



Preoperative dental implant planning using the OP200 D Volumetric Tomography (VT)

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The demand for dental implant-supported prosthetic treatments has increased dramatically over the last few years. At the same time, patients' demand for quality is increasing more and more so that preoperative, radiological planning has taken on a more influential role in treatment success in terms of its aesthetic and functional appeal. 3D DVTs are becoming increasingly popular, but acquisition costs are extremely high and using them to create images is still relatively costly. The Dental CT has shown satisfactory results, however concerns about patient exposure to radiation should not be overlooked.

INSTRUMENTARIUM DENTAL has developed a digital radiological tool in its OP200 D. VT option, which makes use of the proven benefits of transversal tomography combined with the principles of a digital Volumetric Tomography and which, as a result, supplies valuable diagnostic information for preoperative dental implant planning.

The VT option based on Narrow Beam technology allows for the presentation of ROI in the volumetric view while keeping exposure to radiation at acceptable levels. It offers excellent image quality, suitable for everyday use as an affordable alternative to DVT and CBCT.

Case Study:

A 64 year-old patient arrived at our dental offices inquiring about treatment options for the edentulous space reg. 045; 046 in the mandible. The patient's dental history showed nothing of concern.

Intraoral findings:

The patient's oral hygiene was excellent, the upper and lower jaw and the condition of the remaining teeth had been adequately and sufficiently treated in terms of prosthetics and decay prevention

Radiological findings:

The radiological findings showed no pathological findings whatsoever. The bone structure reg. 045 / 046 was unproblematic. (tooth 44 had been extracted in April 2007)

Diagnosis:

Edentulous space reg. 045/046 in the right mandible.

THERAPY

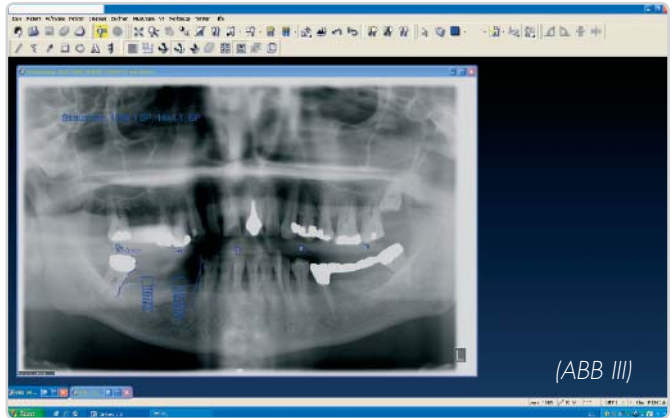
Treatment plan:

After an in-depth consultation, the patient decided to have the edentulous space treated with dental implant support at the edentulous region, at which point the dental implant planning could be carried out with the help of the OP200 D VT option.

To begin with, a dental impression was made using a bite block equipped with reference balls (Instrumentarium Dental). (ABB I)



ABB II and V: Example of patient positioning



The positioning tool in the OP200 D was then replaced with the VT panoramic positioning tool, the bite block was then clamped in, and the patient was then positioned in the device using her dental impression. The scout image was created. (ABB II, ABB III)

Subsequently the positioning tool was replaced with the VT positioning tool that can be set to five regions and the ROI was set, in this case at the mandibular molar on the right. The patient was then again positioned using her bite impression. (ABB IV, ABB V)

