

# TOOTH SUPPORTED OVERDENTURES: COMPARISON OF DIRECT TECHNIQUE (RIGID) VERSES INDIRECT TECHNIQUE (RESILIENT) OF STUD ATTACHMENT.

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## Abstract:

*Several partially edentulous patients are advised extraction of sound teeth as these teeth are inadequate to provide support for a good prosthesis. An overdenture in such cases provides opportunity to preserve the sound teeth and still provide a successful prosthetic rehabilitation. Resilient precision attachments further provide additional advantage of improved retention and stability and their resiliency helps preserving the abutment teeth over a longer period of time. Various techniques are followed to fabricate and incorporate these attachments. This case report describes two partially edentulous patients rehabilitated with tooth supported overdenture by direct and indirect technique respectively.*

**Key words:** Over denture, stud attachment, tooth supported denture

## Introduction:

Conventional complete dentures are the most common prosthesis given till age for complete edentulism. Due to various reasons this may not always be completely satisfactory for all the patients. Minimal modifications to this conventional procedure for the advantage of the patient can enhance the overall success of the prosthetic rehabilitation.

Tooth/implant supported overdentures are such modified treatment modalities unlike conventional complete dentures in which all the teeth are extracted. By definition an overdenture is 'a denture the base of which covers one or more prepared roots or implants'.<sup>1</sup> It gently reminds us the statement of M. M. DeVan, "Our goal should be the perpetual preservation of what remains than meticulous replacement of what is missing".<sup>2</sup> Tooth supported overdenture fulfils this dictum

over conventional complete denture. Overdentures gained popularity in 1970's, after Atkinson published his work.<sup>3</sup>

An overdenture has many advantages like improved retention, stability, support and resulting improved masticatory efficiency, preservation of proprioception, preservation of alveolar bone and the psychological comfort of preserving natural teeth. Patients who have worn partial dentures previously adapt to the overdentures rapidly. Such prostheses prove to be a blessing in disguise in cases of resorbed mandibular residual ridges. An overdenture has very minimal disadvantages provided they are designed and processed properly. Disadvantages are increased financial burden for periodontal and endodontic treatment, need for more meticulous maintenance, bulk of the attachment needing extra space and denture fracture due to reduced bulk of denture material.

Precision resilient stud attachments help us overcome the problem of bulky attachments and also the resiliency helps in decreasing the overloading of abutments. Precision attachments maintain appropriate male and female contacts for utmost retention and stability. Either direct placement of prefabricated attachments or indirect method of customised attachments can be used to fabricate and incorporate these attachments to the dentures.

The aim of this case report is to describe the direct and indirect methods of incorporation of the attachments to the mandibular tooth supported overdenture, compare ease of fabrication methods and comfort levels of the patients using these attachments.

## Case Presentation

Two partially edentulous patients reported to the department of Prosthodontics for their placement of missing teeth. Both the patients showed no extra-oral gross discrepancy and gave no history of previous major illness, hospitalisation

or intake of drugs. Case 1-Male patient aged 45 years presented with periodontally compromised dentition with carious teeth. Intra oral examination revealed multiple decayed and mobile periodontally compromised teeth but firm and sound maxillary canines, mandibular right canine and left first premolar with gingival recession. (Fig. 1A and B). The maxillary residual ridge was high and well rounded and the mandibular residual ridge was resorbed in the posterior region. Case 2- 52 years old female presented with multiple periodontally compromised teeth. Intra oral examination revealed multiple periodontally compromised maxillary and mandibular anterior teeth with supraeruption and firm canines in all four quadrants (Fig. 2A). The maxillary residual ridge was moderate in size and posterior residual ridge was resorbed.

Dental Panoramic Topograph (DPT) revealed generalised bone loss in both the cases which indicated the reduction of crown root ratio for favourable prognosis. (Fig 1B and Fig 2A)

Diagnostic jaw relation recording, articulation and evaluation showed adequate interarch space favourable for construction of overdentures (Fig 1C). Similar evaluation was done for Case 2.

## Treatment

Case 1- After thorough evaluation treatment plan was formulated and consent was obtained from patient after discussion. Extraction of the mobile periodontally compromised and decayed teeth was carried out. The remaining teeth were treated with appropriate periodontal and endodontic procedures. Maxillary tooth supported overdenture was planned preceded by short metal copings. Mandibular tooth supported overdenture denture was planned retained by prefabricated precision attachments (Essential Dental Systems, NJ, USA) (Fig. 1D) using direct technique.

