

TOPICS – Day 1

- Factors influencing the long-term stability of dental implants
- Surgical procedures in posterior sites: Standard implant placement with or without flap elevation
- Surgical procedures in posterior sites: Implant placement with GBR
- Implant placement and sinus floor elevation: Lateral window vs Osteotome technique, when simultaneous, when staged?
- Prosthetic planning and restorative principles in posterior sites
- Fundamental esthetic principles revealed in the context of anterior maxillary implant restorations – a critical appraisal
- **Esthetic risk assessment and basic surgical principles in esthetic sites**
- Prosthetic handling of esthetic challenges: case reports

TAOI Annual Congress 2017 with the B&B Team



Implant Placement in Esthetic Sites

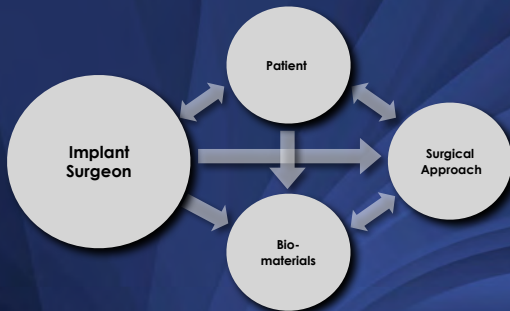
- This is a frequent clinical situation today
 - ▶ today, we see predominantly implant placement post extraction
- Implant sites in the esthetic zone are demanding
 - ▶ Cat. A or Cat. C
- The timing of the treatment is crucial:
 - ▶ when to place and when to restore the implant(s)



TAOI Annual Congress 2017 with the B&B Team



Factors influencing Treatment Outcomes



Buser & Chen 2008, mod. 2016



Surgical Recipe for successful Outcomes in Implant Esthetics

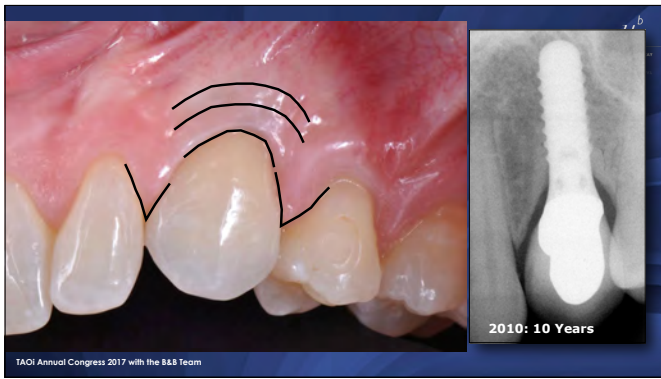
- Good understanding of **tissue biology**
 - ▶ Concept of **biologic width**
Beiglundh & Lindhe 1996, Cochran et al. 1997, Kan et al. 2003
 - ▶ **Hard and soft tissue alterations** following extraction
Schropp et al. 2003, Araujo et al. 2005a,b, Araujo et al. 2006a,b, Chappuis et al. 2013, Chappuis et al. 2015, Chen et al. 2016
 - ▶ **Biology of bone defects**
Scherer et al. 1994, Buser et al. 2009
- Detailed **esthetic risk assessment** is mandatory
Marin et al. 2006
- **Correct 3-D implant position** must be achieved
Buser et al. 2004
- **Facial contour augmentation** with GBR is most often needed
Buser et al. 2008
- **Primary wound closure** to protect applied biomaterials



Surgical Recipe for successful Outcomes in Implant Esthetics

- Good understanding of **tissue biology**
 - ▶ Concept of **biologic width**
Beiglundh & Lindhe 1996, Cochran et al. 1997, Kan et al. 2003
 - ▶ **Hard and soft tissue alterations** following extraction
Schropp et al. 2003, Araujo et al. 2005a,b, Araujo et al. 2006a,b, Chappuis et al. 2013, Chappuis et al. 2015, Chen et al. 2016
 - ▶ **Biology of bone defects**
Scherer et al. 1994, Buser et al. 2009
- Detailed **esthetic risk assessment** is mandatory
Marin et al. 2006
- **Correct 3-D implant position** must be achieved
Buser et al. 2004
- **Facial contour augmentation** with GBR is most often needed
Buser et al. 2008
- **Primary wound closure** to protect applied biomaterials





The concept of the **biologic width** around dental implants

Berglundh, Lindhe: Dimension of the periimplant mucosa. Biologic width revisited. *J Clin Periodontol* 23:971-973, 1996

