08

DITRON DENTAL
RESEARCH & DEVELOPMENT

IMMEDIATE VS. DELAYED LOADING AND AESTHETIC CONSIDERATIONS IN IMPLANT-SUPPORTED DENTAL RESTORATION – A CASE SERIES

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The first dental implantation protocol was presented by Brånemark et al.[1] and consisted of a two-stage method, delaying the prosthetic loading by six months after the implantation to allow proper osteointegration. Additionally, according to Brånemark's protocols, a long eight-week delay was required between an extraction of a hopeless tooth and an implantation.

This protocol was accompanied by short- and long-term aesthetic problems. In the short term, during the 6-8 months between extraction and implantation, the patient continued to be partially or fully edentulous; while in the long-term, bone loss and remodeling after the extraction could have led to improper position of the implant, creation of unfavorable crown-to-root proportion, and an aesthetic problem due to potential peri-implant bone recession or "long" restorations. The aesthetic requirement led clinicians to consider, at first, a different approach known as immediate implant placement in the extraction site[2]. This method is advantageous by maintaining the periodontal architecture, because of the implant's anatomic compatibility with the dental socket, and the possibility of eliminating local contamination. This method also helps with preservation of aesthetics, the maintenance of the alveolar walls, a better positioning of the implant, and a reduction in surgery time and the overall treatment. Numerous reviews, however, have suggested that the immediate implant placement in a socket with infectious process would be contraindicated as contamination could compromise the osseointegration process.[3] Thus, immediate implant placement in sockets associated to endo-periodontal infection cannot be considered a reliable treatment. Nevertheless, according to a prospective cohort study, immediate implantations in sites suffering of chronic apical pathology, with the use of plasma rich growth factor (PRGF) on the implant surface, was considered effective, safe and successful, with a survival rate of 98.4% after one year, while preserving bone, function and aesthetics.[4]

According to a 3-year prospective study,[5] two main conclusions were made:

1. Immediate implant placement can be considered as a safe, effective, and predictable treatment option in infected sockets when appropriate preoperative procedures are taken to clean and decontaminate the surgical sites.

2. Using a protocol of debridement, curettage, cleaning with 90% hydrogen peroxide, irradiations with yttrium–scandium–gallium–garnet (Er,Cr:YSGG) laser, and chlorhexidine rinses together with guided bone regeneration under antibiotic coverage may guarantee the durability of immediate implants inserted in infected alveoli. An additional study suggests that immediate replacement of infected teeth by implants can be successful using a protocol that includes antibiotic therapy, debridement, antisepsis of the compromised tissue, and given the achievement of high primary implant stability.[6]

Immediate loading after immediate implantation, however, requires an attentive evaluation of the teeth's radicular morphology to be extracted, the presence of at least 4mm native bone beyond the radicular apex, in view of selecting the ideal implant for this type of implantology application.

In this report, we will present three cases with various combinations of delayed and immediate implantation, and delayed and immediate loading, including creative solutions that may allow this delay without jeopardizing function and aesthetics.

CASE I

Figure 1

Figure 1:
A 35-year old generally healthy female arrived at the clinic, complaining of constant dislocation of a permanently cemented crown on tooth #1.1 (#8). Note the gingival inflammation around 1.1-2.1, caused by insufficient brushing – as the patient feared that brushing may remove the crown once more. Heavy smoking was an additional factor in the gingival inflammation and mediocre oral hygiene status presented at admission.

