

Surgical-prosthetic rehabilitation of patients with aggressive periodontitis and immediately loaded implants: a report of two cases

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ABSTRACT

Background Treatment with dental implants is demonstrated to be a predictable procedure to replace lost or defective teeth in patients with a history of chronic and aggressive periodontitis. Although the dental implants are less successful in compromised patients compared to uncompromised patients.

Case report In this report, two cases are described of Generalized Aggressive Periodontitis (GAgP) treated with multidisciplinary management and a two-year follow-up. The two patients received periodontal and prosthetic treatment with immediately loaded implants using a supported surgical computer-planned guide. Dental implants were inserted by means of a flapless procedure, and immediate provisionalizations were put into place. The survival of the implants was evaluated by clinical and radiographic means after two years. Minimal pain and edema on the surgical site were observed.

Conclusion The 2 case reports support the benefits of immediate loading with provisional implant-retained fixed prostheses in patients with GAgP.

KEY WORDS: Aggressive periodontitis; Computer-guided-implant surgery; Dental Implants; Immediate loading; Periodontitis.

INTRODUCTION

Osseointegration of dental implants is considered to be profoundly predictable (1, 2). Even in patients with severe crestal bone loss, dental implants are possible through bone regeneration techniques. The application of regenerative techniques enables dental implants to be placed in the correct position, allowing future rehabilitation in accordance with the treatment plan (3).

The use of cone beam computed tomography (CBCT), 3-dimensional (3D) implant planning software, and computer-aided design/computer-assisted manufacturing (CAD/CAM) technology are undoubtedly important achievements in dental treatment (4). These advances provide exploratory precision in the patient's bone anatomy, enabling a virtual execution of the surgery in an accurate and ideal, prosthetically driven manner. Computer-guided implant surgery has a 97.3% survival rate according to a recent systematic review (5). Guided implant surgery also offers the clinician the option to perform flapless surgery with maximum patient comfort and reduced clinical work. These advantages produce better wound healing with less morbidity and postoperative medication and greater patient acceptance to receive surgical treatment (6-10). The literature provides strong evidence that immediate loading of dental implants with fixed provisional prostheses in both the edentulous mandible and maxilla is as predictable as early and conventional loading (11). Recently, the American Academy of Periodontology and the European Federation of Periodontology introduced a new classification of periodontitis, where "chronic" or "aggressive" periodontitis were grouped into a single category, "periodontitis", presenting the disease a grading system with different stages that can be adapted over time to new emergent evidences (12). Implant therapy can be challenging in patients with a history of aggressive periodontitis compared to healthy

and chronic periodontitis patients (13).

Clinical and longitudinal studies suggest that implant therapy can be used in patients with GAgP (14, 15).

This report describes two cases treated for generalized AgP with implants placed using a novel surgical computer-planned guide along with immediate provisionalization, both in fully edentulous and partially edentulous patients. A two-year follow-up is presented on implant survival with clinical and radiological evaluation.

Case 1

A 33-year-old female patient was referred in February 2015 with multiple teeth mobility grade III and advanced bone loss. The patient complained of discomfort when chewing, esthetic problems, spontaneous bleeding, and recurrent periodontal abscess formation. The patient was a non-smoker and did not present any systemic health problems. No family association could be established as susceptible to periodontal disease, although the patient mentioned that past family members were affected with early tooth loss and mobility.

The clinical examination reported the probing pocket depth and clinical attachment loss ranging between 4 and 12 mm. Caries lesions and remaining root tips can be seen in occlusal views. Panoramic and periapical radiographs revealed advanced bone loss with generalized horizontal and localized vertical defects in both arches. According to the clinical features and radiological information, the final diagnosis indicated the presence of a generalized AgP.

After informed consent was obtained from the patient, oral hygiene instructions were given, and scaling and root planing were performed to reduce the number of bacteria and gingival inflammation. Because all of the teeth presented a hopeless prognosis, extractions were performed. Conventional complete dentures were made as a temporary immediate rehabilitation using resin-based crowns on polymethylmethacrylate (Ivostar-Gnathostar®, Ivoclar-Vivadent™, Schaan, Liechtenstein). Soft tissue conditioner was applied (Tempo® Lang Dental Manufacturing Co., Inc., Chicago, USA), and the dentures were checked monthly for control and occlusion adjustment.

