

Perceptions of NZ orthodontists and periodontists on the management of gingival recession in orthodontic patients

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ABSTRACT

Background: This study aimed to investigate the perceptions and opinions of orthodontists and periodontists on the management of gingival recession in orthodontic patients.

Methods: An online survey was sent to 29 periodontists and 80 orthodontists registered and currently practising in New Zealand. All participants answered questions about the timing and clinical indications of mucogingival surgeries in orthodontic patients diagnosed with mucogingival deformities.

Results: Most periodontists and orthodontists believed that gingival grafts should ideally be performed after orthodontic treatment. In clinical practice, 40% of periodontists indicated that they would receive referrals after completion of orthodontic treatment. However, 29.6% of orthodontists indicated that they would refer to a periodontist before orthodontic treatment in clinical practice. The most crucial factor that affected periodontists' decision-making was 'evidence-based guidelines' (35.0%), followed by 'clinical experience' (30.0%) and 'patient concerns' (15.0%). All four factors of 'gingival phenotype', 'presence of gingival recession', 'amount of keratinised tissue' and 'planning specific tooth movements' were equally considered by orthodontists regarding their decision-making.

Conclusions: The majority of the surveyed New Zealand periodontists and orthodontists expressed a belief that the ideal timing for the management of gingival recessions would be after the completion of orthodontic treatment.

Keywords: mucogingival deformities, gingival graft, orthodontic treatment, gingival recession, keratinised tissue.

Abbreviations and acronyms: CAF = coronally advanced flap; CEJ = cemento-enamel junction; CTG = connective tissue graft; FGG = free gingival graft; GTR = guided tissue regeneration; MGJ = mucogingival junction.

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INTRODUCTION

In recent years, the general public has shown increased self-awareness and a stronger desire for perceived dentofacial attractiveness, increasing the demand for orthodontic treatment.^{1,2} However, the development of gingival recession may be a risk following orthodontic tooth movements, subsequently compromising harmonious dentofacial aesthetics.³

The gingival tissue is a part of the masticatory mucosa covering the alveolar bone and surrounding the cervical portion of the tooth. It consists of an epithelial layer and an underlying connective tissue called lamina propria. Coronally, the free gingiva appears coral pink clinically and lies from the gingival margin to the level of cemento-enamel junction (CEJ), which is usually 1–2mm.⁴ The attached gingiva is continuous, with free gingiva in the apical direction. The loose, darker red alveolar mucosa can be seen

apically separated by a distinct border called the mucogingival junction (MGJ).⁴

The concept of biological width refers to the attached soft tissue that covers the tooth structure coronal to alveolar bone crest.⁵ Histologically, the mean value of biological width is 2.04mm, which consists of 0.97mm of epithelial attachment, and 1.07mm of connective attachment.⁶ The histological and clinical evidence suggests that biological width substantially impacts periodontal health. The violation of biological width is considered a significant problem. It can irritate the gingival tissue to initiate gingival inflammation leading to the loss of periodontal ligament, resorption of bone and consequently gingival recession.^{6,7}

According to the most updated classification scheme for periodontal and peri-implant diseases, gingival recession is classified as a mucogingival deformity around the tooth.^{8,9} Gingival recession is defined as

an apical shift of mucogingival tissue to the CEJ, resulting in root exposure.¹⁰ Several previous studies have reported that gingival recession can develop during orthodontic treatment.^{9,11–13} A buccal tooth movement may reduce the buccal-lingual thickness of the gingiva, which is a factor for the progression of mucogingival deformities, especially when combined with inappropriate oral hygiene habits and traumatic tooth brushing techniques.¹⁴ It is equally important to recognise that a non-controlled orthodontic force can harm the periodontium.¹⁵ A recent study reported a 5% to 12% prevalence of gingival recession immediately following orthodontic treatment.⁹ Additionally, 5-year follow up studies that were performed reported an increased prevalence of up to 47%.⁹ Gingival recession as a mucogingival deformity is not only aesthetically undesirable but can also increase the risk of dentine hypersensitivity, carious and non-carious cervical lesions.¹⁶

