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CLINICAL ARTICLE

Complications of zygomatic implantology: observational clinical studyPizzolante T.¹, Memè L.¹, Ciccariello A.¹, Andreoli E.², Bambini F., Inchingolo F.⁴, Mummolo S.¹,¹ University of L'Aquila Department of Clinical Medicine, Science of Life and of Health² Private practice in Castelforte (LT) e Gaeta (LT)³ Polytechnic University of Marche, Department D.I.S.CO., Ancona, Italy⁴ University of Bari, Italy**Corresponding author:** Prof Fabrizio Bambini, Department of Clinical Sciences and Stomatology, Polytechnic, University of Marche, Ancona, Italy; e-mail: f.bambini@staff.univpm.i**Received:** Aug15,2024; **Accept:** sep15,2024; **Publish:** sep20,2024**Abstract**

Background: The rehabilitation of the atrophic maxilla with zygomatic implants appears to be a complex challenge as this surgery is not without complications. For this reason, the operator approaching it must be aware of the possible surgical complications.

The aim of this study was firstly to assess the incidence of complications following zygomatic implant operations performed using the intrasinus technique and to compare the data obtained with the results already present in the literature.

Materials And Methods: The methods chosen for the evaluation of implant success were those reported in the article by Chrcanovic et al which refers to factors such as implant survival rate, percentage of failed implants and incidence of post-operative complications. A total of 174 implants were included in the study.

The study comprised three phases:

Phase 1

-collection of the personal, anamnestic, clinical and radiological data of each patient participating in the study

-detection of the number of zygomatic implants, the number of failed implants and any post-operative complications resulting from the intrasinus technique and subsequent comparison with data reported in the literature.

Phase 2

-comparison of complications arising with intrasinusal and extrasinusal technique

Phase 3

-administration of the satisfaction questionnaire of patients treated with the extrasinusal technique.

Results: Complications occurred in 14 patients and the most frequent complication was sinusitis, followed by soft tissue infections, 3 implants failed. Specifically, the most frequent complication related to intrasinusal technique surgery is sinusitis, caused by invasion of the Higmoro antrum by the implant.

Frequency analysis of the patient questionnaire shows high satisfaction with implant-prosthetic rehabilitation with zygomatic implants. Patients appear very satisfied with the aesthetics and functionality provided by the rehabilitation.

Conclusion: zygomatic implants allow the fixed rehabilitation of patients with severe upper jaw atrophies, and although complications may occur, patient satisfaction was very high as it allows them to fully recover aesthetics and function, facilitating a rapid return to social life.

Keywords:

Keywords: zygomatic implants, complications, jaw atrophies, satisfaction

Introduction

Zygomatic implantology is a branch of implantology, (advanced implantology), which consists of placing dental implants in the zygomatic bone. It is performed in patients with bone atrophy where the amount of residual bone is insufficient for placement of traditional implants. Before the introduction of osseointegrated implants, the only therapeutic solution for the treatment of total edentulias was total removable dentures.

The introduction of the implant technique in the 1980s therefore represented a breakthrough in the field of dentistry.

However, the rehabilitation of the atrophic maxilla with zygomatic implants appears to be a complex challenge as this surgery is not without complications.

For this reason, the operator approaching it must be aware of the possible surgical complications.

The aim of this study was firstly to assess the incidence of complications following zygomatic implant operations performed using the intrasinus technique and to compare the data obtained with the results already present in the literature.

In addition, a comparison was made between the intrasinusal and extrasinusal technique, and finally, the degree of patient satisfaction in relation to rehabilitation treatment with the extrasinusal technique was analysed.

The study was conducted thanks to Dr Enrico Andreoli, who made available his extensive knowledge in the field of zygomatic implantology.

Together with his team, the doctor visited 63 patients who had been rehabilitated by means of the intrasinus technique but not operated on by him, in order to obtain the data for this study.

Material and Methods

The methods chosen for the evaluation of implant success were those reported in the article by Chrcanovic et al. (1) which refers to factors such as:

- implant survival rate;
- percentage of failed implants;
- incidence of post-operative complications.

