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Article

Factors Affecting the Implant Supracrestal Complex: A Scoping Review as Part of a Global Consensus Meeting Organised by the Osstem Implant Community

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Abstract

Aim: To map current evidence and identify key factors influencing peri-implant tissue stability related to abutment configuration, design, materials, and prosthetic protocols in implant-supported fixed prostheses. **Methods:** A comprehensive search of PubMed and Scopus was performed up to June 2025, supplemented by manual searches. Human studies in English with ≥ 1 year of follow-up were included. Two reviewers independently conducted screening, data extraction, and quality assessment using the Newcastle–Ottawa Scale. The review was carried out at the Universities of Sassari and Ferrara in collaboration with the Osstem Global Consensus Meeting. **Results:** From 974 records, 46 studies were included: 33 randomized clinical trials, 9 cohort, 2 case-control, and 2 cross-sectional studies. Thirty-nine were rated as good quality and five as fair. Concave abutment profiles and emergence angles $< 30^\circ$ promoted peri-implant tissue stability, while convex designs and wider angles increased risks of bone loss and peri-implantitis. Titanium remains the reference abutment material in posterior sites, zirconia provides superior aesthetics anteriorly, and hybrid abutments balance strength and esthetics. **Conclusions:** Prosthetic design and abutment material selection critically affect peri-implant tissue stability and esthetic outcomes. Evidence supports screw-retained designs, platform switching, and the “one abutment–one time” approach for predictable long-term success.

Keywords: biological width; dental implant; dental implant abutment; prosthetic design

1. Introduction

Biologic width (BW) is defined as the combined dimension of the connective tissue and junctional epithelial attachment formed adjacent to a tooth and superior to the crestal bone. It functions as a natural seal protecting the tooth from infections. The normal dimension is 2.04 mm on average. [1] In dental implants, BW commonly describes the apico-coronal dimensions of the supracrestal tissues. [2,3]

Two-piece implants generally exhibit a greater biological width than single-piece implants or natural teeth, primarily due to the presence of a microgap at the implant–abutment interface. The position of this microgap significantly influences both soft tissue adaptation and marginal bone stability. [4] Connective tissues are generally more stable than the epithelial and remain consistent regardless of the type of implant loading. [5] Although connective tissue is more stable around one-piece implants and natural teeth, microbial activity still challenges the junctional epithelium. Regardless of tissue biotype, the peri-implant biological width shows some structural and histologic changes as those seen around natural teeth. [6,7] Dental implants lack a periodontal ligament, vascular plexus, neurosensory system, and cementum; collagen fibers orient circumferentially and attach via hemidesmosomes. [8] The supra-crestal connective tissue, characterized by reduced fibroblast density and vascularity, resembles scar tissue and adheres to the titanium oxide surface. [9] Due to its single vascular supply, peri-implant mucosa is more susceptible to breakdown, highlighting the need for strict maintenance to ensure stability. [10]

Several terms describe the soft tissues surrounding dental implants including peri-implant soft tissue barrier, [11] peri-implant mucosa, [12] implant mucosal tunnel, [13] implant supracrestal complex [14] and more recently peri-implant phenotype. [15] In this review, all are unified under the term

“Peri-implant Tissue Complex”, defined as the system comprising soft and hard tissues, implant–abutment components, and microbial colonization along the transmucosal area. According to Monje et al. [16] peri-implant tissues should be studied in close relation with the implant–abutment–prosthesis complex.

Traditional implant success criteria focused on osseointegration and implant survival, [17] whereas current criteria also include peri-implant tissue health, prosthetic success, and esthetics. [18] The implant–abutment interface is central to both esthetic and mechanical outcomes. [14] The peri-implant tissue complex encompasses the supracrestal attached tissues—connective tissue, junctional and sulcular epithelium (biological width)—and the implant–abutment–restoration (IAR) assembly. [19] Within this system, the emergence profile and restoration angle are crucial for tissue stability and esthetics. [20]

The emergence angle (EA) is defined by the Glossary of Prosthodontic Terms as “the angle between the average tangent of the transitional contour and the long axis of a tooth, dental implant, or dental implant abutment” while the emergence profile is “the contour of a tooth or restoration, such as the crown on a natural tooth, dental implant, or dental implant abutment, as it relates to the emergence from circumscribed soft tissues”. [1] Clinically, the transition zone measures about 4–5 mm in esthetic areas and 3–4 mm in non-esthetic sites. [21,22]

Titanium and zirconia remain the most common abutment materials. Titanium is preferred for its superior mechanical strength at the implant–abutment interface [23] whereas zirconia offers improved soft tissue color and esthetic outcomes, often reflected in higher Pink Esthetic Scores (PES). [24] Its main drawback is a greater risk of mechanical complications, though titanium-reinforced designs appear promising. [25] Biologically, both materials perform similarly for up to five years. [25] The impact of CAD/CAM abutments on peri-implant soft tissue health still needs clarification, and their use should be carefully individualized. [26]

This scoping review aims to map the current literature on implant-supported fixed dental prostheses (FDPs), highlighting key concepts, evidence types, research gaps, and priorities related to prosthetic features regarding abutment configuration, design, materials, and clinical protocols.

2. Methods

This review was conducted at the Department of Medicine, Surgery, and Pharmacy, University of Sassari (November 2023–September 2025), in collaboration with the Department of Translational Medicine, University of Ferrara, and the Osstem Global Consensus Meeting (GCM). The GCM involved international experts from academia and clinical practice, organized into three divisions: surgical, prosthodontic, and digital. This manuscript summarizes the outcomes of the Prosthodontics Division. A panel of ten prosthodontic specialists defined discussion topics, formulated PICO questions, and prepared narrative or systematic reviews. These were critically appraised and refined through moderated debates. Preliminary online sessions allowed early discussion, while final consensus statements were developed during the Osstem World Meeting in Seoul. The process integrated scientific evidence with expert opinion to formulate validated clinical recommendations. Previous publications have already reported consensus statements on implant fracture risk and prosthetic factors associated with peri-implantitis. [27]

2.1. Search Strategies

This scoping review was conducted following the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines. [28] The focused question was: “Do the prosthetic profile (concave or convex) of the abutment and/or the material (metal-ceramic, all-ceramic, hybrid ceramic, and PEEK implant-supported FDPs) influence the outcomes of implant supported restorations)?

Population (P), intervention (I), comparison (C) and outcomes (O), i.e. “PICO” for this scoping review were:

- Population: subjects with anterior and/or posterior implant-supported FDPs.
- Intervention: test implant-abutment design/material
- Comparison: control implant-abutment design/material
- Outcomes: survival rate, technical and/or biological complications, pink esthetic score.

Pubmed and Scopus databases were electronically searched to obtain publications written in English language up to June 2025. The search was limited to human studies evaluating implant supracrestal complex health. The following detailed search terms were used according to the PICO questions, and the search strategy was as follows: (("Dental Implants"[Mesh]) OR "Dental Prosthesis, Implant-Supported"[Mesh]) AND "Dental Implant-Abutment Design" [Mesh]. Filters applied: Abstract, Humans, English.

