What's new for the clinician?

Summaries of and excerpts from recently published papers

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1. Early loading of fluoridated implants placed in fresh extraction sockets

Oxby, G., Oxby, F., Oxby, J., Saltvik, T. and Nilsson, P. (2015), Clinical Implant Dentistry and Related Research, 2015; 17: 898–907.

Immediate/early loading of implants in healed sites and extraction sockets is an increasingly popular treatment modality in implant patients undergoing planned tooth extractions due to the reduced treatment time required. Several clinical studies on immediate loading of implants have demonstrated successful results with regard to survival rate.[1] An important factor in successful clinical outcomes is the type of implant used. The OsseoSpeed™ implant has been developed with a fluoride-modified titanium surface that has demonstrated firmer bone anchorage than an unmodified control surface.[1] Results from two different five-year prospective clinical studies have shown that early and immediate loading of fluoridated implants resulted in a low degree of marginal bone reduction and high implant survival rates.[1]

Oxby and colleagues (2015)[1] reported on a trial that sought to report on the clinical and medium- to long-term radiographic results of fluoridated implants placed into both fresh extraction sockets and healed bone in preparation for early loading with final prosthetic constructions.

MATERIALS AND METHODS

The study included patients who had consented to treatment with the OsseoSpeed™ implant system, who had undergone full surgical and prosthetic treatment and had loading with a permanent prosthetic construction less than 60 days after surgery (early loading). The sample comprised thirty-nine patients and, in 24 of these, one or more implants had been placed in healed sites as well as into extraction sockets immediately after tooth removal. All implants in the remaining 14 patients had been placed in healed bone. The radiographic examination prior to treatment included intraoral and panoramic radiographs and, if required, tomography.

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ACRONYMS

FCPs: fixed complete prostheses
FPPs: fixed partial prostheses
ST: single-tooth

None of the participants suffered from any severe systemic disease and the sample included smokers. The surgical procedures were standardized and carried out under local anaesthesia and with antibiotics (clindamycin 600 mg; Dalacin) from the day before surgery and for 9 days postoperatively.

A total of 182 fluoridated implants were placed in the 39 patients, with 72 (40%) inserted immediately after tooth extraction and 110 (60%) placed in healed bone. A suitable healing abutment was connected to each implant. The margins of the soft tissue around the extraction sockets were adapted and sutured with resorbable coated Vicryl® to reduce the open extraction wound. However, no attempts were made to mobilize the buccal mucosa to completely cover the wound.

Impressions were taken 10 to 14 days after surgery. The fixed partial prostheses (FPPs) and fixed complete prostheses (FCPs) were fabricated according to the Cresco Precision™ method (DENTSPLY) and were screw-retained. The single-tooth (ST) implants were restored by screw-retained metal-ceramic crowns. All ST crowns had adjacent teeth.

Forty-nine permanent fixed restorations were delivered and loaded within 53 days (range 14–53 days, average 31 days. Eight of the 39 patients received two restorations, while one patient merited three.

The patients were recalled annually for clinical and radiographic examinations during an observation time from 36 to 63 months (mean 55 months. The clinical examinations included evaluation of stability of constructions, oral hygiene, and health of peri-implant soft tissues using probes. Moreover, clinical photographs were taken at each follow-up visit to enable evaluation

of the aesthetic outcomes over time, for which an index of three possible scores was created: 1 (intact buccal gingiva), 2 (exposed abutment), and 3 (exposed abutment and implant neck).

A conventional radiographic technique was used for the baseline examinations at delivery of the restorations, while a digital technique was used for the follow-up examinations. Measurements were recorded by an independent radiologist using paired views of the radiographs taken at baseline and at the final examinations. The outer rim of the implant platform was used as the reference point for the measurements. The bone level was defined and recorded as the distance from the reference point to the proximal implant-bone contact level.

RESULTS

During the course of the study, three of the 39 patients died from unrelated causes, and one patient relocated and was not available for the final examination. However, all 39 patients were followed for at least 36 months.

No implants were lost during the follow-up during the 36- to 63-month observation period, giving a survival rate of 100% for implants in both healed sites and in extraction sockets. There were no signs of peri-implant purulent infection with aggressive marginal bone loss during the follow-up period.

The aesthetic evaluation showed good soft tissue preservation over time. Soft tissue complications (exposed abutments and implant necks) were observed at only two of the implants, which were scored as "3" on the aesthetic index. The remaining 180 implants were evaluated as "1" (intact buccal gingiva).

