

MINIMALLY INVASIVE RESTORATIONS - A PARADIGM SHIFT ??



Dr. Sathyajith Naik N.
Professor



Dr. K.K. Shashibhushan
Professor



Dr. Satyaki Arora
Post Graduate



Dr. V.V. Subba Reddy
Principal
Professor & Head

Our dental schooling and training has been based on concepts with amalgams, and for most of us this has proved to be in good stead. But let us examine this a little further.

STANDARD CAVITY DESIGNS: DO WE REALLY NEED THEM?

A surgical approach to the elimination of a carious lesion was developed a century ago; this approach was necessary at that time, because there was no valid alternative. This approach required maximal intervention into the crown of the tooth. Destruction of sound tooth structure was necessary to ensure complete removal of the diseased portion and to obtain retention for the restoration. This led to a loss of esthetics, a potential alteration of the occlusal anatomy, weakening of the remainder of the crown, and further insult to the pulpal tissue that was already affected by the disease.¹

The standard designs concept embodies a mechanical solution to a biologic problem. As in the words of a champion of ART, Dr. Chris Holmgren "we do not think of cutting a finger to treat a finger nail infection". Consequential to large preparations are large restorations, less tooth structure, and hence more stress on restoration and a diminished capacity of the tooth to handle such stress.

The increased understanding of the carious process, the efficacy of non-invasive methods of containing lesion progression, and advances in the development of adhesive restorative materials have led to the reassessment of black's classic principles in favor of a more conservative approach to cavity preparation².

MINIMAL INVASIVE DESIGNS: THE PARADIGM SHIFT

The use of modified cavity designs for the treatment of initial carious lesions can be justified on the grounds that, because no restorative material can adequately replace natural tooth structure for remineralize and heal demineralized tooth structure to some degree.

Therefore, neither enamel nor dentin should be removed simply because it has lost calcium and phosphate ions as a result of acid attack. The significance of the fluoride ion was not known³. the function of the fluoride ion is now known and understood more clearly.

When we have adhesive materials like glass ionomers and dentin bonding agents, why do we need to depend on a mechanical design for purpose of retention. Composites and glass ionomer cements have undergone a sea of modifications, since the time of their introduction, and today have superior mechanical properties. Flexural modulus, wear resistance and surface hardness of composite resins are now adequate for a good performance in the oral environment.

Additional techniques such as slot preparations, tunnel preparations, and temporary tooth separation provide enough access without having to cut structurally sound marginal ridges and weaken the remaining tooth structure.

Newer concepts using minimal preparation and use of adhesive materials for restoration are more beneficial and should be adopted as a standard approach to each and every case of new restorations. This shift in thinking is needed, and we should move away from conventional approaches, from "cutting and filling" to "sealing and healing".

MINIMAL INVASIVE RESTORATIONS: THE CONCEPT

Use small round burs to approach and open carious lesions. Excavation of softened and carious dentin is mandatory. But occlusal/ enamel extensions need to be kept to the absolute minimum needed for effective excavation of softened dentin and restoration. Choose adhesive and bio-active restorative materials like glass ionomers, or adhesive and composite combinations.

Cover the adjacent occlusal pits and fissures with the restorative. In this way there are a number of benefits to be realized.

The Benefits:

Smaller restorations- less stress on restoration, hence longer life.

Smaller cavities- lesser preparation time, quicker. See more patients.

Less tooth removal- doesn't weaken tooth.

Less tooth removal- less painful, no anaesthesia needed usually.

ART or the Atraumatic Restorative Technique:

ART or the Atraumatic Restorative Technique is a method of caries management developed primarily for use in the Third World countries where skilled dental man power and facilities are limited and the population need is high. The technique uses simple hand instruments (such as chisels and excavators) to break through the enamel and remove as much caries as possible. The cavity is isolated using cotton rolls. When excavation of carries is complete (or as complete as can be achieved) the residual cavity is restored using a modified GIC. These GICs are reinforced to give increased strength under functional loads and are radio opaque.

