Three-unit bridge in the posterior area

A step-by-step clinical case report by Sergio Piano, Italy

Incorporating digital workflows into our treatments can provide numerous benefits, including increased precision and quality of results. Nevertheless, selecting the correct quality and design of materials for our treatments is just as crucial as performing a comprehensive decision-making process to define our clinical strategy and workflow. The following case report describes a smile makeover in a woman with high aesthetic aspirations. A digitised process, implant placement, and immediate implant loading were among them.


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We met the patient's needs by using an efficient treatment protocol for implant placement and providing an aesthetic provisional and final restoration design using the Straumann® BLX implant made of Roxolid® and coated with a surface of SLActive® in combination with the digital workflow.

Initial situation

A 58-year-old female healthy patient presented to our office with the chief complaint of reduced masticatory function on the left side and the desire to improve her smile. Moreover, the patient manifested her wish of avoiding removable rehabilitations during any of the treatment phases and wanted to be treated with a reduced invasiveness procedure, as she has had previous unpleasant experiences with dental treatments. The extra-oral evaluation revealed a medium smile line with a dark area on the second quadrant due to the absence of premolars and molars (Fig. 1).

The intra-oral assessment exposed a partial edentulism maxilla, with the absence of teeth #17, #14, #24, #25, #26 & #27 and black triangles on the second sextant (Fig. 2). The occlusal view of the upper jaw showed a Kennedy Class II Applegate modification I with teeth slightly misaligned (Fig. 3). The lateral photo view showed a possible good amount of available bone in height (Fig. 4). The view of the left side


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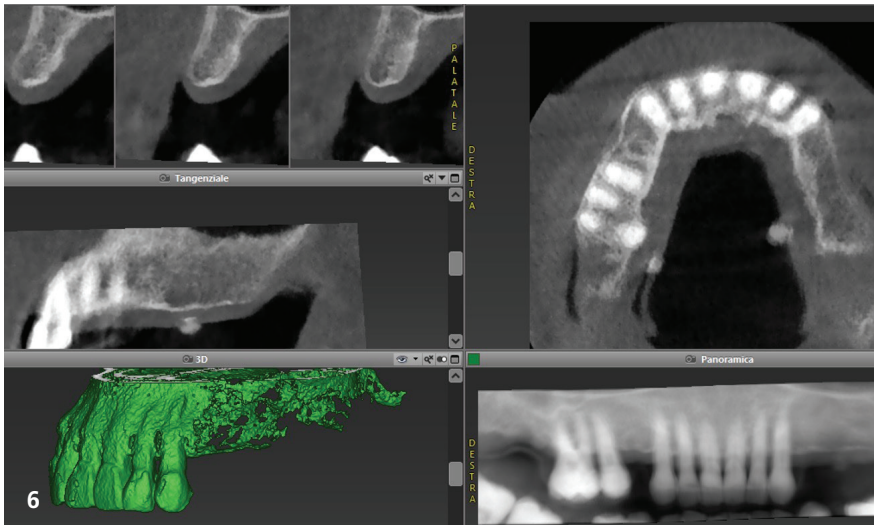

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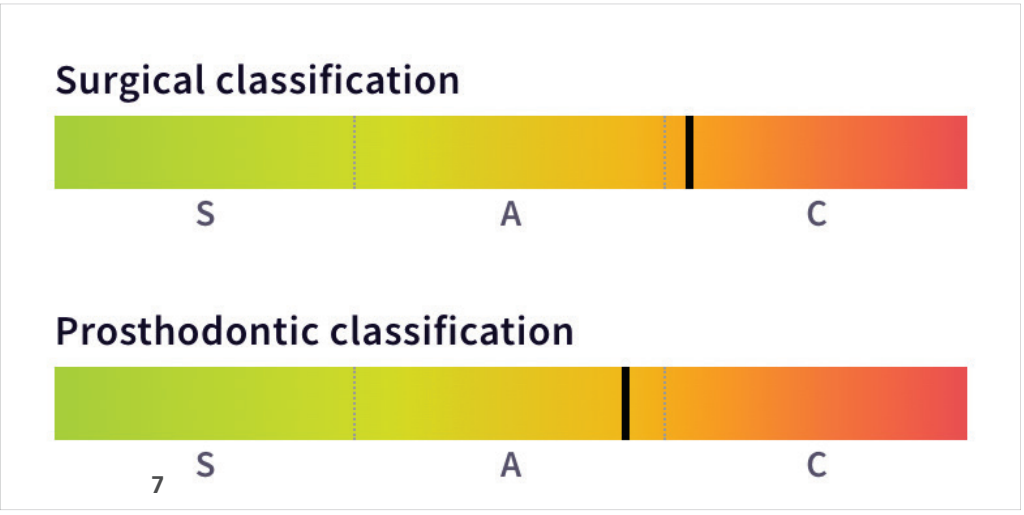

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of the mouth in occlusion showed the extrusion of teeth #34 and #36 (Fig. 5).

