

Extraction vs. Non-Extraction Therapy: Statistics and Retrospective Study

Abstract

Objective: Since 1970 there has been a progressive trend in Western countries toward non-extraction management for comprehensive orthodontic problems because of advances in clinical technology. It is hypothesized that extractions are rare in an Asian group practice using advanced technology, including self-ligating brackets (SLB) and extra-alveolar temporary anchorage devices (E-A TADs).

Materials and Methods: 200 consecutive patient files were drawn on October 31, 2015, from the Beethoven Orthodontic Center in Hsinchu City, Taiwan, to determine if teeth were extracted as part of a comprehensive treatment plan. Third molar extractions were not included if their removal was unrelated to the treatment of the malocclusion.

Results: The chief complaint (CC) for 47% of the patients in the sample was lip protrusion. Other concerns were prognathic (Class III) occlusion (15%), a perceived need for interdisciplinary treatment (10%), impaction(s) (7%), and other problems (20%). In evaluating the labial profile for the patients with a CC of lip protrusion, 39% of upper and 55% of lower lips protruded beyond the Ricketts E-line. Sixty-five percent of the lip protrusion patients accepted a treatment plan involving extractions. Eighty-five percent of the extractions were performed to reduce protrusion, and maintain lip balance to the E-line. Forty percent of the patients had crowding >7mm. Twenty percent of the extractions were for compromised dental health such as caries, failed root canal treatment, fracture, and prostheses.

Conclusions: The hypothesis is rejected that advanced clinical technology has markedly decreased the extraction rate for Asians. Patients affected by lip protrusion and/or severe crowding readily accept a treatment plan to reduce the number of permanent teeth. A desirable soft tissue profile with optimal lip esthetics is a significant factor in the decision for extractions. Additionally, extractions and space closure treatment were perceived as the most efficient approach for correcting asymmetry, as well as for avoiding prostheses and/or implants. Despite the pros and cons for extraction treatment, patient expectations and treatment preference remain the most crucial factor for implementing an extraction treatment plan. (Int J Orthod Implantol 2016;44:76-86)

Key words:

Extraction vs non-extraction treatment, patient treatment preference, E-line, retrospective analysis, Asian facial preference, lip protrusion, severe crowding, patient expectations

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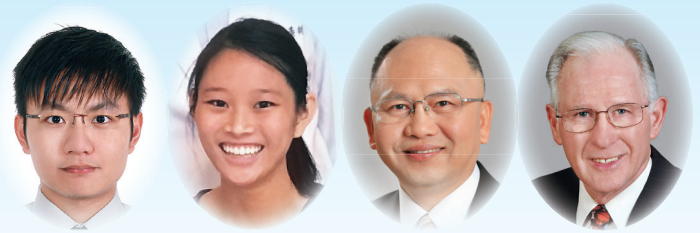
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Introduction

Extractions for orthodontic purposes has always been controversial. Angle believed that “a correct treatment” could achieve ideal occlusion and esthetics without extractions, Case, Tweed, and Begg argued that extractions were essential for a stable resolution of protrusion and/or severe crowding.^{1,2} After the death of Angle (1930) extractions were increasingly more prevalent until the middle 1960s.^{3,4} For the last four decades, there has been a progressive trend toward non-extraction therapy once brackets could be reliably bonded directly on teeth. A landmark malpractice decision in 1987 suggested temporomandibular disorder (TMD) was associated with first premolar extraction and the use of headgear to retract maxillary incisors.^{1,2} The lawsuit claimed that the extractions along with the use of headgear were the proximate cause for temporomandibular disorder (TMD). Despite little or no scientific support for extractions as an etiology for TMD, this litigation led to more conservative, non-extraction treatment to avoid malpractice liability.^{1,3}

Overall, the prevalence of orthodontic extractions in the United States peaked around 80% in the mid 1960s and fell to 15-20% in the 1990s.¹⁻⁴ For the past two decades, there has been a continuing decrease in extraction treatment associated with the introduction of modern appliances, increased tolerance for arch expansion, TAD anchorage, and the use of aligners.¹⁻⁶

Considering the non-extraction trend in Western practices, it was of interest to investigate the current extraction experience in a progressive Asian practice that uses a number of technologies that appear to be limiting extractions in the West.¹⁻⁶

