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Recommendations for treating stage I-III periodontitis in the Taiwanese population: A consensus report from the Taiwan Academy of Periodontology

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Background/Purpose: Based on the fundamental of the S3-level clinical practice guideline (CPG) for treating stage I-III periodontitis developed by the European Federation of Periodontology (EFP), this consensus report aimed to develop treatment recommendations for treating periodontitis in the Taiwanese population.

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treatment;
Asians

Methods: The report was constructed by experts from the Taiwan Academy of Periodontology. The following topics were reviewed: (a) the prevalence of periodontitis in Asia and current status of treatment in Taiwan; (b) specific anatomical considerations for treating periodontitis in Asians; (d) educational and preventive interventions and supragingival plaque control; (d) subgingival instrumentation and adjunctive treatment; (e) surgical periodontal therapy; and (f) maintenance and supportive periodontal care. Recommendations were made according to the evidences from the EFP CPG, the published literature and clinical studies in Asians, and the expert opinions.
Results: The treatment recommendations for the Taiwanese population were generally in parallel with the EFP CPG, and extra cautions during treatment and maintenance phases were advised due to the anatomical variations, such as shorter root trunk, higher prevalence of supernumerary distolingual root and lingual bony concavity in mandibular posteriors, and thinner anterior labial plate, of the Asian population.
Conclusion: The EFP CPG could be adopted for treating periodontitis and maintaining periodontal health of the Taiwanese population, and anatomical variations should be cautious when the treatment is delivered.

Contents

Introduction

To establish professional recommendations for treating periodontitis in the Taiwanese population, the Taiwan Academy of Periodontology (TAP) adopted the concept of the EFP S3 level clinical practice guideline for the treatment of stage I-III periodontitis[1] and invited local experts in periodontics to organize a consensus conference in Taipei, Taiwan, on October 11, 2020. The conference was organized by Professor Cheng-Yang Chiang, the President of TAP, Professor Po-Chun Chang, the Chairman of the Publication Committee and the official editor of TAP, Dr. Yu-Jen Wu, the Chairman of the Education Committee of TAP, and Dr. Kuo-Ching Huang, the Director of the Board Council of TAP.

The committee was formed of editorial panels from five major periodontal specialty training institutes in Taiwan, including Drs. Jung-Tsu Chen and Che-Chang Tu (National Taiwan University), Yu-Hsiang Chou (Kaohsiung Medical University), Ren-Yeong Huang and Po-Jan Kuo (National Defense Medical Center), Taichen Lin (Chung Shan Medical University), Yi-Chun Lin (Taipei Veterans General Hospital), and I-Ting Wu (China Medical University). The reviewing panels of experienced periodontists in Taiwan included Professors Lein-Tuan Hou, Yu-Ling Lai, Hsein-Kun Lu, Chi-Cheng Tsai, Kuo Yuan, and Drs. Chun-Jung Chen, Cheng-Sheng Ho, and Yueh-Chao Yang, and four organizers of the consensus meeting. Prior to the consensus meeting, the organizers collectively assigned the following topics to editorial panels for preliminary review:

1. The prevalence of periodontitis in Asia and current status of treatment in Taiwan
2. Specific anatomical considerations for treating periodontitis in Asians
3. Educational and preventive interventions and supragingival plaque control (parallel to the EFP recommendations for the first step of therapy)

4. Subgingival instrumentation and adjunctive treatment (parallel to the EFP recommendations for the second step of therapy)
5. Surgical periodontal therapy (parallel to the EFP recommendations for the third step of therapy)
6. Maintenance and supportive periodontal care (parallel to the EFP Recommendations for the fourth step of therapy)

Based on the evidences from the EFP practice guidelines, the published literature and clinical studies of the Asian population, and their clinical experience, the editorial panels made preliminary recommendations for treating the Taiwanese population prior to meeting. During the consensus meeting, the six topics with recommendations from editorial panels were thoroughly assessed by the reviewing panels, and the major point of judgment was primarily based on the difference in anatomy between Western and Asian populations as well as the strength of evidence from the EFP practice guidelines. The reviewing panels, together with the editorial panels, discussed all of the clinical recommendations raised in the EFP practice guidelines until a consensus was reached (>70% of the committee agreed with the recommendation), and the 'strong' consensus was defined as all committees agreeing with the recommendation.