Cochran, Hermann, Schenk, Higginbottom, Buser: Biologic width around titanium implants. A histometric analysis of the implanto-gingival junction around unloaded and loaded nonsubmerged implants in the canine mandible. *J Periodontol* 68:186-198, 1997

Kan, Rungcharassaeng, Umezū, Kols: Dimensions of peri-implant mucosa: an evaluation of maxillary anterior single implants in humans. *J Periodontol* 2003;74:557-562

TAOI Annual Congress 2017 with the B&B Team



The **bone** plays a key role for esthetics

TAOI Annual Congress 2017 with the B&B Team

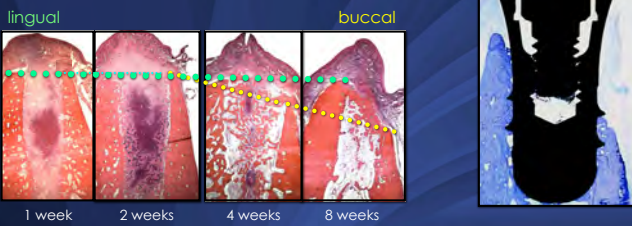
Surgical Recipe for successful Outcomes in Implant Esthetics

- Good understanding of **tissue biology**
 - **Hard and soft tissue alterations** following extraction
 - Schropp et al. 2003, Araujo et al. 2005a,b, Araujo et al. 2006a,b, Chappuis et al. 2013, Chappuis et al. 2015, Chen et al. 2016
 - **Biology of bone defects**
 - Chen et al. 2013, Buser et al. 2007
- Detailed esthetic risk assessment is mandatory
- Correct 3-D implant position must be achieved
- Facial contour augmentation with GBR is most often needed
- Primary wound closure is properly applied biomaterial



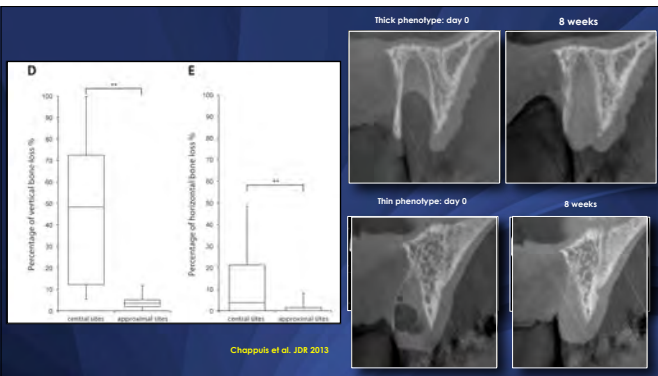
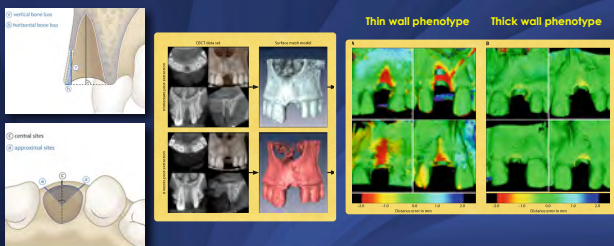
Araujo MG, Lindhe J: Dimensional ridge alterations following tooth extraction. *J Clin Periodontol* 32: 212-18, 2005
 Araujo MG, Sukekava F, Wennstrom JL, Lindhe J: Ridge alterations following implant placement in fresh extraction sockets. *J Clin Periodontol* 32: 645-52, 2005

Buccal sites: Mean vertical bone loss of ≥ 2.3 mm

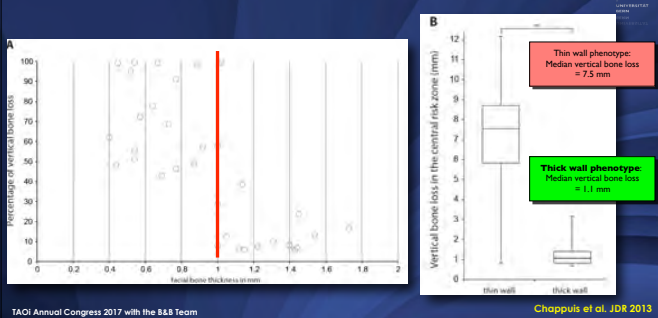


Chappuis V, Engel O, Reyes M, Shahim K, Nolte LP, Buser D: Ridge alterations post extraction in the esthetic zone: A 3D analysis with CBCT. *J Dent Res* 92: 195S-201S, 2013

- Prospective case series study in 39 patients with a single tooth extraction in the max
- 2 CBCT's at day 0 and after 8 weeks of soft tissue healing



Regression Analysis in Central Sites for Vertical Bone Loss



2-wall Defect: Defect Regeneration very predictable and fast

TAOI Annual Congress 2017 with the B&B Team

Swiss Alps Valley Defect Grand Canyon Defect

TAOI Annual Congress 2017 with the B&B Team

Ridge Alterations following Extraction: Timing is crucial!!