However, the effects of orthodontic forces on the periodontium can vary, dependent on the type of tooth movement. Some studies proposed that orthodontic movement within the alveolar bone poses a minimal risk of gingival recession.^{17,18} This view is supported by a recent systematic review which reported that orthodontic treatment has minimal adverse effects on the periodontium.¹⁵ Interestingly, some studies report that specific orthodontic procedures are beneficial to gingival recession and oral hygiene by increasing dental cleansability.¹⁴ Furthermore, lingual tooth movement may increase the thickness of the buccal mucogingival complex. As a result, any existing gingival recession may decrease, and it may not be necessary to perform gingival graft surgery before any planned lingual movement of teeth.¹⁹

The lack of keratinised tissue was previously considered a factor for developing inflammation and gingival recession. When oral hygiene is compromised commonly seen in patients undergoing orthodontic treatment, the attached gingiva becomes an essential factor for maintaining gingival health.²⁰ Friedman first introduced mucogingival surgery in the 1950s to preserve the attached gingiva. Surgical procedures such as guided tissue regeneration (GTR), coronally advanced flap (CAF), free gingival graft (FGG) and subepithelial connective tissue graft (SCTG) have been indicated to prevent or correct gingival recession and improve aesthetics.^{16,21–23} However, there is currently a lack of a consensus in the form of an internationally accepted guideline, and much controversy remains regarding the timing of when mucogingival surgeries should be performed concerning orthodontic treatments. Therefore, this study explores the differences in perceptions and opinions between orthodontists and periodontists on the management of mucogingival

deformities in orthodontic patients to assist in developing a universal guideline for clinicians.

METHODS

Ethics approval was obtained from the University of Otago Human Ethics Committee (reference number: D21/034). This study took place over a period of 6 months in 2021, and surveyed orthodontists and periodontists currently registered and practicing in New Zealand.

All participants gave their consent in the first question of the questionnaire distributed. Orthodontists and periodontists currently registered and practising in New Zealand were invited via emails to complete an online questionnaire generated using Qualtrics software (Qualtrics, Provo, UT) between January and June in 2021. To determine the perceptions & opinions of orthodontists and periodontists in New Zealand regarding when gingival grafting should be performed concerning orthodontic treatment, survey questions were distributed separately to orthodontists and periodontists registered with the Dental Council of New Zealand (DCNZ). Of the 45 periodontists and 142 orthodontists registered with DCNZ, 16 periodontists and 62 orthodontists had non-valid email or duplicate email addresses, leaving 29 periodontists and 80 orthodontists that were included in the study.

There were five questions in total – two general questions and three questions dedicated to orthodontists and periodontists each specifically. The two general questions asked participants to identify their dental specialty and their years of clinical experience. The three specific questions asked about the timing of when the referral for gingival graft treatment was made or received and the factors which affected their decision-making. Responses for the timing question included before, during, after orthodontic treatment or 'other'. Factors influencing their decision-making included four different categorical variables and 'other'.

The 'other' option was provided to allow for open answers to minimise researcher bias. An inductive approach was used to analyse the collected qualitative data. Participants who responded 'other' were reviewed, and repeating themes were identified. Relevant quotes were allocated into themes and are presented in Table 2. Identified themes were discussed and refined to maximise consistency and validity during the analysis. We aimed to comprehensively interpret data collected by performing continuous data analysis until no new themes could be identified.²⁴

In addition, a literature review was performed to corroborate the findings of our survey. Two hundred and eighteen studies indexed in PubMed were included through searching for the keywords "gingival

recession" and "orthodontic patients" via the End-Note PubMed Online Search function. Case reports and case series were excluded from the study due to low-level evidence. Thirty studies were left after screening the titles and abstracts. The full texts of all 30 studies were then read, leaving 18 studies at the end assessed as being valuable to our study.

