Combining orthodontics with a zirconia collar implant

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Fig. 1: Front view in occlusion. **Fig. 2:** Lower occlusal view. **Fig. 3:** Pre-operative intraoral view of LL4.

A male patient in his thirties presented with a submerged LL4 that was very mobile and had a poor prognosis. The patient was fit and well with no medical issues. He came to the practice on a recommendation and his main concern was the position of his teeth—he had an increased overjet and wanted straighter teeth. The patient's dentition was healthy and his periodontal condition was good. Treatment options were discussed with the patient. These initially included no treatment or orthodontics—through either myself or a specialist orthodontist—to correct the position of the teeth, in addition to extraction and replacement of the LL4. Replacement options for the LL4 were also offered, including no treatment, dentures, a dental bridge or a dental implant. The patient did not want a fixed orthodontic appliance. Instead, he preferred a discreet removable solution, as he was conscious of being in a client-facing job role. As such, he decided on extraction of the LL4, orthodontics with transparent aligners system and replacement of the LL4 with an implant. Following extraction of the LL4, we knew from the outset how much space needed to be maintained ready for implant placement (Figs. 1–3). Aligners procedure was performed over 18 months to level out and align the lower arch, as well as to correct the patient's increased overjet to the point where he was happy. Orthodontic treatment effectively maintained the space left behind in the LL4 for the implant to be placed.

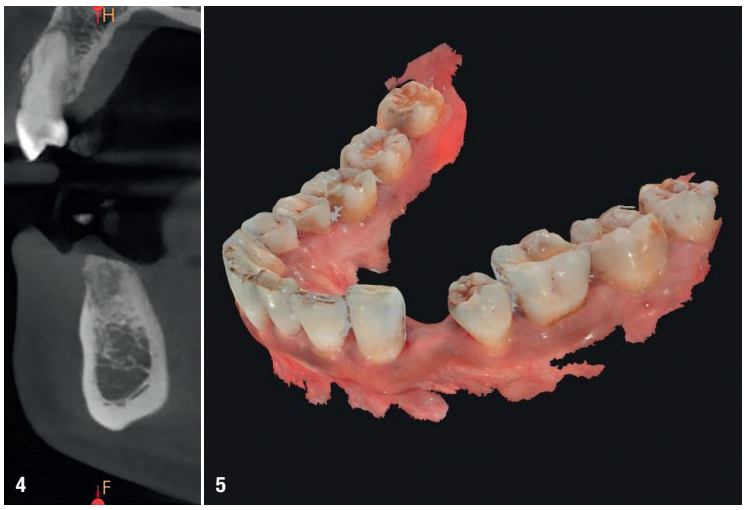

Fig. 4: CBCT scan close up of LL4. **Fig. 5:** Prosthetic-driven implant planning model.

Implant consultation

When the patient returned to the practice to discuss implant treatment, different implant systems were presented. The patient chose the Z1 implant (TBR Dental) as he had a thin gingival biotype, so the zirconia collar design of this implant would enable better aesthetics to be achieved. The patient had the bone structure to support either a bone- or tissue-level implant, so we were fortunate enough to be able to choose a solution that met the clinical needs of the patient best.

Treatment planning

Treatment planning began with taking CBCT scans (Figs. 4 & 5) to determine the position of the inferior alveolar nerve (IAN) and the mental nerve. This was essential to plan optimal placement of the implant. Injury to the IAN as a result of