2.2. Selection of Studies and Data Extraction

The electronic search was completed by manual searches of all the selected full text articles/references. Initial screening was based on the relevance of the titles. If the title did not provide sufficient information, the article was moved to the next stage for abstract analysis and further confirmation. In a second stage, full abstracts of the selected articles were obtained and screened for a more comprehensive assessment. If a decision could not be reached based on the abstract, the paper was selected for full-text reading. Finally, the full texts of all the selected abstracts were carefully evaluated according to the inclusion and exclusion for inclusion in the final review. The search was independently performed by two authors (FG and GF). Any disagreement was resolved by consensus between the authors and the supervisors (SC and MT).

2.3. Inclusion and Exclusion Criteria

Eligible studies with at least one year of follow-up, reported clinical and/or radiographic outcomes related to the implant-abutment connection (e.g. marginal bone levels, pink esthetic score, periodontal parameters) were selected for further analysis. Articles were excluded if they reported in-vitro analyses, or if the abstract/full text was unavailable.

2.4. Grading of the Evidence

The methodological quality of the included studies was evaluated using the Newcastle–Ottawa Scale (NOS), which assesses selection, comparability, and outcome domains for non-randomized studies. Each study was independently reviewed by two authors, and discrepancies were resolved through discussion. In line with the exploratory nature of a scoping review, the NOS scores were not used to exclude studies but rather to provide an overview of the quality and potential risk of bias within the available evidence.

2.5. Measures and Analysis of Results

Due to the exploratory nature of this scoping review, no statistical analysis was performed; the findings were presented as a descriptive synthesis of the available evidence.

2.6. Conclusions for the Attendants

The presenters (MY and SL) prepared the scoping review, in agreement with AGREE guidelines. The level of evidence was sufficient for the purpose of this Global Consensus Meeting. To reach the consensus on the topic “Prosthetic Design Considering gingival Health and Esthetics” a 14-question questionnaire was prepared and discussed.

Clinical questions:

1. Do you agree to use the term Peri-implant Tissue Attachment to define the soft and hard tissues that forms around a dental implant to stabilize and protect it?
2. Do you agree that screw-retained restorations should be considered to increase aesthetic outcomes, and minimizing biological risks for bone level implants?
3. Do you agree that platform shifting should be integrated in the implant-abutment complex?
4. Do you agree that PMMA fixed on temporary titanium link should be used for temporary restorations.
5. Do you agree that titanium link with either multilayer or monolithic zirconia, or porcelain fused to zirconia (PFZ) restorations should be used for definitive restorations (from single crown up to 3-unit bridge)?
6. Do you agree that a titanium link with 1–2 mm of gingival height (whether temporary or definitive) should be selected based on the implant depth, ensuring that the depth matches the chosen gingival height (at crestal level or 1–2 mm subcrestally)?
7. Do you agree that the emergence angle (EA) at the mesio-distal aspect, should be always lower than 40°. Ideally between 20° and 30°.
8. Do you agree that in a buccal perspective, EA should as flat as possible in the subcritical counter and 70 to 90° immediately before the cervical point of the restoration?
9. In case of immediate implants, do you agree implant-abutment connection should be placed 4-4.5 mm from the cervical point of the tooth to be rehabilitate, and maximum 1-1.5 mm deeper to the “intact” buccal plate, as well as, as palatal as possible within the volume of the tooth to be rehabilitate?
10. Do you agree that in anterior area, healed sites, implant should be place 4 mm distant from the cervical portion of the tooth to be rehabilitate?
11. Do you agree that in the posterior areas, healed sites, implant should be place 3 mm distant from the cervical portion of the tooth to be rehabilitate, maximum 2 mm subcrestally? According to the soft tissue thickness.
12. Do you agree that in case of a very tight implant-abutment connection, implant could be placed top to 3 mm deeper?
13. Do you agree that the abutment should be removed as less as possible. In the full arch restorations, one abutment one time could be delivered using Multi abutments. However, in FP1 prosthesis customized abutment could be used.

14. Do you agree that digital technologies and AI could support clinicians in the development of proper implant 3D position and proper abutment design?

3. Results

The selection process of publications, reported in the PRISMA flow diagram (Fig. 1), yielded a total of 976 papers. After abstract assessment, 69 full-text articles were obtained. Further screening was carried out using the full text, which led to the exclusion of 23 more articles. The full texts of the remaining 46 eligible studies were included in the present review. Finally, all the studies were classified according to different prosthetic features, such as abutment configuration, design, materials, and protocols.

Figure 1. PRISMA flow diagram of study selection and inclusion process.

3.1. Grading of the Evidence

The quality of the included papers was assessed according to the Newcastle Ottawa Scale. Within the 46 selected studies, 33 were randomized clinical trials, 9 were cohort studies, 2 was a case-control study, and 2 were cross-sectional studies. According to the Newcastle-Ottawa Scale (NOS), 39 studies were of good quality, 5 were of fair quality, and none was of low quality. Therefore, the overall risk assessment indicated a low risk of bias. All the selected manuscripts were summarized in table 1.

3.2. Summary of the evidence

3.2.1. Implant-Abutment Design and Materials

Regarding the abutment Design Considerations, the literature showed that concave emergence profiles promote soft tissue thickness and stability by allowing space for collagen fiber proliferation and vascularization. [22] Convex or overcontoured profiles are associated with soft tissue recession, inflammation, and increased risk of peri-implantitis. [29,30] A tailored emergence profile, particularly in the esthetic zone, is crucial for natural appearance and healthy peri-implant mucosa. Emergence angles $>30^\circ$ increase the risk of peri-implantitis and impaired soft tissue integration, [31] while EAs $<30^\circ$ reduce plaque accumulation and inflammation risk. On bone-level implants, wide EA and convex profiles further raise risk, whereas shallower EA with straight or concave contours at interproximal areas help maintain peri-implant health.

3.2.2. Abutment Materials

Material choice affects biomechanics, soft tissue response, and esthetics. Titanium remains the gold standard for strength, biocompatibility, and corrosion resistance, ideal for posterior regions, full-arch prostheses, and bruxers, though its gray color may affect esthetics in thin mucosa. [32] Zirconia offers excellent esthetics, biocompatibility, and soft tissue integration, making it suitable for anterior areas and high-esthetic cases. Its lower fracture resistance, however, limits use in high-load situations. [33] Hybrid materials aim to balance strength and appearance. PEEK is mainly used for temporaries due to low rigidity, while titanium-zirconia hybrids combine titanium's strength with zirconia's esthetic advantage—ideal for anterior regions where both function and esthetics are critical.

3.2.3. Design and Material Considerations by Restoration Type

Single-tooth restorations require careful control of the emergence profile and angle to shape soft tissues and achieve esthetics. Zirconia abutments are preferred in anterior sites for color and biocompatibility, while titanium remains ideal posteriorly for its strength. CAD/CAM customization further improves anatomical precision.

