

Prosthetics in pediatric dentistry

Dr. Réka Sklánitz

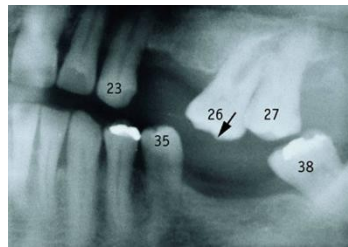
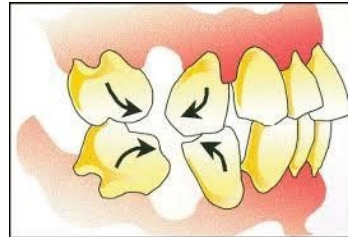
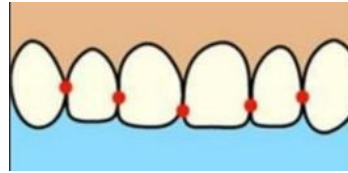
Department of Paediatric Dentistry and Orthodontics



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Aim of prosthodontic treatment in childhood

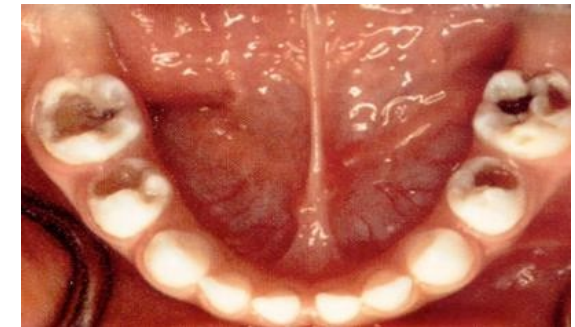
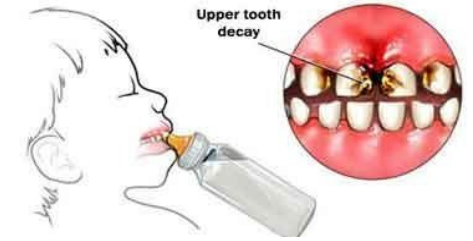
- to restore the destroyed teeth and replace the missing ones
- because the loss of a single tooth:
 - destabilization of the contact point system, masticatory function
 - tilting of the adjacent teeth
 - elongation of the antagonist tooth
- in the primary dentition: **space maintenance**
- in young, permanent dentition: create **adequate circumstances** for later restoration



Indication of prosthodontic treatment in childhood

Indication – **caries**

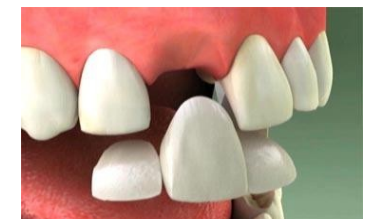
- inadequate oral hygiene
- primary dentition – caries rapida (ECC)
- early primary tooth extraction – more than a year before the eruption of the adjacent permanent one
 - Leeway space
 - crowding in the permanent dentition



Indication – trauma

risk factor. Angle II/ 1 – protruded incisors

- fracture /luxation → complications → extraction
- avulsion
 - **primary** dentition: never should be replanted!
 - esthetic problems
 - speech issues
 - canines can maintain the space
 - primary molars: key role in space maintenance
 - **permanent** dentition: replantation can be successful, but root resorption/ankylosis can occur
 - keep the tooth in place till 18 yo
 - if it is not possible – minimally invasive solution (Maryland bridge, acrylic bridge)

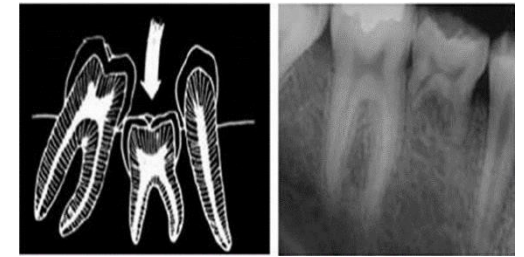


<http://drdentonhardie.com/maryland-bridge.html>

Indication – developmental anomalies

- **Numerical anomalies: hypodontia**

- aplasia
- oligodontia
- partial anodontia (syndromes)
- total anodontia (syndromes)



Indication – developmental anomalies

- **Structural** anomalies:
 - enamel hypoplasia
 - amelogenesis imperfecta
 - dentinogenesis imperfecta
- **Environmental** defect of tooth formation
 - severe fluorosis
 - molar – incisor hypomineralisation (MIH)
 - Turner tooth



Dr. Mlinkó Éva's photos

Pros and cons of prosthodontic treatment

ADVANTAGES



- restore the masticatory function
- prevention and correction of speech impediments
- prevention of harmful habits, malfunctions
- obturator function
- esthetics

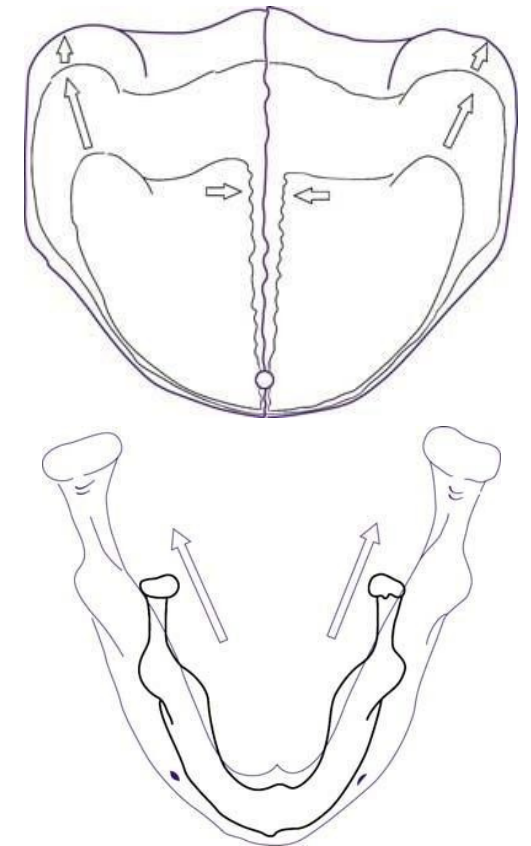
DISADVANTAGES



- caries
- periodontal damages (gingivitis, periodontitis)
- inhibits skeletal growth
- pressure accelerates the eruption of the permanent teeth
- bone loss in the alveolar ridge
- inflammation of the mucosa

Childhood characteristics of prosthetic care

- the maxilla and mandible are under development
 - ***prosthesis should not inhibit skeletal growth***
- teeth are changing (mixed dentition phase)
- permanent teeth are under development
- more difficult cooperation



Treatment planning

- thorough anamnesis and clinical examination
 - dental status
 - cavities
 - primary/mixed/permanent dentition
 - occlusion
 - form, structure, and stability of the teeth
 - can it hold a clasp?
 - is additional anchorage needed?
 - physiological tooth loss, time of tooth eruption

Prosthodontics in primary and mixed dentition

FIXED – mind the jaw and tooth development!

