



# Scientific Highlights

SHORT OVERVIEWS ON RECENTLY PUBLISHED SCIENTIFIC EVIDENCE.

Issue 3/2022

*Edited by Dr Pooja Nair*

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## in this issue



### EDITOR'S CHOICE

Analysis of implant loss risk factors after simultaneous guided bone regeneration: A retrospective study of 5404 dental implants.

*(X Shen et al. 2022)*

and

Round and flat zygomatic implants: effectiveness after a 1-year follow-up non-interventional study.

*(C Aparicio et al. 2022)*

An Integrated Fully Digital Prosthetic Workflow for the Immediate Full-Arch Restoration of Edentulous Patients.

*(B Sobczak et al. 2022)*

Immediate implant placement vs. early implant treatment in the esthetic area. A 1-year randomized clinical trial.

*(A Puisys et al. 2022)*

## Editor's choice

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Clin Implant Dent Relat Res. 2022 Apr 8. doi: 10.1111/cid.13087.

# Analysis of implant loss risk factors after simultaneous guided bone regeneration: A retrospective study of 5404 dental implants

X Shen, S Yang, Y Xu, J Xu, Y Feng, F He

## Study objectives and methods

The purpose was to analyze the risk factors for implant loss after simultaneous guided bone regeneration (GBR). Patients who underwent implant placement with simultaneous GBR between January 2011 and December 2018 were screened for this study. The cumulative survival rate (CSR) was calculated using the life table method. Log-rank test and Kaplan-Meier survival estimates were used to identify potential risk factors for implant loss. The association between the investigated variables and implant loss was determined using hazard ratios (HRs) obtained from a multivariate Cox regression analysis.

## Results

- A total of 3973 patients with 5404 implants were included in this study.
- The CSRs of the implants at 1, 5, and 10 years were 99.6%, 98.9%, and 98.7%, respectively.
- Male patient (HR = 2.94, 95% CI: 1.41-6.14), periodontitis (HR = 4.26, 95% CI: 2.05-9.86), tissue-level implants (HR = 3.02, 95% CI: 1.30-6.98), narrow implants (HR = 2.71, 95% CI: 1.12-6.57), and implant length  $\leq 10$  mm (HR = 2.91, 95% CI: 1.41-6.02) significantly increased the risk of implant loss ( $p < 0.05$ ).
- The risk of implant loss was significantly higher in the maxillary posterior region (HR = 2.26, 95% CI: 1.04-4.90) than in the maxillary anterior region ( $p < 0.05$ ).
- Compared to Straumann, Nobel (HR = 4.07, 95% CI: 1.75-9.44) and other implant systems (HR = 14.23, 95% CI: 4.32-46.85) showed a significantly higher risk of implant loss ( $p < 0.05$ ).

## Conclusions

Male patient, periodontitis, maxillary posterior region, Nobel implant system, other implant systems, tissue-level implants, narrow implants, and implant length  $\leq 10$  mm were considered risk factors for implant loss after simultaneous GBR.

Adapted from X Shen et al, Clin Implant Dent Relat Res. 2022 Apr 8, for more info about this publication click [HERE](#)

Int J Implant Dent. 2022 Apr 1;8(1):13. doi: 10.1186/s40729-022-00412-8

## Round and flat zygomatic implants: effectiveness after a 1-year follow-up non-interventional study

C Aparicio, W D Polido, J Chow, R Davó, B Al-Nawas



### Study objectives and methods

There are few zygomatic implants (ZI) designs available. The objective of this non-interventional study was to report the effectiveness of two new site-specific ZI, selected and placed following the zygoma anatomy-guided approach (ZAGA).

Consecutive patients presenting indications for rehabilitation using ZI were treated according to ZAGA Concept recommendations. Implants were immediately loaded following the manufacturer's instructions. Success criteria regarding prosthetic offset, rhino-sinus status, soft tissue condition, and implant stability were additionally used as outcome parameters.