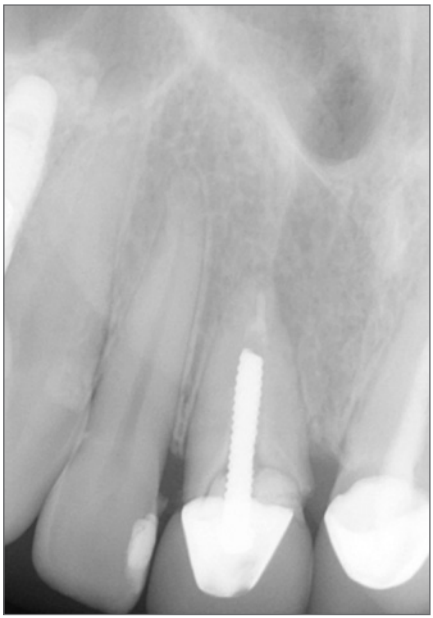

Figure 2

Figure 2:
A pre-operative X-ray shows a failing post-and-core structure on tooth 1.1, and a similar clinical picture in 2.1 (#9). The treatment plan accepted by the patient included:

- Removal of both 1.1 and 2.1 crowns
- Extraction of 1.1, socket preservation and delayed implantation, while 2.1 will serve as a temporary abutment tooth for a 1.1-2.1 cantilever bridge.
- Extraction and immediate implantation in 2.1, and restoration with Zirconia crowns.

DAY OF SURGERY

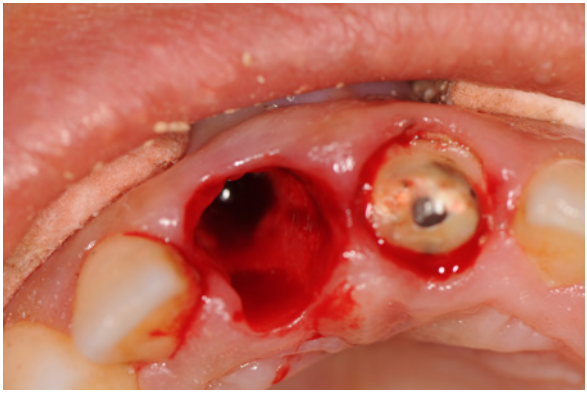

Figure 3a

Figure 3b

Figure 3 a,b:
On the day of surgery, tooth #1.1 was extracted and the crown was removed from tooth #2.1.

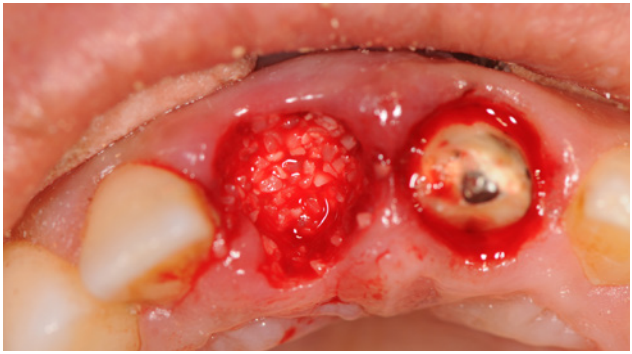

Figure 4a

Figure 4b

Figure 4 a,b:
Non functional upper wisdom tooth was extracted and dentin autograft for socket preservation was prepared using the protocol of Smart Dentin Grinder Technique (KometaBio Ltd.)

Figure 5

Figure 5:
A temporary cantilever bridge was fitted (retained by tooth #2.1) to provide immediate aesthetics & functionality, while diminishing the occlusal stress on the 1.1 site, to secure optimal bone remodeling.

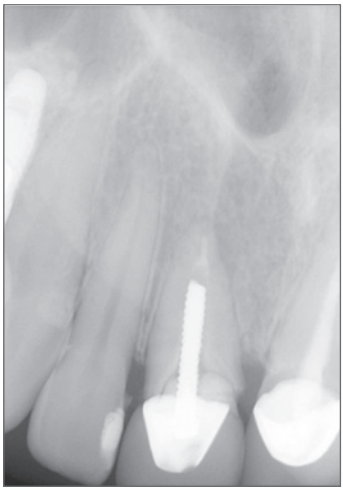

Figure 6a - Diagnostic

Figure 6b - Day of SP

Figure 6c - 2 months follow up

Figure 6d - 3 months follow up

Figure 6 a,b,c,d:
Follow-up X-rays were performed at two and three months post-surgery. Note the excellent bone remodeling achieved by using a dentine autograft.