The consensus was then organized by the editorial and the reviewing panels in Chinese and English. Based on the dissemination plan of TAP, the Chinese version of consensus report is published in a supplemental issue of the *Journal of the Taiwan Academy of Periodontology* (https://doi.org/10.3966/102799622020122502002).[2]

The prevalence of periodontitis in Asia and current status of treatment in Taiwan

Based on the population data available in the WHO Global Oral Health Data Bank in 2011, among 35-44 year-old subjects, approximately 50% population in the South-East Asia region and 40% population in the Western Pacific region had a maximal community periodontal index (CPI) score of 3 or 4.[3] Table 1 lists nationwide studies for the prevalence of periodontitis in Asia after 2000. In general, 40–60% population was affected by periodontitis, and the prevalence was higher in the elderly population. The prevalence of severe chronic periodontitis (CPI score = 4) in 2010, as reported by Kassebaum et al. after age-standardization, was 10–14% in Asia.[4]

In Taiwan, most inhabitants were covered by the National Health Insurance (NHI) system, and periodontal treatments under NHI included regular prophylaxis, root planing, and access flap surgery (AFS). Because of the high incidence of periodontitis in Taiwan, a NHI-funded comprehensive periodontal treatment project (CPTP) has been implemented for treating patients with moderate to severe periodontitis since 2010. CPTP covered non-surgical periodontal therapy, including full mouth subgingival instrumentation, oral hygiene instruction, and dental plaque control, of adult patients with at least 6 teeth of ≥5 mm probing pocket depth (PPD), and encouraged regular supportive periodontal care. As Jhang et al. reported, CPTP contributed to 1.64 mm PPD reduction and 1.25 clinical attachment level (CAL) gain in sites with initial ≥5 mm CAL.[5] Compared with conventional scaling and root planing (SRp), CPTP combined with a postcard recall system reduced the incidence of moderate and deep pockets, bleeding on probing, plaque score, and tooth loss over 3.8 years.[6] Based on the report from the Taiwan Dental Association, 173,073 patients completed CPTP in 2019, and the mean PPD reduction was 0.73 mm, whereas in sites with an initial PPD ≥ 5 mm, the mean PPD reduction was 2.79 mm, with a 29.16% plaque score reduction. The data from the NHI Research Database also revealed that patients receiving CPTP had substantially lower rates of retreatment, endodontic therapy, surgical restoration, and tooth extraction than those receiving SRp only over 18 months.[7]

Table 1 Nationwide studies for the prevalence of periodontitis in Asia.

Country	Year	Criteria of periodontitis	Findings	Reference
India	2002–2003	CAL ≥4 mm	34–44 years: 57.1% 65–74 years: 60.6%	28
Taiwan	2008	CPI score ≥3	All adults: 56.2% 35–44 years: 53.1% 45–64 years: 68.6% ≥65 years: 73.4%	29
Hong Kong	2011	PPD ≥4 mm	35–44 years: 39.6% 65–74 years (non-institutionalized): 59.2% ≥65 years (institutionalized): 56.4%	30
Korea	2014	CPI score ≥3	All adults: 41.1%	31
Japan	2016	CPI score ≥3	All adults: 49.4% 35–44 years: 42.6% 45–64 years: 52.0% ≥65 years: 54.5%	32
China	2018	PPD ≥4 mm	35–44 years: 52.7% 55–64 years: 69.3% 65–74 years: 64.6%	33,34

Abbreviations: CAL: clinical attachment level; CPI: community periodontal index; PPD: probing pocket depth.

Specific anatomical considerations for treating periodontitis in Asians

Tooth-associated variations

Previous studies demonstrated that complex dental anatomical variations may contribute to the retention of bacterial biofilms, which can lead to the increasing difficulty of carrying out periodontal therapy, compromising the prognosis. Knowledge of the anatomy of the oral structures, especially root anatomy, is therefore necessary for the diagnosis and management of existing or potential periodontal breakdown.[8,9]

The subsequent paragraphs described two major tooth-associated variations in Asians, including a short root trunk and a supernumerary distolingual root of the molars, and specific considerations in formulating diagnostic and treatment plans for these furcation-involved molars.

