

Case Report

Restoring *aesthetic* and *functional* harmony: multidisciplinary management of missing lateral incisors

Maxillary lateral incisor agenesis (MLIA), defined as the congenital absence of one or both upper lateral incisors, is observed in approximately 2% of the population. This condition may result from genetic mutations (such as those in the MSX1 and PAX9 genes), developmental anomalies, trauma, or conditions like ectodermal dysplasia, cleft lip, and cleft palate, or Down syndrome. The missing lateral incisors contribute to a disrupted smile, a shift in midline, and often lead to occlusal complications such as altered bite and functional deficiencies. Consequently, individuals with MLIA may experience reduced self-esteem and impaired chewing function.

When confronted with congenital absence of lateral incisors, clinicians must consider various treatment options, including canine substitution, tooth-supported restorations, or dental implants. The decision depends on multiple factors, such as the patient's age, the condition of the surrounding tissues, and the availability of adequate space for implants. A collaborative, multidisciplinary approach that combines orthodontics, implant surgery, and prosthodontics is often the most effective solution for achieving a functional and aesthetically harmonious outcome.



Dr. Dimitar Filtchev

- Dr. Dimitar Filtchev obtained his degree in Dental Medicine from the Faculty of Dental Medicine in Sofia, in 1998.
- Since then, he has been running a successful private practice in Sofia, focused on Implantology and Esthetic Dentistry.
- He has more than 80 publications in scientific journals, many scientific presentations at international dental congresses, numerous participations as an invited speaker at national and international congresses.
- He is also a DDS Ambassador.

PATIENT PROFILE

Age: 34-year-old female

Chief Complaint: aesthetic concerns due to the absence of maxillary lateral incisors.

Medical History: the patient had no significant systemic health issues and was in good periodontal health.

Diagnosis: congenitally missing maxillary lateral incisors (teeth #11,

#21), with inadequate space for implant placement. The patient exhibited Class II subdivision malocclusion, where the upper incisor midline was slightly shifted to the right. In addition, the deciduous canines (teeth #53, #63) were still present in the upper arch, further complicating space management for the final implant placement.



FIG.1 Initial situation.

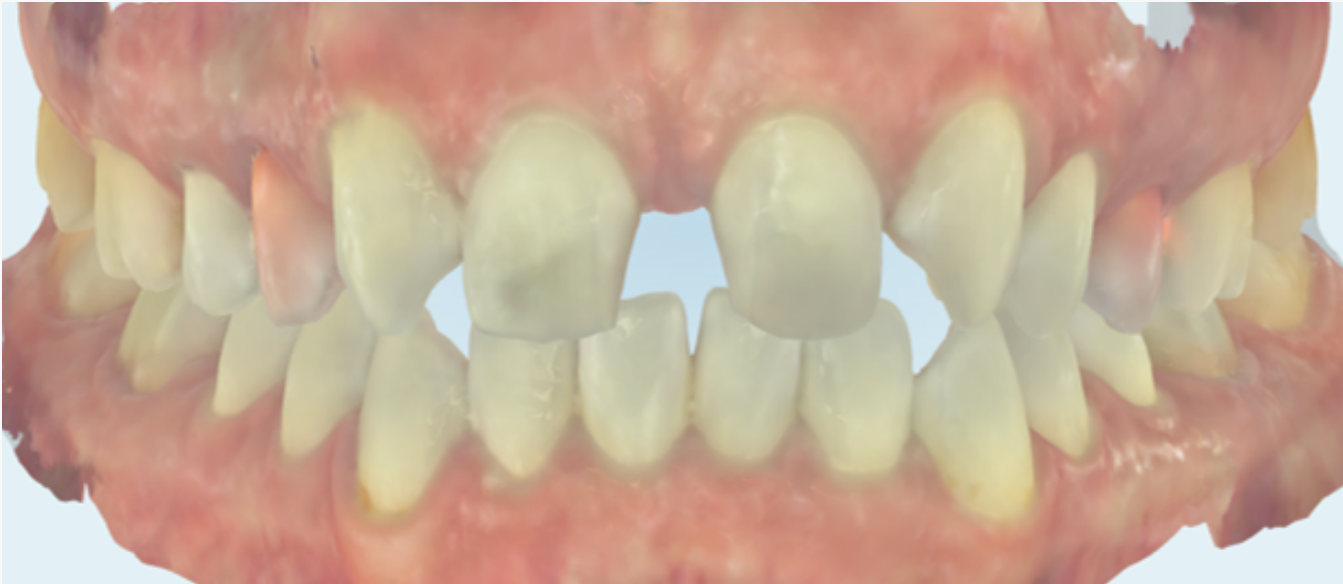


FIG. 2A Intraoral scan.