For partial-arch restorations, design should ensure parallel insertion paths and easy hygiene. Titanium is preferred for posterior bridges to resist load, while esthetic abutments suit visible areas. Screw-retained designs are recommended for retrievability and maintenance.

In complete-arch restorations, priorities include passive fit, balanced load, and proper prosthetic space. Titanium is favored for strength and functional reliability [4,6,25,34] Multi-unit abutments help correct implant angulation and streamline workflows. [35,36] In these cases, soft tissue contours are typically shaped at the prosthetic level rather than at the abutment one. [6,25]

3.3. Management of Temporary and Definitive Restoration

The subcritical contour, located in the supra-crestal area, should be designed with a concave emergence profile, as this configuration creates the widest possible regenerative space for soft tissues. The blood clot naturally occupied it in the early phases of healing to enhancing soft tissue stability and volume preservation. [8] Abutment choice—Ti-Link, customized, or stock—depends on the clinical scenario and the height of adjacent bone peaks. The critical contour supports the marginal tissue: the buccal emergence angle should be 70°–90° [37–39] and <30° mesiodistally. [31,40,41] At the juxtagingival profile, an S-shaped contour promotes esthetics and soft tissue adaptation. [40,42] 3D customization of both sub- and supragingival contours is essential for esthetics, hygiene, and long-term stability, influenced by implant position and periodontal phenotype. [10]

3.4. Questionnaire Results

Eight of ten participants completed the questionnaire. Six of eight professors agreed with the term “Peri-implant Tissue Attachment” instead of Supracrestal Tissue Attachment (STA), noting that bone is not always at crest level. PTA was therefore accepted as the preferred term.

Screw-retained restorations should be considered to increase aesthetic outcomes, and minimizing biological risks for bone level implants. The main benefits are advantages in terms of retrievability, maintenance, and customization. Moreover, using titanium link, the overall prosthetic room for esthetics could be improved. Platform shifting should be integrated in the implant-abutment complex. In order to reduce inflammation and potentially, bone resorption around implants, the abutments should be removed as less as possible. In the full arch restorations, one abutment one time could be delivered using Multi abutments. However, in FP1 prosthesis customized abutment could be used.

Regarding the height of the links, a titanium link with 1–2 mm of gingival height (whether temporary or definitive) should be selected based on the implant depth, ensuring that the depth matches the chosen gingival height. In case of immediate implants, implant-abutment connection should be placed 4–4.5 mm from the cervical point of the tooth to be rehabilitate, and maximum 1–1.5 mm deeper to the “intact” buccal plate, as well as, as palatal as possible within the volume of the tooth to be rehabilitate. In healed sites, implant should be place 4 mm distant from the cervical portion of the tooth to be rehabilitate. On the contrary, in the posterior areas, healed sites, implant should be place 3 mm distant from the cervical portion of the tooth to be rehabilitate, maximum 2 mm subcrestally, according to the soft tissue thickness. For example, thin biotype (1 mm), implants should be placed 2 mm deeper. On the contrary, thick biotype (3 mm or more) implants should be placed at crestal level. Finally, in case of a very tight implant-abutment connection, implant could be placed top to 3 mm deeper, maximum. PMMA fixed on temporary titanium link should be used for temporary restorations, and titanium link with either multilayer or monolithic zirconia, or porcelain fused to zirconia (PFZ) restorations should be used for definitive restorations (from single crown up to 3-unit bridge).

All participants agreed that the vertical dimension of the peri-implant tissue attachment should be 2–4 mm or more for optimal health and esthetics. Prosthodontists should design the critical and subcritical contours to support these tissues accordingly. There was consensus that higher emergence angles (EA) of abutments or crowns increase the risk of bone loss and peri-implantitis. For subcrestal implants, five of eight experts recommended an EA as close to 0° (flat) as possible, while two

highlighted the need for a slight angle (in the first 1–2 mm) to support restorative materials. The main disagreement concerned whether EA >30° represents a critical risk factor—half agreed it does. On the final points, most participants agreed that a convex design near the junctional epithelium can be problematic in thin biotypes, and that ridge-lap designs with short peri-implant tissue attachment may contribute to bone loss and peri-implantitis, depending on materials and techniques used.

Digital technologies and AI could support clinicians in the development of proper implant 3D position and proper abutment design, however, we must be cautious since there is not enough data yet. At the moment, double control is needed. The first at the data collection, and the second to interpret and consider the results obtained.

4. Discussion

Achieving esthetic and biologically stable outcomes depends on abutment material, design, and prosthetic strategy. Titanium abutments remain the gold standard for strength and biocompatibility, despite slightly higher plaque accumulation that does not translate into inflammation. [23,34] Zirconia offers superior esthetics and soft tissue integration, especially in the anterior region, though with higher fracture risk. [25,43–45] Long-term studies showed stable bone and low complications. [23,46] PEEK is a cost-effective alternative with comparable 5-year outcomes to zirconia but limited mechanical resistance in high-load areas. [46] Gold alloy abutments have shown less favorable biological outcomes, with higher bleeding indices than titanium and zirconia. [47] Overall, titanium is preferred for posterior load-bearing sites, zirconia for anterior esthetic areas, and PEEK for cost-sensitive cases.

Abutment morphology plays a decisive role in peri-implant tissue stability. Concave or straight emergence profiles promote soft tissue adaptation, facilitating hygiene, whereas convex profiles hinder plaque control and increase inflammation. [48,49] EA >30° raises peri-implantitis risk, while EA 20–30° interproximally and up to 45° buccally reduced bleeding and bone loss. [20,21,37] Concave profiles improved mucosal stability but required more time and costs, without clear esthetic advantages. [29] Customized CAD/CAM abutments allow optimize EA and EP for anatomy, and esthetics. [2,37] For these reasons, it is the authors opinion that a concave EA at the subcritical contour supports tissue thickness and healing. Buccal EA should be 70–90°, mesiodistal about 40°, with an S-shaped juxtagingival profile for soft tissue harmony. [38] According to this concept, in esthetic zones, 4–4.5 mm of vertical space is needed, and implants should be placed 1–1.5 mm subcrestally and slightly palatal. Posterior implants are ideally placed 3 mm below the crest, considering tissue thickness and periodontal phenotype. [39]

Retention strategy also affects outcomes. It is already demonstrated that screw-retained restorations improve retrievability and maintenance while minimizing biological risks. [50,51] Both screw- and cement-retained designs show high survival, but cemented ones carry greater peri-implantitis risk due to cement excess. [52–55] In fact, several studies confirmed higher biological complications and pathogenic bacteria in cemented prostheses. [52,54–57]

Platform switching (PS) - using a narrower abutment - helps preserve bone but evidence beyond 5 years remains limited. Studies showed reduced marginal loss (~0.4 mm) with PS; [58] even if several randomized trials confirmed these benefits within 5 years, others show no consistent differences. [59–64] Conical interfaces have shown greater stability than PS and flat-to-flat connections. [48,51] Spinato et al. [65] and Blanco et al. [66] highlighted the importance of abutment height, with short abutments associated with greater marginal and interproximal bone loss. Vervaeke et al. [67] further linked thin vertical mucosal tissues to increased bone loss.

