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## REVIEW ARTICLE

### Prosthetic Complications of Implant Supported Dentures

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#### ABSTRACT

Implant retained overdenture are the most reliable treatment options for edentulous patients to address the problems associated with complete dentures such as lack of stability and retention. Outcome of implant therapy is no longer measured by survival of implant alone, but by aesthetic and functional success of the prostheses. Hence; we planned the present review to highlight some of the important aspects of prosthetic complications of implant supported over-dentures.

**Key words:** Implant, Prosthetic, Over-denture.

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#### Introduction

Implant-supported or retained dentures have been increasingly accepted as an alternative to conventional dentures for oral rehabilitation of edentulous patients. Patient desire for improved masticatory function is often given as a primary reason for treatment with implant-supported or retained dentures.<sup>1, 2</sup> While this restoration of masticatory function may be of critical value to the patient, there is some concern that this rationale for selection of implant-supported or retained dentures compared to conventional dentures may be based on a perception that implant-supported or retained dentures will routinely improve masticatory ability. This belief may be reinforced by studies comparing patient perceptions of functions related to mastication with conventional and implant-supported or retained dentures.<sup>3-5</sup>

#### Review of literature

Ülkü SZ et al evaluated clinical prosthetic values and complications that occurred during 4-year follow-up in implant-supported restorations. This retrospective study included 40 patients who received oral rehabilitation with an implant-supported prosthesis. A total of 162 implants

were placed: 99 in the maxilla and 63 in the mandible. The prosthetic and surgical data were recorded. Data including prosthetic complications and implant loss were recorded and statistically analyzed using Cox proportional hazard regression analysis. In total, 159 implants (98.14%) survived, 3 implants (1.86%) failed, and 100% of the prostheses were successful. There were 62 dental implants used as abutments for removable dentures and 97 for fixed dentures. The most frequent prosthetic complications after placement of an implant-supported prosthesis were loss of retention, mucositis, abutment screw loosening, and fracture. Patient satisfaction after prosthesis use was also evaluated, showing that satisfaction was systematically increased. To minimize the frequency of complications, protocols must be established from diagnosis to the completion of treatment and follow-up of implant-supported prostheses, especially in terms of adequate technical steps and careful radiographic evaluation of the components.<sup>6</sup>

Dhillon N et al described the case report of management of prosthetic complication in implant-retained overdenture. Implant retained overdenture are the most reliable treatment options for edentulous patients to address the problems associated with complete dentures

such as lack of stability and retention. Outcome of implant therapy is no longer measured by survival of implant alone, but by aesthetic and functional success of the prostheses. Fracture of denture base is one of the prosthodontic complications seen with implant retained overdentures with ball attachments. This clinical report described a treatment approach for oral rehabilitation of a patient with implant retained mandibular overdenture who had chief complaint of repeated fracture of mandibular denture.<sup>7</sup>

Nedir R et al evaluated prosthetic complication on 236 patients treated with 528 implants in an 8-year private practice experience. The study sample included 55 overdentures (ODs) and 265 fixed partial dentures (FPDs). Among the latter, 231 FPDs were cemented and 34 were screw-retained. The type and frequency of prosthetic incidents were recorded, including adjustments and complications. Over this period, 1 abutment fractured and 2 became loose, leading to a cumulative implant component success rate of 99.2%. Patients with removable prostheses had more complications than those with fixed ones, 66.0% versus 11.5%; the difference was significant ( $P < .001$ ). Posterior fixed prostheses had more complications than anterior ones, 11.0% versus 0%; however, the difference was not significant ( $P = .16$ ). The complication rates for cemented and screw-retained prostheses did not differ significantly (10.4% versus 5.9%;  $P = .61$ ). Prostheses with an extension cantilever had more complications, 29.4% versus 7.9%; the difference was significant ( $P = .01$ ). In the OD group, the ball-retained prostheses had a significantly higher rate of complications than the bar-retained ones (77.5% versus 42.9%;  $P = .04$ ). In the FPD group, complications were not recurrent; most occurred during the first 2 years, and the rate of complications did not increase with time. In the OD group, 1.3 incidents per prosthesis were recorded. Incidents were often recurrent, and the rate of complications did not decrease with time. Removable and fixed prostheses were associated with complications at different frequencies and of different types. In the removable group, adjustments and foreseeable complications were numerous, recurrent, and usually easy to manage. Bar-retained prostheses had fewer complications than ball-retained ones.<sup>8</sup>

Chaffee NR et al evaluated the amount of maintenance required to provide acceptable and satisfactory implant-retained mandibular overdentures in a prospective clinical trial. Fifty-eight patients received new maxillary and mandibular complete dentures followed by placement of microthreaded/TiOblast implants in the mandibular left and right canine regions. At 3 months, ball abutments were placed, and the mandibular prostheses were relined to receive Dalla Bona-type ball housings (baseline). Prostheses were prospectively evaluated, and adjustments were made at 3-, 6-, 12-, 24-, and 36-month recall visits and at nonscheduled visits for 9 types of prosthetic complications. Of 58 patients, 6 required no adjustments. The remaining 52 patients made 327 return visits (including 194 nonscheduled visits) for prosthesis and/or abutment adjustments. One hundred and fifteen

practitioner hours were required to provide prosthetic solutions to patient concerns at the return visits. The total estimated cost for all professional and laboratory services was \$12,624.00 (\$218.00 per patient). Although mandibular implant-supported overdentures with Dalla Bona-type ball attachments are an acceptable treatment option for edentulous patients, routine maintenance is required to ensure successful long-term outcomes.<sup>9</sup>

