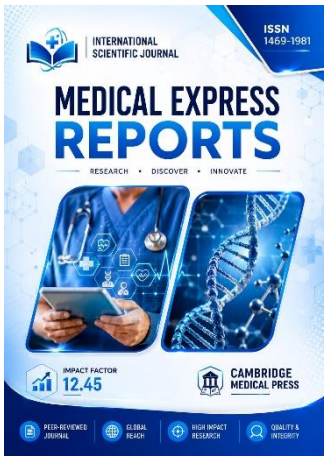
MEDICAL EXPRESS REPORTS
IMPACT FACTOR:12.45 ISSN:1469-1981



NAVIGATIONAL IMPLANT PLACEMENT IN THE DELAYED PROTOCOL: AN EVIDENCE-BASED REVIEW

Salimova M.A.
Shukhratullaeva M.A.

Tashkent State Medical University

ARTICLE INFO:

Received:20.11.2026
Revised: 21.11.2026
Accepted:22.11.2026

KEY WORDS:

guided implant surgery; dynamic navigation; delayed implant placement; late placement; accuracy; CBCT; static computer-aided implant surgery

ABSTRACT

Guided implant surgery transfers a digital, prosthetically driven plan to the patient with a static template, a dynamic navigation system, or a robot. In healed ridges (delayed or late placement, ITI types 3–4), the anatomy is stable and soft tissue has matured, which makes the digital plan reproducible. This review summarises the classification of placement timing, the biology of the healed ridge, the accuracy of static, dynamic and robotic systems, factors that change accuracy, clinical outcomes (survival, complications, marginal bone), and practical workflow and safety rules. Pooled data show mean deviations of about 1.0–1.2 mm at the entry point, 1.2–1.4 mm at the apex and 3–3.6° in angulation, which is why a safety margin of at least 2 mm from vital structures is recommended [8,15,16]. Long-term data specific to healed ridges are limited, and several conclusions below come from mixed populations, so they should be read with that in mind..

Terminology and Classification of Delayed Implant Placement. The timing of dental implant placement following tooth extraction is commonly classified according to the healing status of the extraction socket rather than exclusively on the basis of fixed chronological intervals. The International Team for Implantology (ITI) classification, initially described by Hämmerle et al. (2004) and subsequently presented in the ITI Treatment Guide, Volume 3, distinguishes four placement protocols according to the degree of soft-tissue and osseous healing [1–3].

Type 1 (immediate placement) refers to implant insertion directly into the fresh extraction socket on the day of tooth extraction, before the initiation of significant socket healing. Type 2 (early placement with soft-tissue healing) involves implant insertion after the healing of the soft tissues, typically 4–8 weeks following extraction, when substantial bone fill has not yet occurred. Type 3 (early placement with partial bone healing) is performed after approximately 12–16 weeks, when soft-tissue healing is complete and significant bone formation has taken place within the socket. Type 4 (late placement) denotes implant insertion into a fully healed alveolar ridge, generally more than six months after tooth extraction [1–3].

It is important to clarify that delayed implant placement is not a distinct, formally defined category within the original ITI classification. Rather, the term is used inconsistently throughout the literature to describe different post-extraction healing intervals, including early placement in selected contexts and, more commonly, placement after partial or complete socket healing. In the present article, delayed implant placement is defined operationally as implant insertion into a partially healed or fully healed alveolar ridge, corresponding to ITI Types 3 and 4, respectively. This distinction is particularly relevant when evaluating navigation-assisted implant placement, because the anatomical characteristics of the residual ridge, the extent of bone remodeling, and the availability of sufficient bone volume may differ according to the healing stage.

Furthermore, the ITI classification was expanded in 2018 to incorporate implant loading protocols, thereby providing a more comprehensive framework for describing treatment timing and subsequent prosthetic rehabilitation. For example, type 4C denotes late implant placement followed by conventional loading [4]. Subsequent evidence-based reviews have further examined the clinical implications of implant placement timing and the factors influencing treatment outcomes [27]. Accordingly, the explicit differentiation between early placement with partial bone healing and late placement in a fully healed ridge is essential for maintaining terminological consistency and enabling meaningful comparisons among clinical studies [1–4, 27].

