A Paradigm Shift in Prosthetic Dentistry

Learning Objectives

- Review studies evaluating Teeth adjacent to treated and untreated bounded edentulous spaces
- Review studies on long-term success rate for Endo-treated teeth
- Review the evidence on Fixed partial denture survival analysis studies
- Evaluate long-term outcomes on Implant Supported Restorations
- Evaluate clinical studies with the Straumann Dental Implant System

Terminology

- Immediate Loading: same day or within 24 hours loading
- Immediate Temporization: Placement of temporary restoration (out of occlusion) at the time of surgery
- Early Loading: loading 3-8 weeks after placement
- Delayed Loading: 3 to 6 months loading
- One-stage system: only one surgery is required
- Two-stage system: a 2^{nd} surgery is required for implant uncovering

Survival rates of Teeth Bounded to Edentulous Spaces

- VA Medical Center Longitudinal Study- Shugars JADA 1998:1089-1095
  - 19% of adjacent teeth failed if untreated
  - 10% failed if treated with FPD
  - 30 % failed if treated with RPD
- Aquilino SA J Prosthetic Dentistry- Retrospective study 317 patients –
  - 10 year survival rate for RPDs 56%
  - 10 year survival rate for FPDs 90 %

Conclusions

- There is significant loss of adjacent teeth (19%) if the missing tooth is not replaced.
- FPDs improved survival rate, with abutment tooth loss of 10% at 10 years
- RPDs increased abutment tooth failure rate ranging from 30% to 44%

Fixed Partial Denture Survival Studies

- Biologic failures: caries, periodontal disease, endodontic or periapical problems.
- Mechanical failures: loss of retention, porcelain fracture, wear of gold restoration, framework fracture defective margins, poor contours, poor esthetics.

FPD Survival Rate Studies

- Palmquist. Int J Pros 1993;6:279-285

  103 FPD 18-23 year Survival: 79%
- Lindquist. Int J Pros 1998;11:133-138

  140 FPD. 20 years Success 65%
- Hammerle Int J Pros 2000:13:409-415

  115 FPD and 229 abutment teeth. 5-16 years. 12% lost vitality, 8% secondary caries, 8% loss of retention, and 3% tooth fracture
- Scurria MS JPD 1998; 79:459-464

  Meta-analysis of 9 studies. 2761 abutment teeth 3-20.5 years. 10-year survival 85%- 15-year 66%

More FPD long-term studies

- De Backer H Int J Prosthodont 2006

  3- unit FPD survival rate: 73.1%

  Main reason for failures was caries (38.1%)
- De Backer H Int J Prosthodont 2008

  4- unit FPD survival rate: 68.3%

  Main cause for irreversible failure was caries (32%)

Conclusions

- Studies seem to be in agreement that FPD's are about 66% successful for periods of 15 years.
- Several studies indicate that the mean lifespan for FPDs is about 10 years
- Various studies report abutment tooth loss ranging from 2% to 30% for periods of 8 to 14 years.

Implant Survival Analysis

- Immediate success rate is >98% and after 1st year of function, failure rate is very low.
- Priest GF IJOMI 1999;14:181-188. 99 patients with 116 implants & 112 single tooth implant prostheses – 10 years Survival rate 97.4%
- Eckert S and Sanchez A. IJOMI 2005. 7398 implants (5 implant systems) Survival rate 96%.
- Gomez-Roman IJOMI 1997;12:209-309. 376 patients with 696 implants (300 single crowns) 5 years Survival rate 96%
- Lindhe et al. Clin Oral Impl Res 1998;9:80-90 (meta-analysis of 19 studies) 2686 implants: 570 single crowns 2116 in FPD. 7 years. Survival rate FPD 93.6%, Single crown 97.5%.

