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RESEARCH ARTICLE

EVIDENCE-BASED PROSTHODONTICS: AN INTEGRATED REVIEW OF CLINICAL EVIDENCE AND CONTEMPORARY ADVANCES

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Abstract

Evidence based prosthodontics (EBP) integrates the best available scien tific evidence with clinical expertise and patient values. Prosthodontics includes long-established procedures, interventions supported by varying levels of evidence and rapidly developing technologies. A critical evidence- based approach is needed to distinguish demonstrated clinical benefit from tradition, laboratory findings and technological enthusiasm.[1]This narrative review presents a broad, clinically oriented synthesis of evidence across complete dentures, removable partial dent ures, fixed prosthodontics, occlusion, temporomandibular disorders, implant prosthodontics, implant overdentures, full-arch rehabilitation, peri - implant health, bone augmentation, contemporary biomaterials, CAD/CAM, digital dentures, additive manufacturing, artificial intellige nce, patient reported outcomes and maintenance. The McGill Consensu s of 2002 and York Consensus of 2009 are discussed as important milestones within implant prosthodontics rather than as the central theme of EBP.3,4,5 Current evidence supports two-implant mandibular overdentures as a highly effective option for many edentulous patients, while treatment must remain individualized. Contemporary ceramics and digital workflows provide predictable options in selected indication s, although long-term comparative evidence is less mature for several newer technologies. Evidence-based prosthodontics therefore means choosing the most appropriate treatment after balancing evidence quality, clinical applicability, biological and technical risk, patient-reported benefit, maintenance, cost and patient preference.

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Introduction: -

Evidence-based medicine was defined as the conscientious, explicit and judicious use of current best evidence in decisions about individual patients. This principle became central to evidence-based dentistry and is particularly

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relevant to prosthodontics because treatment success is multidimensional. [6] A prosthesis may survive mechanically but fail to meet the patient's expectations; an implant may achieve osseointegration while the associated prosthesis develops technical complications; and a technically precise complete denture may still provide inadequate function in patients with severely resorbed ridges.Therefore, survival, complications, function, comfort, aesthetics, satisfaction and oral-health-related quality of life must be considered together. [2] A foundational review of evidence-based prosthodontics emphasized that many interventions have long clinical endpoints, heterogeneous outcome measures and limited high-level evidence. Critical appraisal is therefore essential rather than accepting established teaching solely because it is traditional. [2]

Foundations of Evidence-Based Prosthodontics (EBP): -

The practical model of EBP integrates three components: the best available external evidence, clinical expertise and patient values and preferences. Research provides estimates of treatment effects; clinical expertise determines applicability and execution; and the patient determines which benefits and burdens are acceptable.[23] Clinical questions can be structured using PICO—Patient/Problem, Intervention, Comparison and Outcome. Evidence should then be searched and critically appraised according to the clinical question. Randomized trials and systematic reviews are particularly valuable for comparative interventions, but evidence hierarchy is not synonymous with evidence quality; a poorly conducted randomized trial may be less credible than a rigorous prospective cohort study.

Literature search and selection (narrative review methodology): -

A focused narrative literature search was undertaken to inform this review. PubMed/MEDLINE and Google Scholar were used to identify relevant publications, and reference lists of key reviews and consensus statements were hand-searched. Search concepts combined terms relating to evidence-based dentistry/prosthodontics with complete dentures, removable partial dentures, fixed dental prostheses, occlusion, temporomandibular disorders, dental implants, overdentures, peri-implant disease, bone augmentation, biomaterials, CAD/CAM, digital dentures, additive manufacturing and artificial intelligence. Priority was given to systematic reviews, meta-analyses, randomized clinical trials, consensus statements and clinically relevant prospective studies; foundational publications were retained where they defined established concepts. Publications were considered relevant when they addressed clinical effectiveness, complications, patient-reported outcomes, maintenance, cost or implementation in prosthodontic care.