The “One Abutment–One Time” (OAOT) protocol, in which the definitive abutment is placed at implant surgery and not subsequently removed, reduces early bone remodeling by avoiding repeated disconnections. [68,69] Other studies confirmed this effect in Morse taper implants, though with uncertain clinical relevance, as differences were often small and not always significant. [70–72]

Loading protocols show comparable short- and medium-term outcomes; immediate loading appears to be safe in selected cases but needs further validation with larger randomized trials. [73–76]

Apico-coronal implant positioning also influences bone stability and esthetics. Current evidence recommends placing implants 2–3 mm apical to the planned gingival margin in the anterior region to support papillae and emergence profiles and approximately 2 mm subcrestally in posterior areas to minimize bone loss. [77–80]

5. Conclusions

In summary, the peri-implant tissue complex is strongly influenced by abutment material, design, prosthetic retention, and implant positioning. Titanium remains the most reliable abutment material, while zirconia and PEEK may be considered in esthetic contexts. Controlled emergence profiles and angles, screw-retention, platform switching, and OAOT protocols support biological stability. Subcrestal placement is generally favored for optimizing bone preservation and esthetics. Collectively, these strategies enhance long-term predictability and align with modern success criteria that extend beyond osseointegration to include peri-implant tissue health and natural esthetics.

Table 1. Summary of clinical studies included in the review, categorized by prosthetic variables. For each study the title, the authors, year of publication, main findings, NOS score, and overall quality assessment were reported.

Title	AUTORS	Main Findings	NOS POINTS	QUALITY ASSESSMENT
Retention type				
Cemented versus screw-retained zirconia-based single-implant restorations: 5-year results of a randomized controlled clinical trial	Sofia T. Lamperti et al. 2022	Cemented crowns had more marginal bone change and complications, while screw-retained showed better biological performance	9	GOOD QUALITY
Cemented vs screw-retained zirconia-based single implant reconstructions: A 3-year prospective randomized controlled clinical trial	Riccardo D. Kraus et al. 2019	Similar survival for both groups; technical complications were frequent in both	8	GOOD QUALITY
Early histological, microbiological, radiological, and clinical response to cemented and screw-retained all-ceramic single crown	Daniel S Thoma et al. 2018	No relevant differences in short-term between cemented and screw-retained crowns	9	GOOD QUALITY
Five-year randomized controlled clinical study comparing cemented and screw-retained zirconia-based implant-supported single crowns	Riccardo D Kraus et al. 2022	Screw-retained had fewer complications, with comparable survival	9	GOOD QUALITY

Gram-negative enteric rods/Pseudomonas colonization in mucositis and peri-implantitis of implants restored with cemented and screwed reconstructions: A cross-sectional study	Carlos-Andrés Ramón-Morales et al. 2019	Cemented crowns showed more pathogenic bacteria in diseased sites, unlike screw-retained	8	GOOD QUALITY
Randomized Controlled Clinical Trial Comparing Cemented Versus Screw-Retained Single Crowns on Customized Zirconia Abutments: 3-Year Results	Linda Heierle et al. 2019	Comparable outcomes between cemented and screw-retained zirconia crowns	6	FAIR QUALITY
Retrospective analysis of loosening of cement-retained vs screw-retained fixed implant-supported reconstructions	Michael Korsch et al. 2015	Screw-retained FDPs loosened more often, but both had high survival	7	GOOD QUALITY
Impact of the retention system of implant fixed dental restorations on the peri-implant health, state of the prosthesis and patients' oral health-related quality of life	Gonzalo García-Minguillán et al., 2020	Screw-retained FDPs provided better peri-implant health and patient satisfaction	7	FAIR QUALITY
Monolithic hybrid abutment crowns (screw-retained) versus monolithic hybrid abutments with adhesively cemented monolithic crowns	Michael Naumann et al., 2023	Both designs performed similarly; one failure occurred in the cemented group	8	GOOD QUALITY
The influence of titanium base abutments on peri-implant soft tissue inflammatory parameters and marginal bone loss: A randomized clinical trial	Saulo Pamato et al., 2020	Ti-base showed stable peri-implant tissues and bone, comparable to conventional	8	GOOD QUALITY
Implant-abutment matching				
Influence of platform switching on bone-level alterations: a three-year randomized clinical trial	N Enkling et al., 2013	Platform switching did not significantly reduce bone loss compared to standard platform	8	GOOD QUALITY
Peri-implant marginal bone loss reduction with platform-switching components: 5-Year post-loading results of an equivalence randomized clinical trial	Ana Messias et al., 2019	Platform-switching abutments showed less marginal bone loss than platform-matching	8	GOOD QUALITY

Platform switching versus regular platform implants: 3-year post-loading results from a randomised controlled trial	Silvio Mario Meloni et al., 2016	No significant bone or soft tissue differences between platform-switching and regular implants	7	FAIR QUALITY
Platform switching versus regular platform single implants: 5-year post-loading results from a randomised controlled trial	Silvio Mario Meloni et al., 2020	No significant bone, soft tissue differences and survival rates between platform-switching and regular implants	9	GOOD QUALITY
Three-year post-loading results of a randomised, controlled, split-mouth trial comparing implants with different prosthetic interfaces and design in partially posterior edentulous mandibles	Alessandro Pozzi et al., 2014	Conical connection implants showed less bone loss than external hex implants	9	GOOD QUALITY
Radiographic Assessment Of Crestal Bone Loss In Tissue-Level Implants Restored By Platform Matching Compared With Bone-Level Implants Restored By Platform Switching: A Randomized, Controlled, Split-Mouth Trial With 3-Year Follow-Up	Laura Lago et al., 2019	No significant difference in crestal bone level changes between tissue-level implants with platform matching and bone-level implants with platform switching	7	GOOD QUALITY
Three-Year Prospective Randomized Comparative Assessment of Anterior Maxillary Single Implants with Different Abutment Interfaces	Lyndon F Cooper et al., 2019	Conical interface implants had less bone loss than flat or platform-switched	8	GOOD QUALITY
Abutment material				
A prospective clinical study of alumina-toughened zirconia abutments for implant-supported fixed restorations with a mean follow-up period of 6.9 years	Hyung-In Yoon et al., 2019	Alumina-toughened zirconia abutments showed good long-term survival with acceptable success rates	8	GOOD QUALITY
Randomized clinical trial of zirconia and polyetheretherketone implant abutments for single-tooth implant restorations: A 5-year evaluation	Pramodkumar Ayyadanveetil et al., 2021	Identical survival and similar biologic and esthetic outcomes at 5 years	8	GOOD QUALITY