More Survival Rate Studies

- Lekholm et al. Clin Implant Dent Relat Res 2006;8:178-186. 17 partially edentulous patients with 69 Branemark implants. Survival rate 91% at 20 years.
- Astrand P et al. Clin Implant Dent Relat Res 2008 April. 21 totally edentulous patients with 123 implants were evaluated. Survival rate 99.1%

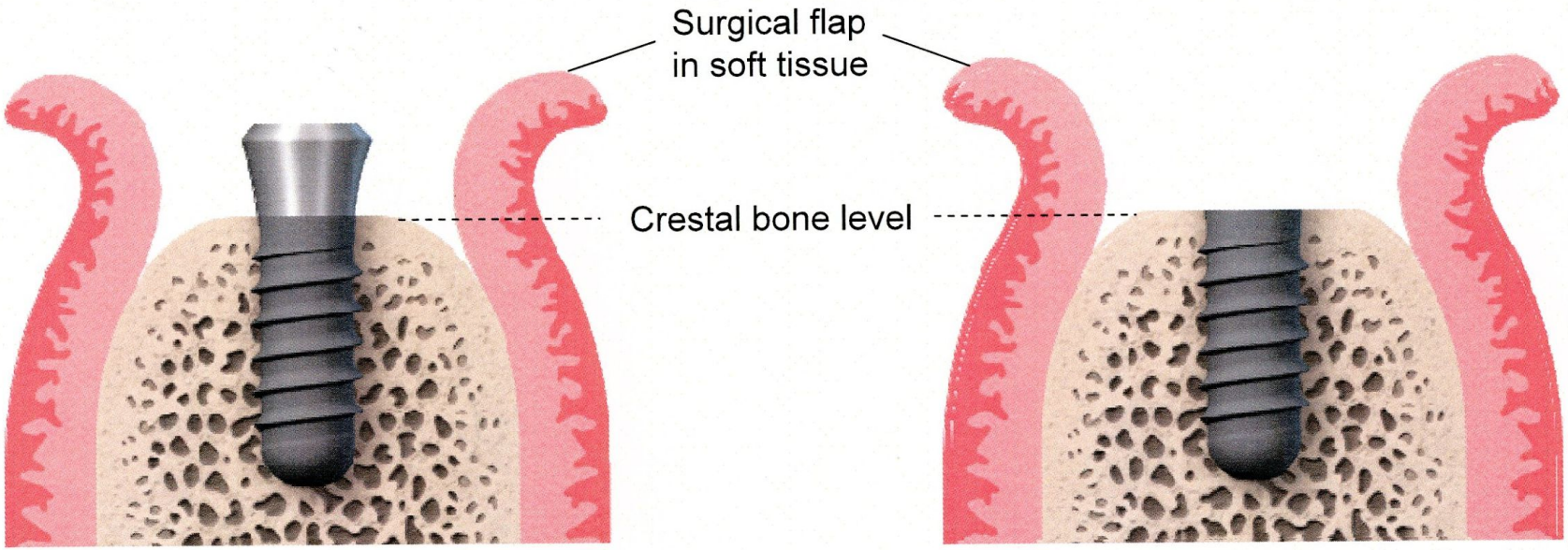
Summary

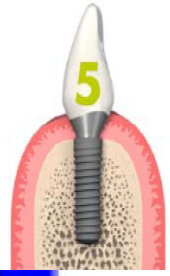
- Treatment options for tooth replacement have different success rates
- FPDs 85% successful at 10 years
  66% successful at 15 years
  69% successful at 20 years
- Implant-Supported Prostheses
  - 96% successful at 5 years
  - 91-99.2% successful at 20 years

Advantages of Implant-supported Vs. Fixed Partial Prosthesis

- Preservation of tooth structure
- Preservation of bone structure
- Preservation of soft tissue esthetics
- Improved ability for OHI
- Improved Quality of Life
- Decreased risk for caries

Clinical Studies on the Straumann System





Solid Screw implants for Posterior Replacement

- Levine et al. 2002 IJOMI .
- Retrospective analysis 675 posterior single-tooth implants were restored in 471 patients with average time of loading 21.30 months.
- A cumulative survival rate of 99.1% was obtained for all sites (6 failures).
- Minimal restorative problems were found with either screw-retained (n = 71) or cemented restorations on solid abutments (n = 600); 80.3% of screw-retained and 98.2% of cemented restorations were free of complications, respectively. Patient satisfaction scores were high (97.4%)
- The data suggest that solid-screw(4.1 or 4.8 mm wide) Straumann implants can be an excellent choice for posterior single-tooth restorations.