Shorter root trunk. Hou et al. reported that the root trunk from extracted molars in Taiwanese patients was generally 1–2 mm shorter than those in Western studies (Table 2).[10] A molar with a shorter root trunk is more vulnerable to bacterial invasion and furcation involvement but has a better prognosis after treatment because of the limited amount of periodontal destruction.[11] In contrast, a furcation-involved molar with a longer root trunk and short root cone may not be indicated for root resective surgery since this molar will lose significant periodontal support consequently.[11–13] At the cellular level, the inherent morphological character of the root trunk beyond the furcation entrance may prevent the barrier membrane from adhering to the root surfaces and lead to unpredictable outcomes of regenerative approaches.[12]

Supernumerary distolingual root (DLR). The supernumerary distolingual root (DLR) in mandibular molars, also named "radix entomolaris" (RE) is characterized by its high prevalence in the Asian population.[14,15] The presence of this dental characteristic has been recognized as a genetically determined racial trait.[16] In Caucasians and Africans, the prevalence of DLR is less than 5%, whereas in populations with Asian traits (including Chinese, Japanese, Korean, and Taiwanese), the prevalence ranges from 5% to greater than 30% (Table 3). Among these populations, DLR is considered a normal morphological variant and it can be thought of as an Asiatic trait.[16] Mandibular molars with DLR make thorough debridement more difficult, leading to unfavorable outcome of periodontal regeneration and a poor prognosis. If molars with DLR have initial to moderate furcation involvement, conservative treatment options, such as ultrasonic scaling, subgingival instrumentation, regenerative therapy, or resective therapy, are recommended. However, extra caution is required when regenerative procedures are performed in DLR-involved molars, and the prognosis may be questionable because the size of the DLR is far smaller than that of a normal root. If a molar with DLR has severe furcation involvement, which means that there are through-and-through defects, resective approaches, such as root amputation or section of the DLR, should be considered.

Periodontium-associated variations (soft and hard tissues)

A stable tooth-supporting apparatus (i.e., alveolar bone, gingiva, and periodontal ligament) plays an important role in periodontitis progression and treatment interventions. Knowledge regarding variations in hard and soft tissue is essential for clinicians to perform detailed examinations, procedures, and treatment plans.[17,18] The impacts of surgically associated anatomical variations between Taiwanese/Asian and Western individuals are described as follows:[19–22]

First, a high prevalence and variations in the position of the mandibular foramen and anterior loop of inferior alveolar nerve were observed in the Asian population, and these variations should be considered during surgery to avoid accidental injury to the nerves and vessels extending from the mental foramen.[21,22] Second, lingual concavity often appears in the posterior tooth region between the second premolars and second molars, which contains critical anatomical structures (e.g., the lingual nerve and sublingual artery). A high prevalence of mandibular lingual concavity was noted in Taiwanese patients, and special caution should be taken when using clinical and radiological examinations prior to surgery.[20] Third, the labial bone plate of the maxillary anterior teeth is thinner in Asian populations than in Western populations. Fenestration or perforation of the labial plate is possible when there is a high prevalence of class I sagittal root position (SRP) of maxillary anterior teeth, in which the root is positioned against the labial cortical plate.[19] Fourth, the hard palate often serves as a donor site for either epithelized mucosa grafts or subepithelial connective tissue when carrying out periodontal mucogingival surgery. The volume/thickness of the harvested mucosa graft tissue may have an impact on the decisions of surgical modalities and on the treatment outcomes. It has been shown that the thickness of the palatal masticatory mucosa is thinner in Taiwanese patients,[23,24] which appear to be an anatomical restriction preventing harvesting a high quantity of mucosal graft. The results also demonstrated a thinner mucosa around the palatal root of maxillary first molar; thus, careful and skillful techniques would be essential when harvesting tissue close to the greater palatine artery.[23,24]

Recommendations for the educational and preventive interventions and supragingival plaque control (Table 4)

Regarding the aspects of self-performed oral hygiene practices and risk factor control, the committees generally agree with the recommendations from the EFP clinical

Table 2 Studies for the prevalence of root trunk length.

