Quad Zygoma
Technique and Realities

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Complete maxillary rehabilitation has changed dramatically since the advent of osseointegration; treatment options have become more varied and less invasive procedures have emerged. This is timely as life expectancy has increased, resulting in more elderly patients seeking treatment. Thus, severe maxillary atrophy can present relatively frequently in clinical practice. The quad zygoma concept addresses the severely atrophic maxilla by making use of 4 zygoma implants (Fig. 1). Two implants are placed bilaterally with appropriate anterior and posterior spread and inclination for prosthetic rehabilitation. Typically, a fixed prosthesis is provided although this implant solution may also be used to retain an overdenture.

Bone loss secondary to dental extractions occurs in a predictable manner. Many phenomena affect the alveolar bone leading to severe atrophy and a decrease in volume making it difficult to insert dental implants. (Fig. 2) The timeline of progression to severe bone loss is variable among patients; however, with enough time and overlying compressive forces of a complete denture, the fate of edentulous jaws is predictable.

Rehabilitation of completely edentulous patients regardless of the degree of atrophy has historically involved the use of complete removable dentures. This approach, however, may not meet the functional, psychological, and social needs of each individual.

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Over time options evolved:

1. Surgical reconstruction of the jaws involving bone grafting followed by secondary implant placement
2. Using implants in a tilted fashion to eliminate the need for bone grafting and engage available bone where possible with appropriate distribution of the implants for prosthetic rehabilitation
3. Using an alternate source of bone such as the zygoma or pterygoids for anchorage of implants

When severe bone atrophy has occurred, the option of prosthetic reconstruction to compensate for the composite defect as opposed to surgical reconstruction (to rebuild lost anatomy) enables less invasive surgical interventions for patients (Fig. 3). The synergy between surgery and prosthetics is paramount. The quad zygoma combined with prosthetic reconstruction can address patients’ needs for esthetics and function similar to conventional treatments. The reality of needing less surgery to rehabilitate the edentulous maxilla is one that beckons surgeons to examine their goals of treatment and work closely with prosthodontists to obtain successful outcomes. Inarguably, prosthetic reconstruction of lost anatomy eliminates the morbidity associated with surgical reconstruction.

Bone augmentation techniques are widely used and are supported by a great deal of scientific evidence. Nevertheless, clinical and biological limitations are inherent, preventing success rates from reaching those of the alternative approach based on extra-alveolar implants. In clinical practice, the presence of hyperplastic maxillary sinuses with uncontrollable infectious processes, severe alveolar atrophy, or other clinical situations such as defects secondary to trauma or the treatment of pathology requiring severe resective surgeries may mean that the only possible treatment is by means of zygomatic implants.

Fig. 1. Quad zygoma.

From a biological perspective, autologous bone grafts are considered the gold standard. However, morbidity at the donor site, bone resorption when subjected to loading, a prolonged treatment timeline, and problems that can arise with clinically challenging scenarios must be weighed in considering this treatment solution. In addition, the need to achieve adequate vascularization internally and externally makes the technique difficult to apply in cases of severe vertical atrophy. It is often impossible to achieve adequate internal and peripheral vascularization of the graft in large vertical reconstructions. Furthermore, few studies have investigated the use of grafts (bone grafts or other biomaterials) to regenerate severe maxillary atrophy. A recent randomized clinical trial conducted with this profile of patients suggested that, although the use of biomaterials might be possible, rehabilitation takes an average of 430 days. Zygoma implants obtained better outcomes and constituted a much faster means of rehabilitation.

Fig. 2. (A) Cawood and Howell class V. (B) Cawood and Howell class VI.
Nonalveolar implants offer a predictable alternative to bone augmentation techniques in situations of severe alveolar atrophy. The placement of implants in bone of a different embryologic origin favors high survival rates derived from the absence of bone resorption and atrophy. In the authors’ experience, bone resorption can be seen years later in grafted sites with implants; this is not typically seen in the malar bone (Fig. 4).