Maxillary canines were prepared to receive short

metal copings, impressions made and coping cementation done. Mandibular canine and first premolar on right and left side respectively were prepared with post space according to the reamer and counter-sink provided by the manufacturer (Fig. 1E) and the prefabricated posts were cemented using glass ionomer cement type 2 (GC, Tokyo, Japan) to provide added benefit of fluoride releasing anticariogenic property. The posts were cemented such that the shoulder of the posts seated in the sink prepared by the counter-sink drill (Fig. 1F). Intra oral periapical radiographs were made to ensure complete seating. Primary impressions were made of the maxillary and mandibular arch in alginate (DPI, Mumbai, India). Border molding was done using low fusing compound (DPI, Mumbai, India) and final impressions were made using light body poly vinyl siloxane material (Aquasil, Dentsply Caulk, Milford, USA) in custom acrylic trays. Before final impression of the mandibular arch, the ball attachments were covered with rubber elastics to prevent any undercut to be recorded.

Facebow transfer was done and jaw relations recorded. Teeth arrangement on the articulated casts was followed by trial appointment. Trial dentures were inserted, evaluated and approval obtained from the patient. During denture processing the mandibular attachments were blocked using dental plaster to provide a counter space in the denture for the female attachments. At insertion appointment, after proper evaluation and occlusal adjustments of the dentures intra-orally, female attachments were placed onto the male counterpart in the mouth and picked up in autopolymerising acrylic resin (DPI, Mumbai, India) in their respective spaces. Metal housings were not used due to insufficient bulk of denture base. Soft nylon caps were used to counteract the non-parallel position of the male attachments. Patient was educated about maintenance and hygiene of the attachments and advised to use soft unituffed bristle brush for cleaning of elastic rings and stud attachment on abutment teeth. Regular recall visits to evaluate abutment teeth were scheduled. Pa-

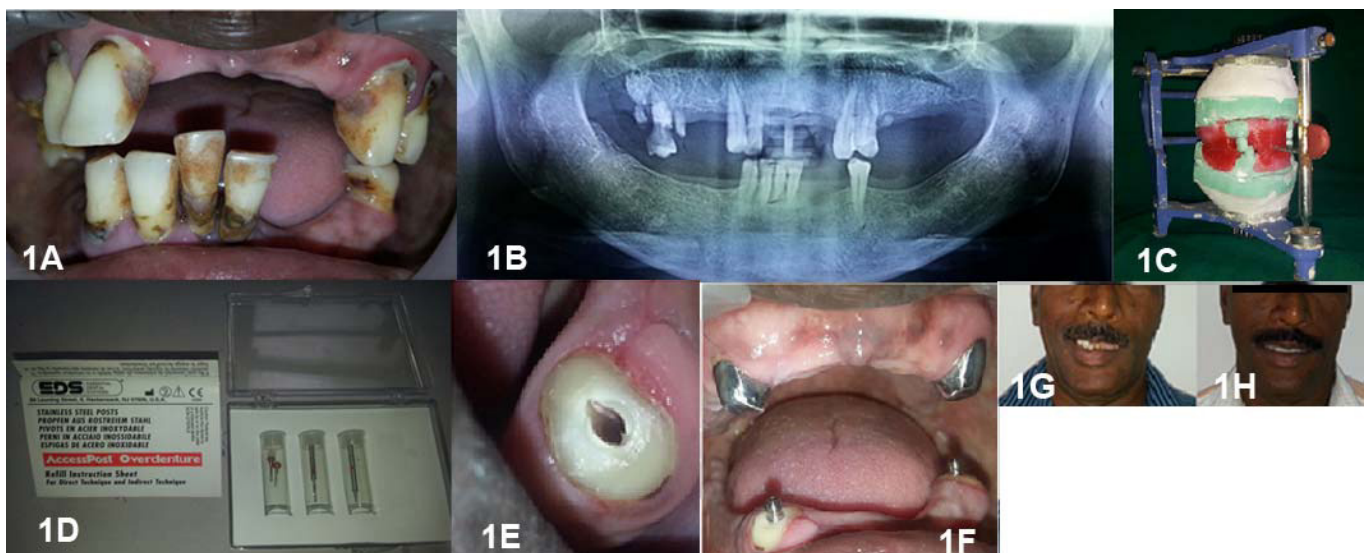


Figure 1:

- 1A - Preoperative intraoral photograph. (Case-1)
- 1B - Dental Panoramic Tomogram
- 1C - Diagnostic jaw relation recording.
- 1D - Prefabricated overdenture attachments

- 1E - countersink preparation.
- 1F - shoulder of the post completely seated into the preparation.
- 1G - Preoperative photograph of the patient.
- 1H - Postoperative photograph of the patient.

tient was satisfied with the new dentures in terms of esthetic and retentive qualities at the insertion appointment ( Fig.1G and H).