- crowns (preformed crowns, regular crowns)
- veneers
- inlays, onlay, overlays
- intraradicular: post and core
- bridges
- implants

REMOVABLE

- complete denture
- overdenture
- partial denture

OTHER DEVICES

- mouthguards
- space maintainers
- obturator

Fixed prosthodontics

Fixed prosthodontics - **crowns**

preformed/prefabricated crowns

- primary teeth → definitive
- young, permanent teeth → temporary

- stainless steel crown (SSC)
- facial cut-out SSC
- pre-veneered SSC
- polycarbonate crown
- strip / celluloid crown
- zirconia crown

regular crowns

- fully developed permanent teeth

Fixed prosthodontics – crowns: **preformed crowns**

- **Indication:**

- multi-surface carious lesions
- after primary tooth pulpotomy, pulpectomy
- trauma
- developmental defects
- as an abutment for space maintainers

- **Contraindication**

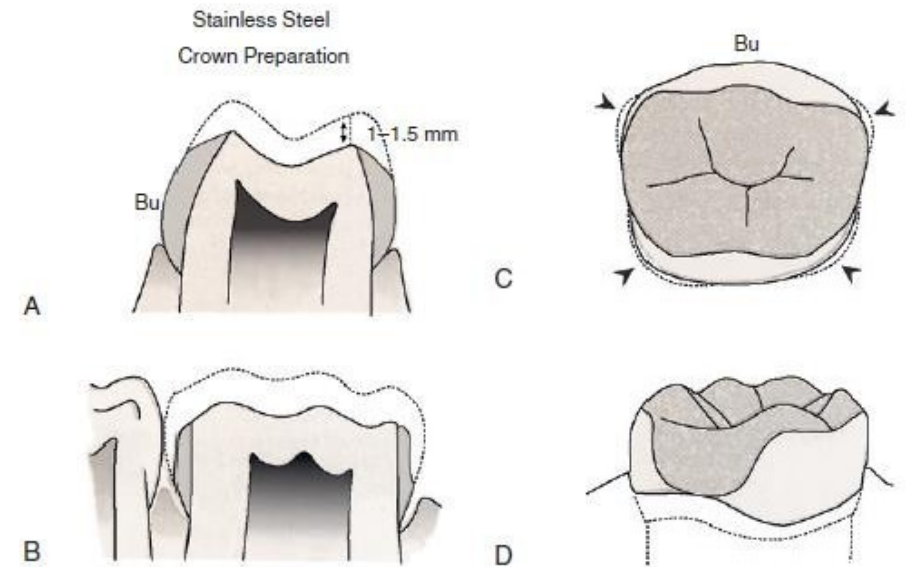
- allergy
- more than ½ of the root is resorbed



Fixed prosthodontics – crowns: **preformed crowns**

Stainless steel crowns (SSC)

- crown selection: mesio-distal width of the tooth prior to preparation
- local anesthesia
- if necessary: caries removal, pulpotomy/pulpectomy, build up (GIC, compomer)
- (rubber dam)
- preparation
 - occlusal reduction: 1-1,5 mm
 - approximal reduction: 1 mm
 - buccal, lingual: not necessary
 - occluso-buccal, occluso-lingual edges: 30-45° bevel prep. – coronal third

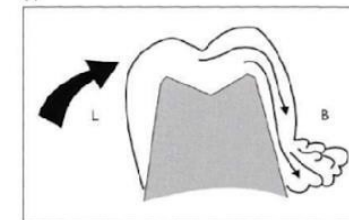
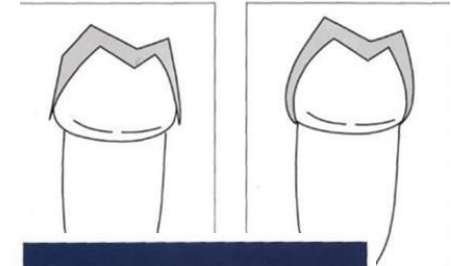
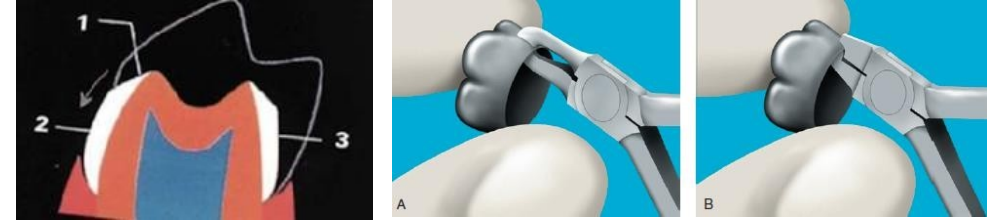


William Waggoner F, T. N. Restorative Dentistry for the Primary Dentition. in *Pediatric Dentistry - Infancy Through Adolescence* (ed. Nowak, A. J.) 304–328 (Elsevier, 2019)
<https://kidsworldpediatricdental.com/services/ssc-stainless-steel-crowns/>

Fixed prosthodontics – crowns: **preformed crowns**

Stainless steel crowns (SSC)

- crown seating: first lingually, then buccally
- gingival adjustment, contouring with special pliers
- (distal slice on the 2nd primary molar: to avoid permanent molar impaction)
- cementation
 - almost completely fill up with cement (GIC, polycarboxylate cement)
 - seat on the lingual first, then the buccal
 - remove excess cement
- occlusion control
- short and long-term control



