

Caries of primary teeth.

Treatment

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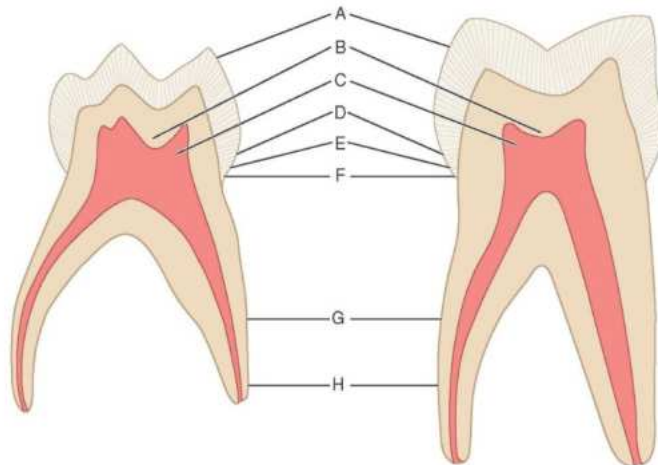
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Caries of primary teeth

Caries of primary teeth

Rapid progression:

- children's nutrition and eating habits
- not proper oral hygiene
- deciduous teeth differ in structure and mineralization



Order of appearance

1. Incisors
 - along the neonatal line
 - circular spreading
2. 1. primary molars
 - 2-3 years of age
 - occlusal caries
3. 2. primary molars
 - 3-4 years of age
 - on the occlusal surface
4. Approximal caries
 - cessation of self-cleaning surfaces due to the appearance of contact points



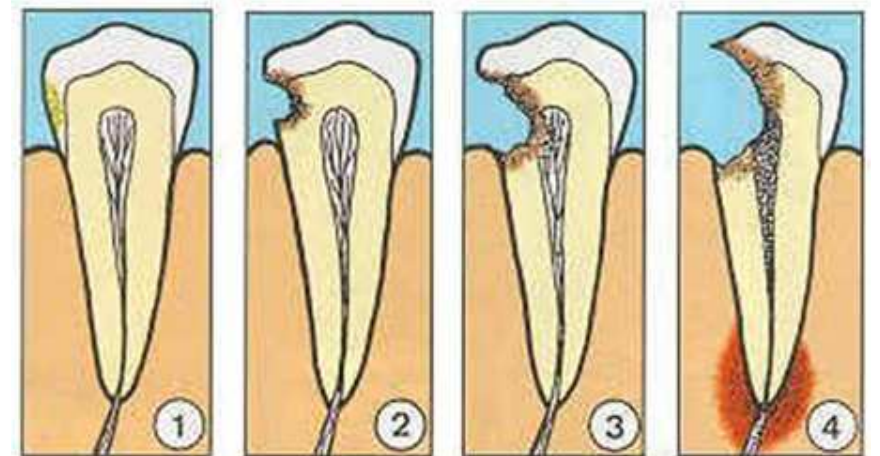
Classification

Quality:

1. Caries sicca
 - relatively hard
 - brown, broken surfaces
 - slower progression
2. Caries humida
 - softened hard tissues
 - rapid progression
3. Circular caries „rampant caries”

Depth:

4. Caries superficialis
5. Caries media
6. Caries profunda
7. Caries penetrans



Classification

Localization:

1. Occlusal caries (fissure/pit)
2. Approximal caries
3. Smooth surface caries



Early childhood caries (ECC)

Definition

„ the presence of

- one or more decayed (non-cavitated or cavitated lesions)
- missing (due to caries), or
- filled tooth surfaces in any primary tooth
- in a child under the age of six”
- severe early childhood caries (S-ECC)
 - 1) – 3 yo : any sign of smooth surface caries
 - 2) 3-5 yo: 1 or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth
 - 3) dmf- score :
 - ≥ 4 (3 yo)
 - ≥ 5 (4 yo)
 - ≥ 6 (5 yo)



