



PRECISION WITH PRECISION ATTACHMENTS - A REVIEW

Dr. Anoushka Banerjee, 3rd year MDS, Department of Prosthodontics, D.Y Patil School of Dentistry, Navi Mumbai

Dr. Asha M. Rathod, Professor, Department of Prosthodontics, D.Y Patil School of Dentistry, Navi Mumbai

Dr. Gaurang Mistry, Dean, Head of Department, Professor, Department of Prosthodontics, D.Y Patil School of Dentistry, Navi Mumbai

Dr. Sheetal Parab, Associate Professor, Department of Prosthodontics, D.Y Patil School of Dentistry, Navi Mumbai

Corresponding author: Dr. Anoushka Banerjee, 3rd year MDS, Department of Prosthodontics, D.Y Patil School of Dentistry, Navi Mumbai

Abstract: The awareness about good quality dental care is a necessary element for a good clinical practice. Various options available for the replacement of partially missing teeth are clasp retained removable partial dentures, removable partial dentures with precision attachments and implants. The advantage of the attachment-retained prosthesis lies in the fact that the removable part can be treated as a partial denture and almost resembles a fixed prosthesis once in the mouth. Precision attachments are sometimes said to be a connecting link between the fixed and removable type of prosthesis. This article brings clarity on the precision attachments used in a prosthodontic treatment plan. A removable partial denture with a retained attachment system is one of the treatment modalities which may assist a prosthodontist to achieve better functionality and aesthetics. An attachment is therefore defined as “A mechanical device for the fixation, retention and stabilization of prosthesis.”

Introduction: To address the condition of partial edentulism, tissue-supported prostheses alone do not treat the functional and aesthetic requirements. In such situations, implant-assisted prosthodontics has become a contemporary choice of replacement for natural teeth. However, implant therapy may not be used to replace missing natural teeth for some patients. Although the attachment retained removable partial denture (RPD) is not used as widely as the clasp- retained type, it is not an outdated treatment modality in dentistry. The precision attachment denture has long been considered advantageous in dentistry as it combines fixed and removable prosthodontics in a way as to create a clasp-less partial denture possible keeping aesthetics in mind. Nevertheless, they have in the past, been largely ignored by most dental professionals for many reasons, mainly

for the cost and inadequate understanding of their application. Last decade with greater demand for complex and aesthetic restoration and an increase in the popularity of implant has brought a concomitant increase in the popularity of attachment retained prosthesis.

Precision attachments retain and attach a removable bridge or partial denture on natural teeth whether vital or nonvital. Some act as retainers for overdentures where few abutments remain. The main purpose of each precision attachment besides retention is its concealment within or under a restoration as an aesthetically better alternative to a visible clasp retainer (Abhilash Anantharaju, 2013). The popularity of precision attachments is due to its two basic objectives. These are:

- To relate the desired platform to the available tooth support.
- To distribute as far as possible the load to be thrust on the teeth by the appliance.

Precision attachments are two precious metal components which are manufactured to form a joint. First component or matrix is a metal receptacle or keyway, which is positioned within the normal clinical contours of a cast restoration placed on the attachment and the second component or matrix is attached to the removable partial denture (Figure 1). They are designed to replace occlusal rest, bracing arm and retaining arm of the conventional clasp retained partial denture. Extracoronary attachments are preferred and are considered more efficient in providing retention and restoring function and aesthetics over intracoronary attachments as the latter has the risk for over contouring of distal portion of the crown, which can result in periodontal breakdown as a result of increased plaque collection.

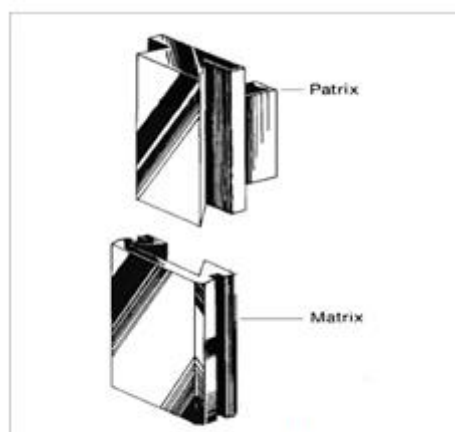


Figure 1: Matrix and Patrix

Classification

Based on their method of fabrication and the tolerance of fit between the components:

1. Precision attachment (prefabricated type): machined components with precisely manufactured metal to metal parts with close tolerance.
2. Semi-precision attachment (laboratory made or custom made types) components usually originate as prefabricated or manufactured patterns.(2)

According to their relationship to the abutment teeth:

1. Intracoronal/ internal attachment: If the attachment resides within the body / normal contours of the abutment teeth.
2. Extracoronal/ external attachment: If the attachment resides outside the normal clinical contours of the abutment/crown.(9,10)

Based on function or movement:

1. Solid/rigid: When metal-to-metal contact of the patrix and matrix restricts the relative movement between the abutment and prosthesis during the functional loading, the attachment is said to be rigid. Rigid attachments are those that theoretically allow no movement of their component parts during function. However, even under the best of condition, minute movement of the prostheses will occur when occlusal forces are applied. The amount of movement will increase with wear of component. These attachments are usually used in bounded saddle situations where the abutment teeth fully support the restoration and attachment, and soft tissue does not give any support.

Subclassified into a two types: Non-lockable and lockable.

1. Resilient: Many attachments are designed to permit movement of the denture base, and during function, these attachments are resilient attachments.

Advantages of precision attachments:

- Improved aesthetics and elevated psychological acceptance.
- Compared to conventional clasp retained partial denture they give better retention and stability, less liable to fracture than clasp and are less bulky.
- Lateral forces in the abutment during the insertion and removal are eliminated and more axial force during functions are achieved.

Disadvantages:

- Complexity of design, complex principles and procedures for fabrication.
- Increased overall cost of the treatment. .
- Requires high technical expertise for successful fabrication experience and knowledge on the part of dentist and laboratory technician are essential.
- Increased demand on oral hygiene performance.(3)

Requirements

1. Occluso-gingival length– minimum of 4 mm vertical space is required so that there is adequate space between plane of occlusion and gingiva.
2. Placement of attachments in the incisors can be difficult because of limited faciolingual width.

3. Adequate space between pulp and normal tooth contour is necessary for the intracoronal component of an internal attachment. (2,12)

❖ **Intracoronal precision attachment – prefabricated type:** It comes with two components: matrix and patrix. These are often accompanied by paralleling guide that fits into the dental surveyor as well as the device to activate the attachment after fabrication. Matrix (female) is waxed into the crown or attached with the preparation in the tooth. Patrix (male) is attached to the framework by soldering. Type of retention is either friction or mechanical.

Intracoronal attachment based on retention:

- 1) Passive attachment
- 2) Active attachment – Active friction grip attachment, Active snap grip attachment
- 3) Locked precision

Attachment Advantages:

- Improved aesthetics.
- Point of force application to the teeth is more apical than for occlusal or incisal rest thus shortening the lever arm and decreasing torquing forces.
- Point of application of force applied through the device lies close to the long axis of abutment.
- Self-cleansing contours of teeth can be maintained.

Disadvantages:

- Requires adequate faciolingual width / cervico-occlusal height to provide as large as frictional area as possible between the slot and flange.
 - Requires extensive preparation of the abutment teeth to obtain space for the keyway mechanism.
- ❖ **Extracoronal precision attachments-** are used to join a prosthesis to a retainer, part of all of their mechanisms is outside the contour of the retainer. It was introduced by Henry R Boos in the early 1900's and later modified by F Ewing Roach (1908).

Classified by Boitel 1978

- Rigid attachment (Figure 2)
- Resilient attachment (Figure 2)
- Bar attachment

Advantages:

- It does not alter the normal contour of the abutment, crown being entirely outside the tooth contour.
- Easy insertion and greater freedom in design.
- Do not require space within the contours of the abutment tooth hence can be used when

there is insufficient buccolingual width to accommodate the intraoral attachment.

