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Commentary

Rehabilitation of irradiated patients with chemically modified and conventional SLA implants: a clinical clarification

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We recently published the five-year results of a clinical study investigating the success of conventional and chemically modified implants in patients who received radiation therapy following the removal of a malignant tumour (oral squamous cell carcinoma; (1). In this study, the implant survival rate after 5 years was shown to be 75·8% and 74·4% for SLA and SLActive implants, respectively. While the survival rates as published are, from a statistical point of view, accurate, the rates do not fully reflect the clinical picture necessary for adequate decision-making for clinicians who consider treating such patients with implants. In particular, we would like to reiterate that the implant survival rate, as presented on the basis of the number of surviving implants in the patients remaining after 5 years, may make clinicians reconsider treating these patients, or even actively discourage clinicians from providing implant rehabilitation for these patients, which is not the intention of the authors.

Patients receiving radiation therapy due to resection of oral cancers are considered to be a high-risk patient group with a substantially increased risk of implant failure due to treatment. Indeed, this opinion has been reinforced by some recent reviews (2). However, our study shows that, with the appropriate implants and surgical technique, successful osseointegration can be obtained and maintained over a long period in these patients, despite the patients receiving radiation doses up to 72 Gy, a level above that suggested to pose a greater risk for implant failure (50 Gy; 3). Indeed, it could be argued that patients receiving radiation therapy after surgery for oral cancer are one of the groups who would benefit the most from implant treatment and it could be their only opportunity to receive a prosthetic rehabilitation. These patients will substantially increase their quality of life, because conventional prostheses are often associated with problems; in some cases, conventional treatment may even be impossible due to anatomical deformities following tumour resection. Therefore, to help clinicians interpret the outcome of this study for adequate decision-making, we would like to place the results in a clinically relevant context.

A total of 102 dental implants were placed in 20 irradiated tumour patients in this split-mouth study. Five of these implants were removed during a block resection in the first month following implant treatment due to a recurrence of the tumour (OSCC). Two SLA implants in two different patients were lost 2 months after implant placement due to lack of osseointegration; this also occurred before loading, but prosthetic rehabilitation was performed successfully in these patients despite the loss of these implants. Further implants were documented as lost in four patients (18 implants); unfortunately, these patients died due to their oral disease between 3 and 5 years after implant placement. In our investigation, these implants were considered 'lost', that is 'non-surviving' for the purpose of the Kaplan–Meier analysis presented in the paper, resulting in the implant survival rates stated above. However, we feel it is important to emphasise two points regarding the results. First, implants should not be considered as failed implants (i.e. lack of osseointegration), as would be the case for 'non-surviving' implants in a conventional clinical implant study; at the time of the patients' deaths, all the remaining implants were still

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in place in these patients. In our original preliminary publication, which included results after a mean observation period of 14·4 months, the implant survival rate was 98% (96% and 100% for SLA and SLActive implants, respectively; 4). This survival rate remains unchanged until the time these patients died. When calculating the survival rate considering failed osseointegration as an event, with death and resection as censored data, the survival rate remains unchanged at 98% after 5 years (96% and 100% for SLA and SLActive implants, respectively). The second point to emphasise is that within this study, only two implants (SLA implants) failed due to lack of osseointegration prior to prosthetic loading. All of the remaining implants were considered successful according to the Buser success criteria up to that point, resulting in an implant success rate of 100%. While it may not be appropriate to extrapolate beyond this point for the implants in the deceased patients, in terms of their functionality and clinical assessments, we saw no reason to expect that the clinical performance and longevity of their implants would be any different to the other implants in the study had the patients survived. When interpreting implant survival rates, one has to consider the increased morbidity and mortality of patients with oral squamous cell carcinoma. Data from the German-Austrian-Swiss Working Group for Maxillary and Facial tumours have estimated a Kaplan–Meier 5-year survival rate of 52·7% for patients undergoing radiotherapy (5). It has also been estimated that around 20% of the patients experience a tumour recurrence within 2–3 years of the initial cancer treatment. Furthermore, 100% of the prosthetic implant-supported restorations (i.e. excluding the patients deceased due to cancer mortality) remained *in situ* at the five-year follow-up.

We hope that this further explanation of the implant survival rate, placing it in the context of the morbidity and mortality of patients receiving radiation therapy after oral tumour resection, is useful. In particular, we hope that it will encourage clinicians to treat their patients appropriately and offer them the best possible oral health-related quality of life.

Yours sincerely,

K. Nelson & Susanne Nahles (on behalf of the authors)

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