a. Diagnostic X-ray
b. Post-operative X-ray
c. Follow-up 2 months post-surgery
d. Follow-up 3 months post-surgery

Figure 7a

Figure 7b

Figure 7 a,b:
After 3 months the bridge was removed, and the cantilever part was separated. The retaining part was placed on tooth #2.1 as a single temporary crown.
Note that the use of a cantilever bridge, diminishing the occlusal stress, allowed the gingival tissue to grow coronally, which later provided an optimal soft-tissue support for the implant and the restoration.

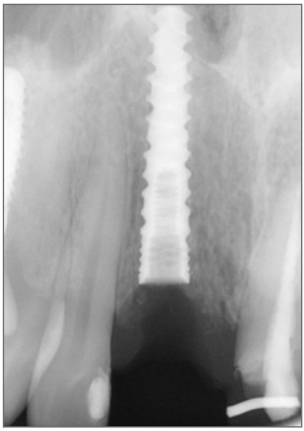

Figure 8a

Figure 8b

Figure 8c

Figure 8d

Figure 8 a,b,c,d:
In a single-stage procedure, a closed nasal floor elevation was performed, and a Ditron MPI Implant (3.5mm/16mm) was installed. The impant was immediately loaded with a temporary crown, constructed upon a Ditron Dental temporary abutment. The crown was designed with a favorable emergence contour to support the creation of an aesthetic gingival profile.

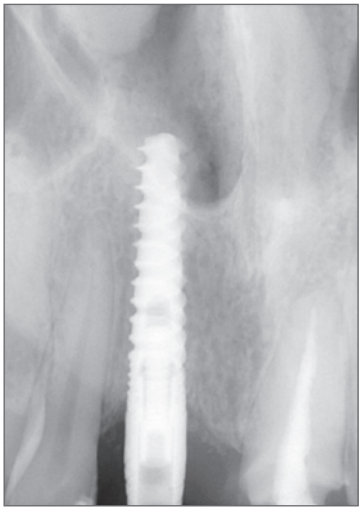

Figure 9:
Follow-up X-ray – 6 weeks post-implantation.

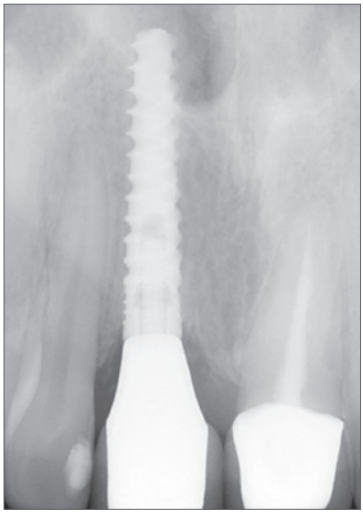

Figure 10:
At four months after implant placement a permanent Zirconia crown was fitted and cemented to a Zirconia abutment supported by a Ditron Dental Titanium base.

Figure 11a

Figure 11b

Figure 11c

Figure 11 a,b,c:
Tooth #2.1 was restored with a permanent Zirconia crown. Though the initial treatment plan included its extraction, in the end it remained intact even when it served as an abutment for a temporary cantilever bridge.

Figure 12 - 1.5 year follow up

Figure 12:
At a follow-up examination after 18 months, the patient is satisfied. The crowns are intact and show excellent aesthetics and gingival health.

