

User Case Abstract

Obstructive sleep apnea: the digital therapeutic splint

The author reports on his experiences in treating patients with sleep apnea with a fully digitally supported 3D analysis and splint therapy. He reports on his first experiences with the SICAT AIR System and the Optisleep therapeutic splint.

Methods

The author has already been working with innovations in and patients suffering from obstructive sleep apnea for 12 years. The objective was to optimize this indication field further and to work digitally to give patients an even more precise analysis and to enable safe treatment. The SICAT AIR System (SICAT, Bonn) was purchased in May 2016. The decisive factor for the purchase was the option of digitally fabricating a protrusion splint together with connectivity of the DVT and CEREC devices (Dentsply Sirona, Salzburg).

Results

The previously analogue process is now performed digitally with SICAT AIR in two sessions. The software enables analysis of the upper airways based on 3D X-ray data, merging the surface scan data of the maxilla and mandible, and on this basis, the precise planning and fabrication of a therapeutic splint - the Optisleep. The system is suitable for a fully digital workflow and allows the exact documentation of patient cases.

As a result, the author was able to familiarize himself quickly with the digital system, it is user-friendly and provides simple and intuitive operability. The author also comes to a positive assessment in terms of efficiency and convenience. Fast, precise and safe work is achieved by connecting the X-ray systems to the Sidexis 4 X-ray software. The optical scanning data can be integrated into the Sidexis 4 software within minutes and used for the SICAT AIR. These data can also be transmitted to SICAT in Bonn directly from the software to order the Optisleep. Furthermore, the data can be used immediately for analysis and visualization for the patient.

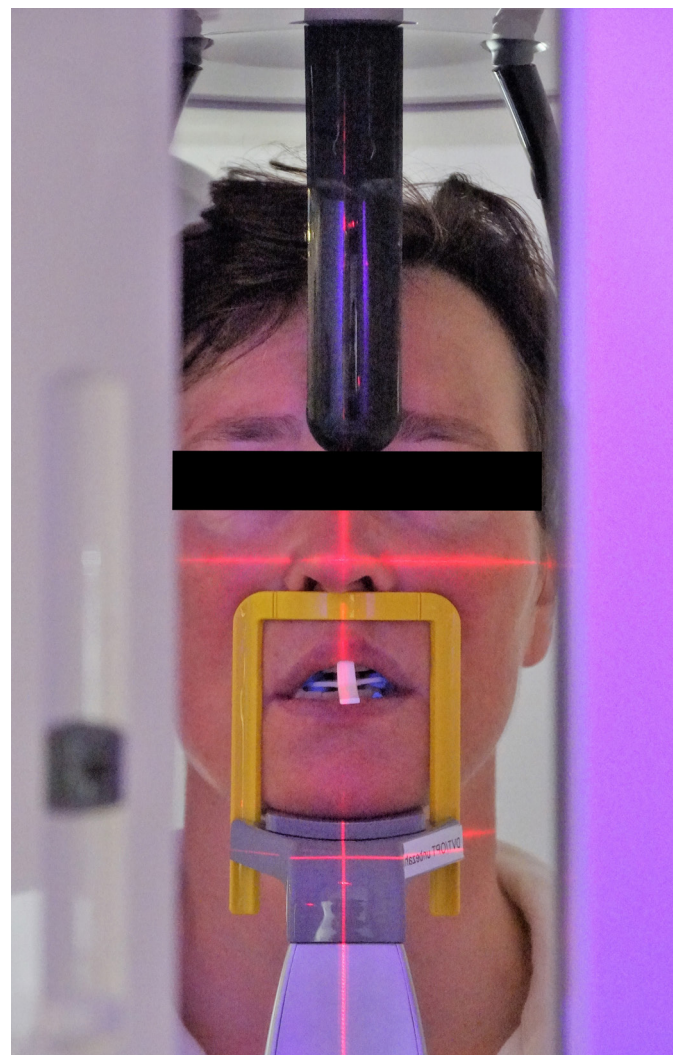


Fig. 1: Generation of DVT images 50-60 % protrusion.



Fig. 2: The mandible and maxilla are scanned with the CEREC Omnicam.