Day 0 8 weeks > 6 months

Surgical Recipe for successful Outcomes in Implant Esthetics

- Good understanding of **issue biology**
 - Concept of **biologic width**
 - Ridge alterations following extraction
- Detailed **esthetic risk assessment** is mandatory
- Correct **3-D Implant position** must be achieved
- **Facial contour augmentation** with GBR is most often needed
- **Primary wound closure** to protect applied biomaterials

TAOI Annual Congress 2017 with the B&B Team

Esthetic Risk Assessment in Implant Patients

Risk Factor	Low	Medium	High
Medical status	Healthy patient (well-tolerant)		Reduced immune system
Smoking habit	non-smoker	light smoker (<10 cigarettes)	heavy smoker (>10 cigarettes)
Patient's aesthetic demands	low	medium	high
Lip line	low	medium	high
Gingival biotype	thick, low inflammation	medium thickness, medium inflammation	thin, high inflammation
Shape of tooth crown	rectangular		triangular
Amount of adjacent teeth	≥ 6 teeth to adjacent teeth	≥ 3 to ≤ 6 teeth to adjacent teeth	≤ 2 teeth (partial denture)
Local infection of implant site	none	chronic	acute
Restorative status of neighbor teeth	high		medium
Width of alveolar bone defect	1 tooth < 2 mm, 2 teeth < 3 mm	1 tooth > 2 mm, 2 teeth > 3 mm	2 teeth and more
Soft tissue esthetics	ideal soft tissues		soft tissue defect
Amount of alveolar bone	no bone deficiency	moderate bone deficiency	severe bone deficiency

TAOI Annual Congress 2017 with the B&B Team Chapter 3: Martin, Morton & Ruser 2006

Kois J: Predictable single tooth peri-implant esthetics: five diagnostic keys. *Compend Contin Educ Dent* 22:199, 2001
 De Rouck T, Eghbali R, Gollys K, De Bruyn H, Cosyn J: The gingival biotype revisited: transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva. *J Clin Periodontol* 36:428-433, 2009

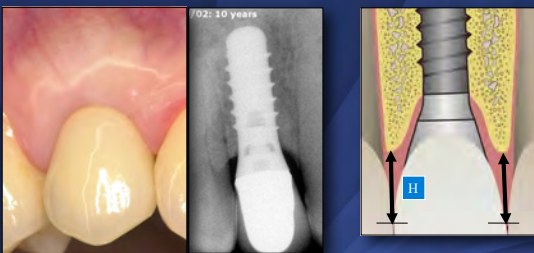


TAOI Annual Congress 2017 with the B&B Team

Risk Factor	Low	Medium	High
Medical status	healthy patient intact immune s.		reduced immune system
Smoking habit	non-smoker	light smoker < 10 sig/d	heavy smoker ≥ 10 sig/d
Patient's esthetic demand	low	medium	high
Lip line	low	medium	high
Gingival biotype	thick, low-scalloped	medium thick, medium scalloped	thin, high scalloped
Shape of tooth crown	rectangular		triangular
Bone level at adjacent teeth	≤ 5 mm to contact point	5.5 to 6.5 mm to contact point	≥ 7 mm to contact point
Local infection at implant site	none	chronic	acute
Restorative status of neighb. teeth	virgin		restored
Width of esthetic space	1 tooth ≥ 7 mm* 1 tooth ≥ 5.5 mm*	1 tooth < 7 mm* 1 tooth < 5.5 mm*	2 teeth and more
Soft tissue anatomy	intact soft tissues		soft tissue defect
Bone defect at implant site	no bone deficiency	horizontal bone deficiency	vertical bone deficiency

