Fig. 1: The initial exploratory findings for the patient revealed periodontally normal dentition with agenesis of tooth 12 and microdontia of tooth 22.

Fig. 2: Instead of absent tooth 12, the incisor was moved using orthodontics.

ISY – THE INNOVATIVE IMPLANT SYSTEM IS BECOMING EVEN MORE FIRMLY ESTABLISHED IN DENTAL PRACTICES

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The past few years have seen a myriad of new ideas develop in our field of work with many established systems being put under close scrutiny based on a changing awareness of economics, science, and innovation. Innovations should primarily aim to make improvements, with the tried and true revealing itself in the process and the superfluous pruned away. In the eyes of Bob Dylan, "a man is a success if he gets up in the morning and gets to bed at night, and in between he does what he wants to do." Innovation and limitation contradict one another – even when working, a tool should enable its user to work creatively and freely and to implement the best ideas. Since the introduction of the iSy Implant System, it has become more and more firmly established in our department, particularly in situations where it becomes apparent that it creates freedom for both the clinician and the patient. It would be short sighted to label the iSy system as a cost-effective alternative for limited indications because it opens up enormous opportunities, mostly in the details, that only become apparent at second glance. Details that sometimes make the critical difference and in many aspects are even unique.

Initial findings

The 22-year-old patient presented for advice to the implant outpatient clinic of the Clinic for Oral and Maxillofacial Plastic Surgery at the Frankfurt University Hospital for the first time in 2014. Her primary concerns at the time were agenesis of tooth 12, in place of which tooth 13 was moved using orthodontics, and a missing tooth 26 that had been extracted four months prior. Both gaps had not been provisionally restored at the time of the initial presentation. The initial exploratory findings indicated a preserved, well cared for and periodontally normal, youthful dentition. Along with the agenesis of tooth 12, microdontia of tooth 22 was also observed **(Fig. 1 and 2)**.

The patient met all the prerequisites for a safe, planned implantation with transgingival healing [1, 2]. The clinical and radiological examinations classified the bone bed horizontally and vertically as sufficient with a broad band of attached gingiva covering the bone bed. Augmentation measures around the hard and soft tissue were thus not indicated.

The patient wanted to eliminate both gaps; a bridge restoration was discussed as an option, but after explaining the benefits and drawbacks, a restoration of this type was ruled out. Along with the insertion of two implants, the restoration of an harmonious and symmetrical anterior upper jaw using the adhesive technique was also planned together with the patient. The patient declined surgical crown lengthening of tooth 22.

The preservation of hard and soft tissue throughout the entire treatment and elevation procedure was prioritized, and in the anterior area in particular the challenge was to achieve a balanced and natural red/white esthetics [3, 4].

Implantation treatment sequence

The procedure proceeded without any problems under local anesthesia and was carried out in accordance with the standard iSy protocol. The implant bed was revealed using a minimally invasive crestal incision with the basal part of the attached gingiva of the vestibular and

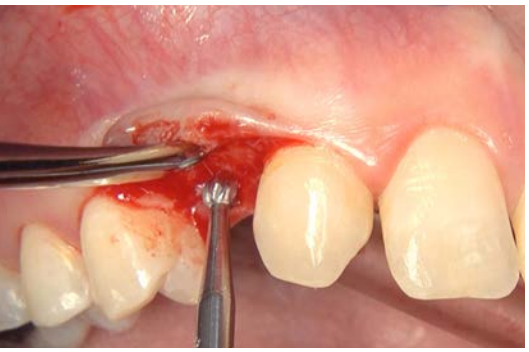

Fig. 3: After the minimally invasive crestal incision, the implant bed was first prepared using the round burr.