RESULTS

The response rate was 51.7% among periodontists (15 out of 29) and 36.2% among orthodontists (29 out of 80). Amongst participants, roughly 50% of both periodontists and orthodontists had been practising for more than 20 years (Table 1).

In clinical practice, the most significant proportion of periodontists surveyed reported that they would generally receive referrals from orthodontists for gingival graft treatment after (40.0%) orthodontic treatment, followed by a similar proportion reporting receipt of referrals before (26.7%) or during all three phases (26.7%) of orthodontic treatment. Only a single periodontist (6.7%) reported primarily receiving referrals during orthodontic treatment (Fig. 1).

In clinical practice, roughly a third of orthodontists surveyed indicated that they would refer patients for gingival graft treatment before commencing treatment (29.6%). A smaller proportion indicated that they would refer after treatment (14.8%) or not at all (7.4%). Almost half (48.1%) of orthodontists surveyed selected 'other' regarding when to refer patients for gingival graft treatment in clinical practice (Fig. 2). Among the orthodontists who chose the option 'other', the majority (61.5%) mentioned referring patients to periodontists for a second opinion. The following comment exemplifies this:

"I would encourage the patient to have a periodontist consultation first before orthodontic treatment."

The remaining orthodontists who selected 'other' (38.5%) believed it is dependent on various factors such as particular tooth movement, the severity of

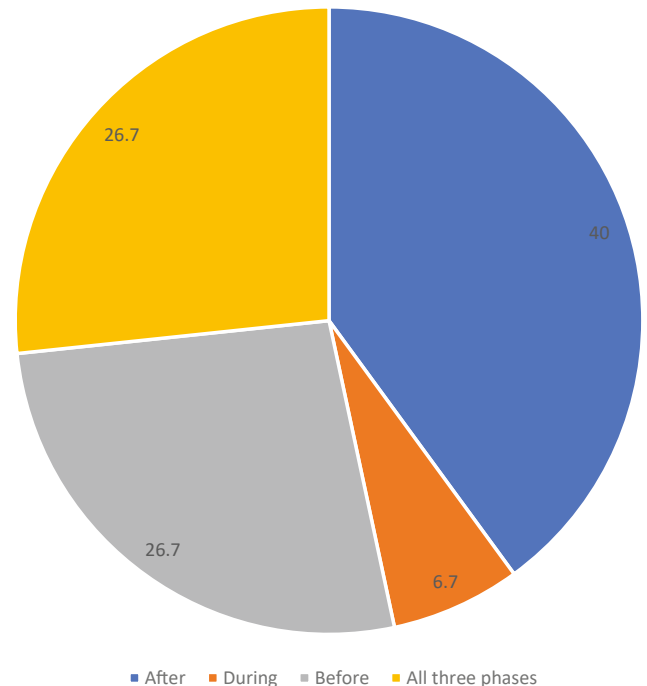


Fig. 1 Responses reported by periodontists to the question "In which phase of the orthodontic treatment do you generally receive referrals for gingival grafts from an orthodontist?"

gingival recession etc. Comments made by the orthodontists are presented in Table 2. Analysis of the open comments made by orthodontists revealed that the vast majority believed that they would make a referral to a periodontist for an initial consultation before commencing treatment, but leave the treatment for after completion of treatment.

The most significant proportion of periodontists surveyed believed that the ideal timing of gingival graft treatment should be performed after orthodontic treatment (42.9%), followed by before orthodontic treatment (21.4%). No periodontists surveyed believed that gingival graft treatment should be performed during orthodontic treatment or not at all. Approximately a third of the periodontists surveyed indicated that the timing of gingival graft treatment is dependent on each case, and factors such as patients' age and possible progressive attachment loss due to tooth movement should be taken into account (Fig. 3, Table 2). The following comment exemplifies this:

"If the tissue is delicate and tooth movement may lead to progressive loss of attachment, then grafting before ortho is indicated, but generally I prefer to wait until after completion of orthodontic treatment."