Materials and Methods

200 consecutive patient files, retrospective to October 31, 2015, were drawn from the records of the Beethoven Orthodontic Center. The sample was composed of 132 females and 68 males, ranging in age from 8-52 years old. The largest group (47%) was 18-30 years of age, followed by 40% ranging

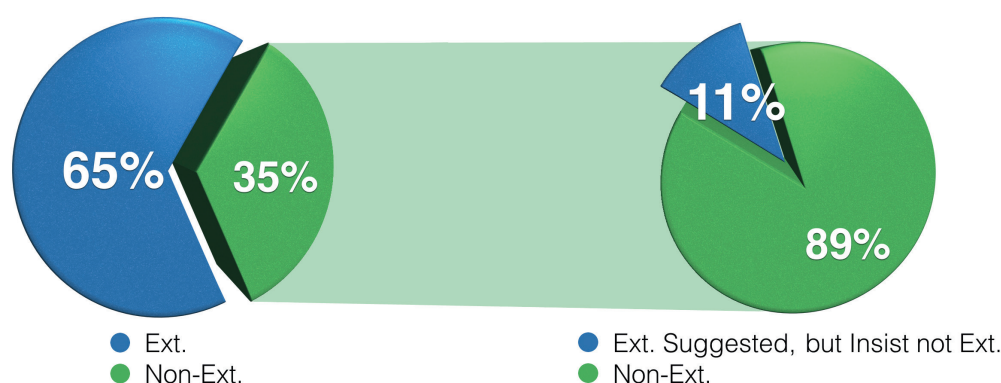
from 10-17 years, 13% were over age 30 years, and <1% were less than 10 years old. Lip protrusion was assessed with Ricketts E-line method.⁷

Results

Extractions were advised for 68% of the entire sample, and all patients concurred except for 3% who preferred a non-extraction approach. Thus, the extraction prevalence was 65% for all patients in the four age groups (Fig. 1), and the non-extraction group (35%) was subdivided into 89% for which non-extraction treatment was recommended, and 11% who insisted on no extractions despite the professional recommendation to the contrary (Fig. 2). Most individuals were concerned about some form of facial protrusion (22+25=47%); however, the less prevalent patient/parent concerns were prognathic (Class III) malocclusion (15%),

perceived need for interdisciplinary treatment (IDT) (10%), impaction(s) (7%), and other problems (20%) (Fig. 3). Ten percent of the extractions were to take advantage of 3rd molar substitution for compromised or missing 1st and 2nd molars (Fig. 10).

The most frequent chief complaint (CC) was facial protrusion (47%), which was the sum of lip (22%) and bimaxillary protrusion (25%) (Fig. 4). Thirty-eight percent of upper lips in the sample were protrusive to the E-line (Fig. 5), and the corresponding figure for lower lip protrusion was 55% (Fig. 6). Eighty-five percent of the extractions were to improve or maintain lip protrusion to the E-Line (Fig. 7). Forty percent of patients approved extractions to relieve crowding of >7mm (Fig. 8). Twenty percent of the extractions were related to advanced caries, compromised root canal treatment (RCT), tooth



■ Fig. 1:

The extraction percentage for the Beethoven Orthodontic Center was 65%. Although 68% of the patients were advised to have extractions, all but 3% accepted the recommendation.

■ Fig. 2:

The nonextraction fraction was 35%, and 89% of that group had accepted the non-extraction advise of the clinician. However, 11% of the non-extraction patients had previously declined the recommendation for extractions, so they were being treated non-extraction based on their personal preference.

fracture, and prosthetic problems (Fig. 9). Ten percent of patients preferred extraction of compromised teeth to take advantage of 3rd molar substitution to restore missing units in the arch (Fig. 10). Eighty percent of the extractions were 1st premolars (Fig. 11).

