachment.
7. Quinlican attachment.
8. The compact unit (Priska)
9. Batesti units.
10. Conod unit.
11. Bacer and Fah units.
12. The 0-50 system
13. Howmedics and Inone units.
14. Whale don’t stud assembly.
15. Kurer stud attachment.
A mounted diagnostic casts is an important aid to check the space available before an attachment is selected.

Most of the stud types can be considered to be snap fasteners. Stud devices are simplates among all attachments. The male part of the unit consists of a stud shaped projection soldered to the diaphragm of a dovel retained restoration. The female part fits over the male unit and is embedded within the denture base of the prosthesis. There are a few systems which work in the reverse. Eg. Zest Anchor. A few studs are anteriorly riged (because the size makes it difficult to prevent a small amount of movement between the two components). In some springs are specifically incorporated to allow a controlled degree of movement.

Advantages:

Retention, stability and support.

A positive lock of certain units can maintain the border seal of the denture.

Selection of attachments:

The success of prosthesis usually depends on careful treatment planning and attention to the prosthodontic problems. The mechanical ingenuity of the attachment is important, but must take second place. The shape and size of the units is normally the over riding consideration although the auxiliary devices that accompany the attachment must influence the choice.

Correct vertical space assessment must be taken care of. Extra radicular stud attachments are relatively strong and can often provide more effective retention than their interradicular counter parts. Larger attachments are generally stronger than smaller ones and less prone to wear. Debate still continues as to
whether or not the comparatively rigid units should be selected as opposed to those that allow movement.

Mensor (1980) autotiny work by Fenner, Herber and Mabiemann (1950) has claimed rigid or cylindrical stud attachments produce no tipping action on the root. Ball and socket designs are stated to produce 4 times as much tipping potential.

A recent lab study by Thayer and Caputo (1980) employed photo-elastic stress analysis. They found that forces applied to a Dolder bar were resolved in an apical direction where as stud attachments engaging the dowel retained diaphragm might produce tipping potentials.

Leverage effect upon the root has also an effect on attachment selection. Mouth preparation, ease of rebasing and repair procedures also determine the type of stud attachment.

The number of stud attachment:

One stud attachment on each side of the arch will usually suffice other remaining roots can be covered with simple copings. Increased number of attachments in a denture does not produce a corresponding improvement in retention.

Popular attachment system:

A. Dalbo Stud Unit:

a. Ball and Socket.
b. Rigid Dalbo

Extremely popular of the design series, neatness strength, time tested.

Features: 4mm high with spherical shape male section, easy to clean. The fingers of the socket are surrounded by nylon rings. That simplifies adjustments. Adjustments are simple to carry out. Retention can be increased by altering free ends of lamellae.

Adjuncts:


B. The compact unit:

Height – 2.85 mm

Din of retention knob is 2.9mm

Divergence of 10° between the alignment of 2 attachment may be permitted without causing increased wear of male section. It was developed from the ancrofix.


Retention of both types of Gerber attachment is obtained by a retaining spring in the female unit engaging a peripheral groove in the male section. The spring clip may be removed for adjustment by unscrewing. The base of the female
unit using the special instrument provided. Both types of male unit screwed on to their soldering base and prevented from unscrewing with a little resin cement. They may be unscrewed in the mouth with a heated screw driver. Leaving exposed a screw thread projecting from the base of the attachment.

Gerber pointed out that if two or more teeth were used, the most distal attachment should allow more vertical play than the anterior ones, as it is likely that greater dispathc force would be applied to the molar surfaces of the prosthesis.

D. Ceka System:

1. Rigid

2. Resilient.

Rigid and Resilient designs share a common base. But the Ceka extracoronal units are not identical. Therefore it is not possible to change resilient for rigid constructions merely by changing, the retention portions. The vertical travel allowed by the resilient stud unit is 0.4mm. the retention pin or male section is screwed on to the base ring.

Anciliary instruments:

a. Locating device.

b. Adjustments device.

c. Changing attachments.
d. Repair and rebasing device.

Limiting factor is the vertical space required by the unit resulting in 5mm vertical space requirement for the attachment components.

As with all attachments systems their alignment with each other and the path of insertion of the prosthesis must be planned. The attachment base is soldered to the prepared flat surface of the coping. The spring pin or male section may be removed from its base, so this allows considerable versatility, since breakage of the pin is easily solved by removing it and replacing it with another unit. This is done by a special tool provided with which the spring pin is unscrewed. While the other end of the special tool may be used to increase the retention by means of the wedge shape instrument.

Rebasing techniques are quite straightforward and there is a locating dowel that engages the female section of the attachment before the impression is cast.