Similarly, the largest proportion of orthodontists surveyed also believed that the ideal timing of gingival graft treatment should be performed after orthodontic

Table 1. Years of practising experience reported by study participants

	Periodontists	Orthodontists	Total
Years in practice			
< 5	2	2	4
5-10	3	3	6
10-15	1	5	6
15-20	2	5	7
> 20	7	14	21
Total	15	29	44

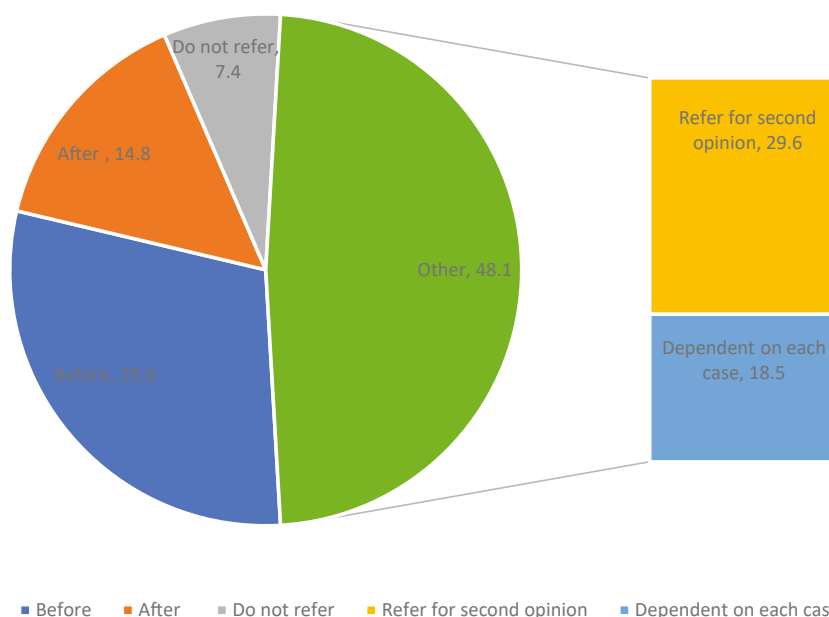


Fig. 2 Responses reported by orthodontists to the question "If the patient presents with mucogingival conditions such as gingival recession or insufficient keratinised tissue width, when do you refer the patient for gingival graft?"

Table 2. Open comments made by participants selecting 'other' in response to questions throughout the survey

When do orthodontists refer the patient for gingival graft treatment in clinical practice?

Refer for a second opinion

#18 "before (for patient information) with a view to correction after the braces."

#25 "refer them[patient] to a periodontist for consult and treatment planning ideas."

#27 "seek periodontists' opinion."

#33 "opinion from periodontists before surgery, not until after[consultation]"

#34 "referral for opinion by periodontists."

#37 "I will decide on timing. The timing of graft placement with my local periodontist."

#40 "I would refer for an opinion before treatment but gingival graft likely to be left till after orthodontic treatment."

#35 "Depends upon what your orthodontic treatment involves and will this have an impact on the pre-existing recession, I would encourage the patient to have a periodontist consultation first before orthodontic treatment."

Depending on each case

#24 "depends on the cases."

#26 "moderate [gingival recession] – monitor and refer at the end of treatment. Severe [gingival recession]-refer pre-treatment"

#31 "all of the above it influences my treatment plan."

#36 "it depends. If I think this tooth will get worse with ortho and is in a position where it can be grafted, I will refer for a graft before orthodontic treatment."

#41 "it depends."

What is the ideal timing of gingival graft treatment in periodontists' opinions?

It depends on each case

#09 "if the tissue is delicate and tooth movement may lead to progressive loss of attachment, then grafting before ortho is indicated, but generally I prefer to wait until after completion of orthodontic treatment."

