Case Report

Implant Rehabilitation in Advanced Generalized Aggressive Periodontitis: A Case Report and Literature Review

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Abstract

Dental implants have provided exceptional rehabilitative options for edentulous and partially edentulous patients. However, as more implants come into play, the more the clinicians come across problems where specific considerations must be taken into account to meet expectations. The Toronto Bridge is a treatment modality proposed for restoring several teeth lost in patients with increased crown height (interarch) space. Herein, we applied the Toronto Bridge to rehabilitate a patient with generalized aggressive periodontitis; this article suggests that an implant-supported Toronto Bridge can be a reliable and acceptable treatment modality for patients suffering from tooth loss and vertical bone loss as the result of generalized aggressive periodontal disease.

Keywords: Aggressive Periodontitis; Periodontal Diseases; Prosthesis Design; Dental Prosthesis, Implant-Supported

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INTRODUCTION

Both localized and generalized forms of aggressive periodontitis (AP) are chiefly diagnosed by rapid destruction of periodontal tissue and alveolar bone in young patients reporting no other health-related complaints [1,2]. In the generalized form of aggressive periodontitis (GAP), interproximal attachment loss affects at least three permanent teeth other than the first molars and incisors [3]. For the AP to be successfully treated, early diagnosis is paramount [4,5]. In other words, when treatment is delayed for any given reason, the consequences can lead to tooth loss and complicate implant/prosthetic rehabilitation to restore function and esthetics [6].

There are many prosthetic treatment options to replace teeth lost due to periodontitis and there are many factors that influence decision-making. Implant-supported restorations are documented as the treatment of choice to replace missing teeth. Research has shown that implant survival rates in patients with GAP are 97.4% to 100% in the short-term [7-9] and 83.3% to 96% in the long-term [10,11]. Clinical studies reveal that implant five-year

success rate varies in different jaws; it is 85.7% in the maxilla and 93.3% in the mandible [7-10]. In addition, patients with GAP show 95.9% to 100% survival rates of suprastructures [10-13]. Thus, it is reliable to use implants in patients with AP [12].

In the case of increased crown height space (inter-arch space) from vertical bone loss, treatment options include removable or fixed implant-supported prostheses. Fixed implant-supported prostheses can be screw- or cement-retained or a combination of both (abutment hybrid prosthesis or Toronto Bridge). Each of these options is subject to individual considerations, characteristics and applications:

I) Removable implant overdenture allows less strict implant positioning and easy restoration of excessive crown height space. Yet, the patients report a lower level of satisfaction compared to fixed restorations.

II) Fixed prostheses may be screw-retained, cement-retained or a combination of both:

- Screw-retained prostheses: merit the ability to splint, facilitate retrieve and compensate for the tissues frequently lost in moderately- to severely-resorbed alveolar ridges. However, there are hardship in attaining passive fit of the cast framework, distortion in framework following the porcelain firing and occasional problems in esthetics [14,15].
- Cement-retained prostheses: The advantages over the above-mentioned type are the passively fitting framework and better esthetics (albeit with retrievability, repair and cement-related complications) [16-18].

Fixed screw- or cement-retained restorations can also be metal-resin or hybrid. The fatigue of acrylic is greater than the traditional prosthesis, and therefore more complications and repairs are expected [19].

- A combination of screw and cement-retained fixed prosthesis (Toronto Bridge) overcomes the aforementioned drawbacks and is a combination of a screw-retained titanium, zirconia or cast framework and cement-retained crowns. In this restoration, the soft tissue is replaced using gingival-colored porcelain or composite resin [20]. The present study aims to describe periodontal and implant rehabilitation of a patient with advanced GAP.