The average bone level at baseline was significantly lower ($p = .0002$) at implants in fresh extraction sockets (-1.0 ± 1.3 mm) compared with implants in healed sites (-0.3 ± 0.6 mm). The corresponding values after three to five years of function were identical (-0.6 ± 0.7).

The change of bone level from baseline to the three- to five-year visits was significantly different ($p = .0036$). An average bone loss of 0.3 ± 0.9 mm was seen at implants placed in healed bone, and a bone level gain of 0.3 ± 1.4 mm was seen for the implants in fresh extraction sockets.

The frequency distribution of bone level revealed that 85% of implants placed in fresh extraction sockets and 84% of implants in healed bone did not show any loss of bone level during follow-up ($p = NS$). The proportions of implants with bone levels from 0 to 0.9 mm from the reference points at the three to five-year follow-up were 72% and 78% in implants placed in fresh extraction sockets and in those placed in healed bone, respectively ($p = NS$).

CONCLUSION

Early loading of fluoridated implants with permanent constructions appears to be a viable therapy for implants placed immediately in both extraction sites and in healed bone.

IMPLICATIONS FOR PRACTICE

Although this study provides another viable alternative for immediate implants, readers should be cautious in interpreting these results as ideally, one immediate implant system should be compared with another in a parallel group randomized clinical trial.

Reference

1. Oxby, G., Oxby, F., Oxby, J., Saltvik, T. and Nilsson, P. Early loading of fluoridated implants placed in fresh extraction sockets and healed bone: a 3- to 5-year clinical and radiographic follow-up study of 39 consecutive patients. Clinical Implant Dentistry and Related Research, 2015) 17: 898–907.

2. Efficacy of air polishing for the non-surgical treatment of peri-implant diseases: a systematic review

Schwarz F, Becker K, Renvert S. J Clin Periodontol. 2015; 42: 951–9.

Air polishing has been available since the late 1970s as an alternative to using a prophy angle and rubber cup during supra-gingival polishing. The technology uses a combination of abrasive particles with water and compressed air delivered through an air polishing device. The most common abrasive agent used during supra-gingival air-polishing is a sodium bicarbonate, aluminum trihydroxide, calcium carbonate and bioactive calcium sodium phosphosilicate material (bioactive glass).

The abrasive nature of sodium bicarbonate, calcium carbonate, and bioactive glass contraindicate their safe use in subgingival air polishing. Two ingredients which can be used safely are erythritol and glycine. Research demonstrates that glycine powder air polishing (GPAP) is effective at removing subgingival biofilm and in cleaning root surfaces, a helpful addition to the efforts of clinicians to prevent both peri-implant mucositis and peri-implantitis.[1]

ACRONYMS

BI: bleeding index
BOP: bleeding on probing
CCT: non-randomized controlled clinical trial
GPAP: glycine powder air polishing
PD: pocket depth
RCT: randomized controlled clinical trial
WMD: weighted mean difference

Despite the remarkably high success rate of dental implant therapy, increasing numbers of patients are developing peri-implant mucositis or peri-implantitis—both of which are infectious diseases. Experts at the 2012 Consensus Conference of the European Association for Osseointegration concluded that peri-implant mucositis can be successfully treated nonsurgically, and that all treatment modalities should disrupt the submucosal biofilm. Schwarz and colleagues (2015)[1] reported on a systematic review

that sought to address the following focused question: In patients suffering from peri-implant diseases, what is the efficacy of air polishing on changing signs of inflammation compared with control treatments?

MATERIALS AND METHODS

A search strategy with a combination of key words and free text terms was developed for use in the PubMed database. This was complemented by a hand search of selected journals and the references of all selected full-text articles and related reviews were scanned. If required, the corresponding authors were contacted and requested to provide missing data or information.

Prospective randomized controlled (RCT), or non-randomized controlled (CCT) trials (split-mouth or parallel group designs) in humans comparing air polishing with control measures for the non-surgical treatment of peri-implant mucositis and peri-implantitis were considered for inclusion. Additionally, included studies had to report on the clinical changes in mucosal inflammation (i.e. bleeding scores) after treatment as an outcome measure.

A quality assessment of all selected full-text articles was performed according to the Cochrane Collaboration's tool for assessing risk of bias (low, high, unclear) including the following domains: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, and incomplete outcome data. Quality assessment was performed independently by two authors and disagreements were resolved by discussion.

