



RESTORATIVE MATERIALS AND TECHNIQUES FOR PRIMARY TEETH

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RESTORATIVE MATERIALS

- The restoration of carious primary teeth is still a major treatment need in young children.
- Despite the decline in dental caries in children, many carious lesions in primary teeth are untreated, leading to pain and extractions (kilpatrick et. Al., 1995).

RESTORATIVE MATERIALS

- Child dental **health** survey (1993) about 45% of the 5 year olds have decay experience and need to restore the teeth for normal function.
- The demands made for a restoration in the primary dentition are somewhat different from those in the permanent dentition.

WHY DIFFERENT DEMAND ?

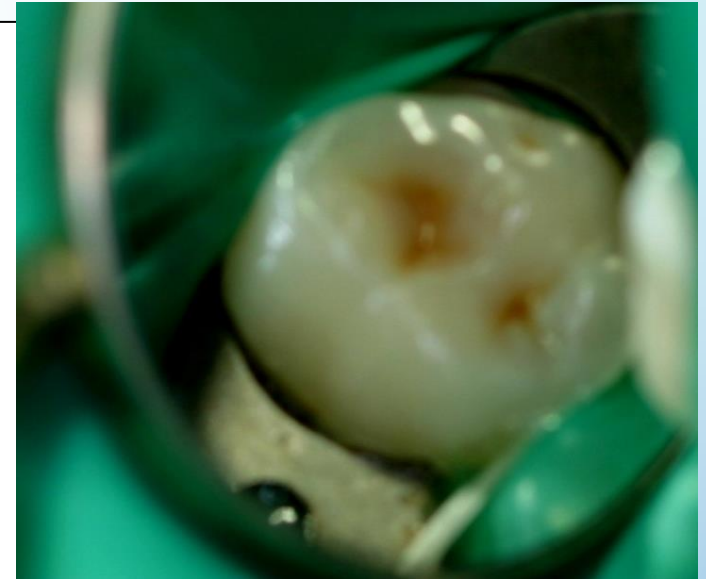
- Limited life span of the teeth themselves
- Variable levels of cooperation achieved by children
- Different morphology of primary teeth.

MORPHOLOGY OF PRIMARY TEETH

- Greatest convexity at cervical third of the crown
- Mesiodistal width and crown length
- Enamel and dentine thinner
- Larger pulp with prominent pulp horns
- Pulp close to the mesial surface
- Contact areas broad and flattened
- Longer, more flared and slender molar roots

WHY RESTORE PRIMARY TEETH?

- Restoration of function
 - Mastication
 - Speech
 - Aesthetics
 - Occlusion
- Prevention of pain or sepsis
- Prevention of space loss
- Maintain occlusal height and arch length



WHY RESTORE PRIMARY TEETH?

- It may cause damage to permanent successor e.g., Turner's tooth
- Prevention of future caries developing
- Levels of streptococcus mutans and lactobacilli and substrate decrease when cavities have been treated
- Build up dental awareness and cooperation of patient and parent

REQUIREMENTS OF MATERIALS FOR PRIMARY DENTITION

- Can have lower masticatory and biting forces
- Less durable materials may be adequate and acceptable
- Wear resistance of the material can be less since primary teeth may exfoliate sooner or later after placement of restoration
- The need for longevity of restoration is less

REQUIREMENTS OF MATERIALS FOR PRIMARY DENTITION

- **Setting reaction** should be **quicker** - limited attention span
- Materials may be **less technique sensitive** - moisture control is difficult in child patient and difficulties in isolation
- Materials must be **able to tolerate presence of moisture**

REQUIREMENTS OF MATERIALS FOR PRIMARY DENTITION

- Materials should have **adequate strength if less bulk**, since primary teeth is small, small lock (width and depth) and have wide proximal box. The cavity tend to be wider and more shallow
- **Good adhesives properties** since this will provide comfort to child since less cavity preparation is required

TYPE OF MATERIAL AVAILABLE

- Amalgam
- Stainless steel crowns
- Composite resins
- Glass ionomer cements
- Resin modified glass ionomer cements
- Compomers
- High viscosity glass ionomer cements
- Lining cements (Calcium hydroxide hard setting cements & GLC)
- Temporary cements (Zinc oxide eugenol, intermediate restorative material)

