

Meeting modern demands with computer-guided surgery

Treatment of mandibular edentulism

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Within the last five years, the world of implant dentistry has seen the emergence of computerized technologies, like CAD/CAM and computer-guided surgery. Astra Tech Facilitate™ is a perfect example.

This article presents an option for highly demanding surgical cases in the esthetic zone with computerguided surgery for transmuqueous implant placement and immediate temporization using Astra Tech Facilitate Computer Guided Implant Treatment. Introduced in 2006 and based on SimPlant software from Materialise™, Facilitate has been specially developed for Astra Tech Implant System™.

Optimized implant placement

With Facilitate, the practitioner is able to choose between tooth-, bone- or mucosa-supported surgical guides. The use of a stereolithographic surgical guide increases patient safety by providing a more precise and predictable implant placement than if a regular surgical guide had been used^{A,B}. Hence, this technique optimizes implant placement and soft tissue esthetics, while providing the patient with an immediate fixed restoration.

Case in point

The 71-year-old female patient was wearing a poorly adapted removable partial denture retained by 33 and 45. At clinical examination, 31, 32, 41, 42 and 45 were deteriorated beyond repair and the patient was in need of a new prosthetic rehabilitation.

The planned treatment involved the following:

- Extractions of 31, 32, 41, 42, 45, 16 and 17.

- Implants in site 36, 35, 34, 32, 42, 45, 46, 47 (OsseoSpeed™ 4.5).
- Six TiDesign™ and two ZirDesign™ abutments.
- Three immediate provisional bridges.
- After three months three Zirconia bridges.

Planning phase

1- Since the old RPD was not satisfactory, a new and adequately adapted scan prosthesis is fabricated in order to validate optimal esthetics and occlusion¹⁻²⁻³. A scan of the mandible with the new prosthesis is performed, followed by a separate scan of the prosthesis (double scan technique). Radiopaque markers are included in the acrylic of the scan prosthesis to allow proper mandible/prosthesis relation match in the Facilitate software.

2- The dicom images from the scanner are converted by the Facilitate Pro Software. The 3D image obtained allows for optimal visualisation of the bone at implant site, of the soft tissues and of the future prosthetic restoration (Figure 2), leading to a more accurate implant placement⁴ (Figure 3). The completed planning is sent to the production unit (Materialise NV, Leuven, Belgium), for production of a tooth- and mucosa-supported surgical guide using stereolithography⁵ (Figure 4).

3- The surgical guide is sent to the laboratory technician who uses the guide with replicas fixed to the implant holders to cast a working model (Figure 5). With the exact position of implant and soft tissues, the technician is able to create three provisional prosthesis with self-cured resin on TiDesign™ and ZirDesign™ abutments (Figure 6).

Surgical procedures

Local anaesthesia is administered to the patient⁶⁻⁷, and extraction of teeth 32, 31, 41, 42, 45, 16 and 17 is performed. The Facilitate Surgical Guide™ is positioned

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Figure 1: X-ray.

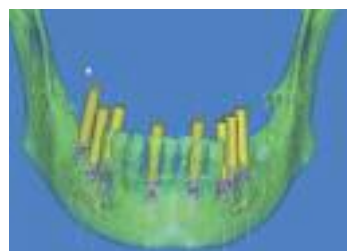


Figure 2, 3: Optimal visualization of the bone at the implant site, soft tissues and of the future prosthetic restoration leading to a more accurate implant placement.



Figure 4: Tooth- and mucosa-supported surgical guide.



Figure 5: Surgical guide with replica implant holders and implant replicas.



Figure 6: Working model with exact position of implant and soft tissues.

properly using teeth 33, 43 and 44. The surgical phase starts by drilling with specially designed Facilitate SP drills and corresponding drill keys (Figure 7).

Profuse irrigation of the site with isotonic saline solution is performed during the entire drilling sequence. The eight OsseoSpeed 4.5 implants are mounted on the implant holder and placed through the guide with a contra-angle at a maximal torque of 35 Ncm (pictures 8). The implant holders are then loosened, and the surgical guide removed.

Minimal gingivoplasty is performed to allow an ideal prosthetic connection (Figure 9).

Prosthetic procedures

Six TiDesign™ abutments and two ZirDesign™ abutments are placed immediately after surgical guide removal (Figure 10)⁹.

After this, the acrylic provisional bridges are placed over the abutments sealed with a temporary cement (Figure 11). The occlusion is adjusted and controlled for even contacts.

Both procedures, surgical and prosthetic, took 90 minutes. Post-operative control at 48 hours shows normal healing tissues with minimal pain, satisfactory function and adequate occlusion (Figure 12).

Conclusion

Astra Tech Facilitate™ is an exceptional tool for helping the dentist evaluate and simulate virtually every aspect of the

implant treatment. The thorough planning it enables leads to a more comfortable and safe surgical protocol that can be further enhanced by using stereolithographic surgical guides.

Obviously, immediate implantations, flapless surgery and immediate loading remain clinically difficult and demanding therapies, and virtually every surgeon performing guided surgery will experience a learning curve that gradually leads to more complex and challenging procedures. Nonetheless, Facilitate is an efficient, precise and predictable way to treat patients.

Summary

Computer-guided surgery is helping to meet growing demands for shorter treatment time, less painful procedures and perfect esthetic results. In this article, Dr. Daniel Leibar, DDS and Dr. Jean-Sébastien Renaud, DMD take a closer look at Astra Tech Facilitate™ Computer Guided Implant Treatment, and conclude that it is an efficient, precise and predictable way to treat patients, particularly when used with stereolithographic surgical guides.

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Figure 7: Surgical phase starts by drilling with specially designed Facilitate SP drills and corresponding drill keys.



Figure 8: OsseoSpeed™ implants are placed at maximal torque of 35 Ncm.



Figure 9: Removal of the surgical guide.



Figure 10: ZirDesign™ and TiDesign™ abutments.



Figure 11: Immediate placement.



Figure 12: Post-operative control.

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