TAOI Annual Congress 2017 with the B&B Team

Vertical crest height at adjacent teeth



Choquet, Hermans, Adriaenssens, Daelemans, Tarnow, Malevez: Clinical and radiographic evaluation of the papilla level adjacent to single-tooth dental implants. A retrospective study in the maxillary anterior region. *J Periodontol* 72:1364, 2001
 Ryser, Block, Mercante: Correlation of papilla to crestal bone levels around single tooth implants in immediate or delayed crown protocols. *J Oral Maxillofac Surg* 63:1184, 2005

TAOI Annual Congress 2017 with the



2008: 5 yrs

TAOI Annual Congress 2017 with the

2013.07: 10 1/2 yrs



2002.11

TAOI Annual Congress 2017 with the B&B Team

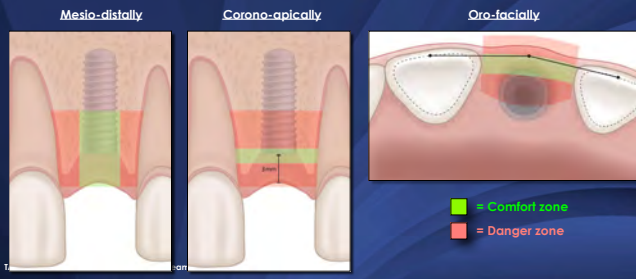
Surgical Recipe for successful Esthetic Outcomes



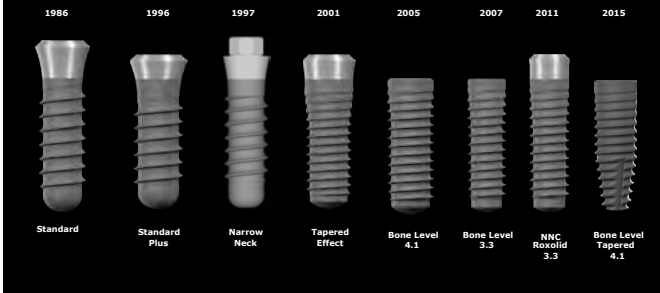
- Good understanding of tissue biology
 - Concept of biologic width
 - Ridge alterations following extraction
- Detailed esthetic risk assessment is mandatory
- Correct 3-D implant position must be achieved
- Facial contour augmentation with GBR is most often needed
- Primary wound closure to protect applied biomaterials

TAOI Annual Congress 2017 with the B&B Team

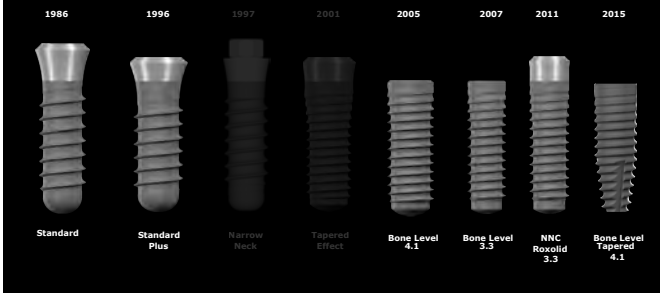
Buser, Martin, Belser: Optimizing esthetics for implant restorations in the anterior maxilla: Anatomic and surgical considerations. *Int J Oral Maxillofac Implants* 19 (Suppl 1): 43, 2004



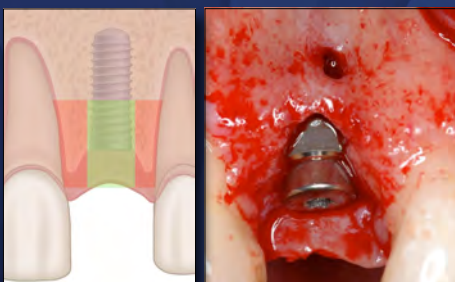
Development of Straumann Implants for Esthetic Sites



Development of Straumann Implants for Esthetic Sites

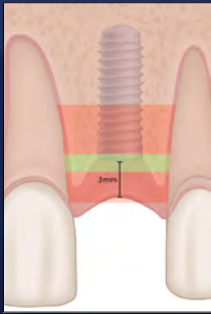


Mesio-distal Positioning: Bone Level Implants



- Mesio-distal Position:
- Respect a minimal distance to the root surfaces of adjacent teeth
 - A distance of 1.5 mm is recommended for Bone Level implants

Corono-apical Direction

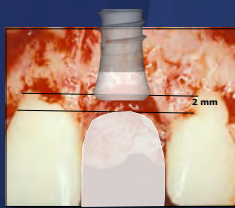


Problems with corono-apical malpositions

- **Too superficial location: Coronal malposition**
 - ✓ Metal margin becomes visible
 - ✓ Emergence profile becomes problematic
- **Too deep location: Apical malposition**
 - ✓ Too much countersinking
 - ✓ Malposition often results in facial recession of mucosa
 - ✓ Difficult prosthetic handling