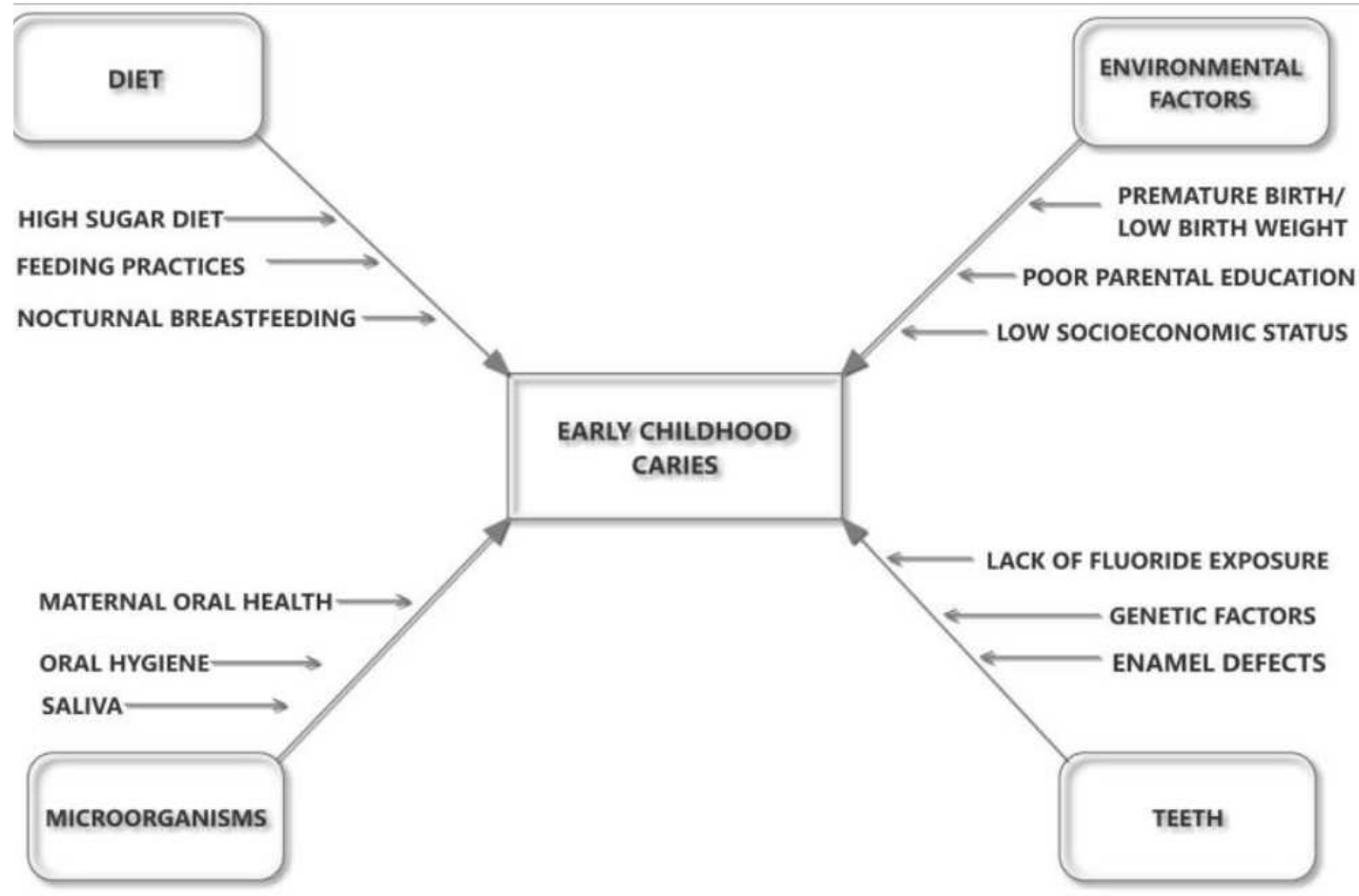
Policy on early childhood caries (ECC): Consequences and preventive strategies. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry; 2022:90-3.

Nursing bottle/ circular caries

- ~ 48%
 1. on the palatal surface of the upper incisors along the neonatal line
 2. approximal surface
 3. labial surface
 4. posterior teeth
- Lower front teeth are protected by the cleaning effect of the saliva and by the tongue



Etiology - multifactorial



The influence of host-microbe-diet interactions in the etiology and pathogenesis of early childhood caries. Anil S, Anand PS. Early Childhood Caries: Prevalence, Risk Factors, and Prevention. *Front Pediatr.* 2017 Jul 18;5:157. doi: 10.3389/fped.2017.00157. PMID: 28770188; PMCID: PMC5514393.

Nursing bottle, pacifier

- Get the babies to sleep
- Usually filled with fermentable carbohydrates (juices, sugary tea, cocoa)
- In contact with the palatal surface of the not fully mineralized, newly erupted teeth
- Long exposure (8 hrs/day)
- Low salivary flow rate and buffering capacity



Other etiological factors

- "cup with handles ", sport bottles
- Calming down the child by breastfeeding after 1 year of age
 - breast milk: 7% lactose
 - frequency and the method of consumption is harmful
- Parents' active, untreated lesions



Treatment of the decayed primary teeth

Why is it important to treat them?