### Results

- Twenty patients were followed for a period of 12 to 28 months (average 18.8 months). Ten received 2 ZI plus regular anterior implants; One received 3 ZI plus regular implants and nine received 4 ZI.
- In total, 59 ZI were placed, 34 (58%) Straumann ZAGA-Flat design, and 25 (42%) ZAGA-Round.
- Forty-nine percent of the sites were classified as ZAGA-4 type and 27% as ZAGA-2. Four patients (20%) presented discontinuities of the sinus-nose floor before surgery and 15 patients (75%) presented previous sinus opacities.
- All implants bar one reached more than 45 N.cm of insertion torque.
- No surgical complications were observed. After 1 year, the modified Lund-Mackay score was negative in 17 patients.
- Seventeen sites in 11 patients exhibited decreased opacity when pre-surgical imaging was compared to 1-year post-surgical CBCT.
- All implants and prostheses remained stable and in function.

### Conclusions

The study concluded 100% implant/prosthesis survival rates and low complication levels. Within the limitations of the sample and observation period, results suggest that even in cases of extremely resorbed maxillae (as per cases in this study), ZAGA-Flat and ZAGA-Round ZI are viable treatment options when restoring atrophic maxillae following the ZAGA protocol.

Adapted from C Aparicio et al, *Int J Implant Dent*. 2022 Apr 1;8(1):13., for more info about this publication click [HERE](#)

Int J Environ Res Public Health 2022 Mar 31;19(7):4126. doi: 10.3390/ijerph19074126

# An Integrated Fully Digital Prosthetic Workflow for the Immediate Full-Arch Restoration of Edentulous Patients-A Case Report

B Sobczak, P Majewski



## Abstract

Digital prosthetic workflows may significantly increase the efficiency and predictability of the immediate rehabilitation of implant-supported fixed complete dentures. Advanced digital prosthetic workflows require exact and detailed virtual planning models. The direct generation of these models via direct digital impressions remains technique sensitive and demanding. This report illustrates an advanced digital workflow for accurate and efficient immediate full-arch restoration, with an aesthetically and anatomically adapted natural tooth-like prosthesis. The workflow application to fully edentulous arches, and arches with residual failing dentition, is presented. A key characteristic was efficiently integrating and interlinking the prosthetic and surgical workflows via denture replica surgical guides as landmarks for scan registration. This approach allowed for accurate implant placement and efficient and detailed anatomy-based chairside prosthetic planning, and for the manufacturing of the provisional and final restorations under detailed consideration of implant restoration, and the patient's macro-aesthetic and soft tissue anatomy.

Adapted from B Sobczak et al., *Int J Environ Res Public Health* 2022 Mar 31;19(7):4126, for more info about this publication click [HERE](#)

Clin Oral Implants Res. 2022 Mar 23. doi: 10.1111/clr.13924

# Immediate implant placement vs. early implant treatment in the esthetic area. A 1-year randomized clinical trial

A Puisys, V Auzbikaviciute, E Vindasiute-Narbute, M Pranskunas, D Razukevicus, T Linkevicius

## Study objectives and methods

To assess the impact of implant placement and temporization timing on esthetic outcomes of single maxillary anterior implants with intact bone walls and interproximal bone.

Test group patients received an immediate implant with immediate provisional restoration and socket preservation, while patients in the control group received an early implant placement with guided bone regeneration and delayed loading. Patients were followed for 1 year after final prosthetic and pink esthetic score (PES), mid-buccal mucosal level (MBML), crestal bone changes (CBC), and peri-implant soft tissue parameters, and patient chair time was recorded.