The study comprised three phases:

Phase 1

- collection of the personal, anamnestic, clinical and radiological data of each patient participating in the study;
- detection of the number of zygomatic implants, the number of failed implants and any post-operative

complications resulting from the intrasinus technique and subsequent comparison with data reported in the literature.

Phase 2

- comparison of complications arising with intrasinusal and extrasinusal technique

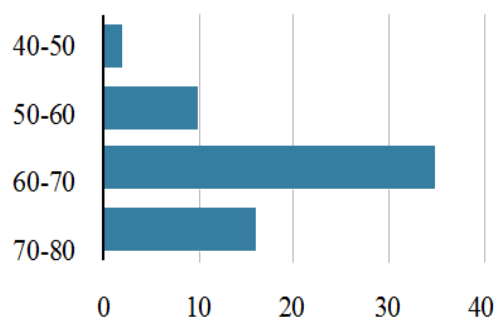
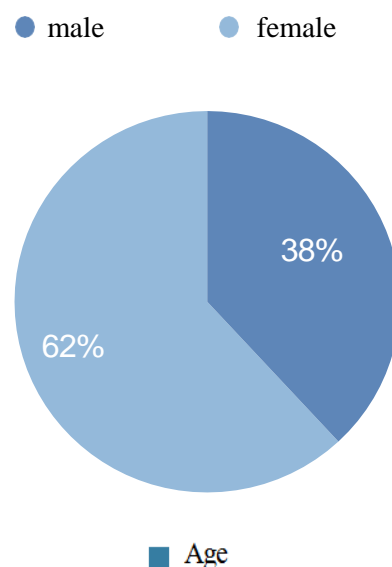
Phase 3

- administration of the satisfaction questionnaire of patients treated with the extrasinusal technique.

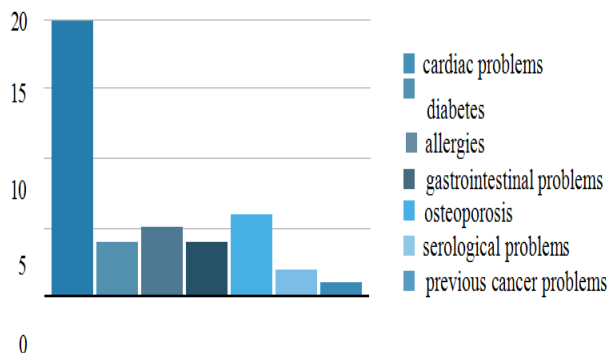
Data collection and sample description

Sixty-three patients with zygomatic implants were included in the data collection of this study with a number of 174 zygomatic implants (24 quad zygoma and 39 with one zygomatic implant per side). The follow-up of the implants ranged from 6 months to 3 years with a mean of 2.3 years and a standard deviation of 0.8 years.

The population of 63 patients had a female subject frequency of 61.9% and a male subject frequency of 38.09%.



The population was then analysed with anamnestic data for relevant medical conditions such as: cardiological problems 31.7% (hypertension, therapy with anticoagulants etc.), serological problems 3.17%, diabetes 6.34%, allergies 7.93%, gastrointestinal problems 6.34%, osteoporosis 9.52% and previous cancer problems 1.58%. 33.42% of the population had no relevant medical conditions. Within the sample, 49.20% were smokers.



Administration of patient satisfaction questionnaires

A questionnaire was administered to each patient participating in the study with the aim of assessing the degree of satisfaction after rehabilitation with zygomatic implants (extrasinus technique). The questions asked were as follows:

- a. before undergoing rehabilitation with zygomatic implants did he have difficulties in relate to others because of his teeth?
- b. before undergoing rehabilitation with zygomatic implants were you satisfied with the aesthetics of your teeth?
- c. did you experience post-operative pain?
- d. after rehabilitation are you satisfied with the aesthetics of your smile?
- e. do you experience any feelings of discomfort or discomfort after the rehabilitation?
- f. do you think that this rehabilitation has improved your quality of life?
- g. would you choose to undergo this surgical treatment again?
- h. would you recommend zygomatic implant rehabilitation to people in the same situation as you? same condition?