Long-term survival and success of zirconia screw-retained implant-supported prostheses for up to 12 years: A retrospective multicenter study	Alessandro Pozzi et al., 2021	Very high survival with minimal bone loss; main complication was veneer chipping, no zirconia framework fractures	8	GOOD QUALITY
Eleven-Year Follow-Up of a Prospective Study of Zirconia Implant Abutments Supporting Single All-Ceramic Crowns in Anterior and Premolar Regions	Anja Zembic et al., 2015	Zirconia abutments and crowns showed ~96% abutment survival and ~91% crown survival after 11 years, with only minor technical issues	6	FAIR QUALITY
Multivariate analysis of the influence of prosthodontic factors on peri-implant bleeding index and marginal bone level in a molar site: A cross-sectional study	Masaki Inoue et al., 2020	Tapered (joint) connections had less marginal bone loss than butt joint; zirconia and titanium abutments showed less bleeding than gold. Retention type (cement vs screw) made no difference	8	GOOD QUALITY
Five-year outcomes of a randomized controlled clinical trial comparing single-tooth implant-supported restoration with either zirconia or titanium abutments	Luca Ferrantino et al., 2023	Zirconia abutments had better aesthetic outcomes than titanium, with similar clinical and radiographic behaviour	8	GOOD QUALITY
13-year follow-up of a randomized controlled study on zirconia and titanium abutments	Viviane Laura Humm et al., 2023	Zirconia and titanium abutments both showed 100% survival with similar outcomes	8	GOOD QUALITY
Abutment design				
Biological width establishment around dental implants is influenced by abutment height irrespective of vertical mucosal thickness: A cluster randomized controlled trial	Sergio Spinato et al., 2019	Short abutments (1 mm) lead to significantly more marginal bone loss at 12 months than long abutments (3 mm), regardless of mucosal thickness	9	GOOD QUALITY

Comparison of two different abutment designs on marginal bone loss and soft tissue development	Ratnadeep C Patil et al., 2014	Curved and straight abutments showed no significant differences in bone or soft tissue outcomes	8	GOOD QUALITY
Effect of abutment height on interproximal implant bone level in the early healing: A randomized clinical trial	Juan Blanco et al., 2017	Short (1 mm) abutments showed more early bone loss than 3 mm abutments	8	GOOD QUALITY
The Influence of Initial Soft Tissue Thickness on Peri-Implant Bone Remodeling	Vervaeke et al., 2014	Thinner initial soft tissue leads to more early peri-implant bone loss; taller abutments preserve bone better	8	GOOD QUALITY
Influence of abutment shape on peri-implant tissue conditions: A randomized clinical trial	Juan Carlos Bernabeu-Mira et al., 2023	Cylindrical abutments caused less marginal bone loss and less bleeding on probing over the first 12 months compared to wide abutments	8	GOOD QUALITY
Influence of buccal emergence profile designs on peri-implant tissues: A randomized controlled trial	Juan Wang et al., 2020	Emergence profile design based on the width/height ratio ($\approx 32^\circ$ angle) significantly reduced gingival margin recession at 12 months compared with standard emergence profile with thick phenotype	8	GOOD QUALITY
The link between abutment configuration and marginal bone loss in subcrestally placed posterior implant supported restorations	Jung-Hyun Nam et al., 2025	In subcrestal and equicrestal implants, profile angles within 2 mm (up to 3 mm subcrestal) correlate with bone loss; smaller angles are preferable	8	GOOD QUALITY

Impact of profile angle of CAD-CAM abutment on the marginal bone loss of implant-supported single-tooth posterior restorations	Jin-Won Han et al., 2025	Convex profiles and wide profile angles near the implant junction increase marginal bone loss; concave/straight <20° reduce it	8	GOOD QUALITY
Association between Peri-Implant Soft Tissue Health and Different Prosthetic Emergence Angles in Esthetic Areas: Digital Evaluation after 3 Years' Function	Diego Lops et al., 2022	Emergence angles ≥30° did not lead to worse soft tissue health compared to angles ≤30° after 3 years	8	GOOD QUALITY
Anterior implant restorations with a convex emergence profile increase the frequency of recession: 12-month results of a randomized controlled clinical trial	Marina Siegenthaler et al., 2022	Convex emergence profiles increased the risk of mucosal recession compared with concave or standard designs after 12 months	8	GOOD QUALITY
Surgical and prosthetic protocols				
The effect of one-time abutment placement on interproximal bone levels and peri-implant soft tissues: a prospective randomized clinical trial	Ana Molina et al., 2017	One-time abutment placement resulted in significantly less bone loss in the early healing period compared to repeated abutment changes	8	GOOD QUALITY
Immediate loading of occluding definitive partial fixed prostheses vs non-occluding provisional restorations - 3-year post-loading results from a pragmatic multicentre randomised controlled trial	Marco Esposito et al., 2018	Definitive occluding fixed prostheses under immediate loading performed similarly in bone, soft tissue response, and overall success compared to non-occluding provisionals	7	GOOD QUALITY
Immediate occlusal vs nonocclusal loading of implants: A randomized prospective clinical pilot study and patient centered outcome after 36 months	Susanne Vogl et al., 2019	No significant differences in survival, bone levels, or patient satisfaction between occlusal	7	GOOD QUALITY

		and non-occlusal immediate loading		
Immediate versus delayed temporization at posterior single implant sites: A randomized controlled trial	Joseph Wang et al.,2020	Immediate and delayed temporization showed very similar bone and soft tissue outcomes at 12 months	7	GOOD QUALITY
Immediate vs. delayed loading in the posterior mandible: a split-mouth study with up to 15 years of follow-up	Georgios E Romanos et al., 2014	Immediate loading in the posterior mandible had long- term outcomes comparable to delayed loading when using platform-switched implants	8	GOOD QUALITY
One Abutment One Time: A Multicenter, Prospective, Controlled, Randomized Study	José Vicente Ríos-Santos et al., 2020	One-time abutment placement preserved marginal bone and soft tissues better than repeated dis/reconnections	8	GOOD QUALITY
The influence of repeated abutment changes on peri- implant tissue stability: 3-year post-loading results from a multicentre randomised controlled trial	Eriberto Bressan et al.,2017	Repeated abutment dis/reconnections caused greater peri- implant bone loss compared to one- time abutment placement	8	GOOD QUALITY
One abutment-one time versus a provisional abutment in immediately loaded post- extractive single implants: a 1- year follow-up of a multicentre randomised controlled trial	Tommaso Grandi et al., 2014	The one-time abutment approach maintained peri- implant tissues better than provisional abutment use in immediate loading		GOOD QUALITY
Clinical and radiologic outcomes after submerged and transmucosal implant placement with two-piece implants in the anterior maxilla and mandible: 3-year results of a randomized controlled clinical trial	Mariano Sanz et al., 2015	Submerged and transmucosal placement showed similar implant survival, bone, and soft tissue outcomes after 3 years	8	GOOD QUALITY

