

## Treatment of Class II division 1 malocclusion in a non growing patient

### A case report with review of literature

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#### Abstract:

*In our orthodontic practice we have seen a recent spurt of increasing numbers of young adults who desire cost effective, non surgical correction of Class II malocclusion and accept dental camouflage as a treatment option to mask the skeletal discrepancy. When planning the treatment in such cases the orthodontist often faces the dilemma whether to extract 2 maxillary premolars or 2 maxillary and 2 mandibular premolars. This case report presents one such case (along with review of literature) of a 21 year old non-growing female, having skeletal Class II division 1 malocclusion with an overjet of 14mm, who did not want surgical approach to treatment and even though the underlying sagittal jaw discrepancy was severe, the selective extraction of two permanent maxillary first premolar teeth was considered acceptable. Following treatment marked improvement in patient's smile, facial profile and lip competence were achieved and there was a remarkable increase in the patient's confidence and quality of life.*

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#### KEY WORDS

*Dental Camouflage, Class II malocclusion*

#### Introduction

Over the last decade, increasing numbers of adults have become aware of orthodontic treatment and are demanding high-quality treatment, in the shortest possible time with increased efficiency and reduced costs.<sup>1</sup> Class II malocclusions can be treated by several means, according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance.<sup>2</sup> Methods include extraoral appliances, functional appliances and fixed appliances associated with Class II intermaxillary elastics.<sup>3</sup> On the other hand, correction of Class II malocclusions in non-growing patients usually includes orthognathic surgery or selective removal of permanent teeth, with subsequent dental camouflage to mask the skeletal discrepancy. The indications for extractions in orthodontic practice have historically been controversial.<sup>4-6</sup> Premolars are probably the most commonly extracted teeth for orthodontic purposes as they are conveniently located between the anterior and posterior segments. Variations in extraction sequences including upper and lower first or second premolars have been recommended by different authors for a variety of reasons.<sup>7-12</sup>

For correction of Class II malocclusions in non-growing patients extractions can involve 2 maxillary premolars<sup>13</sup> or 2 maxillary and 2 mandibular premolars.<sup>14</sup> It is usually not the skeletal characteristics of a Class II malocclusion that primarily determine whether it should be treated with 2 or 4 premolar extractions but, rather, the dentoalveolar characteristics.

The extraction of only 2 maxillary premolars is generally indicated when there is no crowding or cephalometric discrepancy in the mandibular arch.<sup>15,16</sup> Extraction of 4 premolars is indicated primarily for crowding in the mandibular arch, a cephalometric discrepancy, or a combination of both, in growing patients.<sup>15-17</sup> Recent studies have shown that patient satisfaction with camouflage treatment is similar to that achieved with surgical mandibular advancement<sup>18</sup> and that treatment with two maxillary premolar extractions gives a better occlusal result than treatment with four premolar extractions.<sup>19</sup>

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Fig 1: Pre-treatment Photographs.



Fig 2: Cephalometric superimposition

## Case Report

A 21 year old female reported to the Orthodontic Clinic with multiple complaints “my teeth stick out”, “I am unable to close my lips” “I feel embarrassed when I laugh”. She gave a history of thumb sucking as a child. Extra oral examination revealed a mesocephalic symmetrical face, convex hard and soft tissue profile, lip trap and an acute nasolabial angle. The patient showed a good range of mandibular movements and no TMJ symptoms. Intraoral examination revealed that the patient had a full Class II molar and canine relationship, a “V-shaped” arch form, excessively proclined maxillary incisors with an overjet of 14mm and associated palatal impingement of the lower incisors (Fig 1). A surgical approach to treatment was not desired by the patients, and although the underlying sagittal jaw discrepancy was severe, the selective extraction of two permanent maxillary first premolar teeth was considered acceptable. Our treatment objective focused on the chief complaint of the patient, and the treatment plan was individualized based on the specific treatment goals.

### Treatment goals:

Obtaining good facial balance

Obtaining optimal static and functional occlusion and stability of the treatment results.

Treatment objectives which would lead to overall improvement of the hard- and soft-tissue profile and facial aesthetics were:

To correct the upper incisor crown position by controlled tipping.

To achieve an ideal overjet.

To eliminate lower lip trap.

To achieve lip competence.