FIG. 2B Intraoral scan.

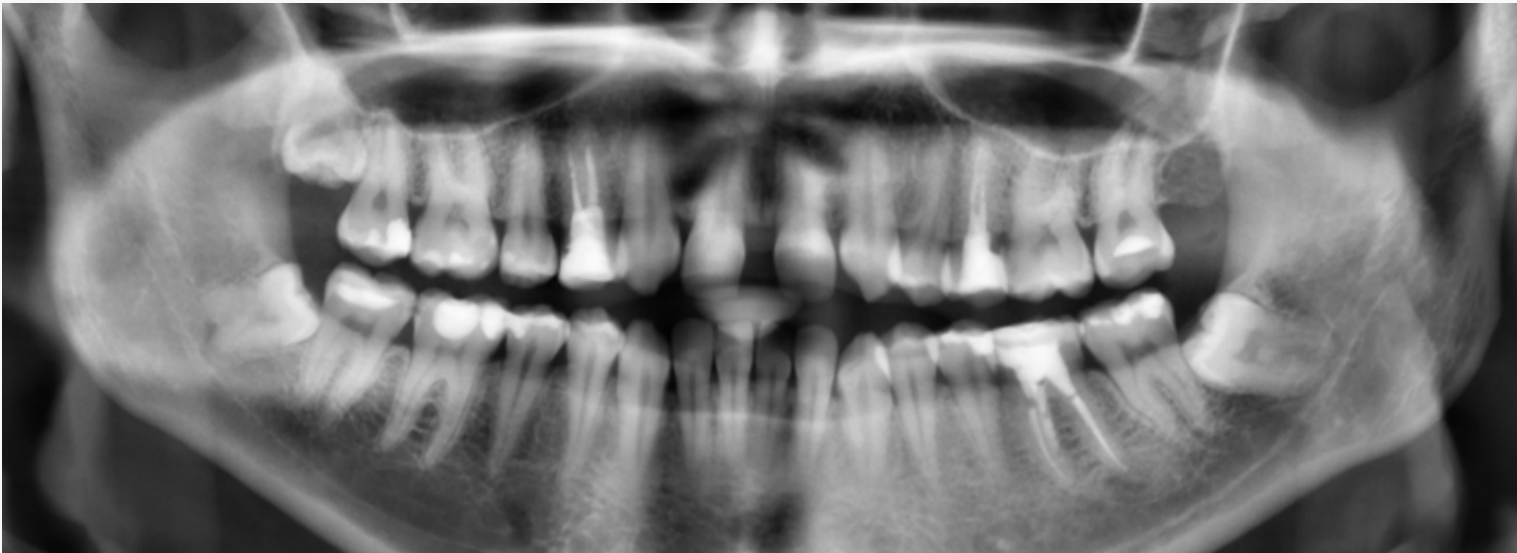


FIG. 3 Initial X-Ray.

CLINICAL EXAMINATION

Intraoral Findings: the patient presented with Class II molar relationships, and there was no overjet or overbite present. The occlusion was edge-to-edge between the maxillary and mandibular canines, leading to potential functional difficulties. The midline of the upper incisors was shifted to the right, due to the absence of lateral incisors and the persistence of the deciduous canines in the maxillary arch. The periodontal health was excellent, with no signs of inflammation, bleeding on probing, or pockets greater than 3 mm in depth.



FIG. 4 Initial view with smile.