A CBCT exam visualised with the software coDiagnostiX® was used to assess the quality and quantity of bone available for implant placement (Fig. 6). In the region #24–#26, the assessment revealed adequate vertical and horizontal bone availability.

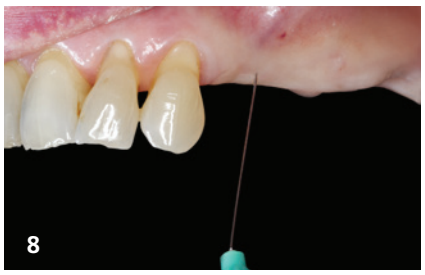
Treatment planning

Considering the patient's requests, the aims of the treatment were:

- To evaluate the placement of two implants in positions #24 and #26 to be restored with a fixed three-unit bridge.
- To consider the possibility of performing an immediate prosthesis on the implants, if a satisfactory primary stability is obtained: in this way, a pleasant aesthetic appearance is guaranteed from the beginning of the treatment.
- To consider the option of placing the implants with a computer-guided surgery and a flapless approach to reduce the invasiveness and to simplify the prosthetic workflow.

Taking the above aims into consideration, the following treatment options were presented and discussed with the patient:

1. Implant placement in positions #24 and #26 with no provisional restoration during the healing time. After implants' osseointegration, final restoration with a three-unit implant-supported bridge #24–#26.
2. Implant placement in positions #24 and #26 and, if the implant stability is optimal, immediate provisional implant-supported bridge. After implants' os-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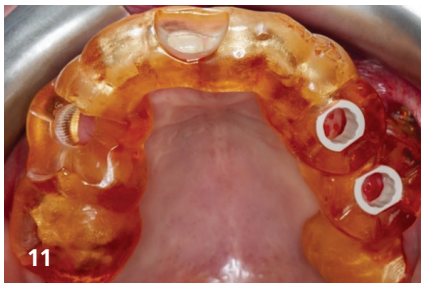
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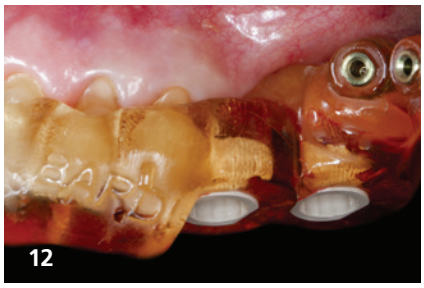
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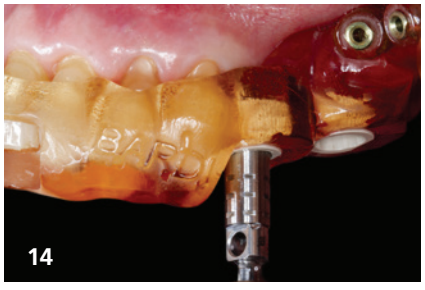
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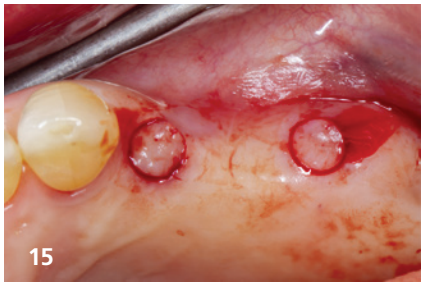
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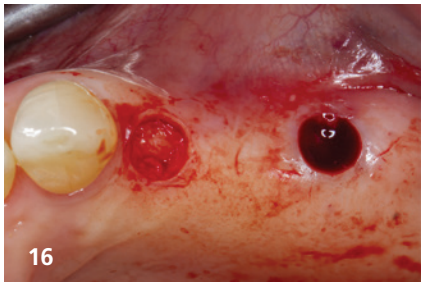
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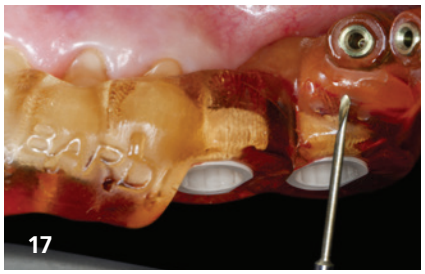
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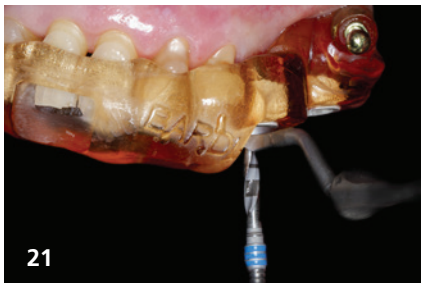
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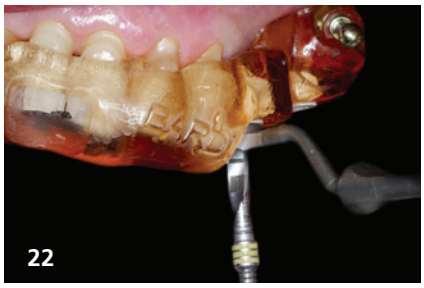
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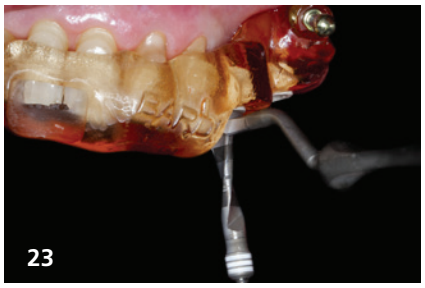
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seointegration, final restoration with a three-unit implant-supported bridge #24–#26.