Immediate loading of screw-retained all-ceramic crowns in immediate versus delayed single implant placement	Stefan Vandeweghe et al., 2013	Immediate and delayed single implants restored with all-ceramic crowns had comparable survival and bone outcomes	6	FAIR QUALITY
Comparative Study of the Crestal vs Subcrestal Placement of Dental Implants via Radiographic and Clinical Evaluation	Puja Chatterjee et al., 2022	Subcrestal placement showed slightly better crestal bone preservation than crestal placement	8	GOOD QUALITY
Effect of different implant placement depths on crestal bone levels and soft tissue behavior: A 5-year randomized clinical trial	Rafael Amorim Cavalcanti de Siqueira et al.,2020	Subcrestal placement led to less crestal bone loss compared with equicrestal implants over 5 years	8	GOOD QUALITY

References

1. The Glossary of Prosthodontic Terms 2023: Tenth Edition. *J Prosthet Dent* 2023; **130**: e1–e3.

2. Mulla SA *et al.* Exploring the Biological Width in Dentistry: A Comprehensive Narrative Review. *Cureus* 2023; **15**: e42080.

3. Caton JG *et al.* A new classification scheme for periodontal and peri-implant diseases and conditions - Introduction and key changes from the 1999 classification. *J Clin Periodontol* 2018; **45 Suppl 20**: S1–S8.

4. Hermann JS, Schoolfield JD, Schenk RK, Buser D, Cochran DL. Influence of the size of the microgap on crestal bone changes around titanium implants. A histometric evaluation of unloaded non-submerged implants in the canine mandible. *J Periodontol* 2001; **72**: 1372–1383.

5. Lindhe J, Berglundh T, Ericsson I, Liljenberg B, Marinello C. Experimental breakdown of peri-implant and periodontal tissues. A study in the beagle dog. *Clin Oral Implants Res* 1992; **3**: 9–16.

6. Kawahara H, Kawahara D, Mimura Y, Takashima Y, Ong JL. Morphologic studies on the biologic seal of titanium dental implants. Report II. In vivo study on the defending mechanism of epithelial adhesions/attachment against invasive factors. *Int J Oral Maxillofac Implants* 1998; **13**: 465–473.

7. Schwarz F, Ramanauskaite A. It is all about peri-implant tissue health. *Periodontol 2000* 2022; **88**: 9–12.

8. Alexander R, Liu X. Soft tissue integration around dental implants: A pressing priority. *Biomaterials* 2026; **324**: 123491.

9. Baus-Domínguez M *et al.* Behaviour of the Peri-Implant Soft Tissue with Different Rehabilitation Materials on Implants. *Polymers (Basel)* 2023; **15**: 3321.

10. Choe S, Ma T, Jones D, Shiao HJ, Saito H. Peri-implant mucosal tissue attachment: Narrative review. *Dent Rev* 2024; **4**: 100141.

11. Glauser R, Schüpbach P, Gottlow J, Hämmerle CHF. Periimplant soft tissue barrier at experimental one-piece mini-implants with different surface topography in humans: A light-microscopic overview and histometric analysis. *Clin Implant Dent Relat Res* 2005; **7 Suppl 1**: S44–51.

12. Majzoub J, Chen Z, Saleh I, Askar H, Wang H-L. Influence of restorative design on the progression of peri-implant bone loss: A retrospective study. *J Periodontol* 2021; **92**: 536–546.

13. Lin C-Y, Kuo P-Y, Chiu M-Y, Wang H-L. Depth of mucosal tunnel in peri-implant health during 12-month follow-up in patients with controlled periodontitis. *J Periodontol* 2023; **94**: 66–76.

14. Mattheos N, Vergoullis I, Janda M, Miseli A. The Implant Supracrestal Complex and Its Significance for Long-Term Successful Clinical Outcomes. *Int J Prosthodont* 2021; **34**: 88–100.
15. Avila-Ortiz G, Gonzalez-Martin O, Couso-Queiruga E, Wang H-L. The peri-implant phenotype. *J Periodontol* 2020; **91**: 283–288.
16. Monje A, Catena A, Borgnakke WS. Association between diabetes mellitus/hyperglycaemia and peri-implant diseases: Systematic review and meta-analysis. *J Clin Periodontol* 2017; **44**: 636–648.
17. Papaspyridakos P, Chen C-J, Singh M, Weber H-P, Gallucci GO. Success criteria in implant dentistry: a systematic review. *J Dent Res* 2012; **91**: 242–248.
18. Lee D-J, Son J, Ahn K-M. Evaluation of Criteria for Dental Implant Success: A Systematic Literature Review. *J Implantol Appl Sci* 2024; **28**: 123–133.
19. Won C. A Novel Framework for Optimizing Peri-Implant Soft Tissue in Subcrestally Placed Implants in Single Molar Cases: Integrating Transitional and Subcrestal Zones for Biological Stability. *J Clin Med* 2025; **14**: 2435.
20. Mattheos N, Janda M, Acharya A, Pekarski S, Larsson C. Impact of design elements of the implant supracrestal complex (ISC) on the risk of peri-implant mucositis and peri-implantitis: A critical review. *Clin Oral Implants Res* 2021; **32 Suppl 21**: 181–202.
21. Puisys A, Janda M, Auzbikaviciute V, Gallucci GO, Mattheos N. Contour angle and peri-implant tissue height: Two interrelated features of the implant supracrestal complex. *Clin Exp Dent Res* 2023; **9**: 418–424.
22. Souza AB, Alshihri A, Kämmerer PW, Araújo MG, Gallucci GO. Histological and micro-CT analysis of peri-implant soft and hard tissue healing on implants with different healing abutments configurations. *Clin Oral Implants Res* 2018; **29**: 1007–1015.
23. Linkevicius T, Apse P. Influence of abutment material on stability of peri-implant tissues: a systematic review. *Int J Oral Maxillofac Implants* 2008; **23**: 449–456.
24. Sailer I, Philipp A, Zembic A, Pjetursson BE, Hämmerle CHF, Zwahlen M. A systematic review of the performance of ceramic and metal implant abutments supporting fixed implant reconstructions. *Clin Oral Implants Res* 2009; **20 Suppl 4**: 4–31.
25. Zembic A, Sailer I, Jung RE, Hämmerle CHF. Randomized-controlled clinical trial of customized zirconia and titanium implant abutments for single-tooth implants in canine and posterior regions: 3-year results. *Clin Oral Implants Res* 2009; **20**: 802–808.
26. Spitznagel FA, Balmer M, Wiedemeier DB, Jung RE, Gierthmuehlen PC. Clinical outcomes of all-ceramic single crowns and fixed dental prostheses supported by ceramic implants: A systematic review and meta-analyses. *Clin Oral Implants Res* 2022; **33**: 1–20.
27. Tallarico M *et al.* Prosthetic Guidelines to Prevent Implant Fracture and Peri-Implantitis: A Consensus Statement from the Osstem Implant Community. *Prosthesis* 2025; **7**: 65.
28. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med* 2009; **6**: e1000097.
29. Siegenthaler M, Strauss FJ, Gamper F, Hämmerle CHF, Jung RE, Thoma DS. Anterior implant restorations with a convex emergence profile increase the frequency of recession: 12-month results of a randomized controlled clinical trial. *J Clin Periodontol* 2022; **49**: 1145–1157.
30. Gomez-Meda R, Esquivel J, Blatz MB. The esthetic biological contour concept for implant restoration emergence profile design. *J Esthet Restor Dent* 2021; **33**: 173–184.
31. Katafuchi M, Weinstein BF, Leroux BG, Chen Y-W, Daubert DM. Restoration contour is a risk indicator for peri-implantitis: A cross-sectional radiographic analysis. *J Clin Periodontol* 2018; **45**: 225–232.
32. Yang F *et al.* Evaluation of microgaps and microleakage at the implant-abutment interface of individualized abutments in the maxillary anterior region under functional loading: A pragmatic clinical trial. *J Prosthodont Res* 2025; **69**: 58–67.
33. Andreiotelli M, Kohal R-J. Fracture strength of zirconia implants after artificial aging. *Clin Implant Dent Relat Res* 2009; **11**: 158–166.
34. Pamato S, Honório HM, da Costa JA, Traebert JL, Bonfante EA, Pereira JR. The influence of titanium base abutments on peri-implant soft tissue inflammatory parameters and marginal bone loss: A randomized clinical trial. *Clin Implant Dent Relat Res* 2020; **22**: 542–548.