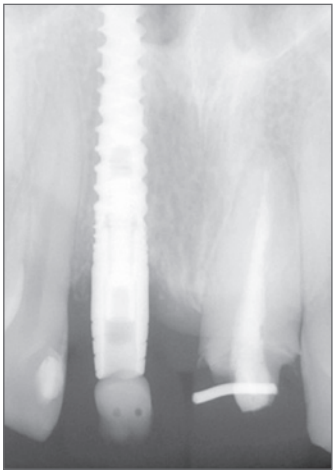

Figure 13a

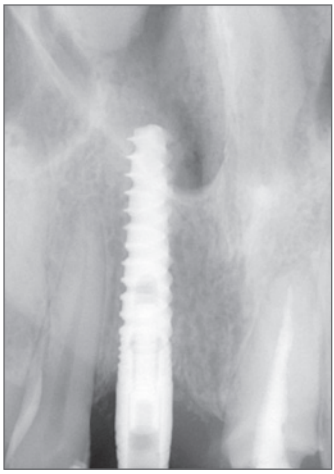

Figure 13b

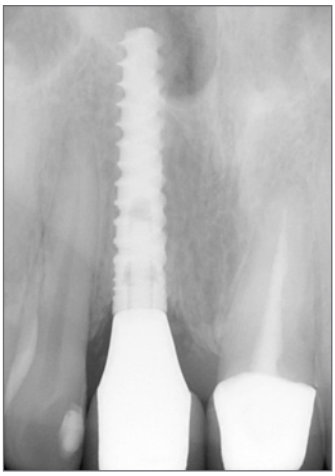

Figure 13c

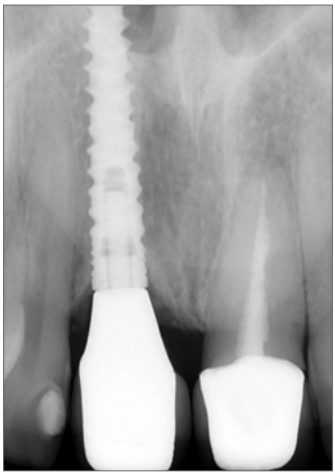

Figure 13d

Figure 13 a,b,c,d:

a. Day of surgery and immediate loading
b. Follow-up at 1.5 months post-implantation (with a temporary abutment and crown)
c. Follow-up at 4 months – following cementation of a permanent crown
d. Follow-up at 18 months – note the excellent mineralization of the cortical plate, demonstrating excellent fit of the prosthetic assembly and peri-implant health.

Figure 14a - initial state

Figure 14b - 4 months

Figure 14c - 18 months

Figure 14 a,b,c:

a. Diagnostic photo at admission – initial state
b. At 4 months post-implantation – fitting of permanent crowns
c. 18 months follow-up

CASE II

Figure 1a

Figure 1b

Figure 1 a,b:
A 45-year old, generally healthy female, complained of a dislodgement of a crown from tooth #2.3 (#11).

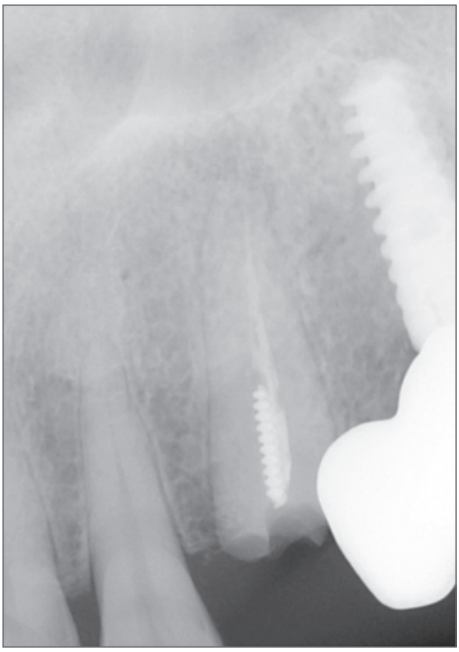

Figure 2

Figure 2:
A diagnostic X-ray shows the remains of a custom post, as well as a failed root canal obturation exhibiting a periapical radiolucency.

