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Review

Factors Affecting the Implant Supracrestal Complex: A Consensus Paper from the Global Consensus Meeting Organized by the Osstem Implant Community

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Abstract

Aim: To develop clear, evidence-based, and standardized guidelines for the design, selection, and clinical use of implant abutments and prosthetic components in order to optimize the biological, mechanical, and esthetic performance of the implant supracrestal complex. **Methods**: A panel of 10 expert clinicians and researchers in prosthodontics participated in the Osstem Global Consensus Meeting. For the present consensus meeting, a scoping review was performed in advance and discussed among the participants. A comprehensive search of the literature was performed up to June 2025. Two reviewers (M.T. and F.G.) independently conducted screening, data extraction, and quality assessment using the Newcastle–Ottawa Scale. The evidence was synthesized and discussed by the panel of expert clinicians during the consensus meeting. After that, guidelines were developed using a 14-question questionnaire to formulate consensus-based clinical recommendations. The participants answered structured questions and discussed discrepancies to achieve a consensus. **Results**: The panel of expert clinicians reached a consensus on several prosthetic key points. Concave abutment profiles and emergence angles <30° 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, while zirconia provides superior esthetics anteriorly, and hybrid abutments balance strength and esthetics. **Conclusions**: Prosthetic design and abutment material selection critically affect peri-implant tissue stability and esthetic outcomes. The evidence supports screw-retained designs, platform switching, and the "one abutment–one time" approach for predictable long-term success.

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1. Introduction

Biological 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 protective seal, preventing microbial penetration and infection. 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 compared with 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]. Connective tissue attachment is more stable around one-piece implants and natural teeth, but microbial activity still challenges the junctional epithelium. Regardless of tissue biotype, the peri-implant biological width shows the same 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 supracrestal 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, the peri-implant mucosa is more susceptible to breakdown, highlighting the need for strict maintenance to ensure stability [10].

Several terms have been proposed to 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 consensus paper, 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.

The traditional criteria for implant success have focused primarily on osseointegration and implant survival [17], whereas the 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].

The purpose of this consensus paper is to provide guidelines based on the available scientific and clinical evidence through an agreement among researchers, professors, and clinicians. These guidelines will support the implant community by offering a comprehensive overview of the factors affecting the implant supracrestal complex, with an emphasis on recent scientific findings and clinical approaches, highlighting key concepts, evidence types, research gaps, and priorities related to prosthetic features regarding abutment configuration, design, materials, and clinical protocols. Additionally, the guidelines will establish standardized terminology and concepts to enhance clarity and consistency in implant dentistry.

2. Methods

2.1. Settings and Protocol

This consensus paper was written at the Department of Medicine, Surgery, and Pharmacy, University of Sassari, Italy, between November 2023 and March 2025, in collaboration with the Department of Translational Medicine, University of Ferrara, and in conjunction with the Osstem Global Consensus Meeting (GCM).

Experts, including professors and clinicians, were selected based on their academic and professional credentials to participate as members of the Audience and/or the Scientific Committee. The GCM involved international experts from academia and clinical practice, organized into three Divisions: Surgical, Prosthodontics, and Digital. This manuscript summarizes the outcomes of the Prosthodontics Division. A panel of ten prosthodontic specialists defined discussion topics, incorporated PCC elements (population, concept, context), and prepared narrative [27] or scoping reviews. These were critically appraised and refined through moderated debates. Previous publications have already reported consensus statements on implant fracture risk and prosthetic factors associated with peri-implantitis [27].

For the present consensus meeting, a scoping review was conducted in advance, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [28]. 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. All authors, including those listed as independent researchers, participated as invited experts within the Osstem Global Consensus Meeting based on their clinical and/or scientific expertise; affiliations reflect institutional status and do not imply functional independence from the consensus process.

2.2. Scoping Review Methodology

The following literature mapping describes the structured process used to identify and summarize the available evidence prior to the consensus meeting and should not be interpreted as a standalone scoping review.