Studies	Year	Population	Sample size	Maxillary 1st molar			Maxillary 2nd molar			Mandibular 1st molar		Mandibular 2nd molar		Concluding remark
				Buccal	Mesial	Distal	Buccal	Mesial	Distal	Buccal	Lingual	Buccal	Lingual	
Hou and Tsai[10]	1997	Taiwan	89 maxillary molars, 93 mandibular molars	3.4 mm	3.6 mm	3.7 mm	3 mm	4 mm	3 mm	1.9 mm	2.9 mm	2.8 mm	3.5 mm	There is a strong correlation between vertical length and type of root trunk and furcation involvement
Kerns et al.[35]	1999	United States	412 extracted	4.1 mm	4.7 mm	4.7 mm	4.3 mm	6.4 mm	4.8 mm	3.3 mm	4.3 mm	3.3 mm	3.8 mm	The complexity of the furcation area with a large number of anatomic irregularities and plaque-retentive structures that could hamper adequate cleaning during periodontal treatment
Gher and Dunlap[13]	1985	United States	20 extracted maxillary first molar	4.2 mm	3.6 mm	4.8 mm								Horizontal attachment loss of 6.0 mm or greater would have resulted in Grade III furcation involvement in all the teeth studied
Plagmann et al.[36]	2000	Germany	359 extracted molar teeth	4.3 mm	4.8 mm	4.5 mm	4.2 mm	4.6 mm	4.3 mm	3.3 mm	4.3 mm	3.3 mm	4.5 mm	The variability of furcation morphology, which has considerable influence on the etiology and severity of periodontitis as well as on the therapeutic success and the potential for recurrent disease or disease progression

Table 3 Studies for the prevalence of supernumerary distolingual root.

Year	Studies	Population	Sample size (No. of teeth)	Distolingual root (No. of teeth)	Prevalence
Caucasians					
1971	de Souza-Freitas et al.[37]	European	844	27	3.2%
1971	Skidmore et al.[38]	Caucasian	45	1	2.2%
1986	Steelman et al.[39]	Hispanic children	156	10	6.4%
2009	Schäfer et al.[40]	Germany	1024	7	0.7%
Negroids					
2011	Sert et al.[41]	Turkish	417	6	1.44%
2011	Chandra et al.[42]	Indian	1000	133	13.30%
2012	Chourasia et al.[43]	Indian	150	8	5.30%
2013	Garg et al.[44]	Indian	500	25	5.00%
Mongoloids					
1993	Yew & Chan[45]	Chinese	832	179	21.5%
2010	Song et al.[46]	Korean	3088	756	24.5%
2012	Kim et al.[47]	Korean	1400	373	26.6%
2013	Park et al.[48]	Korean	666	149	22.4%
Taiwanese					
2007	Tu et al.[14]	Taiwan	166	35	21.1%
2007	Huang et al.[15]	Taiwan	332	72	21.7%
2009	Tu et al.[49]	Taiwan	246	63	25.61%
2009	Chen et al.[50]	Taiwan	183	36	20.0%
2009	Chen et al.[51]	Taiwan	293	29	9.9%
2010	Huang et al.[52]	Taiwan	521	115	22.1%
2010	Huang et al.[53]	Taiwan	237	60	25.3%
2017	Wu et al.[54]	Taiwan	466	115	24.7%

Table 4 Recommendations for the educational and preventive interventions and supragingival plaque control.

		EFP Recommendation	EFP Evidence Level	TAP Recommendation		TAP Evidence Level
				Recommendation	Consensus level	
R1.1	What are the adequate oral hygiene practices of periodontitis patients in the different steps of periodontitis therapy?	**Strongly recommend**	■ Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strongest	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R1.2	Are additional strategies in motivation useful?	**Strongly recommend**	■ Systemic Review ☐ RCT ☐ Observations ■ Expert opinions	Yes	Strongest	■ EFP evidence ■ Asian studies ■ Expert opinions
R1.3	Are psychological methods for motivation effective to improve the patient's compliance in oral hygiene practices?	**Open recommendation**	■ Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable	Strongest	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R1.4	What is the efficacy of supragingival professional mechanical plaque removal (PMPR) and control of retentive factors in periodontitis therapy?	**Strongly recommend**	■ Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strongest	■ EFP evidence ☐ Asian studies ☐ Expert opinions

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Table 4 (*continued*)