35. Nuytens P, Grande F, D'haese R, Salameh Z, Lepidi L. Novel complete-arch pillar system (CAPS) to register implant position and maxillomandibular relationship in one single visit. *J Dent* 2024; **143**: 104885.
36. Grande F, Pozzan MC, Marconato R, Mollica F, Catapano S. Evaluation of Load Distribution in a Mandibular Model with Four Implants Depending on the Number of Prosthetic Screws Used for OT-Bridge System: A Finite Element Analysis (FEA). *Materials (Basel)* 2022; **15**: 7963.
37. Lops D *et al.* Association between Peri-Implant Soft Tissue Health and Different Prosthetic Emergence Angles in Esthetic Areas: Digital Evaluation after 3 Years' Function. *J Clin Med* 2022; **11**: 6243.
38. González-Martín O, Lee E, Weisgold A, Veltri M, Su H. Contour Management of Implant Restorations for Optimal Emergence Profiles: Guidelines for Immediate and Delayed Provisional Restorations. *Int J Periodontics Restorative Dent* 2020; **40**: 61–70.
39. Chu SJ *et al.* Restorative Emergence Profile for Single-Tooth Implants in Healthy Periodontal Patients: Clinical Guidelines and Decision-Making Strategies. *Int J Periodontics Restorative Dent* 2019; **40**: 19–29.
40. Nam J-H, Chang J, Pyo S-W, Kim S. The link between abutment configuration and marginal bone loss in subcrestally placed posterior implant-supported restorations. *J Prosthet Dent* 2025; : S0022391325000459.
41. Yi Y, Koo K-T, Schwarz F, Ben Amara H, Heo S-J. Association of prosthetic features and peri-implantitis: A cross-sectional study. *J Clin Periodontol* 2020; **47**: 392–403.
42. Han J-W, Han J-W, Pyo S-W, Kim S. Impact of profile angle of CAD-CAM abutment on the marginal bone loss of implant-supported single-tooth posterior restorations. *J Prosthet Dent* 2025; **134**: 1180–1186.
43. Ferrari M *et al.* 3-Year Randomized Controlled Prospective Clinical Trial on Different CAD-CAM Implant Abutments. *Clin Implant Dent Relat Res* 2016; **18**: 1134–1141.
44. Esquivel-Upshaw JF, Clark AE, Shuster JJ, Anusavice KJ. Randomized clinical trial of implant-supported ceramic-ceramic and metal-ceramic fixed dental prostheses: preliminary results. *J Prosthodont* 2014; **23**: 73–82.
45. Heierle L, Wolleb K, Hämmerle CH, Wiedemeier DB, Sailer I, Thoma DS. Randomized Controlled Clinical Trial Comparing Cemented Versus Screw-Retained Single Crowns on Customized Zirconia Abutments: 3-Year Results. *Int J Prosthodont* 2019; **32**: 174–176.
46. Ayyadanveetil P, Thavakkara V, Latha N, Pavanam M, Saraswathy A, Kuruniyan MS. Randomized clinical trial of zirconia and polyetheretherketone implant abutments for single-tooth implant restorations: A 5-year evaluation. *J Prosthet Dent* 2022; **128**: 1275–1281.
47. Inoue M, Nakano T, Shimomoto T, Kabata D, Shintani A, Yatani H. Multivariate analysis of the influence of prosthodontic factors on peri-implant bleeding index and marginal bone level in a molar site: A cross-sectional study. *Clin Implant Dent Relat Res* 2020; **22**: 713–722.
48. Cooper LF *et al.* Three-Year Prospective Randomized Comparative Assessment of Anterior Maxillary Single Implants with Different Abutment Interfaces. *Int J Oral Maxillofac Implants* 2019; **34**: 150–158.
49. Patil RC, den Hartog L, van Heereveld C, Jagdale A, Dilbaghi A, Cune MS. Comparison of two different abutment designs on marginal bone loss and soft tissue development. *Int J Oral Maxillofac Implants* 2014; **29**: 675–681.
50. Lamperti ST, Wolleb K, Hämmerle CHF, Jung RE, Hüsler J, Thoma DS. Cemented versus screw-retained zirconia-based single-implant restorations: 5-year results of a randomized controlled clinical trial. *Clin Oral Implants Res* 2022; **33**: 353–361.
51. Pozzi A, Arcuri L, Fabbri G, Singer G, Londono J. Long-term survival and success of zirconia screw-retained implant-supported prostheses for up to 12 years: A retrospective multicenter study. *J Prosthet Dent* 2023; **129**: 96–108.
52. Kraus RD, Epprecht A, Hämmerle CHF, Sailer I, Thoma DS. Cemented vs screw-retained zirconia-based single implant reconstructions: A 3-year prospective randomized controlled clinical trial. *Clin Implant Dent Relat Res* 2019; **21**: 578–585.
53. Thoma DS, Wolleb K, Bienz SP, Wiedemeier D, Hämmerle CHF, Sailer I. Early histological, microbiological, radiological, and clinical response to cemented and screw-retained all-ceramic single crowns. *Clin Oral Implants Res* 2018; **29**: 996–1006.