- prevent or relieve pain
- maintain proper mastication
- speech development
- psychological, and social development
- reduction of cariogenic milieu when the permanent ones erupt
- prevent pulp inflammation → prevent developmental anomaly of the permanent germ (Turner's tooth)
- prevent orthodontic anomalies



Difficulties and possibilities of treating children

Difficulties:

- lack of / minimal compliance
 - mental immaturity
 - fear of the unknown (strangers, unfamiliar situations)
- the smallest uncomfortable or painful experience --> fear --> refuse treatment
- small teeth with multi-surface lesions

Aim: start with **non-restorative methods** (*NRCC- non-restorative cavity control*)

goal:

- decrease CFU (colony forming units)
- arrest active lesions, slow down the progress
- facilitate remineralization
- gain their trust

Non-restorative methods – varnishes

- Pros:
 - topical effect – remineralization ↑
 - reservoir: slow and constant rate of agent release
 - ease of use
 - no / minimal systemic effect
- Cons:
 - reapply every 3-6 months: more frequently in risk-patients
 - rarely. side effects – stomatitis, burning sensation

Non-restorative methods – varnishes

- Fluoride varnishes:
 - NaF (22 500ppm F⁻)
 - SDF – silver diamine fluoride
 - 38 % : 25% silver (253 900ppm), 5 % fluoride, 8 % ammonia
 - creates calcium fluoride deposits on the tooth surface and a deposition of the silver phosphate layer
 - silver:
 - pros: antimicrobial (bactericid) effect
 - cons: permanent black staining, silver allergy!
 - SDI Riva Star : + KI (potassium iodide) → silver iodide: creamy, white precipitate




<https://www.sdi.com.au/au/product/rivastar/>



STEP 1:
CLEAN THE AFFECTED TOOTH, ISOLATE AND DRY THE SURROUNDING

STEP 2
APPLY PETROLLEUM JELLY ON LIPS AND GINGIVA

STEP 3.1
TAKE A DROP OF SDF ON A MICRO BRUSH AND RUB IT ON THE AFFECTED AREA FOR ABOUT A MINUTE



STEP 3.2
FOR INTERPROXIMAL AREA APPLY E-SDF ON A FLOSS AND FLOSS BETWEEN THE AFFECTED TEETH

STEP 4
LEAVE THE E-SDF FOR 3 MINUTES

STEP 5
CLEAN THE EXCESS E-SDF WITH A COTTON ROLL

*DO NOT USE IN PATIENTS HAVING SILVER ALLERGY



<https://www.youtube.com/watch?v=p9Tazwitcao>

Non-restorative methods – biofilm modulation

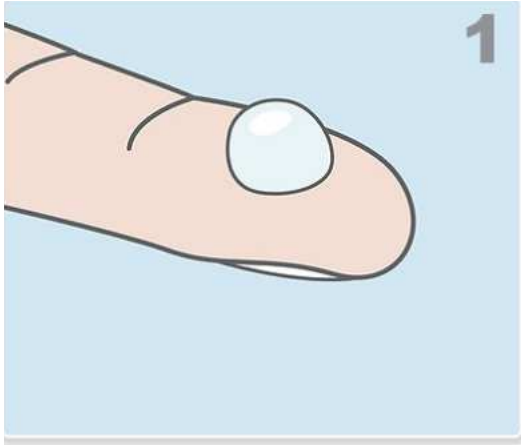
- CPP-ACP

- casein phosphopeptide (CPP) – amorphous calcium phosphate (ACP) as a nanocomplex binds to the enamel surface
- calcium and phosphate release – remineralization ↑
- reduces the biofilm formation of *Str. mutans*
- CAVE: casein allergy!
- *Tooth Mousse* (GC International, Itabashi-ku, Tokyo, Japan),
- *MI Paste Plus* (GC International, Itabashi-ku, Tokyo, Japan), - fluoride