STAINLESS STEEL CROWNS

ADVANTAGES

- DURABILITY
- LONGEVITY
- RELATIVELY INEXPENSIVE
- MINIMAL TECHNIQUE
- FULL CORONAL COVERAGE

DISADVANTAGES

POOR AESTHETICS



STAINLESS STEEL CROWN VS AMALGAM

Study	n SSC Am	Failure rate SSC Am	Study Duration	Patient Age at Placement
Braff (1975)	76 150	30% 89%	2.7	4.2 yrs
Dawson et al (1981)	64 102	12% 71%	2 (min)	5.5 yrs
Messer & Levering (1988)	331 1,117	12% 22%	5	4-7 yrs
Roberts & Sherriff (1990)	673 706	2% 12%	10	6-7 (amlg)
Einwag & Dunninger (1996)	66 66	6% 58%	8	n/s

AESTHETIC SSC

Advantages

- Good initial aesthetics

Disadvantages

1 or 2 shades

De-bonding

Expensive

INDICATIONS FOR SSC'S

- Pulp therapy
- Multi surface caries
- Developmental defects
- Early wear and loss of occlusal height
- Amalgam or large restorations likely to fail
- Fractured teeth
- Young children with high caries risk treated under GA



CLINICAL PROCEDURE

1. *Evaluate the preoperative occlusion*

Note the dental midline and the cusp to fosse relationship bilaterally

2. *Selection of crown*

Crown should have adequate mesiodistal diameter, proper occlusogingival crown height and light resistance to seating

3. *Tooth preparation*

CHECKING FINAL CROWN ADAPTATION

- The crown must snap into place
- The crown should not rock on the tooth
- The properly seated crown will correspond to the marginal ridge of the adjacent tooth
- The crown should be in proper occlusion
- There should be no blanching of the gingival tissues
- The crown margin extends 1mm gingival to the gingival crust



- TOOTH STATUS
- PRIOR TO CEMENTATION
- AFTER CEMENTATION

TIPS AND TRICKS

- When fitting crown on both first and second primary molar together, more reduction interproximally
- Try fitting SSC on second primary molar first
- If first permanent molar un-erupted, ensure adequate distal reduction of second primary molar to fit appropriate SSC → prevent **impaction** of first permanent molar
- Size **4** is most common size for second primary molars
- Size **4** or **5** most common for first primary molars

MATERIALS USED FOR RESTORATION

AMALGAM

Advantages

- Easy to manipulate
- Good durability
- Lower cost
- ↓ Microleakage with time
- Not technique sensitivity

Disadvantages

- Not aesthetic
- Mercury issues
- Not conservative

AMALGAM

- Failure rates class II restorations -12%-70%
- Amalgam class II might not be appropriate for high risk, very young patients
- Amalgam class II is most suitable for small preparations

RESIN COMPOSITE

Advantages

- Good aesthetics
- Micromechanical bond to enamel
- Bonds to dentine via hybrid layer
- Conservative of tooth structure

Disadvantages

Shrinkage

Microleakage

Secondary caries

Technique sensitive

RESIN COMPOSITES

- Filler size affects: ability to polish / aesthetics, polymerisation depth, shrinkage, and physical properties
- Smaller filler particle size : Greater ability to polish
- Large size: strength
- Hybrid resins-mixture
- Nanotechnology: Filler particle size in nanometer range, high polish, also forms clusters for strength

FLOWABLE RESIN COMPOSITE

- Filler loading 37%- 53%
- Ability to flow into sharp angles and surface irregularities
- The lower the filler content
 - More polymerisation shrinkage
 - Increased wear

PACKABLE RESIN COMPOSITE

- Highly filled CR with viscous resin matrix
- More condensable
- Physical properties
 - Increased wear

GLASS IONOMER CEMENTS

Advantages

- Chemically bond to both enamel and dentine
- Conservative prep
- Biocompatible
- Uptake & release fluoride
- Decreased moisture sensitivity

Disadvantages:

Wear

Poor Strength

Not suited for high stress bearing area

RESIN-MODIFIED GIC

- 80% GLASS IONOMER MATERIAL
- 20% VISIBLE LIGHT POLYMERIZED RESIN
- ACID-BASE AND LIGHT-CURING
- INCREASED STRENGTH AND SOLUBILITY RESISTANCE
- ADHESION - IONIC INTERACTION AND MECHANICAL INTERLOCKING OF THE POLYMER TO THE DENTINE