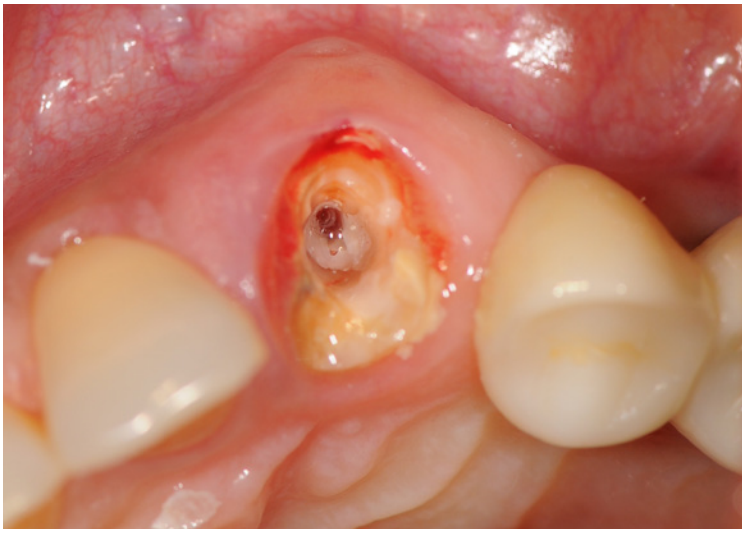

Figure 3

Figure 3:
The crown dislodgement was due to fracture of the custom core and decay that reached the alveolar bone level. Therefore, the survival of the tooth was greatly jeopardized, and the proposed treatment plan, accepted by the patient, was extraction of the tooth and an immediate implantation.

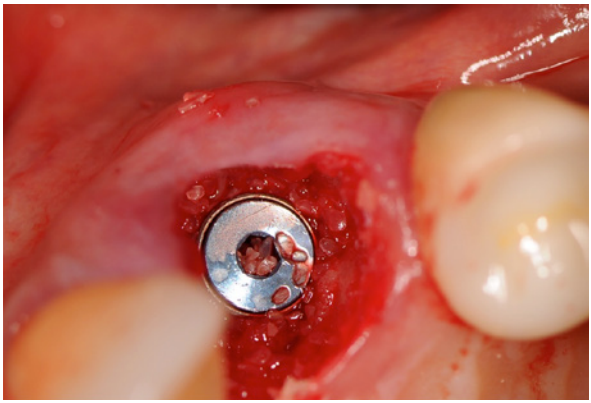

Figure 4a

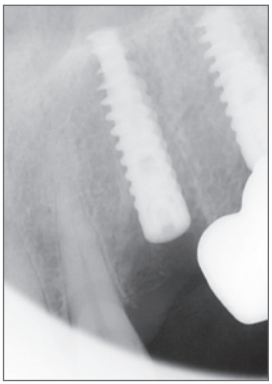

Figure 4b

Figure 4 a,b:
Tooth #2.3 was extracted. Similarly to the previous case, the extracted root was cleaned of gutta-percha remnants and used in a dentine grinder (KometaBio Ltd.) to serve as a dentine autograft.
An immediate implantation was performed with a Ditron MPI 3.75mm / 16mm implant, combined with a closed sinus floor lifting of ~1.5 mm and grafting with dentine.

Figure 5a

Figure 5b

Figure 5 a,b:
The implant was immediately loaded. The old porcelain crown was lined with acrylate (PMMA) and connected to a Ditron Dental temporary abutment, to be used as a screw-retained temporary crown. Thus, it was possible to preserve the aesthetic appearance the patient was already used to until final restoration.

Figure 6a

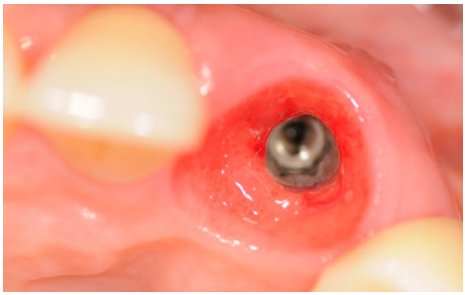

Figure 6b

Figure 6c

Figure 6 a,b,c:
Three months after the operation, the temporary crown was removed. Note the excellent gingival profile, created thanks to the favorable implant position, abutment contour and the bone grafting during the implant placement.

