The complete digital implant workflow

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Planmeca is known for high-tech innovations and continuous product development. The company’s powerful Planmeca Romexis software platform allows all stages of the dental implant and aesthetic prosthodontic treatment to be completed using one piece of software, from the computer-assisted design of patients’ smiles to the fabrication of surgical guides.

The following clinical case, which I performed together with my colleagues Dr Ponomarev, Dr Kozhevkin and Dr Yarokhin, illustrates how digital solutions can be used in prosthodontic treatment, implant placement and restoration design. According to our experiences, digital CAD/CAM technologies enable maximal functional and aesthetic results compared to traditional methods.

Clinical case report
The clinical case illustrates the advantages of using Planmeca CAD/CAM solutions in the digital planning of an implant placement and surgical guide, as well as in the fabrication of a ceramic restoration. This article presents a clinical case in which the treatment was completed using the Planmeca Romexis 3D Implant Guide software, Planmeca PlanCAD Premium software and Planmeca PlanMill 40 milling unit.

The clinical case features a female patient, who complained about missing tooth #22, as well as the shield-like shape of tooth #12 (Figs. 1 & 2). During the initial examination, the area around the missing tooth was estimated to be quite narrow for an implant. However, the patient declined orthodontic preparation, as she had already previously had orthodontic treatment with orthodontic surgery.

In this particular case, we started with an aesthetic analysis of the patient’s CBCT data and concluded that a Straumann implant with a 2.9 mm diameter would fit in the area of tooth #22, if we used a surgical guide for maximum precision (Figs. 3–5). For tooth #12, we decided to fabricate a thin-walled IPS e.max ceramic restoration (Ivoclar Vivadent).

Thanks to digital planning and a carefully fabricated surgical guide, the implant was placed successfully, even though the anatomical conditions appeared to be less than advantageous. We achieved a torque of 30 Ncm and attached a healing abutment to the implant (Figs. 6 & 7).

Three months after the implant placement operation, the osseointegration of the implant fixture was completed. A temporary crown was fabricated on the implant from a...
VITA ENAMIC multiColor block to support the formation of soft tissues (Figs. 8–10). We improved the original design on the Straumann superstructure with gum contouring. On tooth #11, crown lengthening was performed with an electrosurgical tool (Figs. 11–13).

Once the formation of the soft tissues was complete, tooth #11 was minimally prepared for the ceramic crown with the help of a surgical microscope. After the preparation, the teeth were scanned in order to digitally design a custom abutment and crowns (Figs. 14–19).

The final smile design was planned digitally together with the patient. For the implant structure, we chose an individual zirconium abutment screw with a ceramic facing and a fully anatomical Empress crown (Figs. 20 & 21). The ceramic facing concealed the excessive brightness of the zirconium, and we were able to achieve the desired colour. Thanks to the digital workflow, we managed to fulfil the wishes of the patient (Figs. 22–24).

Conclusion

With digital technologies, the entire implant workflow can be completed in the dental clinic, from planning to fabrication of the restorations. Digital planning increases the reliability of the implant treatment and helps the dentist to succeed in the operation. Digital tools allow achieving the maximum functional and aesthetic result even in combined operations in which an implant and ceramic restoration are performed simultaneously.

Thanks to the development of modern technologies, a 3D model of a patient’s set of teeth can now be acquired in only a few minutes, without infringing on the comfort of the patient. At the same time, combining a CBCT image with an intraoral scan enables the dentist to plan the implant placement and surgical guide accurately and with just a few mouse clicks.

Finally, digital technologies also enable visualising the treatment outcome for the patient. Clear visualisations of the end result facilitate communication with the patient, which, in turn, can increase case acceptance.

About the author

Dr Kirill Kostin graduated from Saint Petersburg State Medical University in Russia in 2004. He became the co-founder of the PerfectSmile dental clinic and dental study centre in 2014. At his clinic in Saint Petersburg, Dr Kostin runs a private practice concentrating on the aesthetic and functional rehabilitation of natural dentition and implants, applying various digital instruments as part of restorative procedures (digital smile design, intraoral scanning, CAD/CAM milling, 3D printing, and guided surgical procedures). Using a dental microscope on a daily basis, Dr Kostin focuses on minimally invasive restorative procedures with direct and indirect restorations. This particular case Kostin performed together with his colleagues Drs Mikhail Erohin, Oleg Ponomarev and Maxim Kishchev.

Figs. 14–19: The final restorations were designed in Planmeca PlanCAD Premium.

Figs. 20 & 21: Final restorations: Zirconium abutment screw with a ceramic facing and a fully anatomical Empress crown.

Figs. 22–24: Final outcome after the completion of the treatment.