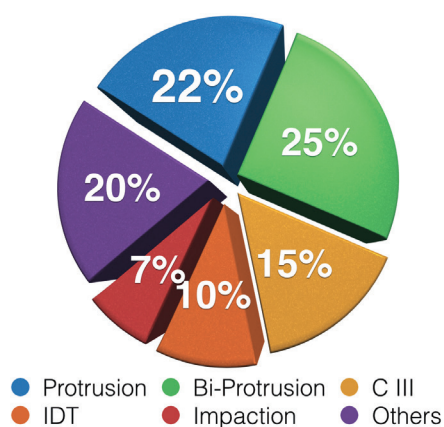
Discussion

The hypothesis is rejected because a majority of patients in the current Asian sample pursued comprehensive orthodontic treatment that included extractions. Despite technical advances providing additional non-extraction options, 65% of patients seeking treatment for protrusion problems (47% of all patients) preferred extraction therapy. About 3% of patients were adamantly opposed to extractions for orthodontics, but most patients for whom extractions were recommended readily accepted the

option. It was clear to all concerned that extractions were the most expedient approach for controlling lip protrusion, particularly when severe crowding must be corrected in the lower arch. The most frequently extracted teeth (80%) were 1st premolars (Fig. 11), which was widely perceived to be a rational mechanical and esthetic approach to the problem.

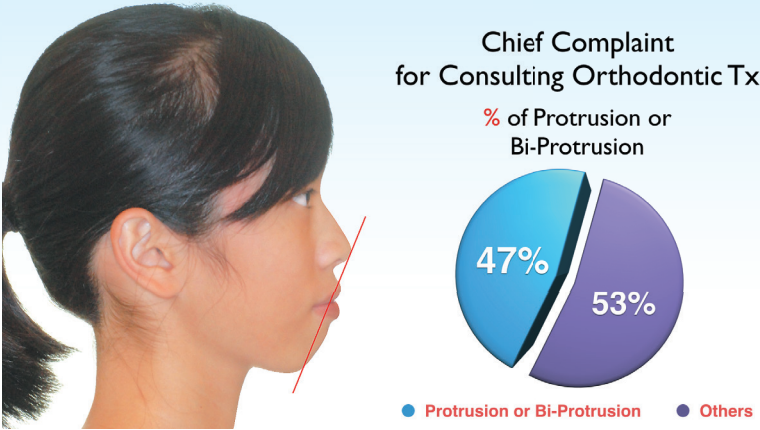
The decision to extract for a particular patient was based on a collective evaluation of the profile, mandibular plane angle, axial inclination of the incisors, crowding, and decayed or missing teeth (Table 1). Patient compliance with the recommendation for extractions appeared to be largely based on their personal opinion about the procedure. The present data are consistent with patients having a preconceived acceptance or rejection of extractions. There was no indication that a patient's decision to reject extractions was based on perceived outcomes. They were either compliant (OK) with extractions or they were not (Table 1).^{3,7,8}

Asian patients are concerned about facial esthetics (Fig. 12), particularly lip protrusion relative to the facial profile (Figs. 4-6). The applicable beauty standard favors a straight profile with a prominent nose and retruded lips.⁹⁻¹¹ There is also an emphasis on the chin and lower lip areas, as was pointed out by Soh et al.⁹ in a study of facial profile preferences by oral surgeons, orthodontists, and the lay public. Overall, East Asians prefer a straight profile (Fig. 12) for both males and females that is considered normal or minimally retrusive by Western standards.^{9,10}

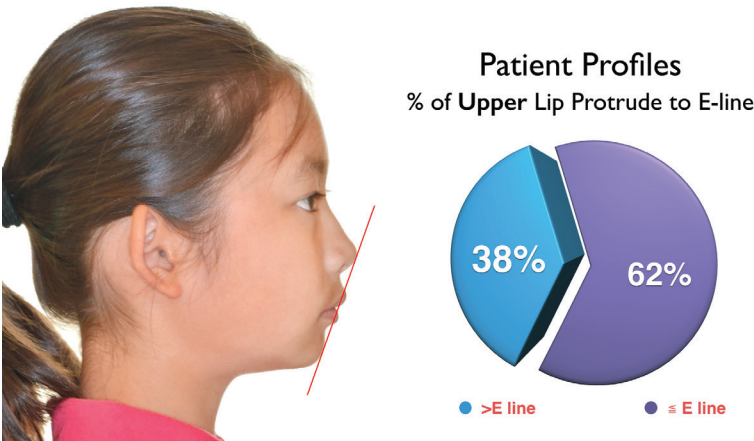


■ Fig. 3:

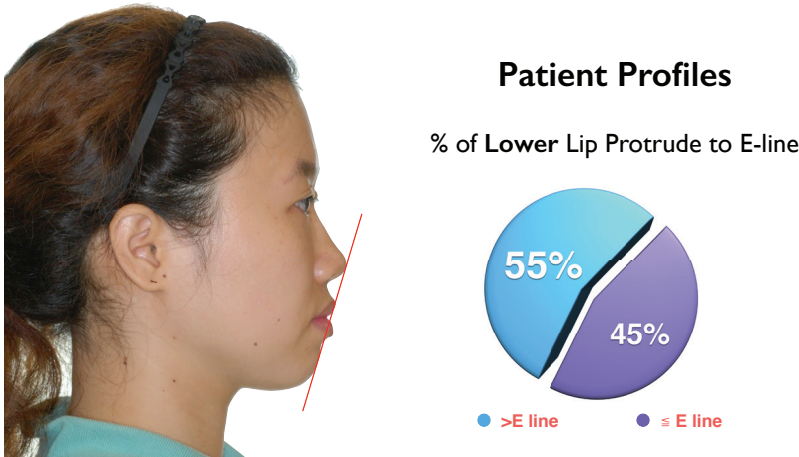
The chief complaint for the orthodontics consultation was 22% lip protrusion (Protrusion); 25% bimaxillary-protrusion (Bi-Protrusion); 15% Class III; 10% interdisciplinary treatment; 7% impactions; 20% other problems.



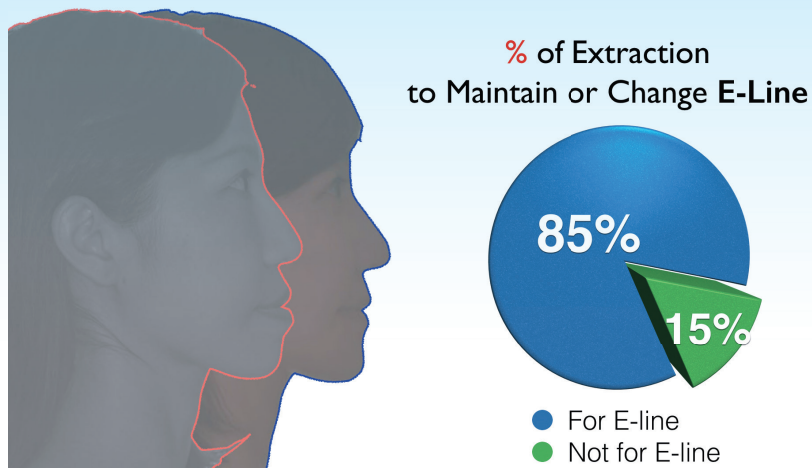
■ Fig. 4: Protrusion of the lower face was the chief complaint for 47% of the patients (22 plus 25% according to Figure 4). These patients wanted to establish or maintain a straight lower facial profile.



■ Fig. 5: Upper lip protrusion to the E-line was the principal problem for 38% of the patients, with a perceived profile problem.

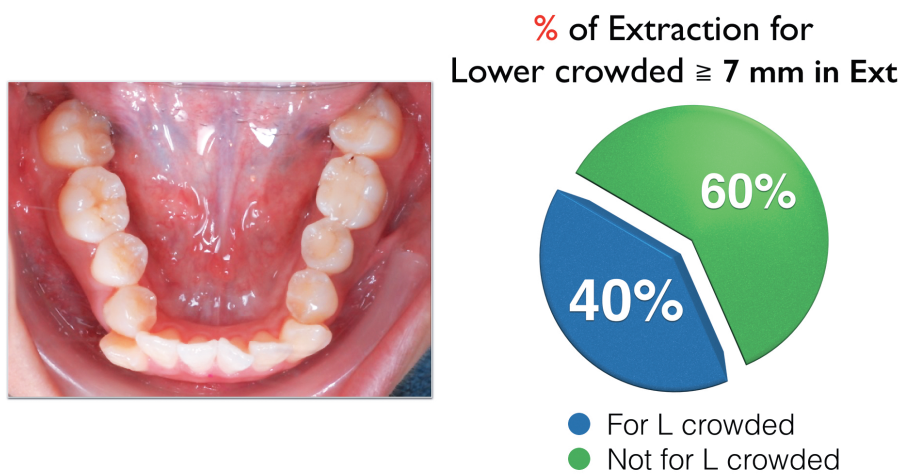


■ Fig. 6: Lower lip protrusion to the E-line was the principal problem for 55% of the patients, with a perceived profile problem.