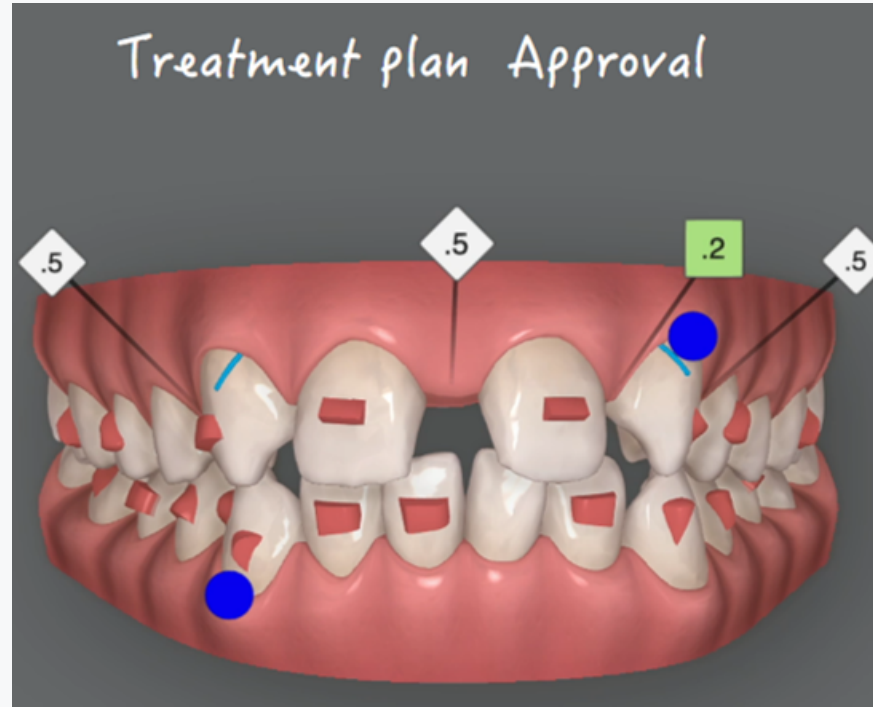


FIG. 5 Invisalign Clincheck.

TREATMENT OBJECTIVES

The overall goal of the treatment was to restore the aesthetic appearance, function, and long-term stability of the patient's dentition. Specifically, the objectives were:

- **Orthodontic Phase:** to create adequate space for the missing lateral incisors using Invisalign aligners, while preserving the alignment and function of the adjacent teeth.
- **Surgical Phase:** to place dental im-

plants in the lateral incisor regions with the assistance of a connective tissue graft (CTG) to enhance soft tissue contours.

- **Prosthetic Phase:** to restore the lateral incisors with natural-looking crowns, ensuring proper occlusion and aesthetic integration into the smile.

ORTHODONTIC PHASE

The first step of treatment involved the use of Invisalign aligners to create space for the missing lateral incisors.

This phase lasted approximately 8 months and required careful planning to ensure both the creation of sufficient space for implant placement and the alignment of adjacent teeth to maintain proper occlusion.

Invisalign aligners were chosen because they provide a non-invasive, comfortable, and aesthetic alternative to traditional braces.

The aligners are custom-designed to gradually move the teeth into the desired position without requiring metal brackets or wires, which is an attractive option for adult patients seeking a more discreet orthodontic treatment.



FIG. 6 Invisalign treatment.



FIG. 7A-B Results after Invisalign treatment.



FIG. 8A-B Intraoral scans after Invisalign treatment.

“The objective of the Orthodontic Phase was to create adequate space for the missing lateral incisors while preserving the alignment and function of the adjacent teeth.”

KEY CONSIDERATIONS IN THE ORTHODONTIC PHASE

- **Space Creation:** it was essential to create enough space for the implants, considering the bone volume and soft-tissue contours that would later support the restorations.
- **Timing:** the implant placement was planned to occur after the patient's growth had stabilized, as facial growth can affect the optimal positioning of implants. The patient was in her mid-30s, which made this an appropriate time to proceed with surgical intervention.
- **Alignment of Adjacent Teeth:** the movement of the canines to create space in the upper arch also required monitoring to ensure that the osseous ridge was wide enough to accommodate the implants.
- **Outcome:** the orthodontic phase was successful, with sufficient space created for the implants and the adjacent teeth properly aligned. At the conclusion of this phase, the patient's teeth were ready for surgical preparation.



FIG. 9A-B Results after Invisalign treatment.

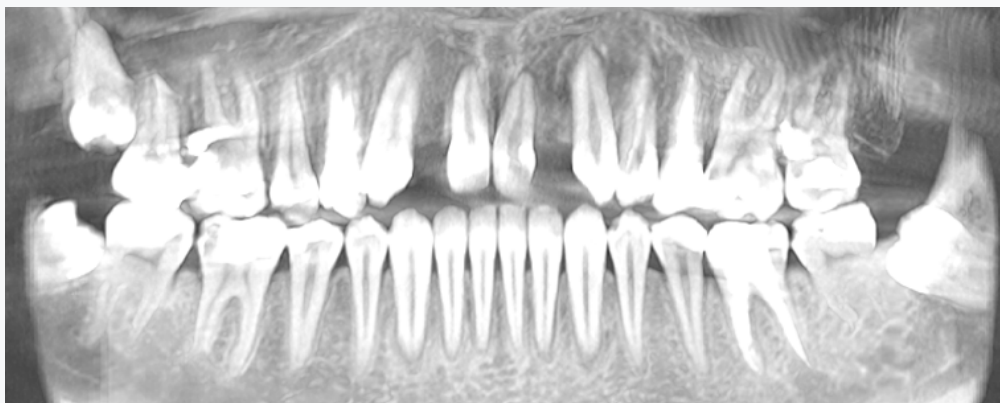


FIG. 10 X-ray after the Invisalign treatment.