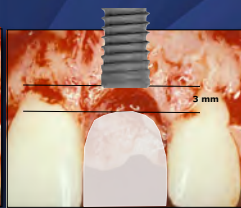
Corono-apical Positioning

Soft Tissue Level Implants



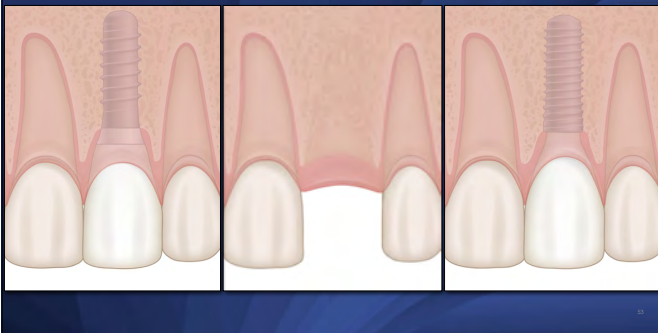
Rule:
2 mm apical to the future mid-facial mucosal margin

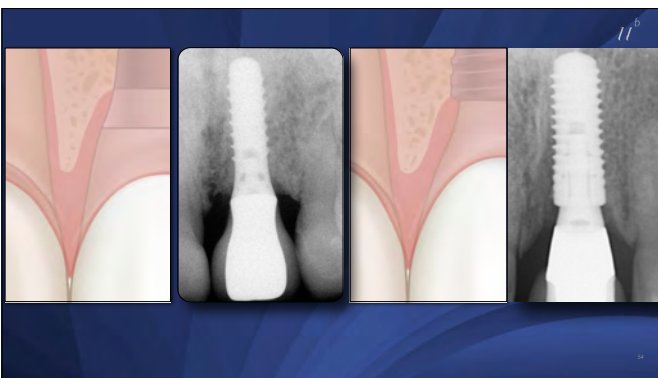
Bone Level Implants



Rule:
3 mm apical to the future mid-facial mucosal margin

Tissue Level vs. Bone Level Implants?

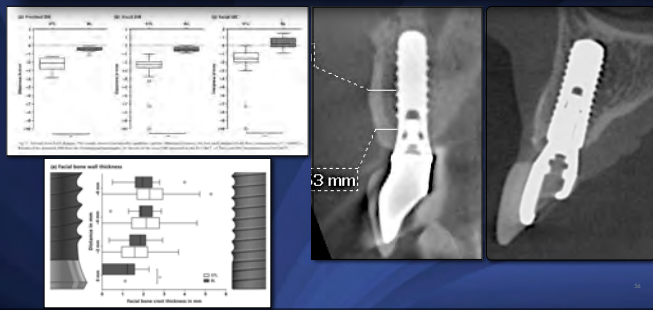




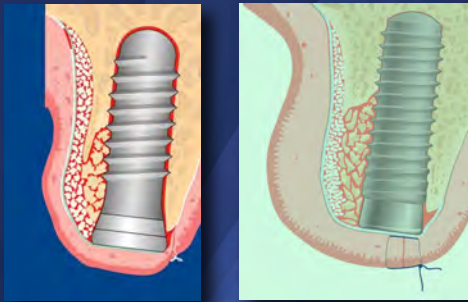
Chappuis V, Bornstein MM, Buser UC, Buser D: Influence of Implant neck design on facial bone crest dimensions in the esthetic zone analyzed by cone beam CT: A comparative study with a 5 to 9 year follow-up. Clin Oral Implants Res 27:1055-64, 2016.

- Radiographic analysis of 42 TL implants (5-9 yrs follow-up) and 20 BL implants (6 yrs)
 - ✓ Patient pool of two studies (Buser et al. Perio 2013; Buser et al. JDR 2013)
- Measurement of various radiographic distances





Tissue Level vs. Bone Level Implant?