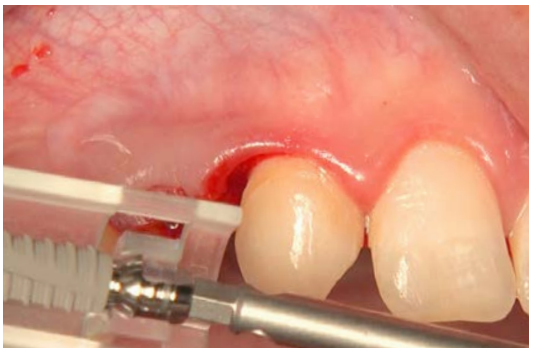

Fig. 4: The iSy implant was inserted according to the iSy drilling protocol using the pilot drill and single-patient form drill.

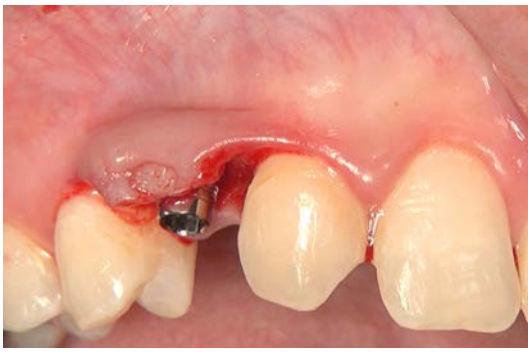

Fig. 5: The iSy implant underwent transgingival healing. The basal parts of the attached gingiva of the vestibular and palatal flaps were not detached.

Fig. 6: Using a 4-mm punch, the mucosa in region 13 was precisely shaped around the implant base.

Fig 7: Only that area critical for an harmonious gingival line was specifically removed.

Fig. 8: Individual button sutures were used to suture the minimally invasive incision around the gingiva former inserted into the implant base.

Fig. 9: To achieve an esthetic emergence profile, the soft tissue around the gingiva former in region 26 was removed using a slightly larger punch.

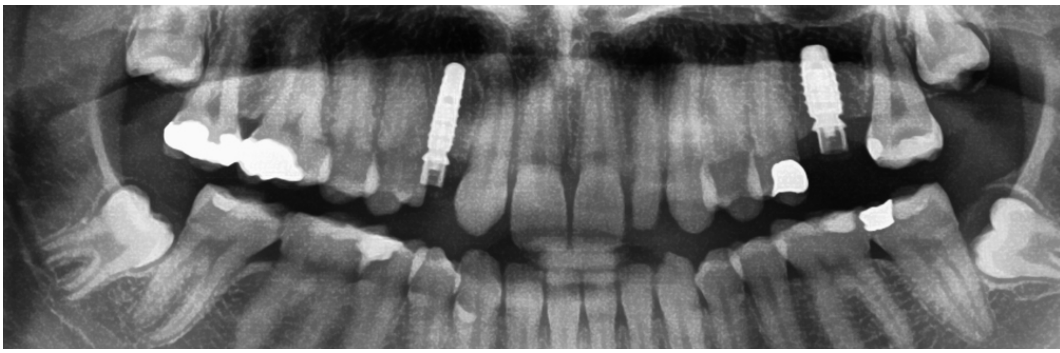

Fig. 10: A radiographic image was taken at the end of the surgical procedure to check the situation. It shows an iSy implant with Ø 3.8 mm and a length of 13 mm in region 13 and in region 26 an implant of Ø 4.4 mm / L 11 mm with the pre-mounted implant bases that bear the PEEK gingiva formers.

palatal flap not detached. The drill sequence in the iSy System is made up of a round burr, the Ø 2.8 mm pilot drill, and the single-patient form drill corresponding to the implant diameter, with the latter being supplied with the implant **(Fig. 3 to 5)**.

In the area of the vestibular flap in region 13, after insertion of the implant the mucosa was precisely shaped using a 4 mm punch. It is recommended to use the punch only after completing the implantation because at this point only that area that is critical in this case for an harmonious gingival line is precisely and specifically reduced **(Fig. 6 and 7)**.

At the time of the implantation, a wide gingiva former was not yet supplied with the iSy System which was why a punch was also used here that had a diameter slightly larger than that of the gingiva former. In this way, a naturally shaped emergence profile is effectively obtained in order to optimally shape the soft tissue for a molar [5].