RMGIC

Advantage

- Fluoride release
- Dual cured
- Conservative prep
- Aesthetic appearance
- Easy to use
- Less technique sensitive

Disadvantage

? Mechanical

Strength and aesthetic

Properties < composite resin

COMPOMER

Advantages

- Easy to use
- More moisture tolerant than CR
- Superior physical properties to GIC/RMGIC
- ? Fluoride release
- Similar aesthetics to CR

Disadvantages

Wear

? longevity (lack of long term studies)

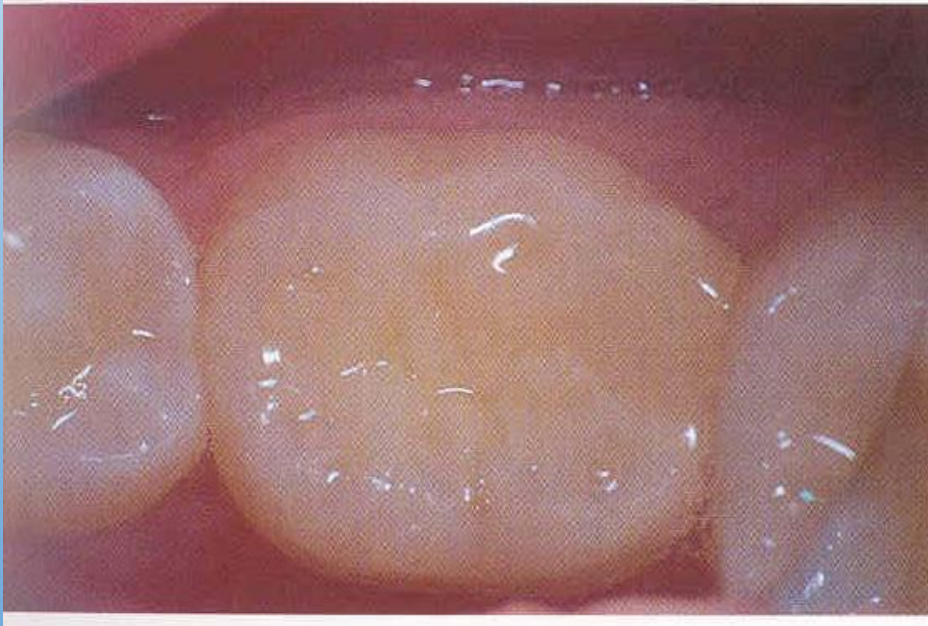
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RESTORATION OF POSTERIOR TEETH