After 9 months, the edentulous ridges were completely healed and a CBCT scan was used (Orthopantomograph™ OP300, Instrumentarium Dental™, Finland) to analyze residual bone volume. Severe alveolar bone loss and poor bone quality were present. A surgical guide was designed with computer-aided software and manufactured into a stereolithographic surgical guide (MIS MGUIDE™, Israel). Eleven implants (6 in the maxilla, 5 in the mandible) were placed (SEVEN®, MIS Implants Technologies, Barlev Industrial Park, Israel) (Table 1).

Local anesthesia was administered using 4% articaine with 1:100,000 epinephrine (DFL, Rio de Janeiro, RJ, Brazil), and the punch tissue drill was used through

Implants used in patient 1	
Position (No.)	Implant type
5	3.75mm x 8 mm
6	3.75 mm x 8 mm
7	3.75 mm x 8 mm
9	3.3 mm x 10 mm
10	3.75 mm x 8 mm
12	3.75 mm x 10 mm
21	3.75 mm x 10 mm
23	3.75 mm x 11.5 mm
24	3.75 mm x 13 mm
26	3.75 mm x 11.5 mm
28	3.75 mm x 11.5 mm

TABLE 1. Length and diameter of implants used.

the surgical guide at 25 rpm. To access the bone, each marked gingiva was manually removed using a flapless procedure. Drilling sequences were performed according to the planned implants.

Immediate implant placement was performed, and primary stability was achieved with an insertion torque ≥ 35 Ncm². Pre-planned Multi-unit implant abutments were placed and kept in place with self-cured acrylic resin (Veracril®; New Stetic Dental Ltda, Petrópolis, RJ, Brazil). Although there was a generalized bone resorption, bone grafting was not necessary. Immediate temporary restorations was seated over the multi-unit abutments and later adjusted to clear centric and eccentric contacts. Postoperative instructions included 1 g of amoxicillin plus clavulanic acid twice a day for 5 days, 25 mg of dexamethasone for 2 days and local irrigation of chlorhexidine 0.12%, three times a day for 14 days. The patient returned one week after surgery for a postoperative assessment. Recovery was successful, minimal pain and edema on the surgical site were observed.

After osseointegration, the final impressions were taken using multi-unit transfers (SEVEN®, MIS Implants Technologies, Barlev Industrial Park, Israel) splinted with braided floss with a thick layer of acrylic (GC Pattern Resin®; GC Corp., Tokyo, Japan). Adapted plastic impression trays and silicones by addition, light and heavy (Elite HD plus Zhermack, Italy) were used. Metal-acrylic hybrid prostheses with a Co-Cr reinforced metal framework, using resin teeth based on polymethylmethacrylate (Ivoclar-Vivadent™, Schaan, Liechtenstein) and thermo-cured acrylic (Veracril®; New Stetic Dental Ltda, Petrópolis, RJ, Brazil) were made. The patient was checked periodically for the following 2 years after rehabilitation (Fig. 1, 2, 3).