Biological basis of the healed ridge

Tooth extraction starts a predictable remodelling process. In the dog, marked dimensional change occurs in the first 8 weeks, in two overlapping phases, and the buccal wall loses more height than the lingual wall [5]. Placing an implant in a fresh socket does not stop this [6]. In humans, a systematic review reported a mean horizontal reduction of about 3.8 mm and a mean vertical reduction of about 1.2 mm on the buccal side after 6 months, with horizontal reduction of 29–63% and vertical reduction of 11–22% [7].

For planning, this has three consequences:

A healed ridge is narrower than the extracted tooth region, so implant diameter and position must be planned on current CBCT, not on pre-extraction images.

In the ITI review of 91 studies, bone augmentation was more successful with immediate and early placement (types 1–3) than with late placement (type 4), partly because late sites had more

one-wall and no-wall defects [2]. A delayed protocol may therefore need staged or simultaneous augmentation.

Implant survival in healed sites is high. The same review found survival above 95% in most studies and similar survival for postextraction and healed-site implants, with a median of 99% for type 1 and 94% for type 4 in conventionally loaded cohorts, and wide ranges for both [2].

The main benefit of waiting is a mature, stable soft-tissue and bone environment, at the cost of longer treatment time and more resorption. Early placement (types 2–3) was associated with less mucosal recession than immediate placement [2].

Navigation technologies

Static computer-aided implant surgery (s-CAIS). A CAD/CAM template, supported by teeth, mucosa or bone, directs the drills through sleeves. It is the best-studied approach.

Dynamic computer-aided implant surgery (d-CAIS, "navigation"). Optical tracking shows the handpiece and the patient on screen against the CBCT plan in real time, so the plan can be changed during surgery and no template is needed. Accuracy depends on tracking technology, calibration and user experience [22].

Robot-assisted surgery. It adds mechanical or autonomous control of the drill path. In a meta-analysis of 67 articles, robotic systems tended to show the lowest deviation, but the evidence is the newest and thinnest [15].

The terms "fully guided" (all drills and the implant through the guide), "partially guided" (pilot or some drills guided, implant placed freehand) and "pilot-guided" describe how much of the sequence is controlled. In the 2024 meta-analysis, fully guided placement was significantly more accurate than pilot-guided placement, with no significant difference from partially guided placement [15].

Accuracy of guided placement

Source	Method / studies	Entry point (mm)	Apex (mm)	Angle (°)
Tahmaseb et al. 2018 [8]	Static; 20 clinical studies, 2,238 implants in 471 patients	1.2 (1.04–1.44)	1.4 (1.28–1.58)	3.5 (3.0–3.96)
Khaohoen et al. 2024 [15]	Static, dynamic and robotic; 67 articles	1.11 (1.02–1.19)	1.40 (1.31–1.49)	3.51 (3.27–3.75)
Khaohoen et al. 2024 [15], robotic subgroup	Robotic systems	0.81	0.77	1.71
Wei et al. 2021 [16]	Dynamic; 5 clinical trials + 5 model studies, 1,298 drillings/implants	1.02 (0.83–1.21)	1.33 (0.98–1.67)	3.59 (2.09–5.09)

Source	Method / studies	Entry point (mm)	Apex (mm)	Angle (°)
Shi et al. 2023 [14]	Static guides; 41 articles	Mean distance deviation below 2 mm (most below 1 mm)	Same	Below 8° (most below 5°)

Values are means with 95% confidence intervals where reported.

Static versus dynamic. Jorba-García et al. (24 studies, 9 systems) concluded that dynamic systems allow highly accurate placement with a mean angular deviation under 4°, more accurate than freehand and slightly less angular deviation than static guides [17]. A 2025 meta-analysis of studies from 2014–2024 found that computer-aided surgery (static or dynamic) substantially improved accuracy compared with freehand placement, with no statistically significant difference between static and dynamic [18]. A meta-regression within the dynamic data found no differences between jaws or between five different systems [16]. An in vitro study found that dynamic navigation improved accuracy for a novice surgeon in several variables, whereas for an experienced surgeon it improved angulation only [23].

Clinical meaning. Deviations of around 1 mm and 3.5° are acceptable for most sites, but individual maximum errors are larger than the means. This is the basis for the recommendation to keep a safety margin of at least 2 mm from vital structures [8].