		EFP Recommendation	EFP Evidence Level	TAP Recommendation		TAP Evidence Level
				Recommendation	Consensus level	
R1.5	What is the efficacy of risk factor control in periodontitis therapy?	**Strongly recommend**	☐Systemic Review ■ RCT ☐ Observations ☐ Expert opinions	Yes	Strongest	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R1.6	What is the efficacy of tobacco smoking cessation interventions in periodontitis therapy?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strongest	■ EFP evidence ■ Asian studies[55] ☐ Expert opinions
R1.7	What is the efficacy of promotion of diabetes control interventions in periodontitis therapy?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strongest	■ EFP evidence ■ Asian studies[56] ☐ Expert opinions
R1.8	What is the efficacy of increasing physical exercise (activity) in periodontitis therapy?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strongest	■EFP evidence ■ Asian studies[57] ☐ Expert opinions
R1.9	What is the efficacy of dietary counselling in periodontitis therapy?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Yes (two experts voted indeterminable)	■ EFP evidence ■ Asian studies[58] ☐ Expert opinions
R1.10	What is the efficacy of lifestyle modifications aiming at weight loss in periodontitis therapy?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Yes (two experts voted indeterminable)	■ EFP evidence[59] ■ Asian studies ☐ Expert opinions

Abbreviations: EFP: European Federation of Periodontology; TAP: Taiwan Academy of Periodontology; RCT: randomized controlled trial.

practice guideline.[1] Good oral hygiene and thorough supragingival professional mechanical plaque removal (PMPR) are important for preventing periodontal destruction. Patients who undergo periodontal therapy should quit tobacco smoking. The committee recommend diabetes control interventions in patients receiving periodontitis therapy. In addition, body weight loss and physical exercise (activity) have an impact on periodontal therapy. However, adjunctive dietary counseling in periodontal treatment is not recommended by the committee.

Recommendations for subgingival instrumentation and adjunctive treatment (Table 5)

Regarding the aspects of subgingival instrumentation combined with hand and powered instruments and either performed quadrantwise over multiple visits or as a single full mouth procedure, the committees generally agree with the recommendations from the EFP clinical practice guideline.[1] It is considered inconclusive that the adjunctive application of laser or antimicrobial photodynamic therapy (aPDT) to subgingival instrumentation is superior to subgingival instrumentation alone, and the routine adjunctive use of host-modulating agents such as statins, probiotics, sub-antimicrobial doses of doxycycline (SDD), bisphosphonates, anti-inflammatory drugs, omega-3 polyunsaturated fatty acids (PUFAs) or metformin is not recommended. However, the committees do suggest considering the use of adjunctive chemical agents, locally administered antiseptics or antibiotics in addition to subgingival instrumentation to improve the clinical outcome based on previous studies.[25–27] The use of adjunctive systemically administered antibiotics may be beneficial for young adults with generalized periodontitis stage III; however, the global concern about the overuse of antibiotics and the development of antibiotic resistance must be considered.

Recommendations for surgical periodontal therapy (Table 6)

Regarding the aspects of periodontal surgical interventions for the treatment of stage III patients, the committees generally agree with the recommendations from the EFP clinical practice guidelines.[1] When deep residual pockets present after adequate oral hygiene instruction and subgingival instrumentation, further surgical therapies are suggested, and access flap surgery (AFS), resective surgery or regenerative surgery are the choices of interventions. Surgical therapy should be carried out by experts, including periodontal specialists and dentists with additional surgical training. If experts are not available or referral is not an option, repeated subgingival instrumentation, with or

Table 5 Recommendations for subgingival instrumentation and adjunctive treatment.