Multicenter Retrospective Analysis of Wide-neck Dental Implants

- Levine R et al. (IJOMI 2008) evaluated the predictability of Straumann 1-stage wide-neck SLA implants used for molar replacement.
- 499 implants in 410 patients were assessed with a mean loading time of 24 months. 359 implants were placed in the mandible, 148 in the maxilla.
- Cumulative survival rates was 99.2% for mandibular molars, and 96.6% for maxillary molars.
- This data suggest that the 1-stage solid-screw wide-neck implant is a good choice for molar single-tooth replacement.

Straumann SLA vs Nobel Ti-Unite Surface

- Jung et al. J Periodontology 2008,79:1857-1863 (October issue)
- 5 year comparative study
- Mandibular posterior single implants
- 193 implants with SLA surface; 112 implants with Ti-unite surface.
- Survival rate for SLA 99%, Ti-unite 96%

Shorter implants vs. Longer Implants

- Fugazzotto (IJOMI 2008). Retrospective study in patients receiving Straumann tissue level implants that were less than 10 mm in length.
- A total of 2,073 implants were assessed in 1,774 patients. Implants were 6, 7, 8, or 9 mm supporting single crowns or short-span fixed prostheses.
- Cumulative survival rates ranged from 98.1% to 99.7%.
- Conclusions: with proper case selection and utilization, shorter implants demonstrate a success rate comparable to those reported for longer implants.

Long-term Clinical Study on Full Arch Immediate Loading Implants

- Kinsel (IJOMI 2007). Retrospective study on 344 single-stage Straumann on 43 patients with 56 edentulous arches immediately loaded with 1-piece provisional prosthesis.
- Follow-up 2 to 10 years. A total of 16 implants failed to integrate, with a survival rate of 95.3%.
- Reduced implant length was the sole significant predictor for failure.

SLActive Surface Technology

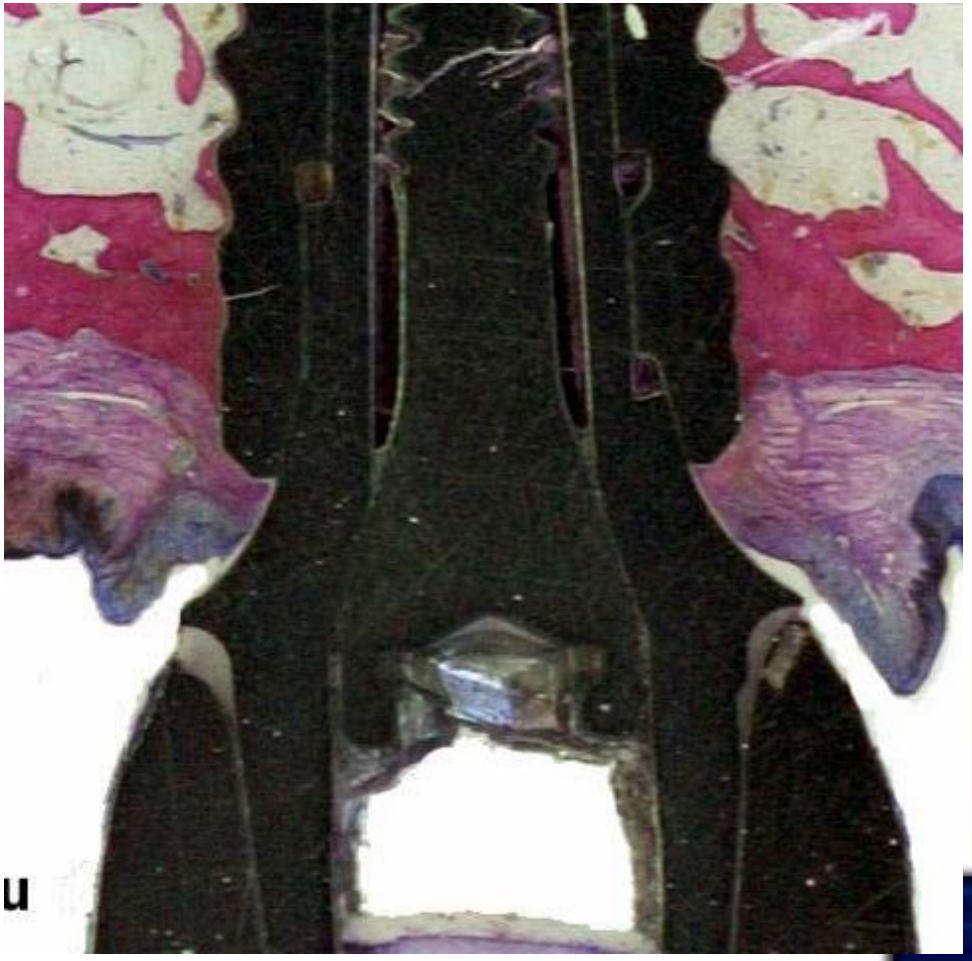
Clinical Studies on SLActive Surface Technology