Factors Influencing the Accuracy of Guided Implant Placement

Guide support. In a meta-analysis of clinical studies, bone-supported guides showed significantly greater deviation than tooth-supported guides at the entry point, apex and in angle, and mucosa-supported guides did better than bone-supported ones, with no significant difference between mucosa- and tooth-supported guides [12]. A 2023 network meta-analysis reported 1.31° more angular deviation with bone support than with tooth support (95% CI 0.47–2.15) and no significant difference in linear deviation, but it noted high risk of bias in nearly all included studies, so the recommendation is weak [13]. A review of 41 articles found that bilateral tooth-supported guides had the highest in vitro accuracy and similar in vivo accuracy to unilateral tooth-supported guides, and that mucosa-supported guides had the lowest in vivo accuracy. It also reported that milling gave higher in vivo accuracy than 3D printing, although it said more data were needed, and that fixation screws and sleeve design affected accuracy [14].

Type of edentulism. The static meta-analysis found significantly better accuracy in partially edentulous than in fully edentulous cases [8]. For the typical delayed case (a single missing tooth or a short span with neighbouring teeth) a tooth-supported guide is therefore the preferred design. This recommendation is my synthesis of the evidence above, not a finding of one study.

Template production and support in earlier reviews. The 2009 systematic review found no significant differences between studies by method of template production or by support and stabilisation, which shows how the picture has changed as the evidence grew [11].

Why healed ridges suit guided surgery. A guide seats on a stable surface in a healed ridge, because the soft tissue and bone no longer change after the scan. This is clinical reasoning. The sources cited here pool healed and fresh sites and do not directly test accuracy in healed ridges alone.

Clinical outcomes

Survival and complications. The 2009 reviews reported survival of 91–100% at 12–60 months in six clinical studies with 537 implants, mostly restored immediately after flapless surgery. Early surgical complications occurred in 9.1% of cases, early prosthetic complications in 18.8% and late prosthetic complications in 12% [11]. Another 2009 review of five clinical studies (506 implants) found a mean failure rate of 3.36% (range 0–8.45%) after at least 12 months, with intraoperative complications in 4.6% of cases (limited interocclusal distance, limited primary stability, need for additional grafting) [10]. These data are early, and both reviews called for longer follow-up.

Guided versus freehand. The evidence is not unanimous:

A 2021 meta-analysis reported implant failure of 2.25% with guided and 6.42% with freehand placement (risk ratio 0.29, 95% CI 0.15–0.58) [19].

A meta-analysis of four studies found no difference between computer-guided and freehand surgery in marginal bone loss (mean difference −0.11 mm), mechanical complications, biological complications or survival [20].

An umbrella review of 13 systematic reviews reported better accuracy with guided placement and comparable marginal bone loss and survival [24].

The consistent finding is better accuracy with guidance. A clear survival advantage is not consistently shown, and freehand placement by experienced surgeons gives comparable long-term results in the available data.

ITI consensus. The 2018 consensus report concluded that static computer-aided surgery was beneficial compared with conventional surgery in pain and discomfort, economics and intraoperative complications. It also warned that flapless guided surgery can place the implant outside the zone of keratinised mucosa and must be done with great care [9].

Clinical Workflow for Delayed Implant Placement

1. Timing of implant placement. Delayed implant placement is generally performed in healed extraction sites corresponding to Type 3 (approximately 12–16 weeks after extraction) or Type 4 (more than 6 months after extraction). The appropriate timing should be determined through clinical examination and radiographic assessment rather than chronological criteria alone [2,3].

2. Comprehensive clinical assessment. Preoperative evaluation should include a detailed medical history, assessment of periodontal and occlusal status, measurement of keratinised mucosa width, evaluation of mouth opening, and determination of the available interocclusal space. Adequate interocclusal clearance is particularly important when guided surgery is planned,

as additional vertical space is required for the surgical guide and guided drills. Insufficient space may contribute to intraoperative complications [10].

3. Data acquisition and integration. Preoperative planning requires cone-beam computed tomography (CBCT) and an intraoral scan or digitised model of the dental arches. These datasets are integrated within dedicated implant-planning software to establish the relationship between the alveolar anatomy and the proposed prosthetic restoration. The accuracy of dataset registration should be carefully verified before proceeding with implant planning, as errors in image alignment may compromise the accuracy of subsequent surgical steps.

4. Prosthetically driven implant planning. Implant positioning should be determined primarily by the intended prosthetic outcome. The restoration is designed first, followed by the selection of the optimal implant position, diameter, and length according to the dimensions and morphology of the healed alveolar ridge. The need for simultaneous or staged bone augmentation should also be assessed. A minimum safety distance of 2 mm should be maintained from critical anatomical structures, including the inferior alveolar canal, mental foramen, and adjacent tooth roots, where applicable [8].

