



TECHNICAL REPORT

Building Proximal Contacts and Contours in Resin Composite Restorations: A Technical Report

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ABSTRACT: **Background:** Direct Posterior Composite restorations are one of the most commonly practiced restoration in clinical practice. It is considered to be the best alternative among all metal free restorations owing to low cost, satisfactory clinical success rate, relatively simple procedure not but least preserve remaining tooth structure in accordance to minimal invasive dentistry. Obtaining a precise contour and contact for class- II composite restoration or reconstruction is challenging as the most frequently faced complications are open contact leading to food impaction and post-operative sensitivity. Inefficient contour result in faulty occlusion and excessive wear of the restoration. Improper contact jeopardizes the health of the entire periodontium such as increased gingival inflammation, attachment loss apart from overhanging restorations. So the primary objective of a class II resin composite restoration is to create a functional and predictable ideal physiological proximal contact. Numerous techniques and special armamentarium are needed to overcome the problems encountered in such clinical situations. **Conclusion:** This technical report shows various matrices and techniques that are used to overcome the open contact problem. These are evidence based solutions that can be used in clinical practice.

Keywords: Proximal restorations, class II restorations, dental amalgam, resin composite

Though amalgam has a legendary history of better strength and clinical success rate, the patient's desire and demand has sidelined it over aesthetic restorations. Achieving a tight proximal contact with silver amalgam is very simple and easy owing to its property of application of positive pressure during condensation. But the difficulties encountered with resin composite are its inability to exert positive pressure due to its viscoelastic

property since these materials depend on the contour and position of matrix^[1,2] which is considered as a first problem. This property off late is being improved with better materials such as packable composites ,pre-polymerised composites, glass ceramic inserts

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etc which not only increased packing force capacity but also improved the performance in clinical situation and in achieving optimum proximal contacts and contours ^[3,4].

The second problem with resin composite is polymerisation shrinkage. Since the composite resin have tendency to pull away from cavity walls during polymerization, contraction gap is formed which permits ingress of microorganisms and oral fluids leading to marginal leakage, hypersensitivity, marginal staining and secondary caries resulting in clinical failure^[5,6]. This property is also being handled by use of special instruments for placing composite resins, using wedges, separating rings and matrix systems and performing various polymerisation protocols such as incremental oblique techniques, modified pin ball technique etc.

Difficulty in obtaining optimum contouring in the proximal contacts is also attributed to the morphological outline of the tooth structure which is convex in both cervical – occlusal and buccal - lingual direction, inadequate visibility and access and requirement of a perfectly adapted matrix for contouring ^[7]. To encounter such difficulties and also to achieve the optimum proximal contour variety of matrix systems are being introduced. A few studies have reported the effectiveness of some matrix systems such as Pre- and non-contoured, straight, sectional and circumferential metal or plastic matrix bands

combined with separation rings with or without the use of retainers, but no studies prove them to be effective in reconstructing the contact and contour similar to intact tooth.

Tight contacts can be mastered through various methods using different hand instruments and different polymerization protocol. Enumerated below are the various methods

Varied hand instruments:

- Circumferential matrix
- Sectional matrix band
- Saddle matrix
- Light transmitting hand instruments
- contact forming instrument

Varied polymerisation protocols

- Incremental oblique layering technique
- Modified Pin ball technique
- Trans wedge curing technique

BUILDING CONTACT USING CIRCUMFERENTIAL RETAINER WITH POLYESTER MATRIX BAND (Fig 1)

This technique involves using circumferential retainer (Tofflemire) with transparent matrix band and light transmitting wedges.

Advantages:

Since it is transparent, various curing protocols can be followed such as Trans enamel curing, Trans wedge curing etc.

Disadvantages:

Can create flat anatomical contour if not done properly

BUILDING CONTACT USING SECTIONAL MATRIX SYSTEM(Fig :2-A,B,C,D)

The first contoured sectional matrix was introduced in 1985 by Meyer which has an anatomically pre- contoured metal band and a contact ring which works on the principle of orthodontic separator ring. Sectional matrices are thin and it has widest style selection with a cervical extension for sub-gingival restorations.

The matrix was stabilized with means of

wooden wedges placed distally and mesially which plays a role in providing optimum gingival adaptation of the matrix band.

Advantages:

Good contour can be achieved in small cavities and also by burnishing the band of those portions turned to the proximal surfaces which allows easier recontouring of the proximal convexity.

Tight proximal contact^[2].

Disadvantages:

Various curing protocols cannot be followed



Fig 1 : circumferential retainer with polyester matrix band and light transmitting wedge



Fig 2A: contact ring-commercial brand



Fig 2B: contact rings with matrix bands



Fig 2C: contact ring on the mesial aspect of 36 with wooden wedge



Fig 2D: burnishing the band

BUILDING CONTACTS USING SADDLE CONTOURED METAL MATRIX (Fig 3-A,B,C)

Saddle matrix system is the one with retainer particularly used for contacts involving wide axial angles which cannot be contoured using sectional matrix. This system is supplied with a spring clip or clamp whose tines are inserted into cylinder shape tubes in the edges of saddle matrixes .