This removable spring pin (male section) is particularly useful when a duplicate denture is required, as it saves intraoral locating procedures which are difficult to carryout. The spring pins are unscrewed and special locating components with parallel sided tagging screwed down on the copings in the mouth. The master impression will now reproduce the parallel sided tagging. In the laboratory, identical components are slid into the impression leaving the screw threads projecting. The dummy screw base is now attached to the components in the impression and the impression is poured. Thus within the master cast includes dummy screw based identical in every respect to those in the mouth. Spring pins can now be placed on them and the duplicate denture constructed. On this cast with sure knowledge that is will fit accurately in the mouth.
E. Introfix is a solid cylinder attachment that can be used for fixed removable bridge work as well as for overdentures. It consists of 3 parts:

1. A solder bar that is common to the acrofix.

2. A replaceable and adjustable male friction part.

3. A female cylindrical housing.

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<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>1. Simple to use.</td>
<td>1. Paralleling necessary.</td>
</tr>
<tr>
<td>2. Components are replaceable and interchangeable with the solder base of the acrofix.</td>
<td>2. Processed in the lab.</td>
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<tr>
<td>3. The attachment provides good seating and retention.</td>
<td>3. Torqum potential is maximum if dentures base is not adapted properly.</td>
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<tr>
<td>4. Can be used in combination with resilient attachments.</td>
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<td>5. Service life is indefinite</td>
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E. Schubiger

Consists of a short screw block for bar fixation a larger one for fixed removable bridge work and an individual cap core system.

Over denture attachments has 3 parts.
a. Solder base common to the Gerber.

b. A sleeve in ceramic metal.

c. A cap nut.

d. Overall height is 2.8mm.

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<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>1. Allows complete flexibility</td>
<td>Paralleling is necessary.</td>
</tr>
<tr>
<td>2. Provides for bar fixation.</td>
<td>Complex and expensive.</td>
</tr>
<tr>
<td>3. Permits conversation from bar to individual stud fixation. (Gerber)</td>
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F. Rothermann Unit:

a. Rigid (less height 1mm).

b. Resilient (more height 1.7mm).

Advantages: Requires little vertical space and tolerance for limited misalignment of attachments.

It is a button shaped attachment with the male unit incorporating a groove of uneven depth. The clip of the female section slides over the tapered upper edge of the male. With the free ends of the female engaging the deepest retaining groove. The female clip is designed to be retained with acrylic resin. A modified version of the clip is now available with tagging that runs at right
angles to the original design. Apart from the minimal vertical space requirement an additional advantage is the tolerance for limited misalignment of attachment.

Intra radicular stud attachments:

The advantages of this system lies in cost and space requirements. They do not require precious metal coping dowel nor special laboratory procedures. They are relatively simple and quick.

Zest Anchor system:

A nylon male element is incorporated in the denture base and projects downwards, engaging a recess in the root preparation, further the loads are applied at a point. That is well apical to the gingival margin of the root. A variety of abutments may be employed including hemisected molar roots. 2 sizes of zest anchor are available depending on the root length and diameter. The systems has been extensively refined over the years and a comprehensive kit is now available. The vertical space requirements are the same as Rothermann unit.

Bar compared to Stud Fixation:

1. Splinting of two or more teeth with a bar produces stability similar to the rigid stud type attachment when the overdenture is in place. But the study type allow independent movement.

2. If one tooth is weak the strong tooth can serve as the fulcrum point for movement of the weaker tooth in the prosthesis. With bar fixation, a stronger and a weaker tooth can be splinted with the result that the stronger
tooth strengthens the weaker tooth and the weaker tooth weakens the stronger tooth.

Bar Attachments:

The bar attachments help in splinting of the abutment teeth, retention and support of the appliance. The inter occlusal space availability has already been emphasized. Bar attachments are classified into two types bar units and bar joints. Bar unit has a rigid fixation where there is no movement between the bar and overlying sleeve and can be classified as tooth born. Bar joints permits rotational movement between sleeve and bar and derives more or residual ridge support.

Types of Bar Attachments:

1. Hader Bar.
2. Dolder bar attachment.
4. Ackerman clips and
5. C.M. clip

Hader Bar attachment:

- Can serve as a bar joint or a bar unit.
- Can be used as a stud attachment and a bar attachment.
- Consists of preformed plastic bars and clips.

Fabrication:

The plastic bar is attached to the wax copings and is cast with the coping. Plastic clip is embedded in the denture for retention. But metal clip offers more retention than the plastic. Plastic clip wears off rapidly. For more retention additional clips can be added and tension of the metal clip can be increased.