SLOT CAVITY

- SLOT CAVITY (DISTAL MARGIN)
- PLACEMENT OF RMGIC



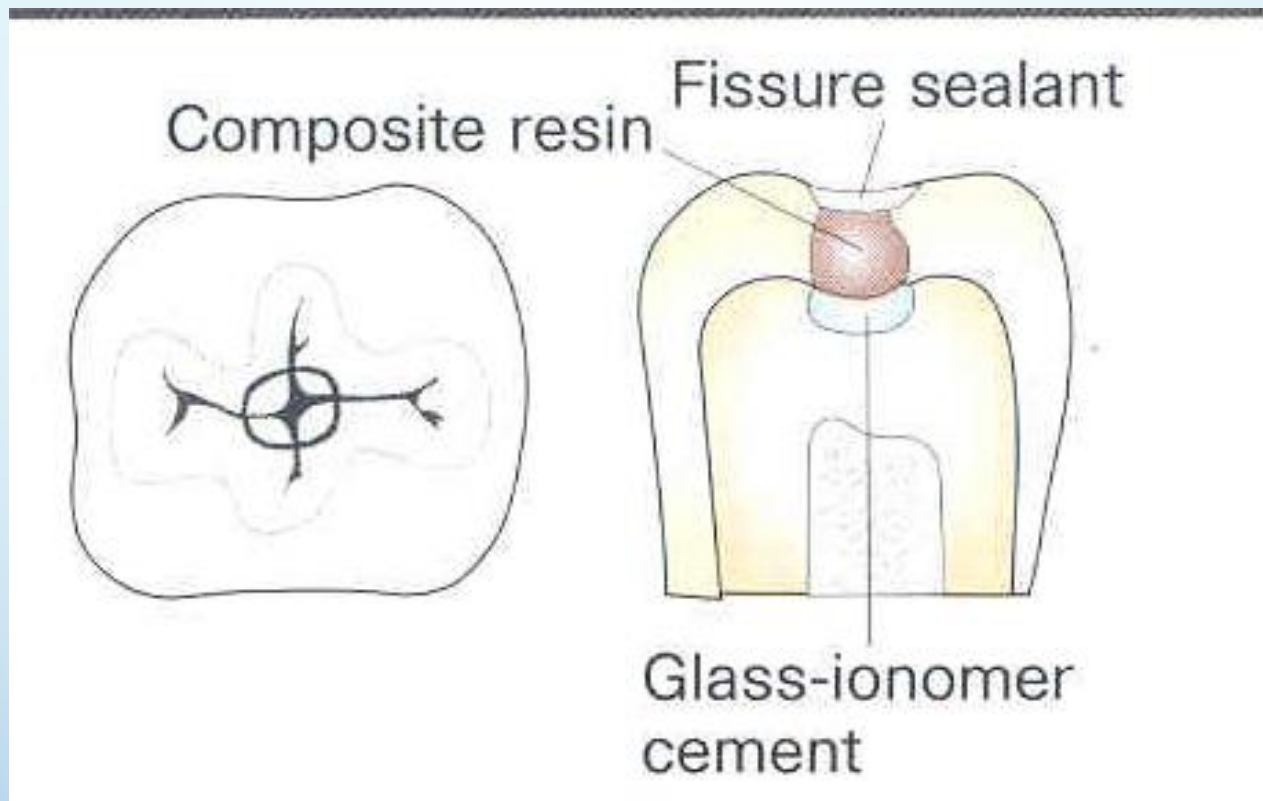


- TUNNEL TECHNIQUE (DISTAL MARGIN)
- RESTORED WITH RMGIC

PREVENTIVE RESIN RESTORATION

- Pit and fissure caries
- Only caries removed → composite resin → fissure seal remaining fissure system
- Developed as an alternative to “extension to prevention” in 1997 (simonsen)
- Minimal intervention technique





- TYPE A - CARIES CONFINED TO ENAMEL
- TYPE B - INCIPIENT LESION IN DENTINE THAT IS SMALL AND CONFINED
- TYPE C - CHARACTERIZED BY GREATER EXPLORATORY PREPARATION IN DENTINE

PREVENTION RESIN RESTORATION

- Prospective clinical trial, split mouth design, amalgam or PRR, 150 pairs of permanent molars over 5 years
 - No significant difference between amalgam & PRR (11 / 8 failures)
 - Amalgam occupied 25% / PRR 5% of occlusal surface (Welbury et al, 1990)
- Retrospective study of 2,000 PRR over 8 years (permanent teeth)
80% sealant remained ; 98% of the composite remained intact (Walker & pinkham, 1990)

Studies on PRR in primary teeth are lacking

SSC OR AMALGAM OR CR OR GIC

- Kilpatrick (1993) review
- SSC most durable restorations
- Class II amalgam restorations good survival up to about 3 years, prone to fracture
- CR at least as durable as amalgam over short term
- 4- year survival time
 - Amalgam 60%
 - Composite resin 40%
 - GIC 5%

GENERAL ANESTHETIC

- > 50% of children who returned after receiving care with general anaesthesia required additional treatment in < 6months *berkowitz et al (1997)*
- SSC's used when treating children under GA
 - Full coverage, superior durability, and longevity
 - Decrease the frequency of re-exposure to GA
 - Decrease associated costs
 - Young children + gross caries + behavioural / medical problems + GA → SSC's

Thank you part 2 in next lecture

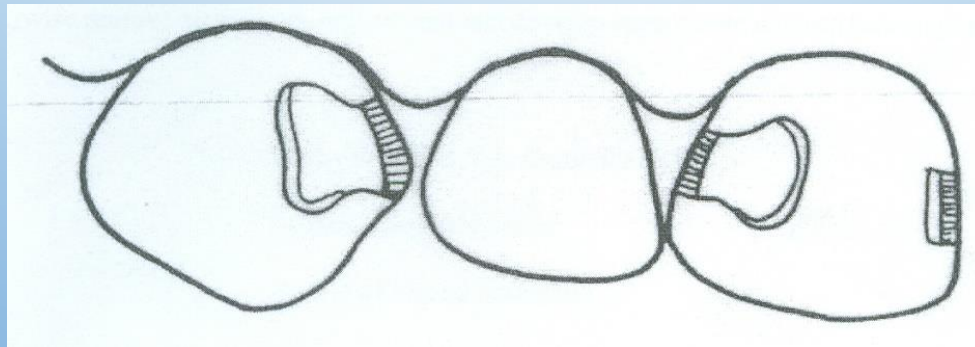


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RESTORATION OF PRIMARY ANTERIOR TEETH