Goodacre CJ et al identified the types of complications that have been reported in conjunction with endosseous root form implants and associated implant prostheses. A Medline and an extensive hand search were performed on English-language publications beginning in 1981. The searches focused on publications that contained clinical data regarding success/failure/complications. The complications were divided into the following 6 categories: surgical, implant loss, bone loss, peri-implant soft tissue, mechanical, and esthetic/phonetic. The raw data were combined from multiple studies and means calculated to identify trends noted in the incidences of complications. The most common implant complications (those with a greater than a 15% incidence) were loosening of the overdenture retentive mechanism (33%), implant loss in irradiated maxillae (25%), hemorrhage-related complications (24%), resin veneer fracture with fixed partial dentures (22%), implant loss with maxillary overdentures (21%), overdentures needing to be relined (19%), implant loss in type IV bone (16%), and overdenture clip/attachment fracture (16%). It was not possible to calculate an overall complications incidence for implant prostheses because there were not multiple clinical studies that simultaneously evaluated all or most of the categories of complications. Although the implant data had to be obtained from different studies, they do indicate a trend toward a greater incidence of complications with implant prostheses than single crowns, fixed partial dentures, all-ceramic crowns, resin-bonded prostheses, and posts and cores.<sup>10</sup>

Engelhardt F et al screened data of 32 patients supplied with implant-supported and Locator-attached overdentures for prosthetic complications and maintenance requirements, which were recorded and statistically analyzed. Mean observation time was  $4.78 \pm 1.72$  years. Loss of retention was the most frequently observed event ( $n = 22$ ). Damage and exchange of the insert holders ( $n = 4$ ) and loosening of locator attachments ( $n = 2$ ) and fracture of the insert holder ( $n = 2$ ) were uncommon events; no loss of locator attachments was observed. Loss of retention in Locator-attached overdentures is frequent; correlating patient-specific parameters with prosthetic complications is necessary to define recommendations for the use of Locator attachments.<sup>11</sup>

Andriottielli M et al identified the prosthetic complications associated with the different attachment mechanisms used for implant-supported or implant-retained overdentures. A search of the MEDLINE and PubMed databases was conducted to find articles in English and German peer-reviewed journals published between 1980 and 2008. The search focused on

randomized controlled clinical trials and prospective studies with follow-up periods of at least 5 years that contained clinical data regarding success, failure, and prosthetic complications. The search yielded a limited number of randomized controlled clinical trials referring to implant-supported or implant-retained overdentures. Very few studies have prospectively compared prosthetic complications for a period longer than 5 years after delivery of the prosthesis. Implant-supported or implant-retained overdentures in the mandible provide predictable results with improved stability, retention, and patient satisfaction.<sup>12</sup>

Dudic A et al analyzed three categories of prosthetic complications in relation to the type of retention mechanism for overdenture connection to the implants (ie, rigid or resilient). One hundred nineteen patients with a total of 258 implants participated in the study. They had been monitored regularly during an observation period of 5 to 15 years (mean 9.3 yr). Seventy-five patients had a resilient retention device (ball anchors or a round clip bar); 44 patients had a rigid bar with or without distal extensions. The incidence and rate of complications were calculated for the overall- and for the 2- and 5-year observation periods. The mean number of complications per overdenture during the entire observation period was 3.5; this did not differ statistically between the two retention groups. Some significant differences were found only for the 2- and 5- year period. Broken, loose, or lost female parts were more frequently observed with resilient devices, as were repairs and relining of the resin denture base, whereas tightening of bar retainers was more typical with rigid bars. A change from a resilient retention device to a rigid bar was performed more often than vice versa but not at a statistically significant level. Although these long-term results do not indicate a significant difference between the retention groups, a slight superiority of the rigid bar is suggested.<sup>13</sup>

Rentsch-Kollar A et al summarized a long-term clinical observation of patients with implant overdentures. Between 1984 and 1997, edentulous patients were consecutively admitted for treatment with an implant overdenture. The dentures were connected to the implants by means of bars or ball anchors. Regular maintenance was provided with at least one or two scheduled visits per year. Recall attendance and reasons for dropout were analyzed based on the specific history of the patient. Denture maintenance service, relining, repair, and fabrication of new dentures were identified, and complications with the retention devices specified separately. In the time period from 1984 to 2008, 147 patients with a total of 314 implants had completed a follow-up period of >10 years. One hundred one patients were still available in 2008, while 46 patients were not reexamined for various reasons. Compliance was high, with a regular recall attendance of >90%. More than 80% of dentures remained in continuous service. Although major prosthetic maintenance was rather low in relation to the long observation period, visits to a dental hygienist and dentist resulted in an annual visit rate of 1.5 and 2.4, respectively. If new dentures became necessary, these

were made in student courses, which increased the treatment time and number of appointments needed. Complications with the retention devices consisted mostly of the mounting of new female retainers, the repair of bars, and the changing of ball anchors. The average number of events and the rate of prosthetic service with ball anchors were significantly higher than those with bars. Twenty-two patients changed from ball anchors to bars; 9 patients switched from a clip bar to a rigid U-shaped bar. This long-term follow-up study demonstrates that implant overdentures are a favorable solution for edentulous patients with regular maintenance.<sup>14</sup>

### Conclusion

In implant-supported dentures, planning of treatment in advance is crucial, and routine control of the dentures after treatment is completed is of great importance. The best way to manage complications is to prevent them in the first place.

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