Zygomatic implants were introduced for the rehabilitation of patients with extensive bone loss derived from trauma, neoplasms, or congenital pathologies. These implants can be combined with intra-alveolar implants or may be used alone to support a prosthesis. Several anatomic studies have validated the good quality of zygomatic bone and have stressed the importance of the cortical portion of the zygomatic bone for anchoring implants. It has also been documented that the area of zygomatic bone used for implant insertion has wider and thicker trabecular bone. This may explain the excellent potential for primary stability of zygomatic implants and, thus, the suitability for immediate loading. This advantage of immediate loading with zygomatic implants normalizes patients’ quality of life immediately.3

**INDICATIONS AND CONTRAINDICATIONS**

Indications include severe maxillary atrophy, in particular inadequate bone volume for the placement of even a single dental implant both anteriorly and posteriorly.10 (Fig. 5). The quad zygoma is used as the first option of choice in these patients. It may also be used as a rescue implant in patients who previously had bone grafting and implants that failed.

The concept of using short implants anteriorly in conjunction with a zygoma implant posteriorly is controversial with few supporting studies in the literature. In the authors’ experience, it is prudent to perform a quad zygoma whenever the bone loss anteriorly precludes placement of conventional implants of at least 10 mm in length.

The quad zygoma may be used for rehabilitation with either a fixed or removable prosthesis (Fig. 6).

Contraindications include:

- General contraindications to implant surgery
- Radiation to the head and neck region of more than 70 Gy
- Immunosuppressed or immunocompromised patients
- Intravenous amino-bisphosphonates use
- Untreated periodontal disease
- Poor oral hygiene and motivation
- Uncontrolled diabetes
- Pregnant or lactating women
- Addiction to alcohol or drugs
- Restricted mouth opening (<3 cm interarch measured anteriorly)
- Acute or chronic infection/inflammation in the area intended for implant placement
- Acute maxillary sinusitis
- Chronic maxillary sinusitis with obstruction of the osteomeatal complex
- Abnormalities in the malar bone

Pre-operative planning should include prosthetic work-up of the patient as per conventional full-mouth rehabilitation protocols.
Factors to consider include:

- Vertical dimension
- Occlusion
- Smile line
- Smile curvature
- Teeth position
- Size of teeth
- Buccal corridors
- Opposing dentition
- Parafunelional habits
- Skeletal jaw relationship

In addition, other key factors must be considered such as the restoration of masticatory function, phonation, and aesthetics—all the criteria that traditionally ensure quality of any complete prosthesis. Pre-operative prosthetic treatment planning is critical for success.

The quad zygoma procedure is a prosthetically driven technique in which the patient must undergo complete prosthodontic preparation before implant placement. Once the provisional prosthesis has been made, a surgical guide with palatal support is prepared based on the assembly of the teeth and then used for implant placement. This is fabricated in transparent acrylic resin. It will also be used post-operatively to register implant positions for fabricating the definitive prosthesis in the laboratory.

**Radiographic Analysis**

Plain film radiography in the form of a panoramic radiograph is suitable as a preliminary film only. Appropriate radiographic analysis and planning can only be done using a computed tomography (CT) scan.

Various implant planning software is available to enable 3-dimensional reconstruction of the atrophic maxilla and enable virtual implant placement. This facilitates determination of the implant lengths and appropriate positioning at the level of the alveolar process and the zygoma (Fig. 7). Using cone beam CT (CBCT), the anatomy of the zygomatic processes should be analyzed as well as the position, volume, and amount of the residual alveolar ridge, the health of the maxillary sinus, and patency of the osteomeatal complex bilaterally.

**Surgical technique**

The surgical technique has been described by several authors. Intravenous sedation or general anesthesia is typically used with intraoral infiltrative local anesthesia in the surgical area facilitating hemostasis and reducing the amount of analgesia required. Pre-operative antibiotics are prescribed. The patient is prepared and draped such that a sterile field is present and the infraorbital rim, lateral orbital rim, and body of the zygoma can be palpated by the surgeon during the procedure.
A full-thickness palatal-crestal incision is made on the alveolar ridge from first molar to first molar. The palatal incision design is to ensure that a good width of keratinized tissue surrounds the implants labially/buccally. Distal vertical releasing incisions are made bilaterally to enable good visualization of the surgical field by raising a mucoperiosteal flap. Subperiosteal dissection is also carried out superiorly following the path of the zygomatic buttress to the frontozygomatic notch. It is important to visualize several anatomic structures:

- The maxilla from the piriform apertures up to and including the zygomatic buttress
- The infraorbital foramen
- The malar bone
- The palate adjacent to the incision

Care must be taken to identify, preserve, and protect the infraorbital neurovascular bundle. Once the dissection is completed, an oblique osteotomy is made measuring approximately 0.5 × 1.5 to 2 cm in the lateral wall of the maxilla adjacent to the sinus. The Schneiderian membrane is dissected off the lateral wall of the sinus and the internal cortex of the zygomatic bone. This allows for visual and/or tactile access to the internal cortex of the zygoma. This window can be made using the surgeon’s instrumentation typically used to perform a direct sinus lift.

