Interdisciplinary approach for anterior maxillary teeth in a young patient: orthodontics, smile design, bone level implant placement & esthetic restorations

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Introduction

Implant dentistry demands an interdisciplinary approach that incorporates all of dentistry's knowledge, experience, and skills to aid in delivering a comprehensive treatment plan. Esthetics in dentistry is frequently the motivation for seeking dental care and treatment. In my private practice, it is usual to receive patients who demand natural-appearing results. Before beginning therapy, our team examines all the factors that could influence the treatment outcome. With today's growing patient expectations, we cannot focus on just a single tooth, which is why an interdisciplinary approach involving all dental specialties can lead to a complete treatment plan and produce undoubtedly better results.

The following case report describes a successful interdisciplinary treatment of the esthetic zone with a hopeless maxillary central incisor in a young patient with very high expectations. The treatment included orthodontics, smile design, Straumann® BLX implant placement, soft tissue augmentation, and esthetic restorations.

Initial situation

A 27-year-old female, healthy, non-smoker visited our dental office seeking esthetic solutions in the anterior zone. She was dissatisfied with the crown that had been in place for years and disliked her gapped teeth. She emphasized her desire to have a uniform, brighter smile with a minimally invasive treatment approach.

The extraoral examination showed a symmetric, light convex face and a slightly high smile line (Fig. 1). The intraoral examination revealed irregular interdental spaces in the upper and lower anterior region, with a dental class I malocclusion (Figs. 2,3). The patient was periodontally stable, with sufficient soft and hard tissues at the prospective implant site. The radiographic assessment also revealed adequate bone availability for the implantation of a standard-length implant (Fig. 4). The casts revealed tooth-size discrepancy.

After a thorough discussion of the various treatment options, the patient opted for an implant-supported fixed prosthesis and esthetic restorations on the adjacent teeth following orthodontic treatment to reduce the mesio-distal distance of the diastema between teeth #11 & #21.

Treatment planning

Due to the significant esthetic and functional aspects involved, the planned sequence was as follows:

1. Orthodontic treatment was performed to position the teeth in the most esthetic,

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Fig 1

Fig 2

Fig 3

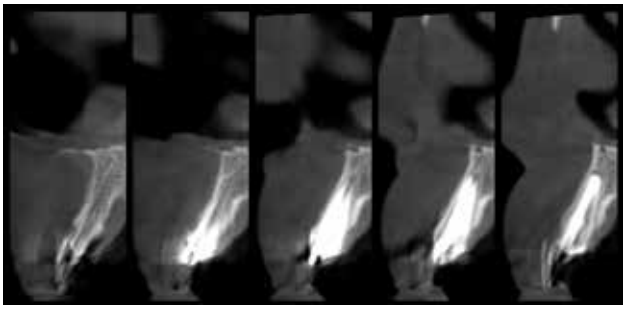

Fig 4

functionally optimal position. Esthetic brackets were used for all upper incisors to close the space between the gapped front teeth. Alignment and leveling were planned with 0.014-inch and 0.016-inch NiTi sectional archwires, followed by 0.016-inch, and 0.018-inch stainless steel wires. Space closure was achieved with elastomeric power chains (Figs. 5,6).

2. A digital esthetic plan was created four weeks after orthodontic treatment using the digital smile design (DSD) system. First, a diagnostic wax-up was made and used for the preparation of the silicone guide. Next, a direct mock-up with composite resin was placed in the mouth, evaluated, discussed, and approved by the patient (Figs. 5-7). The mock-up in the patient's mouth aims to preview the treatment outcome and evaluate the esthetic result expected by the patient. We also evaluated the functionality, phonetics, harmony, and position of the lips.