The suturing was done using Prolene 6/0 (Ethicon) and individual button sutures **(Fig. 8 and 9)** and radiographic imaging was carried out to check the situation **(Fig. 10)**. When the sutures were removed seven days later, the tissue around the PEEK gingiva former was completely free of irritation **(Fig. 11 to 13)**.

Fig. 11: Seven days after the surgical procedure the sutures were removed.

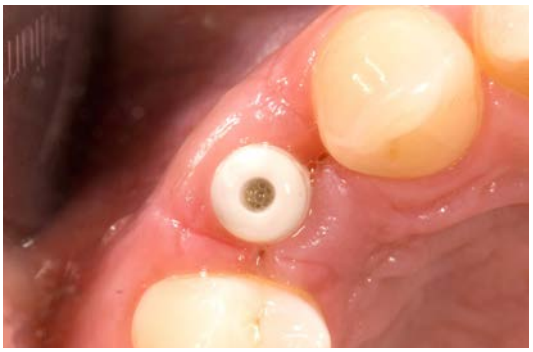

Fig. 12: The soft tissue was completely free of irritation.

Fig. 13: Four weeks postoperative the patient attended for impression taking for a temporary restoration.

Fig. 16: Using the handle, the mounted gingiva formers were removed.

Fig. 17: The iSy implant base remained in the implant…

Fig. 18: …and the multifunctional cap was simply attached for the impression taking.

Prosthetic restoration

Impressions were taken of the implants using Impregum™ (3M Espe) four weeks after surgery with mucosal conditions completely free of irritation. The path from the intraoral situation to the master model follows an intuitive workflow and does not require the implant base to be removed. Two multifunctional caps are included as standard with each iSy implant along with the pre-drill and the cover cap. As well as conventional pick-up impression taking, the multifunctional caps can be used as scan bodies, for immediate temporary restorations, or even coding of bite registrations.

For the impression taking, only the gingiva formers have to be removed using the detachment instrument and replaced by the multifunctional cap. Both lock in securely and index precisely on the shoulder of the factory-mounted implant base **(Fig. 14 to 20)**.

On the prepared master model, the implant and soft tissue situation was digitally recorded using a Cerec scanner (Sirona), and a provisional crown was designed in region 13 **(Fig. 21)**.

The gingiva former in region 13 was replaced by a milled PMMA temporary restoration in order to individually shape the soft tissue in this area. The desired emergence profile was created in the gingival mask of the master model so that it could be precisely transferred to the definitive restoration [6].
The temporary restoration was removed from the occlusion and designed proximally to assure balanced shaping and stabilization of the papillae during the complete osseointegration **(Fig. 22 to 24)**. In regio 26 the gingiva former could be repositioned after the impression taking and left until the definitive integration.

The planned single-tooth restoration in the left upper jaw was implemented with a screw-retained, hybrid abutment crown made of IPS e.max® CAD with the design and fabrication of the molar crown carried out completely using the CAD/CAM process with a Cerec milling unit [7, 8].

Generally, the screw channel is first sealed with a temporary light-curing composite to ensure the fixing screw remains easily accessible until the first check-up if required. The channel is then sealed with a tooth-colored composite.

One of the major advantages of hybrid restorations is the precise factory fit of the connection of the titanium base to the ceramic block fabricated in the CAM process. The connection is assured precisely using indexing and it allows the fabrication of both screw-retained, one-piece restorations and individual mesostructures. The crown is also cemented on the base extraorally. This allows any residual cement to be easily removed and the transition can be beautifully polished [9, 10].

IPS e.max® CAD is a lithium disilicate (LS2) glass ceramic with a very high tensile strength (360 MPa) and not only for this reason is it one of the main components for CAD/CAM fabricated single-tooth restorations in our clinic since its market introduction.

Fig. 14: Fully anatomical soft tissue conditioning was performed using a temporary restoration on the iSy implant base.

Fig. 15: At this point the soft tissue was stable and healthy and the gingival contour was harmonious.