5. Selection of the surgical guidance technique. The choice of guidance method depends on the clinical indication, anatomical conditions, and surgical complexity. Tooth-supported static surgical guides are generally suitable for single-tooth replacement and short-span implant procedures [12–14]. Dynamic navigation may be considered when limited space for guide placement or the potential need for intraoperative modifications makes static guidance less practical. However, its implementation requires appropriate training and familiarity with the navigation system [17,23].

6. Surgical procedure. Before osteotomy preparation, the fit, stability, and fixation of the surgical guide should be verified. A flapless approach may be considered when the width of the keratinised mucosa and the available alveolar bone are sufficient to support safe implant placement [9]. Whenever clinically feasible, a fully guided surgical protocol should be followed, as fully guided implant placement has demonstrated greater accuracy than pilot-guided techniques [15]. Adequate irrigation and intermittent drilling are essential to minimise thermal injury to the surrounding bone and preserve conditions favourable for osseointegration.

7. Postoperative verification and loading protocol. Following implant placement, the achieved three-dimensional position and primary stability should be documented. Postoperative CBCT may be used when clinically indicated to compare the actual implant position with the preoperative plan. The loading protocol should be selected according to primary stability, bone quality, implant position, prosthetic requirements, and the applicable clinical classification [4]. Conventional or earlier loading may be considered based on the overall clinical assessment and the established criteria for implant loading.

Limitations of the evidence

The evidence is strongest for positional accuracy and weakest for long-term, patient-centred outcomes. The main limits are these.

Study design and certainty. The dynamic navigation meta-analysis combined clinical trials with model studies [16], and a later clinical paper noted that most accuracy data on commercial dynamic systems come from in vitro models and a small number of surgical teams [34]. In the static literature, a 2023 network meta-analysis rated nearly all included studies at high risk of bias [13]. Randomized evidence does exist. A network meta-analysis of 21 randomized trials (956 participants, 1,632 implants) found that robotic, static and dynamic guidance all reduced deviation compared with freehand placement, by 0.60–0.67 mm at the platform, 0.90–1.35 mm at the apex and 3.7–5.3° in angulation [31].

Measurement and heterogeneity. There is no universal standard for measuring accuracy [14]. A scoping review of 21 clinical studies found extensive methodological heterogeneity, and this produced widely varying values for the same accuracy metrics [30]. A 2024 review of 23 clinical studies reported mean coronal deviations of 0.87–2.05 mm for mucosa-supported, 0.71–1.60 mm for bone-supported and 0.39–1.63 mm for tooth-supported guides [28]. These ranges overlap heavily. My reading is that the differences between guide types seen in pooled analyses are small compared with the spread between individual studies.

Accuracy is a surrogate outcome. It is not established that better accuracy gives better survival, bone stability or fewer complications. One meta-analysis found lower failure with guidance (2.25% versus 6.42%) [19], while another found no difference in marginal bone loss, complications or survival [20] and an umbrella review found comparable survival and bone loss [24]. The meta-analysis that found no difference included only four studies.

Follow-up length. The 2009 reviews covered 12–60 months [10,11]. A 2020 review found only four studies with at least 5 years of follow-up, all using one implant and guide system, with 5-year cumulative survival of 94.5–100% against an estimated 95.6% for implants in general [29]. A 10-year series of 32 implants in 15 patients reported 81.25% survival, but the sample is too small to generalise [33]. I found no long-term guided-surgery data limited to healed ridges.

Patient-centred outcomes and cost. A white paper concluded that documentation of patient-reported outcomes with computer-assisted surgery remains limited, and that the effect of cost on patient preferences has not been explored because most randomized trials subsidized the cost to patients [32]. This is despite the ITI consensus finding static guidance beneficial for pain, economics and intraoperative complications [9].

Operators, systems and generalisability. Dynamic navigation has a marked learning curve [15]. In an in vitro study the benefit for an experienced surgeon was limited to angulation, whereas a novice gained in several variables [23]. Systems also differ. An in vitro review of five systems found all within acceptable limits, with differing numerical errors, and accuracy depended on tracking technology, calibration and user experience [22]. Results from one system or one team

cannot be assumed to apply to another. Robotic systems have the newest evidence base and a high purchase cost [15].