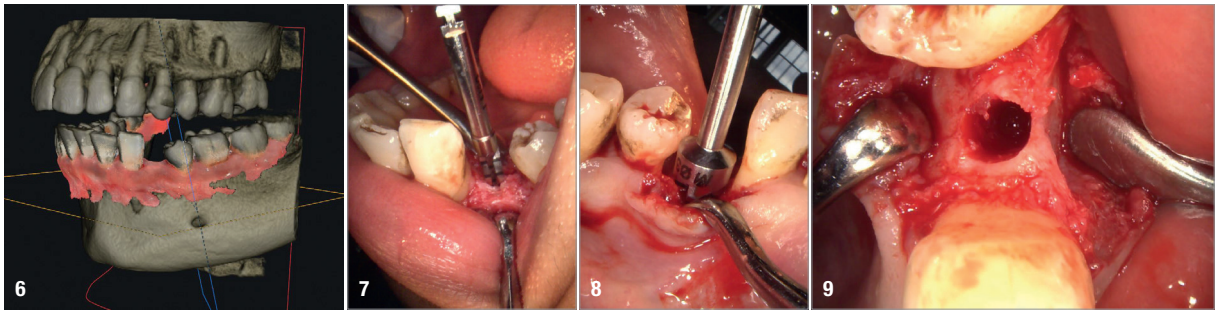

Fig. 6: 3D render with prosthetic-driven implant planning model. **Fig. 7:** Buccal view of TBR drill. **Fig. 8:** Lingual view of countersink. **Fig. 9:** Prepared site for implant placement following countersink.

implant surgery can cause severe pain and altered sensation in the face, which can affect everyday activities such as speaking and eating.[1] The CBCT scans also facilitated visualisation and assessment of the patient's bone density, so that treatment could be planned from a 3D perspective (Fig. 6). An implant (3.5 mm in diameter, 10.5 mm in length; TBR Dental) with a zirconia collar height of 1.5 mm was chosen. Each stage of the procedure was discussed with the patient, before he consented to treatment and surgery could begin.

Implant placement

The surgical aspect of treatment was straight-forward, as it had been planned meticulously in advance. A delayed implant placement protocol was followed that included raising a flap. This technique involved making an incision in the gingiva and lifting a flap to provide access to the bone. The patient's bone density ensured that a bone graft procedure was not necessary for implant placement, which enabled countersinking of the implant (Figs. 7–9), meaning the bone was prepared for the zirconia collar of the implant to be placed slightly below the crestal bone (Figs. 10 & 11). This is a protocol the author typically follows to achieve better integration of the implant with the bone and, consequently, improved gingival attachment to the zirconia collar for enhanced aesthetics. The zirconia collar of the implant acts like a healing abutment to encourage gingival flaring and soft tissue healing for a good gingival profile to develop. This procedure allows the hard and soft tissue to heal at the same time as the gingiva is not handled several times—as it would be with a bone level implant. In this case, a cover screw could be fitted to the implant and left for 3 months to achieve excellent osseointegration. The surgical site had been sutured. A radiograph was taken to confirm that the implant was positioned correctly. The patient was sent away with appropriate post-surgery care instructions, which involved wearing his retainers as normal to maintain the space in the LL4 during healing.

Restoration

The implant was reviewed after three months and found to be stable. The soft tissue was pink, healthy and firm, and the LL4 space had been effectively maintained as a result of the patient wearing his retainers. The implant was restored through a digital workflow. A CS 3600 intraoral scanner was used to scan the lower and upper arches with the implant cover screw in place, which was then removed and the focus area scanned again to capture the emergence profile (Fig. 12). A TBR scan body was then placed (Fig. 13) and a final scan taken (Figs. 14 & 15). This was checked and sent to the laboratory to produce a screw-retained E.max crown on a pre-manufactured, titanium-base abutment from TBR. The patient was invited back to the practice to have the final restoration fitted. The E.max crown was seated correctly onto the implant (Figs. 16 & 17) and the access hole was sealed with PTFE tape (Fig. 18), before being filled with