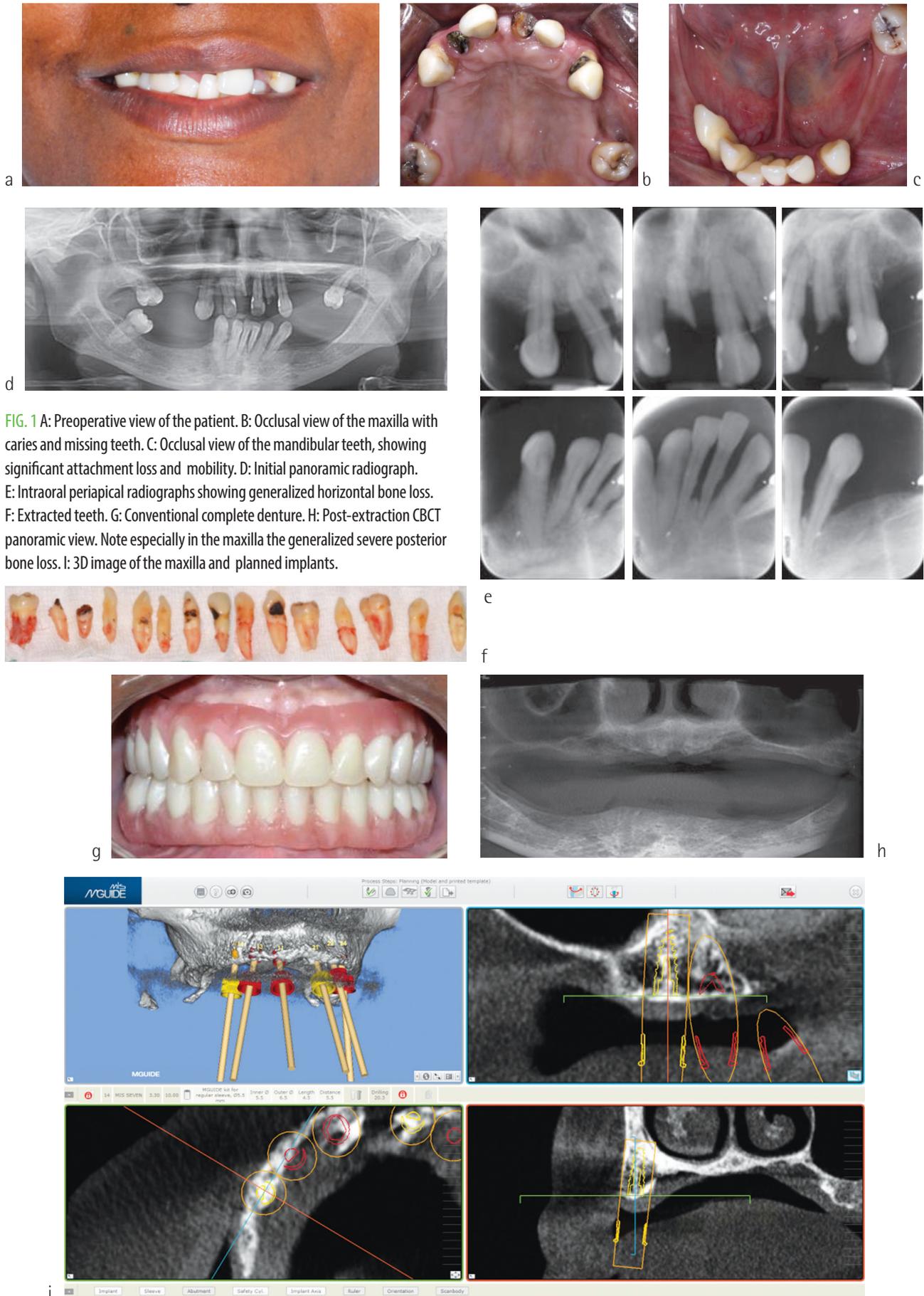


FIG. 1 A: Preoperative view of the patient. B: Occlusal view of the maxilla with caries and missing teeth. C: Occlusal view of the mandibular teeth, showing significant attachment loss and mobility. D: Initial panoramic radiograph. E: Intraoral periapical radiographs showing generalized horizontal bone loss. F: Extracted teeth. G: Conventional complete denture. H: Post-extraction CBCT panoramic view. Note especially in the maxilla the generalized severe posterior bone loss. I: 3D image of the maxilla and planned implants.