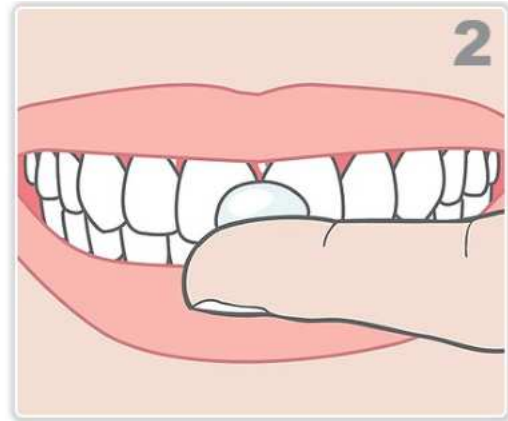


Sionov RV, Tsavdaridou D, Aqawi M, Zaks B, Steinberg D, Shalish M. Tooth mousse containing casein phosphopeptide-amorphous calcium phosphate prevents biofilm formation of *Streptococcus mutans*. *BMC Oral Health*. 2021 Mar 19;21(1):136. doi: 10.1186/s12903-021-01502-6. PMID: 33740976; PMCID: PMC7980609.;

<https://www.vcdental.com.au/2020/02/12/what-is-tooth-mousse/>



After brushing your teeth, squeeze a small amount of GC Tooth Mousse/Plus onto a clean finger.



Apply to all teeth with a clean finger and use your tongue to spread around evenly.



Leave GC Tooth Mousse/Plus on teeth for a minimum of 3 minutes avoiding spitting out and swallowing.

For better results, allow GC Tooth Mousse/Plus to remain in contact with your saliva for an additional 1-2 minutes.



Spit out the excess.

Any GC Tooth Mousse/Plus remaining on the surface can be left to gradually dissipate. Avoid rinsing, and do not eat or drink for 30 minutes following application.

<https://www.toothmousse.com.au/instructions>

Education

- risk assessment
- educate the parents:
 - liquid nutrition can also form plaque on the teeth
 - teeth should be cleaned after pacifiers or nursing
 - change of eating habits
 - not to let the baby sleep with pacifiers or during nursing
 - nursing bottle should contain only water

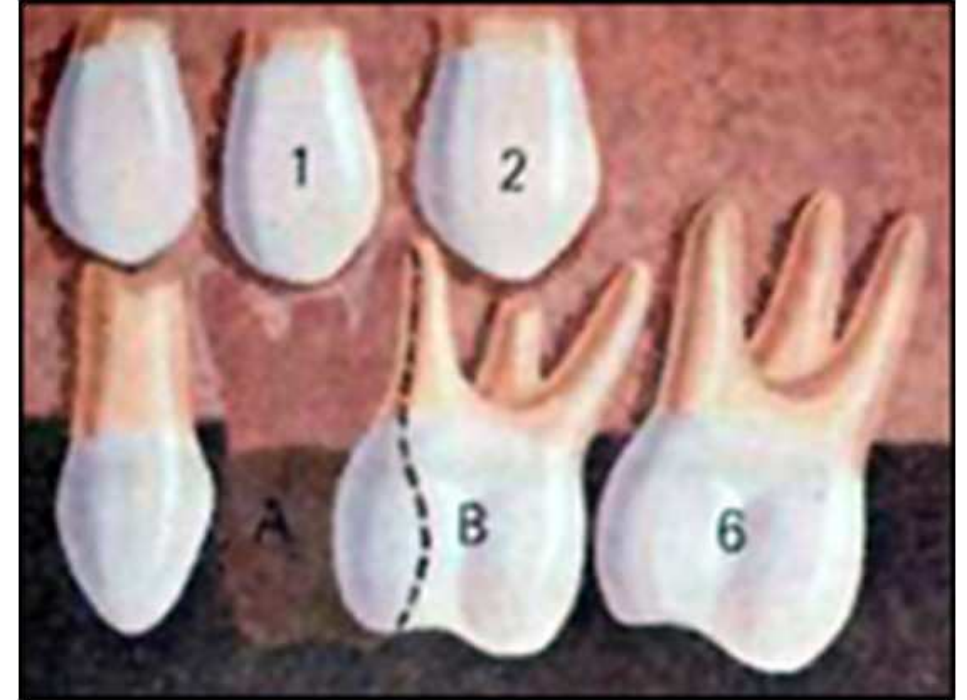


Restoring the primary teeth

- esthetic fillings, preformed, crowns, dental amalgam
 - cavity: size, shape
 - exfoliation of the deciduous
 - caries risk
 - compliance of the child and parents
 - personnel, pieces of equipment, financial possibilities
 - special requirements

Extraction of the primary teeth

- deep, advanced caries
- **Indications:**
 - risk of endocarditis
 - immunosuppressed patient
 - severe systemic disease
 - the tooth cannot be restored
 - increased mobility of the tooth
 - severe odontogenic inflammation that couldn't have been treated by conservative therapy
 - permanent tooth will erupt in 1-1,5 years
- **Contraindications:**
 - hemophilia
 - aplasia (e.g. ectodermal dysplasia)
 - orthodontic considerations (deep bite, crowding)
 - otherwise intact and healthy dental arches