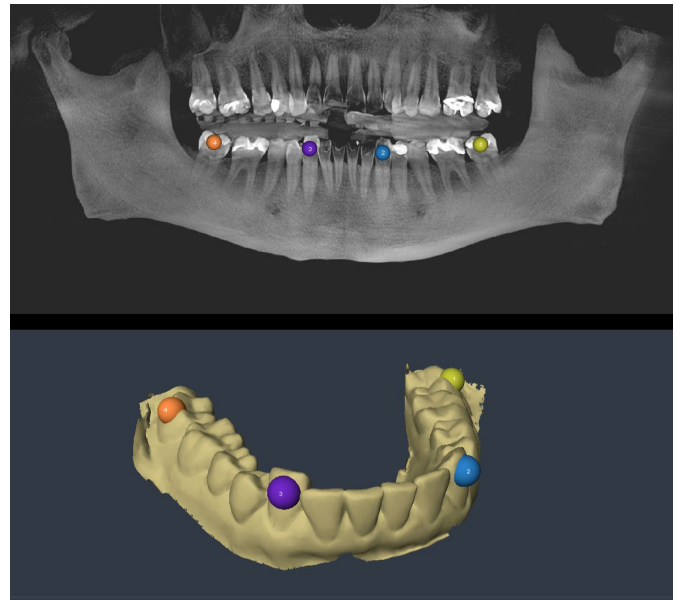


Fig. 3: DVT image (top) and CEREC scan (bottom) are merged by labelling the teeth with markers.

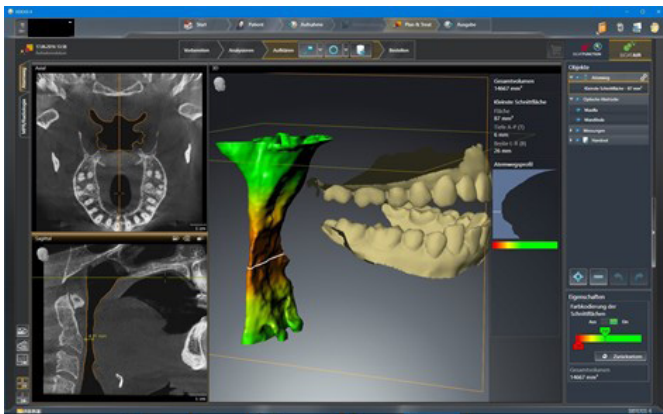


Fig. 4: View of the upper airways in the SICAT AIR software.



Fig. 5: The Optisleep therapeutic splints are fabricated directly from the software by SICAT.

The 3D image allows a precise representation of the anatomy of the upper airways and existing constrictions over several parameters. One can view the volume of the airways via SICAT AIR. The relevant constrictions are marked in color. One also has the option of comparing the airways: changes with and without protrusion are shown as a direct comparison, which allows prediction of the therapeutic effect and visualizes the effects of splint therapy on the temporomandibular joints. The extremely clear representation also lends itself to patient consultancy as the necessity for splint therapy can be illustrated in a comprehensible manner. All image data can be saved as screenshots and used for subsequent discussions and the final report with the referring colleagues.

Case history

A 55-year-old female patient with diagnosed obstructive sleep apnea presented in the practice. Being of slim and sporty stature, the patient did not represent a typical case of sleep apnea, and for reasons of comfort

she did not wish to wear a CPAP mask, but preferred a more delicate, comfortable and ideally metal-free solution.

A functional analysis was performed prior to taking the DVT images - in other words, checking occlusion, articulation, parafunctions and nasal breathing. The result was inconspicuous. First, a DVT image (Omnicam) followed by a CEREC scan of the maxilla and mandible were taken in a protruded bite position of 50-60 per cent of the maximum possible movement. The axial view of the airways layer shows the narrowest position in protruded position in a colored 3D representation, the constriction of the upper airways is indicated by the orange-red coloring. This allows judging whether the set protruded position is sufficient to free the patient of her symptoms. After correct setting, an Optisleep therapeutic splint can be ordered from SICAT through the software. Fabrication takes seven days.

The patient was very satisfied with the result and commented positively on the pleasant wear comfort of the splint. In addition, the symptoms of apnea, such as tiredness during the day and headaches, disappeared.

Summary

Therapeutic splints with SICAT AIR for the treatment of obstructive sleep apnea can be generated from the Orthophos X-ray system and CEREC in an extremely short time, thus dispensing with the necessity of unpleasant impression taking with trays and impression materials. Precise scans of the maxilla and mandible and 3D X-rays of the upper airways deliver exact data for fabricating perfectly fitting protrusion splints. The "Optisleep" has a very precise fit and patients can cope well with it. The splint is of high quality, durable, delicate and very comfortable to wear as the hinge function of the jaw is retained to a certain degree. Fitting the protrusion by changing the connectors is easy. The therapeutic success has been confirmed both subjectively and objectively (by creating polygraphics with the splint): snoring as well as the number of breathing interruptions during sleep apnea are reduced.



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Original paper published in:
Zahnzeitung Schweiz 2017;5(1-2):2-3.)

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