

# Maximize the accuracy of OneGuide on edentulous patient using orthodontic mini screw

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## Introduction

There are many advantages in guided surgery, such as reduction of operation time, reduction of patient's pain, and reduction of risk harming important anatomical structures. Despite these advantages, there are some limitations to consider when planning a guided surgery for edentulous patients. In edentulous cases, accuracy in superimposing the model and CT scan is poor. For superimposition, reference points on hard tissue are necessary. However, the residual alveolar bone without a definite morphology is insufficient.

A radiographic guide that can be provided by OneGuide team would make better overlap. However, the problem of requiring one more visit for 'CT taking with delivered radiographic guide' still remains. In addition, the radio graphic guide is supported only by the soft tissues, leaving problems that the guide template is able to slip during CT scan and during surgery.

## Purpose

To overcome such limitations, edentulous patients also need a solid reference that is radio-graphical marker and can be used as a supportive part during surgery. Therefore, in our clinic, we immediately made reference points in the patient's mouth using orthodontic mini screw. This case report presents this novel method and discusses its accuracy.

## Materials & Methods

### Patient Information

- Age / Sex : 46 / M
- CC : Need to extract mandibular molars
- Medical history : non-specific
- Dental history: #12,13,14 fractured, provisional denture (pt. does not want further treatment on maxilla)
- Tx Plan: #35-37, 45-47 ext, implant retained overdenture

### Pre-op panoramic radiograph



### Treatment Plan

#33, 43i osstem TSIII SA 4.5x7mm + locators + denture

### Orthodontic Screw (Osstem, Korea)

Ti-6Al-4V, Machined surface. D Ø1.4~1.8 L 6~10mm

A minimum diameter of 1.4 mm is recommended to prevent fractures. Adding of resin balls around the necks is required for avoiding bubbles on impression or breakage of cast.

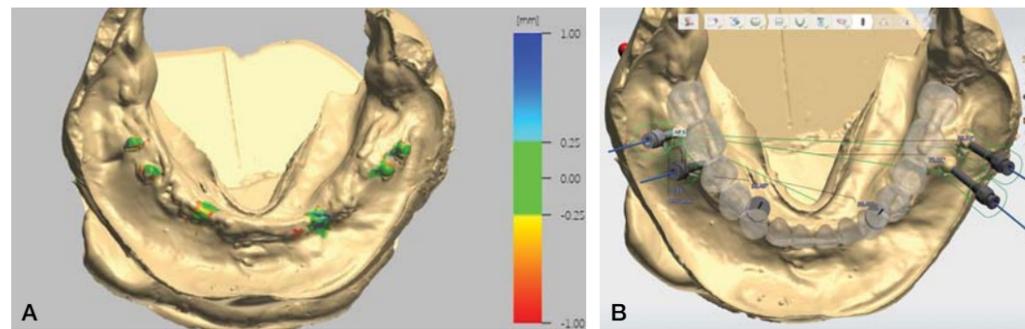
### Location for mini screw



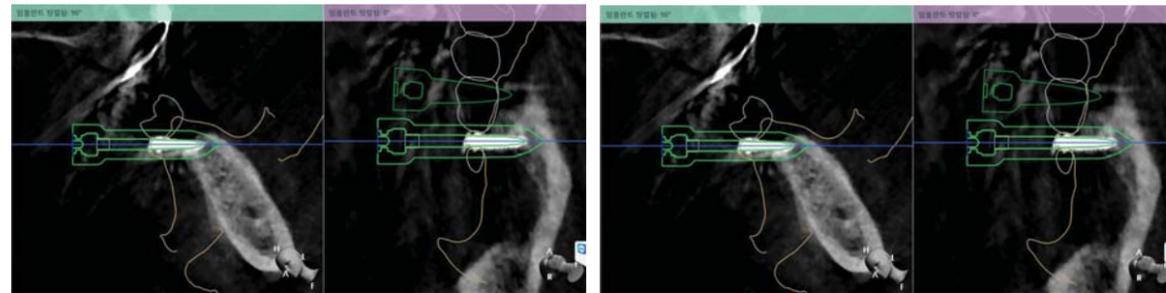
Avoid locations where fixtures are planned to be implanted and locations that can cause discomfort to the patient. At least four mini screws are needed. The more distant the four points, the more stable one plane they coordinate. Since Implantation on movable gingiva may cause inflammation, keratinized gingiva is recommended.

## Result

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(A) Fitness of CT scan and the cast; Green areas on orthodontic mini screws with resin ball show fine fitness  
 (B) Measuring angle and distances of each implant

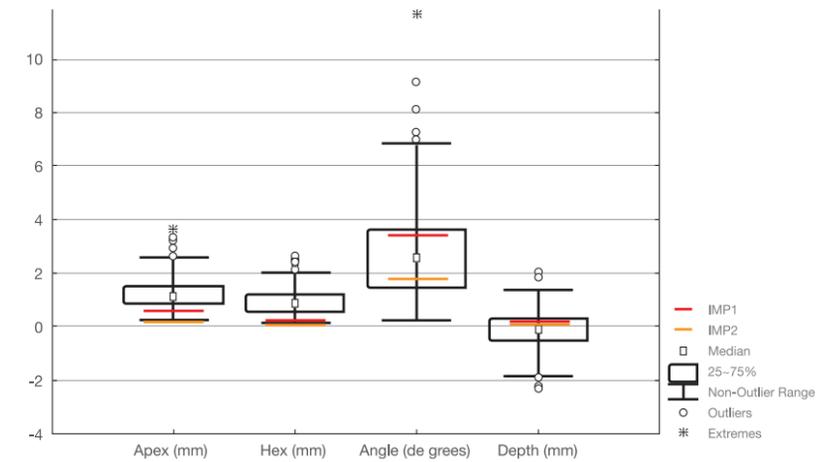


Superimposition of postoperative CT scan (A) to a virtually implanted orthodontic screw (B) to a virtually implanted fixture

**Table 1. deviations in top, apex, depth (mm) and angle (degree).**

Variable	Top	Apex	Depth	Angle
IMP1	0.24	0.63	0.27	3.42
IMP2	0.13	0.27	0.16	1.84
Mean*	0.80	1.15	-0.29	2.16
Minimum*	0.16	0.24	-2.33	0.27
Max*	2.45	3.62	0.94	11.74

\*Data of fifty implants on edentulous mandible with Nobel Guide.<sup>1)</sup>



Box plots of deviations. (red lines added on figure of Pettersson, 2012) Data from 139 implants including 89 on maxilla and 50 on mandible.

## Conclusion

Most of the variables in this case report were less than or equal to the average of previous studies<sup>1-3)</sup>, proving excellency of OneGuide system. The angle of Imp1 was slightly higher than the average. It appears that drill had been slightly slipped touching the lingual cortex. This study has a limitation that only two implants were observed. However, it has significance to reduce previous errors that caused by superposition of CT scan into a edentulous cast by creating absolute references.

Although this procedure has a disadvantage of requiring another “operation”, it is believed that there is little resistance to patients. This technique will be majorly necessary in cases where an error of 0.5 mm can have impact on the outcomes.