CASE REPORT

A 30-year-old female referred to the implant department complaining of tooth loss and poor masticatory function. She also suffered from dull pain of the upper right canine and molars and mobility of the teeth (#2, 3 and 6 in universal numbering), and asymmetrical lower anterior gingival margin. Teeth #4 and 5 had been extracted as a result of an excessive mobility the year before. The patient was systemically healthy with no relevant medical history. There was no family history of similar complaints or early tooth loss. Routine blood test (CBC, HGB, HCT, cholesterol, TG, MCH, MCHC, platelets, FBS, HbA1C, Fe, Ferritin) results were within normal limits. Extraoral examination did not indicate any abnormalities. The plaque index (5%) revealed good oral hygiene status, yet more than 50% bleeding on probing was noticed. There was grade I mobility of tooth #6, grade III mobility and grade IV furcation involvement of tooth #3, and grade II mobility and grade II furcation involvement of tooth #2. The probing depth was within normal limits except for teeth #2, 3 and distal surface of #6 with up to 5, 5 and 8 mm pocket depths, respectively. The teeth #2, 3, and distal surface of #6 showed 5-7 mm gingival recession, while it was observed to be about 2-4 mm for teeth #25, 26 and 8. Gingival examination revealed normal color, knife-edge contour and firm consistency except for teeth #2, 3, 6, 25, and 26 that were slightly reddish in color, bluntly rounded in contour, soft in consistency, and had lost stippling (Fig. 1). According to the clinical features and pathologic report of the biopsy sample, the definite diagnosis indicated the presence of advanced GAP with incidental attachment loss.

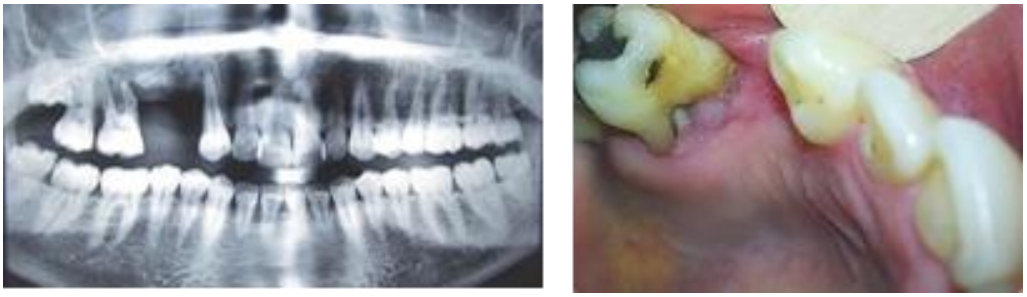

Fig. 1. Pre-procedure radiograph and intraoral view

The preliminary phase of treatment was to extract five teeth including:

a) The maxillary right first molar with poor periodontal prognosis, b) the third molar teeth with non-working interferences in the left maxilla as well as both sides of the mandible, and c) right maxillary impacted third molar. The occlusion was adjusted to decrease the applied load, which the remaining right maxillary teeth must tolerate in working movements.

The patient was motivated to achieve better plaque control. Two weeks later, the patient was called in to undergo supra- and subgingival scaling in addition to gingival curettage of the right posterior maxilla. This was followed by a 10-day prescription of systemic antibiotics (500 mg amoxicillin and 250 mg metronidazole three times daily). A re-evaluation four weeks later showed a reduction in probing depths and absence of bleeding on probing.

As the mobility of tooth #2 increased, it was decided to extract it during implant placement. In the second phase of treatment, a Miller classic free gingival autograft from the palatal tissue was applied for the mandibular right incisors to increase the width and thickness of attached gingiva, prevent the progression of gingival recession and reduce teeth hypersensitivity [21]. Moreover, the pouch technique was done to insert the subepithelial connective tissue graft to the gingival level of the maxillary incisors (Fig. 2).

Due to the height of the remaining bone (2 mm), sinus elevation of the posterior right maxilla was carried out using Bio-Oss® and Bio-Gide® [22]. Having mounted the diagnostic casts, the teeth were set up diagnostically seven months later [22]. The crown height space (17-19 mm) mandated the use of the Toronto Bridge [14].