William Waggoner F, T. N. Restorative Dentistry for the Primary Dentition. in *Pediatric Dentistry - Infancy Through Adolescence* (ed. Nowak, A. J.) 304–328 (Elsevier, 2019)
Velan, E. Restorative Dentistry for the Adolescent. in *Pediatric Dentistry - Infancy Through Adolescence* (ed. Nowak, A. J.) 598–609 (Elsevier, 2019).
Duggal MS, Curzom ME: Stainless Steel Crowns for primary molars in: Restorative techniques in pediatric dentistry 2nd ed

Fixed prosthodontics – crowns: **preformed crowns**

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 anesthesia
- **principle:** SSC filled with GIC seals the lesion and bacteria from microleakage and nutrition supplement

- no preparation
 - orthodontic spacers in the approximal area (few days before the crown fitting)
 - increased occluso-vertical dimension (adjusts within a few weeks)

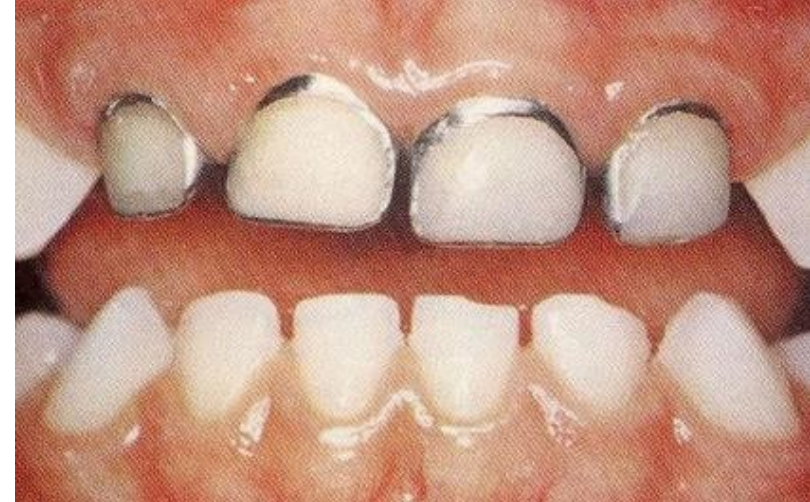
- modifications:
 - approximal reduction
 - occlusal reduction
 - SDF varnish

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

Fixed prosthodontics – crowns: **preformed crowns**

Facial cut-out SSC

- front region
- steps are the same as for SSC crowns
- after cementation
 - remove the labial surface with burs
 - fill up with composite
- esthetically compromised – not used



Fixed prosthodontics – crowns: **preformed crowns**

Pre-veneered SSC

- front and molar region
- labial surface covered with composite or porcelain
- pros:
 - esthetic
 - mechanical properties (SSC)
- cons:
 - more reduction is needed
 - marginally cannot be contoured
 - reduced crown retention
 - fracture or loss of the veneer
 - more expensive

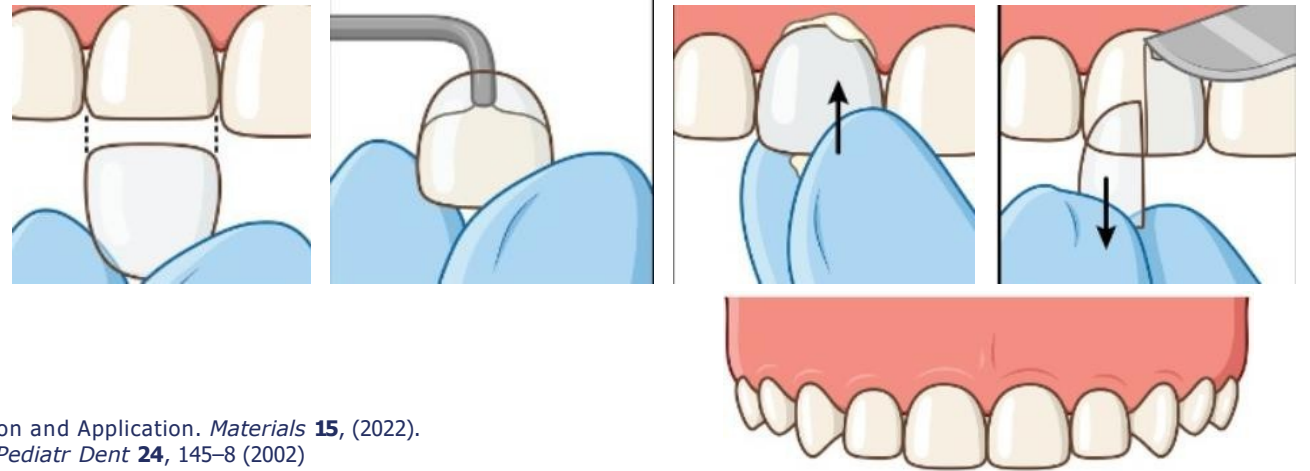


Sztyler K, Wiglusz RJ, Dobrzynski M. Review on Preformed Crowns in Pediatric Dentistry-The Composition and Application. Materials (Basel). 2022 Mar 11;15(6):2081. doi: 10.3390/ma15062081. PMID: 35329535; PMCID: PMC8950869.
<https://www.smilesu.com/cosmetic-dentistry.html>
<https://nusmile.com/products/nusmile-signature-pre-veneered-posterior-basic-kit>

Fixed prosthodontics – crowns: **preformed crowns**

Strip crowns

- front region
- size of strip crown is chosen
- if necessary: caries removal, pulp protection – indirect pulp capping
- trim with scissors
- vent holes (incisal edge) for the excess material
- isolation
- etching, bonding
- fill the crown with composite (GIC: lack of cooperation, tooth development not finished)
- crown fitting
 - excess removal
 - polymerization
- crown removal (not necessary)
- occlusion control
- finishing, polishing



Sztyler, K., Wiglusz, R. J. & Dobrzynski, M. Review on Preformed Crowns in Pediatric Dentistry—The Composition and Application. *Materials* **15**, (2022).
Kupietzky, A. Bonded resin composite strip crowns for primary incisors: clinical tips for a successful outcome. *Pediatr Dent* **24**, 145–8 (2002)
<https://www.pulpdent.com/strips-crowns-in-5-easy-steps/>