## Results

- Fifty patients received the intended treatment (25 test and 25 control).
- No implants failed.
- PES after 1 year was  $12.8 \pm 1.19$  for the test group and  $12.5 \pm 1.36$  for the control group ( $p = .362$ ).
- MBML difference between baseline (after final crown delivery) and the 1-year follow-up was gain of  $0.2 \pm 1.02$  mm for the test group ( $p = .047$ ) and no change in the control group.
- CBC after 1 year were  $0.1 \text{ mm} \pm 0.21 \text{ mm}$  (mesial) and  $0.2 \text{ mm} \pm 0.22 \text{ mm}$  (distal) for the test group and  $0.2 \text{ mm} \pm 0.25 \text{ mm}$  (mesial) and  $0.3 \text{ mm} \pm 0.19 \text{ mm}$  (distal) for the control group,  $p = .540$  (mesial) and  $p = .462$  (distal).
- Test group required half the chair time ( $127 \pm 13$  min) when compared to the control group ( $259 \pm 15$  min,  $p < .001$ ).

## Conclusions

Within the limits of this trial, both treatment protocols resulted in excellent esthetic outcomes with PES >12 after 1-year follow-up.

Adapted from A Puisys, et al, Clin Oral Implants Res. 2022 Mar 23, for more info about this publication click [HERE](#)

Clin Implant Dent Relat Res. 2022 Apr;24(2):141-150. doi: 10.1111/cid.13058.

## Connective tissue graft vs porcine collagen matrix after immediate implant placement in esthetic area: A randomized clinical trial

A Puisys, J Deikuvienė, E Vindasiute-Narbute, D Razukevicius, T Zvirblis, T Linkevicius

### Study objectives and methods

The use of connective tissue graft (CTG) with immediate implant placement and provisionalisation have shown promising results. It is not clear if the same outcome could be achieved using porcine-derived collagen matrix (PDCM) as grafting material. This study aimed to assess the esthetic and functional outcomes of immediate temporization of immediately placed fully tapered implants combined with bone and soft tissue augmentation, using either a CTG or a PDCM, in fresh extraction sockets of the anterior sites.

Patients with a failing anterior tooth were included in this study. After extraction, they received an immediate implant with simultaneous hard and soft tissue augmentation and immediate provisional restoration. Patients were randomly assigned to one of the group. Soft tissue augmentation in the control group (CTG) consisted of a CTG, whereas PDCM was used in the test group. After 4 months, definitive restorations were delivered, and pink esthetic score (PES) was evaluated at T1, prosthetic delivery, and at 12-month follow-up (T2). In addition, crestal bone change, probing depth, bleeding on probing, plaque index, bleeding on provisional removal, and implant stability quotient were also recorded.

### Results

- A total of 45 patients received the intended treatment (22 controls and 23 tests) 45 implants totally,
- with no implant failures at T2.
- PES mean  $\pm$  SD after 1 year was noted to be  $12.9 \pm 1.2$  for the CTG group and  $12.1 \pm 1.3$  for the PDCM group ( $p = 0.507$ ).

### Conclusions

Within the limits of this trial, both treatment protocols resulted in comparable esthetic outcomes, with results showing PES  $>12$  and stable clinical parameters after 1 year of follow-up.

Adapted from A Puisys, et al, Clin Implant Dent Relat Res. 2022 Apr; 24(2):141-150, for more info about this publication click [HERE](#)



Int J Oral Implantol (Berl). 2022 Mar 10;15(1):71-86.

## Influence of loading and drilling on marginal bone loss around implants with a Dynamic Bone Management design: A single-blind, randomised, 12-month clinical trial

F S Naya, A G García, P Galindo-Moreno, F G Sampedro, D R López, S R Zorrilla, P G Vila, C M C Petronacci, E O Rey, J M S Martín, A B Carrión, M P Sayáns

### Study objectives and methods

To evaluate marginal bone loss 6 and 12 months after prosthetic loading of implants with Dynamic Bone Management (Straumann, Basel, Switzerland) through the implementation of different drilling protocols.

A balanced, randomised, single-blind clinical trial was conducted with four parallel experimental arms: immediate loading and under-drilling, immediate loading and complete drilling, early loading and under-drilling, and early loading and complete drilling. Forty-four implants with a Dynamic Bone Management design and with a diameter of 3.75 mm and a length of 10.00 mm were placed in healed mature bone (more than 6 months post-extraction).

