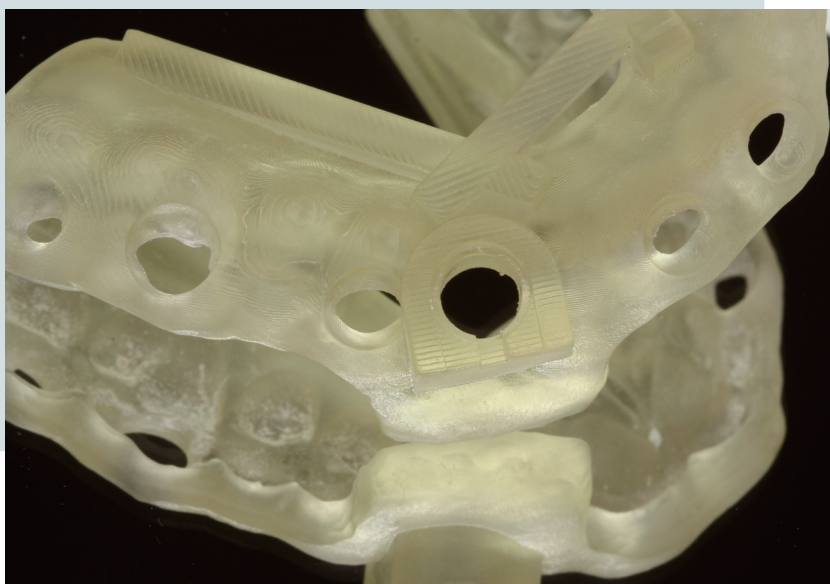


Can we trust guided surgery in tight spaces?

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ABSTRACT

Space limitation remains a challenge for dental implant placement.

Whereas free-hand surgery can be risky for adjacent structures and affect the esthetic outcomes in demanding cases, the use of a surgical guide limits the visual access and built-in errors must be considered. This case report covers a 40-year-old female who underwent implant placement using R2GATE to replace a failing deciduous upper cuspid, where the esthetic demands were critical due to high smile line and the implant positioning was challenging due to a limited mesio-distal space.

INTRODUCTION

Recent publications have revealed significant differences between various computer-assisted implant surgery systems in terms of the accuracy parameters, namely angular deviation values up to 7.82° and platform deviation values up to $1.18 \pm 0.19\text{mm}$ (1, 2, 3). The R2GATE system has been shown to be a powerful tool with good accuracy(2), which is particularly important when facing tight interdental spaces and other anatomical boundary conditions that require special care in order to avoid errors during planning and surgical execution that can ultimately result in failure.

A healthy 45-year-old female presented with complaints of tooth movement and esthetic impairment of the upper left cuspid position. Clinical and radiographic examination revealed a deciduous cuspid in the arch. The root length and resorption explained the tooth mobility, while abfraction of the deciduous crown, a high smile-line, crossbite, and short clinical crown were all responsible for the esthetic impairment (Figs. 1,2).



Fig 1. Intra-oral clinical appearance at initial stage

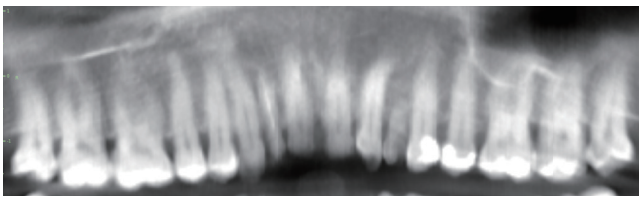


Fig 2. Panoramic view of maxilla at initial stage

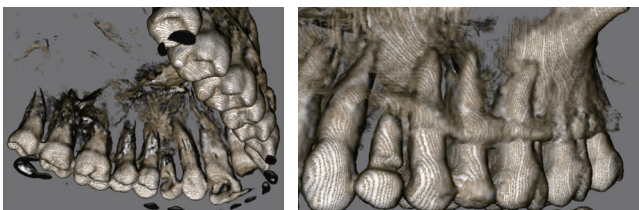


Fig 3. CT scan detail of the maxilla. Palatal and buccal views

Further case analysis revealed the absence of the upper left lateral and the positioning of the upper left cuspid in a lateral position. The CT scan shows a tight interdental space with a reduced apical space due to the tipping of the cuspid distal root (Fig 3).

While initial correction of the crossbite was advised, the patient refused and only wanted to address the main complaint. Thus, immediate dental implant placement after extraction with a direct provisional was planned. The CT scan and silicone tray impressions (no intraoral scan was available) were sent to the R2GATE® Center (Corus, Porto, Portugal). An AnyRidge implant (3.5mm diameter/8.5mm length) was selected based on the case planning using R2GATE® software (Figs. 4, 5), and after clinical validation a tooth-supported sleeveless stent was designed for the implant placement (Figs. 6, 7).