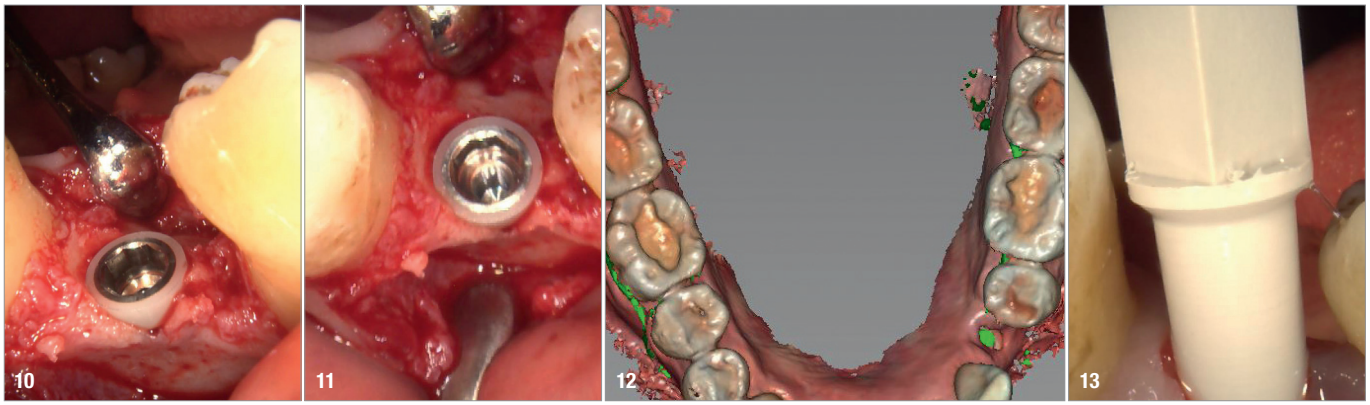

Fig. 10: Buccal view of implant placement. **Fig. 11:** Occlusal view of TBR 3.5 x 10 mm implant placement. **Fig. 12:** Intraoral scan of lower arch with cover screw present on implant. **Fig. 13:** Buccal view of scan body seated in LL4.

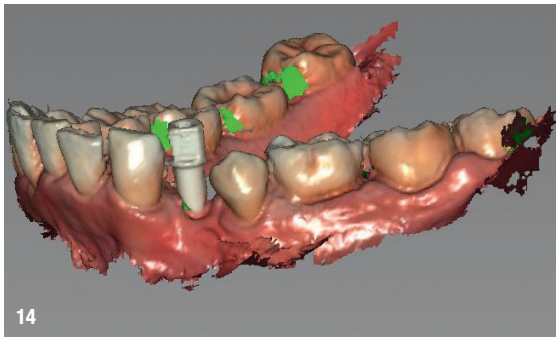
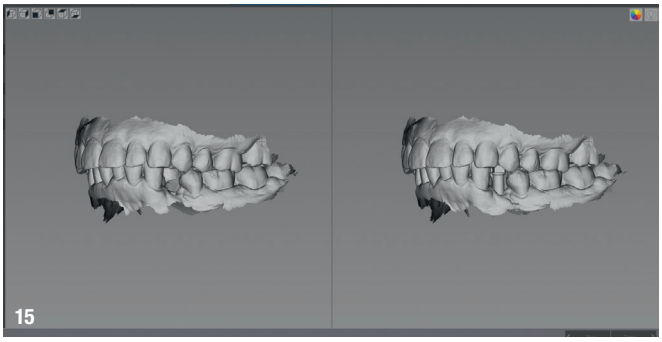

Fig. 14: Buccal view of lower arch IO scan with scan body. **Fig. 15:** Comparison model of LL4 region with and without scan body.

a temporary dressing. This was removed after a week and the crown tightened to 25 Ncm (Fig. 19). PTFE tape and composite were used to seal the screw-access hole. The patient was delighted with the overall outcome (Figs. 20 & 21).