Incipient caries

- instruction and motivation
- remineralization
 - fluoride varnishes
 - for at-home use:
 - fluoride-containing toothpaste (age-appropriate F⁻ ppm !)
 - CPP-ACP paste (Tooth Mousse, GC)



Severe, progressed ECC (S-ECC)

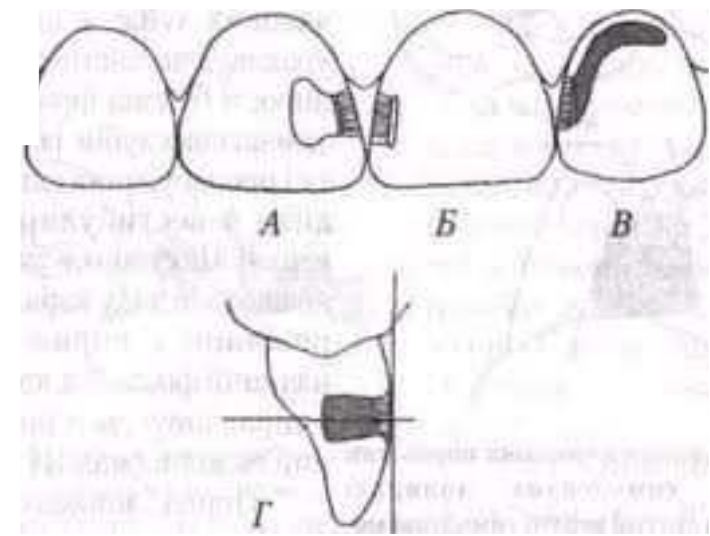
- pulp testing
- choices of build-up materials
 - glass ionomer cement (GIC)
 - composite (strip) crowns
 - preformed metal crowns (molar region)



Treatment of decayed primary incisors

Approximal caries

- **restoration**
 - from labial direction
 - enamel: high-speed, diamond bur
 - dentin: low-speed, SS bur
 - GIC, RMGIC, compomer (esthetics)
- **removing the contact points and impregnation** (compromised treatment)
 - open the contact points with diamond or carbide burs --> self-cleaning surfaces, easier to varnish
 - esthetically compromised
 - frequent application of fluoride varnish



Multi-surface caries

- Preformed crowns
 - destroyed, but vital deciduous incisors
 - durable and esthetic
 - cooperation and absolute isolation is required
 - general anaesthesia
- material:
 - strip crowns: composite or RMGIC
 - zirconia



Multi-surface caries – strip crown



Figure 1. Shows fractured right central incisor

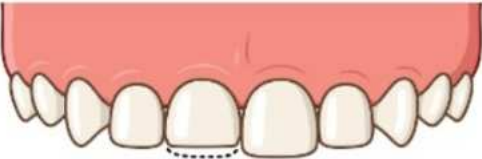


Figure 2. Decay has been removed. In this case a 2mm short bevel of the enamel edges would be ideal to facilitate a better transition from the material to the tooth.