- Oates et al (IJOMI 2007) completed RCT on chemically modified large-grit, acid-etched (SLA) in 31 patients.
- Each patient received 2 implants with the same physical properties but with surfaces that were chemically different.
- Resonance frequency analysis was assessed weekly for 6 weeks after implant placement.
- All implants were proven clinically successful allowing for restoration.
- A shift from decreasing to increasing stability occurred at 2 weeks for SLActive implants versus 4 weeks for SLA implants.
- This study demonstrates that chemical modification of SLA surface to alter the biologic events of the osseointegration process may be associated with enhance healing response.

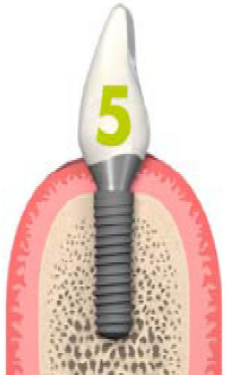
SLActive® multi-center study Ganeles et al (in press Clinical Oral Implant Research)

- The 1-year results of SLActive® multi-center study have been accepted by Clinical Oral Implants Research.
- At one year after implant placement, the study concluded the following:
- Immediate and early loading with Straumann® SLActive implants yields excellent survival rates (98 % and 97 % after 1 year)
- Immediate loading is as successful as early loading with Straumann® SLActive implants
- Successful implant treatment is possible with Straumann® SLActive even in poor quality bone
- No implant failures were evident in Type IV bone

Crestal Bone Preservation



Crestal bone preservation with Platform Switching



- IJOMI (under review). Marginal bone height and BMD at 1-year post-loading of Bone level SLActive Straumann Implants
- A total of 137 implants in 21 patients were inserted. Implant stability and bone height was measure at implant placement and 1 year follow-up. All implants received immediate loading. BMD and bone height did not differ at the 1-year visit from baseline measurements.

Bottom Line

- Solid-screw(4.1 or 4.8 mm wide-neck) Straumann implants can be a satisfactory choice for posterior single-tooth restorations (99% survival rate)
- With proper case selection and utilization, shorter implants demonstrate a success rate comparable to those reported for longer implants.
- In fully edentulous cases, immediate implant loading demonstrates a high success rate similar to delayed loading cases.
- Immediate implant loading should be avoided with shorter implants.
- Chemical modification of SLA surface enhance the osseointegration process.
- Short-term clinical studies demonstrate preservation of crestal bone, and excellent survival rates for SLActive Implants
- In short-term studies, immediate loading of Straumann® SLActive implants is as successful as early loading.
- Long-term studies are needed before we can make final recommendations of loading protocols with SLActive implants.

Success rate for Endo-treated teeth

- Eriksen H. Endo Dental Traum 1991:189, Jokinen MA Scan J Dent Res 1978;86:366- Success rate for RCTs are as low as 53% and as high as 95%.
- Sjogren et al. Int Endo J 1997;30:297. Teeth with pre-existing periapical lesion have the prognosis for success reduced 10 to 20%.