Editorials, duplicate records, purely promotional material and studies without a clear clinical or methodological contribution were not used to support clinical recommendations. Because this is a narrative rather than a systematic review, no formal pooled analysis or exhaustive study-count flow diagram was undertaken. Selection was purposive, and the possibility of selection bias remains. The search date and exact database-specific search strings were not prospectively registered; this limits reproducibility and should be acknowledged when interpreting the synthesis. Evidence appraisal was qualitative rather than a formal GRADE assessment. For each topic, the review considered study design, consistency of findings, directness to clinical practice, follow-up duration, patient-centered outcomes and limitations reported by the source. Systematic reviews and consensus statements were not automatically treated as high certainty: their conclusions were interpreted in light of the quality and quantity of included studies. Claims about newer digital and AI workflows were deliberately framed as emerging evidence where long-term comparative clinical data remain limited.

Figure 1. Hierarchy of evidence in clinical decision-making (redrawn and adapted from Venkatesan et al.[9]; the source review attributes the original schematic to Burns et al.).

Table 1. Research reporting and appraisal frameworks listed by Venkatesan et al.[9]

Framework	Full name / description
CONSORT	Consolidated Standards of Reporting Trials
TREND	Transparent Reporting of Evaluations with Nonrandomized Design
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SORT	Strength of Recommendation Taxonomy
AMSTAR	Assessment of Multiple Systematic Reviews
MOOSE	Meta-analysis of Observational Studies in Epidemiology

Table 2. Knowledge-translation resources listed by Venkatesan et al.[9]

Database / resource	URL listed in source article
CINAHL	www.ebscohost.com/biomedical-libraries/the-cinahl-database
Atlantic Health Promotion Research Centre Knowledge Translation Library, Dalhousie University	www.ahprc.dal.ca/kt/default.asp
Canadian Health Services Research Foundation (CHSRF)	www.cfhi-fcass.ca/WhatWeDo/AppliedResearchandPolicyAnalysis.asp
Cochrane Effective Practice and Organization of Care Group	www.epoc.cochrane.org/en/index.html
Knowledge Translation + (KT+)	plus.mcmaster.ca/kt/Default.aspx
Keenan Research Centre – Research Programs Joint Program in Knowledge Translation	www.stmichaelshospital.com/research/ktclearinghouse.php
New York Academy of Medicine	www.nyam.org/library/pages/grey-literature-report/

Evidence-Based Diagnosis and Treatment Planning: -

Evidence-based prosthodontic care begins with diagnosis rather than procedure selection. The clinician should identify the chief complaint, functional limitation, biological condition, prognosis, medical and psychosocial risks, aesthetic expectations and capacity for maintenance.[23] Treatment alternatives should be compared according to expected benefit, biological cost, technical complexity, financial burden, maintenance and retreatment. Patient-reported outcomes are increasingly important because prosthetic survival alone does not describe the patient's experience.[8,10]

Complete Denture Prosthodontics:

Conventional complete dentures remain an important treatment because they are non-invasive and relatively inexpensive, but mandibular instability is a well-recognized limitation, particularly with severe ridge resorption. 8 The shortened dental arch (SDA) concept is also relevant to broader edentulous-arch planning: where a patient has a functional and comfortable residual dentition or a planned prosthetic arrangement that meets functional needs, replacement of every missing posterior tooth should not be assumed to be necessary. Its applicability must be judged individually and should not be used to overlook patient-specific functional or aesthetic requirements. No single complete-denture impression philosophy has strong evidence of universal superiority. Selective-pressure, mucostatic and functional approaches should therefore be selected according to ridge anatomy, tissue condition, retention requirements and clinical expertise. A randomized controlled trial has also demonstrated differences in patient preference between impression materials, emphasizing that patient experience should complement technical assessment.[2,11] Centric relation remains a useful clinical reference, but contemporary evidence challenges simplistic assumptions regarding its absolute reproducibility and its relationship with disease. Vertical dimension should likewise be individualized using facial proportions, phonetics, interocclusal space, aesthetics and patient comfort.[12] Occlusal scheme is another area in which traditional teaching exceeds the strength of available evidence. A systematic review of systematic reviews found that several schemes can produce satisfactory clinical outcomes, with limitations in the quality of the underlying evidence. Therefore, balanced, lingualized and other schemes should not be presented as universally superior.[13,14] Denture adhesives can improve retention, stability and patient confidence in appropriately selected patients, but they should complement rather than replace proper denture assessment.