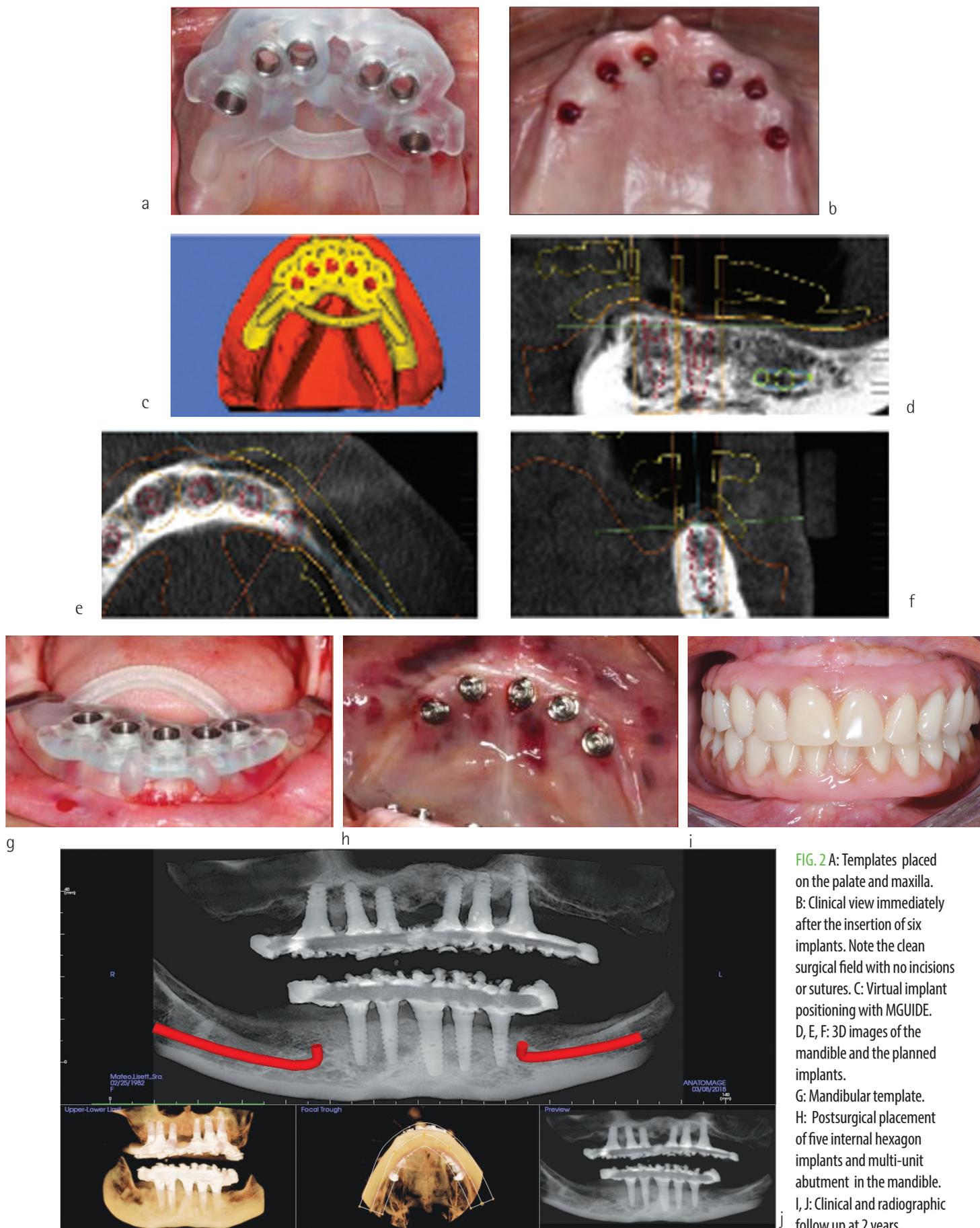


FIG. 2A: Templates placed on the palate and maxilla. **B:** Clinical view immediately after the insertion of six implants. Note the clean surgical field with no incisions or sutures. **C:** Virtual implant positioning with MGUIDE. **D, E, F:** 3D images of the mandible and the planned implants. **G:** Mandibular template. **H:** Postsurgical placement of five internal hexagon implants and multi-unit abutment in the mandible. **I, J:** Clinical and radiographic follow up at 2 years.



FIG. 3 Extraoral view of the patient with the final restorations.

Case 2

A 34-year-old female was referred in June 2015, presenting a deficient complete denture in the upper jaw and bilateral absence of mandibular molars. The patient did not present any systemic condition or environmental risk factors that could compromise the patients' periodontal health. Severe generalized horizontal and vertical crestal bone loss in the maxilla, as well as a periapical lesion in tooth 20, were evident in the panoramic and periapical radiographs. Although seen radiographically that the patient may have chronic periodontitis, the patient indicated that all missing teeth were extracted during adolescence due to bone loss and tooth mobility.

The initial patient request was to simply replace a maxillary deficient complete denture. After discussing the advantages and disadvantages of different treatment options, the patient accepted the possibility of other alternatives. The first goal was to control the periodontal disease; thus, all mandibular teeth received scaling and root planing. Emphasis on motivation and oral hygiene instructions were given. Root canal treatment was planned in tooth 20. After informed consent was obtained from the patient, impressions of both arches and a bite registration were taken.

A virtual software program was used to plan the implant placement and to manufacture the stereolithographic computer-assisted surgical guide (MIS MGUIDE™, Barlev Industrial Park, Israel). The CBCT scan evaluation showed severe bone loss in the maxillary anterior region and a trabeculated aspect in the maxillary posterior region. This case scenario resulted in a challenging approach for planning because of the severe and advanced bone loss of the patient.

