PREVIEW ARTICLE

Precision Attachments- An Overview

Anupama Nigam, Ajay Singh, Abhinav Shekhar, Himanshu Gupta

Abstract

Precision attachments offer considerable advantages in dentistry because of their flexibility. Evidence of the use of precision attachments dates back to Egyptian times with evidence of the wire and riveted device. The modern forms however range from simple skides to more complex assemblies. The main aim of this review article is to illustrate the advantages and use of precision attachments to the dental practitioner.

Key words: Precision attachments, Intracoronal, Extracoronal

Introduction

Precision attachments offer considerable advantages in dentistry because of their flexibility. Evidence of the use of precision attachments dates back to Egyptian times with evidence of the wire and riveted device. The modern forms however range from simple skides to more complex assemblies.

The use of precision attachments adds a new dimension to dental treatment and also broadens the referral base of a dental surgeon. It is an invaluable tool in the field of restorative and implant dentistry. They are used to overcome the problems of alignment and excessive loss of tissue in the oral cavity in implant work.

The main aim of this review article is to illustrate the advantages and use of precision attachments to the dental practitioner.

Discussion

Definitions

According to GPT 1999, precision attachments are defined as ‘a retainer consisting of a metal receptacle (matrix) and a closely fitting part (patrix); the matrix is usually contained within normal expanded contour of crown on abutment teeth and patrix is attached to a pontic or the removable partial denture framework.

An attachment is a mechanical device for the fixation, retention and stabilization of a dental prosthesis2.
Intracoronal describes an attachment within the confines of the cusps and normal proximal axial contour or within the normal contours of the crown of a tooth.

Extracoronal is that attachment which exists outside, or external to, the crown portion of a natural tooth. The extracoronal attachment projects outside the crown and provides either a rigid or resilient connection between the teeth and the prosthesis.

**Planning Precision Attachment Restorations**

While planning precision attachment restorations some essential principles must be followed. They are:

- **Accurate radiographs**
- **Diagnostic casts**
- **Thorough mouth examination**
- **Health history**
- **Evaluation of available support**

Only after the biomechanical aspects have been established should the plan for the design of the restoration may be formulated.

**Intracoronal Attachments**

Examples of intracoronal attachments include the Stern, Stern-McCollum and Ney attachments.

They involve the key-keyway mechanism with the keyway contained within the crown. It is a passive attachment that can be constructed in the laboratory, or pre-formed plastic patterns can be used and incorporated in a wax pattern.

It is used to overcome the lack of parallelism in prepared abutment teeth and as a means of reducing the forces on a retainer.

In a study conducted by Wang Y. et al on the stress analysis of distal extension removable partial denture retained within two types of semiprecision attachments it was found that the intracoronal attachment produces higher stress at the site of the alveolar bone around the abutment than the extracoronal attachment. On the other hand the extracoronal attachment produced higher stress at the edentulous alveolar crest and the distal cervical alveolar bone of the distal abutment than the intracoronal attachment. It was therefore suggested that the intracoronal attachment be applied in cases where the periodontal condition of the distal abutment was good and the extracoronal attachment be used where the condition of the edentulous alveolar crest is fairly good and the distal abutment is weak periodontally.

Prieskel suggested that small bounded spaces, with appreciable bone loss may be restored with intracoronal attachment. Another application is to join in the mouth a series of crowns that do not share a common path of insertion.

For retaining the intracoronal attachments to the removable partial denture framework they can either be embedded in the investment material or in receptacles in the abutment crowns which are embedded in refractory investment material.

**Extracoronal Attachments**

Examples of these attachments include the ASC 52, Dalbo, Ceka and Era. They have the ability to provide more resilience as a stress director if required. The main disadvantage with extracoronal attachments is that more space is required within the removable partial denture as they are bulky.

**Anchors or Stud Attachments**

Anchors or stud attachments are made in rigid form for bounded saddle situations and in resilient forms for free end saddles. They are generally used in conjugation with posts and diaphragms placed in root canals following root canal therapy.

Stud attachments consist of a post like male secured to the diaphragm of coping female which engages the male post. Retention is obtained by frictional fit or snap like action.

**Dalla Bona System (DALBO)**

The DALBO design consists of a patrix and a matrix. The patrix consists of a soldering plate mounted extra-coronally and to its rear lays a vertical squared column modified cervically by provision of a substantial ball. Matrix consists of vertical, occlusally closed trunk ridged and ringed for retention within which lies a steel coil ring.

The advantages of DALBO units are:

- Provides excellent resistance to both distal and lateral displacing forces.
• Incorporates a tilt preventing device that maintains the denture base in contact with the mucosa.
• Requires no buccal retainers or lingual bracing.
• The limitation with the DALBO units is that it cannot be used in fixed bridges due to its size.\(^7\)

**Rothermann Anchors**

Rothermann anchors consist of a clasp arm which is the matrix engaging an undercut on a shallow cylinder which is the patrix. They are very shallow and easy for the technician to use because they incorporate their own solder.\(^8\)

**CEKA Attachment**

The CEKA attachment was developed by Karl Cluytens in 1951 in Germany. Mr Cluytens constructed a bar into which two straight holes were drilled. The bar was attached to abutment crowns, and metal tubes with flat tops were placed into the holes to attach the prosthesis and the abutment bar. A screw with a spring constructed of round wire was placed in the tube to act as a retentive device for the bar.\(^6\)

The advantages of the CEKA attachment are:
• Aesthetics, care of utilization and ease of assembly.
• Reduces stress to abutment teeth to a minimum.
• It also eliminates the necessity for parallelism between abutment assemblies.
• Permits the use of unilateral prosthesis without cross arch stabilization.

The attachment consists of two parts –
1. The retainer which is a precious metal ring 1.4 mm thick with an orifice in the centre.
2. The metal extension with a base ring which is used to solder the extension to the framework of the prosthesis.

**Bar Attachments**

Bar attachments consist of a metal bar that splints two or more abutments. It provides rigid splinting of abutments with good retention, stability and support. The spaced teeth which are splinted by a bar are mutually suppositive.\(^8\) The main disadvantage of bar attachments is that they cannot be used with reduced interocclusal space.

**Ackerman Bar**

It is probably the most versatile and popular factory made model. There are two types of bar: round and egg shaped.

One advantage of the round bar is that it can be bent in all directions and can be constructed to follow not only the antero-posterior relationship but also the vertical changes in the arch. The egg shaped bar has extra rigidity making bending more difficult.

**Dolder Bar**

It is available in two types;
1. Pear shaped which allows a degree of resilience of movement between it and the sleeve.
2. Parallel bar which allows no movement.

Dolder bar units are tooth supported and non-rotational and are indicated where numerous attachments are present (four in three planes). Friction between the walls provides retention. In Dolder bar units paralleling of bars is more important which is provided with a special paralleling mandrill.

**Conclusion**

There is a wide selection of attachments available in the market, with a variety of functions and advantages such as aesthetics, retention, stress distribution, cross arch stabilization and versatility.

In contrast they are also costly, complicated and subject to wear, breakage, repair and replacement. Thus the practitioner needs to be aware of these potential problems, and the use of attachments requires thorough treatment planning, specific knowledge and technical skills.

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