Figure 7a

Figure 7b

Figure 7 a,b:
A permanent Zirconia abutment was connected to the implant, and a permanent Zirconia cemented crown was fitted.

Figure 8a

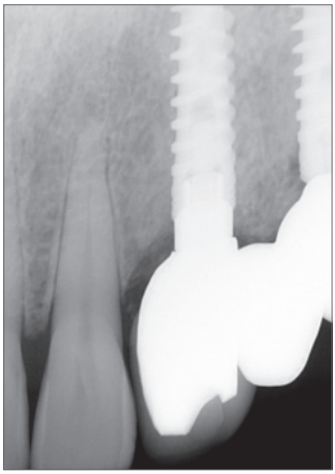

Figure 8b

Figure 8 a,b:
At a 15-months post-operative follow up, the crown and implant are intact. Note the stabilization of the bone level around the 2.3 implant as well as an acceptable appearance of gingival papilla in between 2.2-2.3.

CASE III

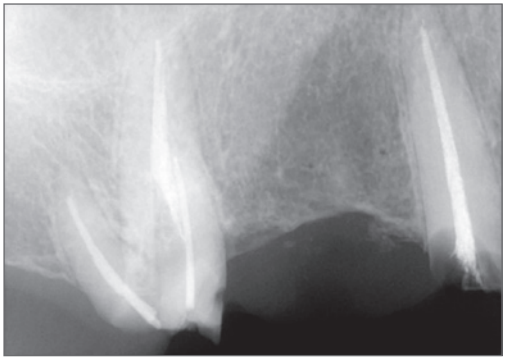

Figure 1a

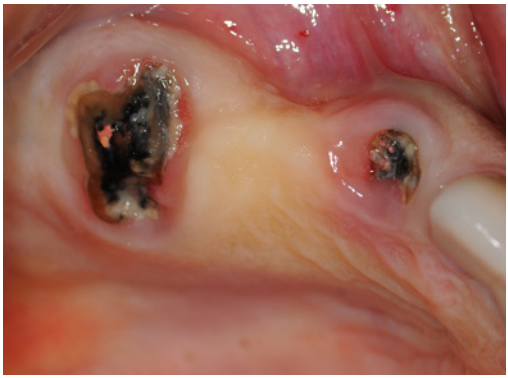

Figure 1b

Figure 1 a,b:
A 54-year old generally healthy, non-smoking and vegetarian male, arrived at the clinic complaining of fractured teeth in the upper right maxillary region.
Teeth #1.6 (#3) and #1.3 (#6) were deemed hopeless, and the treatment plan included their extraction, combined with simultaneous implant placement in the area of #16,15,14 with immediate loading. In the 1.3 site, due to lack of available buccal bone and to prevent the risk of recession, socket preservation and delayed implant placement were planned.