SURGICAL PROTOCOL

• **Pre-Surgical Planning:** the planning phase included extensive diagnostic imaging, including a Cone Beam Computed Tomography (CBCT) scan to assess bone density, available space, and the anatomical features of the implant sites. Based on the CBCT results, the surgical plan was designed with a focus on both aesthetic and functional considerations.

The goal was to ensure that the implants were placed in the optimal position to support both the aesthetic contours of the gums and the functional requirements of the occlusion. A surgical guide was fabricated using 3D software to accurately plan implant placement, ensuring ideal angulation and depth. A prosthetic guide was milled to visualize the future restoration, to check the accuracy of the surgical guide and as a

reference to the vertical positioning of the implant. It can be converted and used as a provisional restoration.

• **Implant Placement:** the implant procedure was performed under local anesthesia. A minimal incision was made to preserve the surrounding soft tissue while exposing the implant sites, using the mucogingival approach with a full thickness flap only in the zone of the implant placement, which we determine with the surgical guide.

Sequential drilling was done at low speeds to prepare the osteotomy sites, ensuring adequate irrigation to avoid thermal damage. The implants used were titanium (3.3 mm diameter, 10 mm length) with primary stability achieved via torque values of over 35 Ncm, making them suitable for early loading.

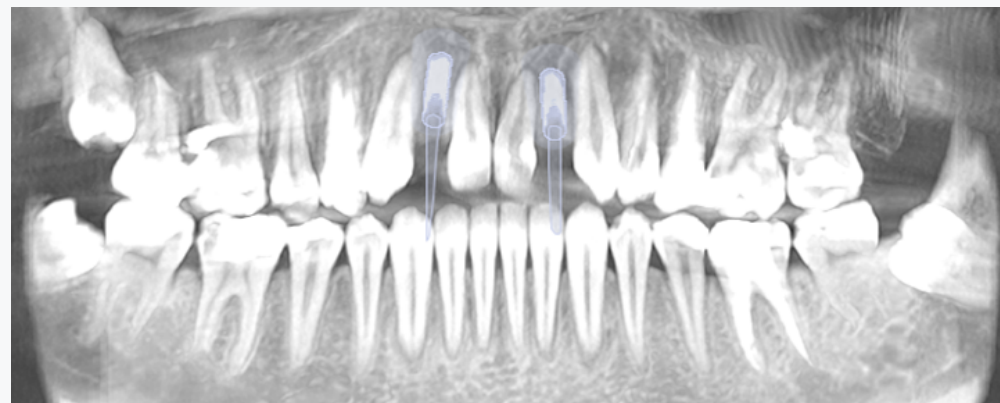


FIG. 11 Implant planning.



FIG. 12A, B Surgery phases.

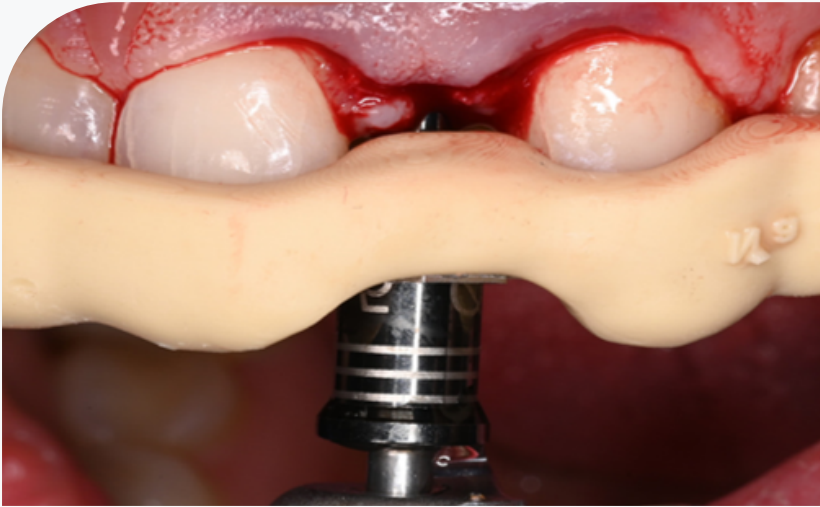


FIG. 13A, B Surgery and prosthetic guide.



FIG. 14A, B Deepitelized connective tissue graft from the palatal area.