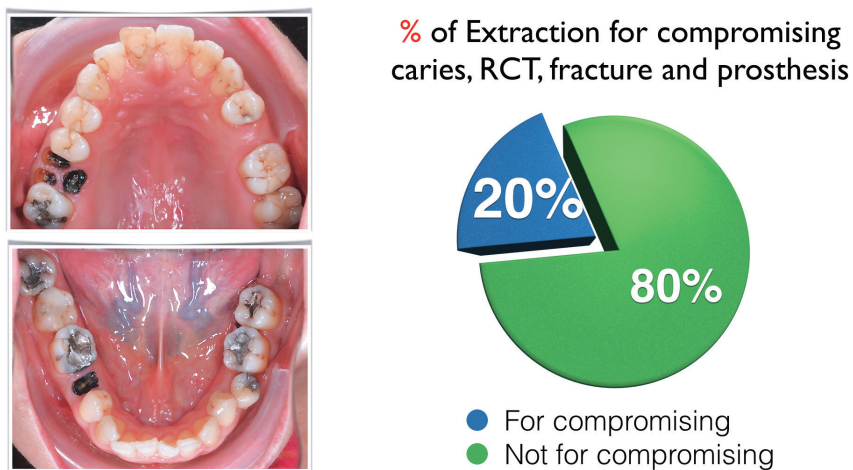


■ Fig. 7:

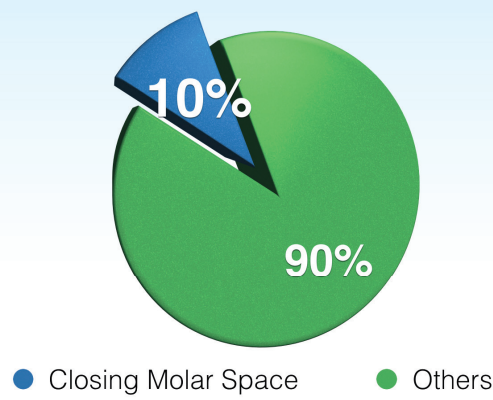
To maintain or correct the lip profile to the E-line was the goal for 85% of the extraction patients. The remaining 15% had extractions that were not related to the lip profile.



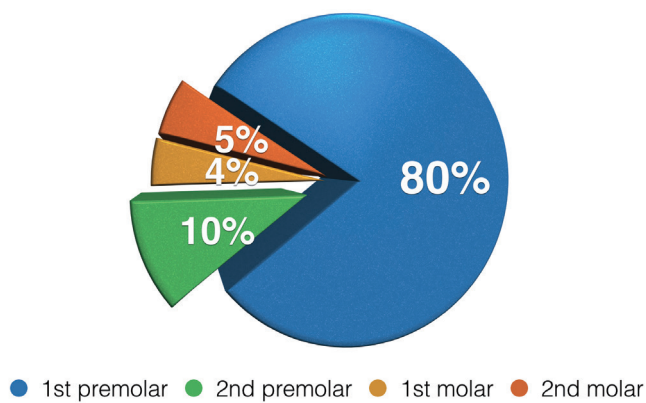
■ Fig. 8: Forty percent of the extraction patients had lower arch crowding of 7mm or more.



■ Fig. 9: Twenty percent of the extraction patients had teeth removed because of other compromising dental problems.



■ Fig. 10 : Ten percent of the extractions required closing molar spaces and 3rd molar substitution.



■ Fig. 11: Eighty percent of the extractions were 1st premolars, followed by 2nd premolars (10%), 1st molars (4%), and 2nd molars (5%).