Fixed prosthodontics – crowns: **preformed**

crowns

Strip crowns

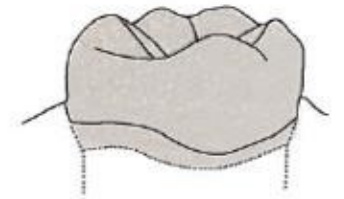
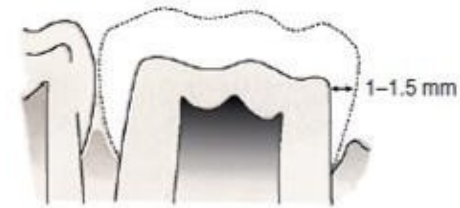
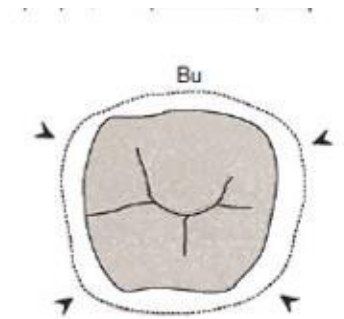
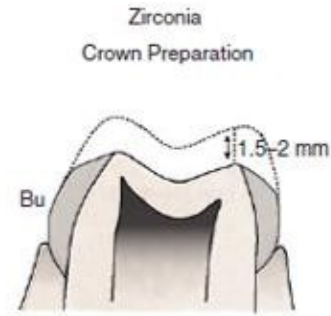


Dr.Sklánitz Réka's case: 9 yo patient with non-complicated crown fractures of 11,21

Fixed prosthodontics – crowns: **preformed crowns**

Zirconia crowns

- pros:
 - esthetics
 - good mechanical properties
 - biocompatibility
- cons:
 - extended preparation – pulp chamber is close!
 - expensive
 - can cause tooth-wear on the antagonist



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ZIRCONIA



Aiem, E., Smaïl-Faugeron, V. & Muller-Bolla, M. Aesthetic preformed paediatric crowns: systematic review. *Int J Paediatr Dent* **27**, 273–282 (2017)
William Waggoner F, T. N. Restorative Dentistry for the Primary Dentition. in *Paediatric Dentistry - Infancy Through Adolescence* (ed. Nowak, A. J.) 304–328 (Elsevier, 2019)
<https://nusmile.com/products/nusmile-zr-zirconia-1st-primary-molar-narrow-starter-kit>
<https://nusmile.com/pages/nusmile-zr-primary>

Fixed prosthodontics – **regular crowns**

- - **16 yo** (occlusion is fully developed):
 - PMMA (polymethyl-methacrylate) crowns - temporary
 - minimally invasive preparation
- **16-18 yo < :**
 - PFM (porcelain fused metal)
 - zirconia
- for molars affected by developmental defect: metal > PMMA crown (can break easily)

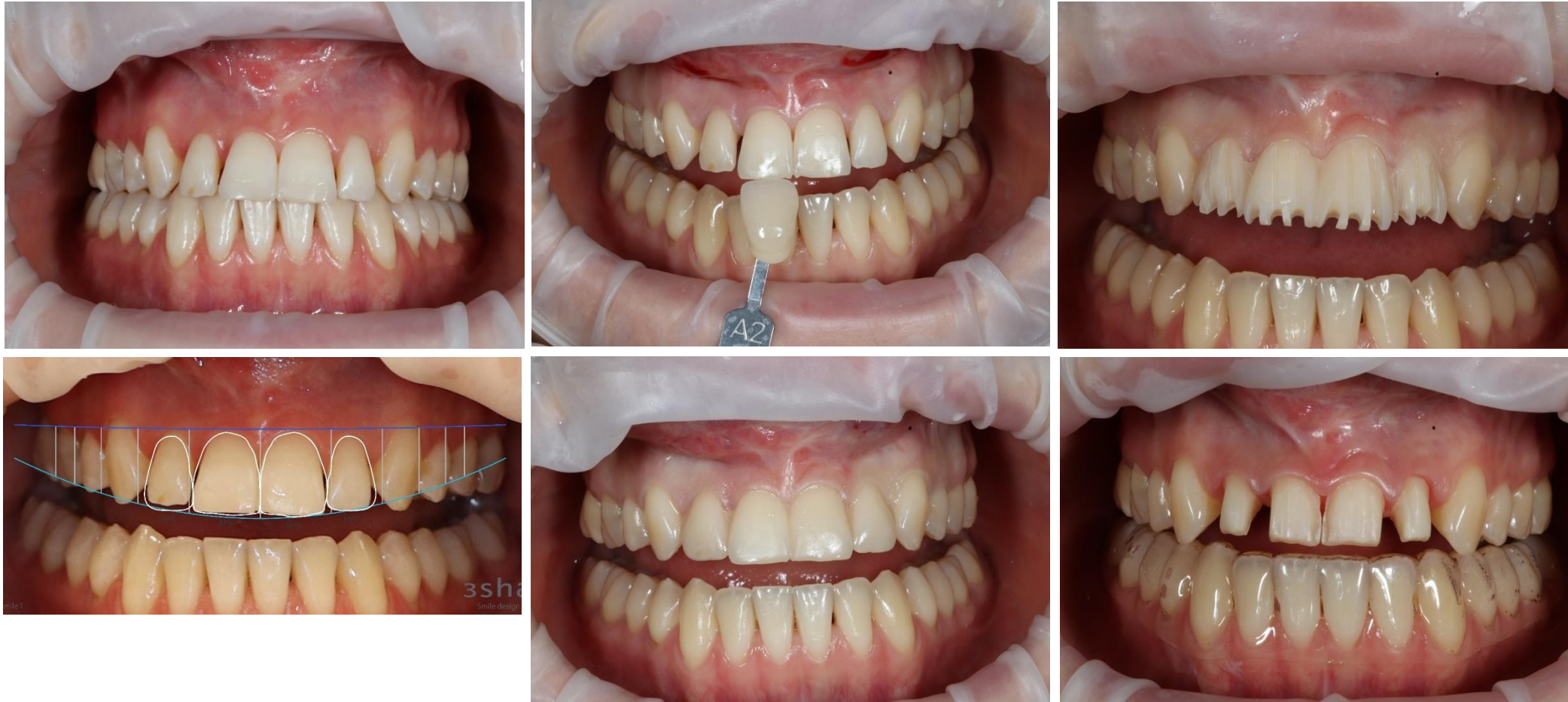
Fixed prosthodontics – regular crowns

- **PMMA crown**



Dr. Lipták Laura's case: 10 yo patient affected by MIH. Temporary treatment of tooth 46 with PMMA crown

