

Buccal Mini-Implant Site Selection: The Mucosal Fallacy and Zones of Opportunity

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The attached gingiva in the areas of the alveolus and the infrazygomatic crest has long been a favored site for buccal mini-implant placement.^{1,2} The rationale is that because an implant is a fixed anchor with no mobility, it should be placed in soft tissue that likewise has no mobility. Any movement of the soft tissue during function, as occurs with the unattached gingiva, could present a risk of side effects such as tissue irritation, micro-tears, soft-tissue inflammation, and tissue overgrowth, all of which may have a negative impact on implant retention and patient comfort¹ (Table 1).

This article evaluates the current evidence, in light of our clinical experience, on how the quality of gingival tissue should influence the selection of buccal mini-implant insertion sites.

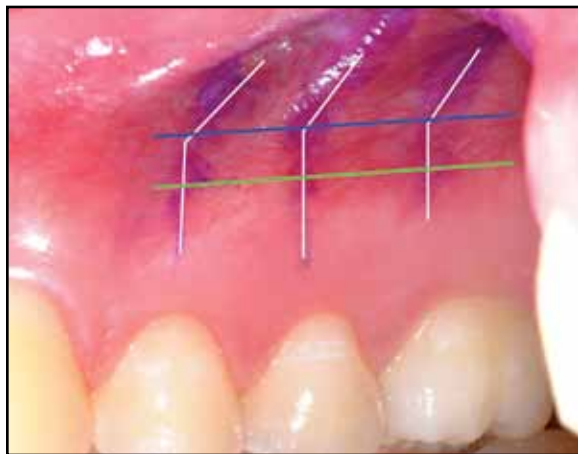


Fig. 1 Purple vertical lines drawn on mucosa with indelible pencil (highlighted by white lines) indicate degree of mucosal mobility under tension. Green line indicates mucogingival junction. Mucosa between green and blue lines has limited mobility; mucosa apical to blue line is highly mobile.

The Evidence

Multiple studies have investigated the impact of mucosal quality on the success rates of orthodontic mini-implants.³⁻⁷ Unfortunately, they have not delivered a unanimous verdict. Although studies with samples of 100 or more were unable to detect a difference,^{4,5,7} some smaller studies did report greater success in the attached gingiva.^{3,6}

A reasonable explanation for this lack of conclusiveness may be found in the varying mobility of the mucosa at different heights. The mucosa is affixed at the mucogingival junction (MGJ), where it has virtually no mobility (Fig. 1), making this a suitable area for mini-implant insertion. As mobility increases with distance from the MGJ, side effects should also increase in prevalence and severity, theoretically reaching their peak at the maximum distance from the MGJ—in the depth of the vestibule. Indeed, Viwattanatipa and colleagues observed significant differences in success



Fig. 2 Soft tissue around mini-implant inserted in area of limited-mobility mucosa remains healthy and inflammation free even after months in place.

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TABLE 1
EXPECTED SOFT-TISSUE RESPONSES TO
MINI-IMPLANT INSERTION

Insertion Site	Expected Soft-Tissue Response
Attached, keratinized gingiva	Favorable tissue adaptation Reduced irritation Absence of inflammation
Mobile, non-keratinized mucosa	Poor tissue adaptation Irritation Micro-tears Inflammation Overgrowth Micro-jiggling

rates between “high mucosal” mini-implants and those placed at the MGJ.⁶

Most studies, however, have not differentiated between the limited-mobility mucosa just apical to the MGJ (Fig. 2) and the highly mobile mucosa located more apically (Fig. 3). The former area provides two distinct advantages for place-

ment of an orthodontic mini-implant:

1. The bone at this level is at a maximum distance from the alveolar crest within soft tissue that offers a predictably positive response to an orthodontic mini-implant and good primary stability, since recent studies have noted that cortical bone increases in the apical direction.⁸⁻¹⁰ Targeting the