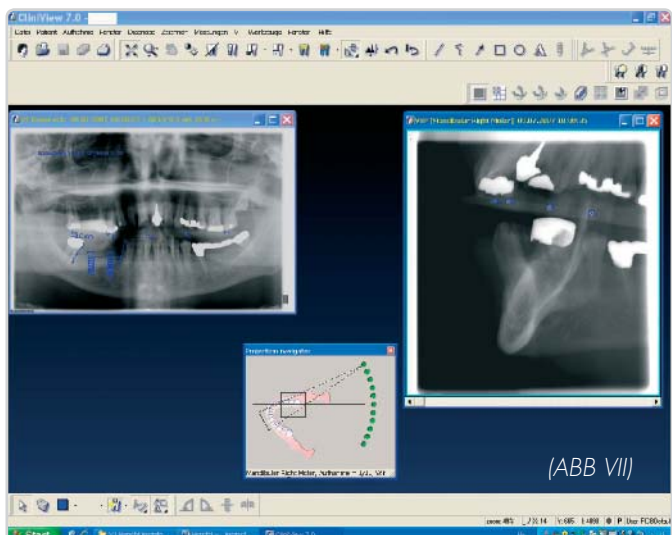
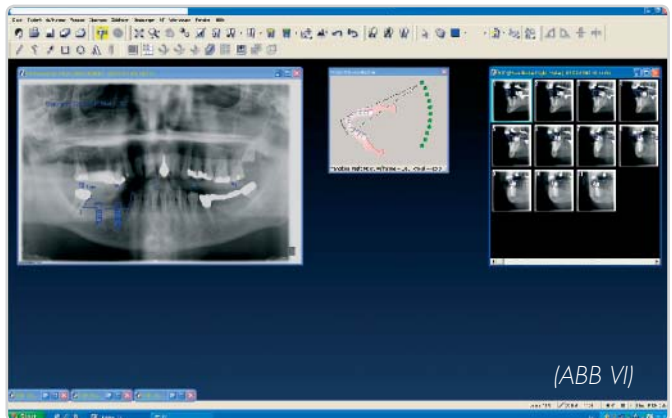
In less than one minute, a maximum of 11 digital images of this area in a 50-degree radius was taken.

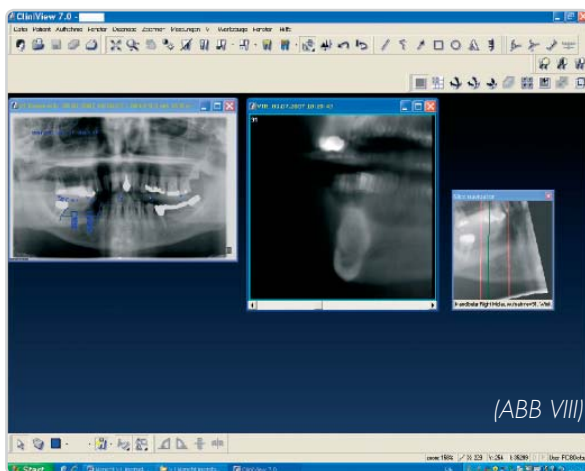
The VT pan image and one single or all of these 11 digital projection images can now be displayed on the monitor. (ABB VI, ABB VII)

By clicking an icon, the VT software links these images so that the VT reconstruction can be started just by clicking on another icon. In the meantime, the patient was free to leave and a date was set for the implant procedure.

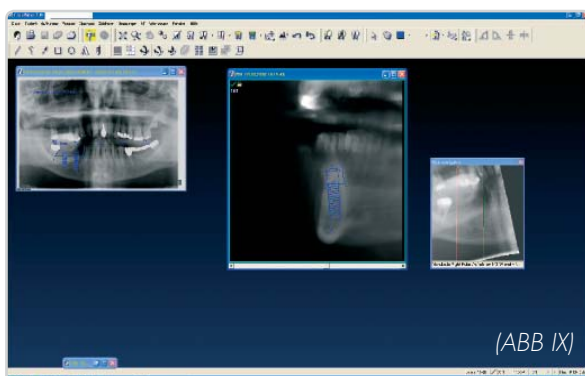
After approx. 10 minutes, the VT reconstruction was calculated. The results of these calculations are 256 slices with a minimum slice thickness of 0.23 mm in a 60 mm long, sagittal volume tomographic presentation. With the aid of a panoramic view in a navigation window, it is now possible to navigate through this ROI presentation. (ABB VIII)

With the means of this special presentation of a volume, exact information on the anatomic conditions of the area to be operated on, is now available along with any additional information required.