DIFFICULTIES IN PLACING CLASS III RESTORATIONS

- Technique sensitivity
- Retention of small class III restorations is not adequate
- Inadequate tooth surface for bonding



FULL CORONAL RESTORATION INDICATIONS

- Decay is present on multiple surfaces
- An incisal edge is involved
- There is extensive cervical decalcification
- Pulpal therapy is indicated
- The caries lesion is small, but oral hygiene is poor
- Patient behavior makes moisture control or precision preparations difficult to achieve

COMPOSITE STRIP CROWN

Advantages

- Superior aesthetics
- Reasonable cost
- Less time for placement

Disadvantages

- Technique sensitive
- Less durable
- Rely on the dentin and enamel for retention



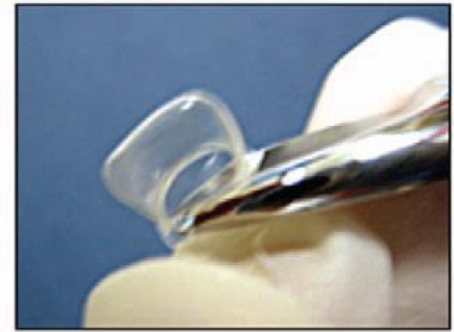
Available as:

- Unitek strip crown
- 3M, St. Paul crown

COMPOSITE STRIP CROWNS



COMPOSITE CROWN TECHNIQUE



POLYCARBONATE CROWN

ADVANTAGES

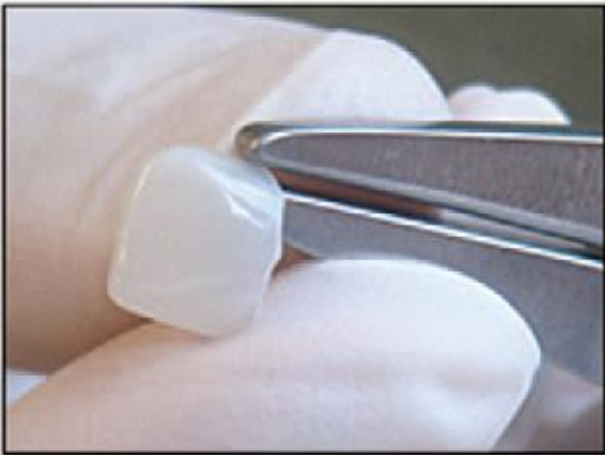
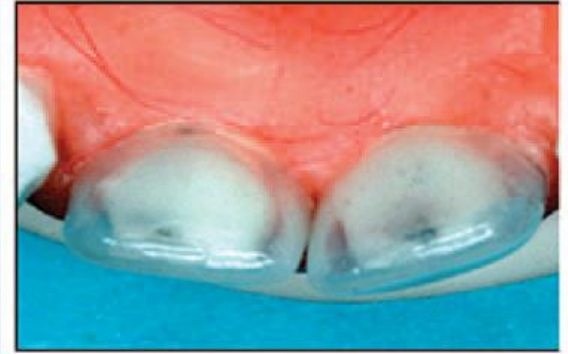
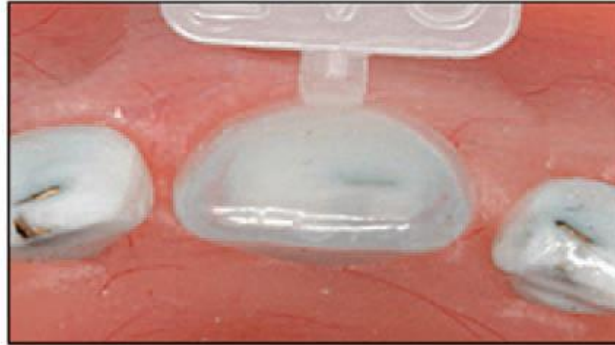
- Aesthetic
- Less technique sensitive
- Take the same time as other crowns