Unfortunately, in the process of planning the placement of the implants tooth 20 fractured and an extraction had to be performed. The socket was filled with a large particulate gamma-radiated human mineralized allograft (Puros®, Zimmer Dental, USA). Primary closure

Implants used in patient 2	
Position (No)	Implant type
2	5mm x 11.5 mm
3	5 mm x 8 mm
5	4.20 mm x 10 mm
12	3.3 mm x 11.5 mm
13	3.75 mm x 8 mm
14	3.75 mm x 8 mm
19	3.75 mm x 11.5 mm
20	3.90 mm x 10mm
30	3.75 mm 13 mm

TABLE 2 Length and diameter of implants used.

was obtained with interrupted sutures.

Local nerve block anesthesia was delivered using 4% articaine with 1:100,000 epinephrine. The guides were firmly placed, and the soft tissue was removed using the punch drill technique at 25 rpm. Punched mucosa was manually removed uncovering the underlying bone. The drilling sequences were performed according to the implant lengths and diameters planned (Table 2). Primary stability was achieved in all the inserted implants and kept with healing abutments (SEVEN®, MIS Implants Technologies, Barlev Industrial Park, Israel). For the mandible, two implants were inserted in place of teeth 19 and 30 (Fig. 4, 5). A pre-fabricated immediate overdenture was made using resin teeth based on polymethylmethacrylate (Ivoclar-Vivadent™, Schaan, Liechtenstein) teeth and heat-cure acrylic (Veracril®; New Stetic Dental Ltda, Petrópolis, RJ, Brazil). The overdenture was installed over the maxillary healing abutments with a soft tissue conditioner (Tempo® Lang