Removable Partial Prosthodontics: -

Evidence-based removable partial prosthodontics emphasizes preservation of remaining teeth and tissues, adequate support and stability, acceptable aesthetics and maintainability. Design should account for periodontal support, ridge anatomy, abutment prognosis, patient dexterity and anticipated future tooth loss.[15] The shortened dental arch concept illustrates that replacement of every missing tooth is not necessarily required when function and patient satisfaction can be maintained. Digital surveying and CAD/CAM frameworks are promising, but long-term comparative clinical evidence remains less mature than for established conventional designs.

Fixed Prosthodontics: -

Tooth-supported fixed dental prostheses have a substantial clinical evidence base. A systematic review reported approximately 89% survival after 10 years for fixed partial dentures, with biological and technical complications influencing long-term performance.[16] Digital impression systems can provide clinically acceptable accuracy. A systematic review and meta-analysis comparing digital and conventional impressions for fixed prosthodontics found favorable results in several clinical measures, although performance varies with scanner, preparation geometry, operator and clinical situation.[17] Modern ceramics include zirconia, lithium disilicate, leucite-reinforced ceramics and resin-based materials. Zirconia demonstrates high short- and medium-term survival in many indications, while veneering fracture and design-related complications remain relevant. Lithium disilicate provides strong evidence for selected single-crown and adhesive indications, particularly where optical properties and adhesive bonding are important. Material selection should therefore be indication-specific rather than based on the assumption that one material is universally superior.

Occlusion and Temporomandibular Disorders: -

Occlusal concepts remain important in prosthodontics, but evidence does not support the simplistic proposition that occlusion alone causes temporomandibular disorders. TMDs are multifactorial conditions, and irreversible occlusal adjustment should not be used routinely as preventive treatment. In implant prosthodontics, traditional concerns about non-axial forces are useful biomechanical considerations, but the assumption that non-axial loading inevitably causes implant failure is not supported by strong clinical evidence. [19]

Implant Prosthodontics: -

Implant therapy has transformed prosthodontic rehabilitation. Success depends on implant survival, surgical factors, patient-related risk, prosthetic design, occlusion, peri-implant tissue health and long-term maintenance. Immediate, early and conventional loading can all be successful in appropriately selected situations; loading should therefore be considered together with primary stability, implant distribution and prosthetic design. In selected cases, osseodensification protocols using Densah burs are used during osteotomy preparation. The burs are designed to compact and autograft bone along the osteotomy walls rather than relying solely on conventional cutting, with the aim of enhancing local bone density and primary stability. The effect depends on bone quality, drill protocol and clinical indication; this technique should be described as an option with a biomechanical rationale, not as a guaranteed improvement in long-term implant success. Modern implant prosthodontics should avoid rigid rules regarding implant number, loading or prosthetic material. Treatment planning must integrate anatomy, prosthetic space, hygiene, patient expectations, cost and maintenance.

Implant Overdentures and the Edentulous Patient: -

The McGill Consensus Statement followed a symposium at McGill University on 24–25 May 2002 and concluded that evidence supported a two-implant mandibular overdenture as the first-choice standard of care for many edentulous patients. The statement was a landmark because it challenged the assumption that a conventional mandibular denture should automatically remain the default. [3] The York Consensus of 2009 followed the McGill statement and emphasized the substantial body of patient-centered evidence demonstrating greater satisfaction and quality of life with mandibular implant-supported overdentures than conventional dentures. It also considered performance, cost and clinical time.[4,5] Subsequent systematic evidence has confirmed that two-implant mandibular overdentures improve satisfaction, masticatory performance and oral-health-related quality of life compared with conventional dentures. However, 'first choice' should not be interpreted as 'mandatory for every patient.' Surgery, anatomy, finances, systemic risk, maintenance and patient preference remain decisive. Single-implant overdentures can also be effective in selected patients, although contemporary patient-reported evidence generally favors two implants when both are feasible. [20] Attachment systems including bars, balls and locator-type designs have all been studied. Evidence does not establish one attachment as universally superior; differences in retention, maintenance and complications should be weighed against patient-specific requirements.[21,22]

Implant-Supported Fixed Complete-Arch Prostheses: -

Full-arch fixed implant prostheses provide high stability and patient satisfaction but generally require greater surgical, restorative and maintenance resources than overdentures. Contemporary consensus evidence supports several implant-number strategies when distribution and prosthetic design are appropriate. The decision between fixed and removable implant rehabilitation should consider lip support, phonetics, prosthetic space, hygiene, anatomy, expectations, finances and maintenance. A technically complex fixed prosthesis is not automatically the best treatment for every patient.