Fig. 19: The multifunctional caps click audibly onto the implant bases. The pronounced undercut holds the caps in the impression material with no rotation.

Fig. 20: Using the pick-up impression method, impressions were taken of the multifunctional caps.

Fig. 21: After the cast fabrication, the implant position was scanned in.

Fig. 22: The temporary restoration was fabricated in the CAD/CAM process using high-performance PMMA.

Fig. 23: The temporary restoration was evaluated both for occlusion and function.

Fig. 24: Until the osseointegration was complete, the balanced shaping and stabilization of the papillae was assured by the design of the temporary restoration.

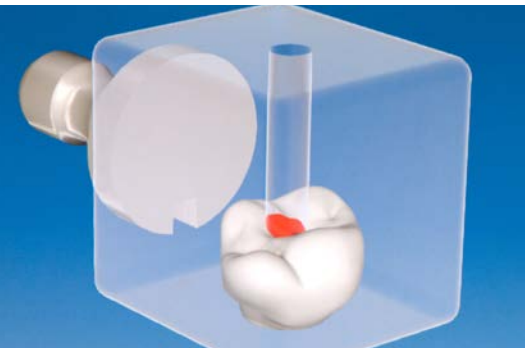

Fig. 25: The hybrid abutment crown was fabricated in region 26 using the CAD/CAM process.

Fig. 26: The anatomic hybrid abutment crown was milled from the lithium disilicate glass ceramic IPS e.max®.

Fig. 27: The "blue" crown was customized before the firing process using staining shades.

Fig. 31: The customized titanium abutment was screwed in…

Fig. 32: …and the contouring of the soft tissue was checked with the zirconia crown framework.

Fig. 33: The custom layered zirconia crown was cemented onto the titanium abutment and the remaining cement was carefully removed.

IPS e.max® CAD is polished in a "soft" interim stage in which the material has a bluish color. The customization can then be carried out using e.max® Ceram stains and a subsequent crystallization firing at 840–850°C during which the final tensile strength of 360 MPa and the desired properties such as tooth color, translucency, and brightness are produced.

For this patient an LT block with low translucency was selected. This is very suitable for fully anatomical hybrid crowns in the posterior area **(Fig. 25 to 29)**.

In region 13 a slender conventional titanium abutment was fabricated for the definitive restoration. The individual ceramic was layered on a milled zirconia framework and the restoration was cemented intraorally **(Fig. 30 to 33)**.

The success of this standardized treatment concept is illustrated at the recall after one year. The gingiva is stable and attached around the implant restoration in regions 13 and 26 **(Fig. 34 to 36)**.

Conclusion

iSy is not only a cost-effective alternative but also a system with enormous potential for the practice that enables completely free and creative work. Even if the present case does not represent an instance of major surgery, it nevertheless represents a majority of the routine indications for many colleagues enthused about implantology.

After the expansion of the system this year, initial limitations have also been eliminated. The iSy family was expanded by a 7.3 mm short implant and subgingival healing is now just as easy as contouring for wider emergence profiles.

Time will tell whether this concept will resemble a true innovation. But there is already much to suggest it will.

I am very grateful to MDT Thorsten Peter, Deputy Head of the dental service of the Polyclinic for Dental Prosthetics, and Mr. Andreas Kusch, dental technician and CAD/CAM specialist, who made a considerable contribution to the outcome achieved thanks to their great support.

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Fig. 28: After firing, the anatomical crown emergence profile and the occlusion were checked on the model.

Fig. 29: The anatomical crown shape and the precisely created proximal contacts encourage stabilization of the interdental papillae.

Fig. 30: In region 13 a slender titanium abutment was used to cement an individually veneered zirconia crown.

Fig. 34: The screw access channel was sealed with composite.

Fig. 35: One year postoperative sees a stable gingival cuff and closed interdental spaces.

Fig. 36: With the iSy implant concept, the requirements of an esthetically challenging reconstruction in the anterior area are successfully satisfied.

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