2.2.1. Search Strategies

The focused question was as follows: Does 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)?

The population (P) includes partially edentulous adult patients rehabilitated with implant-supported fixed dental prostheses (FDPs) in the anterior and/or posterior regions, supported by one or more dental implants. The core concept (C) of the scoping review is the influence of prosthetic design characteristics and restorative materials on biological, esthetic, and clinical outcomes of implant-supported fixed dental prostheses (survival rate, technical and/or biological complications, pink esthetic score.). The context (C) of the scoping review comprises published clinical studies conducted in routine implant dentistry settings, including comparative studies.

PubMed and Scopus databases were electronically searched to obtain publications written in the 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 PCC elements, and the search strategy was as follows: ((“Dental Implants” [Mesh]) OR “Dental Prosthesis, Implant-Supported” [Mesh]) AND “Dental Implant-Abutment Design” [Mesh]. The applied filters included Abstract, Humans, and English.

2.2.2. Selection of Studies and Data Extraction

The electronic search was completed by conducting manual searches of all the selected full text articles/references. An 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 (F.G. and G.F.). Any disagreement was resolved by consensus between the authors and the supervisors (S.C. and M.T.).

2.2.3. 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.

2.2.4. Grading of the Evidence

The methodological quality was assessed using the Newcastle–Ottawa Scale (NOS), which evaluates non-randomized studies across three domains: selection of study groups, comparability of cohorts, and ascertainment of outcomes. Studies were awarded a maximum of nine points, with higher scores indicating better methodological quality. Each study was independently reviewed by two authors, and any 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. The NOS assessment was used descriptively to characterize the study methodology and heterogeneity, without implying evidence grading or overall certainty, in accordance with the exploratory purpose of scoping reviews.

No formal evidence grading, pooling of data, or certainty assessment was performed, in accordance with the supportive and exploratory role of the literature mapping within a consensus process.

2.2.5. 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.

2.3. Consensus Process and Questionnaire (Expert Opinion Component)

The presenters (M.Y. and S.L.) prepared the scoping review, in agreement with the AGREE guidelines. The level of evidence was sufficient for the purpose of this Global Consensus Meeting. To reach a consensus on the topic "Prosthetic Design Considering Gingival Health and Esthetics" a 14-question questionnaire was prepared and discussed.

The clinical questions included the following:

1. Do you agree to use the term peri-implant tissue attachment to define the soft and hard tissues that form around a dental implant to stabilize and protect it?
2. Do you agree that screw-retained restorations should be considered to increase esthetic outcomes and to minimize biological risks for bone level implants?
3. Do you agree that platform switching should be integrated in the implant–abutment complex?
4. Do you agree that a PMMA fixed on a temporary titanium link should be used for temporary restorations?
5. Do you agree that a titanium link with either multilayer or monolithic zirconia, or porcelain fused to zirconia (PFZ) restorations should be used for definitive restorations (from a single crown up to a 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 mesiodistal aspect should always be lower than 40°, ideally between 20° and 30°?
8. Do you agree that, in a buccal perspective, the EA should be as flat as possible in the subcritical counter and 70° to 90° immediately before the cervical point of the restoration?
9. In the case of immediate implants, do you agree that the implant–abutment connection should be placed 4–4.5 mm from the cervical point of the tooth to be rehabilitated, and maximum 1–1.5 mm deeper to the "intact" buccal plate and as palatal as possible within the volume of the tooth to be rehabilitated?
10. Do you agree that in the anterior area and healed sites, the implant should be placed 4 mm distant from the cervical portion of the tooth to be rehabilitated?
11. Do you agree that, in the posterior areas and healed sites, the implant should be placed 3 mm distant from the cervical portion of the tooth to be rehabilitated, maximum 2 mm subcrestally and according to the soft tissue thickness?
12. Do you agree that, in the case of a very tight implant–abutment connection, the implant could be placed up to 3 mm deeper?
13. Do you agree that the abutment should be removed as infrequently as possible? In full arch restorations, one abutment–one time could be delivered using multi-unit abutments. However, in an FP1 prosthesis, a customized abutment could be used.
14. Do you agree that digital technologies and AI could support clinicians in the development of the proper implanted 3D position and the proper abutment design?