54. Kraus RD, Espuelas C, Hämmerle CHF, Jung RE, Sailer I, Thoma DS. Five-year randomized controlled clinical study comparing cemented and screw-retained zirconia-based implant-supported single crowns. *Clin Oral Implants Res* 2022; **33**: 537–547.
55. Ramón-Morales C-A, Ramón-Morales O-M, Ardila CM. Gram-negative enteric rods/Pseudomonas colonization in mucositis and peri-implantitis of implants restored with cemented and screwed reconstructions: A cross-sectional study. *Clin Implant Dent Relat Res* 2019; **21**: 946–952.
56. García-Minguillán G, Del Río J, Preciado A, Lynch CD, Castillo-Oyagüe R. Impact of the retention system of implant fixed dental restorations on the peri-implant health, state of the prosthesis, and patients' oral health-related quality of life. *J Dent* 2020; **94**: 103298.
57. Korsch M, Walther W. Retrospective analysis of loosening of cement-retained vs screw-retained fixed implant-supported reconstructions. *Quintessence Int* 2015; **46**: 583–589.
58. Atieh MA, Ibrahim HM, Atieh AH. Platform switching for marginal bone preservation around dental implants: a systematic review and meta-analysis. *J Periodontol* 2010; **81**: 1350–1366.
59. Enkling N *et al*. Influence of platform switching on bone-level alterations: a three-year randomized clinical trial. *J Dent Res* 2013; **92**: 139S–45S.
60. Messias A *et al*. Peri-implant marginal bone loss reduction with platform-switching components: 5-Year post-loading results of an equivalence randomized clinical trial. *J Clin Periodontol* 2019; **46**: 678–687.
61. Meloni SM, Jovanovic SA, Pisano M, Tallarico M. Platform switching versus regular platform implants: 3-year post-loading results from a randomised controlled trial. *Eur J Oral Implantol* 2016; **9**: 381–390.
62. Meloni SM *et al*. Platform switching versus regular platform single implants: 5-year post-loading results from a randomised controlled trial. *Int J Oral Implantol (Berl)* 2020; **13**: 43–52.
63. Pozzi A, Tallarico M, Moy PK. Three-year post-loading results of a randomised, controlled, split-mouth trial comparing implants with different prosthetic interfaces and design in partially posterior edentulous mandibles. *Eur J Oral Implantol* 2014; **7**: 47–61.
64. Lago L, da Silva L, Martinez-Silva I, Rilo B. Radiographic Assessment Of Crestal Bone Loss In Tissue-Level Implants Restored By Platform Matching Compared With Bone-Level Implants Restored By Platform Switching: A Randomized, Controlled, Split-Mouth Trial With 3-Year Follow-Up. *Int J Oral Maxillofac Implants* 2019; **34**: 179–186.
65. Spinato S, Stacchi C, Lombardi T, Bernardello F, Messina M, Zaffe D. Biological width establishment around dental implants is influenced by abutment height irrespective of vertical mucosal thickness: A cluster randomized controlled trial. *Clin Oral Implants Res* 2019; **30**: 649–659.
66. Blanco J, Pico A, Caneiro L, Nóvoa L, Batalla P, Martín-Lancharro P. Effect of abutment height on interproximal implant bone level in the early healing: A randomized clinical trial. *Clin Oral Implants Res* 2018; **29**: 108–117.
67. Vervaeke S, Dierens M, Besseler J, De Bruyn H. The influence of initial soft tissue thickness on peri-implant bone remodeling. *Clin Implant Dent Relat Res* 2014; **16**: 238–247.
68. Tallarico M, Caneva M, Meloni SM, Xhanari E, Covani U, Canullo L. Definitive Abutments Placed at Implant Insertion and Never Removed: Is It an Effective Approach? A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *J Oral Maxillofac Surg* 2018; **76**: 316–324.
69. Atieh MA, Tawse-Smith A, Alsabeeha NHM, Ma S, Duncan WJ. The One Abutment-One Time Protocol: A Systematic Review and Meta-Analysis. *J Periodontol* 2017; **88**: 1173–1185.
70. Santos JS, Santos T de S, Martins-Filho PRS, Krockow N von, Weigl P, Pablo H. One Abutment at One Time Concept for Platform-Switched Morse Implants: Systematic Review and Meta-Analysis. *Braz Dent J* 2018; **29**: 7–13.
71. Ríos-Santos JV *et al*. One Abutment One Time: A Multicenter, Prospective, Controlled, Randomized Study. *Int J Environ Res Public Health* 2020; **17**: 9453.
72. Grandi T, Guazzi P, Samarani R, Maghaireh H, Grandi G. One abutment-one time versus a provisional abutment in immediately loaded post-extractive single implants: a 1-year follow-up of a multicentre randomised controlled trial. *Eur J Oral Implantol* 2014; **7**: 141–149.
73. Romanos GE, Aydin E, Locher K, Nentwig G-H. Immediate vs. delayed loading in the posterior mandible: a split-mouth study with up to 15 years of follow-up. *Clin Oral Implants Res* 2016; **27**: e74-79.

74. Esposito M, Grufferty B, Papavasiliou G, Dominiak M, Trullenque-Eriksson A, Heinemann F. Immediate loading of occluding definitive partial fixed prostheses vs non-occluding provisional restorations - 3-year post-loading results from a pragmatic multicentre randomised controlled trial. *Eur J Oral Implantol* 2018; **11**: 309–320.
75. Wang J, Lerman G, Bittner N, Fan W, Lalla E, Papapanou PN. Immediate versus delayed temporization at posterior single implant sites: A randomized controlled trial. *J Clin Periodontol* 2020; **47**: 1281–1291.
76. Vogl S, Stopper M, Hof M, Theisen K, Wegscheider WA, Lorenzoni M. Immediate occlusal vs nonocclusal loading of implants: A randomized prospective clinical pilot study and patient centered outcome after 36 months. *Clin Implant Dent Relat Res* 2019; **21**: 766–774.
77. Vandeweghe S, Nicolopoulos C, Thevisen E, Jimbo R, Wennerberg A, De Bruyn H. Immediate loading of screw-retained all-ceramic crowns in immediate versus delayed single implant placement. *Int J Prosthodont* 2013; **26**: 458–464.
78. de Siqueira RAC, Savaget Gonçalves Junior R, Dos Santos PGF, de Mattias Sartori IA, Wang H-L, Fontão FNGK. Effect of different implant placement depths on crestal bone levels and soft tissue behavior: A 5-year randomized clinical trial. *Clin Oral Implants Res* 2020; **31**: 282–293.
79. Chatterjee P, Shashikala R, Navneetham A. Comparative Study of the Crestal vs Subcrestal Placement of Dental Implants via Radiographic and Clinical Evaluation. *J Contemp Dent Pract* 2022; **23**: 623–627.
80. Valles C, Rodríguez-Ciurana X, Clementini M, Baglivo M, Paniagua B, Nart J. Influence of subcrestal implant placement compared with equicrestal position on the peri-implant hard and soft tissues around platform-switched implants: a systematic review and meta-analysis. *Clin Oral Invest* 2018; **22**: 555–570.

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