### Results

- The mean primary stability achieved was  $60.6 \pm 12.2$  implant stability quotient, with a range from 21 to 75, and no differences were observed when considering the drilling protocol used, bone type or location.
- Early loading resulted in a loss of 0.728 mm (standard error 0.212; 95% confidence interval 1.134 to -0.325; t value -3.440), whereas immediate loading did not result in any bone loss.
- When the interaction between the loading and drilling protocols was studied, performing the complete drilling protocol in conjunction with early implant loading was found to result in lower marginal bone loss, with a marginal bone gain effect of 0.814 mm (standard error 0.283; 95% confidence interval -0.274 to 1.353; t value 2.880).

### Conclusions

Use of the complete drilling protocol in conjunction with early implant loading resulted in the lowest marginal bone loss at 12 months.

Adapted from F S Naya, et al., *Int J Oral Implantol (Berl)*. 2022 Mar 10;15(1):71-86., for more info about this publication click [HERE](#)

Materials (Basel). 2022 Apr 26;15(9):3138. doi: 10.3390/ma15093138.

# Short versus Longer Implants in Sites without the Need for Bone Augmentation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

L Guida, E Bressan, G Cecoro, A D Volpe, M Del Fabbro, M Annunziata



## Study objectives and methods

The present systematic review and meta-analysis aims to analyse the clinical performance of short compared to longer implants inserted in sites without the need for bone augmentation.

The protocol of the present PRISMA-driven meta-analysis was registered on PROSPERO (CRD42021264781). Electronic and manual searches were performed up to January 2022. All Randomized Controlled Trials (RCTs) comparing short ( $\leq 6$  mm) to longer ( $\geq 8.5$  mm) implants placed in non-atrophic and non-augmented sites were included. The quality of the included studies was assessed using the Cochrane risk of bias tool for randomized clinical trials (RoB 2) and the quality of evidence was determined with the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach. A meta-analysis was performed on implant survival rate, marginal bone level change (MBLc), and technical and biological complications at the available follow-up time points. The power of the meta-analytic findings was determined by trial sequential analysis (TSA).

## Results

- From 1485 initial records, 13 articles were finally included.
- No significant difference was found in the survival rate between short and long implant at any follow-up (moderate quality of evidence).
- Significantly more bone loss for long implants at 1 and 5 years from implant placement and more technical complications with short implants at 10 years were found.
- No other significant inter-group differences in terms of MBLc and biological complications were detected.

## Conclusions

Moderate evidence exists suggesting that short implants perform as well as longer ones in the rehabilitation of edentulous sites without the need for bone augmentation. Further long-term, well-designed RCTs, however, are still needed to provide specific evidence-based clinical recommendations for an extended use of short implants in non-atrophic sites.

Adapted from L Guida, *Materials (Basel)*. 2022 Apr 26;15(9):3138, for more info about this publication click [HERE](#)

Biomed J Sci & Tech Res 43(3)-2022. doi: 10.26717/BJSTR.2022.43.006916

# A Versatile Integrated Digital Prosthetic Workflow for the Immediate Pink-free Full-arch Restoration: A Case Series

*B Sobczak, P Majewski*



## Abstract

Digital prosthetic workflows may significantly increase the efficiency, predictability, and patient acceptance of clinical protocols to transition failing dentitions into an implant-supported fixed complete rehabilitation. This report illustrates the application of a recently described advanced integrated prosthetic digital workflow (Sobczak Concept®) in a series of patients and indications. The workflow was based on prosthetic wax-ups built and updated throughout the workflow from multiple preand intra-surgical full-arch intraoral scans. A key feature was based on combining digitally smile-designed provisional wax-ups with post-placement anatomically driven waxing of the cervical prosthetic contours. This combination allowed designing and adapting aesthetic concepts based on well-established macro-and micro-aesthetic design principles, validating them directly with the patient, and delivering them in a natural-teeth-like, pink-free anatomically adapted prosthesis for a versatile range of indications.

