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Longevity of Resin Bonded FPD-A Review

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ABSTRACT
The resin bonded FPD is a better alternative to conventional FPD due to its conservative tooth preparation, but due to its limited survival rates it is not used much in clinical practice nowadays due to the emergence of Implants.Despite these factors the RBFPD can be used in medically compromised patients like osteoporosis patients and periodontally compromised patients with the knowledge of its longevity as an interim prosthesis or definitive treatment plan.
Keywords*: Longevity of RBFPD,bond strength, RBFPD in Osteoporosis patient*

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I. Introduction:

To overcome disadvantages of conventional fixed partial denture like destruction of tooth structure required for the abutment preparation, resin bonded fpds were introduced in 1955 by Buonocore.
Resin bond fpd is a conservative alternative to conventional fixed partial denture and should be included in patient treatment plan with a knowledge of longevity.
Debonding of resin bonded fpd creates patient distress in the dentist his/her clinical skill and the prosthesis.So several studies have been done to overcome this disputes on longevity.

Types:

- Rochette bridge
- Maryland bridge
- Castmesh FPD
- Virginia bridge
- Carolina bridge (modified RBFPD)

Rochette bridge:
Rochette in 1973 combined mechanical retention with a silane coupling agent to produce adhesion to the metal. It is a wing like retainer with funnel shaped perforation through then to enhance resin retention [1].
Indication:
Used for both anterior and posterior fpd.
Disadvantages:
The retention resin rivets extruding through the perforated framework were exposed to increased stress as well as abrasion and leakage that diminished their longevity [1].
Maryland bridge:

- In this the inner metal surface is etched either using electrochemical method or chemical method. This type of etched metal prosthesis is called Maryland bridge.
- This technique was first used by Livaditis and Thompson.
- They etched using 35%solution of nitric acid with a current of 250 mA/cm [2] for 5 Minutes, followed by immersing in 18%Hcl in an ultrasonic cleaner for 10 minutes which is specific for non beryllium nickel chromium alloy.

- For beryllium containing nickel-chromium alloy,10%sulphuric acid at 300mA/cm² was used followed by same cleaning procedure by Thomson etal.
- Since electrochemical etching is technique sensitive.
- Livaditis reported same etching results by placing nickel chromium beryllium alloy in etching solution for one hour in water bottle at 70°c.
- Retainers coated with pyrolized silane have been shown to be 47% to 104% more retentive than retainers treated by etching alone [1].

Cast mesh fixed partial denture :

1. In this techniques that produce roughness before the alloy is cast is used.
2. A net like nylon mesh can be placed over the lingual surfaces of the abutment teeth on the working cast.
3. It is then covered by and incorporated into the retainer wax pattern,with the under-surface of the retainer becoming a mesh like surface when the retainer is cast.

Advantages:

1. It eliminated the use of acid etching.
2. It permits the use of noble metal alloys.

Disadvantages:

1. The material tends to be stiff, making it somewhat difficult to adapt to detail the abutment
2. The retentive ability is compromised if the wax runs too freely into mesh by blocking out the undercuts.

Virginia bridge:

- In this Lost salt technique's used
- Particle roughened retainers by incorporating salt crystals into the retainer patterns to produce roughness on the inner surfaces.
- Sieved cubic salt crystals (Nacl)-sprinkled over the outlined area sparing 0.5-1mm wide crystal free margin.
- Retainer patterns were fabricated from resin removed from the cast-resin was polymerized cleaned with a solvent, placed in water in an ultrasonic cleaner to dissolve the salt crystals.

Carolina bridge

The Carolina bridge (CB), an all-porcelain bonded pontic, was firstIntroduced in 1987, and was developed as an alternative to Maryland bridge, which require some degree of toothpreparation, thus making themirreversible in nature [3].

Carolina ridge is an esthetic and conservative interim treatment option that can be utilized in favorable clinical situations.

Advantage

- Conserving enamel of the adjacent teeth since,The procedure does not mandate any preparation.
- It completely relies on enamel bonding strength. When planning for a CB, the clinician and the patient should understand that this treatment is a temporary treatment option until the patient is ready for a more definitive treat-ment such as implant therapy [3.]