#15 "it is situation-dependent"

#21 "depends on the clinical situation. After orthodontic treatment is more common than before treatment."

#22 "depends."

#44 "depends on whether the patient is an adolescent or adult."

What is the ideal timing of gingival graft in orthodontists' opinion?

It depends on each case

#10 "it varies from case to case – sometimes before and sometimes after."

#26 "as above [all conditions mentioned in Figure 5]."

#27 "case-by-case basis."

#31 "depends, there is a shift that some orthodontists will do pre-orthodontic treatment graft."

#29 "before and consent patients for after as well."

#37 "depends on the specifics of the cases."

Consultation with periodontists (n=4)

#24 "in consultation with periodontist"

#25 "when the periodontist says"

#32 "recommendation of periodontist"

#34 "Normally advised by periodontist to do this after"

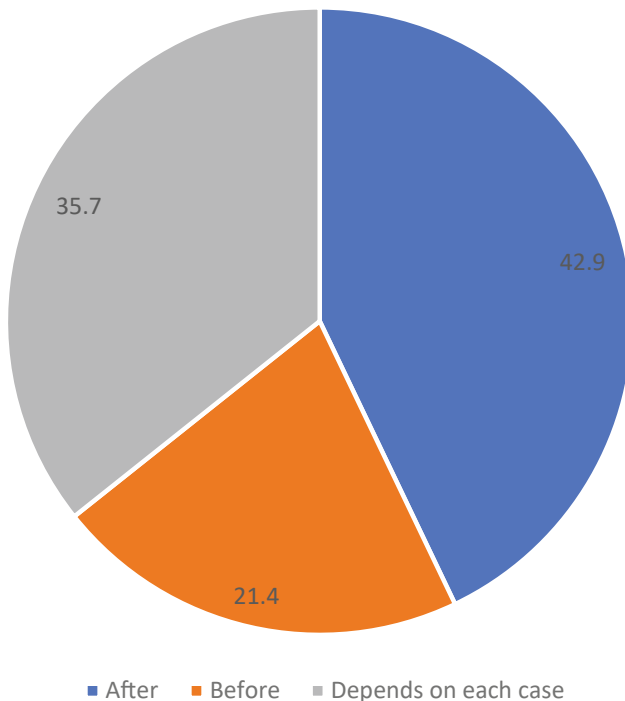


Fig. 3 Periodontists' beliefs on the ideal timing of gingival graft treatment in orthodontic patients with gingival recession or insufficient keratinised tissue width.

treatment (48.1%), followed by before orthodontic treatment (7.4%) and no referral at all (7.4%). No orthodontists surveyed believed that the ideal timing is during orthodontic treatment. A considerable proportion of orthodontists indicated that it would be dependent on each case (22.2%) or that it would be necessary for a consultation with a periodontist (14.8%) (Fig. 4).

