



SCIENTIFIC **HIGHLIGHTS**

SPECIAL ISSUE

Proceedings of the First ITI Consensus Workshop on Zygomatic Implants
Frankfurt, 23-24 March 2023

Issue **5/2023**

Edited by Dr. Marcin Maj

1. ITI Consensus Report on zygomatic Implants: indications, evaluation of surgical techniques and long-term treatment outcomes 4
2. Evaluation of surgical techniques in survival rate and complications of zygomatic implants for the rehabilitation of the atrophic edentulous maxilla: a systematic review 5
3. Zygoma implant under function: biomechanical principles clarified. 6
4. Indications for zygomatic implants: a systematic review 7
5. Long-term treatment outcomes with zygomatic implants: a systematic review and meta-analysis 8

IN THIS ISSUE

ITI Consensus Report on zygomatic implants: indications, evaluation of surgical techniques and long-term treatment outcomes

(Bilal Al-Nawas et al. 2023)

and

Evaluation of surgical techniques in survival rate and complications of zygomatic implants for the rehabilitation of the atrophic edentulous maxilla: a systematic review

(Peer W Kämmerer et al., 2023)

Zygoma implant under function: biomechanical principles clarified.

(Edmond Bedrossian et al., 2023)

Indications for zygomatic implants: a systematic review

(Waldemar D Polido et al., 2023)

Long-term treatment outcomes with zygomatic implants: a systematic review and meta-analysis

(Matthew Brennan Roper et al., 2023)

Int J Implant Dent. 2023 2023 Sep 12;9(1):28

ITI Consensus Report on zygomatic Implants: indications, evaluation of surgical techniques and long-term treatment outcomes

Bilal Al-Nawas, Tara Aghaloo, Carlos Aparicio, Edmond Bedrossian, Lawrence Brecht, Matthew Brennand-Roper, James Chow, Rubén Davó, Shengchi Fan, Ronald Jung, Peer W Kämmerer, Vinay V Kumar, Wei-Shao Lin, Chantal Malevez, Dean Morton, Justin Pijpe, Waldemar D Polido, Gerry M Raghoebar, Lambert J Stumpel, Frank J Tuminelli, Jean-Baptiste Verdino, Arjan Vissink, Yiqun Wu, Sepehr Zarrine



STUDY OBJECTIVES AND METHODS

The aim of the ITI Consensus Workshop on zygomatic implants was to provide Consensus Statements and Clinical Recommendations for the use of zygomatic implants. Three systematic reviews and one narrative review were written to address focused questions on (1) the indications for the use of zygomatic implants; (2) the survival rates and complications associated with surgery in zygomatic implant placement; (3) long-term survival rates of zygomatic implants and (4) the biomechanical principles involved when zygoma implants are placed under functional loads. Based on the reviews, three working groups then developed Consensus Statements and Clinical Recommendations. These were discussed in a plenary and finalized in Delphi rounds.

RESULTS

- A total of 21 Consensus Statements were developed from the systematic reviews.
- Additionally, the group developed 17 Clinical Recommendations based on the Consensus Statements and the combined expertise of the participants.

CONCLUSIONS

Zygomatic implants are mainly indicated in cases with maxillary bone atrophy or deficiency. Long-term mean zygomatic implant survival was 96.2% [95% CI 93.8; 97.7] over a mean follow-up of 75.4 months (6.3 years) with a follow-up range of 36-141.6 months (3-11.8 years). Immediate loading showed a statistically significant increase in survival over delayed loading. Sinusitis presented with a total prevalence of 14.2% [95% CI 8.8; 22.0] over a mean 65.4 months follow-up, representing the most common complication which may lead to zygomatic implant loss. The international experts suggested clinical recommendations regarding planning, surgery, restoration, outcomes, and the patient's perspective.