Healed ridges specifically. None of the cited accuracy or survival analyses separates healed-ridge sites (types 3–4) from other sites. The ITI timing review [2] covers placement timing and not guided surgery, so combining the two bodies of evidence, as this article does, is an extrapolation.

Conclusion. Guided and navigated placement in a healed ridge is accurate to roughly 1 mm and 3.5° on average, and in most reviews it is more accurate than freehand placement. Tooth-supported static guides perform best, partially edentulous cases do better than fully edentulous ones, and dynamic navigation reaches similar accuracy to static guides. The clear gain is in precision and surgical planning. A survival benefit over experienced freehand placement is not firmly proven. Good results depend on a well-fitting guide, an accurate data merge, a safety margin of at least 2 mm, adequate irrigation and attention to keratinised mucosa in flapless cases.

References

1. Hämmerle CH, Chen ST, Wilson TG Jr. Consensus statements and recommended clinical procedures regarding the placement of implants in extraction sockets. Int J Oral Maxillofac Implants. 2004;19(Suppl):26–28.
2. Chen ST, Buser D. Clinical and esthetic outcomes of implants placed in postextraction sites. Int J Oral Maxillofac Implants. 2009;24(Suppl):186–217.
3. Chen S, Buser D. Implants in post-extraction sites: a literature update. In: Buser D, Belser U, Wismeijer D, eds. ITI Treatment Guide, Vol. 3: Implants in Extraction Sockets. Berlin: Quintessence; 2008.
4. Gallucci GO, et al. Implant placement and loading protocols in partially edentulous patients: a systematic review. Clin Oral Implants Res. 2018;29(Suppl 16).
5. Araújo MG, Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. J Clin Periodontol. 2005;32(2):212–218.
6. Araújo MG, Lindhe J. Ridge alterations following implant placement in fresh extraction sockets: an experimental study in the dog. J Clin Periodontol. 2005;32(6):645–652. doi:10.1111/j.1600-051X.2005.00726.x
7. Tan WL, Wong TL, Wong MC, Lang NP. A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans. Clin Oral Implants Res. 2012;23(Suppl 5):1–21.
8. Tahmaseb A, Wu V, Wismeijer D, Coucke W, Evans C. The accuracy of static computer-aided implant surgery: a systematic review and meta-analysis. Clin Oral Implants Res. 2018;29(Suppl 16):416–435.
9. Wismeijer D, Joda T, Flügge T, et al. Group 5 ITI Consensus Report: digital technologies. Clin Oral Implants Res. 2018;29(Suppl 16):436–442. doi:10.1111/clr.13309
10. Jung RE, Schneider D, Ganeles J, Wismeijer D, Zwahlen M, Hämmerle CHF, Tahmaseb A. Computer technology applications in surgical implant dentistry: a systematic review. Int J Oral Maxillofac Implants. 2009;24(Suppl):92–109.

11. Schneider D, Marquardt P, Zwahlen M, Jung RE. A systematic review on the accuracy and the clinical outcome of computer-guided template-based implant dentistry. Clin Oral Implants Res. 2009;20(Suppl 4):73–86. doi:10.1111/j.1600-0501.2009.01788.x

12. Raico Gallardo YN, da Silva-Olivio IRT, Mukai E, Morimoto S, Sesma N, Cordaro L. Accuracy comparison of guided surgery for dental implants according to the tissue of support: a systematic review and meta-analysis. Clin Oral Implants Res. 2016 (online). doi:10.1111/clr.12841

13. Balaguer Martí JC, Canet López Á, Peñarrocha Diago M, Romeo Rubio M, Peñarrocha Diago M, García Mira B. Influence of splint support on the precision of static totally guided dental implant surgery: a systematic review and network meta-analysis. Int J Oral Maxillofac Implants. 2023;38(1):157–168. doi:10.11607/jomi.9796

14. Shi Y, Wang J, Ma C, et al. A systematic review of the accuracy of digital surgical guides for dental implantation. Int J Implant Dent. 2023. doi:10.1186/s40729-023-00507-w

15. Khaohoen A, et al. Accuracy of implant placement with computer-aided static, dynamic, and robot-assisted surgery: a systematic review and meta-analysis of clinical trials. BMC Oral Health. 2024. doi:10.1186/s12903-024-04033-y

16. Wei SM, Zhu Y, Wei JX, Zhang CN, Shi JY, Lai HC. Accuracy of dynamic navigation in implant surgery: a systematic review and meta-analysis. Clin Oral Implants Res. 2021;32(4):383–393. doi:10.1111/clr.13719

17. Jorba-García A, González-Barnadas A, Camps-Font O, Figueiredo R, Valmaseda-Castellón E. Accuracy assessment of dynamic computer-aided implant placement: a systematic review and meta-analysis. Clin Oral Investig. 2021;25(5):2479–2494.