Fixed prosthodontics – veneers



Case of Dr. Szegedi Levente (orthodontist) and Dr. Géczi Zoltán (prosthodontist): Restoration of the upper incisors with IPS e.max veneers after orthodontic treatment due to Bolton-discrepancy

Fixed prosthodontics – veneers



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Fixed prosthodontics - **bridges**

- not indicated until the skeletal growth is finished (18+ yo)
- any prosthodontic solutions beside crowns should be observed and changed if necessary, after 1 year because of the developmental changes
- in primary dentition: acrylic bridges with loops
 - not to inhibit growth
 - front region
 - minimal or no preparation



Fixed prosthodontics - **implants**

- not indicated until the skeletal growth is finished (18+ yo)
- doesn't follow the dentoalveolar growth (~ankylosed tooth)
 - keeps its position within the bone
 - dentoalveolar growth can be slowed down/arrested around the implant
 - restoration will end up in infraocclusion
 - can obstruct the natural mesialization of the teeth ⇒ asymmetric dental arch



Dr. Kelemen Anikó's case

Op Heij, D. G., Opdebeeck, H., van Steenberghe, D. & Quirynen, M. Age as compromising factor for implant insertion: *Age compromising implant insertion. Periodontol.* 2000 **33**, 172-184 (2003)

Removable dentures

Removable dentures - **indication**

- multiplex aplasia (oligodontia, partial/total anodontia)
- jaws are under development
 - as the jaws grow the changing of the denture is necessary!
- tooth eruption and movement is under physiological change
- space maintenance
 - Nance appliance
 - Hawley retention plate with



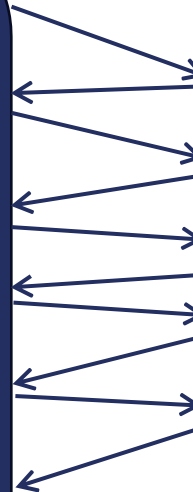
Removable dentures – **complete denture**

Clinical steps

- primary impressions
- outlining the borders of the special tray
- converting the special trays to functional ones: secondary, functional impressions
- registration of jaw relation, tooth shade selection
- try-in of trial dentures
- insertion, education, motivation
- short-term (1 week)
- long-term control (6 months)

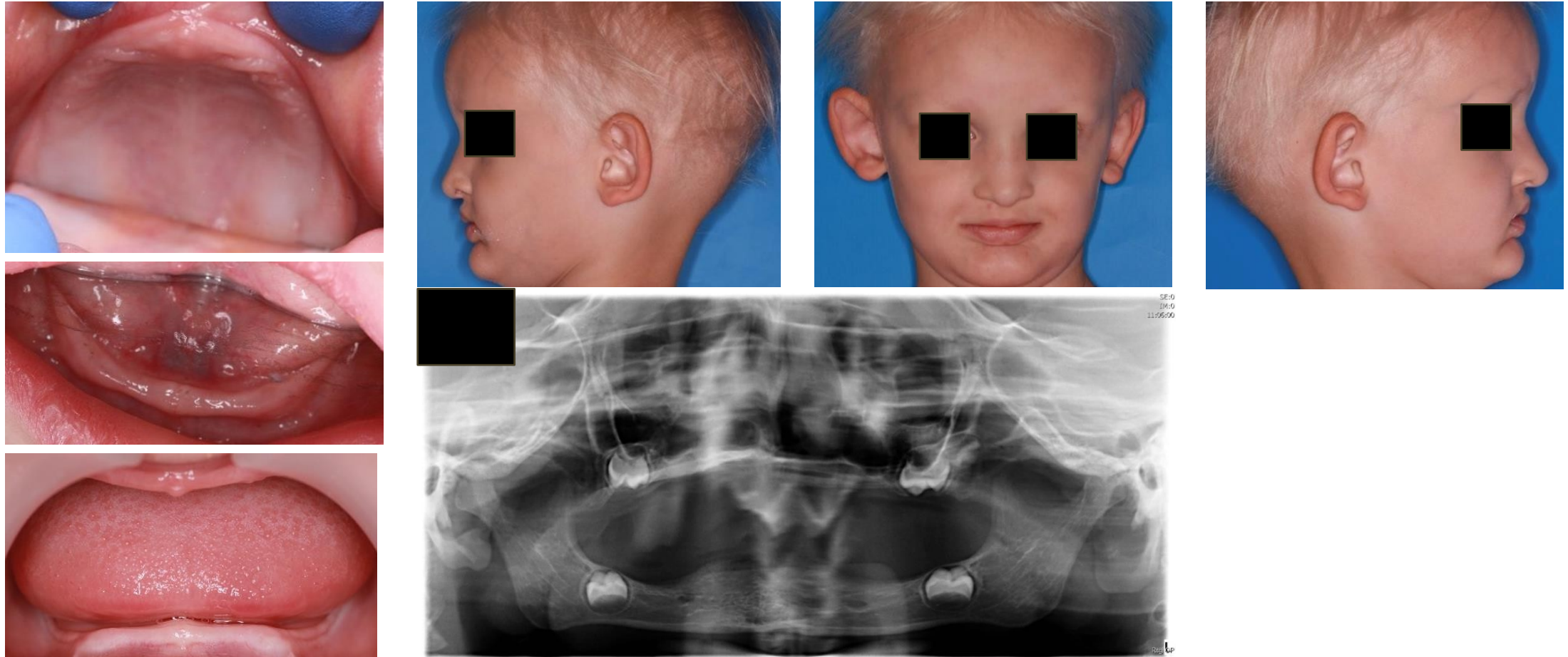
Laboratory steps

- primary casts
- special (individual) tray
- secondary casts
- trial dentures
- final complete dentures