Peri-Implant Health, Complications and Maintenance: -

Long-term implant success extends beyond osseointegration. Peri-implant mucositis, peri-implantitis, screw loosening, fracture, wear and loss of attachment retention can compromise treatment. [23] Recent evidence indicates that implant-overdenture failures are multifactorial and can relate to patient condition, edentulous arch characteristics, implant number and loading protocol. Regular follow-up and appropriate maintenance are essential.

Bone Grafting and Implant Site Development: -

Guided bone regeneration, ridge preservation, ridge augmentation and sinus augmentation have substantial evidence supporting their use in appropriately selected defects. Consensus recommendations emphasize defect morphology, blood supply, membrane management, stabilization and soft-tissue closure.[25,26] Autogenous bone, allografts, xenografts and alloplastic materials may all be useful depending on the indication. No graft material should be regarded as universally superior. The evidence-based goal is to select the least morbid predictable approach capable of creating the anatomy required by the planned prosthesis.

Contemporary Prosthodontic Biomaterials: -

Contemporary materials include zirconia, lithium disilicate, resin nanoceramics, high-performance polymers, PMMA and printable resins. Their selection should be based on clinical indication, strength, thickness, bonding, aesthetics, antagonist wear, repairability and long-term evidence. Laboratory strength should not be equated with clinical superiority. Material performance is influenced by preparation design, manufacturing method, surface treatment, occlusal loading and maintenance.

Digital Prosthodontics: -

Digital prosthodontics now encompasses intraoral scanning, CAD/CAM, virtual articulation, digital smile design, guided implant workflows and digitally fabricated complete dentures. Its principal advantages include data storage, reproducibility, communication and workflow integration.[17] Digital workflows should not automatically be described as clinically superior. The evidence is indication-specific and depends on scanner, software, manufacturing process and operator experience.

Digital Complete Dentures and Additive Manufacturing: -

CAD/CAM complete dentures can be milled or printed. Recent clinical evidence indicates that digital workflows can reduce clinical time and provide reproducible fabrication, while retention and mechanical performance vary with manufacturing method and material.[24,25] A systematic review of digitally fabricated complete dentures found promising applications but also highlighted technical challenges and the need for stronger clinical evidence, including longer follow-up and standardized outcome measures. Digital dentures should therefore be selected according to the complete workflow and patient requirements rather than technology alone.[25] Evidence for digitally fabricated implant-retained overdentures is still developing, and direct comparative clinical studies remain limited. Accordingly, digital workflows should be selected on the basis of case requirements, workflow reliability, patient-reported outcomes, maintenance needs and available clinical evidence rather than an assumption of superiority.

Artificial Intelligence in Prosthodontics: -

Artificial intelligence is being investigated for diagnosis, radiographic interpretation, tooth and landmark detection, shade selection, implant planning, prosthesis design and outcome prediction. Reviews describe expanding applications but emphasize that many studies remain at the technical-validation stage.[26,27] High retrospective accuracy does not establish clinical effectiveness. External validation, representative datasets, calibration, explainability, privacy, bias assessment and prospective clinical evaluation are necessary. At present, AI is best regarded as decision support and workflow augmentation rather than replacement of clinician judgement.

Esthetic, Geriatric and Maxillofacial Prosthodontics: -

Esthetic prosthodontics increasingly uses facial analysis, smile analysis and digital planning, but biological and functional feasibility must remain primary. Minimally invasive ceramic treatment should preserve sound tooth structure whenever predictable bonding and material thickness can be achieved. In geriatric and medically compromised patients, evidence-based treatment must consider frailty, dexterity, cognition, xerostomia, medical burden and ability to attend maintenance. A simpler maintainable prosthesis may provide greater overall benefit than a technically complex reconstruction. Maxillofacial prosthodontics increasingly incorporates osseointegrated implants, digital design and 3D printing for obturators and facial prostheses. Interdisciplinary planning and patient-reported outcomes are particularly important.