3. Implant placement in positions #24 and #26 with a guided surgery approach and, if the implant stability is adequate, immediate provisional implant-supported bridge. After implants' osseointegration, final restoration with a three-unit implant-supported bridge #24–#26.

The SAC v2.0 assessment tool (based on ITI SAC Classification) was used to identify the degree of complexity and potential risk involved in the planned case (Fig. 7).

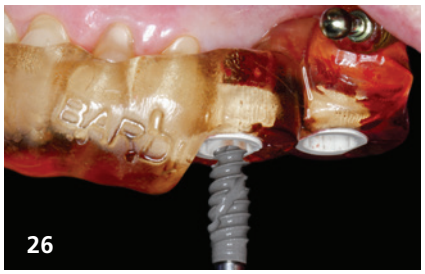
In order to make the final decision on treatment planning, pros and cons are evaluated considering the choice of a computer-guided implant positioning with an immediate prosthesis (three-unit bridge) for the replacement of the teeth #24, #25 & #26.

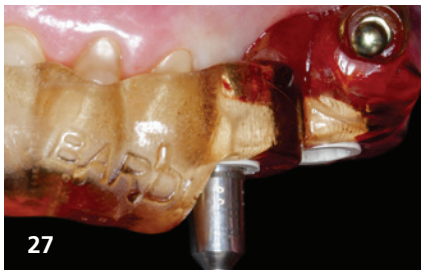
It was decided to choose option number 3 after discussing the risks, benefits, and treatment options; and considering the patient's age, medical conditions, and expectations. Thus, it was planned to treat the patient with Straumann® BLX implants in sites #24 and #26 with immediate prostheses (three-unit bridge) using computer-guided planning and surgery. The rational of the treatment was the following:

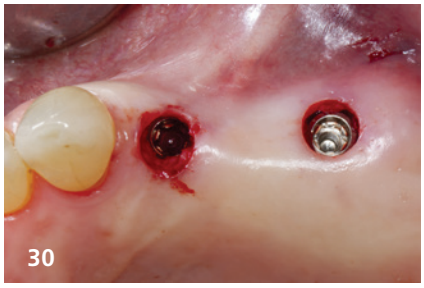
- The choice of a fixed implant-supported rehabilitation allowed to satisfy the request of the patient to avoid a removable prosthetic solution.
- The patient can be provided, as requested, with a fixed provisional bridge assuring a pleasing aesthetic appearance from the beginning of the treatment.
- The use of BLX implants, thanks to their specific shape, guarantees the high stability needed for the immediate prosthesis.
- The computer-guided planning and implant placement assure a surgical approach with reduced invasiveness and simplify the prosthetic procedures.
- The appropriate amount of keratinised gingiva allows for a flapless approach, thus minimising the surgical impact.
- A favourable site anatomy, a suitable bone availability, and a convenient amount of keratinised gingiva reduce the risk of aesthetic complications.