- **Connective Tissue Grafting (CTG):** to ensure proper gingival contour around the implants, a palatal connective tissue graft was harvested and then deepitelized. The CTG was used to enhance the soft tissue volume in the peri-implant area, providing a natural and aesthetic emergence profile.

The prosthetic guides were rebased on a titanium provisional abutment and converted to screw-retained provisional crowns and were placed immediately or after implantation to shape the peri-implant soft tissue. These were designed with reduced occlusal contact to protect the implants during osseointegration. The temporary crowns were placed to support soft-tissue healing and guide gingival architecture.

The suture technique employed microsurgical sutures, which ensured minimal trauma and optimized healing, allowing the graft to integrate successfully with the surrounding tissue and with the provisional restoration.

- **Postoperative Care:** patients were prescribed: Antibiotics to prevent infection, Analgesics for pain management, Chlorhex m, Tissue Grafting (CTG): a palatal graft was used to augment the peri-implant soft tissues, ensuring optimal gingival contour and long term stability.

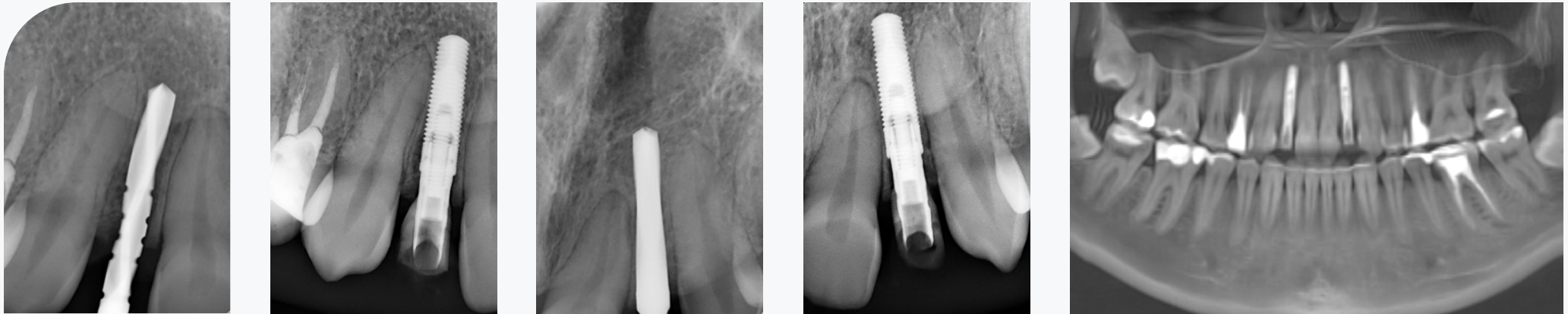


FIG. 15A-E Surgery X-rays.