Patient-Reported Outcomes, Cost and Shared Decision-Making: -

Prosthodontic success should be measured by meaningful patient benefit as well as technical survival. Implant overdentures and fixed implant prostheses both produce substantial improvements in patient-reported outcomes in appropriately selected edentulous patients.[8]Cost-effectiveness should include surgery, laboratory procedures, appointments, maintenance, replacement of attachments, repairs and retreatment. Shared decision-making requires presentation of alternatives, benefits, risks, uncertainties and maintenance requirements.[7,10]

Evidence-Based Interpretation of Common Prosthodontic Dogmas: -

Several traditional propositions should be interpreted cautiously. No single impression technique has universal superiority; facebow transfer is not automatically necessary for every case; no complete-denture occlusal scheme is universally superior; not every edentulous patient requires implants; more implants do not necessarily produce proportionally greater patient benefit; zirconia is not universally superior to metal-ceramic; and digital dentistry is not automatically better than conventional treatment.[2,9,13] This does not mean that traditional techniques are wrong. It means that the clinician should distinguish between biologically necessary principles, useful techniques and procedures whose routine use has not been demonstrated to change clinically important outcomes.

Evidence Gaps and Future Directions: -

- Long-term comparative trials of conventional, overdenture and fixed implant rehabilitation.
- Standardized patient-reported outcomes across prosthodontic disciplines.
- Independent long-term evaluation of printable denture and restorative materials.
- Comparative clinical evidence for contemporary ceramic generations.

- Prospective external validation of artificial-intelligence systems.
- Cost-effectiveness studies incorporating maintenance and retreatment.
- Research in frail older adults and medically compromised patients.
- Large clinical registries integrating biological, technical and patient-centered outcomes.

Practical Evidence-Based Prosthodontic Algorithm: -

1. Define the patient's chief complaint, priorities and treatment goals.
2. Complete the clinical assessment and establish diagnosis, prognosis, medical risk and relevant biological factors.
3. Identify reasonable alternatives, including conventional, minimally invasive, removable, fixed, implant-assisted and digital options where appropriate.
4. Formulate a focused clinical question using PICO (Patient/Problem, Intervention, Comparison and Outcome) when uncertainty affects the decision.
5. Search for relevant systematic reviews, consensus statements, clinical trials and well-designed observational studies.
6. Appraise validity, consistency, effect size, harms, follow-up, patient-reported outcomes and applicability to the individual patient.
7. Integrate the evidence with clinical expertise, patient preferences, cost, access and the likely maintenance burden.
8. Explain benefits, risks, uncertainties and alternatives, and agree on a shared treatment plan.
9. Choose the least complex predictable option that meets the patient's clinically important goals.
10. Document the decision, review outcomes and revise care when the patient's condition or the evidence changes.

Results: -

The literature reviewed supports a consistent overarching finding: prosthodontic outcomes should be judged by more than prosthesis or implant survival. Function, comfort, aesthetics, patient satisfaction, biological and technical complications, maintenance burden and affordability are interdependent outcomes. This is especially important when comparing conventional and implant-assisted rehabilitation, because improvements in retention and quality of life must be weighed against surgery, cost and long-term maintenance.

Discussion: -

Across conventional complete dentures, evidence does not establish one impression philosophy or occlusal scheme as universally best for every patient. The available overview of systematic reviews on complete-denture occlusion reported that several schemes can provide acceptable outcomes, but most included reviews had low or critically low methodological quality. This supports individualized selection rather than a universal prescription. In removable partial prosthodontics, the shortened dental arch concept similarly challenges the assumption that every missing posterior tooth must always be replaced; the decision depends on function, remaining teeth, patient priorities and anticipated maintenance. For fixed prosthodontics, long-term survival data provide a useful benchmark, but survival should not obscure biological complications, loss of abutment vitality, caries, periodontal problems, ceramic chipping or repair needs. Digital impressions and CAD/CAM may improve workflow efficiency and communication in selected cases; however, accuracy under controlled conditions does not automatically prove superior long-term patient outcomes. The same distinction applies to digitally fabricated complete dentures: a recent systematic review identified promising clinical applications but also technical challenges and a need for stronger clinical evidence, including longer follow-up and more standardized outcome measures. Implant overdentures, particularly two-implant mandibular overdentures, have strong support as an effective option for many edentulous patients. Nonetheless, they are not mandatory for every patient.

