



Case Study

FOUNDATION OF RESTORATION – PIN RETAINED AMALGAM

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ABSTRACT

Dental amalgam has served as an excellent and versatile restorative material for many years. There is still no adequate economic alternative for dental amalgam. Pins are used whenever adequate resistance and retention forms cannot be established with slots, locks and other undercuts only. It is an important adjunct in the restoration of extensive carious teeth. Pins not only helps in binding of amalgam to the tooth but also binds weak tooth structure to the amalgam. This case report present the innovative technique that outlines the reconstruction of severely damaged posterior teeth with missing functional cusp.

INTRODUCTION

Complex amalgam restorations, defined as restorations that cover or replace at least one Cusp, have been shown to provide a longevity of clinical service approaching that of more conservative class II restorations. [1] Several clinical studies have demonstrated that high copper amalgams can provide satisfactory performance for more than 12 years. This appears to be true even for large restorations that replace cusps.[2]

Restorations of extensively carious teeth to an optimum state of health function and aesthetics continues to be a challenge for all operating dental surgeon.[3]

Since Markley's first report on the pin retention of amalgam in 1958 much research has been done on this topic.

In 1969, Moffa et al reported on the retentive properties of three different pin designs in dentin and amalgam. They noted that 2mm was the optimal retentive pin in dentin /pin in amalgam length for the self-threading pins and they

concluded that the self-threading pin was the most retentive one in dentin and amalgam.[4,5] Auxillary retentive provisions in the form of pins are often required for restoration of mutilated and broken tooth, especially in young patients in which pulp chamber is relatively large ,dental tubules are comparatively immature and gingival lines are still high.

CASE REPORT

A 28 year old male patient visited the department of conservative dentistry and endodontics with the chief complaint of food lodgement in the lower right back teeth region since 2 months.

The medical history of the patient was noncontributory.

On clinical examination the oral health condition of the patient is fair ,presence of extensive caries involving the buccal surface. The tooth was asymptomatic and no pain could be elicited. The tooth responded positively to the thermal and electric pulp testing . The involved tooth showed no signs of mobility. His radiographic examination

revealed the presence of carious lesion approaching but not involving the pulp with no signs of apical involvement.

The patient's informed consent and necessary ethical clearance were obtained. The procedure was started with the caries excavation and elimination of the weak enamel margins. Indirect pulp capping procedure done with dycal ,tofflemire matrix band and wedge placed and temporized with kalzinol. After 3 weeks the tooth was subjected to vitality test and positive response was obtained. A pin amalgam restoration was planned.

The procedure was started with reducing temporary restorative material to base. Gingival seat as well as from the walls the material was completely removed. A cove on the disto-buccal axial line angle was created to facilitate the placement of the pin and condensation of amalgam around it.

Next a pin channel was prepared at a depth of 2mm by using a customized drill on the gingival seat 0.5mm within the dentino-enamel junction[DEJ]. Cavity varnish was applied and a thread pin [Filpin FILHOL Dental UK] of 0.76 mm diameter was inserted in the pinhole by using a contraangled hand piece at a speed of 500 rpm. Tofflemire matrix band and the retainer were adapted around the prepared tooth with wedge. Silver amalgam was first condensed around pin and into the cove and it was gradually built up followed by precurve burnishing, carving ,checking of the occlusion and post carve burnishing. The finishing and polishing were done after 24 hrs.

Figure 1:Pre-operative photograph



Figure 2:Temporary restorative material reduced to base with cove preparation



Figure 3:Placement of pin



Figure 4: Post-operative photograph



DISCUSSION

Traditionally, amalgam has been the material of choice for the restoration of the direct cuspal-coverage of the posterior teeth. Smales et al found a 66.7% survival rate after 10 years for large, cusp-covered amalgam restorations [6]. McDaniel et al carried out a survey, which revealed that the leading cause of the failure among the cuspal-coverage amalgam restorations was the tooth fracture. They assumed that the main reason for the failure was a too conservative tooth preparation; they recommended the replacement of the weak cusps with large amalgam restorations [7].

Polymerization shrinkage is a major concern during the placement of the direct, posterior, Resin Based Composite (RBC) restorations. As compared to the similar amalgam restorations, the placement of a direct RBC restoration takes 2.5 times longer due to the complex sequence which is included in the incremental techniques (Roulet, 1997). Patients with para-functional habits are not the ideal candidates for similar treatments. If a conventional, continuous, fast-curing technique is adopted, the bonding interface may remain intact, but microcracks may develop just outside the cavosurface margins due to the stress of polymerization shrinkage [8].

Conversely, alternative, indirect methods for restoring the severely destroyed molars and the premolars with tooth

coloured and cast metal restorations are also available, but, the operative procedures for these are more complex and time consuming and they come at higher costs [9].

A well placed extensive amalgam restoration replacing one or more cusps may provide a long term successful alternative to a cast restorations. Historically extensive amalgam restorations have been retained with pins .[10] Pins do not obviate the need for the cavity preparation, but they rather complement the features of the cavity design. Pins by themselves incorporate stresses in the tooth structure. Hence, a judicious blend of minimal pins and cavity features are ideal, to have the maximum of the retention and the resistance features.[11] . Cetosino demonstrated extensive restorations retained with more numerous and smaller amalgam pins have greater resistance than those retained with fewer and larger amalgam pins.[10]

The principles of cavity preparation for pin retained amalgam are firstly the conservation of tooth structure and secondly the removal of remaining carious or weakened tooth structures.[11] The retention of the pin in dentin and amalgam depends on type ,surface characteristics ,orientation ,number and diameter of the pin. Even though the increase in number of pins provide good retention in dentin and amalgam ,it must be compared with potential problems created.[12]

The area that has to receive a vertical pin should be flat and perpendicular to the long axis of the tooth, and it should present a zone of dentin which is sufficiently wide for the placement of a pin. In general, any area which is designed to receive a pin should be reduced enough to allow a pin length of 2.0 mm and an amalgam covering of at least 0.5 mm around the pin and 2.0 mm occlusal to the pin. A cove is placed, to provide a sufficient bulk of amalgam all around [13].

The position of a pin depends on several factors, first of which is the internal morphology of the cavity. Secondly, the external morphology of the tooth must be considered. Thirdly, the anticipated bulk of the amalgam must be considered, since the pins which are placed in areas of greater bulk are less likely to weaken the amalgam. Finally, the anticipated points of the occlusal load must be considered, since a vertical pin which is positioned directly below an occlusal load weakens the amalgam significantly (Cecconi and Asgar, 1971) [13].

The prediction that the amalgam would not last until the end of the 20th century was wrong. Conversely, recent studies have concluded that the combined amalgam-composite cusp coverage restoration showed acceptable clinical performance over a period of time [14,15].

CONCLUSION

Amalgam restoration served for many years in dentistry as a restorative material irrespective of its aesthetic properties .Preservation of the tooth structure , low placement costs and reduced chair time will continue to make the amalgam the material of choice for many patients.pin retained restorations will probably overcome the reduction of

natural tooth structure and restore its normal function and anatomical contour irrespective of esthetics and prior replacement for the cast restoration as well as the crown. Amalgam will probably disappear eventually, but its disappearance will be brought about by a better and more aesthetic material, rather than by concerns over health hazards. When it will disappear, it will have served dentistry and patients well for more than 200 years

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