3. Results

The scoping review conducted in advance of the Global Consensus Meeting yielded a total of 976 records, as reported in the PRISMA flow diagram (reported as Supplementary Materials). After removal of duplicates and screening of titles and abstracts against the predefined focused question and inclusion/exclusion criteria, 907 records were excluded. A total of 69 articles were retrieved for full-text assessment. Following full-text screening, 23 studies were excluded because they did not meet the minimum follow-up of 1 year and/or did not report relevant clinical or radiographic outcomes related to the implant–abutment connection (e.g., marginal bone levels, pink esthetic score, periodontal parameters). Consequently, 46 studies fulfilled the eligibility criteria and were included in the scoping review. The full texts of these 46 eligible studies constituted the evidence base that was presented and discussed during the Global Consensus Meeting to support the development of the consensus statements. The included studies were classified according to key prosthetic features, including abutment configuration, design, materials, and clinical protocols. Of the 46 studies, 33 were randomized clinical trials, 9 were cohort studies, 2 were case–control studies, and 2 were cross-sectional studies. According to the Newcastle–Ottawa Scale (NOS), 39 studies were rated as good quality and 5 were rated as fair quality, with none classified as low quality, Nevertheless, these findings should be interpreted cautiously, as the NOS star-based system may involve a degree of subjectivity—particularly in the assessment of confounder adjustment—and provides a less comprehensive evaluation of bias compared with more detailed tools, as further discussed in the following sections. The NOS scores for each study and for each assessment domain are reported as Supplementary Materials to ensure the transparency of the quality appraisal.

3.1. Summary of the Evidence

3.1.1. Implant–Abutment Design and Materials

Regarding the abutment design, the literature indicates 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 a natural appearance and for healthy peri-implant mucosa. Emergence angles > 30° increase the risk of peri-implantitis and impaired soft tissue integration [31], while EAs < 30° reduce plaque accumulation and inflammation risk. On bone-level implants, a wide EA and convex profiles further raises risk, whereas a shallower EA with straight or concave contours at interproximal areas helps maintain peri-implant health.

3.1.2. Abutment Materials

Abutment material selection influences the biomechanical behavior, soft tissue response, and esthetic outcomes. 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 its use in high-load situations [33]. Hybrid materials aim to balance strength and appearance. PEEK is mainly used for temporary prostheses 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.

3.1.3. Design and Material Considerations by Restoration Type

Single-tooth restorations require precise 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, the 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 level [6,25].

3.1.4. Management of Temporary and Definitive Restoration

The subcritical contour, located in the supracrestal 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]. The 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]. The 3D customization of both the sub- and supragingival contours is essential for esthetics, hygiene, and long-term stability, and is influenced by implant position and periodontal phenotype [10].

3.2. Consensus Questionnaire Results (Expert Opinion)

Eight of ten participants completed the questionnaire. Six of eight professors agreed with the term "peri-implant tissue attachment" (PTA) rather than 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 esthetic outcomes and to minimize biological risks for bone level implants. The main benefits are advantages in terms of retrievability, maintenance, and customization. Moreover, by using a titanium link, the overall prosthetic room for esthetics could be improved. Platform shifting may be integrated in the implant–abutment complex. In order to reduce inflammation and, potentially, bone resorption around the implants, the abutments should be removed as infrequently as possible. In full arch restorations, one abutment–one time could be delivered using multi-unit abutments. However, in an FP1 prosthesis, a customized abutment could be used.