To improve the lip-to-incisor relationship

To achieve a flat occlusal plane

To achieve an ideal overbite.

To achieve adequate functional occlusal intercuspation with a Class II molar and a Class I canine relationship.

The molar positions, arch width, and midlines needed to be maintained.

### Treatment plan:

Extraction of maxillary first premolars.

Alignment & levelling of the arches.

Closing the extraction space by retraction of the maxillary canines followed by four incisors.

Levelling the curve of Spee without increasing arch perimeter.

Final consolidation of space and settling of the occlusion.

The cephalometric analysis confirmed a skeletal class II malocclusion with ANB of 8 degrees, Wits of 10 mm and proclined maxillary incisors [U1-SN 124o, U1-NA 42o/14mm] (Table 1). The maxillary first premolars were extracted. The patient underwent fixed orthodontic mechanotherapy with standard edgewise (0.022-inch slot) with headgear tubes soldered on the upper molar bands. It is necessary to align and level arches prior to retraction of canines. An initial 0.016-inch round nickel titanium arch wire was used for levelling and alignment of both arches. After 4 weeks, upper and lower 0.016-inch round steel wire was placed with appropriate bite-opening curves which were followed by upper and lower 0.017 x 0.025-inch stainless steel (SS) wires at 8 weeks. At the end of 12 weeks enough levelling and aligning had occurred to place upper and lower 0.019 x 0.025-inch SS wires. Anterior teeth can be retracted in one of two ways: en masse retraction of the six anterior teeth, or a two-step procedure involving canine retraction followed by retraction of the four incisors. In this case we retracted the anterior teeth in a two step procedure, firstly the canines followed by the incisors in order to prevent undesirable mesial drift of maxillary molars, as camouflage treatment with 2 premolar extractions requires anchorage conservation and in order to further reinforce our anchorage we used Nance button. Maxillary canines were retracted using sliding mechanics followed by en mass retraction of the four maxillary incisors. After the closure of the 1st premolar extraction space, the extraction site was stabilized with a figure eight ligation between canine, second premolar and molar. An .019 x .025 nickel titanium arch wire was placed to level the arch followed by .014 S.S. wires for occlusal settling following which the case was debonded and a maxillary modified Hawley wraparound retainer was given (as it does not interference with the occlusion).



Fig.3 Post-treatment Photographs

Table I Cephalometric Analysis

	Variable	Pre-treatment	Post-treatment
<b>Skeletal</b>	SNA	81°	81°
	SNB	73°	73°
	ANB	8°	8°
	Wits (AO-BO)	10mm	10mm
	GoGn-SN	35°	35°
<b>Dental</b>	U1-SN	124°	104°
	U1- NA	14mm / 42°	4mm / 23°
	L1 - NB	5mm / 24°	6mm / 26°
	IMPA	98°	101°
	Overjet	14mm	2mm
<b>Soft tissue</b>	Nasolabial angle	81°	102°
	U lip-S line	+5mm	0
	L lip-S line	+2mm	0

## Discussion

Treatment of an adult Class II patient requires careful diagnosis and a treatment plan involving esthetic, occlusal, and functional considerations. Ideally, the ability to identify specific abnormalities should lead to elimination of a malocclusion by normalization of the defective structures. In many situations, however, diagnosis is not matched by comparable differential treatment objectives and procedures. This problem is particularly evident in the correction of Class II malocclusions of skeletal origin in a non-growing patient. In the case being reported, surgical option of treatment was declined by the patients and it was decided to hide the skeletal discrepancy by extracting the maxillary premolars and retracting the anterior teeth to improve the profile of the patient and obtain proper functional occlusion. The changes with treatment were achieved solely a result of dental and accompanying soft tissue profile changes and there was no skeletal change (Fig 2) (Table 1).

Treatment of complete Class II malocclusions by extracting only 2 maxillary premolars requires anchorage to avoid mesial movement of the posterior segment during retraction of the anterior teeth. Because the average mesiodistal diameter of premolars is 7 mm, the anterior teeth should therefore be distalized by this distance.<sup>21</sup> Appliances that provide this anchorage are primarily intraoral devices, such as palatal bars, Nance buttons, or similar fixed devices.<sup>22,23</sup> However, in complete Class II therapy with 4 premolar extractions, the need for anchorage is even greater, because the posterior segment must not only be maintained in place but also be distalized to achieve a Class I molar relationship at the end of treatment<sup>14,24</sup> consequently, treatment success depends on reinforcing the anchorage with extra oral appliances and thus on patient compliance.