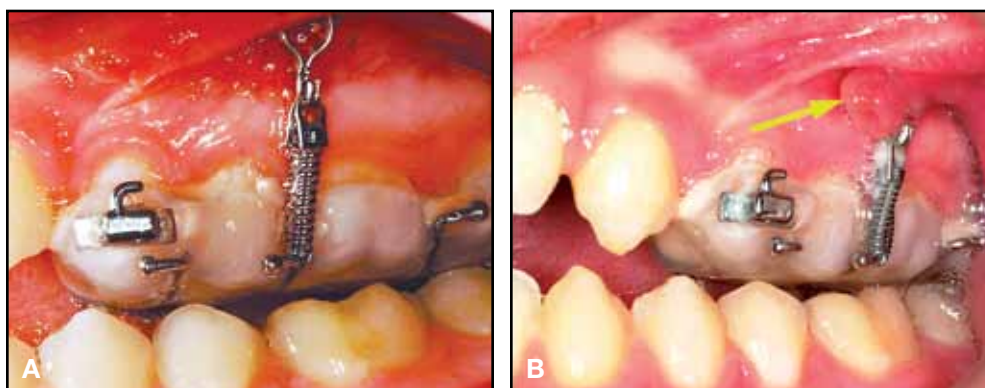


Fig. 3 Mini-implant placed at infrazygomatic crest in highly mobile mucosa. **A.** Patient on day of insertion. **B.** Mini-implant fully overgrown by mucosa and irritation fibroma (arrow) four weeks later.

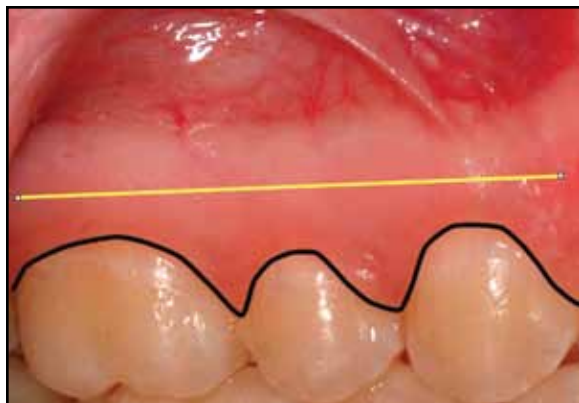


Fig. 4 Likely location of alveolar crest (yellow line) in relation to gingival margin (black line).

attached gingiva, which is similar in appearance to the free gingiva, can actually place the mini-implant too far in the crestal direction, where the bone support is inadequate. In an average patient, the alveolar crest and, therefore, the attached gingiva begin about 1.5mm from the cemento-enamel junction and 2.5mm from the gingival margin (Fig. 4).

2. This region offers adequate space between the conical dental roots, which generally diverge in an apical direction¹¹ (Fig. 5). That reduces the likelihood of root contact, one of the major causes of mini-implant failure.^{12,13}

Conclusion

Insertion of orthodontic mini-implants in the buccal mucosa should not automatically be ruled out because of the risk of poor soft-tissue response or implant failure, as long as the screws are placed close to the MGJ. Our experience shows that this area offers a distinct “zone of opportunity” with many favorable properties for mini-implant placement.

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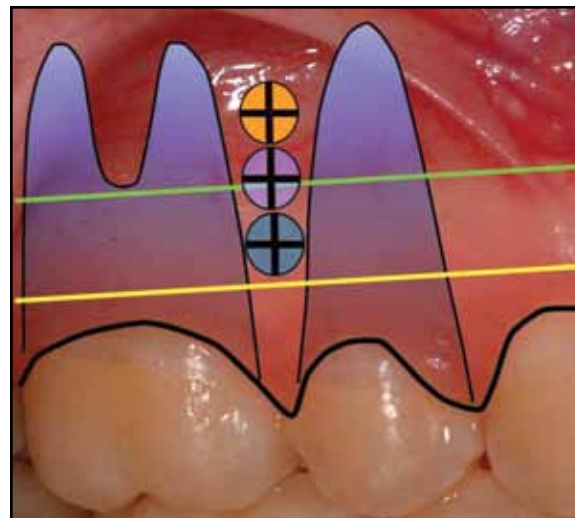


Fig. 5 Interradicular space for mini-implants increases with insertion height (black line = gingival margin; yellow line = alveolar crest; green line = mucogingival junction).

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