Fig 4. R2GATE planning, 3D rendering, Buccal view

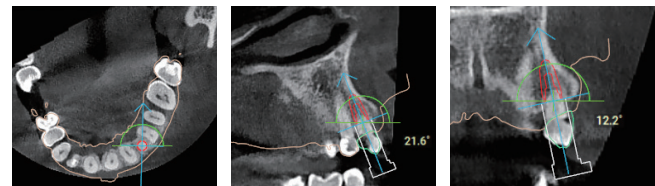


Fig 5. Occlusal and coronal views of R2GATE planning

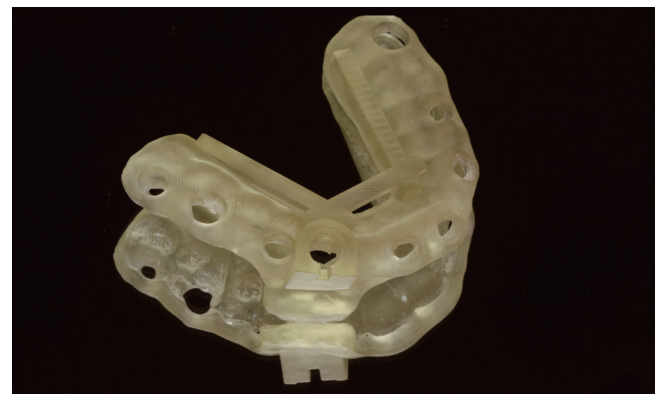


Fig 6. Sleeveless guide for implant placement after milling

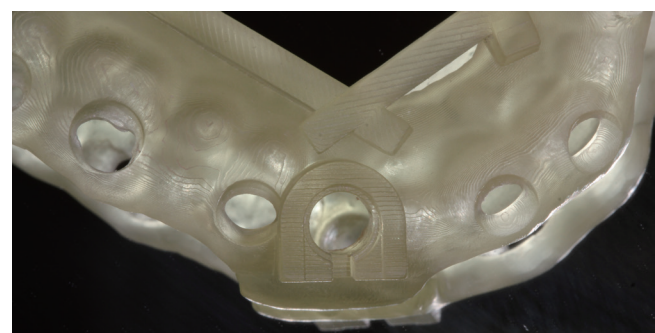


Fig 7. Detail of the surgical access on the guide and windows for fit check

The failing tooth was extracted under local anesthesia. Windows designed on the occlusal surfaces of the neighboring teeth allowed for a successful position-check of the stent. The R2GATE® AnyRidge drill kit was used for the drilling and implant placement following the

manufacturer's suggested protocol, and the total surgery time was 5 minutes. Intra-oral x-rays were taken to check the implant position, and a clinical view of the axis upon placement is shown in Fig 8. The torque and ISQ values allowed for immediate loading and a direct restoration was performed chair-side using a provisional cylinder (1.5mm) and composite. The occlusion was addressed to avoid any contact due to intercuspitation or lateral movements during the provisional phase (Fig 9). After 3 months, the provisional was removed and final tray-impressions were performed for the final crown (Zirconia, Ti Base 1.5mm) (Fig 10, Fig11). The 2-year clinical and radiographic follow-up are presented in Fig 11 & 12, where the hard and soft tissue stability demonstrate a successful outcome.

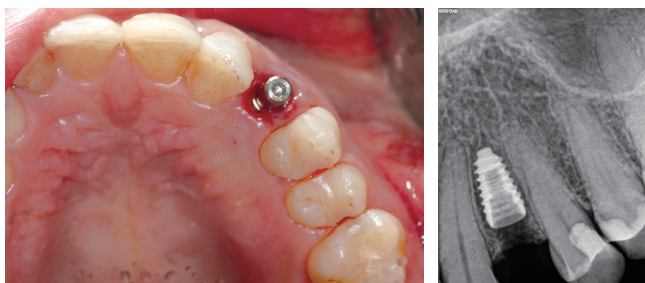


Fig 8. Intra-op check of emergence profile and radiographic position of the implant. Note the proximity with the neighboring teeth.



Fig 9. Clinical buccal view of the provisional in place and radiographic check of positioning

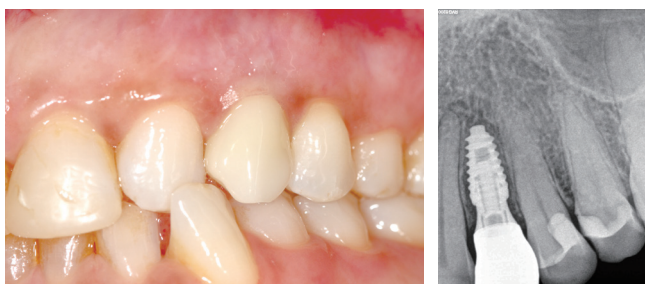


Fig 10. Final Zirconia on Ti interface at the time of installation and radiographic check for positioning



Fig 11. Extra-oral view of final result in wide smile. Check how high the smile line is.



Fig 12. 2-years follow-up on clinical and radiographic stability

CONCLUSION

This case report shows a highly predictable option for such cases and how accurate and reliable R2GATE assisted surgery can be. Performing easy and fast surgery, along with a reduced chance of error that can result in failure is an obvious option for any clinical setting.

PERSONAL THOUGHTS

My first experience of using guided surgery for implant placement was back in 2008 with another system. Guided procedures are not for inexperienced users and the errors are cumulative, starting with the treatment plan all the way to the surgical execution. Minor cumulative errors are not acceptable today, especially in demanding situations like the present case. A minor deviation would have resulted in root destruction of the adjacent teeth and even implant failure with disastrous esthetic consequences considering the tooth position and smile exposure. My experience with the R2GATE® system – from planning thru to surgery – has been very positive. Plus, in this case, the deep implant placement while maintaining the proximal bone was decisive in the esthetic outcome.

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