Then, the radiographic guide was subsequently turned into the surgical guide following cone beam computed tomography evaluation. Three implants (4.5×13mm) (Xive, Dentsply/ Friadent, Mannheim, Germany) were placed at the positions of teeth #2, 3 and 4. During the second stage of implant surgery three months later, a free gingival autograft was done to compensate for width inadequacy of keratinized tissue. The primary impression was taken four months after the second-stage surgery.

A resin jig (GC Pattern Resin, GC Corp, Tokyo, Japan) and a special tray were made in the laboratory to ensure impression accuracy. The final impression (through open-tray impression technique) was taken by applying addition silicone (Zhermack, Badia Polesine, Rovigo, Italy).

The final casts were poured by type III stone (elite® model, Zhermack, Badia Polesine, Rovigo, Italy) and mounted using mounting plaster (Elite® Arti, Zhermack, Rovigo, Italy) on a semi-adjustable articulator (Dentatus, ARH, Stockholm, Sweden).

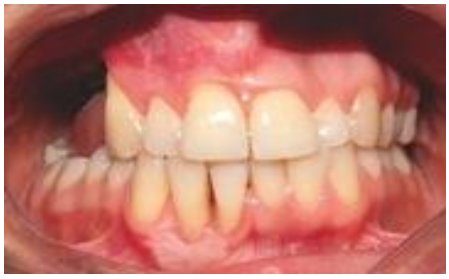

Fig. 2. Photograph of the patient following second phase of treatment. Free gingival graft was applied for mandibular right incisors as well as subepithelial connective tissue graft for maxillary incisors.

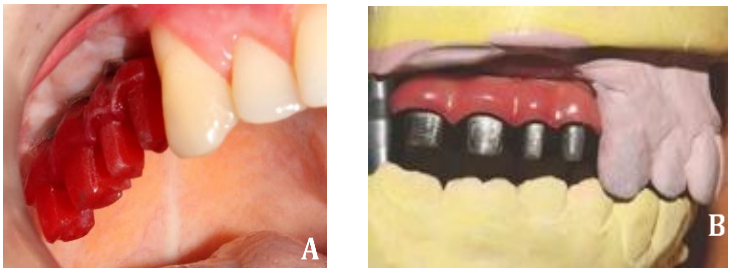

Fig. 3. Abutment hybrid prosthesis substructure was formed (A), cast and veneered with pink porcelain (B).

The teeth were set up to be used as restorative guide so that the required space for restorative materials could be determined in the prosthetic phase. FRIALIT® multipurpose abutments (Xive, Dentsply/Friadent, Mannheim, Germany) were selected with appropriate gingival height. These potentially facilitate the management of complications, eliminate the minor divergence of implants and provide a better passive fit compared to that of the UCLA abutment known as AuroBase. The next step was to form a screw-retained substructure by castable waxing sleeves and pattern resin (GC Corp., Tokyo, Japan) (Fig. 3A).

The acrylic pattern was intraorally checked, cut back according to the index and eventually cast (DeguDent U, DeguDent GmbH, Hanau-Wolfgang, Germany). As clinically and radiographically acceptable passive fit was confirmed, the gingival part of the substructure was veneered with pink porcelain (Fig. 3B) to resemble soft tissue and four individual metal-ceramic crowns were made (DeguDent U, DeguDent GmbH, Hanau-Wolfgang, Germany; Ivoclar Vivadent, Schaan, Liechtenstein).

The crowns were adjusted intraorally to occlude with their opposing teeth during the normal working excursions (group function occlusion).

The exposed parts of the framework were polished and porcelain veneers were glazed.

On the basis of what the manufacturer's recommendations dictate, the multipurpose abutments and prosthetic screws were secured at 24 Ncm torque. The screw access holes were sealed with Teflon tape.