DISADVANTAGES

- Not recommended in heavy bruxers
- Greater tooth reduction required



POLYCARBONATE CROWN TECHNIQUE



PRIMARY ZIRCONIA CROWN

- Mechanical properties very similar to metals, yet color similar to teeth
- Ready-made primary zirconia crowns are available for primary incisors (ZIRKIZ, HASS corp; korea)



Karaca et.al 2013

CLINICAL TECHNIQUE

- Caries moved with stainless steel round burs
- Facial and lingual reduction 0.5-1.0 mm
- Occlusion checked to insure clearance
- Interproximal reduction creating parallel mesial and distal walls 1-2 mm subgingivally
- Zirconia crowns should fit passively
- Light-cure resin cement is recommended for cementation of ZIRKIZ crowns.
- Zirconia crowns have superior esthetics and natural appearance with short chair time.

CROWNS WITH LABIAL FACING



RECOMMENDATIONS FOR ANTERIOR RESTORATIONS

(A) *Resin-based composite*: class III, IV and V

(B) *GIC & RMGIC*: used if cannot isolate well

(C) *full coverage crowns*:

- Multiple surface caries
- Incisal edge involved
- Pulpal therapy
- Hypoplastic defects
- Poor moisture and hemorrhage control

ESTHETIC RESTORATION OF DISCOLORED PRIMARY INCISORS



Case I





Case 2: Discolored primary incisors esthetic restoration



Fred S Margolis 2005

ESTHETIC RESTORATION OF PERMANENT INCISORS

CHALLENGES FACED TO RESTORE NORMAL OPTICAL AND FUNCTIONAL CHARACTERISTICS

- Natural color transition from tooth to restoration
- Opacification to mask intraoral background
- Translucent incisal edge (young age)
- Natural surface texture as well as a good overall shade match

Good results can be obtained using layering technique understanding basic concepts of light and color. Composite material of various shades and translucencies (enamel, dentin or body, translucencies) and optical properties close to those of the missing tooth structure used to restore.

Layering Technique



Silicone index



Lingual enamel

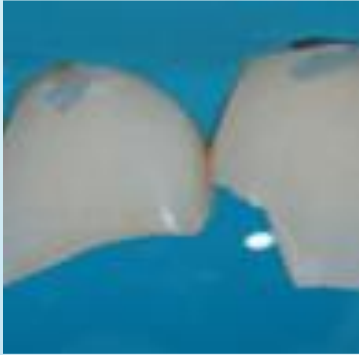


Dentin increments



Final enamel layer





Silicone index



Palatal enamel



Dentin



Interproximal wall reconstruction



Color effect

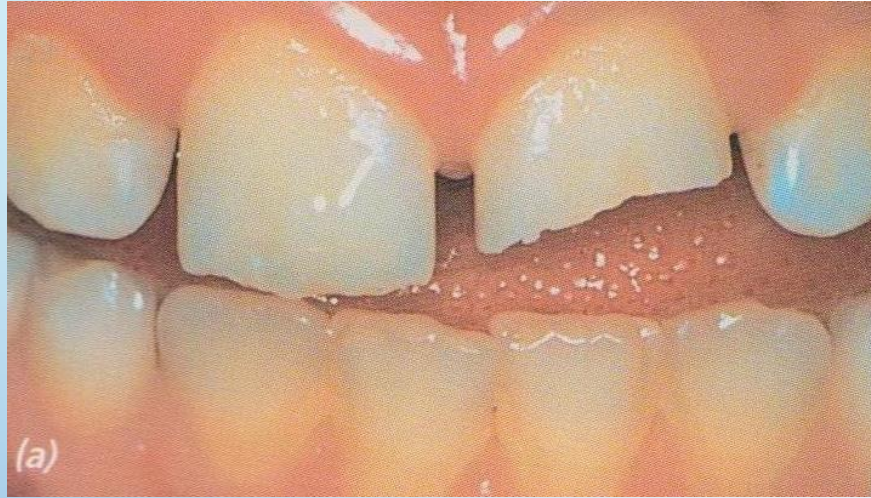


A3 in the middle third progressing to
A1 incisal third



Vestibular enamel

REATTACHMENT OF A CROWN FRAGMENT



CHOOSING THE RIGHT MATERIAL

- Lifespan required for the restoration
- Caries risk
- Size of restoration
- Moisture control
- Desires of the parents and patient