		EFP Recommendation	EFP Evidence Level	Recommendation	TAP Evidence Level	Consensus level
R2.1	Is subgingival instrumentation beneficial for the treatment of periodontitis?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■ EFP evidence ■ Asian studies[60] ☐ Expert opinions
R2.2	Are treatment outcomes of subgingival instrumentation better after use of hand, powered (sonic/ultrasonic) instruments or a combination thereof?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■ EFP evidence ■ Asian studies[61,62] ☐ Expert opinions
R2.3	Are treatment outcomes of subgingival instrumentation better when delivered quadrant-wise over multiple visits or as a full mouth procedure (within 24 h)?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■ EFP evidence ■ Asian studies[63] ☐ Expert opinions
R2.4	Are treatment outcomes with adjunctive application of laser superior to non-surgical subgingival instrumentation alone?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable	Yes (four experts voted for not recommended)	■ EFP evidence ■ Asian studies[64,65] ☐ Expert opinions
R2.5	Are treatment outcomes with adjunctive antimicrobial photodynamic therapy (aPDT) superior to non-surgical subgingival instrumentation alone?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable	Strong	■ EFP evidence ■ Asian studies[66–68] ☐ Expert opinions
R2.6	Does the adjunctive use of local statins improve the clinical outcome of subgingival instrumentation?	**Strongly not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	No	Yes (one expert voted for indeterminable).	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R2.7	Does the adjunctive use of probiotics improve the clinical outcome of subgingival instrumentation?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	No	Yes (one expert voted for indeterminable).	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R2.8	Does the adjunctive use of systemic sub-antimicrobial dose doxycycline (SDD) to subgingival instrumentation improve clinical outcomes?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable	Yes (Five experts voted for not recommended)	■ EFP evidence ☐ Asian studies ■ Expert opinions
R2.9	Does the adjunctive use of systemic/local bisphosphonates to subgingival instrumentation improve clinical outcomes?	**Strongly not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	No	Strong	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R2.10	Does adjunctive use of systemic/local non-steroidal anti-inflammatory drugs to subgingival instrumentation improve the clinical outcomes?	**Strongly not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	No	Strong	■ EFP evidence ☐ Asian studies ☐ Expert opinions

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Table 5 (*continued*)

		EFP Recommendation	EFP Evidence Level	Recommendation	TAP Evidence Level	Consensus level
R2.11	Does the adjunctive use of omega-3 polyunsaturated fatty acids (PUFA) improve the clinical outcome of subgingival instrumentation?	**Strongly not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	No	Strong	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R2.12	Does the adjunctive use of local metformin improve the clinical outcome of subgingival instrumentation?	**Strongly not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	No	Strong	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R2.13	Does the adjunctive use of adjunctive chemotherapeutics (antiseptics) improve the clinical outcome of subgingival instrumentation?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strong	■ EFP evidence ☐ Asian studies ■ Expert opinions
R2.14	Do adjunctive locally administered antiseptics improve the clinical outcome of subgingival instrumentation?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Yes (two experts voted for recommended)	■ EFP evidence ☐ Asian studies ■ Expert opinions
R2.15	Do adjunctive locally administered antibiotics improve the clinical outcome of subgingival instrumentation?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Yes/No (five experts voted for recommended; one expert voted for not recommended)	■ EFP evidence ■ Asian studies[25–27] ☐ Expert opinions
R2.16	Does adjunctive systemically administered antibiotics improve the clinical outcome of subgingival instrumentation?	**1. Routine use: Strongly not recommend** **2. For specific circumstances: Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	1. No 2. Maybe	Strong	■EFP evidence ☐ Asian studies ■ Expert opinions

Abbreviations: EFP: European Federation of Periodontology; TAP: Taiwan Academy of Periodontology; RCT: randomized controlled trial.
[a] It should be determined based on specific clinical circumstances.

Table 6 Recommendations for surgical periodontal therapy.

		EFP Recommendation	EFP Evidence Level	Recommendation	TAP Evidence Level	Consensus level
R3.1	How effective are access flaps as compared to repeated subgingival instrumentation?		■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe[a]	Strong	■ EFP evidence ☐ Asian studies ■ Expert opinions
R3.2	How effective are the different access flap procedures?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■ EFP evidence ☐ Asian studies ■ Expert opinions
R3.3	What is the efficacy of pocket elimination/reduction surgery in comparison with access flap surgery?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Yes (five experts voted for indeterminable)	■ EFP evidence ☐ Asian studies ☐ Expert opinions
R3.4	What is the level of care required for management of deep residual pockets with or without presence of intrabony defects or furcation involvement after completion of steps 1 and 2 of periodontal therapy?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ☐ Asian studies ■ Expert opinions
R3.5	If expertise is not available or referral is not an option, what is the minimum level of primary care required for management of residual pockets associated with or without intrabony defects or furcation involvement after completion of steps 1 and 2 of periodontal therapy?	**Strongly recommend**		Yes	Strong	■EFP evidence ☐ Asian studies ■ Expert opinions
R3.6	What is the importance of adequate self-performed oral hygiene in the context of surgical periodontal treatment?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ☐ Asian studies ■ Expert opinions
R3.7	What is the adequate management of residual deep pockets associated with intrabony defects?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■Asian studies[69–76] ☐ Expert opinions
R3.8	What is the adequate choice of regenerative biomaterials for promoting healing of residual deep pockets associated with a deep intrabony defect?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■ Asian studies[69–78] ☐ Expert opinions
R3.9	What is the adequate choice of surgical flap design for the regenerative treatment of residual deep pockets	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations	Yes	Yes (two experts voted for indeterminable)	■EFP evidence ☐ Asian studies ■ Expert opinions