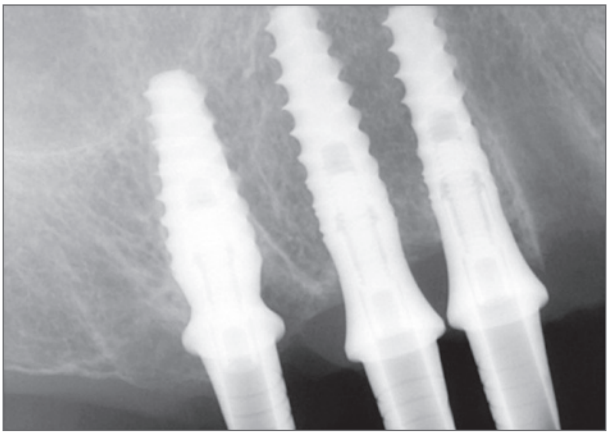

Figure 2a

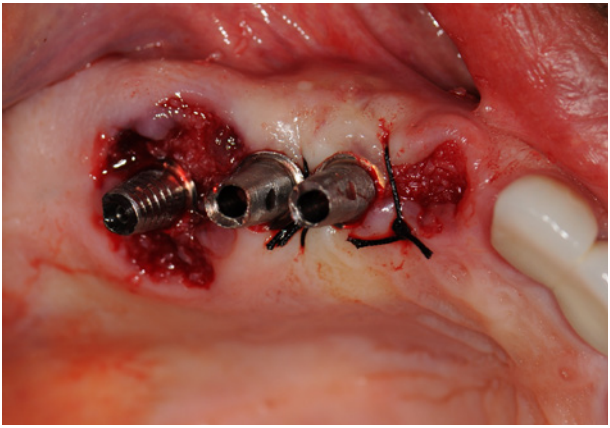

Figure 2b

Figure 2c

Figure 2 a,b,c:

a. Three Ultimate implants (Ditron Dental) were installed, and anatomic abutments were connected with a 10N/cm torque, after minimal extraoral preparation.

b. #1.6 – post-extraction and immediate implant placement, particulate bone grafting was performed around the implant, and the implant was immediately loaded with a Ditron Dental temporary abutment. #1.5 and 1.4 implant placement was performed with a horizontal ridge augmentation, using a DBM graft (OsteoDemin, Impladent Ltd., USA) and a synthetic HA (Osteogen, Impladent Ltd., USA). #1.3 – extraction was performed, followed by socket preservation using PRF only. Note the use of anatomic abutments, allowing soft tissue growth in the implant cervical area. Later, at the permanent restoration stage, they will be replaced by regular abutments, thrusting the gingiva and creating a favorable soft tissue profile.

c. A temporary acrylic bridge, supported by #1.6, 1.5, 1.4, with a cantilever pontic on #1.3, was immediately delivered

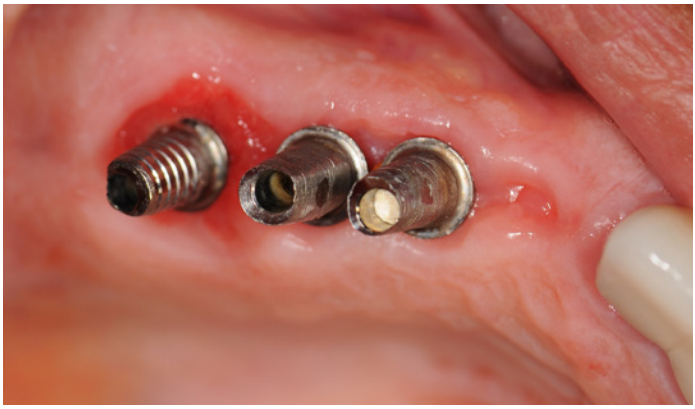

Figure 3a

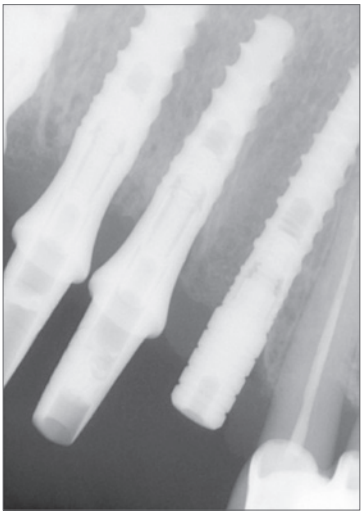

Figure 3b

Figure 3 a,b:
3 months later, the temporary bridge was removed, and an additional Ditron MPI (3.5mm) implant was placed at the #1.3 site, using a flapless approach.