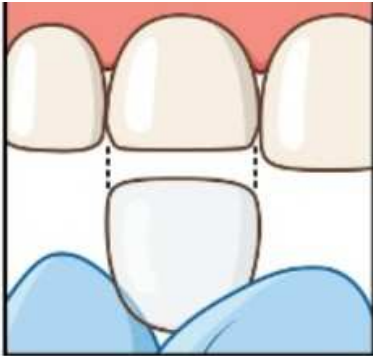


Figure 3. Ensure strip crown is the correct size

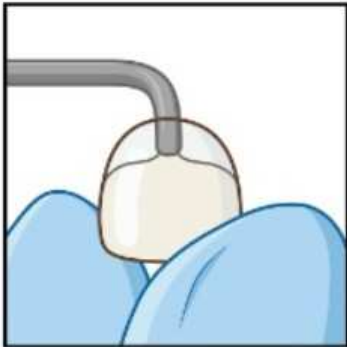


Figure 4: Fill strip crown with ACTIVA BioACTIVE-RESTORATIVE

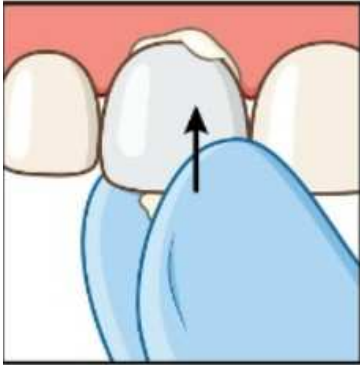


Figure 5: Seat the strip crown

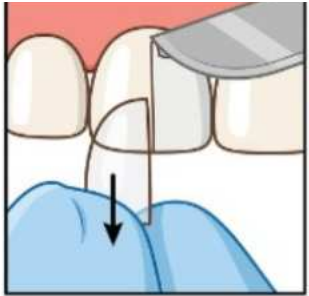


Figure 6. Remove crown form



Figure 7. Completed strip crown restoration

<https://www.pulpdent.com/strips-crowns-in-5-easy-steps/>

Multi-surface caries – strip crown



Lejátszás (k)

lect and trim the 3M™ ESPE™ Strip Crown Form – Pedo.



1:39 / 6:10

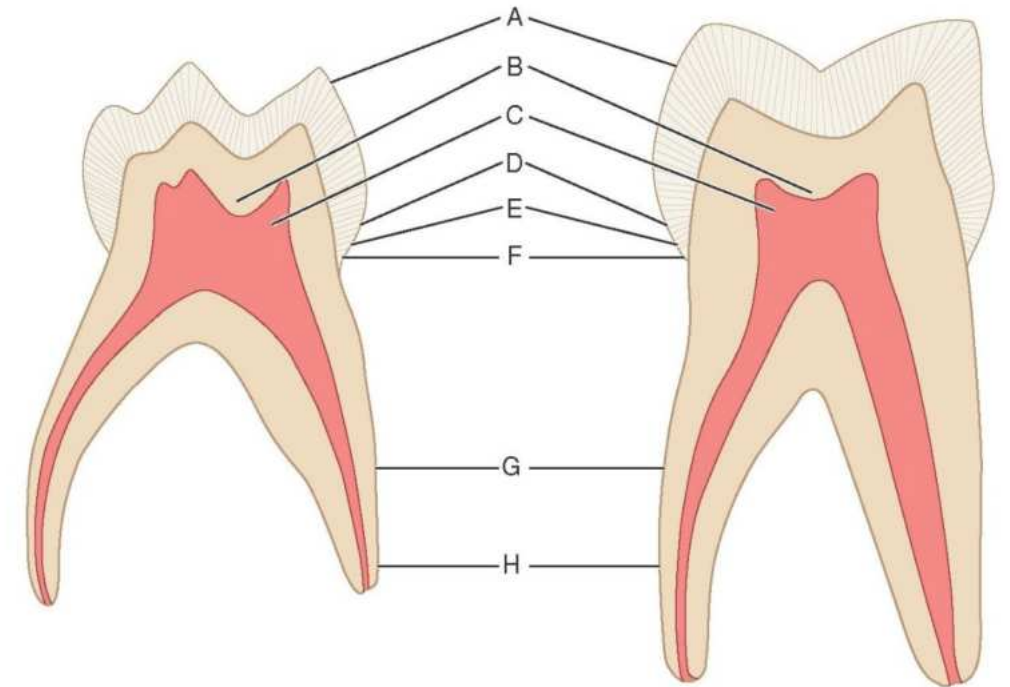
<https://www.youtube.com/watch?v=miGOFLmydhQ>



Treatment of decayed primary molars

Morphology

- thinner enamel and dentin layers → smaller occlusal preparation
- the curvature of the cervical line is prominent → narrower approximal edge
- 1.st primary molars – MB pulp horns are closer to the occlusal surface
- moderate or deep lesions in the dentin → preventive vital amputation (pulpotomy)



Preventive vital amputation/ pulpotomy

- Indication:
 - caries profunda of the 1st primary molars
 - pulp exposure (caries, cavity preparation, trauma)
- Materials and methods:
 - sterile burs (excavator)
 - physiological saline solution
 - sterile cotton pellets
 - Ca(OH)₂ / MTA / Biodentin /formokresol
 - ZnO-Eugenol/ GIC lining
 - build up: composite / GIC
 - metal crown – to protect the weakened tooth structure



Filling materials

- ideally until the exfoliation of primary teeth
- durable even in highly stressed locations
- ‚user-friendly‘
 - small dimensions
 - difficulties (isolation) due decreased cooperation → avoid technique sensitive materials
- high risk of caries – fluoride release



Filling material – glass ionomer cements (GIC)