Hader Bar:

Advantages:

- Bars can be fabricated in any alloy.
- Retention can be replaced by patient or dentist.
- For more retention metal clip can be used.
- Assembly technique is simple.
- Capability to follow gingival contours.

Disadvantages:

- Rider is too bulky occlusogingivally.
- Rider retention decreases rapidly.
- No tension adjustment. For additional retention more metal clips should be added.

Dolder Bar:

- Has bar unit and bar joint

- Preformed bars are available for bar units.

- Shape of the bar, has parallel sides with a rounded top.

- Retention is by means of frictional fit.

- Non resilient attachment.

Fabrication:

The preformed bars are soldered to the copings and the sleeve is embedded in the acrylic over denture.

2. Dolder Bar:

Advantages:

- Availability of two different heights 14.65 mm and 3.6mm.

- Rider and bar are available in any lengths.

- Spacer allows vertical and rotational movement.
Disadvantages:

- Too bulky even in microsize (faciolingually).
- Expensive and requires exceptional skill for its use.
- Allows vertical and rotational movement because of the resilient attachment.
- Contouring the bar joint is difficult.

Bulky and difficult to use because of esthetic considerations.

Baker Clip:

- Consists of ‘U’ shaped clip designed to fit over a round wire. 12 and 14 round gauge wire are used. These wires are soldered to the copings. Clip is positioned over the wire and is attached to the over denture with cold cure resin.

3. Baker Clip:

Advantages:

- Adjustable and provides rotational movement.
- Readily available.

Disadvantages:
- No retention for the clips.

- Soldering the retentive loops reduces the elasticity of the clip.

Ackerman and C.M. Clip:

- These are bar joints.

- Both are similar in designs.

- Consists of a rounded bar and clip, where the clip fits over the bar.

- The slip has retention wings for the easy engagement into the acrylcs.

- Allows vertical and rotational movement because of fixation.

- Provides an excellent retention for overdenture when bar joint system is used.

Advantages:

1. Rider is provided with retention.

2. Spaces provides resiliences and rotation (or) rotation alone if the shim is not used.

Disadvantages:

The basis can be only 1.9mm in diameter.

Magnetic Denture Retention:
These have been in existence since 1930. They can be divided into groups.

1. Those depending on the mutual repulsion of like magnetic poles. Eg. Friedman magnetic stabilizers).

Disadvantages:

   a. Less retentive when most needed (when jaws are part)

   b. Continued resorption.

2. These depending on the mutual attraction unlike poles.

Disadvantages: One continuous attracting forces could cause the embedded bar magnets to move through the bone, erode the soft tissues and become exfoliated.

In order to know about magnetic over denture the field strength and magnetic permanence are 2 terms which require clear understanding. For dental use a high magnetic field strength is desirable as this will provide stronger retention. High permanence is essential for (1) it ensures magnet will be less likely to lose its magnetism. (2) A small magnet can be made without the north pole demagnetising the south pole.

Until 1970 magnets for dental purpose were either Alnico (Al, Co, Ni) or Co/Pt magnets both alloys have magnetic field strength. But their permanence is such that there is a lower limit to their physical size and they cannot be made as small as a tooth and have high field strength.
This limitation was eliminated by the discovery of the rare earth cobalt (REC) magnet alloys. REC alloys have 5 to 40 times field strength. The common composition being cobalt/samarium (CoSm). They were introduced to prosthodontics for retention by Gillings in 1977.

In one approach magnets are attached to the supporting flush with the root faces. Similar but opposite polarity provides retention in the range of 150-400 gms/magnet pair. Denture base/root face separation of as much as 3mm. This is no path of insertion restriction.

Disadvantages:

1. Small root surface of some supporting root limit the size of magnet that can be inserted and limit retention.

2. The magnet alloy can corrode and fracture in the mouth.

3. An avoidable magnetic field surrounds both the intra radicular and denture magnets.

These disadvantage was over come by replacement of one magnet with a magnetisable low intrinsic coercivity alloy, without significant loss of retention. A casting alloy based on palladium, cobalt and nickle is cast as root cap and dowel and fitted to the supporting root is inserted. The casting because of its magnetic coercivity becomes a strong induced magnet and retains the denture like an intraradicular permanent magnet.

Biological Effects of Cobalt/Samarium Magnets:

There are two ways in which Co/Sa magnets could have an effect on tissues:
1. Physical effect because of the presence of magnetic field gradient.

2. Chemical effect due to wear or corrosion products of alloy.

Behrman (1960) in his study concluded that magnetic is completely innocuous to tissues. Similar conclusions were reached by Toto and Choukas.