Advantages:

Simple and easy to use

Disadvantages:

Highly technique sensitive

LIGHT TRANSMITTING HAND INSTRUMENTS/ CONTACT FORMER: FOTO PLUS(Fig 4-A,B,C)

Unique Light transmitting hand instrument made of polycarbonate. It transmits the light thus helps curing resin composite in the gingival margin which is a critical area, thereby eliminating gingival contraction gap. Studies have shown that there is statistically significant reduction in marginal infiltration,



Fig 3A: Saddle matrix



Fig 3B: Retainer in place with wooden wedge



Fig 3C: Burnishing against axial wall will produce optimum contact and contour



Fig 4A: Light transmitting hand instrument- foto plus



Fig 4B: Curing through the tip of the instrument

when the first increment is held under pressure in proximal box during its polymerisation.

Technique using Foto plus

Select the tip that best adapts to the proximal box to act as a piston on the resin inside the cavity. First increment is kept under pressure while being polymerized

CONTACT GOLD (Fig :5-A,B,C)

It is also light transmitting hand instrument made of polysulfone. It is specially made to build ideal shape and consistent contact points in class II composite restorations.

Supplied as a kit with two instruments specifically to be used in moderate and extensive cavities. It is a double ended instrument, one being used for mesial cavity

and the other end for distal cavity. The working tip of the instrument has a slot in the convex prongs which simulate physiologic contacts better than straight sided light tip attachment^[8].

Positive pressure can be applied through this instrument in the proximal box region.

Technique using contact gold

Select the appropriate instrument,

Place the first increment in the cavity.

Position the instrument and move it against the adjacent tooth mesial-pull and distal –push forcing the matrix to make contact with it.

After curing the increment remove the instrument. Complete the curing with further increment.



Fig 5A: Light transmitting hand instrument- contact gold



Fig 5B: Application of positive pressure



Fig 5C: Curing tip is positioned & curing initiated

VARIOUS POLYMERIZATION

PROTOCOLS:

INCREMENTAL OBLIQUE

TECHNIQUE: (Fig 6-A,B,C,D)

This technique when used in combination with light transmitting wedges reduces gingival shrinkage, though it cannot be eliminated^[9].

Studies have proved that this technique can minimize cusp contraction, reduces the possibility of enamel fracturing as well as polymerisation shrinkage^[10].

Technique:

This technique takes advantages of composite resin contraction.

The first increment is placed obliquely in the gingival margin and cured, which pulls the composite lingually and gingivally.

The second increment is placed in oblique to

the first increment and cured, which pulls the composite buccally and gingivally.

Final increment is placed occlusally and cured.

MODIFIED PIN BALL TECHNIQUE:

(Fig 7-A,B,C,D,E)

Flat shaped resin composite conforming to the shape of contact area is polymerized outside and used as pre-polymerised resin composite insert, This flat/convex resin insert is wedged into unpolymerised composite resin in the proximal box against the transparent matrix band. Using of contact forming light transmitting hand instrument, positive pressure is applied in the proximal box and can be torque towards adjacent tooth and curing initiated in similar manner as mentioned above.

Various curing protocols can also be used

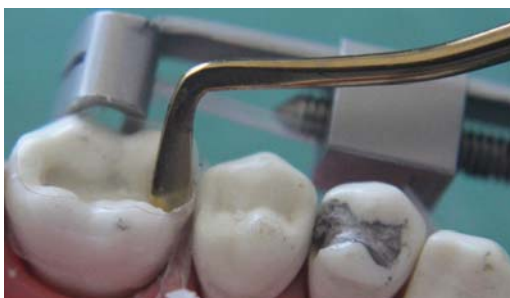


Fig 6A: First oblique increment on buccal wall



Fig 6B: Second oblique increment on palatal wall



Fig 6C: Occlusal increment



Fig 6D: Completed restoration

such as trans- enamel curing, Trans - wedge curing, ramp curing, pulsed curing, soft start curing, ramped curing, delayed curing etc. All this curing protocol is done to minimize the polymerization shrinkage.

The composite resin that is closest to the light is often the most polymerised and it is the hardest part of the restoration. Because this layer is removed with Occlusal adjustments and polishing placement of sealant and post curing are necessary since they reduce wear on the restoration.

CONCLUSION:

Achieving precise contact and contour is very challenging for clinician, which requires both knowledge and skill. This technical report attempted to highlight the techniques along with rationale of its use. Correct blend of both parameters will pave way for highly successful proximal resin composite restorations.



Fig 7A : Prepolymerized custom resin insert

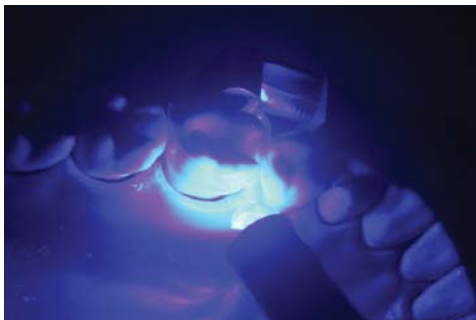


Fig 7B: After curing of resin insert, curing protocol started with trans wedge curing



Fig 7C: Trans enamel from buccal side



Fig 7D: Trans enamel curing from lingual side



Fig 7E: Completed restoration

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