For each answer, the patient had the possibility to choose between the following answers:

- no
- a few
- fairly
- yes
- very much

Each questionnaire was anonymous and each patient was left alone during completion to avoid bias. The operator intervened only if specifically requested by the patient in order to clarify any doubts.

	no	a few	fairly	yes	very much
before undergoing rehabilitation with zygomatic implants did he have difficulties in relate to others because of his teeth?					
before undergoing rehabilitation with zygomatic implants were you satisfied with the aesthetics of your teeth?					
did you experience post-operative pain?					
after rehabilitation are you satisfied with the aesthetics of your smile?					
do you experience any feelings of discomfort or discomfort after the rehabilitation?					
do you think that this rehabilitation has improved your quality of life?					
would you choose to undergo this surgical treatment again?					
would you recommend zygomatic implant rehabilitation to people in the same situation as you? same condition?					

Results

Phase 1 results

One of the objectives of the study was to evaluate implant survival, implant failure and the incidence of complications after zygomatic implantation with the intrasinus technique.

A total of 174 implants were included in the study, of which 3 implants failed.

Complications occurred in 14 patients and the most frequent complication was sinusitis, followed by soft tissue infections.

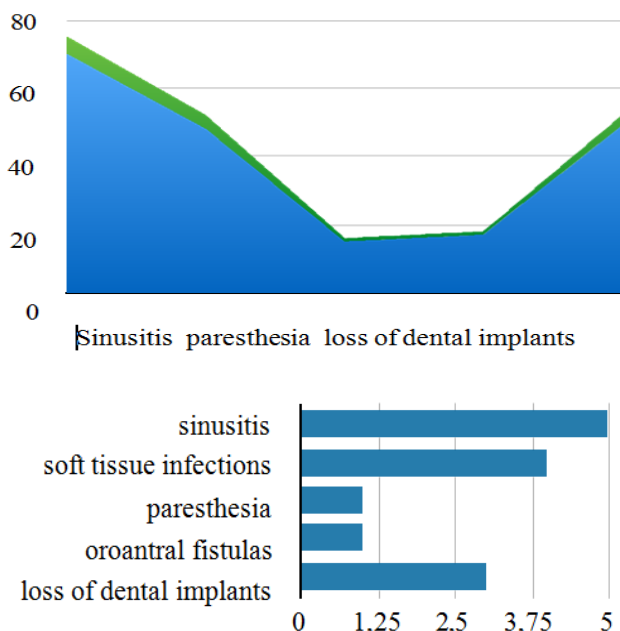
The results of the study were compared with those of the literature and specifically with the following article: "Chrcanovic, Albrektsson & Wennerberg, survival and complications of zygomatic implants: an updated systematic review, 2016".

The Chrcanovic study reviewed included 1145 patients with a number of 2404 zygomatic

implants with a number of failed zygomatic implants of 49 with a follow up from 6 months to 12 years.

The data reported in the above study were as follows:

- 49 cases of zygomatic implant failure (4.27%)
- 70 cases of sinusitis (6.11%)
- 48 peri-implant tissue infections (4.19%)
- 15 paresthesias of the infraorbital nerve (1.31%)
- 17 episodes of oroantral fistula formation (1.48%).



The results show a slight difference between the percentages reported in the literature and those found in our study, but this could be due to the difference of the two samples in the number of patients, as the sample examined by Chracanovic's study was far larger than that of this research. In this case a statistical power test should be performed to assess the number of samples needed to see the desired effect. However since ours was exclusively an observational study new surveys can be performed later to increase the sample base.

Phase 2 results

The aim of phase 2 of our study was to point out the difference between the intrasinusal technique (2) and the extrasinusal technique.

The latter type (zygomatic implantology with extrasinusal technique), is part of the clinical practice of Dr. Enrico Andreoli and his team, and rarely has complications, unlike the intrasinusal technique

which shows a higher incidence of complications, noted in phase 1 of this study.