18. Castro F, Pereira P, Falcão-Costa C, Falcão A, Fernandes JCH, Fernandes GVO, Rios JV. Comparison of the accuracy/precision among guided (static), manual, and dynamic navigation in dental implant surgery: a systematic review and meta-analysis. Oral Maxillofac Surg. 2025. doi:10.1007/s10006-025-01462-z

19. Abdelhay N, Prasad S, Gibson MP. Failure rates associated with guided versus non-guided dental implant placement: a systematic review and meta-analysis. BDJ Open. 2021;7:31. doi:10.1038/s41405-021-00086-1

20. Yogui FC, Verri FR, et al. Comparison between computer-guided and freehand dental implant placement surgery: a systematic review and meta-analysis. Int J Oral Maxillofac Surg. 2020 (online). doi:10.1016/j.ijom.2020.08.004

21. Gallucci G, Evans C, Tahmaseb A. Digital Workflows in Implant Dentistry. ITI Treatment Guide, Vol. 11. Wismeijer D, Barter S, Donos N, eds. Berlin: Quintessence.

22. Matvijenko K, Borusevičius R. Comparison of dynamic navigation systems in dental implantology: a systematic literature review of in vitro studies. Int J Oral Maxillofac Surg. 2025;54(7):647–656. doi:10.1016/j.ijom.2025.02.005

23. Jorba-García A, Figueiredo R, González-Barnadas A, Camps-Font O, Valmaseda-Castellón E. Accuracy and the role of experience in dynamic computer guided dental implant surgery: an in-vitro study. 2019 .

24. Comparing the clinical outcomes of guided and freehand dental implant surgery: an umbrella review of systematic reviews and meta-analyses. PMID 41206337.

25. Bone temperature variation using a 3D-printed surgical guide with internal irrigation. Appl Sci. 2021;11:2588. 25a. Heat generation in guided implant osteotomy: influence of irrigation route, bone structure, and measurement method: a comparative thermal analysis.
26. Thermal changes during guided flapless implant site preparation: a comparative study .
27. Gallucci GO, Hamilton A, Akhondi S, Pala K, Peña-Cardelles JF. Current state of evidence for implant placement and loading in partially edentulous patients: a systematic review .
28. Marquez Bautista N, Meniz-García C, López-Carriches C, Sánchez-Labrador L, Cortés-Bretón Brinkmann J, Madrigal Martínez-Pereda C. Accuracy of different systems of guided implant surgery and methods for quantification: a systematic review. Appl Sci. 2024;14(24):11479. doi:10.3390/app142411479
29. Walker-Finch K, Ucer C. Five-year survival rates for implants placed using digitally-designed static surgical guides: a systematic review. Br J Oral Maxillofac Surg. 2020;58(3):268–276. doi:10.1016/j.bjoms.2019.12.007
30. Methodologies for assessing the dimensional accuracy of computer-guided static implant surgery in clinical settings: a scoping review. Dent J (MDPI), vol. 14, no. 1, art. 43 (authors and year to confirm).
31. Accuracy of implant placement with robotic surgery, dynamic navigation, fully static guide and freehand surgery: a systematic review and network meta-analysis. Int J Oral Maxillofac Implants (preprint; authors and year to confirm).
32. Computer-assisted implant surgery: patients' experience and perspectives (white paper; authors and journal to confirm).
33. A 10-year follow-up study on clinical outcomes of dental implant rehabilitation using surgical guide. J Korean Assoc Oral Maxillofac Surg, vol. 50, no. 2 (authors and year to confirm).
34. A retrospective study of dynamic navigation system-assisted implant placement. BMC Oral Health. doi:10.1186/s12903-023-03481-2 (authors to confirm).
35. Clinical applications and effectiveness of guided implant surgery: a critical review based on randomized controlled trials. BMC Oral Health. doi:10.1186/s12903-017-0441-y (authors and year to confirm; not cited in the text above).
36. Computer-guided implant surgery. Consensus statements, 5th ITI Consensus Conference. ITI Academy consensus database, iti.org.