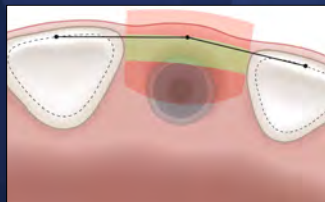
How to avoid Mucosal Problems coronally

Recommendations

- **Use surgical stents if needed**
 - ✓ There is no need in single tooth gaps, if you have good landmarks at adjacent roots
 - ✓ In sites with multiple missing teeth, it is imperative to use a stent
- **Avoid too much countersinking**
 - ✓ Develop a gut feeling for a correct vertical positioning
 - ✓ Just as much as necessary



Implant Platform in Oro-facial Direction



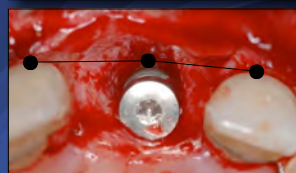
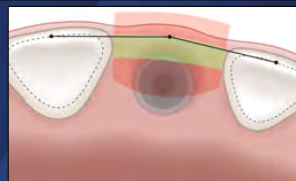
Problems with oro-facial malpositions

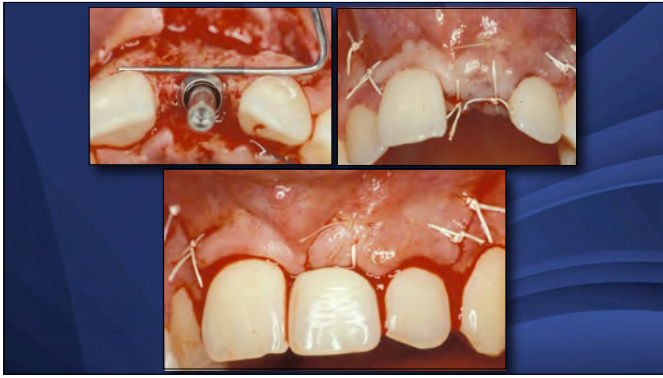
- **Common are facial malpositions**
 - ✓ Increased risk for mucosal recession
 - ✓ Associated with immediate implant placement
 - ✓ Facial malposition can be caused by oversized implants (wide-platform)
- **Rare are palatal malpositions**
 - ✓ This requires restorations with a ridge-lap design

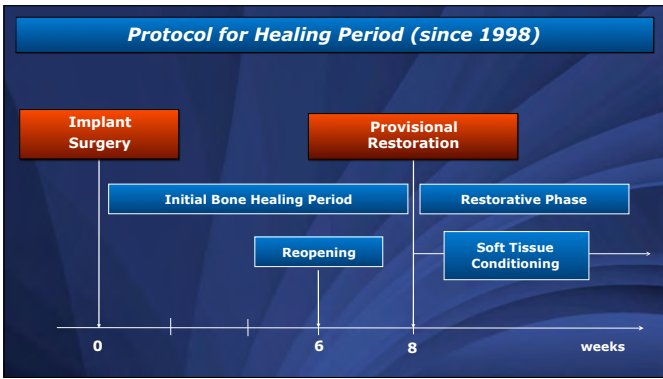
Oro-facial Positioning

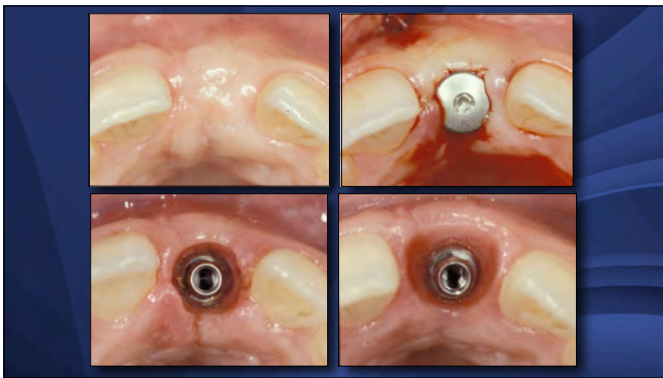
Recommendations

- Don't use wide-platform implants in the anterior maxilla
- Make sure to position the implant into the alveolar process
- Implant platform should be ≈ 1.0 to 1.5 mm palatal to the point of emergence of the future implant crown
 - ✓ Use periodontal probe for orientation













2009: 13 years



1992



2002: 10 years



2017: 25 years



Conclusions: Implant Surgery in Esthetic Sites

- The primary goal is an esthetic treatment outcome
- These situations are demanding for involved clinicians
 - ✓ Advanced to complex level
- A correct 3-dimensional implant position is essential
 - ✓ Restoration-driven implant placement within the comfort zones
 - ✓ Don't use wide-neck or wide-platform implants in the esthetic zone
- Contour augmentation is a key factor for esthetic outcomes
 - ✓ The surgeon must master the GBR technique
- A submerged healing is preferred