Once the surgical field is appropriately exposed, a retractor is placed in the frontozygomatic notch to allow for good visualization of the malar bone during osteotomy preparation. This also enables the surgeon to appreciate the path of the osteotomy preparation.

Positioning of the implants takes into account the anatomy of the body of the zygoma and the maxilla. The goal is to place 2 zygoma implants into a finite space with appropriate prosthetic emergence and as midcrestal as possible. This is both a conceptual and digital exercise for the surgeon. In a cadaver study assessing the accuracy of drilling guides, it was demonstrated that 2 implants can indeed be placed at the level of the zygoma bone in the vast majority of cases given the height and width measurements of a typical malar bone.15

The anterior implants are placed first with emergence at the level of the canines or lateral incisors. Posterior implants emerge in the molar or premolar areas. The implants must be evenly distributed in the zygomatic bone and, ideally, be positioned so that they are spatially separated. The drilling sequence corresponds to the manufacturer’s recommendations progressively increasing the diameter of the drills to avoid overheating the bone and to facilitate insertion of the implant. Drilling begins with a 2.9 mm round drill and continues with a 2.9 mm twist drill. Depending on the implant system one uses, the osteotomy may be widened with a final 3.5 mm diameter twist drill. Abundant irrigation is crucial at the crest but also equally important at the apex in the malar bone to avoid overheating. While drilling the osteotomy, palpating the malar bone extraorally is prudent. In preparing the osteotomy sites, the clinician must bear in mind the desire for immediate loading (as per the prosthetic plan) and ensure appropriate anchorage for this.

After implant insertion, abutments are placed (multi-unit or angulated as required) to support the prosthetic rehabilitation. The flap is co-apted ensuring an excellent collar of keratinized tissue around the implants (Fig. 8).

Prosthetic Phase

During the prosthetic phase, it is preferable for the patient to be fully conscious, whereby impressions are taken only a few hours after surgery. Impressions can also be taken while the patient is still unconscious (under intravenous sedation or general anesthesia), but this will be more difficult.

Following abutment placement, impression copings are attached to the implant abutments and the transparent surgical guide is used for impression transfer, placing and joining implants by means of general purpose acrylic resin. The same guide is used to register the patient’s occlusion and jaw relationship. Once the occlusion has been registered and the guide secured, the space between the impression copings and the surgical guide is filled with fluid silicone. As soon as the material has hardened, the copings are removed in conjunction with the guide and the transepithelial abutments are covered with protective caps. The provisional prosthesis is fabricated in the conventional manner casting a
model and connecting laboratory analogues (Fig. 9). If the patient already has a conventional denture that fulfills all the prosthetic requirements, this may be used as a guide for the surgical template and also be used in the conversion process to an all-acrylic bridge for immediate loading. Two or three of the impression copings are picked up in the mouth (Fig. 10). An impression is then made using an impression tray. The last implants are picked up on the model and the intaglio surface is filled in.

Six months after surgery, implant integration is verified and the soft tissues are assessed prior to fabricating the definitive prosthesis. Six months after surgery, implant integration is verified and the soft tissues are assessed prior to fabricating the definitive prosthesis.

Surgical Techniques for Zygomatic Implant Placement

There is a lack of consensus in the literature as to the ideal surgical technique for the placement of zygomatic implants. All protocols involve similar incisions designed to expose the surgical site. However, the relationship between the portion of the implant not anchored in the zygoma and the sinus membrane, sinus cavity, and lateral wall of the maxilla vary from one technique to another. Different approaches have evolved and developed in order to minimize potential sinus complications and improve the emergence of the implant at the alveolar crest without compromising the reported high survival rates. When it comes to the quad approach, crestal implant emergence is paramount for designing an appropriate prosthesis.

There are several zygoma implant placement techniques.

The classic Branemark approach

The implant passes through the maxillary sinus and the prosthetic platform is on the palatal crest of the alveolus. The lateral antrostomy window perforates through the sinus permitting direct visibility of the roof of the sinus. The Schneiderian membrane is reflected classically.