Disadvantages:

- Lack of occlusal stability
- Improper control of force distribution between
- Maintenance problems
- Bulky, break or wear is possible
- Rebasing problem.(17,18,19)

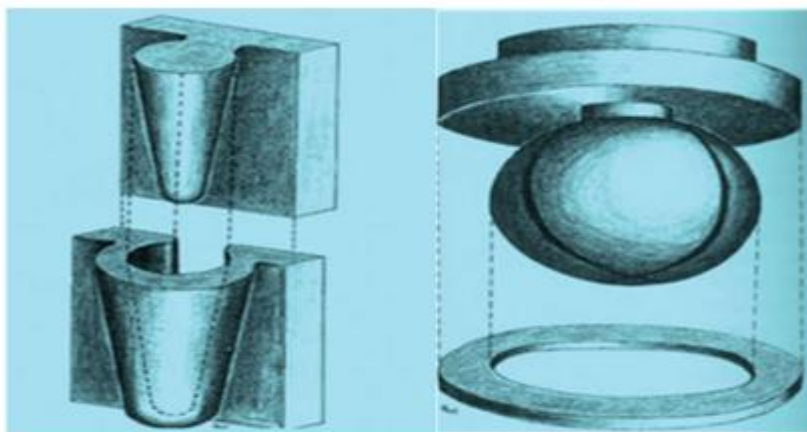


Figure 2: Rigid Attachment, Resilient Attachment

INTRACORONAL VS EXTRACORONAL (Figure 3)

Case selection for intracoronary or extracoronary attachment depends on size and shape of the abutment teeth. For an intracoronary attachment, there might be the need to prepare the abutment more than that required for an extracoronary attachment. Failure to provide adequate space for the intracoronary attachment may cause overcontoured restorations. However when the space is adequate, intracoronary attachment is preferred as they direct the forces along the long axis of abutment teeth. Extracoronary attachments are usually used in cases of inadequate space. Oral hygiene maintenance is vital when using extracoronary attachments.

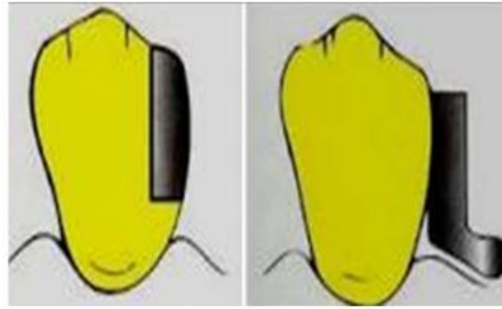


Figure 3: INTRACORONAL EXTRACORONAL

- II. **Semi-precision Attachment:** uses an intracoronal rest seat and resilient lingual arm. A laboratory fabricated rigid metallic patrix of a fixed or removable partial denture that fits into a matrix in a cast restoration, allowing some movement between the components; attachments with plastic components are often called semi precision attachments even if prefabricated (GPT 9, 2017).(Figure 4)



Figure 4: Semin-precision attachments

Advantages:

- Laboratory fabricated precision attachment offers far greater adaptability to a wide variety of clinical situations compared to prefabricated precision attachments.
- Versatility for many clinical variation
- Variation in tooth size and shapes are most easily accommodated.

Disadvantages:

- Long term wear is more.
- Lack of interchangeability of male and female attachment as there is no standardization of sizing.
- Repair and replacement of custom attachments are more difficult as composed to prefabricated parts.

Precision attachments are also classified as the following by George E Ray, 1978 (Figure 5)

Figure 5: Intracoronary, extracoronary, bars, Anchors and accessory components



Precision attachments can also be classified as rigid or movable articulations (George E Ray, 1978)

➤ Rigid articulations:

Group I: Attachments used principally with vital teeth. Passive, active or channel shoulder pin.

Group II: Anchorage used principally with pulp less teeth. Screw blocks and slide blocks.

➤ Movable articulations

Group I: Conjunctors- separable joints used principally with

vital teeth Group II: Connectors- separable joints used

principally with pulp less teeth

Precision attachment can be also be classified as passive, active, locked (G.E Ray) (George E Ray, 1978)

1. Passive attachments: are made in a solid section so that matrix fits into the matrix like a jig-saw puzzle, the retention between two parts depends on accuracy of the fit, shape of the joint, and area of contact.

2. Active attachments: differs from passive attachments in that some form of spring is used to give added retention.

3. Locked precision attachments are either joined together by means of a sliding bolt or latch (latch grip) or screwed together.

Conclusion: A successful prosthetic treatment plan depends on detailed attention to the potential problems. Precision attachments serve the function of retention, stress distribution and aesthetics, but also require technical skill and understanding of its mechanics. A thorough understanding of the basic principles, appropriate training and experience with different types of precision attachments can prove to be beneficial to the clinician and his practise. Let's be precise with precision attachments!

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