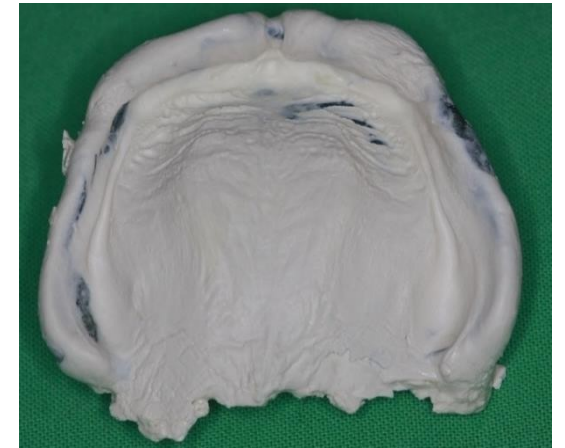
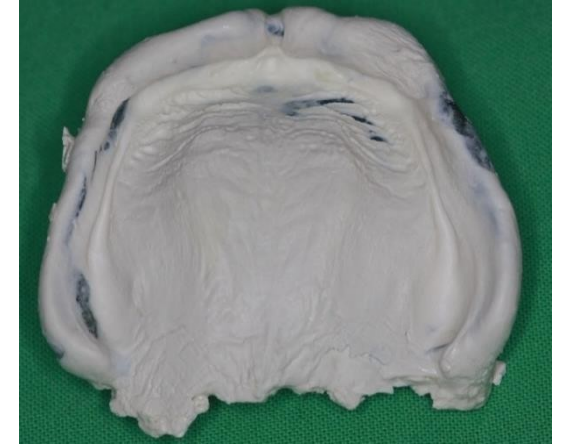
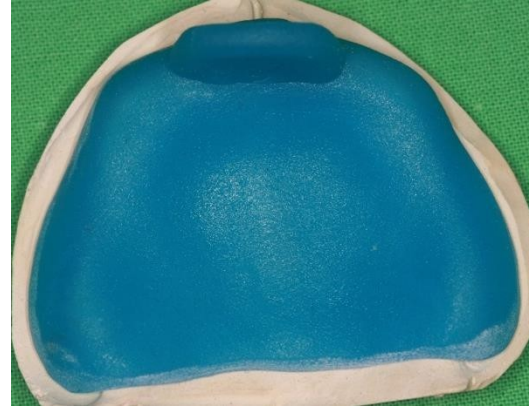
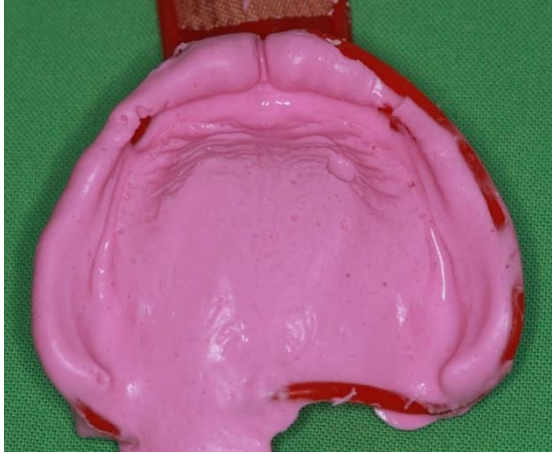
Based on Dr. Saláta József's lecture: Clinical and laboratory steps of constructing complete dentures: an overview

Removable dentures – complete denture



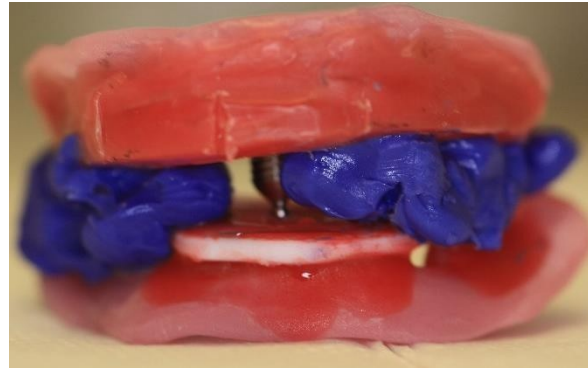
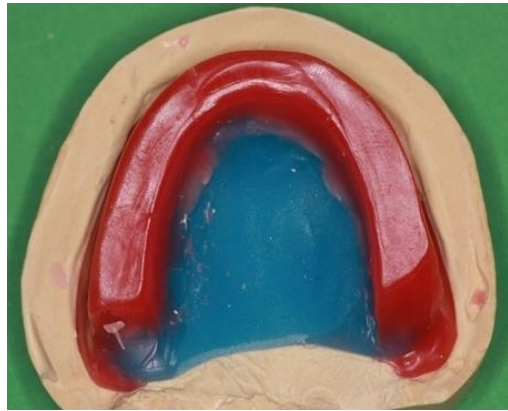
Dr. Sklánitz Réka's case: 4,5 yo patient with ectodermal dysplasia. Total anodontia of primary teeth treated with complete dentures.

Removable dentures – complete denture



Dr. Sklánitz Réka's case: 4,5 yo patient with ectodermal dysplasia. Total anodontia of primary teeth treated with complete dentures.

Removable dentures – complete denture



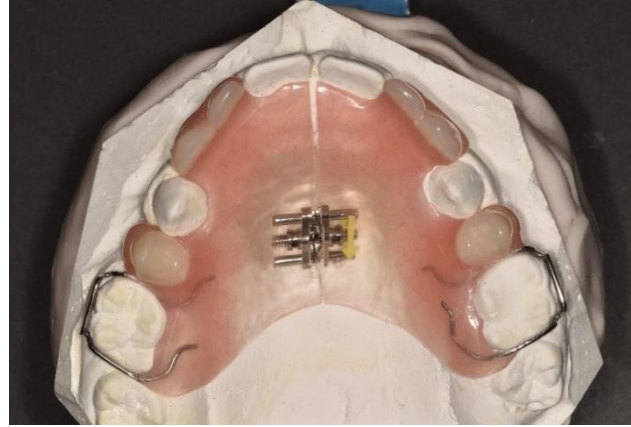
Dr. Sklánitz Réka's case: 4,5 yo patient with ectodermal dysplasia. Total anodontia of primary teeth treated with complete dentures.

Removable dentures – complete denture



Dr. Sklánitz Réka's case: 4,5 yo patient with ectodermal dysplasia. Total anodontia of primary teeth treated with complete dentures.