Case 2- Treatment plan was formulated after thorough examination, discussed with the patient and consent obtained. Extraction of the mobile and supraerupted teeth was carried out excluding the canines in all four quadrants. These canines were treated with periodontal and endodontic procedures as in the first case. Similar as earlier case tooth supported maxillary and mandibular dentures were planned with short metal copings for maxillary canines and precision attachments for mandibular canines.

Metal copings were fabricated for maxillary canines after appropriate tooth preparation. The mandibular attachments were fabricated using indirect method (OT Equator Castable, RHEIN83, Italy) (Fig.2B). The posts space preparation was done up to number 3 peaso reamer. Impressions

were made of the post space by indirect technique. Casts were poured in die stone (Gyprock, Gujarat, India) and wax patterns made onto the casts using type-2 inlay wax (Renfert, Germany). Plastic balls were attached to the wax patterns and checked on the surveyor for proper orientation (Fig.2C). These patterns were cast into nickel chrome metal. The metal copings for the maxillary teeth were cemented. Secondary impressions were made for both the arches as described for the first case. But unlike first case the mandibular posts with stud attachments were not cemented prior to impression procedure and were picked up in the impression. (Fig.2D) Mandibular impression was poured with the posts inserted into the stone cast (Fig.2E) Laboratory and clinical steps of complete denture treatment were followed as described in Case 1. Overdentures were processed over the casts. After retrieval of the dentures the posts were separated, cleaned, sterilised appropriately and cemented into the patient's mouth (Fig.2F). During

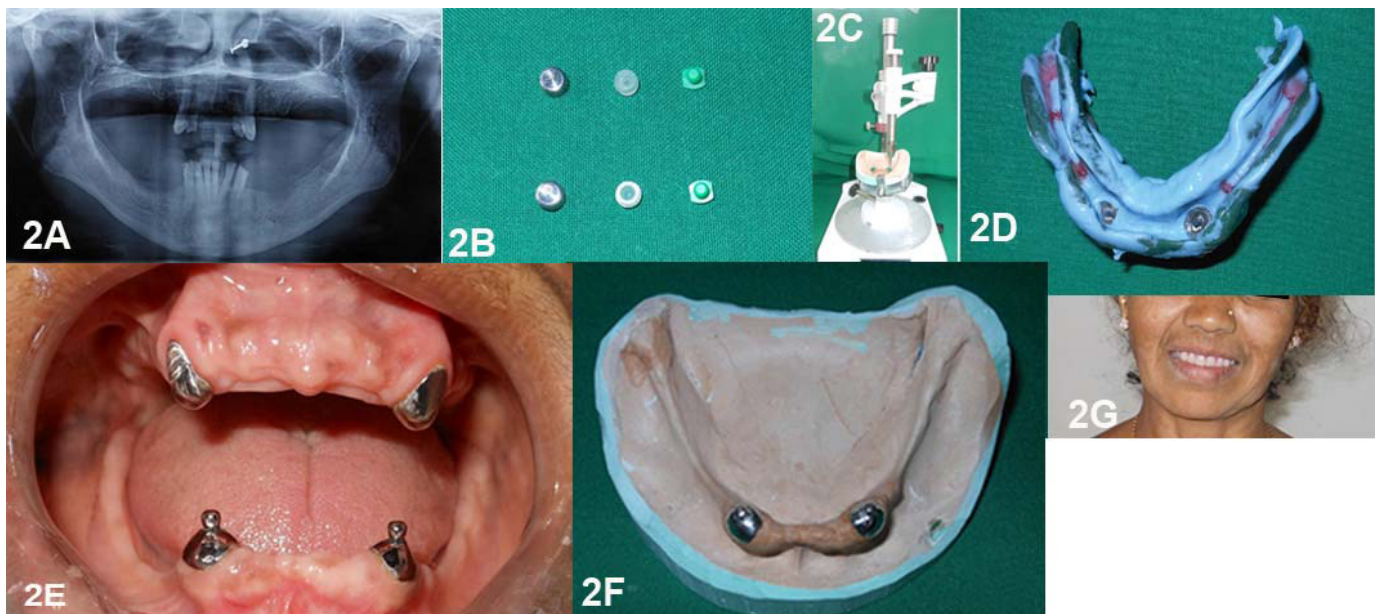


Figure 2:

2A -Dental Panoramic Tomogram (Case-2).