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Table 6 (*continued*)

		EFP Recommendation	EFP Evidence Level	Recommendation	TAP Evidence Level	Consensus level
	associated with an intrabony defect?		☐ Expert opinions			
R3.10	What is the adequate management of molars with Class II and III furcation involvement and residual pockets?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes (treatment instead of tooth extraction should be considered)	Strong	■EFP evidence ■ Asian studies[79–82] ☐ Expert opinions
R3.11	What is the adequate management of residual deep pockets associated with mandibular Class II furcation involvement?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■ Asian studies[80,82] ☐ Expert opinions
R3.12	What is the adequate management of residual deep pockets associated with maxillary buccal Class II furcation involvement?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■Asian studies[80–82] ☐ Expert opinions
R3.13	What is the adequate choice of regenerative biomaterials for the regenerative treatment of residual deep pockets associated with Class II mandibular and maxillary buccal furcation involvement?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■Asian studies[80,82] ☐ Expert opinions
R3.14	What is the adequate management of maxillary interdental Class II furcation involvement?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■EFP evidence ■ Asian studies[79] ■ Expert opinions
R3.15	What is the adequate management of maxillary Class III furcation involvement?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■EFP evidence ■ Asian studies[79] ☐ Expert opinions
R3.16	What is the adequate management of mandibular Class III furcation involvement?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■EFP evidence ■ Asian studies[79] ☐ Expert opinions

Abbreviations: EFP: European Federation of Periodontology; TAP: Taiwan Academy of Periodontology; RCT: randomized controlled trial.

[a] It should be determined based on specific clinical circumstances.

Table 7 Recommendations for the maintenance and supportive periodontal care.

		EFP Recommendation	EFP Evidence Level	Recommendation	TAP Evidence Level	Consensus level
R4.2	Is adherence to supportive periodontal care important?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■ Asian studies[6,83] ☐ Expert opinions
R4.3	Are oral hygiene instructions important? How should they be performed?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■ Asian studies[84,85] ☐ Expert opinions
R4.4	How should we choose an appropriate design of manual, powered toothbrushes and interdental cleaning devices?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■ Asian studies[86,87] ☐ Expert opinions
R4.5	Should we recommend a powered or a manual toothbrush?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■EFP evidence ■ Asian studies[88,89] ☐ Expert opinions
R4.6	How should interdental cleaning be performed?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ☐ Asian studies ☐ Expert opinions
R4.7	What is the value of dental flossing for interdental cleaning in periodontal maintenance patients?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe not	Strong	■EFP evidence ☐ Asian studies ☐ Expert opinions
R4.8	What is the value of other interdental devices for interdental cleaning in periodontal maintenance patients?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strong	■EFP evidence ☐ Asian studies ☐ Expert opinions
R4.9	What additional strategies in motivation are useful?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■ Asian studies[6] ☐ Expert opinions
R4.10	What is the value of adjunctive antiseptics/chemotherapeutic agents for the management of gingival inflammation?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■EFP evidence ■ Asian studies[90] ☐ Expert opinions
R4.11	Should adjunctive chemotherapeutics be recommended for patients in supportive periodontal care?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable[a]	Strong	■EFP evidence ■ Asian studies[91] ☐ Expert opinions

(*continued on next page*)

Table 7 (*continued*)