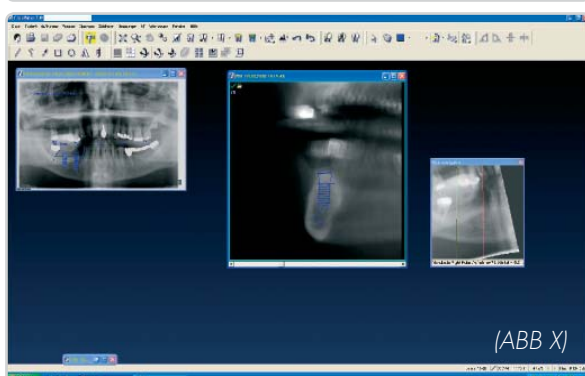




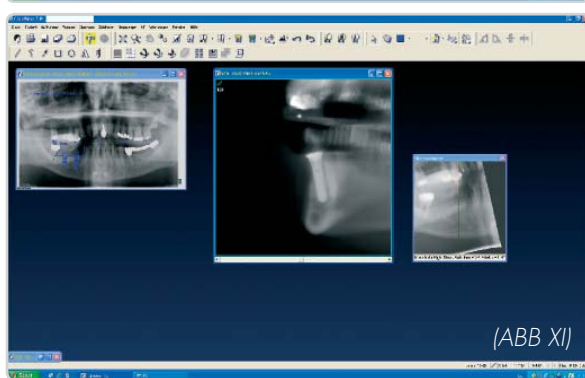
(ABB VIII)



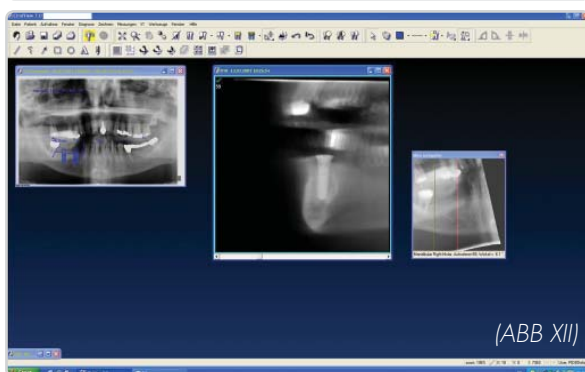
(ABB IX)



(ABB X)



(ABB XI)



(ABB XII)

It was now possible to exactly measure the condition of the bone structure and, with the help of the archived implant information included in the software, a virtual implant procedure could now be carried out.

(ABB IX, ABB X)

Based on the results available from the VT images, in reg. 045, a 4.1 x 14 mm Straumann Standard Plus dental implant and in reg. 046 a 4.1 x 12 mm Straumann Standard Plus dental implant was inserted.

After the insertions were complete, a VT image of this region was again created, which shows the implants centered in the jaw and exactly in the positions they were planned to be in. (ABB XI, ABB XII)

The prosthetic treatment of the implant reg. 045, 046 is carried out after an approx. four to five month healing period.

CONCLUSION

The OP200 D VT option represents a valuable diagnostic tool for the dental implant process, even in cases, which appear to be "straightforward".

In our office and day clinic, the use of the VT option for dental implant planning has become standard practice, because images can be made in reproducible form without requiring any additional time or effort.

The time required to analyze the images is manageable, because the illustration of the VT images, as opposed to a CT or DVT, is similar to the established and time-tested dental imaging process.

As is the case with any image processing software, even the VT option has its limitations. However, this OP200 D VT option is definitely an interesting, not to mention affordable alternative to DVT and CT.



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INSTRUMENTARIUM DENTAL develops, manufactures and markets high-tech systems and solutions for dental and maxillofacial imaging. We work in close co-operation with dental professionals, universities and other research centers in our quest to develop solutions that will meet and exceed the expectations of our customers. As the establisher of panoramic x-ray imaging we are committed to providing high clinical performance while still maintaining simplicity, ease of use and workflow efficiency. The Instrumentarium Dental product portfolio consists of premium quality imaging solutions:

- The 200-generation of the legendary Orthopantomograph® x-ray family, which serves demanding panoramic and cephalometric diagnostic needs both in film and digital environments.
- VT option for digital Orthopantomograph® units – a Volumetric Tomography imaging tool for implant site evaluation.
- Focus™ x-ray and Sigma™ M direct digital sensors – an intelligent solution for advanced intraoral imaging.

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