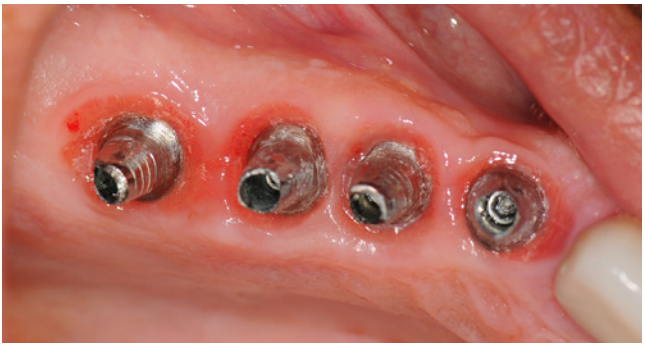

Figure 4a

Figure 4b

Figure 4 a,b:
After an additional four months, final Titanium abutments were delivered, and a soft tissue emergence profile was created using a diagnostic tooth set up made of PMMA.
The patient used the diagnostic setup for 2 weeks, after which a pickup impression was taken, for the technician to receive an imprint of the cervical profile, as well as of the diagnostic setup – in accordance to which the permanent Zirconia crowns were manufactured.

Figure 5a

Figure 5b

Figure 5c

Figure 5 a,b,c:
Final cemented Zirconia crowns were delivered 3 months after #1.3 implant placement. Note that the restorations were delivered as single crowns, and were not interconnected.

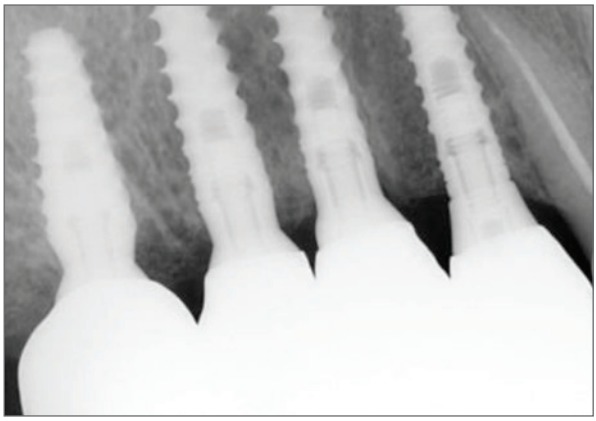

Figure 6a

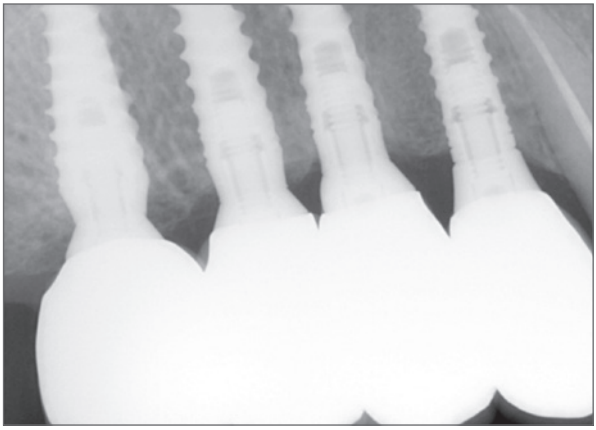

Figure 6b

Figure 6 a,b,c:

a. X-ray immediately after cementations of permanent crowns.
b. Follow-up X-ray after 6 months. Note the stabilization of the interdental alveolar ridge.

CONCLUSION

Immediate implantation and immediate loading may be considered safe and effective treatment modalities. Therefore, experienced clinicians may consider immediate implants as a viable treatment option in patients presenting with hopeless teeth and accompanying dentoalveolar infections, given an appropriate case selection and following a meticulous surgical and restorative protocol.

In cases when favorable conditions are not present, socket preservation and delayed implantation, or immediate implantation and delayed loading are still viable treatments of choice, and the clinician must share the possible treatment options with the patient and explain that the apparent (and temporary) aesthetic disadvantage will be compensated by an improved final result.

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