From Crown to Osteotomy: Why Implant Planning Should Begin With the Final Restoration

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The Two-Minute Decision That Lasts a Lifetime

The most consequential decisions in implant dentistry are not made at delivery. They are made in the first two minutes of surgery. Implant axis. Depth relative to the crest. Proximity to adjacent roots. The available emergence corridor. These variables are fixed the moment osseointegration begins. Once they are set, neither the surgeon nor the laboratory can alter the geometry of what was placed. The restoration adapts to the implant. The biology responds to the restoration. And the long-term outcome, stable or complicated, traces back to that original surgical moment.

The question worth asking before every case is how much of that moment is being planned, and how much is being decided intraoperatively.

Periimplantitis Is Often a Geometry Problem

Periimplantitis is commonly framed as a biological complication, a maintenance failure, a host response issue, a consequence of systemic risk factors. Those contributors are real. But a growing body of evidence points to something more mechanical at the root of many cases: the geometry of how the restoration emerges from the supporting bone.

When an implant is placed with an axis that forces the restoration to flare outward steeply, or at a depth that requires an overcontoured cervical profile to reach the intended crown position, the result is a plaque trap the sulcus cannot clean. The soft tissue seal is compromised. Crestal bone begins to resorb. And because the geometry is permanent, no maintenance protocol reverses it. Implants with convex or steep emergence profiles carry more than double the periimplantitis risk compared to those restored with conservative, concave contours [1]. That threshold sits at approximately 30 degrees of emergence angle, and whether a restoration stays under or exceeds it is determined almost entirely by where and how the implant was placed [2].

> *Periimplantitis prevention, for a meaningful proportion of cases, is a surgical planning question, not a hygiene protocol question.*

When the Restoration Leads, the Surgery Follows

The conventional workflow places surgery first and restoration second. The implant is positioned based on available bone, and the restoration is designed around whatever position resulted. This works when anatomy is ideal and placement is accurate. When either condition is compromised, the restoration inherits the problem, and the clinician manages the consequences.

The more predictable sequence runs in reverse. The intended crown, its position, its emergence angle, its relationship to adjacent teeth, bone, and soft tissue, defines precisely where the implant needs to be. That planned position then drives the surgical guide design. Surgery executes a decision already made in the planning software, not a judgment made in the operatory.

This shift changes what is achievable. Screw channel access is confirmed before the first drill engages bone. Interimplant spacing for papilla preservation is verified before a flap is raised. Immediate provisional restorations can be pre-fabricated to a position that will exist precisely in the bone [3]. The emergence profile, the variable most predictive of long-term tissue health, is designed rather than inherited.

> *Even among experienced surgeons, freehand placement produces angular deviations roughly three times greater than guided placement [4]. That gap does not close with experience alone. It closes with planning.*

One Millimeter. One Degree. One Different Outcome.

The anterior maxilla is where planning failures become visible. The buccal plate at a central incisor averages under 1mm in more than 70% of patients [5], and the natural labial root inclination means the socket points in the wrong direction by default. A modest deviation in axis or depth in this environment does not stay modest.

At the restorative stage, it shows up as an emergence that cannot be made concave, a crown contour that compensates where it should transition, a tissue margin that sits slightly off from the adjacent tooth. The restoration is delivered. The patient accepts it. But the biology has already been set in motion, a profile that traps biofilm, a buccal plate under mechanical stress, a tissue seal that was never fully established.

> *What presents as a periimplantitis case two years later was a geometry problem on the day of surgery.*

The Guide Is Not the Technology. The Plan Is.

A surgical guide is only as accurate as the thinking behind it. A guide built around bone availability is a more precise version of freehand surgery. A guide built around the final restoration is a different category of clinical tool, one that transfers a prosthetic decision into the surgical field rather than a positional preference.

The evidence across case types is consistent. Early implant failure rates are significantly lower with guided placement [6]. Positional accuracy is significantly better [4]. And long-term tissue outcomes improve when emergence geometry is designed before surgery rather than adapted after it [1]. For straightforward single-tooth cases in ideal posterior anatomy, the margin for freehand error may be manageable. For anything anterior, immediate, adjacent, or full arch, the evidence no longer supports leaving that outcome to intraoperative judgment alone.

The most important instrument in implant dentistry is not the surgical guide.
It is the plan the guide is built from. And that plan begins with the final restoration.

References

1. Lin GH et al. The influence of prosthetic designs on peri-implant bone loss: An AO/AAP systematic review and meta-analysis. J Periodontol. 2025;96(6):634-651.
2. Janda M, Mattheos N. Implant-abutment emergence angle and profile in relation to peri-implantitis: A systematic review. Br Dent J. 2024;236(10):765-771.
3. Digital Workflow for Immediate Implant Placement and Chairside Provisionalization in the Esthetic Zone. Clin Implant Dent Relat Res. 2022. PMC9076344.
4. The Accuracy of Implant Placement by Experienced Surgeons: Guided vs Freehand Approach. J Periodontal Implant Sci. 2023;53(5):388-401.
5. Buccal Bone Thickness in Anterior and Posterior Teeth: A Systematic Review. Int J Implant Dent. 2021. PMC8700878.
6. Abdelhady N et al. Comparing the clinical outcomes of guided and freehand dental implant surgery: An umbrella review. BDJ Open. 2021;7:26.

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Ilan Sapir, CDT, is the founder of DTS Dental Technology Solutions. His 16 years in digital implant dentistry include the development of minimally invasive zygomatic and pterygoid surgical guide systems with direct in-OR support, and leading the digital treatment planning department at one of the largest dental manufacturing organizations in the United States, where he designed clinical workflows for thousands of cases. DTS works exclusively with experienced implant clinicians and oral surgeons.

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