



## Research Article

# Parisi-Févola Technique: Minimally Invasive Protocol for Zygomatic Implant Placement Under Local Anesthesia

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### Abstract

**Introduction:** Since their development in 1980 and through subsequent modifications in surgical techniques, zygomatic implant placement has traditionally been associated with general anesthesia and extensive surgical approaches, leading to higher costs and increased procedural morbidity. This study aims to describe and systematize a minimally invasive surgical protocol for zygomatic implant placement under local anesthesia, utilizing minimal flap elevation. This approach is designed to reduce postoperative morbidity without compromising primary stability or clinical predictability.

**Materials and Methods:** A protocol was developed based on the three-dimensional anatomical principles of the zygomatic-maxillary complex, periosteal vascular preservation, and implant trajectory optimization. This protocol was applied to patients with severe maxillary atrophy (Cawood and Howell V–VI) using local anesthesia and a reduced surgical approach.

**Results:** Treated cases demonstrated adequate primary stability, reduced postoperative edema, low incidence of sinus complications, and high patient acceptance. The procedure was performed in an outpatient setting.

**Conclusion:** The Parisi-Févola Technique represents a reproducible and less invasive alternative for the rehabilitation of the severely atrophic maxilla using zygomatic implants, allowing for safe clinical execution under local anesthesia.

## Introduction

Maxillary edentulism is a condition with a rising global prevalence. According to the World Health Organization (WHO), tooth loss can be psychologically traumatic, socially detrimental, and functionally limiting [1]. Alveolar process resorption and the extensive defects resulting from severe maxillary atrophy represent a significant challenge for oral and maxillofacial surgeons [2]. Historically, these conditions were managed using complete removable dentures or more invasive surgical techniques, such as maxillary sinus floor elevation, onlay and inlay grafting (using intraoral or extraoral donor sites), guided bone regeneration, and distraction osteogenesis. These techniques present several disadvantages, including limited functional and aesthetic outcomes, the necessity for multiple surgical interventions with increased associated morbidity, and extended treatment times to achieve final results [3,4]. Numerous clinical studies have confirmed that implant-supported prostheses can considerably improve the rehabilitation of oral function. For patients with severe alveolar bone resorption, zygomatic implants offer a reliable and effective solution for oral rehabilitation [2]. Zygomatic Implants (ZI) were developed and introduced by Prof. P-I Br anemark in the late 1980s; since then, numerous modifications in zygomatic implant designs, surgical approaches, and loading protocols have been documented in the literature [5,6]. However, all these techniques traditionally require intervention under general anesthesia and extensive surgical approaches, leading to higher costs and increased procedural morbidity, respectively. Consequently, the objective of this study is to present the Parisi-F evola surgical protocol for zygomatic implant placement, which consists of a minimally invasive approach performed under local anesthesia with final rehabilitation through immediate loading, as well as to evaluate success, survival rates, and associated complications.

## Materials and Methods

### Patient Selection

Data were collected from the clinical records of patients who attended the Department of Oral and Maxillofacial Surgery at the University of Buenos Aires between March 1, 2021, and March 3, 2026. The inclusion criteria were as follows: Severe maxillary atrophy (Cawood and Howell V–VI).

- Procedures involving the placement of at least two bilateral zygomatic implants.
- Immediate loading with a provisional prosthesis.

### The exclusion criteria were:

- Procedures that did not include zygomatic implant placement.

- Unilateral zygomatic implant surgeries.
- Zygomatic implants with delayed loading.

Data from 119 patients were included. The age range was 40 to 81 years, consisting of 52 men and 67 women. A total of 446 implants were placed. In 15 patients, zygomatic implants were combined with conventional implants in the anterior region. All surgical procedures were performed by the same surgical team. Institutional Ethics Committee approval was waived due to the retrospective nature of the study.

## Preoperative Analysis

The preoperative evaluation for each patient began with a preliminary assessment using orthopantomography (panoramic radiography). For surgical planning, a Cone-Beam Computed Tomography (CBCT) scan was performed for each patient, along with the acquisition of digital files in DICOM (Digital Imaging and Communications in Medicine) format and intraoral scanning to obtain Stereolithography (STL) files. These files were imported into the Blue Sky Plan 4 surgical planning software (Blue Sky Bio, USA). Through this software, a three-dimensional analysis was conducted to evaluate the anatomy of the zygomatic processes, the position, volume, and amount of residual alveolar ridge, maxillary sinus health, and the patency of the bilateral osteomeatal complex prior to surgery. Additionally, digital placement of the implants was performed with the corresponding angulation according to the supporting prosthetic design. Once the planning was finalized, the surgical intervention proceeded (Figure 1).