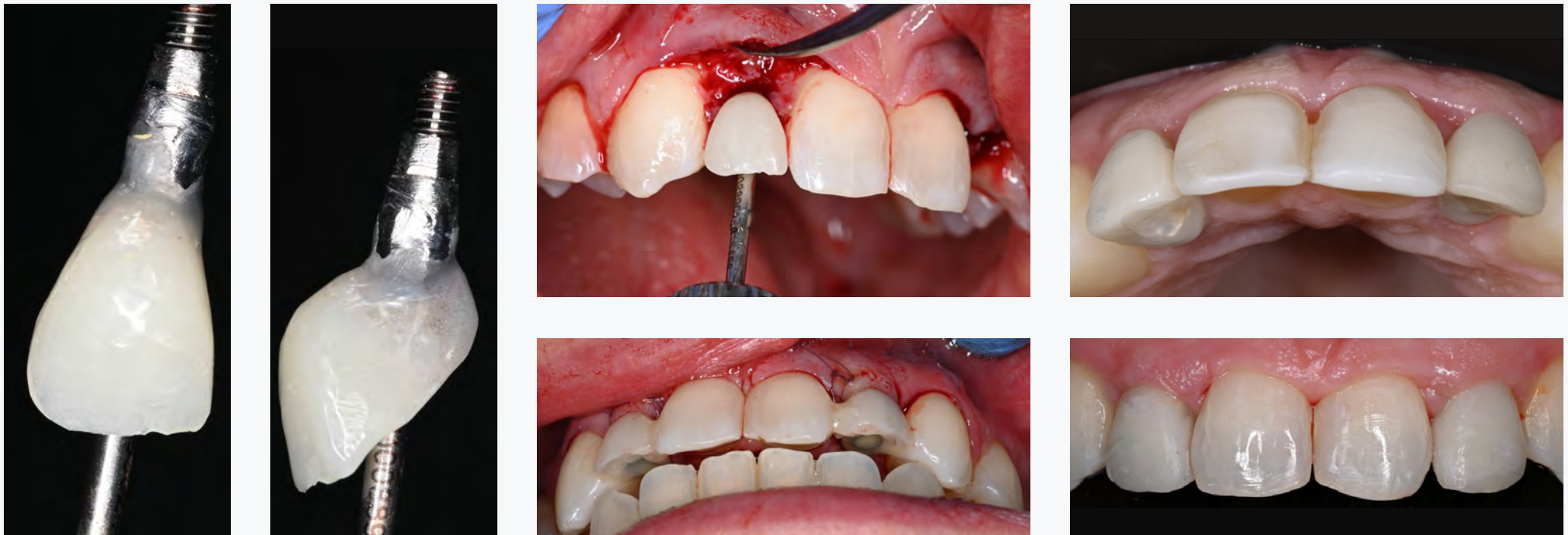
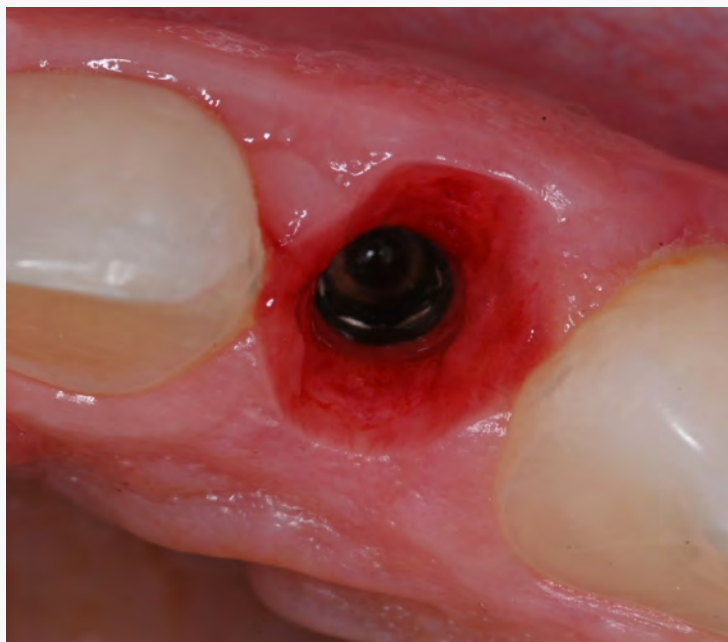
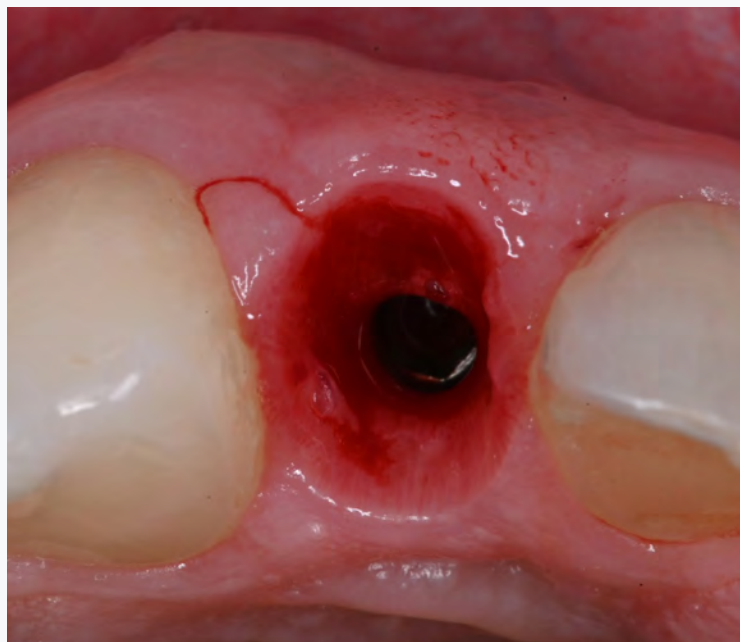


FIG. 16A-D Immediate loading.

FIG. 17A, B First provisionals and tissue remodeling.



PROSTHETIC PHASE: FINAL RESTORATIONS

Once osseointegration of the implants was confirmed, the final restoration phase began. An optical impression was taken using a 3-scan technique: scanning the provisional restorations, the scan bodies, and the emergence profiles. This ensured a high level of accuracy in the final design of the crowns.

A prototype from PMMA was prepared to visualize the final esthetic result and was used as a second provisional, until the final restoration was prepared from Dental Technician Dr. Vincenzo Musella, MDT, DMD.