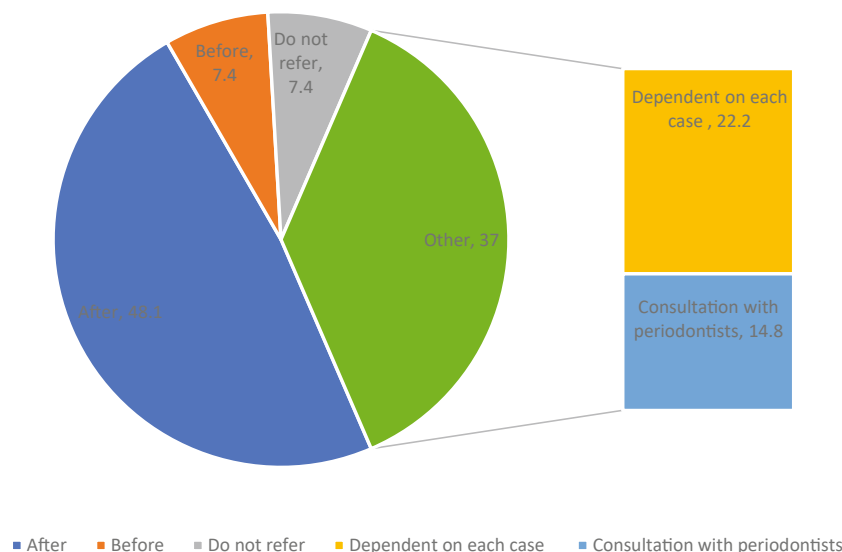


Fig. 4 Orthodontists' beliefs on the ideal timing for gingival graft treatment in orthodontic patients with gingival recession or insufficient keratinised tissue width.

Periodontists surveyed considered 'evidence-based guidelines' to be the most important factor affecting clinical decision-making (35.0%), followed by 'clinical experience' (30.0%) and 'patient complaints of aesthetic, discomfort or tooth sensitivity' (15.0%) (Fig. 5). Interestingly, no periodontists believed that a referral from orthodontists would significantly impact their decision-making. Those who selected 'other' commented on factors such as 'anatomical condition and tissue biotype', 'difficulty of home care' and 'a combination of evidence, experience and patient-based factors' (Table 2).

Comparatively, orthodontists surveyed considered several factors to be equally important in affecting their clinical decision-making – planning specific tooth movements (22.9%), amount of keratinised tissue (24.1%), gingival phenotype (24.1%) and presence of gingival or soft tissue recession (26.5%) (Fig. 6).

DISCUSSION

There is ambiguity in the literature regarding the impact of orthodontic treatment on the development of mucogingival deformities. This study investigated the opinions of New Zealand periodontists and orthodontists on the timing of management of mucogingival deformities in orthodontic patients, along with the factors which may influence their decision-making. Most periodontists in the study generally received referrals from orthodontists for treatment of gingival recession after the completion of orthodontic treatment whereas most orthodontists in the study reported that they commonly referred to periodontists before orthodontic treatment to seek a second opinion. This discrepancy could be due to a

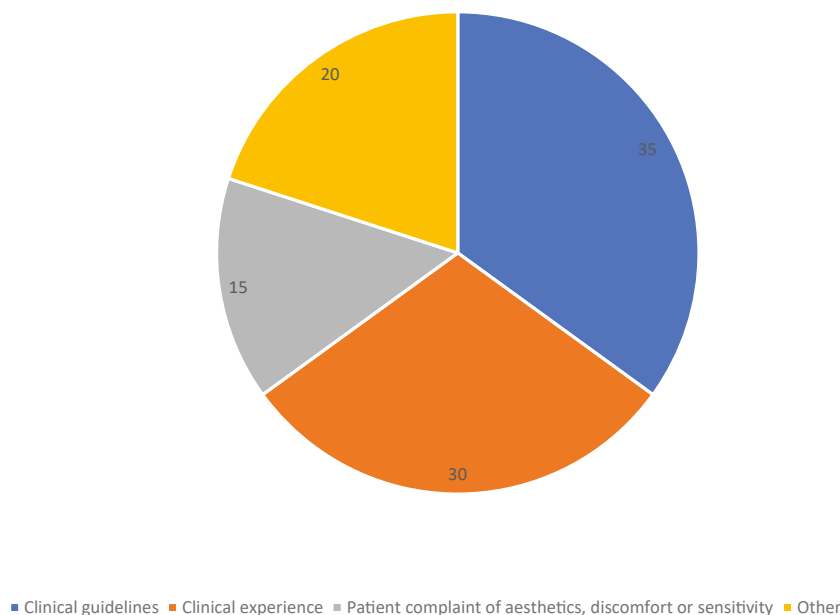


Fig. 5 Factors affecting clinical decision-making reported by periodontists.