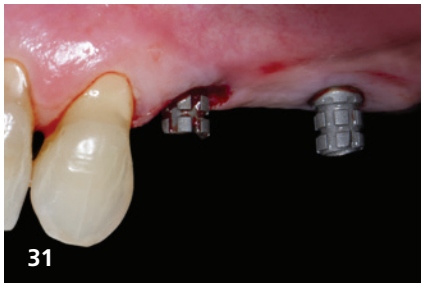
Treatment workflow included:

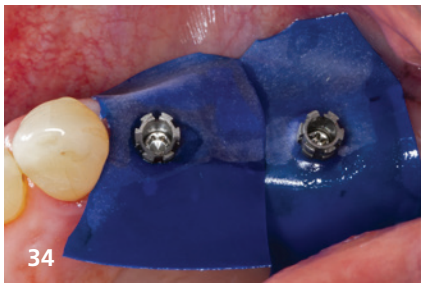
1. Preliminary data acquisition: intra- and extra-oral photos, impressions, creation of the diagnostic guide, and CBCT exam with the diagnostic guide in position (already collected).
2. Scanning of the cast model and the diagnostic guide seated on the model; creation of the corresponding STL files and the STL file related to the digital wax-up of the lacking teeth.
3. Processing of Dicom (CBCT exam) and STL (upper model, upper model with guide and digital wax-up) data in co-DiagnostiX® planning software to carefully plan the implant placement.











4. Production of printed surgical guide and resin models via coDiagnostiX® plan.
5. Execution of the provisional bridge by the dental lab based on digital wax-up (on resin printed models).
6. Surgical phase: implants placement and provisional bridge positioning.
7. After the healing, final rehabilitation with a screw-retained bridge on implants.

Surgical procedure

The patient was directed to rinse her mouth with 0.12% chlorhexidine gluconate on the day of surgery. Anaesthetic infiltration was done with 2% lidocaine and 1:100,000 epinephrine in the area corresponding to the premolar/molar apexes and in the surrounding gingiva (Fig. 8).

A dedicated set of surgical instruments for the BLX implant guided surgery was used (Figs. 9 & 10).

The guide was placed in the mouth and the stability and precision were verified through the windows created into the guide in specific positions of the teeth (Fig. 11). On the lateral view of the guide, it shows the sleeve dedicated to the pin fixation, which was essential to guarantee the perfect stability of the guide during the drilling procedures (Fig. 12). From the occlusal view of the guide, the areas of keratinised gingiva visible through the sleeves assured the possibility of performing a flapless implant surgery (Fig. 13).

A tissue punch, driven by the guide, was used with the purpose of removing the soft tissue layer. During this phase there was no need to fix the guide with the fixation pin (Fig. 14). Then the guide was removed, and it was easy to see the circular cut of the tissue punch (Fig. 15). The soft-tissue discs were then peeled away (Fig. 16).

The guide was kept in its precise position, and with the dedicated bur, the drilling procedure through the sleeve was then performed (Fig. 17 & 18).

The fixation pin, placed in the dedicated sleeve, allows the guide to remain in its stable position, and the drilling procedure can be carried out in a precise way. After the guide placement (Fig. 19), the milling cutter bur was used with the purpose of creating a flat surface for the precise work of the following drills. The specific handle reduced the dimension of the sleeve to those of the selected drill. This bur is the only one without a stop (Fig. 20). The pilot drill ø2.2 mm was used (Fig. 21), followed by the drill ø2.8 mm (Fig. 22), and finally the drill ø3.5 mm (Fig. 23). Each drill was used with copious sterile water, and the tip was moved back and forth to minimise overheating.

In accordance with the choice done during coDiagnostiX® planning, a BLX implant with 4.5 mm diameter and 12 mm length was used in position #24 (Fig. 24). The pin placed in the apical part of the implant was gently broken according to the manufacturer's instruction (Fig. 25).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The implant was then ready to be engaged into the sleeve for the perfect guidance in the prepared bone site (Fig. 26). The dedicated BLX transfer piece drives the implant in the correct position. The procedure will end as soon as the black line is in contact with the edge of the sleeve (Fig. 27). As done in the procedure related to the premolar, the molar site was prepared. Because the quality of the bone was not excellent in this site, the ø2.8 mm drill was the last one used. As seen in the procedure related to the premolar, the choice of the implant was made in accordance with the coDiagnostiX® planning (BLX with 4.5 mm diameter and 8 mm length).

After placing the implant, the insertion torque obtained was evaluated. The high values reached, allowed us to proceed with the immediate provisional bridge (Figs. 28 & 29).

In the occlusal view of the implants after the placement, we could appreciate an optimal 3D position (Fig. 30). The temporary abutments, customised by our dental lab, were screwed on top of the implants (Fig. 31). The temporary bridge was then checked in the patient's mouth in order to evaluate its precise seat on top of temporary abutments (Fig. 32). The seat of the temporary bridge was very precise due to the accurate planning and execution of implant placement, perfectly in line with the prosthetic design (Fig. 33).