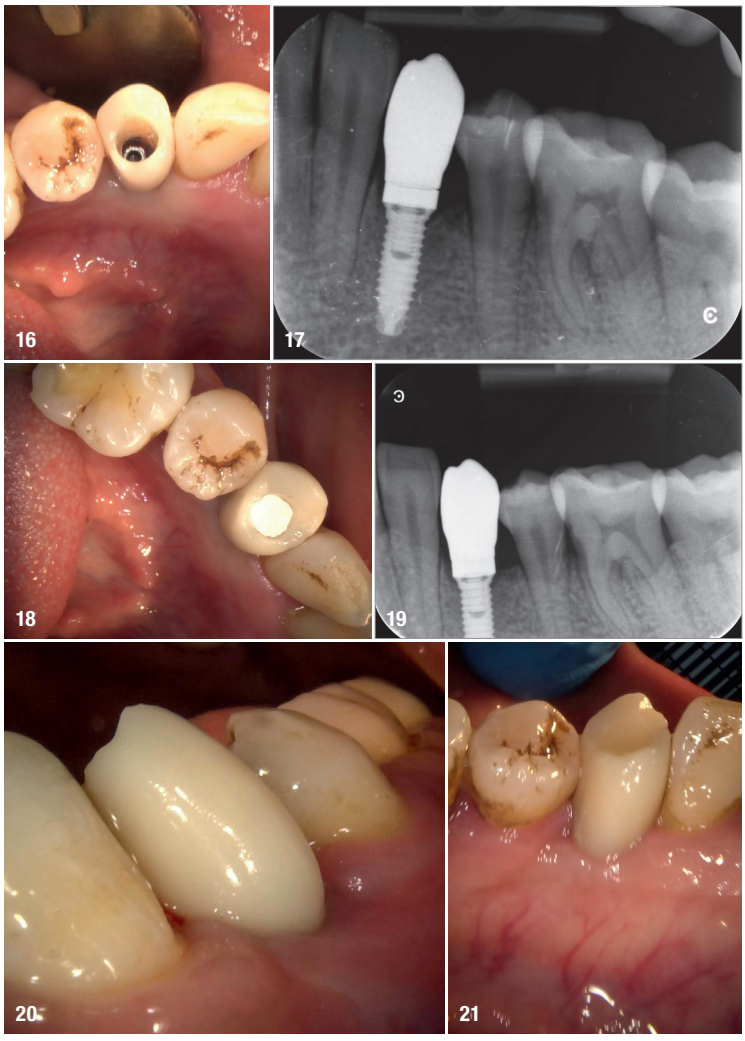

Fig. 16: Occlusal view of screw-retained E.max crown seated in LL4. **Fig. 17:** Post-op palatal aspect of LL4 showing initial seating of final crown. **Fig. 18:** Screw-retained E.max crown with PTFE tape in access hole. **Fig. 19:** Post-op PA LL4—Showing Final Seating of screw-retained E.max Crown. **Fig. 20:** Buccal view of final screw-retained E.max crown. **Fig. 21:** Lingual view of final screw-retained E.max crown.

Discussion

In this case, a combination of orthodontics and implant treatment ensured that a predictable and highly satisfactory result could be achieved. The unique design of the Z1 implant makes it a highly versatile system that can be adapted according to the clinical situation. The zirconia collar also limits the adhesion and proliferation of bacteria to help avoid infection and promote a longer life-span of the dental implant. Moreover, its zirconia collar facilitates treatment by protecting the crestal bone and soft tissue from infection and promoting natural gingival growth.[2,3]

Conclusion

This case emphasises the importance of careful treatment planning and choosing a top-quality implant that allows to achieve excellent aesthetics and function.

about the author

Dr Kunal Shah is the principal of LeoDental in London. He graduated from the University of Birmingham in the UK, was selected as a finalist for Young Dentist of the Year—South in the Dental Awards 2018 and has the accolade for the best implant and imaging clinic in London in 2018. He has a keen interest in the topics of digital dentistry, implantology and restorative dentistry specific to direct resin composites and impression materials, and has published several articles in the professional press and lectured internationally. Dr Shah is also a clinical mentor for students on the year-long postgraduate implant course at LeoDental in conjunction with SmileTube.tv.

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