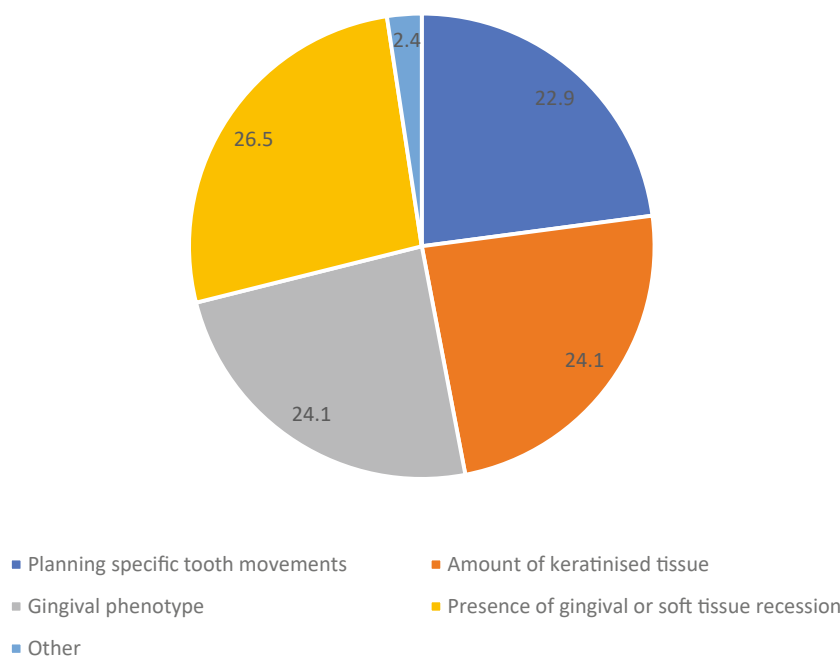


Fig. 6 Factors affecting clinical decision-making reported by orthodontists.

lack of a consensus in the literature regarding whether the orthodontic treatment causes the development of mucogingival deformities. Traditionally, it has been thought that orthodontic treatment is a potential causative factor of gingival recession.¹¹ Thus, post-ortho grafts may still be necessary even after a pre-ortho graft has been performed. This discrepancy may also be due to a misunderstanding of the survey question: the orthodontists may have misinterpreted the referral for the performance of gingival graft treatments as a

referral for consultation with a periodontist. This was evident in their responses to a subsequent question in which they indicated that they believed the ideal timing for gingival grafts was after orthodontic treatment.

Slutzkey and Levin (2008) reported the risk of developing gingival recession in young adults (18–22 years old) who had received orthodontic treatment was doubled compared with those untreated.²⁵ This agrees with Renkema *et al.* (2013), who found that

orthodontically treated patients demonstrated a higher prevalence of labial gingival recessions than untreated controls at all time points of orthodontic treatment.²⁶ Additionally, Allias and Melsen (2003) also found that adult orthodontic patients had a significantly higher prevalence of gingival recession in at least one lower incisor in comparison with untreated controls.²⁷ This is consistent with the present study's findings, where most periodontists and orthodontists surveyed agreed that the ideal timing for gingival graft treatment in orthodontic patients presenting with gingival recession was after the completion of orthodontic treatment to prevent the need for a repeat of gingival graft treatment. The findings of Ngan et al. (1991) have also emphasised that pre-orthodontic gingival grafting did not decrease the risk of post-orthodontic gingival recession.²⁸