Regarding link height, the participants agreed that a titanium link with 1–2 mm of gingival height (whether temporary or definitive) should be selected according to implant depth, ensuring that the depth matches the chosen gingival height. In the case of immediate implants, the implant–abutment connection should be placed 4–4.5 mm from the cervical point of the tooth to be rehabilitated, and maximum 1–1.5 mm deeper to the "intact" buccal plate and as palatal as possible within the volume of the tooth to be rehabilitated. In healed sites, the implant should be placed 4 mm distant from the cervical portion of the tooth to be rehabilitated. On the contrary, in the posterior areas, in healed sites, the implant

should be placed 3 mm distant from the cervical portion of the tooth to be rehabilitated, maximum 2 mm subcrestally, and according to the soft tissue thickness. For example, thin biotype (1 mm) implants should be placed 2 mm deeper, whereas thick biotype (3 mm or more) implants should be placed at the crestal level. Finally, in the case of a very tight implant–abutment connection, the implant could be placed up to 3 mm deeper maximum. PMMA fixed on a temporary titanium link should be used for temporary restorations, and a titanium link with either multilayer or monolithic zirconia, or porcelain fused to zirconia (PFZ) restorations should be used for definitive restorations (from a single crown up to a 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 esthetic outcomes. Prosthodontists should design the critical and subcritical contours to support these tissues accordingly. There was consensus that higher emergence angles (EAs) 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 an 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 a short peri-implant tissue attachment may contribute to bone loss and peri-implantitis, depending on the materials and techniques used.

Digital technologies and AI could support clinicians in the development of the proper implanted 3D position and the proper abutment design; however, we must be cautious since there is currently not enough data. 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

This consensus paper aims to develop a clear, evidence-based, and standardized guideline thought map of the current literature on implant-supported fixed dental prostheses (FDPs), and to highlight some key concepts regarding abutment configuration, design, materials, and clinical protocols. The Results section reports on the evidence mapping, while the questionnaire and related statements represent the expert consensus component, and should be interpreted as hypothesis-generated guidance rather than as formal clinical practice guidelines.

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 have showed stable bone structures 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]. An EA > 30° raises peri-implantitis risk, while an EA of 20–30° interproximally and up to 45° buccally reduces bleeding and bone loss [20,21,37]. Concave profiles improved mucosal stability

but required more time and costs, without clear esthetic advantages [29]. Accordingly, the emergence angle—defined as the angular relationship between the transitional contour and the long axis of the implant—and the emergence profile—describing the three-dimensional contour of the transmucosal component—should be considered to be complementary and interdependent design parameters, as angular values alone do not adequately describe the biological and mechanical impact of the overall prosthetic profile on the peri-implant tissue complex. Customized CAD/CAM abutments allow us to optimize the 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. The buccal emergence angle (EA) should range between 70–90°, with an S-shaped juxtagingival profile, and approximately 30° mesiodistally, to promote optimal soft tissue harmony and peri-implant tissue stability [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].

Recent evidence has indicated that the association between transmucosal contour and marginal bone loss is influenced not only by the magnitude of the angle but by the implant depth, the reference level used for measurement (implant platform versus adjacent bone crest), and the vertical distance from the crest, suggesting that rigid emergence–angle cut-off values should be interpreted cautiously and within a site-, system-, and phenotype-specific context [40].

Retention strategy also affects outcomes. It has already been 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 a greater risk of peri-implantitis due to cement excess [52–55]. In fact, several studies have confirmed higher biological complications and pathogenic bacteria in cemented prostheses [52,54–58].

Platform switching (PS)—using a narrower abutment—helps preserve bone, but evidence beyond 5 years remains limited. Several studies have showed a reduced marginal loss (~0.4 mm) with PS [59]; even if several randomized trials confirmed these benefits within 5 years, others showed no consistent differences [60–66]. Conical interfaces have shown greater stability than PS and flat-to-flat connections [48,51]. Spinato et al. [66] and Quispe-López et al. [67] highlighted the importance of abutment height, with short abutments associated with greater marginal and interproximal bone loss. Vervaeke et al. [68] 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 [69,70]. Other studies have confirmed this effect using Morse taper implants, though with uncertain clinical relevance, as differences were often small and not always significant [71–73].