Sinus slot approach

The slot made through the zygomatic buttress and the implant follows the path of the slot with minimal invasion into the sinus. This is a more crestal position of the prosthetic platform.
Classic exteriorized approach
This approach was first introduced by Miglioranca and colleagues in 2006. A spherical drill is used for the osteotomy penetrating the residual ridge near to the top of the crest from palatal to buccal. The ridge is then transfixed with the drill emerging in the buccal aspect of the ridge external to the sinus. A maxillary antrostomy is not necessary. Drilling continues along the outer aspect of the lateral wall of the sinus until reaching the lateral portion of the zygomatic bone, which is perforated, surpassing the bone’s outer cancellous layer. Implants are placed outside the sinus (Fig. 12).

Extramaxillary approach
In 2008, Maló and colleagues modified the exteriorized approach and used an implant without threads on the coronal two-thirds of the implant. The maxilla is prepared to allow burs direct access to the zygoma’s inferior edge. The maxilla is not used for implant anchorage. The implant is anchored exclusively in the zygomatic bone which is the main conceptual difference between this approach and the others.

Extended sinus lift
Chow and colleagues (2010) proposed an approach to eliminate the risk of maxillary sinusitis. An extended sinus lift (Fig. 13) is performed with a retained bone window. The aim is to keep the sinus membrane intact during zygomatic implant osteotomy preparation.

This procedure has potential advantages:
- Eliminates the risk of maxillary sinusitis
- Increases zygomatic implant stability by promoting bone formation adjacent to the elevated maxillary sinus membrane.

Zygoma Anatomy Guided Approach
In 2011, Aparicio developed a classification system based on skeletal forms of the zygomatic buttress-alveolar crest complex and possible implant pathways related to these categories (Fig. 14). The zygoma anatomy guided approach, named ZAGA 0 to 4, is useful for classifying zygomatic implant cases in terms of operative planning.

The authors identified basic skeletal forms of the zygomatic buttress-alveolar crest complex and subsequent implant pathways among a sample of 100 patients:
- ZAGA 0 (anterior maxillary wall is flat, maxillary horizontal dimension maintained) 15%, of the patient sample
- ZAGA 1 (slightly concave wall, horizontal dimension maintained) 49%
- ZAGA 2 (concave wall, horizontal dimension maintained) 20.5%
- ZAGA 3 (very concave wall, horizontal dimension maintained) 29%
Aparicio proposed different implant placement techniques for these 5 anatomic categories. In short, whether the implant runs completely or partially in the sinus, lateral to the sinus, or lateral to the maxilla is entirely dependent on the patient’s anatomy. In theory, any of these techniques for placing zygomatic implants may be used in the quad zygoma approach. Typically quad zygoma treatment is reserved for severe maxillary atrophy. These patients often present with ZAGA 3 or ZAGA 4 anatomy. As such, often a significant portion of the implants will be exteriorized or extramaxillary.

POINTS TO NOTE REGARDLESS OF TECHNIQUE

Implants must be well distributed in the maxillary arch to obtain adequate anterior and posterior support. Implants should be positioned on the maxillary crest with stable anchorage in the zygomatic bone.

Quad zygoma represents a cross-arch stabilization system in which the provisional prosthesis offers implant stabilization immediately after surgery. Although insertion torque above 35Ncm for every single implant is always a goal, it is not mandatory.

Given that in many scenarios there is lack of implant integration at the crest, a slight bending (but not rotational) movement can be expected with some implants. This ceases as soon as the prosthesis is connected.

If adequate primary stability is not achieved (rare), the implants are submerged. Under no circumstances should the implants be loaded free standing.

POST-OPERATIVE CARE

Post-operative care is similar to that of any implant surgery. In addition, sinus instructions are given. Analgesics and anti-inflammatories are prescribed, as well as antibiotics for a 1 week course. Post-operative follow-up visits are scheduled 1 and 2 weeks after surgery and then at 2, 3 and 6 months after surgery. After 4 to 6 months of loading, the acrylic resin provisional prosthesis is removed to assess the

![Fig. 12. Implants are exteriorized/extramaxillary.](image)

![Fig. 13. (A) Extended sinus lift for the placement of 2 zygoma implants. (B) Implants in place.](image)
implants and soft tissues prior to fabrication of the definitive prosthesis.