Tunnel restoration:

The tunnel restoration, first described by Hunt and Knight represented a new approach to the treatment of approximal carious lesions in molars and premolars. A cavity is prepared in the occlusal surface, centrally to the marginal ridge, and a tunnel is made in the direction of the carious lesion. The preparation is filled with glass-ionomer cement. Fluoride release from the material is expected to reduce caries activity in the immediate environment and inhibit progression of the remaining carious tissue. The tunnel preparation is aesthetically more sound than an amalgam filling.⁴

Temporary tooth separation in tunnel restoration: the diagnostic and management problems associated with the restricted access to the approximal area, however, have limited use of this treatment modality. The difficulty of ascertaining the possible loss of enamel surface integrity is overcome by temporary tooth separation, which permits direct visual and tactile examination of approximal sites.⁵

Resin composite will only adhere to sound, well mineralized, beveled enamel, and it is not possible to develop such a margin around the proximal lesion under these circumstances.. It is important that the selected glass ionomer cement be the strongest available.

Slot preparation:

If the lesion is closer to the marginal ridge, it may be wise to modify the approach and enter the lesion directly from the occlusal aspect through the outer slope of the marginal ridge, thus forming a small "slot or box like cavity". A short piece of a metal matrix strip should be placed and wedged lightly in place if there is any risk to the adjacent proximal surface. This strip can be serve as a matrix for the final restoration. Only completely degraded enamel need to be removed. Demineralized affected dentin on the axial wall can be left in place.

The marginal ridge is retained as much as possible and opened laterally only enough to identify the extent of the lesion. The occlusal surface is not included unless it is frankly carious. The fissure can however be sealed, if necessary with the final restoration. A contact with the adjacent tooth to the buccal or lingual of the slot is retained wherever possible because it will simplify the redevelopment of a satisfactory contact area⁶.

A real life clinical situation:

Often we see multiple pits, in adjacent molars infected with caries. Compare the treatment modalities as outlined below

Conventional treatment philosophy insists on joining of all these pits / infected fissures.

Result of conventional approach:

Larger cavity preparation, more time spent,
Larger restorations- more stress on restoration with greater risks of failure, restoration of larger cavities also consumes more time, and sometimes need anaesthesia.

Minimal invasive procedure:

The infected areas are kept separate and restored as 3 small pits.

Restoration done with high density Glass Ionomer, ketac molar, procedure called "minimally invasive" restoration.

Result of minimally invasive procedure:

Small restorations- less stress and consequently less risk of failure

Less painfull- no anaesthesia

Quicker procedure, savings on time- see more patients

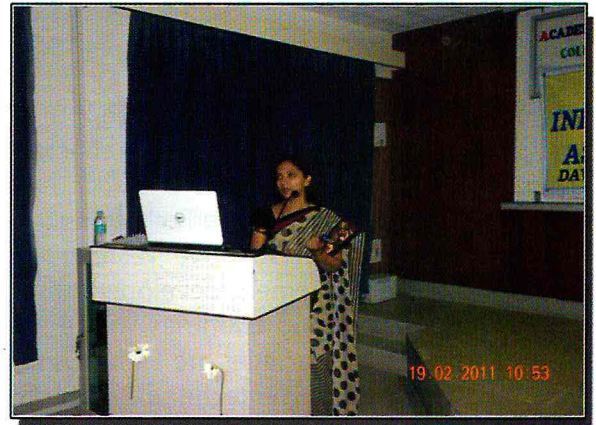
Multiple restorations can be done in a very limited time

Use of finger pressure technique causes better adaptation of GI, smoother restorations.

References:

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2. Knight GM. The use of adhesive materials in the conservative restorations of selected posterior teeth. Aus Dental J 1984;29:324-331.
3. Silverstone LM. The effect of fluoride in the mineralization of enamel caries nad caries like lesions in vitro. J Public Health Dent 1982;24:42-53.
4. S. Nicolaisen, F.R. von der Fehr, N. Lunder, I. Thomsen. Performance of tunnel restorations at 3-6 years. Journal of Dentistry 28(2000) 383-387.
5. Sibilla Bjarnason. Temporary tooth separation in the treatment of approximal carious lesions. Quintessence international volume 27, number 4/1996.
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Scientific Activities



CDE programme on "Esthetics in pediatric dentistry" by Dr.Nagalakshmi choudary on 19/02/2011



CDE programme on "Stress to bliss" by Dr.siddeshwaran held on 19/02/2011



CDE programme on video conferencing & internet application by Dr. Sadashivappa and Mr.Shivanand held on 05/05/2011



CDE programme on "How Special are we to treat ISHCN (Individuals with Special Health Care Need) by Dr. Shruthi held on 19/02/2011



CDE programme on "Periodontics - An overview by Dr. Vandana K.L held on 1/07/2011