Specifically, the most frequent complication related to intrasinusal technique surgery is sinusitis, caused by invasion of the Higmoro antrum by the implant.

This problem is drastically reduced by extrasinusal surgery because this technique does not involve invasion of the maxillary sinus, with the exception of a small percentage of cases, in which the anatomy of the patient's maxilla presents such a convexity that the operator is obliged to make channels to insert the implant in the center of the ridge. In these cases, therefore, a perforation must be made at the level of the vestibular bone of the maxilla to expose the periosteum of Schneider's membrane, and because of the excessive convexity, the membrane is disconnected in order to insert the implant in the correct position.

To date, Dr. Enrico Andreoli has never reported sinusitis as a postoperative complication in his zygomatic implant surgeries with an extrasinusal approach.

Studies have been published in the literature regarding the incidence rate of this issue in relation to the two techniques compared (extrasinusal and intrasinusal), and the results have shown a statistically significant number of sinusitis in patients undergoing zygomatic surgery with the intrasinusal approach, and a significantly lower number of this complication with the extrasinusal technique.³⁻¹²

Phase 3 results

The third objective set was to evaluate through a questionnaire, the satisfaction of more than 100 patients who underwent zygomatic implant surgery performed by Dr. Andreoli Enrico, and therefore with an extrasinusal technique.^{13,14}

	no	a few	fairly	yes	very much
1.question	0%	0%	15,87%	33,33%	50,79%
2.question	66,6%	28,57%	4,76%	0%	0%
3.question	42,85%	55,55%	3,17%	0%	0%
4.question	0%	0%	3,17%	22,22%	74,60%
5.question	93,65%	4,76%	1,58%	0%	0%
6.question	0%	0%	0%	6,34%	93,65%
7.question	0%	0%	3,17%	58,73%	38,09%

Frequency analysis of the patient questionnaire shows high satisfaction with implant-prosthetic rehabilitation with zygomatic implants. Patients appear very satisfied with the aesthetics and functionality provided by the rehabilitation.

Discussion

Based on the data collected in this study and the evidence in the literature,¹⁵⁻²⁴ zygomatic implants have proven to be safe and effective devices for the rehabilitation of atrophic maxillae.²⁵⁻²⁹

These complex anatomies pose a significant challenge, which is why it seems crucial to carefully evaluate the patient's surgical anatomy, as this operative site involves numerous major anatomical structures.

However, such biomedical devices offer advantages over other surgical techniques, including reduced operative time and adequate primary implant stability. In addition, patients included in our study showed a high degree of satisfaction, appreciating the speed, functionality, and aesthetics of implant rehabilitation.³⁰⁻³⁴

Another consideration to be made is that this surgery is not without complications, so the operator approaching zygomatic implantology must be prepared to manage possible surgical complications.³⁵⁻³⁹

For this reason, Dr. Enrico Andreoli and also other dentists recommend an extrasinus approach which allows for less invasive surgery and thus reduces the incidence of some of the major complications reported in the intrasinus approach.⁴⁰⁻⁴⁵

Conclusions

In conclusion, zygomatic implants allow the fixed rehabilitation of patients with severe upper jaw atrophies, and although complications may occur, patient satisfaction was very high as it allows them to fully recover aesthetics and function, facilitating a rapid return to social life.

Author Contributions

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used “Conceptualization, P.T. .; methodology, CA.; validation, L.M.; formal analysis, F.B.; investigation, E.A.; resources, L.M; data curation, F.I.; writing—original draft preparation, S.M.; writing—review and editing, L.M.; visualization, F.B.; supervision, F.I.. All authors have read and agreed to the published version of the manuscript.”

Please turn to the [CRediT taxonomy](#) for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

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Institutional Review Board Statement

The present study was conducted in compliance with the principles of the Declaration of Helsinki on medical protocols and ethics.

Informed Consent Statement

Written informed consent was obtained from the patient involved in the study. Written informed consent has been obtained from the patient to publish this paper.

Data Availability Statement

The data presented in this study are available on request from the corresponding Authors upon reasonable request.

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