The crowns were cemented over the framework by provisional cement (TempBond, Kerr Corporation, Orange, CA, USA) (Fig. 4). Oral hygiene instructions for the Toronto prosthesis were given. These included interdental brush and super floss under hygienic substructure as well as conventional brush and floss for individual crowns. There were, in addition, follow-up sessions scheduled every three months for the first year, and then every six months during the following years.

DISCUSSION

This article presented challenging management of a case of advanced GAP treated via elimination of the situations that encourage plaque accumulation and prevent effective oral hygiene [3,4].

That is to say, it is obligatory to extract every tooth with a hopeless prognosis. Accordingly, the remaining right posterior teeth were extracted. The maxillary canine was diagnosed not to be removed to simultaneously maintain the stability of mesial interdental papillae and enhance the patient's esthetic smile line. The questionable prognosis was improved by occlusal adjustment.

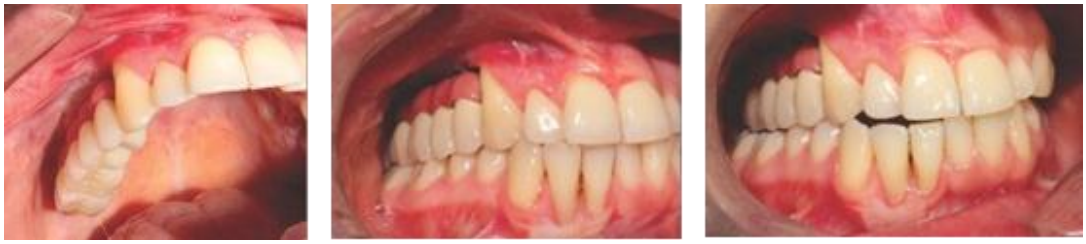

Fig. 4. Prosthesis delivered after occlusal adjustment. Group function occlusion was the preferred occlusion for the defected side.

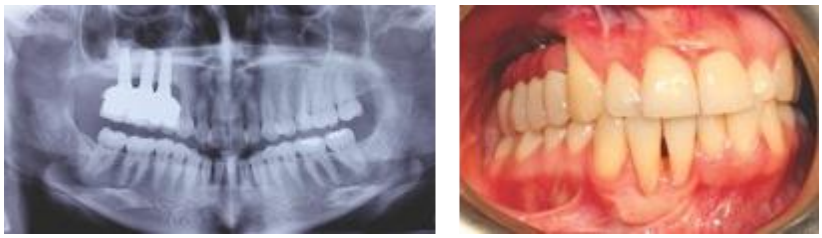

Fig. 5. Radiographic and photographic views of the patient at the two-year follow-up examination.

During the one-year follow-up, the tooth did not show any signs of instability with no further bone resorption. The delay the patient had already experienced in her treatment resulted in irreversible tooth loss that left the clinician with no other choice but to rely on prosthetic rehabilitation.

Today, dental implants provide exceptional facilities for prosthetic management of patients.

According to the literature, implant-supported prostheses are acceptable treatment modalities in patients with AP [7-12].

The "Toronto Bridge" is a term coined in early 1980s when the new implant prosthesis procedure was introduced [20,23]. Although more complex for the technicians, rather time consuming for the clinicians, and less cost-effective for the patients, the technique is a door to numerous advantages (optimal esthetics, passive fit as a prerequisite for long-term implant survival, ease of repair and compensating for the lost tissues in severely resorbed ridges) and it has become the treatment of choice in appropriately selected patients.

Use of the Toronto Bridge provided a functional and esthetic rehabilitative option for the patient presented. At the two-year follow up, the teeth and implants did not show any trace of instability or further bone resorption. Lifelong regular recall and maintenance visits can ensure the long-term success of implant therapy (Fig. 5).

CONCLUSION

The presented article shows that the implant-supported Toronto Bridge can be a reliable and acceptable treatment modality for patients suffering from tooth loss and vertical bone loss resulting from advanced GAP.

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