Prior to connect the bridge and the abutments with resin, the field was isolated by means of two pieces of dental dam. This procedure is very useful especially when a flap is raised, and it is not easy to obtain the ideal wet conditions for resin polymerisation (Fig. 34). Then, a thin layer of resin was placed into the temporary bridge (Fig. 35).

We can appreciate the temporary bridge in position, after the removal of the resin sheet that has allowed the precise placing of the bridge (Fig. 36). After the temporary bridge was unscrewed from the mouth, it was filled with resin in the spaces between bridge and abutments; and then the refinement procedures were done (Fig. 37).

The refinement procedure of the temporary bridge was performed firstly with the tungsten carbide bur, then with a rubber pre-polisher and finally with a polishing buff. It is important to create an ideal emergent profile of the bridge units and to have a completely smooth surface in contact with soft tissues (Fig. 38). A reverse angle view of the temporary bridge showed the correctness of the emergent profiles: in this way the bridge started the precise conditioning of soft tissues from the beginning of the implant healing (Fig. 39).

The temporary bridge was screwed on the implants (Figs. 40 & 41).

The chimneys were closed, and the smile line looked harmonious with the prosthesis well integrated into the patient's mouth (Fig. 42). The temporary bridge was not in full occlusal contact in order to reduce the risk of excessive loading on implants (Fig. 43). The smile of the patient immediately after the surgery (Fig. 44).


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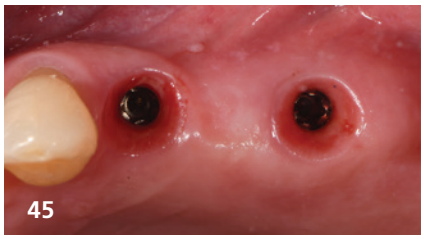
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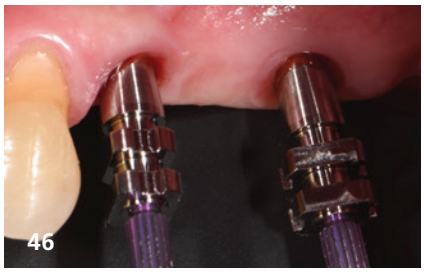
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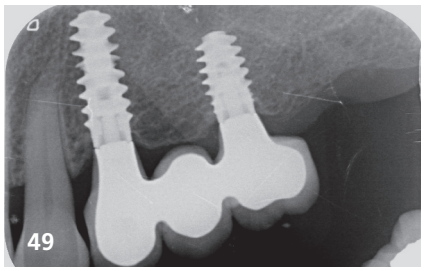
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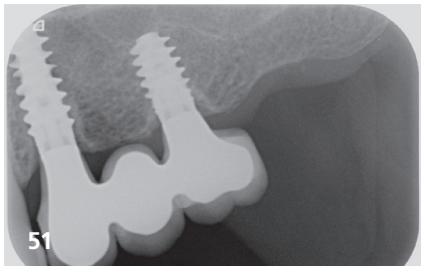
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The treatment at this point already met the patient's expectations, delivering the expected aesthetic and functional clinical benefits.

Prosthetic procedures

The patient reported no mechanical or biological issues at the three-month follow-up visit. Moreover, the clinical examination showed that the emerging profiles created by the provisional bridge were harmonious and natural. To prepare the final restoration; the temporary bridge was removed, and the soft tissues were evaluated. The tissues around the implants were healthy and with an optimal emergency profile (Fig. 45). Afterwards, a conventional impression was taken (Fig. 46).

The final restorations were screwed on implants 24 and 26 and the occlusal plane was corrected by making new restorations at the opposite jaw (Figs. 47 & 48). The final X-ray image showed the perfect integration of the implants and the precision of the prosthetic work (Fig. 49).

Treatment outcomes

The treatment outcome met the patient's aesthetic and functional expectations. The patient reported an improvement in her quality of life. She was involved in a maintenance programme with yearly follow-up visits. Two years later the patient is still very satisfied with the treatment outcome and the peri-implant tissues show an excellent condition (Figs. 50 & 51)

Conclusion

When indicated, immediate treatments can reduce the chair time and cost, maintain the gingival tissues and increase the comfort of our patients.

Acknowledgements

I would like to express my graditude to Dr Elisa Oneto for her great contribution to the prosthetic procedures and to Alessandro Giacometti for his excellent lab work.

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