Removable dentures – **partial denture**



Dr. Lőrincz Gergely's case: Treatment of oligodontia. Temporary, solution: removable acrylic plate with spring. Definitive treatment: Metal-based removable partial denture

Space maintainers

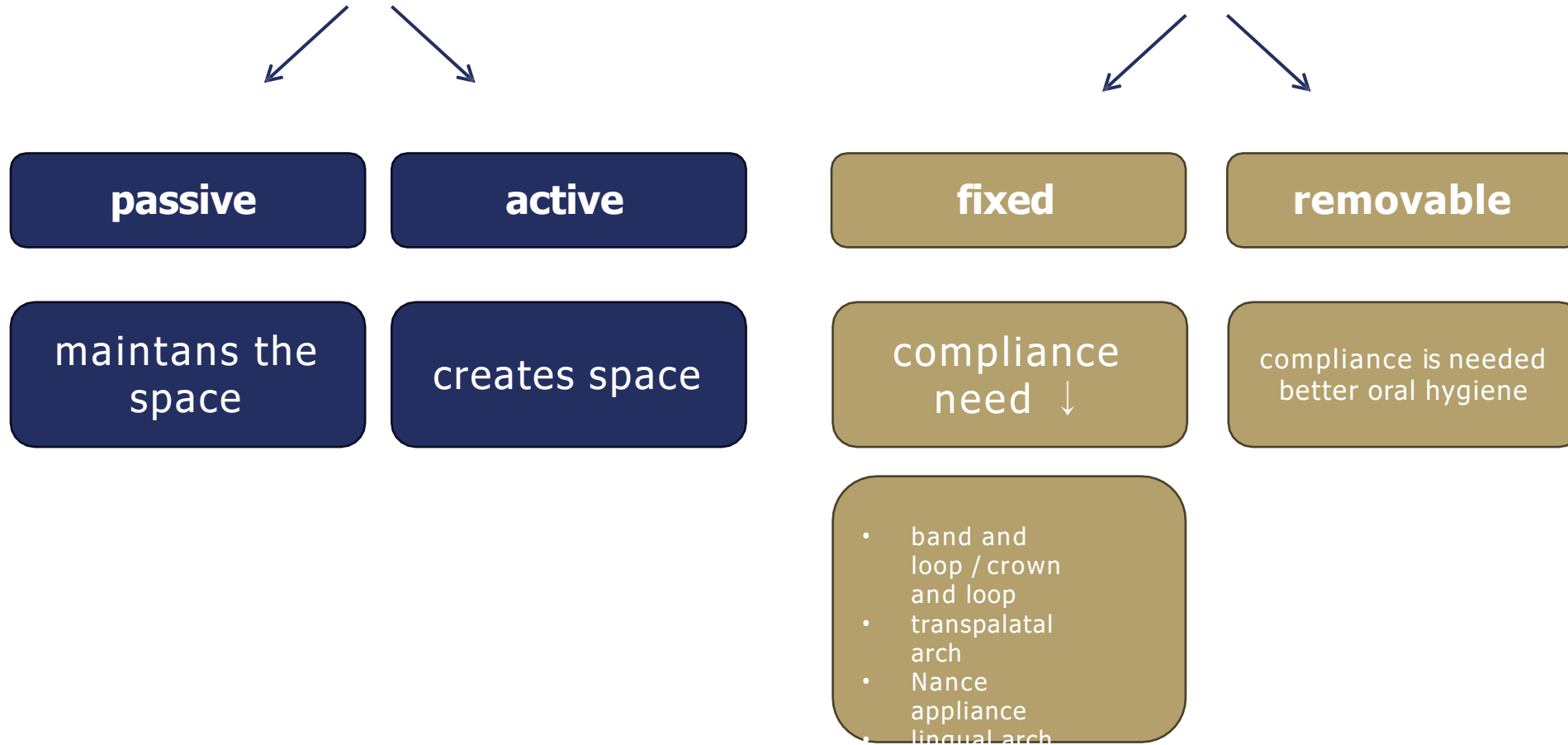
Space maintainers - **indication**

- early primary tooth extraction – more than a year until the eruption of the homolog permanent tooth
 - keep the sagittal distance to prevent crowding in the permanent dentition:
 - ectopic eruption, impaction
 - malocclusion
- trauma – mostly primary central incisors are affected
 - primary canines hold the space



<https://nwpd.com.au/does-my-child-need-a-space-maintainer/>

Space maintainers - **types**



Space maintainers - **fixed**

Band and loop, crown and loop

- ind: loss of 1st, 2nd primary molars
- passive
- active – space creation, uprighting
- enough space for the erupting permanent tooth
- spacers should be placed before insertion
- prefabricated / custom-made by the lab



Dr. Sklánitz Réka's case

Handbook of Clinical Techniques in Pediatric Dentistry: Soxman/Handbook of Clinical Techniques in Pediatric Dentistry. (John Wiley & Sons, Inc, 2015).

doi:10.1002/9781118998199

<https://www.portlandbraces.com/the-band-and-loop-space-maintainers-explained/>

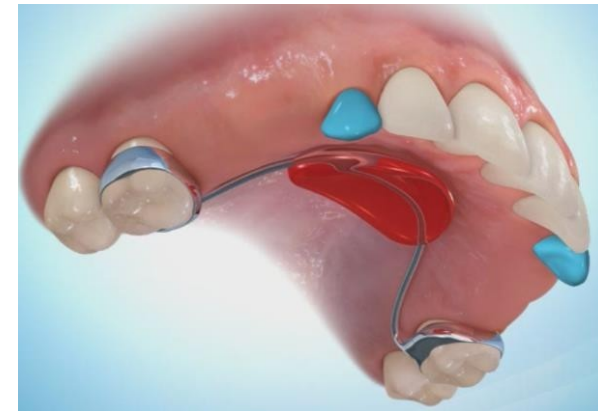
Space maintainers - **fixed**

Transpalatal arch (TPA)

- ind: unilateral maxillary tooth loss
- function: space maintenance, anchorage, rotation, distal tipping

Nance appliance

- ind: bilateral maxillary tooth loss
- acrylic button rests on the palatal rugae