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 [74–77].

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 [78–81].

In conclusion, abutment shape and design, as well as the one-time abutment placement protocol, significantly influenced marginal bone level changes during the first 12 months of function [82–86]. In contrast, submerged versus transmucosal implant placement and

different loading protocols demonstrated comparable implant survival rates, marginal bone stability, and peri-implant soft tissue outcomes [87–90].

An important limitation of the present consensus paper is that, although the literature search and data mapping were conducted independently, the interpretation of the evidence and the resulting clinical considerations were developed within the framework of the Osstem Global Consensus Meeting. This represents a contextual characteristic of the consensus process, which has been transparently disclosed and addressed through explicit conflict-of-interest statements and expanded limitations. Therefore, the proposed prosthetic concepts should be interpreted as expert-informed, hypothesis-generated guidance rather than universally applicable clinical standards. Nevertheless, although this work was developed within the Osstem Global Consensus Meeting framework, some contributors participated as invited, external, and independent experts in the consensus panel to strengthen the credibility of the meeting.

The consensus questionnaire was completed by a limited number of experts (eight participants), and therefore the voting outcomes should be interpreted as expert opinion rather than as broadly generalizable clinical standards. In addition, while the majority of included studies support concave emergence profiles and screw-retained restorations, the available evidence remains heterogeneous, and some parameters—such as emergence angle thresholds—are reported with variability across the studies. Consequently, these concepts should be applied with clinical judgment and adapted to different implant systems, connection geometries, peri-implant phenotypes, and patient-specific risk factors until further long-term, comparative studies are available.

Another limitation of this consensus paper is that its conclusions align with those of previous systematic and narrative reviews. However, this reflects the consistency of the available evidence rather than redundancy [24,91]. The present study aimed to synthesize heterogeneous data and to integrate expert clinical experience to translate evidence into clinically applicable guidance. This approach prioritizes clinical relevance and decision-making support over quantitative comparison, particularly in areas where long-term high-level evidence remains limited. Finally, the value of this manuscript resides in integrating the available data with expert clinical experience, providing a structured and practice-oriented summary rather than generating new hypotheses or experimental results.

5. Conclusions

In summary, the peri-implant tissue complex appears to be influenced by abutment material, prosthetic design, retention strategy, and implant positioning. Titanium remains the most consistently documented abutment material, while zirconia and PEEK may represent suitable alternatives in selected esthetic or low-load contexts. The current evidence suggests that controlled transmucosal profiles and angles, screw-retained restorations, platform switching, and one abutment–one time protocols may support peri-implant tissue stability; however, their clinical application should be individualized according to implant system characteristics, peri-implant phenotype, and site-specific factors. Within these limitations, the present consensus paper provides a practice-oriented framework that aligns with contemporary success criteria extending beyond osseointegration to include peri-implant tissue health and esthetic integration, while highlighting the need for further long-term, comparative studies.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/prosthesis8020018/s1. 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.

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Data Availability Statement: Summary of clinical studies included in the review, categorized by prosthetic variables is available as Supplementary Materials. In the table, for each study the title, the authors, year of publication, main findings, NOS score, and overall quality assessment were reported. PRISMA flow diagram is also reported as Supplementary Materials.

Conflicts of Interest: The expert panel included clinicians with extensive experience using Osstem implant systems, which may represent a perceived conflict of interest. However, the panel and the authorship of this consensus paper also included invited external and independent experts. Furthermore, the main focus of this consensus paper concerns prosthetic factors influencing the implant supracrestal complex, which are independent of the specific implant system used. The implant company did not interfere with the scientific development, content, or conclusions of this global consensus meeting, and its role was limited to the organizational support of the event.

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