## Surgical Technique

With the patient in the supine position under aseptic and antiseptic conditions, sterile drapes are placed. Local anesthesia containing a vasoconstrictor is administered via cutaneous and intraoral infiltration to block the zygomatic, infraorbital, superior alveolar, nasopalatine, and greater palatine nerves. A 1.5 cm linear incision is made in the buccal mucosa, superior to the mucogingival junction at the level of the zygomaticomaxillary buttress. A full-thickness flap is elevated to expose the anterior surface of the zygomatic bone, achieving a minimally invasive approach with maximum preservation of the periosteum and vascularization. Additionally, a 5 to 8 mm full-thickness flap is elevated toward the crestal area to prevent mucosal damage during drilling (Figure 2). The transmucosal (flapless) drilling protocol is initiated, first ensuring the perforation of the alveolar ridge and subsequently confirming the correct position and angulation of the drill at the zygomatic bone level through direct visualization. The drilling depth is measured along the implant site, the selected implant is inserted, and insertion torque is monitored (Figure 3). The planned prosthetic abutment is then placed, and the buccal incision is closed using continuous or interrupted sutures (Figures 4,5). In

cases where conventional implants are simultaneously placed in the anterior region, they are inserted using the same flapless approach. Ideally, if adequate primary stability is achieved across all implants, an immediate full-arch prosthesis or a provisional implant-supported splint is installed, and occlusion is verified (Figure 6). The definitive prosthesis is fabricated 45 days postoperatively (Figures 7,8).

### Postoperative Analysis

Postoperative imaging follow-up was performed using Cone-Beam Computed Tomography (CBCT) following the installation of the prosthesis. Postoperative pain, patient satisfaction, and improvement in quality of life were evaluated using dichotomous variables. Postoperative pain was defined as ‘‘pain/absence of pain,’’ where ‘‘pain’’ was categorized as intense or moderate, and ‘‘absence of pain’’ as mild or none. Patient satisfaction was categorized as ‘‘satisfied/unsatisfied,’’ and improvement in quality of life as ‘‘yes/no.’’

### Results

From early 2021 to early 2026, 119 patients underwent surgery under local anesthesia at the Department of Oral and Maxillofacial Surgery of the University of Buenos Aires, Argentina. The cohort consisted of 52 men and 67 women. Of the 446 implants placed, no loss or failure was observed (follow-up ranging from 6 to 48 months). No cases of pathology or oro-intestinal communication were recorded in the immediate or late postoperative period. Ten patients experienced episodes of postoperative epistaxis due to the surgical procedure, which required no treatment, and gingival recessions occurred in thirteen implants, exposing the crestal region without compromising stability. The total number of complications recorded during the study is presented in Table 1 (Table 1). All implants were immediately loaded by placing a Polymethyl Methacrylate (PMMA)-supported full-arch prosthesis or splint. After an average of 45 days, the process of replacing these with definitive acrylic-on-titanium prostheses began. During the provisional stage, four patients experienced prosthetic fractures, which were replaced immediately, and occlusion was re-evaluated. In the definitive rehabilitation stage, no prosthetic complications, fractures, or screw loosening were recorded. Regarding postoperative pain, 94.96% of patients reported no pain, while 5.04% reported postoperative pain (Pain: 6 patients / No pain: 113 patients). In terms of treatment satisfaction, 100% of the patients were satisfied (Satisfied: 119 patients / Not satisfied: 0 patients). Regarding quality of life, 100% of the patients reported an improvement (Yes: 119 patients / No: 0 patients).

Complications	N	%
Oroantral fistula	0	0.00%
Loss or loosening of the implant	0	0.00%
Peri-implantitis/Exposure of the implant	13	2.91%
Epistaxis	10	8.4%
Sinusitis	0	0.00%
Subcutaneous emphysema in the malar region	0	0.00%
Infraorbital paresthesia	0	0.00%
Orbital penetration	0	0.00%
Total complications	23	5.15%
Total implantes	446	100%
Total patients	119	100%

**Table 1:** Immediate and Delayed Postoperative Complications.

### Discussion

Historically, multiple surgical procedures were required to achieve the reconstruction of atrophic maxillary ridges, demanding significant resources, extensive planning periods, long treatment and healing times, and a high risk of morbidity due to the need for intraoral or extraoral donor sites for bone graft harvesting [12,13]. Currently, indications for zygomatic implants have evolved to include severe posterior maxillary resorption with insufficient bone for conventional implant placement, with or without previous failed treatment with implants or bone grafts. The possibility of shortening treatment time—including immediate loading—the engagement of stable cortical bone in the zygoma, and the elimination of the need for grafting have influenced the decision to utilize zygomatic implants to rehabilitate atrophic edentulous maxillae with implant-supported prostheses [4,14].

