

ON THE ROLE OF NUMBER OF FIXTURES, SURGICAL TECHNIQUE AND TIMING OF LOADING

AKADEMISK AVHANDLING

som för avläggande av odontologie doktorsexamen vid Sahlgrenska akademien vid Göteborgs universitet kommer att offentligen försvaras i föreläsningssal 3, institutionen för odontologi, Göteborg, fredagen den 23 maj 2008 kl. 09:00

av

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Avhandlingen är av sammanläggningstyp och baserar sig på följande delarbeten:

- I** **Eliasson A, Palmqvist S, Svenson B, Sondell K.** Five-year results with fixed complete-arch mandibular prostheses supported by 4 implants. *Int J Oral Maxillofac Implants* 2000;15:505-510.
- II** **Eliasson A, Eriksson T, Johansson A, Wennerberg A.** Fixed partial prostheses supported by 2 or 3 implants: A retrospective study up to 18 years. *Int J Oral Maxillofac Implants* 2006;21:567-574.
- III** **Eliasson A, Blomqvist F, Johansson A, Wennerberg A.** A retrospective analysis of early and delayed loading of full-arch mandibular prostheses using three different implant systems: Clinical results up to 5 years of loading. *Clin Implant Dent Rel Res. In Press.*
- IV** **Eliasson A, Narby B, Ekstrand K, Hirsch J, Johansson A, Wennerberg A.** A 5-year prospective clinical study of treatments with implant-supported fixed prostheses in the edentulous mandible using the Paragon System Implants placed according to a submerged and non-submerged surgical protocol. *Submitted for publication.*
- V** **Eliasson A, Wennerberg A, Johansson A, Örtorp A, Jemt T.** The precision of fit of milled titanium implant frameworks (I-Bridge®) in the edentulous jaw. *Submitted for publication.*

Aims: The aims of this thesis were to analyze reduced number of implants supporting full arch fixed mandibular prostheses and fixed partial dentures (FPDs), non-submerged healing and early loading in the edentulous mandible. A further aim was to evaluate fit of Computer Numerical Control (CNC)-milled I-Bridge[®] frameworks.

Material & Methods: *Paper I.* One hundred and nineteen patients rehabilitated with full arch mandibular prostheses supported by four implants were evaluated after a mean follow-up of 4.4 years. *Paper II.* A total of 178 patients provided with FPDs supported by two (n=92) or three implants (n=122) of whom 123 were evaluated after a mean follow-up of 9.4 years. *Paper III.* Early and delayed loading of full arch mandibular prostheses were evaluated in 109 patients, 54 with delayed loading and 55 with early loading, with a mean follow-up of 3.6 years. *Paper IV.* Submerged and non-submerged implant placement for supporting fixed prostheses in the edentulous mandible were evaluated after five years in 29 patients. *Paper V.* The precision of fit of CNC-milled I-Bridge[®] frameworks was evaluated using two different implant systems.

Results: *Paper I.* The five year cumulative survival rate (CSR) for implants was 99.1% and for prostheses 100%. Mean bone loss from baseline to five-year follow-up was 0.5 mm. No indication could be found that the number of supporting implants influenced the prosthetic complications. *Paper II.* The five year implant and prosthesis CSR was 97.7% for 2-implant supported FPDs and 97.0% for 3-implant supported FPDs. Mean bone loss at five years was 0.4 mm. Significantly more prosthetic and abutment screw loosening were seen in two-implant supported FPDs. *Paper III.* Five year CSR for implants was 94.4% and 92.5% for prostheses in early loading, and 97.9% and 98.0% in the delayed loading group. More prostheses needed adjustment or replacement in the early group, but patients treated with early loading were more pleased with the treatment procedure. *Paper IV.* Five-year CSR survival rate was 99.4%. Three implants fractured in one patient. Mean bone loss at five years was 0.5 mm in submerged implants and 0.4 mm in non-submerged implants. *Paper V.* All frameworks demonstrated clinically acceptable fit with mean distortion values within 23 µm (x-axis), 26 µm (y), 4 µm (z-axis) and 34 µm (3-D) for all frameworks. Control frameworks displayed greater levels of distortion than frameworks produced in a strict test situation.

Conclusion: A reduction of the number of supporting implants to four implants in full arch mandibular prostheses and two implants in three unit FPDs in partial edentulous jaws resulted in the same clinical outcome as when more implants are used. Non-submerged implant placement in the edentulous mandible was as predictable as submerged, but early loading of implant supported mandibular prostheses incurred more prosthetic complications. Computer numerical control-milled frameworks presented levels of precision of fit within limits considered to be clinically acceptable and superior to earlier published results on cast frameworks.

Key words: Computer numerical control, CNC-milling, dental implants, fixed prostheses, non-submerged

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