		EFP Recommendation	EFP Evidence Level	Recommendation	TAP Evidence Level	Consensus level
R4.12	Which antiseptic is the most effective in dentifrices?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strong	■EFP evidence ■ Asian studies[92,93] ☐ Expert opinions
R4.13	Which antiseptic is the most effective in mouth rinses?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strong	■EFP evidence ☐Asian studies ☐ Expert opinions
R4.14	What is the value of professional mechanical plaque removal (PMPR) as part of SPC?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strong	■EFP evidence ■Asian studies[94] ☐ Expert opinions
R4.15	Should alternative methods be used for professional mechanical plaque removal (PMPR) in supportive periodontal care?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe not	Strong	■EFP evidence ☐Asian studies ☐ Expert opinions
R4.16	Should adjunctive methods be used for professional mechanical plaque removal (PMPR) in supportive periodontal care?	**Not recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe not	Strong	■EFP evidence ☐Asian studies ☐ Expert opinions
R4.17	What is the value of risk factor control in SPC?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■Asian studies[6] ☐ Expert opinions
R4.18	What is the role of tobacco smoking cessation interventions in SPC?	**Strongly recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Yes	Strong	■EFP evidence ■Asian studies[6] ☐ Expert opinions
R4.19	What is the role of promotion of diabetes control interventions in SPC?	**Recommend**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Maybe	Strong	■EFP evidence ■Asian studies[95] ☐ Expert opinions
R4.20	What is the role of physical exercise (activity), dietary counselling or lifestyle modifications aiming at weight loss in SPC?	**Open recommendation**	■Systemic Review ☐ RCT ☐ Observations ☐ Expert opinions	Indeterminable	Strong	■EFP evidence ■Asian studies[96] ☐ Expert opinions

Abbreviations: EFP: European Federation of Periodontology; TAP: Taiwan Academy of Periodontology; RCT: randomized controlled trial; SPC: supportive periodontal care.

[a] It should be determined based on specific clinical circumstances.

without AFS, and regular supportive periodontal care are recommended. Additionally, achieving adequate levels of self-performed oral hygiene before surgical therapy is recommended.

For deep intrabony defects with residual deep pockets, using either barrier membranes or enamel matrix derivatives with or without the addition of bone-derived grafts during surgical intervention is recommended. We also recommended the use of specific flap designs with maximum preservation of interdental soft tissue, such as papilla preservation flaps. Class II and III furcation-involved molars with deep residual pockets were suggested to be surgically treated, and for mandibular and maxillary molars with buccal Class II furcation involvement, regenerative therapy by using enamel matrix derivatives alone or bone-derived grafts with or without resorbable membranes is recommended. However, for maxillary molars with interdental Class II furcation involvement, subgingival instrumentation, AFS, periodontal regeneration, root separation or root resection may be considered. For molars with Class III furcation involvement, subgingival instrumentation, AFS, tunneling, root separation or root resection may be considered. Pocket elimination/reduction surgery has comparable therapeutic efficacy as AFS and may be considered an option for surgical periodontal therapy.

Recommendations for the maintenance and supportive periodontal care (Table 7)

Regarding the aspects of self-performed oral hygiene practices and risk factor control, the committees generally agree with the recommendations from the EFP clinical practice guideline,[1] and a regular recall interval is recommended for supportive periodontal care. The visit interval should be scheduled to be 3—12 months based on the patient's risk profile and periodontal conditions. Repeated individual oral hygiene instruction sessions about how and when to use dental brushes, flossers and interdental brushes are important. Powered toothbrushes may be an alternative tool for periodontal maintenance patients; however, in patients with thin gingival phenotype, powered toothbrushes should be used under professional supervision. Clinicians can provide adequate preventive and health promotion tools to facilitate patient motivation. Short-term adjunctive antiseptics may be considered in specific conditions, and there is no strong evidence supporting the effectiveness of other adjunctive agents. Adjunctive antiseptics/chemotherapeutic agents could be used subgingivally under supervision from the specialists. To control gingival inflammation, antiseptic dentifrice containing chlorhexidine, stannous fluoride-sodium hexametaphosphate, sodium lauroylsarcosine, isopropyl methylphenol and cetypyridinium chloride could be considered. In addition, antiseptic mouth rinse containing chlorhexidine, essential oils, and cetylpyridinium chloride could be used, but the committee do not recommend using mouthrinse containing essential oils in periodontally healthy subjects. However, the essential oils-contained mouthrinse could be a potential adjunctive therapy for patients with gingivitis. Professional mechanical plaque removal treatment and control of risk factors, including smoking and diabetes mellitus, are important in the maintenance phase.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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