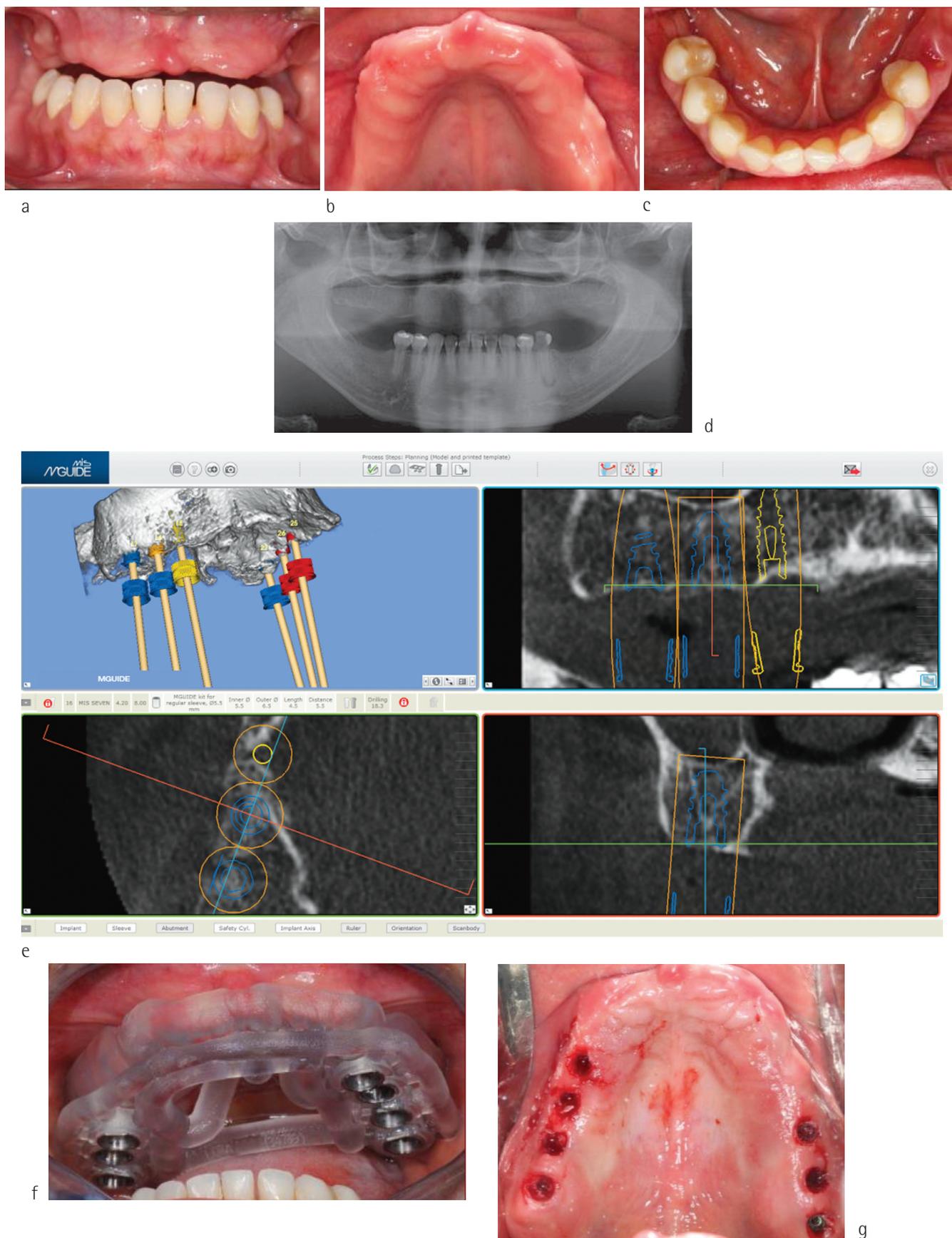
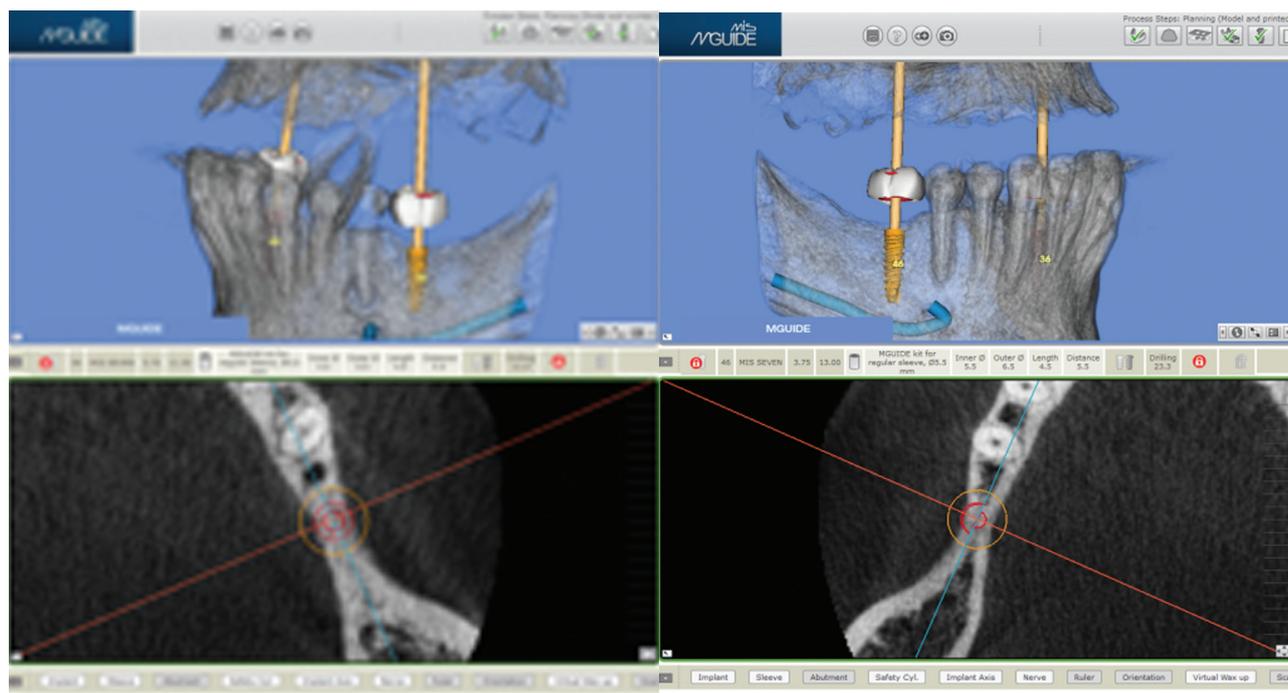


FIG. 4 A: Edentulous maxillary ridge. B: Mandibular teeth remaining. (c) Initial panoramic radiograph. (d) Frontal view showing complete absence of teeth in the upper jaw and bilateral absence of mandibular molars. (e) Maxillary implant virtual planning and CBCT scan views. (f-g) Maxillary surgical guide and implants placed with flap technique.



a



b



c

FIG. 5 A: Mandibular implant virtual planning and CBCT scan views. B-C: Mandibular surgical guide and implants placed with flapless technique.

