

Goodacre CJ, Bernal GB, Rungcharassaeng K. Clinical complications with implants and implant prostheses. J Prosthet Dent 2003;90:121-32. (218 refs)

Purpose: Three purposes were delineated in this article: 1) To identify the types of complications that have been reported in regard to endosseous root form implants and associated implant prostheses; 2) To identify the most common implant complications; 3) To compare the complications incidences associated with implant prostheses with those encountered with fixed restorations/prostheses.

Materials and Methods: The literature review encompassed a Medline search of English-language publications from 1981 to 2001. To be included in this review, the publications had to have presented clinical data that identified the number of implants/prostheses being evaluated, how long they had been in place, and how many were affected by complications. The publications were grouped according to each category of complication, i.e. surgical complications, implant loss, bone-loss, peri-implant soft tissue, mechanical, and esthetic/phonetic complications. The types of complications in each category were identified, and the raw data of a particular complication was combined in order to calculate the mean complications incidence. For a specific complication to be included in the study, 3 or more studies had to report data related to the incidence of a particular complication.

Findings and Conclusions:

Surgical complications- Surgical complications identified in the literature include the following: hemorrhage-related complications, neurosensory disturbances, adjacent tooth devitalization/damage, mandibular fractures, life-threatening hemorrhage, air emboli, implant displacement into the mandibular canal, screwdriver aspiration, descending necrotizing mediastinitis, intraocular hemorrhage, and hiccups. Only 3 of the aforementioned complications had been studied in a sufficient number of data-based publications. These include the following: 1) neurosensory disturbances; 2) hemorrhage-related complications; and 3) mandibular fracture. For the incidence of hemorrhage-related complications, 92 of 379 patients were identified as being affected by factors such as hematomas and ecchymosis. The mean incidence was 24% with a range of 12% to 30%. For neurosensory disturbances, 151 out of 2142 patients experienced some disturbance after surgery for a mean incidence of 7%. Four studies demonstrated that the incidence of disturbance was significantly lower after 1 year. The size and number of the affected areas decreased over time. The mean incidence of mandibular fractures among the 1523 patients treated in the various studies analyzed was found to be 0.3%.

Implant loss- This parameter was evaluated in relationship to the following criteria- prosthesis/arch, time of loss, implant length, bone quality, and systemic conditions.

Prosthesis/arch: For maxillary fixed complete dentures, 9 studies were used to calculate a mean implant loss of 10% (443 of 4559 implants). For the mandibular fixed complete denture, 14 studies were used to report a mean implant loss of 3% (255 of 9991 implants). With implant overdentures, the mean maxillary implant loss was 19% (206 of 1103 implants) and the mean mandibular implant loss was 4% (242 of 5683 implants). The implant loss in the maxilla was found to be greater than the implant loss in the mandible. For implant fixed partial dentures, the maxillary and mandibular implant loss was found to be the same (mean loss of 6%). The mean implant loss for implant single crowns combining both the maxillary and mandibular arches was 3%.

Timing of implant loss: For implant fixed complete dentures, the number of implants lost prior to prosthesis placement was 135 (54%) and the number of implants lost after prosthesis placement was 113 (46%). For implant overdentures, the number of implants lost prior to prosthesis placement was 176 (60%) and the number of implants lost after prosthesis placement was 117 (40%). For implant fixed partial dentures, the number of implants lost prior to prosthesis placement was 104 (61%) and the number of implants lost after prosthesis placement was 66 (39%). For implant single dentures, the number of implants lost prior to prosthesis placement was 7 (47%) and the number of implants lost after prosthesis placement was 8 (53%).

Implant length and bone quality: Thirteen studies presented data regarding the incidence of implant loss relating to implant length. For implants which were 10 mm or less in length 272 of 2754 (10%) failed. For implants which were greater than 10 mm in length 105 of 3015 (3%) failed. Seven studies permitted a comparison of implant loss when placed into different qualities of bone. There were 3192 implants placed in types I to III bone and 113 or 4% of these implants were lost. There were 1009 implants placed in type IV bone and 160 were lost. When evaluating systemic factors for implant failure, it was found that 3

conditions (smoking, radiation therapy, and diabetes) were evaluated in a manner that provided adequate data for inclusion into this review article. Smokers had greater implant loss (11%) than nonsmokers (5%). Radiation treatments to the maxilla caused a greater implant loss (25%) than in the mandible (6%). Five studies provided data related to 507 patients with controlled diabetes in whom implants were placed. A total of 1053 implants were placed and 93 or 9% were lost. From the limited information found in this study, it appeared that osteoporosis, scleroderma, chemotherapy, and hormone replacement therapy did not negatively affect implant success.

Bone loss: The mean bone loss occurring during the first year was 0.9 mm, and the subsequent loss per year after the first year was 0.1 mm. Some studies demonstrated bone gain in both the maxilla (6% of the patients experienced bone gain after 1 year and 38% gained bone after 3 years) and the mandible (2% of the patients experienced bone gain after 1 year whereas 18% had gained bone after 3 years).

Peri-implant soft tissue complications: The most common peri-implant complications were dehiscence/fenestration (mean incidence: 7%; range 2-13%), gingival inflammation/proliferation (mean incidence: 6%; range 1-32%), and fistulas (mean incidence: 1%; range 0.002% to 25%). The incidence of gingival inflammation/proliferation associated with implant overdentures (mean incidence: 19%) was greater than the incidence with other prostheses.

Mechanical complications: There were 14 mechanical complications identified in the literature with overdenture loss of retention/adjustment having the largest mean incidence of complications (30%). Metal framework fractures, abutment screw fractures, and implant fractures had the lowest mean incidence of occurrence (3%, 2%, and 1%, respectively).

Esthetic/phonetic complications: A mean complications incidence of 10% was calculated from the combined data in 7 studies (47 of 493 crowns/prostheses produced esthetic complications). Phonetic problems were found in association with fixed complete dentures, overdentures, and fixed partial dentures. Of the 730 prostheses, 51 created phonetic complications (mean incidence: 7%).

Complications incidence comparison of prostheses: It was not possible to calculate an overall complications incidence for implant prostheses since there were no studies that simultaneously evaluated all or most of the reported complications. However, it was noted that there was a trend toward a greater number of complications associated with implant prostheses. Conventional fixed partial dentures and resin-bonded prostheses were associated with the next greatest number of complications (mean incidence: 27% and 26%, respectively).

Question: According to Goodacre (2003), the most common implant complications in terms of mean incidence reported was/were:

- A) Hemorrhage-related complications
- B) Implant loss in type IV bone
- **C) Loosening of the overdenture retentive mechanism
- D) Overden