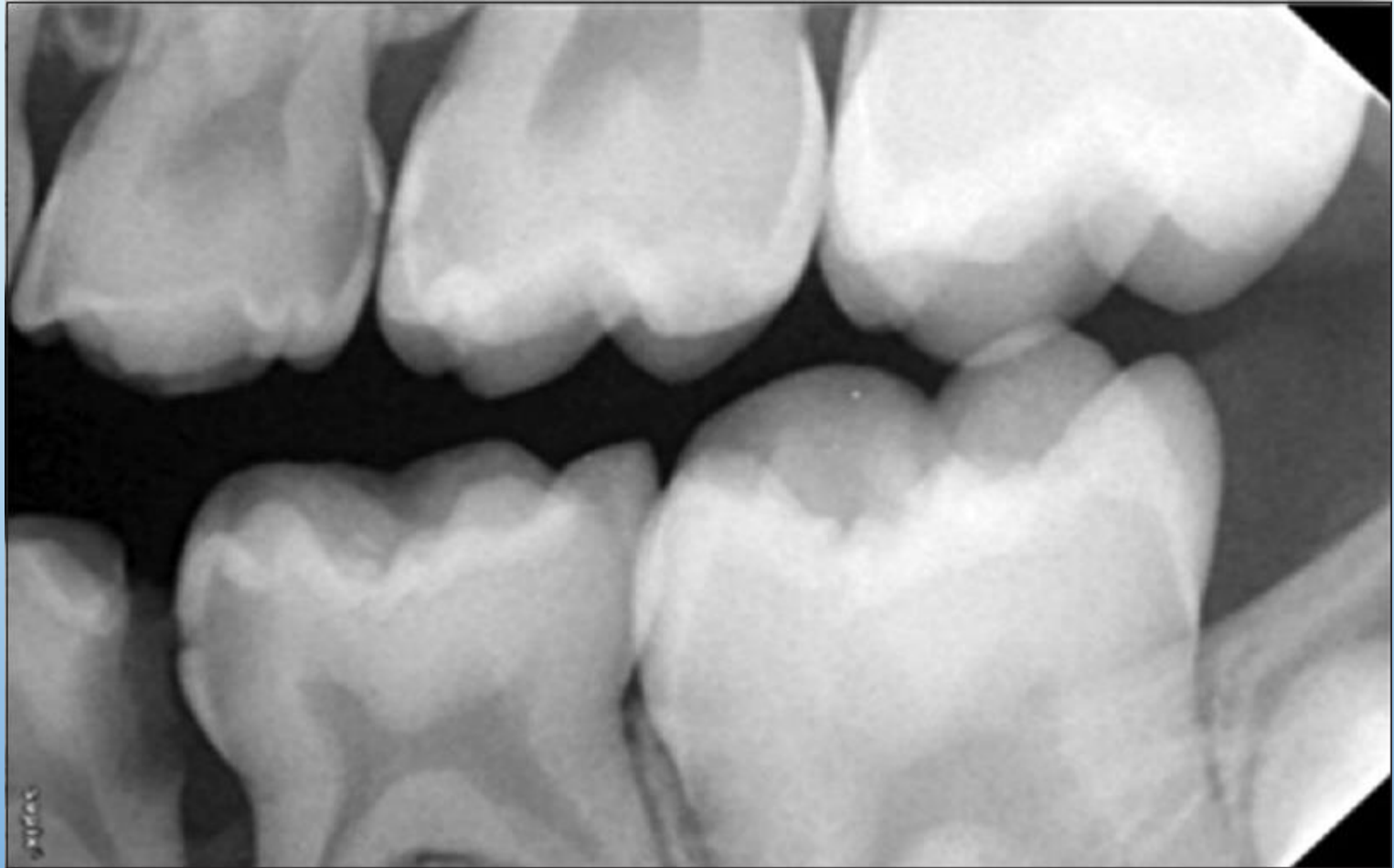
SUMMARY

- Aim for the ideal
- All treatment decisions should be based on sound scientific background
- Ideal environment for placement of restorations may not always be achieved
- Main aim is to avoid re-treatment

CONCLUSION

Mastering these techniques will help the dental health professional meet today's parents demand for their children's teeth to be restored for function and aesthetics.

Clinical Problem Solving and Discussion







(a)



(b)





THANK YOU FOR YOUR KIND ATTENTION