Tsutsui and his colleagues (1979) found alloy to be innocuous in tissue culture test due to corrosion resistance. The wear rate of unprotected faces of magnets used for over denture retention has been found to be less than 1mm/sqmm/year. (Gillings 1978). This is several orders of magnitude less than the recommended maximum ingestion levels for cobalt and samarium.

The external magnetic field can be virtually eliminated by arranging paired magnets is a modified horse shoe configuration by which the retentive effect is almost doubled. The explanation of this apparently anomalous doubling effect is that in the open configurations the north and south pole facing each other contribute to the retention, but the remaining South and North poles do not and their potential retentive effect is thus wasted. Where as all the available magnetic field is used in no closed configuration. Both the open and closed field denture retention system are in current use.

Comparison of magnetic retention and precision attachments.

Advantages :

1. Simplicity.

2. Low cost.
3. Self adjusting (Orthodontic tooth movement for passing contact).

4. Reusable.

5. Inherent stress breaking.

6. Reseating after denture displacement.


8. Low potential for trauma to supporting roots.


10. No special accessories are required.

11. Height of denture retention element is less than many precision attachments.

In a study conducted by Loke in (1960) the retention provided by a standard magnetic retention unit was found to be comparable to the kurer stud attachment, but only about one quarter of the ceka attachment and about $1/7$ that of bona buffer.

However mechanical attachment are subjected to wear in service where as magnets retention does not have any effect. Clinically the retention improves with time probably as a result of closer contact between retention element and root face through orthodontic root movement and interface wear.
The magnetic system provides retention of 500gm with 2 units. Which is adequate in most cases and with more than 4 some patients have difficulty in removing the denture.

The indicated bona buffer attachments may have more than 3.5 kg of retention but this would provide excellent denture stabilizing but could impose unacceptable high stress to the supporting roots.

Submerged Vital Roots:

Many patients cannot change their oral hygiene habits to properly maintain the gingival sulcus or tooth surface. For these patients a method of root retention and ridge preservation not requiring tooth and oral tissue cleanliness may be the treatment of choice.

Guyer and associates in 1978 said that submucosal root retention is one means of eliminating oral hygiene obligations for patients while possibly delaying residual ridge resorption.

The maintenance of alveolar bone tissue has depended up on the presence of a healthy root and periodontal ligament with the resultant tensional forces delivered to the bone by to the teeth during masticatory or parafunctional mandibular movements. Tooth roots retained submucosally seems to be similarly effective in preserving alveolar bone. Though endodontically treated teeth prior to burial are used recent investigations suggest submucosal vital root retention a feasable alternatives. Research results have proved that sectional and buried teeth were compatible with surrounding tissue and showed no pathology within the pulpal tissues or tissues attached to the roots. The retained
root exhibited complete healing with formation of an osteocementoid plug over the coronal surfaces of the root and a healthy viable pulp tissue.

1. Reduced cost.

2. Expeediting the treatment.

3. Preservation of R.R.

4. No maintainance of any degree of oral hygiene around the remaining teeth.

Criteria for Patient Selection :

1. Patients who are psychologically acceptable as CD patients can be candidates for submucosal vital root retention.

2. Should have a normal response to accepted clinical vitality test.

3. Should show at least 3mm of alveolar bone support on radiographic examination.

4. Should be located within the area of the alveolar ridges most affected by ridge resorption following tooth removal.

Large restorations that may create debris during cutting of crown and root should be debrided and filled with a temporary prior to surgery or removal of the time of surgery. Prior to the making of the surgical incision. Adequate healthy gingiva is required to cover the roots to be sectioned. Lack of gingival tissue at the time of surgery may creative tension on the soft tissue. Sutured over the submerged roots and cause failure of the wound edges to remain water
tight closure and heal by primary intension presurgical periodontal sealing. Soft tissue curettage and root planning are considered essential for rapid soft tissue wound healing and acceptance of the retained roots within the alveolar ridge.

Summary

To conclude it would not be a repetition to say that over denture is a preventive dentistry concept which has been brought into prosthodontics, and the alveolar bone with its overlying mucosa was never intended to receive the full force of a complete denture. Even though the technique resemble’s those of complete denture, there are important differences. The prognosis of the restoration is likely to be influenced by numerous factors like 1. Selection of patient. 2. Treatment planning 3. Preparation of the mouth. 4. Execution of the prosthodontic work and 5. Maintenance, finally its reasonable to conclude that the retention of a part of the natural dentition affords the overdenture patient again in neuromuscular performance there by having an edge over his edentulous counter part.

References