**COMPLICATIONS OF ZYGOMATIC IMPLANTS**

**Penetration into the Orbital Cavity**

It is possible to penetrate the orbital cavity especially in zygomatic bones less than 1.8 to 2 cm in height. Damage to the orbital contents and surrounding musculature can ensue. Appropriate training and experience are required to perform zygomatic implants and in particular the quad zygoma technique. Pre-operative planning, adequate exposure, and an in-depth knowledge of the regional anatomy are fundamental to performing this procedure safely. Caution must be taken to avoid inappropriate positioning of the implants; some authors advocate having a 3-dimensional printed model from the patient’s CT scan to enable appropriate study of the site as well as planning and rehearsal of the surgery.

**Peri-Implant Mucositis, Peri-Implantitis, and Retraction of Buccal/Labial Peri-Implant Tissue**

These complications partly depend on the approach selected for implant placement. In a retrospective study, the classic intrasinus approach was compared with ZAGA. Both procedures obtained similar clinical outcomes with respect to implant survival. Nevertheless, the ZAGA concept minimized the risk of maxillary sinus associated pathology and resulted in less bulky, more comfortable, and easier-to-clean prostheses. The relationship between the soft tissues, the bone, and the portion of the implant outside the malar bone remains controversial. Inflammation and tissue retraction can occur around zygomatic implants especially when the implant is placed on the crest without being surrounded by bone (Fig. 15). Zygoma implants without threads in the coronal two-thirds of the implant are available for use in these scenarios, with the goal to minimize soft tissue complications. Interestingly, it has been shown that there is normally gingival attachment at this level. Some authors suggest the use of the buccal fat pad to thicken the tissues at the crestal implant level to prevent retraction of the tissues in the extramaxillary technique. These reports need to be supported by scientific studies. The surgeon should bear in mind that if the patient’s anatomy dictates an exteriorized or extramaxillary approach, it is critical that at the crestal level, the implant is actually embedded in the maxilla rather than lying truly

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Fig. 14. Zygoma anatomic guided approach. (A) ZAGA 0 (B) ZAGA 1 (C) ZAGA 2 (D) ZAGA 3 (E) ZAGA 4.
lateral to it. The implant should not alter the crestal anatomy and be bulky.

**Infection at the Implant Apex**

An extraoral swelling just lateral to the malar bone with or without a cutaneous fistula is indicative of an underlying infection in the malar bone (Fig. 16). This may occur years after the implants have been placed. It can be treated with systemic antibiotics, debridement of the area (via intraoral or extraoral approach), and resecting the apex of the implant so that it is flush with the surrounding bone as needed. This complication can be avoided by ensuring that the implant length is appropriate; the implant apex should engage the outer zygoma cortex but not extend much beyond it. In addition, lack of contamination and ensuring good irrigation of the area throughout the procedure and specifically prior to closure is important.

**Sinusitis**

Sinusitis is the most common complication of zygomatic implants historically.

The prevalence of sinus pathology associated with zygomatic implant surgery remains controversial. It would appear that the risk can be reduced by meticulously assessing the status of the sinuses before implant placement, treating any factors that will predispose the patient to sinus pathology, and by using the exteriorized or extramaxillary approach or the extended sinus lift approach when indicated. If sinusitis occurs that does not resolve with antibiotics, functional endoscopic sinus surgery is required to clear the sinus and ensure patency of the osteomeatal complex. The implant does not require removal.

**Oral-Antral Communication**

In cases in which the alveolar bone is very thin or virtually nonexistent, even a slight overpreparation of the osteotomy site or bone loss over time at the alveolar crest may result in an oral-antral communication (OAC) (Fig. 17). Caution in preparing this area is crucial. Closure of the OAC in these cases are difficult. The use of the buccal fat pad has been reported. A different approach to deal with this complication is the use of bone morphogenic protein. There is no consensus on the best way to manage this negative outcome. Evidence in the literature is required to determine the most predictable method of resolution and prevention.

**Paresthesia/Dysesthesia**

Patients may experience temporary or permanent altered sensation in the distribution of the infraorbital nerve. Careful identification of this neurovascular bundle, preservation, and protection are crucial to prevent this complication. The zygomaticofacial nerve may also be injured resulting in loss of feeling over the cheek prominence.
Fracture of the Zygomatic Implant

Fracture of the zygomatic implant is due to inappropriate implant positioning resulting in overloading and biomechanical failure (Fig. 18). This is a rare complication.

Prosthetic Complications

These include loosening of the transepithelial abutments, loosening of the prosthesis fixation screws, and fracture of the prosthetic teeth or prosthetic structure.