Dr. Sklánitz Réka's case: Early extraction of 55 resulted in the mesialization of the 16. Further orthodontic treatment is needed to create enough space
Handbook of Clinical Techniques in Pediatric Dentistry: Soxman/Handbook of Clinical Techniques in Pediatric Dentistry. (John Wiley & Sons, Inc, 2015). doi:10.1002/9781118998199
<https://www.nsoortho.ca/orthodontic-solutions/retainers-appliances/space-maintainers/nance-upper-holding-arch/>

Space maintainers - **fixed**

Lingual arch

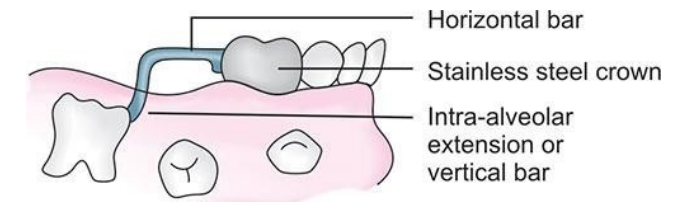
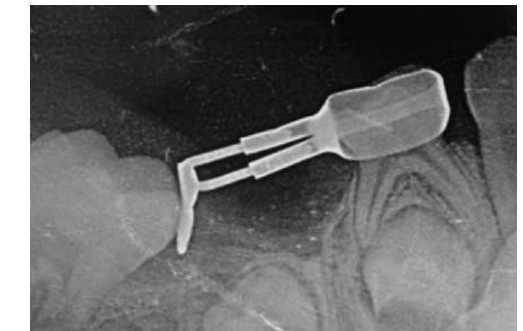
- ind: uni and bilateral mandibular tooth loss
- only after the eruption of the permanent incisors!



Distal shoe (intraalveolar)

Ind. early extraction of the 2nd primary molar before the eruption of the 1st permanent molars

- parts:
 - band/crown: 1st primary molar
 - loop
 - subgingival blade: guides the eruption of the permanent 1st molar
- periapical x-ray is needed!
- local anesthesia: small incision
- can be transformed into a band/crown and loop device after the eruption of the permanent molar by removing the blade

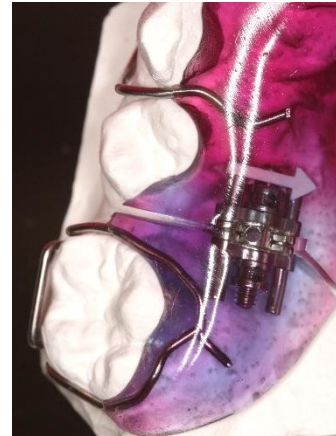


Handbook of Clinical Techniques in Pediatric Dentistry: Soxman/Handbook of Clinical Techniques in Pediatric Dentistry. (John Wiley & Sons, Inc, 2015).
doi:10.1002/9781118998199Dr. Bosch Anna's case: Early extraction of 74,84, resulted in the mesialization of the lateral zone. Lingual arch used as a space maintainer to prevent further mesialization
<https://www.jaypeedigital.com/book/9789350251898/chapter/ch13>

Space maintainers - **removable**

Removable plates

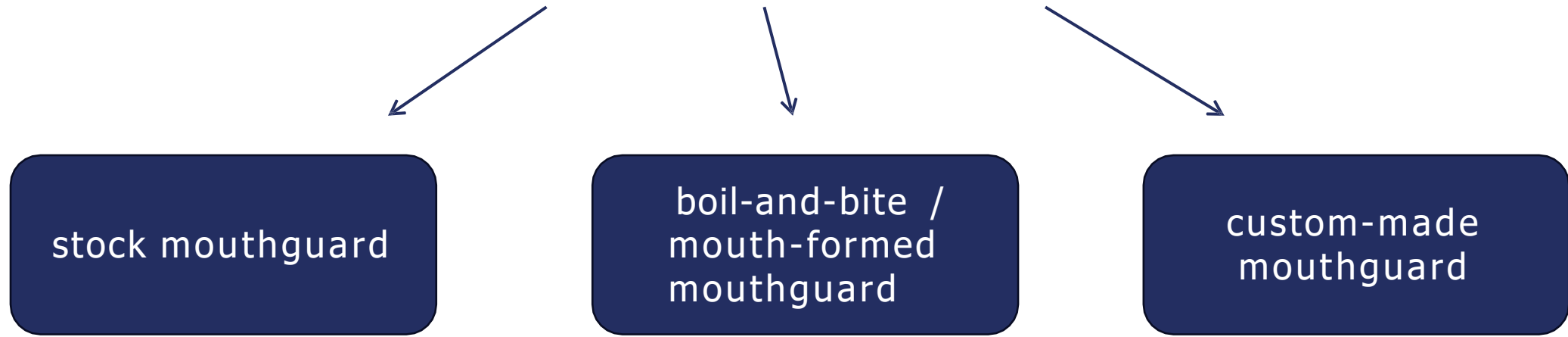
- ind: single or multiple tooth loss
- more cooperation is needed
- easier to maintain proper oral hygiene
- passive/active - spring



Dr. Sklánitz Réka's case: Early extraction of 55 resulted in the mesialization of the 16. Removable, atypical, active, acrylic plate used to create space for the 15..

Mouthguards

Mouthguards - **types**



Mouthguards – **stock mouthguard**

- sold as ready to be used – without any additional customization
- material: polyvinyl-chloride (PVC), polyurethane, vinyl-acetate copolymer
- prefabricated, limited sizes
- loose fit – compensation: clenching teeth together
- difficulty of speaking and breathing
- minimal protection
- cheap



Mouthguards – **boil-and-bite/ mouth-formed mouthguard**

- 2 layers:
 - outer: firm, plastic shell (PVC)
 - inner: relatively spongy (acrylic gel, silicone, EVA (ethylene-vinyl acetate) – thermoplastic)
- some parts can become thinner → level of protection ↓



<https://www.gosupps.com/serenity-bruxism-night-sleep-aid-mouthpiece-boil-and-bite-guard.html>

Mouthguards – **custom-made mouthguard**

- custom fit: made in the dental lab
- highest level of protection
- minimal inconvenience when worn
- expensive



<https://polisheddental.com.au/custom-mouthguards-vs-store-bought-boil-bite-mouthguard/>

Thank you for
your
attention!

Dr. Réka Skláňitz



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