In favourable cases of Class II malocclusions with 4 premolar extractions, the mandibular posterior segment might move forward by half of the extraction space (3.5 mm) during retraction of the mandibular anterior segment and there will be a need to distalize the maxillary posterior segment by a similar distance to achieve a Class I molar relationship. Afterward, all anterior teeth must be distalized 3.5 mm (or "space units"<sup>25</sup>), corresponding to the distalization of the posterior segment, in addition to the 7 mm required for correcting the original anterior overjet to achieve a Class I canine relationship, thus totalling 10.5 mm. Therefore, there will be 3.5 mm of distalization of the posterior segment added to the 10.5 mm of the anterior segment, totalling 14 mm of distalization for both posterior and anterior segments which is twice the amount required for Class II correction with extraction of only the maxillary premolars.<sup>25</sup>

This will bring about a greater need of extra oral anchorage and consequently even more patient compliance than the previous scenario. Additionally in complete Class II therapy with 4 premolar extractions anchorage for the mandibular arch might require reinforcement by a lip bumper—a removable appliance that also depends on patient compliance.

Class II correction when associated with growth potential, might help in achieving a satisfactory occlusal outcome.<sup>26-28</sup> If the patient is still growing, the probability of success of the mentioned protocols is considerably increased because the extra oral appliances for anchorage reinforcement might not only distalize the maxillary teeth but also redirect maxillary growth, restricting its anterior displacement which is valuable for Class II correction. Moreover, mandibular growth, as well as its normal anterior displacement, will increase the probability of correcting the anteroposterior discrepancy.<sup>27,29,30</sup> This growth potential is even more important in Class II patients treated with extraction of 4 premolars because, as previously explained, they will require more distalization of the maxillary teeth, distalization that might be reduced by an association with redirection of growth of the apical bases.<sup>26,29,30</sup> Thus, the great limitation of the Class II treatment protocol with extraction of 4 premolars in adults and non growing patients is clear.

Removable appliance for extra oral anchorage might be replaced with implants<sup>31,32</sup> or mini-implants.<sup>31,33</sup> These seem to provide good anchorage, completely eliminating the need for a removable device.<sup>31,33</sup> On the basis of these considerations, even if these appliances in all the aforementioned cases were to be considered, the need for anchorage would still be proportionally greater in the 4-premolar-extraction protocol<sup>26,23</sup> and the occlusal success rate of Class II correction with 4 premolar extractions is more likely to be compromised by the absence of growth than is treatment with 2 premolar extractions.

The differences in occlusal results with these 2 Class II treatment protocols should be considered when the treatment plan of each patient is established. Treatment planning decisions depend on a cost/benefit ratio.<sup>34</sup> Orthodontic treatment goals usually include obtaining good facial balance, optimal static and functional occlusion, and stability of the treatment results.<sup>35, 36</sup> Whenever possible, all should be attained. In some instances, however, the ultimate objectives cannot be reached because of the severity of the orthodontic problems.<sup>36</sup>

Therefore, when the several treatment variables involved are considered, the greater difficulty in obtaining a good occlusal success rate in complete Class II malocclusion treatment with the 4-premolar-extraction protocol should be kept in mind.

Even though to provide an optimal facial balance, a 4-premolar extraction protocol in a complete Class II malocclusion would be the best option. However, because of the patient's advanced age and poor compliance attitude, a 2-premolar extraction protocol can provide greater benefits and thus can be selected and various studies<sup>37-40</sup> have also shown that extractions of premolars, if undertaken after a thorough diagnosis, lead to positive profile change.

#### Conclusions:

Camouflage treatment of Class II malocclusion in adults is challenging.

Extractions of premolars, if undertaken after a thorough diagnosis leads to positive profile changes and an overall satisfactory facial aesthetics.

A well chosen individualized treatment plan, undertaken with sound biomechanical principles and appropriate control of orthodontic mechanics to execute the plan is the surest way to achieve predictable results with minimal side effects.

Patient satisfaction with camouflage treatment is similar to that achieved with a surgical orthodontic approach.

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