Data from included studies were extracted on the basis of the study design, population, case definition, observation period, interventions, comparisons, primary and secondary outcomes as well as the study quality. For data analysis, the changes in bleeding on probing (BOP) scores after respective healing periods were defined as primary outcome. Secondary outcomes included changes in pocket depth (PD) as well as the resolution of peri-implant mucosal inflammation.

Heterogeneity (I2 statistics) between included RCT's, meta-analysis (weighted mean difference and 95% confidence interval, subject based analysis) and forest plots were assessed using a commercially available software program (Comprehensive Meta-Analysis V2, Biostat). Meta-analysis was based on a random effect model to account for potential methodological differences between studies. Thresholds for the interpretation of I2 values were used as follows: 0–30% (low heterogeneity), 30–60% (moderate heterogeneity), >60% (substantial heterogeneity).

RESULTS

A total of 288 potentially relevant titles and abstracts were identified, and of these 276 publications were excluded. The complete full-text articles of the remaining 12 publications were thoroughly evaluated and a further six papers had to be excluded at this stage because they did not fulfil the inclusion criteria of the present review Finally, a total of five studies (corresponding to six publications) fulfilled the inclusion criteria required for this systematic review.

Non-surgical treatment of peri-implant mucositis

At 3 months after therapy it was found that both test and control groups resulted in significant improvements in bleeding index and PD values. The adjunctive single application of glycine powder air polishing was associated with a lower frequency of sites without bleeding when compared with the control group (29.3% versus 42.1%). At 6 months, the adjunctive single use of glycine powder air polishing resulted in a significantly higher bleeding index (BI) and PD reduction when compared with mechanical debridement alone.

A repeated application also resulted in significant BOP reductions after 12 months of healing. In both groups, the number of diseased sites (pocket depth ≥4 mm with bleeding/suppuration) was significantly reduced between baseline and 12 months. However, no significant differences were noted between groups at 12 months or in the reduction in number of diseased sites from baseline to 12 months.

Non-surgical treatment of peri-implantitis

At 3, 6 and 12 months after therapy, glycine powder air polishing resulted in a statistically significant higher BOP reduction than did mechanical debridement plus local antiseptic therapy (i.e. chlorhexidine digluconate) [3 months: 51.6 (SD = 28.6)% versus 24.8 (SD = 29.8)%; 6 months: 43.5 (SD = 27.7)%versus 11.0 (SD = 15.7)%; 12 months: 41.2 (SD = 29.5)% versus 16.6 (SD = 33.4)%]. Between-group comparisons failed to reveal any significant differences in mean PD reductions at 3, 6, and 12 months. No signs of inflammation, complications or allergic reactions in the form of swellings or redness of the surrounding soft tissues could be observed.

A single subgingival instrumentation using glycine powder air polishing or an Er:YAG laser (energy density of 12.7J/cm^2) (control) resulted in significant BOP reductions at 6 months. The difference between both groups failed to reach statistical significance. A positive treatment outcome (i.e. defined as PD reduction ≥ 0.5mm and gain or no radiographic bone loss) at the implant level was noted in 47% of the test sites and 44% of the control sites.

The weighted mean difference (WMD) [SD; p; 95% CI] in BOP reduction between test and control groups was –23.83% [SD = 12.06; p = 0.048; 95% CI (–47.47, –0.20)] favouring air polishing over control measures (p value for heterogeneity: 0.128, I2 = 56.88% = moderate heterogeneity). The WMD [SD; p; 95% CI] in PD reduction between test and control groups was –0.37mm [SD = 0.23; p = 0.119; 95% CI (–0.84, 0.096)] not favouring air polishing over control measures (p value for heterogeneity: 0.940, I2= 0.00% = low heterogeneity).

CONCLUSIONS

The authors concluded that while air polishing using glycine powder did not reveal any major improvement of bleeding index/ BOP or disease resolution at mucositis sites, it resulted in a significantly higher BOP reduction at peri-implantitis sites when compared with control measures (i.e. mechanical debridement with or without local antiseptic therapy, Er:YAG laser).

IMPLICATIONS FOR PRACTICE

Air polishing using glycine powder is a viable alternative for the non-surgical treatment of peri-implantitis.

Reference

1. Schwarz F, Becker K, Renvert S. Efficacy of air polishing for the non-surgical treatment of peri-implant diseases: a systematic review. J Clin Periodontol. 2015; 42: 951–9.