- conventional GICs have lower success rate than composite fillings
- in smaller cavities, low stress-bearing areas (due to the physical properties)
- higher powder-liquid ratio → improved physical properties
- high viscosity GICs – faster setting time



Figure 1



Figure 2



Figure 3

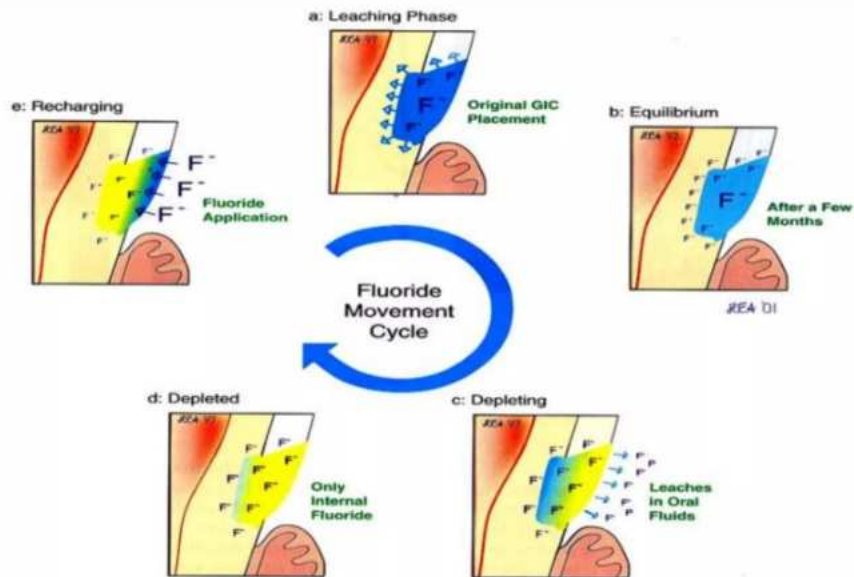


Figure 3-10. Fluoride balance between glass ionomer and tooth. A, Fluoride ions from a glass ionomer leach into the tooth. B, Fluoride in the restoration and tooth reach equilibrium. C, Saliva draws fluoride from the tooth and restoration. D, Both tooth and restoration are depleted of fluoride. E, A topical application of fluoride recharges the cement.

<https://www.aegisdentalnetwork.com/ida/2011/06/glass-ionomer-cements-history-and-current-status>

<https://www.slideshare.net/Greeshmalal/glass-ionomer-cement-165338237>

Filling material – resin-modified glass ionomer cements (RMGIC)

- better physical properties
- in class II. cavities
- light-curing, faster setting
- less sensitive to moist at the beginning of setting



Atraumatic restorative treatment (ART)

Frencken et al, in developing countries – no electricity or access to sophisticated dental equipment

- hand instruments (excavator) – remove the superficial, soft carious dentin
- high-viscosity GICs to fill the cavity and the surrounding fissures (Fuji IX, Ketac Molar)
- principles
 - caries can be arrested in the inner layers
 - if the lesion is sealed from the oral cavity
 - no micro-leakage and nutrition supplement for the bacteria
- used in one surface cavities
- follow-up studies : survival rate
 - class I. cavities: 90-95 %
 - class II. cavities: no difference compared to other adhesive techniques
- failure due to:
 - occlusal abrasion
 - breakage of the filling material in multi-surface cavities

Atraumatic restorative treatment (ART)

- AAPD (American Academy of Pediatric Dentistry: ART – ‚Alternative Restorative Treatment‘
 - advantages:
 - caries removal: hand instrumentation / chemomechanical caries removal (Carisolv) – noise and vibration is eliminated
 - need for local anesthesia ↓
 - GIC – fluoride release
- SMART – silver modified atraumatic restorative treatment
 - SDF varnish – kills bacteria prior to sealing the cavity with GIC



Aly AAM, Aziz AMA, Elghazawy RK, El Fadl RKA. Survival Analysis and Cost Effectiveness of Silver Modified Atraumatic Restorative Treatment (SMART) and ART Occlusal Restorations in Primary Molars: a randomized controlled trial. J Dent. 2023 Jan;128:104379. doi: 10.1016/j.jdent.2022.104379. Epub 2022 Nov 29. PMID: 36460236

Atraumatic restorative treatment (ART)



Waggoner W. . Restorative Dentistry for the primary dentition. in *Pediatric Dentistry - Infancy Through Adolescence* (ed. Nowak, A. J.) 304-329-609 (Elsevier, 2019).