FIG. 18A, B Emergence profile after 3 months.

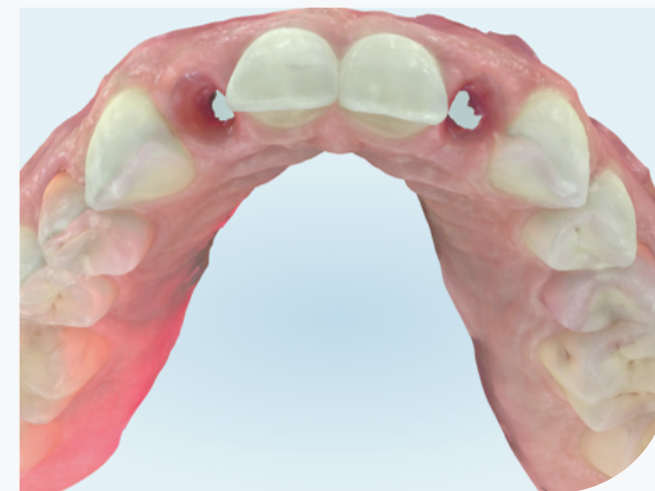


FIG. 19A-C Three-scans technique.



FIG. 20A, B Second provisionals.



FIG. 22A, B Scan with the second provisionals.

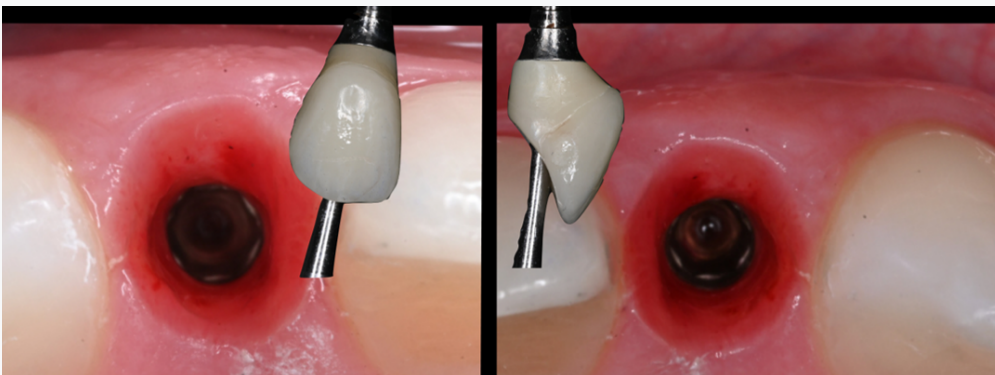


FIG. 21 Emergence profile after the second provisionals.

“A prototype from PMMA was prepared to visualize the final esthetic result and was as a used as a second provisional.”



FIG. 23A, B Photos with the second provisionals.

Zirconia crowns were chosen for their exceptional strength and aesthetic properties, with lithium disilicate veneers added for additional translucency and to closely mimic the natural appearance of the lateral incisors and veneers on the CI. The crowns were screw-retained on tibases with 2,6 mm emergence profile to facilitate easy access for any future adjustments or maintenance. The prosthetic dental technician work was done by Dr. Vincenzo Musella, DMD, MDT.

The final restorations were placed, and final adjustments were made to ensure the occlusion, symmetry, and color

matching were optimal. The result was a seamless restoration that integrated well with the natural dentition.

OUTCOME

- **Aesthetic Outcome:** the final crowns were indistinguishable from the natural teeth, with appropriate gingival contours achieved through the CTG procedure. The patient's smile was restored with natural-looking lateral incisors.

- **Soft-Tissue Health:** the CTG successfully enhanced the peri-implant soft tissues, resulting in stable and harmonious gingival contours around the implants.