3. Atraumatic extraction of tooth #21 prior to the removal of the unesthetic restoration.

4. Immediate implant placement and provisionalization on position #21.

5. Impression for final restorations after six weeks of healing.

6. Porcelain veneers on teeth #12, #11, #22 and an implant-supported crown on tooth #21

Surgical procedure

On the day of surgery, the patient was instructed to rinse her mouth with 0.12% chlorhexidine gluconate. The surgery was performed under local anesthesia with 2% lidocaine with 1:100,000 epinephrine. The atraumatic dental extraction focused on the gentle removal of the root. The goal was to preserve alveolar crestal height in all three dimensions and maintain buccal hard and soft tissue integrity. The procedure was initiated by syndesmotomy with a periotome with gentle

Fig 5

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Fig 8

Fig 9

Fig 10

movements (Fig. 11). Next, the root was split into two parts and carefully extracted with rotational movements to prevent damage to the surrounding tissue (Figs. 12-14).

To eliminate any inflammatory or infectious tissue that may have remained in the socket, the periapical region was carefully curetted, and extensive irrigation was performed with normal saline. The freehand and flapless surgery involved the immediate placement of a Straumann® BLX Implant Ø 3.75 mm - Regular Base -SLActive® 12 mm Roxolid® in position #21 following the manufacturer's instructions to ensure primary stability (Figs. 16-20). The drilling was located on the center of the extraction socket in the palatal wall, and the implant site was to the palatal side in a prosthetic-driven position.

Primary implant stability was achieved, and a prefabricated titanium temporary abutment (Straumann® RB/WB

Fig 11

Fig 12

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Fig 20

Temporary Abutment) was subsequently hand-tightened onto the implant for instant provisionalization. The height of the temporary abutment was measured and the abutment was removed and adjusted extraorally (Fig. 21). Next, the temporary abutments were reseated into the implant, hand-tightened, and the height was rechecked (Fig. 22).

Tooth #21 was inserted into the previously constructed silicon jig. The jig was placed in the patient's mouth (Fig. 23), and the tooth was attached to the temporary abutment with light-polymerized composite resin. The abutment was removed, the excess was cleaned, and the transitions were carefully polished and finished.

The healing abutment was placed and screwed prior to the graft transplantation (Fig. 24).

Fig 21

Fig 22

Fig 23

Fig 24

Fig 25

Fig 26

Fig 27

A subepithelial connective tissue graft was obtained from the palate and was adapted onto the recipient site with the aim of increasing the thickness of the keratinized mucosa. Lastly, the graft was fixed with 5-0 nylon interrupted sutures (Fig. 25). The provisional crown was then screwed into the implant, and the access hole was sealed (Figs. 26,27).

After six weeks of healing with no postoperative complications and stable osseointegration, the healing abutment was removed, the site irrigated with 0.12% chlorhexidine gluconate, and satisfactory healing was verified (Figs. 28-31).

Prosthetic procedure

The adjacent incisors for the laminate porcelain veneers were prepared conservatively (Figs. 32-34).

The transfer impression coping was placed and hand torqued. Retraction cords were used to ensure an optimal impression of the preparation of the adjacent teeth. A

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Fig 35

polyvinyl siloxane (PVS) impression was taken with an open-tray transfer technique for the implant-supported restoration. This information was sent to the lab (Fig. 35).

The implant-supported restoration and veneers were delivered. The provisional restoration was removed, and an ideal emergence profile and appealing esthetics were observed. These adequate tissue dimensions were achieved thanks to soft tissue augmentation and provisional restorative therapy. The implant-supported crown was screwed and the veneers were cemented (Figs. 36-40).

Fig 36

Fig 37

Fig 38

Fig 39

Fig 40

Fig 41

Fig 42

Treatment outcomes

The patient is recalled for prophylaxis and follow-up every year. After three years, the clinical and radiographic outcomes show good esthetics, osseointegration, and maintenance of peri-implant tissues. The patient was delighted with the esthetic and functional result and presented no mechanical or biological complications (Figs. 41,42).

Author's testimonial

State-of-the-art dentistry requires an interdisciplinary approach using the best available materials and focusing on our patient's needs.