2B - Patterns and attachments for fabricating indirect method.

2C - Checking parallelism for ball attachments on a surveyor.

2D - Mandibular final impression.

2E - Intraoral picture showing trial of casted attachments.

2F - Master casts with attachments incorporated.

2G - Post operative photograph of the patient.

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Official Publication of Indian Prosthodontic Society  
Kerala State Branch

insertion appointment metal housings were used on the intaglio surface of the mandibular denture as there was enough interarch space. Prefabricated elastic o-rings corresponding to the stud attachment were used. Patient was given instructions for maintenance and hygiene as mentioned for Case 1.

Patient showed satisfaction with the dentures during insertion appointment (Fig.2G).

Simple alternative to the conventional complete denture has provided the patients with a lot of benefits. The patients were satisfied with the prosthesis in terms of comfort, function and esthetics at the follow up appointments.

## Discussion

Rehabilitation of the completely edentulous patients is extremely necessary as edentulism has an adverse effect on the patients' physical well-being. When patients present with few remaining teeth a partial denture cannot be made as the remaining teeth do not provide adequate support and the extraction of these teeth is undue

loss of patients' available dental structure. An overdenture gives the solution to such situations. Reitz, Weiner and Levin in 1977 in their survey of overdentures mentioned them to be a valid alternative of conventional complete dentures.<sup>4</sup>

Precision attachments were used for the fabrication of these dentures. Resilient attachments act as stress breakers and help providing a tooth tissue support rather than only tooth support. Literature has proved that rigid attachments result in loss of the abutments as the overdentures are supported by soft resilient tissues in the edentulous areas.<sup>5</sup> (Fig.3) Thus stud attachments with resilient female nylon caps were used in the fabrication of the overdentures.

In this report direct and indirect techniques were used for the fabrication and insertion of the attachments respectively. Direct technique has the advantages of ease of procedure, lesser number of appointments, reduced cost, extra laboratory procedures not required and maintaining the precision contacts of the attachments. The indirect method has the advantages of precise fit of the posts to the tooth, the male parts can be made parallel to each other using a surveyor and the height and size of the attachments can be adjusted according to the available space. These techniques even have their own set of disadvantages like in direct technique parallelism cannot be achieved as the posts will follow the root configuration, the variation of root canal configuration can affect the fit and retention of the post in the root and difficult to alter the height and size according to the patients' oral condition. The indirect technique has the disadvantages of loss of the precision of the ball attachment during fabrication of posts, extra appointments, extra laboratory procedures and increased cost and technique sensitive.

Hence no single technique can be considered as a rule of thumb for all cases and all the factors should be considered before finalising on the treatment plan. Both direct and indirect techniques

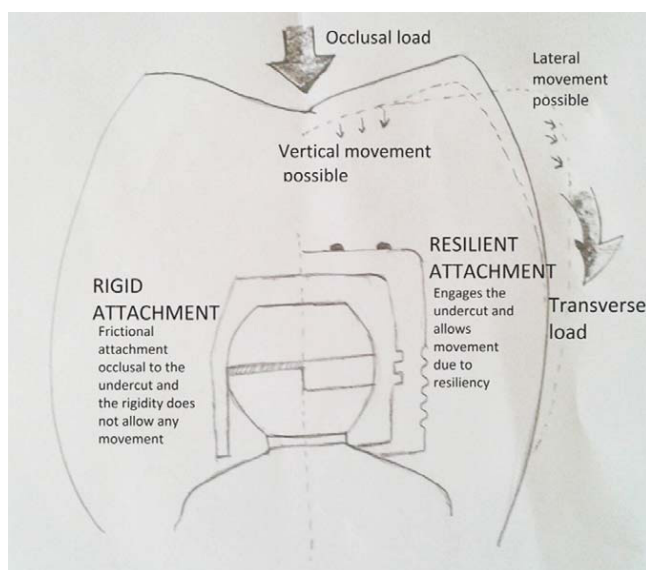


Figure 3- Rigid vs Resilient stud attachment.

of attachment of stud for tooth supported overdentures gave good outcome in terms of patient satisfaction which leads to conclusion that both techniques can be used for stud attachment placement depending upon the clinical situation.

### Conclusion:

- Overdentures provide significant advantages over conventional dentures provided made carefully.
- Precision attachments improve the patient satisfaction and treatment success by improving the retention and stability.
- Resilient attachments help in preservation of the abutments over a longer period of time.

- Followed by thorough evaluation of a particular clinical condition either direct or indirect method can be employed.

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