Anatomical feasibility, medical risk, cost, hygiene ability, access to maintenance and patient preference remain central. Implant-site preparation methods such as Osseo densification using Densah burs are intended to compact rather than simply remove bone during osteotomy preparation and may improve primary stability in selected bone conditions. These biomechanical rationales should not be interpreted as proof of universal superiority; clinical outcomes depend on case selection, technique, bone quality and operator experience, and comparative long-term evidence should guide claims. The evidence for AI in prosthodontics is expanding, but many reports assess retrospective datasets, technical accuracy or laboratory performance. Such findings are not equivalent to demonstrated improvements in patient outcomes. Clinical implementation requires external validation, representative data, calibration, transparency, privacy safeguards and prospective evaluation. Across all topics, the

principal limitation of the present review is its narrative selection process: the findings provide a clinically oriented synthesis, not a complete or quantitatively graded estimate of every intervention's effect.

Summary Points: -

- Evidence-based prosthodontics (EBP) combines the best available research evidence, clinical expertise and informed patient preferences.
- Treatment success should include function, comfort, aesthetics, patient-reported outcomes, biological and technical complications, maintenance and cost—not survival alone.
- No single complete-denture impression philosophy or occlusal scheme is appropriate for every patient; selection should reflect anatomy, tissue condition and patient needs.
- The shortened dental arch concept is relevant to treatment planning beyond removable partial dentures and may inform decisions about whether all missing posterior teeth require replacement.
- Two-implant mandibular overdentures are effective for many edentulous patients, but treatment must remain individualized.
- Digital workflows, printable dentures and AI offer practical opportunities, but their benefits should be balanced against costs, workflow limitations and gaps in long-term clinical evidence.
- Densah burs are used in osseodensification protocols to compact bone during osteotomy preparation; this rationale does not establish universal clinical superiority.
- Shared decision-making and a realistic maintenance plan are essential components of evidence-based care.

1. Define the patient's chief complaint and treatment goals.
2. Establish diagnosis, prognosis and biological risk.
3. List conventional, minimally invasive, implant and digital alternatives.
4. Formulate a PICO question for major uncertainties.
5. Search systematic reviews, consensus statements and high-quality clinical trials.
6. Critically appraise quality, effect size, harms, longevity and applicability.
7. Integrate evidence with clinical expertise and patient preference.
8. Discuss cost, maintenance and retreatment.
9. Select the least complex predictable treatment that meets the patient's clinically important goals.
10. Assess outcomes and revise care as the patient's condition and evidence evolve.

Conclusion: -

Evidence-based prosthodontics (EBP) is a method of clinical reasoning rather than a single treatment protocol. It integrates the best available scientific evidence with clinical expertise and the patient's anatomy, medical condition, expectations, resources and preferences. Its application across complete dentures, removable partial dentures, fixed prosthodontics, occlusion, implant rehabilitation, biomaterials and digital workflows requires critical appraisal of both benefits and limitations. The evidence base extends across conventional complete dentures, removable partial dentures, fixed prosthodontics, occlusion, implants, regenerative procedures, biomaterials, digital workflows and artificial intelligence. The McGill and York consensus statements are important milestones within implant prosthodontics, but they represent only one component of EBP. The future of prosthodontics should therefore avoid both unquestioning adherence to tradition and uncritical adoption of technology. The evidence-based clinician asks whether an intervention provides meaningful, durable and patient-centered benefit, whether the evidence is reliable and applicable, and whether the treatment can be delivered and maintained safely.

Clinical area	Evidence-informed interpretation	Practical implication
Complete dentures	No, universally superior impression philosophy or occlusal scheme is established for all patients.	Individualize to ridge anatomy, tissue tolerance, neuromuscular control and patient-reported outcomes.
Removable partial dentures / SDA	Replacement of every missing tooth is not invariably necessary when function and patient priorities can be met.	Assess occlusion, remaining teeth, support, aesthetics and likely future changes.
Fixed prosthodontics	Long-term survival is favorable for many restorations, but complications and maintenance remain relevant.	Discuss biological and technical risks as well as survival estimates.
Implant overdentures	Two-implant mandibular	Balance expected benefit against

	overdentures benefit many edentulous patients; individual suitability varies.	surgery, anatomy, cost, hygiene and follow-up.
Digital workflows and AI	Technical accuracy and workflow efficiency do not by themselves prove better long-term clinical outcomes.	Use validated systems and explain uncertainty; monitor patient-centered outcomes.

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