Adapted from Al-Nawas B et al., Int J Implant Dent. 2023 2023 Sep 12;9(1):28, for more info about this publication click [HERE](#)

Int J Implant Dent. 2023 May 17;9(1):11

Evaluation of surgical techniques in survival rate and complications of zygomatic implants for the rehabilitation of the atrophic edentulous maxilla: a systematic review

Peer W Kämmerer, Shengchi Fan, Carlos Aparicio, Edmond Bedrossian, Rubén Davó, Dean Morton, Gerry M Raghoobar, Sepehr Zarrine, Bilal Al-Nawas



STUDY OBJECTIVES AND METHODS

The aim of this study was to assess the outcome [zygomatic implant (ZI) survival] and complications of the original surgical technique (OST) and an Anatomy-Guided approach (AGA) in the placement of ZI in patients with severely atrophic maxillae. Two independent reviewers conducted an electronic literature search from January 2000 to August 2022. The inclusion criteria were articles reporting at least five patients with severely atrophic edentulous maxilla undergoing placement OST and/or AGA, with a minimum of 6 months of follow-up. Number of patients, defect characteristics, number of ZI, implant details, surgical technique, survival rate, loading protocol, prosthetic rehabilitation, complications, and follow-up period were compared.

RESULTS

- Twenty-four studies comprised 2194 ZI in 918 patients with 41 failures.
- The ZI survival rate was 90.3-100% in OST and 90.4-100% in AGA.
- Probability of complications with ZI with OST was as follows: sinusitis, 9.53%; soft tissue infection, 7.50%; paresthesia, 10.78%; oroantral fistulas, 4.58%; and direct surgical complication, 6.91%. With AGA, the presenting complications were as follows: sinusitis, 4.39%; soft tissue infection, 4.35%; paresthesia, 0.55%; oroantral fistulas, 1.71%; and direct surgical complication, 1.60%.
- The prevalence of immediate loading protocol was 22.3% in OST and 89.6% in the AGA.
- Due to the heterogeneity of studies, statistical comparison was only possible after the descriptive analysis

CONCLUSIONS

Placing ZI in severely atrophic edentulous maxillae rehabilitation with the OST and AGA is associated with a high implant survival rate and surgical complications within a minimum of 6 months follow-up. Complications, including sinusitis and soft tissue infection around the implant, are the most common. The utilization of immediate loading protocol is more observed in AGA than in OST.

Adapted from Kämmerer P. et al., Int J Implant Dent. 2023 May 17;9(1):11, for more info about this publication click [HERE](#)

Int J Implant Dent. 2023 Jun 22;9(1):15

Zygoma implant under function: biomechanical principles clarified.

Edmond Bedrossian, John Brunski, Bilal Al-Nawas, Peer W Kämmerer



STUDY OBJECTIVES AND METHODS

This study aimed to clarify the biomechanical principles involved when zygoma implants are placed under functional loads. Two independent reviewers conducted electronic search of the literature from January 2000 to February 2023 describing the biomechanical principles involved using the zygoma implant for maxillary reconstruction. Articles describing the stresses within the zygoma implant, the maxillary bone and the zygoma bone under functional loads were included.

RESULTS

- The lack of maxillary boney support at the implant platform resulted in significant higher stress measured within the zygoma implant as well as the zygoma bone.

CONCLUSIONS

The maxilla is the primary support when zygoma implants are placed under functional loads. Quad-cortical stabilization of the zygoma implants and their cross-arch stabilization are recommended to reduce the degree of stress whenever possible.

Adapted from Bedrossian E. et al. Int J Implant Dent. 2023 Jun 22;9(1):15, for more info about this publication click [HERE](#)

Int J Implant Dent. 2023 Jul 1;9(1):17

Indications for zygomatic implants: a systematic review

Waldemar D Polido, Agustin Machado-Fernandez, Wei-Shao Lin, Tara Aghaloo



STUDY OBJECTIVES AND METHODS

The purpose of this systematic review was to assess the evidence regarding the indications for placement of zygomatic implants to rehabilitate edentulous maxillae. A focused question using the PIO format was developed, questioning "in patients in need of an implant-supported rehabilitation of the edentulous maxillae, what are the indications for the use of zygomatic implants". The primary information analyzed and collected was a clear description of the indication for the use of zygomatic implants.