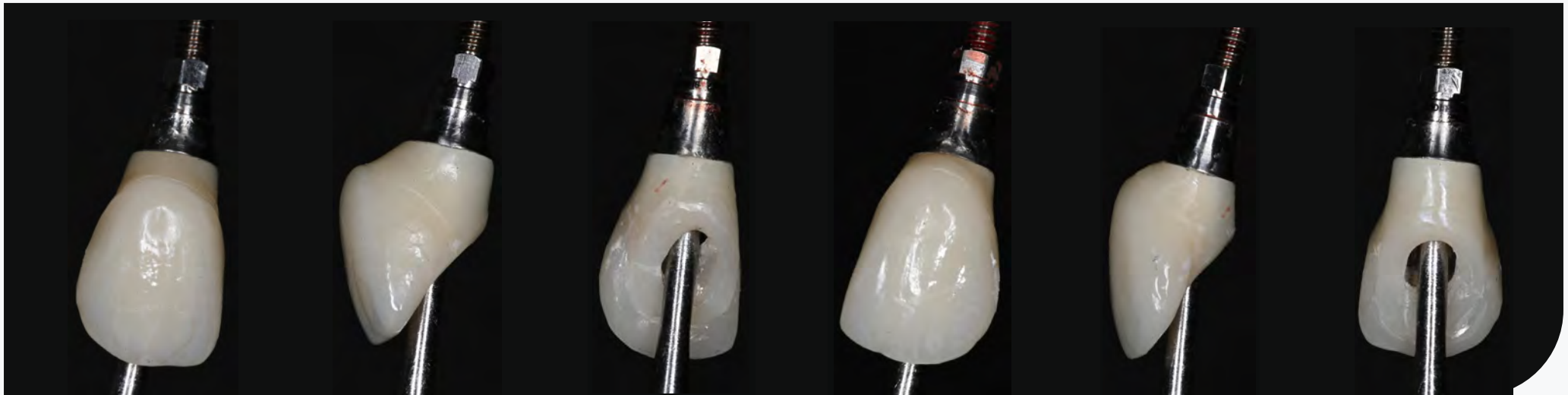


FIG. 24 Permanent crowns.

- **Functional Outcome:** the implant supported crowns allowed for optimal occlusal function, restoring the patient's ability to chew and speak normally.

- **Patient Satisfaction:** the patient reported high satisfaction with both the aesthetic and functional results, feeling much more confident in her smile and overall appearance.

DISCUSSION

This case emphasizes the importance of a multidisciplinary approach in treating patients with missing lateral incisors. The integration of orthodontics, surgical implant placement with soft-tissue enhancement, and advanced prosthodontic techniques provided a highly predictable and successful outcome.

The selected treatment approach—using Invisalign aligners to create space, followed by implant placement with connective tissue grafting (CTG) for soft-tissue enhancement, and final prosthetic restoration—combines the best aspects of each option while minimizing their drawbacks.

Why this approach was chosen:

- **Space Management:** the Invisalign phase allowed for precise control over space creation without compromising the alignment of adjacent teeth. It also provided the flexibility to manage both the dental and soft-tissue profiles, ensuring adequate space for implants while maintaining overall symmetry and balance in the smile.



FIG. 25 Final healing.



FIG. 25 Final result.



- **Soft-Tissue Enhancement:** connective tissue grafting (CTG) was employed to augment the soft tissues around the implants, creating a natural emergence profile and preventing the issue of soft-tissue recession that often occurs with implants placed in high smile zones. This was especially important for maintaining long-term aesthetics and ensuring that the crowns would blend seamlessly with the natural gingiva.

- **Long-Term Function and Aesthetics:** dental implants provide long-term durability, restoring both function and aesthetics. By placing implants after the orthodontic phase and soft-tissue management, the final crowns were able to mimic the natural contours of the lateral incisors. The zirconia crowns with lithium disilicate veneers were chosen for their superior strength, biocompatibility, and ability to mimic the translucency of natural teeth.

Advantages of the selected treatment:

- **Optimal aesthetic results:** the combination of implant technology and soft-tissue augmentation allowed for a natural gingival contour around the lateral incisor implants, ensuring the crowns fit seamlessly within the patient's smile.

- **Long-term success:** the implant provides a stable, durable solution that will not require the significant maintenance or repairs typically associated with bridges.

- **Non-invasive space creation:** the use of Invisalign aligners minimized the need for more invasive orthodontic procedures, offering a comfortable and patient-friendly option for space creation.

CONCLUSION

This case exemplifies the advantages of a multidisciplinary treatment plan in the management of congenital maxillary lateral incisor agenesis. While other options such as canine substitution, single-tooth implants, and bridges may be suitable in certain contexts, the combination of Invisalign aligners, implant placement, CTG, and aesthetic prosthodontics provided the patient with the most comprehensive solution. The treatment successfully addressed both the aesthetic concerns of the patient and the functional requirements of the occlusion, while ensuring long-term stability and patient satisfaction.

By analyzing the strengths and limitations of each alternative treatment, it becomes clear that a personalized, step-by-step approach tailored to the patient's specific an-

atomical and aesthetic needs results in the most predictable and harmonious outcome. The collaborative efforts of the orthodontist, surgeon, and prosthodontist ensured that the patient received optimal care and a smile that would enhance both her confidence and her oral function.

By harmonizing the different phases of treatment, the team was able to provide a functional and aesthetic solution to the patient's missing lateral incisors.

SOURCES

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