Angulated Screw Access concept shifts the functional and aesthetic boundaries of computer-aided implant dentistry

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One of the latest developments from DENTSPLY Implants is the angulated screw access (ASA) concept for ATLANTIS SUS Bridge and Hybrid. This feature opens up new functional and aesthetic options when fabricating screw-retained dental prostheses. It allows for the creation of a screw channel at an angle of up to 30° to the implant axis, thereby enabling a more functional and aesthetic screw-retained prosthesis.

The case presented here shows the individual steps involved, from implant positioning to the fabrication and delivery of a screw-retained bridge. Although the temporary prosthesis was screwed in conventionally, the final prosthetic restoration, delivered three months later, achieved much better aesthetics—exclusively due to the displacement of the screw-access channels.
Depending on the bone availability at the implant site, it is not always possible to place every implant in optimal positions for the prosthesis. Unfavourable implant axes make the fabrication of the prosthesis more difficult, which may significantly influence the functional and aesthetic outcome. The introduction of computer-guided implant placement has fundamentally changed this. This technology enables resources to be optimised through precise planning beforehand and simulation of treatment progress. The ATLANTIS ISUS angulated screw access fits this concept well. While the implant position remains the same, space can be optimised just by moving the screw channels, giving wide-reaching consequences for the final result.

Use of the ATLANTIS ISUS angulated screw access can allow a screw-retained prosthesis to be selected in numerous cases where otherwise the aesthetical and functional outcome would not be ideal.

When fabricating a titanium framework using CAD/CAM technology for a screw-retained prosthesis, the new ATLANTIS ISUS angulated screw access allows the screw access to be angled up to 30° to the implant axis. ATLANTIS ISUS uses a specific hexalobular screwdriver and screws that are identical to the originals except for the screw head interface. This way you can transmit the screw force to the screw axis even when it is applied at an angle. Figure 1a illustrates how an implant screw in an angled channel can remain accessible when use of a straight screw channel (Fig. 1b) would not be feasible.

_Case report_

The 41-year-old patient had been edentulous in the maxilla since the age of 26 and wanted a fixed restoration with immediate restoration. There was no contraindication for an implant-supported prosthetic restoration. Figures 2 and 3 show the initial clinical and radiographic situation.

The treatment plan followed the computer-guided implant treatment criteria for fixed screw-retained bridges. After bite registration (Fig. 4), an aesthetic try-in was made in the laboratory, and this was tried in the patient’s mouth. The dual scan prosthesis (Fig. 5) was made on this basis. Data from the subsequent CT scan was transferred to the SIMPLANT software (DENTSPLY Implants), which simulated the definitive prosthetic tooth positions (Fig. 6).
Figures 7 and 8 show the analysis of the radiographs, which were viewable in slices, thus allowing for very accurate analysis of the bone situation at the planned implant site. Although the patient had good bone volume overall (Fig. 9), the width of the alveolar ridge below the sinus was not always sufficient (Figs. 7 and 8). The aim was to place 8 implants as parallel as possible. The bridge that would later be screw-retained would occupy the original position of the natural teeth.

The dual scan prosthesis was superimposed (matched) with the data obtained from the CT scan in the SIMPLANT software to determine the most optimal implant position. The natural gingival margin was also taken into account (Fig. 10). Guided by the desired prosthetic result, the dentist also selected the implant positions with the aim of optimising the aesthetic result (Fig. 11).

The position of the ANKYLOS implants (DENTSPLY Implants) were planned using the SIMPLANT software.
and calculated so that the implant axes would be as straight as possible. Balance Base abutments (DENTSPLY Implants) were selected, and the SIMPLANT Guide (Fig. 12) was ordered. The Immediate Smile digital enabled further processing of the planning (Fig. 13) and fabrication of a temporary bridge (Figs. 14–16). While the SIMPLANT Guide was being fabricated, the laboratory used the Immediate Smile digital to mill a 3-D model that simulates the positions of the gingiva and abutments (Fig. 15). The temporary prosthesis (Fig. 16) was fabricated on this model. To allow for immediate loading and ensure splinting of the implants, this temporary prosthesis consisted of a metal framework and was veneered with composite.

At the start of the procedure, the SIMPLANT Guide was positioned on the gingiva and secured with four fixation screws (Fig. 17). The eight ANKYLOS implants (all 3.5 mm in diameter and either 8 or 11 mm long) were placed according to the manufacturer’s recom-
mandations (Fig. 18). After removing the guide, primary stability was checked and improved if necessary. The placement heads (Fig. 19) were removed, and the Balance Base abutments were selected according to the gingival thickness at each site (Fig. 20). Comparison of the previously produced simulation with the panoramic view following implant placement illustrates the precision of the procedure (Figs. 21 & 22).

The temporary prosthesis was made in a conventional manner and screwed in place (Fig. 23). The space did not allow for fabrication of a smaller tem-

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**Fig. 25** Transfer posts attached.
**Fig. 26** Basal view of the impression.
**Fig. 27** Model with gingival mask.
**Fig. 28** 3-D view of the master cast with gingival mask in ISUS viewer.

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**Figs. 29a & b** Transfer of the aesthetic try-in to the digital view.
**Fig. 30** Screw accesses displaced in occlusal/palatal direction.
porary bridge. The patient found the teeth to be too large and the dental arch to be positioned too far out (Fig. 24). After three months, the temporary bridge was removed and osseointegration was checked. Transfer posts for the open tray technique were screwed into the implants, and the impression was taken (Figs. 25 & 26). A master cast with gingival mask was then made and scanned (Figs. 27 & 28). To correct the dental arch...
and tooth shape, the definitive tooth set-up was checked in an aesthetic try-in to create an optimal basis for designing the final framework (Fig. 29).

To improve the aesthetics, the ATLANTIS ISUS angulated screw access was used when designing the definitive restoration. As described above, this feature allows access to the implant screw even when the screw access is angulated. In the present case, this meant optimisation of the space in the tooth set-up angle. Figure 30 shows the straight screw channel, which was previously in the incisal margin of the front tooth. The arch could be made smaller in the posterior region as the screw channels there could be displaced into the centre of the masticatory surfaces. As a result, the definitive restoration achieved better results in terms of aesthetics and function than that of the temporary restoration, although the implant positions remained the same. Figures 31 to 34 illustrate the computer-aided design with 3-D software at DENTSPLY Implants’ production facility.

The definitive titanium framework was modelled in the software and then milled (Figs. 35–39). The framework was then veneered with composite and completed (Fig. 40).
Conclusion

The ATLANTIS ISUS angulated screw access increases the aesthetic and functional options by enabling displacement of screw channels for screw-retained implant-supported bridges (Figs. 41 and 42). DENTSPLY Implants now offers access to the screws for prosthetic restoration that can be requested up to 30° of the implant axis. Figure 43 shows epicrestal placement of the eight ANKYLOS implants. By using ATLANTIS ISUS angulated screw access the possibilities for when a screw-retained implant bridge can be used increases. It fits the computer-guided implantology principle perfectly and is thereby further optimizing resources (Fig. 44).

Editorial note: A complete list of references is available from the publisher.