Conversely, Gebistorf et al. (2018) concluded that those who have had orthodontic treatment had a similar impact on long-term periodontal health compared with untreated malocclusion.²⁹ Furthermore, no relationship between functional appliances and gingival recession was found.^{26,30} It has been suggested that orthodontic treatment is not considered a risk factor for developing mucogingival deformities if other established risk factors are well-controlled.^{31–34} Pango Madariaga et al. (2020) proposed that if oral hygiene is well maintained, orthodontic treatment does not impact periodontal health.³⁴ Moreover, if periodontal phenotype were respected, tooth proclination in lower incisors and canines would not risk labial gingival recession. Still, the gingival thickness would be expected to decrease.³⁵ However, these risk factors could be altered by orthodontic treatment. For example, a facial tooth movement may result in a thin phenotype that predisposes to developing mucogingival deformities.¹⁹ A systematic review conducted by Kloukos et al. (2014) concluded that gingival graft treatment before orthodontic treatment could be clinically viable and beneficial to preventing the development or progression of gingival recession in high-risk patients with 'thin' gingival phenotype; however, this treatment approach is not based on solid scientific evidence. The same group also expressed concern regarding whether or not this pre-emptive periodontal intervention was necessary or considered over-treatment, suggesting that it was possible to wait until the potential gingival recession became pathological before intervening.³⁶

Additionally, maintenance of oral hygiene may be compromised during orthodontic treatment. Boke et al. (2014) suggested that fixed appliances were positively correlated with plaque accumulation and the development of overall gingival recession.³⁷ This controversy in the literature may explain why orthodontists in the present study may refer during different

phases of treatment in clinical practice and why an internationally accepted guideline has yet to be developed.

Due to the lack of research investigating the ideal timing of gingival graft treatment in orthodontic patients with mucogingival deformities, there is poor consistency in clinical decision-making amongst clinicians as reflected in the results of our study (Figs 1–4). There are very few studies published to date that have concluded the ideal timing of gingival graft treatment in orthodontic patients with mucogingival deformities. One study conducted by Maynard & Ochesenbein (1975) investigated the prevalence of mucogingival deformities in 100 children who were anticipating orthodontic treatment.³⁸ The authors recommended that a free gingival graft should be performed before tooth movement in the presence of insufficient keratinised tissue. If there is 1mm or less keratinised tissue, then grafts are recommended; grafts would not be recommended when there is over 1mm of attached gingiva.^{38,39} This appears to conflict with the results found in our current study, where the most significant proportion of periodontists and orthodontists surveyed believed that the ideal timing for gingival graft treatment would be after the completion of orthodontic treatment. However, the recommendation by Maynard & Oschesenbein for pre-ortho gingival grafting is based on the premise that the patient exhibits the early presence of inadequate dimensions of keratinised tissue to prevent the progression of the pre-existing mucogingival problems. Thus, this would likely be a case of 'dependent on each case' indicated by participants of our present study. Alternatively, this apparent conflict could also possibly be due to advances and changes in scientific knowledge and understanding regarding the impact of orthodontic treatment in the development of mucogingival deformities over the past few decades. Therefore, in the absence of a clear & concise evidence-based clinical guideline for managing gingival recession in orthodontic patients, practitioners may find the issue challenging and rely more on clinical experience and judgement when deciding when to perform corrective treatment for mucogingival deformities in orthodontic patients. Consequently, this would partially explain the inconsistencies in decision-making observed in the present study, which necessitates a need for our dental professional bodies or an organisation with large outreach to issue a guideline or protocol to promote evidence-based practice and consistency amongst practitioners.

CONCLUSIONS

This study has provided valuable insight into the ideal timing for when orthodontic patients presenting with mucogingival deformities should be referred for

gingival graft treatment. Before this study, there has been a lack of research on this topic due to the ambiguity in the literature regarding the impact of orthodontic treatment on the development of mucogingival deformities. Our results have revealed the inconsistencies in clinical decision-making regarding the treatment of these defects and helped better understand the views of New Zealand periodontists and orthodontists on the optimal timing and indications for gingival graft treatment in orthodontic patients. Future studies should conduct randomised clinical trials to assist the development of evidence-based guidelines for clinical use.

ETHICS APPROVAL

Ethics approval for this study was granted by the University of Otago Human Ethics Committee (reference number: D21/034).

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CONFLICT OF INTEREST

All authors have no conflict of interest to disclose.

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