*Adapted from B Sobczak et al. Biomed J Sci & Tech Res 43(3)-2022, for more info about this publication click [HERE](#)*

J Prosthet Dent. 2022 Apr 29;S0022-3913(22)00190-1. doi: 10.1016/j.prosdent.2022.03.015.12411.

## Patient-reported outcome measures and prosthetic events in implant-supported mandibular overdenture patients after immediate versus delayed loading: A systematic review and meta-analysis

A K C Ribeiro, R T F Costa, B C do E Vasconcelos, S L D de Moraes, A da F P Carreiro, E P Pellizzer

### Study objectives and methods

Immediately loaded mandibular overdentures are clinically acceptable treatment options that have gained popularity because their use shortens the treatment duration. However, whether the immediate loading of dental implants can match the prosthetic events, satisfaction, and quality of life of delayed loading is still unclear. The purpose of this systematic review and meta-analysis was to compare the prosthetic events, satisfaction, and quality of life of immediate versus delayed loading implants in patients rehabilitated with mandibular overdentures.

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and was registered at The International Prospective Register of Systematic Reviews (PROSPERO) (CRD42021258187). Electronic searches were carried out by 2 independent reviewers in the PubMed/MEDLINE, Cochrane Library, and Web of Science databases up to May 2021. Only randomized clinical trials and prospective studies with at least 10 participants that compared immediate versus delayed loading were selected. A meta-analysis was performed by using the RevMan 5 software program for complications and maintenance outcomes.

### Results

- Seven articles were included in the qualitative analysis, and 4 were included in the quantitative analysis.
- The meta-analysis demonstrated no significant difference between immediate and delayed loading for prosthetic complications (RR=1.71; 95% CI=0.67-4.37; I<sup>2</sup>=85%, P=.27) or maintenance (RR=1.92, 95% CI=0.44-8.28; I<sup>2</sup>=94%, P=.38).

### Conclusions

Although the prosthetic complications and maintenance were more likely to favor the delayed loading group, available evidence showed no statistical difference for prosthetic complications and maintenance between immediate loading and delayed loading in mandibular overdentures.

Adapted from A K C Ribeiro et al. *J Prosthet Dent.* 2022 Apr 29, for more info about this publication click [HERE](#)

Materials (Basel). 2022 Apr 29;15(9):3227. doi: 10.3390/ma15093227.

# Diabetes Mellitus and Dental Implants: A Systematic Review and Meta-Analysis

Y Al Ansari, H Shahwan, B R Chrcanovic



## Abstract

The present review aimed to evaluate the impact of diabetes mellitus on dental implant failure rates and marginal bone loss (MBL). An electronic search was undertaken in three databases, plus a manual search of journals. Meta-analyses were performed as well as meta-regressions in order to verify how the odds ratio (OR) and MBL were associated with follow-up time. The review included 89 publications. Altogether, there were 5510 and 62,780 implants placed in diabetic and non-diabetic patients, respectively.

Pairwise meta-analysis showed that implants in diabetic patients had a higher failure risk in comparison to non-diabetic patients (OR 1.777,  $p < 0.001$ ). Implant failures were more likely to occur in type 1 diabetes patients than in type 2 (OR 4.477,  $p = 0.032$ ). The difference in implant failure between the groups was statistically significant in the maxilla but not in the mandible. The MBL mean difference (MD) between the groups was 0.776 mm ( $p = 0.027$ ), with an estimated increase of 0.032 mm in the MBL MD between groups for every additional month of follow-up ( $p < 0.001$ ). There was an estimated decrease of 0.007 in OR for every additional month of follow-up ( $p = 0.048$ ).

In conclusion, implants in diabetic patients showed a 77.7% higher risk of failure than in non-diabetic patients.

Adapted from Y Al Ansari et al., *Materials (Basel)*. 2022 Apr 29;15(9):3227., for more info about this publication click [HERE](#)

## References

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Dr Nair holds a position of Global Scientific Communications Manager at Institute Straumann in Basel, Switzerland.