RESULTS

- A total of 1266 records were identified through database searching. The full-text review was conducted for 117 papers, and 10 were selected to be included in this review.
- Zygomatic implant indications were extreme bone atrophy or deficiency secondary to different factors.
- The quad zygoma concept (two zygomatic implants bilaterally placed and splinted) was applied to 107 patients, the classic zygoma concept (one zygomatic implant bilaterally placed and splinted to standard anterior implants) was used in 88 patients, and the unilateral concept (one zygomatic implant on one side, splinted with one or more conventional implants) was employed in 14 patients.

CONCLUSIONS

The main indication for the use of zygomatic implants was considered extreme maxillary bone atrophy, resulting from many factors. The clear definition of what was considered "extreme bone atrophy" is not uniquely defined in each paper. Further studies are needed to develop clear indications for zygomatic implants.

Adapted from Polido WD et al. *Int J Implant Dent.* 2023 Jul 1;9(1):17, for more info about this publication click [HERE](#)

Int J Implant Dent. 2023 Jul 5;9(1):21

Long-term treatment outcomes with zygomatic implants: a systematic review and meta-analysis

Matthew Brennand Roper, Arjan Vissink, Tom Dudding, Alex Pollard, Barzi Gareb, Chantal Malevez, Thomas Balshi, Lawrence Brecht, Vinay Kumar, Yiqun Wu and Ronald Jung



STUDY OBJECTIVES AND METHODS

The purpose of this study was to perform a systematic review with meta-analysis on the long-term survival rates of zygomatic implants (ZI). ZI success, prostheses survival and success, sinus pathology and patient reported outcomes were also investigated. Studies reporting titanium/titanium alloy ZI survival data, ZI-supported prosthesis data, ZIs directly compared to any other implant therapy including grafted sites, a minimum follow-up time of 3 years and a minimum number of 10 patients were included.

RESULTS

- Five hundred and seventy-four titles were identified, of which 18 met the inclusion criteria. Eligible studies included 1349 ZIs in 623 patients. Mean follow-up period was 75.4 months (range 36–141.6).
- The mean survival of ZIs was 96.2% [95% CI: 93.8; 97.7] at 6 years.
- Mean survival for delayed loading was 95% [95% CI: 91.7; 97.1] and 98.1% [95% CI: 96.2; 99.0] for immediate loading ($p=0.03$).
- Annual incidence rate of ZI failure was 0.7% [95% CI 0.4; 1.0].
- Mean ZI success was 95.7% [95% CI 87.8; 98.6].
- Mean prosthesis survival was 94% [95% CI 88.6; 96.9].
- Sinusitis prevalence was 14.2% [95% CI 8.8; 22.0] at 5 years.
- Patients reported increased satisfaction with ZIs.

CONCLUSIONS

ZIs have long-term survival comparable to conventional implants. Immediate loading showed a statistically significant increase in survival over delayed loading. Prosthesis survival was similar to that of prostheses supported by conventional implants, with similar complications. Sinusitis was the most frequently encountered biological complication. Patients reported improved outcome measures with ZI use.

Adapted from M Brennand Roper et al. Int J Implant Dent. 2023 Jul 5;9(1):21, for more info about this publication click [HERE](#)

REFERENCES

M Brennand Roper et al., Int J Implant Dent. 2023 Jul 5;9(1):21 | Polido WD et al., Int J Implant Dent. 2023 Jul 1;9(1):17 | Bedrossian E. et al., Int J Implant Dent. 2023 Jun 22;9(1):15 | Kämmerer P. et al., Int J Implant Dent. 2023 May 17;9(1):11 | Al Nawas B et al., Int J Implant Dent. 2023 Sep 12;9(1):28 | source: www.pubmed.gov | Dr. Marcin Maj holds the position of Head of Global Scientific Affairs at Institute Straumann in Basel, Switzerland