Dental Manufacturing Co., Inc., Chicago, USA). The occlusion was adjusted intraorally. The patient remained in monthly control for the soft tissue conditioner replacement and the evolution of the case.

Three months after surgery, provisional dentures were further modified. Seven months later, prosthetic treatment was initiated. The mandibular dentition was restored with an implant-supported fixed partial denture. For the final rehabilitation, individual trays were fabricated, and impressions were taken with polyvinyl-siloxane using an open-tray technique. Wax and metal framework try-in for the maxilla and mandible were prepared.

Twelve months after surgery, an implant-supported overdenture was performed. The overdenture was made on a metallic framework with Co-Cr anterior reinforcement, with resin teeth based on polymethylmethacrylate (Ivoclar-Vivadent™, Schaan, Liechtenstein) and heat-cured acrylic resin (Veracril®;

New Stetic Dental Ltda, Petrópolis, RJ, Brazil). Implant-supported removable denture attachments OT-Equator® (MIS Implants Technologies, Barlev Industrial Park, Israel) were inserted in the flask during the acrylic process. Once the denture was finished, it was inserted using soft retention caps in metal housing. Occlusion adjustment was made.

Regarding the mandible, after the osseointegration process was completed, a final impression was taken for rehabilitation using individual lithium disilicate (EMAX®, Ivoclar-Vivadent™, Schaan, Liechtenstein) crowns following the same impression protocol that was used in the maxilla. Two crowns were directly screwed onto the definitive abutments and a cemented crown with self-curing luting composite (Multilink®, Ivoclar-Vivadent™, Schaan, Liechtenstein). A control visit was performed one month after the crowns were placed. Periodontal and peri-implant conditions were stable over a 24-month follow-up period (Fig. 6).



FIG. 6 A: Immediate post implant placement radiograph. B: Implant-supported removable denture with OT-Equator® attachments. C: Intraorally view of the definitive restorations. D: CBCT at 2-year follow-up after loading.

DISCUSSION

There is evidence that the peri-implant bone quality is better when implants are immediately loaded compared to delayed loading protocols (16). Different treatment protocols have been introduced in the literature, and

a team approach is necessary between surgical and restorative dentistry to improve functional, esthetic, and biological outcomes (17).

An appropriate period of time between periodontal treatment and implant placement must be considered when implants are planned for generalized AgP patients. As shown in these cases, all hopeless teeth were extracted as part of the treatment prior to the insertion of the implants. However, in these young patients, any natural tooth that may be retained would be of importance for their psychological acceptance, tactile sensation, and possible significant compliance for maintenance therapy. Zeza et al. (18) reported that the impact of previous periodontitis treatment and frequent recalls might influence and improve compliance levels. This study suggests that with proper SPT compliance peri-implant bone levels can be maintained over long periods, even in patients with periodontitis history.

It is important to note that patients with generalized AgP will require control of the biofilm in order to maintain periodontal and peri-implant health. Therefore, clinicians should have close communication with AgP patients in order to maintain the patients' motivation and to receive periodical maintenance periodontal therapy for the success and the longevity of dental implants restorations.

In the present cases, stereolithographic computer-assisted surgical guides and flapless procedures were used to significantly allow and facilitate the insertion of implants in maxillary atrophied alveolar bone. These minimally invasive approaches reduce the requirement of extensive regenerative procedures and reduce postoperative morbidity and pain. Few clinical studies (15) and case reports (19) have been published because of the reluctance of clinicians to place dental implants in patients with AgP, especially the generalized form that is more characterized by an unpredictable loss of supporting tissues.

A very recent systematic review aimed to investigate the outcomes of implant therapy in partially dentate patients treated for aggressive periodontitis in comparison to periodontally healthy and patients treated for chronic periodontitis utilizing radiographic and clinical parameters. The authors concluded that implant therapy can be performed in patients successfully treated for both chronic and aggressive periodontitis, although increased rates of biological complications might be expected in GAgP patients (20).

CONCLUSION

In conclusion, these 2 case reports support the benefits of immediate loading with provisional implant-retained fixed prostheses in the maxilla and mandible in completely and partially edentulous periodontal patients followed by implant-supported full arch fixed restorations.

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Conflict of interests

No conflict of interest to report. The funder had no role in the intellectual content of the manuscript, data collection and analysis of the paper.

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