Filling material – compomer

- 3 –year survival rate is high – even in stress-bearing areas
- enamel etching: better marginal sealing
- dentin conditioning: improves the success rate
- esthetic
- minimal fluoride release

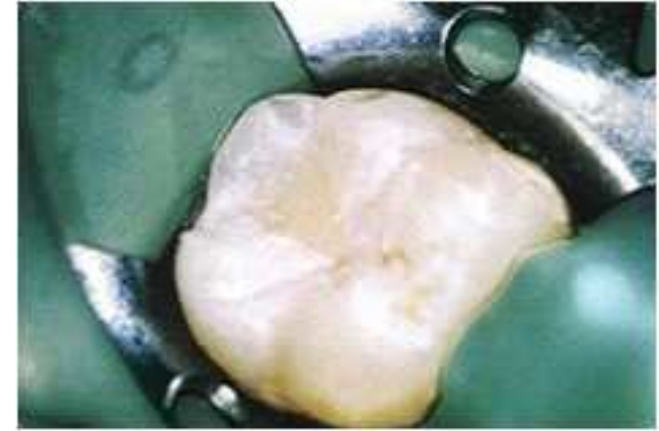


<https://www.dentsplysirona.com/en-gb/shop/categories/restorative.html>

<https://www.voco.dental/en/products/direct-restoration/composer/twinky-star-twinky-star-flow.aspx>

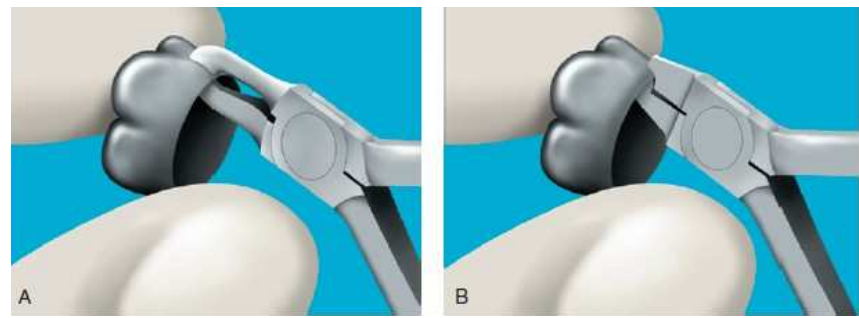
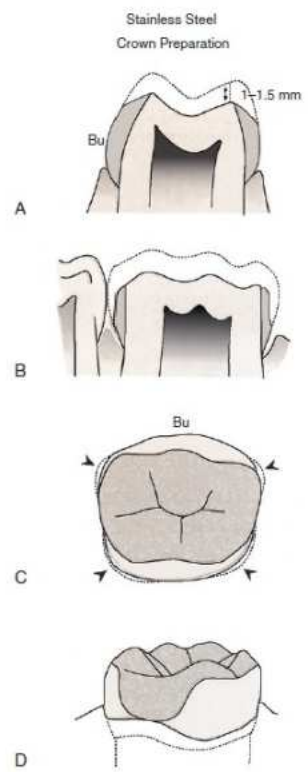
Filling material – composite

- highly technique sensitive
- absolute isolation
- time consuming
- minimally invasive
- preventive composite filling = extended fissure sealing
 - after cavity preparation: filled with composite and fissure sealant
 - indication:
 - small occlusal caries + deep fissures on primary molars
 - increased caries activity



Preformed stainless steel crowns (SSC)

- indications:
 - extended, multi-surface lesions in primary molars
 - severe developmental irregularities of the first permanent molars (amelogenesis imperfecta, dentinogenesis imperfecta, molar - incisor hypomineralization)



Velan, E. Restorative Dentistry for the Adolescent. in *Pediatric Dentistry - Infancy Through Adolescence* (ed. Nowak, A. J.) 598-609 (Elsevier, 2019).

Preformed stainless steel crowns (SSC) – Hall technique

- 1988 – Norna Hall:
 - crown is fitted and cemented over a caries affected primary molar
 - without caries removal
 - without local anesthetic
 - principle: SSC filled with GIC seals the lesion and bacteria from microleakage and nutrition supplement
 - no preparation
 - orthodontic spacers in the interproximal area (few days before the crown fitting)
 - increased occlusovertical dimension (adjusts within a few weeks)
- modifications:
 - approximal reduction
 - occlusal reduction
 - SDF varnish

Innes N, Evans D, Hall N. The Hall technique for managing carious primary molars. Dent Update. 2009;36:472–478.

Preformed stainless steel crowns (SSC) – Hall technique



<https://www.youtube.com/watch?v=ndxQEDw0rAM>

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