Resin cements [2]:

1.Comspan-(L.D.caulk)-filled bisphenol glycidyldimethacrylate/bis-GMA (Two paste system)
2.ABC adhesive bridge cement (Ivoclar North America)
3.Panavia (filled bis GMA) powder and liquid.
Powder(quartz, radiopaque fillers and initiators)
Liquid (Aromatic and aliphatic methacrylates , activators patentedmonomer).
Panavia polymerization inhibited by O2.
Material setting time: 4 minutes
4.Panavia 21
(two paste system, primer supplied With it)
5.All bond 2(bonds by formation of hybrid layer)
6.C and B Metabond (bonds by formation of hybrid layer)-setting time 8 minutes, temperature sensitive [2].

Bond strength:

Panavia 21>panavia>comspan= ABC adhesive bridge.

Features of tooth preparation to improve longevity:
RBFPD requires careful treatment planning and technical skill.
According to studies,shear bond strength of resin to enamel is 4x greater than its tensile bond strength.
MC Laughlin suggested proximal grooves to improve resistance form which thereby increases clinical success rate.
For posterior teeth including rest seat,guide plane ,retentive grooves improves longevity of resin bonded FPD.
Longevity of resin bonded fpd:
Electrolytic ally etched resin bonded FPD are significantly more retentive than rochette variety.
Upon meta analysis, CREUGER and VAN'THOFFcalculated longevity,

Researcher	Number of years	Survival rate of resin bonded fpd
CREUGER and VAN'T HOFF	1st year	89%
	2nd year	84%
	3rd year	80%
	4th year	74%

CREUGER and Collegeus reported,

Number of years	Survival rate	Area of placement of resin bonded FPD
7.5 years	75%	Anterior
7.5 years	44%	Posterior with minimum tooth preparation(only rest seats and guide plane included).

Similarly, Gilmour and Ali reported high failure rate of 30%to 50% with minimally prepared maxillary and mandibular prosthesis [2].

- Studies conducted that posterior RBFPD designed with significant features survive better than anterior prosthesis with minimal preparation

Researcher	Number of year	Survival rate, Retentive features
Simon and colleagues	4years	60to 95%, proximal grooves
Rammelsberg and colleagues	6 years	100%, Posterior prosthesis whose retainers included parallel channels and grooves

Verzijden and colleaguesstated that,
Posterior Maxillary Resin bonded FPD is more retentive than posterior mandibular RBFPD-Increased due to increased crown length [2].
CompleteRBFPD survival rateswere significantly higher in the upper arch, while therewas no difference between the maxilla and the mandible with respect to functional and survivalwith multiple rebonding[4].
Rebonding and failure rates:
Marinello and colleaguesconcluded that re-bonding leads to increase in failure rates.
1st year -40% failure rates
2nd year-60% failure rates
Naifeh and colleagues reported a 50% decrease in original bond strength when retainers and teeth are cleaned of the resin and re-etched and re-bonded.

Contraindication of resin bonded FPD

- Prosthesis with > 1 Pontic
- The use of multiple retainers and pier abutments
- Avoid replacing canines.
- Bruxism and parafunctional habits.

Factors determining the success/survival rate of resin bonded FPD

- Case selection
- Adequate tooth preparation
- Alloy conditioning.
- Type of resin cement used.
- Location of placement of resin bonded FPD
- Operator technique

- Oral environment (use of rubber dam)

II. Conclusion:

Resin bonded FPD is abetter alternative to conventional fixed partial denture. Improving retentive features which increases the longevity of resin bonded fixed partial denture enhances it's frequent usage in treatment plan and clinical practice. The high-Success rates of RBFPDs makes them a widely accepted and financially favorable treatment approach.[3]

Today, less RBFPDs are used as implants are now available. However, RBFPD is stillIndicated if either bone conditions are not suitable forImplants or if economic reasons prohibit more costly therapy. In patients with a missing tooth and perio-dontal involvement or after orthodontics treatment,RBFPDs may serve as transitional restorations. TheseRestorations require minimal tooth preparation and may serve as semi-permanent prostheses for several months or years [4]. As these restorations are less compli-cated, they are also recommended for medically com-promised or geriatric patients.

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