As an alternative to these reconstructive procedures, the use of these implants reduced treatment time and the number of surgical interventions, allowing for immediate fixed prosthetic rehabilitation and quickly achieving high acceptance among both patients and professionals [15,16]. Over time, variations of the original technique have emerged. In 2000, Stella-Warner et al. [7] published the sinus-slot technique, which modified the original approach by creating a slot through the zygomatic-alveolar crest; the implant follows the path of the slot with minimal sinus invasion, bringing the prosthetic platform to a more crestal position. In 2006, Miglioran a et al. [8] developed a technique where the zygomatic

implant does not traverse the sinus cavity during placement, except at the most apical point, where it may pass through the interior of the maxillary sinus before entering the zygoma. Shortly thereafter, in 2008, Mal o and colleagues [9] modified the external approach and utilized an implant without threads in its coronal two-thirds. In this method, the implant is anchored exclusively in the zygomatic bone, which constitutes the main conceptual difference from other approaches. Later, in 2010, Aparicio et al. [11] described a new surgical technique using an extrasinus approach to achieve the emergence of the implant head at the center of the residual alveolar ridge. While these techniques vary in several aspects, they all share the requirement for general anesthesia and surgical approaches that extend bilaterally with extensive periosteal curettage and bone exposure. The new technique we propose allows for an extrasinus implant position and adequate platform emergence at the alveolar crest, performed through a minimally invasive approach under local anesthesia. This leads to a reduction in procedural morbidity, potential complications, and costs related to the healthcare infrastructure and personnel that are indispensable for procedures under general anesthesia. Complications associated with zygomatic implants, reported with the highest prevalence in the literature, include sinusitis and excessive infection of the maxillary sinuses, peri-implantitis or mucositis, epistaxis, implant loss due to sinus symptoms or nonspecific pain, oronasal communication, and temporary sensory alteration of the infraorbital nerve [17].

Less frequent complications include orbital penetration, subcutaneous emphysema, and extensive hematomas in the malar region [18]. Evidence remains to be determined as to whether ZI placement can trigger a foreign body reaction in the sinus membrane. Sinusitis could result from perforation of the Schneiderian membrane during surgery, ZI mobility, the response of the operated sinus to whole blood, or a lack of osseointegration of the coronal portion of the ZI [13]. However, it is known that the cumulative incidence of sinus complications in patients with zygomatic implants placed using the intrasinus technique is 7.2%, significantly higher than with the extrasinus technique, which shows a cumulative incidence of 1.8% [19]. Consistent with these findings, in our study, all implants were placed using an extrasinus approach guided by zygomatic anatomy (ZAGA 0, 1, 2, and 3), and no episodes of sinus symptoms were recorded during the postoperative follow-up (6–48 months). Full-arch rehabilitation with ZI can be achieved through immediate loading (one-stage) or delayed loading (two-stage) protocols. Delayed loading protocols are associated with the original technical approach, while immediate loading protocols were introduced alongside improvements in surgical technique, operator familiarity with the procedure, and innovations in reconstruction design [20]. With immediate loading protocols, the survival rate of placed implants exceeds 96%, according to authors such as Al-Nawas et al. [4] and

Dav o and Pons [16], among others. Di Cosola et al. [21] reported that immediate loading resulted in a significantly lower risk of infectious, neurological, and general complications compared to two-step rehabilitation. In this research, all of our patients were treated with immediate loading protocols, achieving an implant integration rate of 100%, with no reported loosening or loss of either implants or prosthetic screws during a follow-up period of 6 to 48 months. This is consistent with systematic reviews published in recent years. Another complication associated with Zygomatic Implants (ZI) is the occurrence of dehiscence, soft tissue recession, or peri-implantitis at the crestal level. Peri-implant inflammation, followed by soft tissue recession, could be explained by the intimate contact of the implant body with the oral mucosal tissue, particularly in extrasinus implants [22,23]. In our study, this was the most frequent complication. To reduce its incidence, some authors propose using a pedicled Buccal Fat Pad (BFP) flap to cover the implant body after placement, aiming to separate it from the oral mucosa and increase tissue thickness [22–24]. Currently, our working group lacks experience in this specific area; therefore, further research and clinical studies are required in this regard. While the placement of these implants requires advanced surgical skill and prior training in the field of oral and maxillofacial surgery, advancements in technology and biomaterials allow the Parisi-Fevola surgical protocol for zygomatic implant placement to be performed in a dental office setting under local anesthesia. Utilizing a minimally invasive approach with incisions no longer than 15 mm, this protocol enables immediate maxillary arch rehabilitation and the resolution of complex aesthetic-functional problems within 24 hours, while significantly reducing surgical morbidity.

## Conclusion

The Parisi-Fevola surgical protocol for Zygomatic Implant (ZI) placement is characterized as a minimally invasive procedure performed under local anesthesia, enabling immediate maxillary implant rehabilitation. This technique facilitates implant insertion by allowing precise control of the entry point and the planned insertion axis within the zygomatic bone through reduced vestibular approaches and direct visualization. Furthermore, it minimizes the risk of unintentional deviations (false tracks) during the drilling of the most coronal portion. Ultimately, the protocol aims to optimize surgical and prosthetic times, increase survival rates, and enhance the patient’s quality of life in a single session, addressing both aesthetic and functional aspects while providing a more favorable experience for both the patient and the operator. Its systematization could broaden access to zygomatic implantology in specialized outpatient clinical settings. Nevertheless, further studies—primarily prospective in nature—are necessary to evaluate the long-term outcomes of this technique and to assess variables not included in the present article.

**Conflict of Interest:** The authors declare no conflicts of interest.

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