SCIENTIFIC EVIDENCE FOR THE QUAD ZYGOMA

There is an abundance of literature to date supporting the use and high survival rates of zygomatic implants when combined with anterior implants. The quad zygoma concept came into clinical practice years after the single zygomatic implant (combined with conventional implants) proved itself. The literature in this regard is reflective of this timing. There are only a few studies on the quad zygoma procedure. This is certainly not reflective of the international use of this technique and the frequency of its use. The authors encourage others to report on this implant solution.

In 2007, Duarte and colleagues analyzed 12 patients who were treated with 4 zygomatic implants to address severe maxillary atrophy. Immediate loading was performed. Forty-eight zygomatic implants were placed. One implant failed to achieve osseointegration at the 6-month follow-up; integration was maintained for all other implants at 30 months. There were no prosthetic complications.

Stievenart and Malevez in 2010 reported on a clinical series of 20 patients with extremely resorbed maxillae rehabilitated with 4 zygomatic implants: 10 had 2-stage implant treatment and the remaining 10 had single stage implant treatment. The cumulative survival rate after 40 months was 96%.

In a 5-year prospective study, Davó and Pons obtained high long-term survival rates (implants 98.5% and prosthesis 100%) with few complications. The oral health-related quality of life of these patients was found to be normal even with the passage of time.

A meta-analysis by Wang and colleagues in 2015 revealed that the quad zygoma treatment solution is a reliable technique for maxillary rehabilitation. The zygomatic implant survival rate weighted mean was 96.7%.

A systematic review and meta-analysis by Aboul-Hosn Centenero and colleagues evaluated the survival rates of 2 zygomatic implants combined with regular implants versus 4 zygomatic implants. No statistical differences were seen using 1 treatment over the other in terms of survival and failure rates.

A recent randomized clinical trial compared immediately loaded cross-arch maxillary prostheses supported by zygomatic implants to conventional implants placed in augmented bone. This study revealed that immediately loaded zygomatic implants are associated with significantly fewer prosthetic and implant failures (1 out of 36 patients...
with zygomatic implants, compared to 6 out of 37 patients with conventional implants) and a shorter time required for functional loading (1.3 days with zygomatic implants, compared with 444.3 days for conventional implants).9

All studies report some complications with the quad zygoma technique. Surgeons and patients must be aware and informed of the potential adverse outcomes; steps must be taken to minimize such occurrences. The evidence compiled to date suggests that implants placed in the quad zygoma format may still offer a better rehabilitation modality for the severely atrophic maxilla. Nevertheless, long-term data and more studies are needed to confirm or dispute these preliminary findings. There are no randomized controlled clinical trials comparing surgical techniques for the placement of zygomatic implants. It is the authors’ opinion, however, that the prudent approach is one in which the patient’s anatomy dictates the surgical technique as per Aparicio and colleagues.

Future developments needed in quad zygoma surgery encompass the ability to accurately transfer virtually planned implant positions clinically. To date, stereolithographic templates, either bone-supported or mucosa-supported, have been used to install zygomatic implants in the designated positions based on computer-assisted planning. However, there is no effective mechanism yet to physically control the drilling trajectory for zygomatic implants and ensure precision of placement. Therefore, deviation between the actual and planned implant position is inevitable. This is clearly less tolerable in circumstances of extreme resorption in which the quad zygoma approach is utilized. The exact position of both implants in the malar bone is critical. A novel device designed to increase the precision of guided surgical placement of zygomatic implants has recently been published.29 To date, however, given the limited data in the literature, guided zygoma surgery should be considered experimental.

An alternative novel approach to achieving precision with zygoma placement entails surgical navigation. A recently published study examined the use of surgical navigation for zygomatic implant placement in patients with severe maxillary atrophy. The results seem to be promising.30 More data in this regard will be most interesting.

**SUMMARY**

The quad zygoma provides a predictable and efficient way to rehabilitate the severely atrophic maxilla. It is an advanced surgical procedure that requires appropriate training, planning, and meticulous surgery. It is not without potential complications. If executed appropriately, however, these can be minimized. Provided that the surgeon has significant clinical experience, the use of 4 zygomatic implants with an immediate loading protocol is typically predictable. It enables implants to be placed in an alternate anchorage site, eliminating the need for more invasive and lengthy surgical reconstruction of the maxilla.

**REFERENCES**