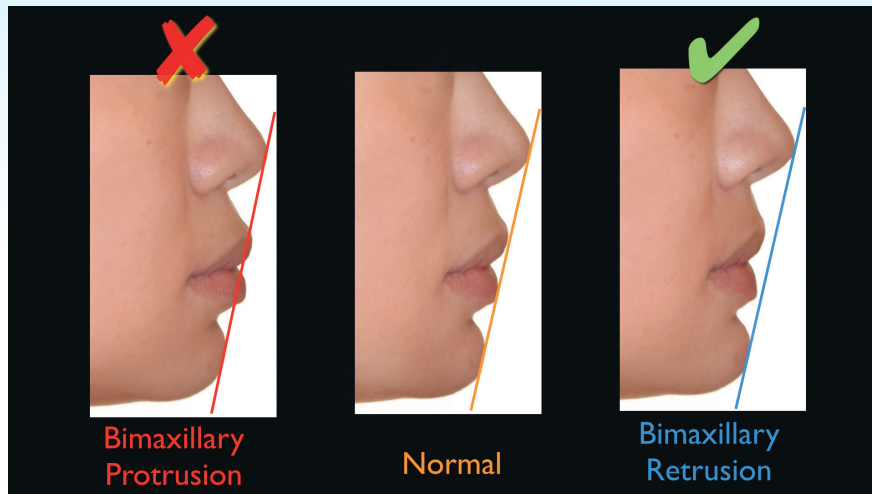
Lateral profile assessment is subjective for an analyst, so an objective index is preferable. Rickett's E-line⁷ for the current study provided an objective measure of lip protrusion, relative to prominence of the chin and nose, that was readily appreciated by the patients. For most of the patients concerned about lip prominence (47% of the entire sample), the E-line was a convincing tool for demonstrating the need for extractions if that was the clinician's judgement. Furthermore, Xu et al.⁹ found that

	Ext.	Not
1. Profile	Protrusive	Straight
2. Md. angle	High	Low
3. Bite	Open	Deep
4. Ant. inclination	Flaring	Flat
5. Crowding	> 7mm	None
6. Decay/missing	Present	????
7. P't perception	OK	No

■ Table 1: The seven clinical factors involved in an extraction treatment plan are listed in the left column. An assessment favoring extractions is listed in the middle column, and factors favoring a non-extraction approach are listed in the right column.

Chinese clinicians favored borderline patient profiles who had teeth extractions versus those who did not. Other studies^{11,12} demonstrated the importance of ethnicity and sex in the perception of profile esthetics. Overall, both clinicians and patients agree that extractions can have a beneficial impact on the soft tissue profile that is favored in East Asia.

Another reason for the high extraction rate was related to dental health. Many patients presenting at the Beethoven Orthodontic Center were referred by other orthodontists, so there was a high probability of a complex malocclusion that required interdisciplinary treatment (IDT). Extractions followed by orthodontic space closure was often indicated for compromised and asymmetric dentitions to minimize the prosthetic and implant requirements. When edentulous areas are asymmetric in the arches, there may be complex anchorage requirements that require extra-alveolar (E-A) temporary anchorage devices (TADs).



■ Fig. 12: Bimaxillary retrusion is an attractive facial form for most East Asians, according to Soh J et al. 2005.

A small fraction of patients (~3%) insisted on non-extraction treatment, despite a recommendation for extractions (Figs. 1 and 2). It was possible to achieve the desired result with modern appliances, but the course of treatment was likely to be complex and lengthy (Figs. 13-16). Leveling and alignment of severe crowding may produce bimaxillary protrusion and anterior openbite (Fig. 14). E-A TADs were required to retract both arches to correct the incisal relationship

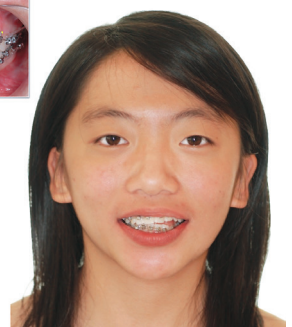
to basal bone, and lip protrusion to the E-line (Fig. 15). Although a stable result was documented with follow-up evaluations three and four years after treatment (Fig. 16), extractions would have been a more expedient choice to meet the patient's esthetic requirements. However, the lengthy complex treatment met the patient's preconceived need for non-extraction treatment and should be presented as an option (Figs. 13-16).

0M Patient perception



5M

Insist Non-Ext.



■ Fig. 13:

Despite a professional recommendation for extractions, the patient insisted on non-extraction treatment. After 5 months of leveling and alignment, both upper and lower lips were protrusive and an asymmetric anterior open bite was noted.



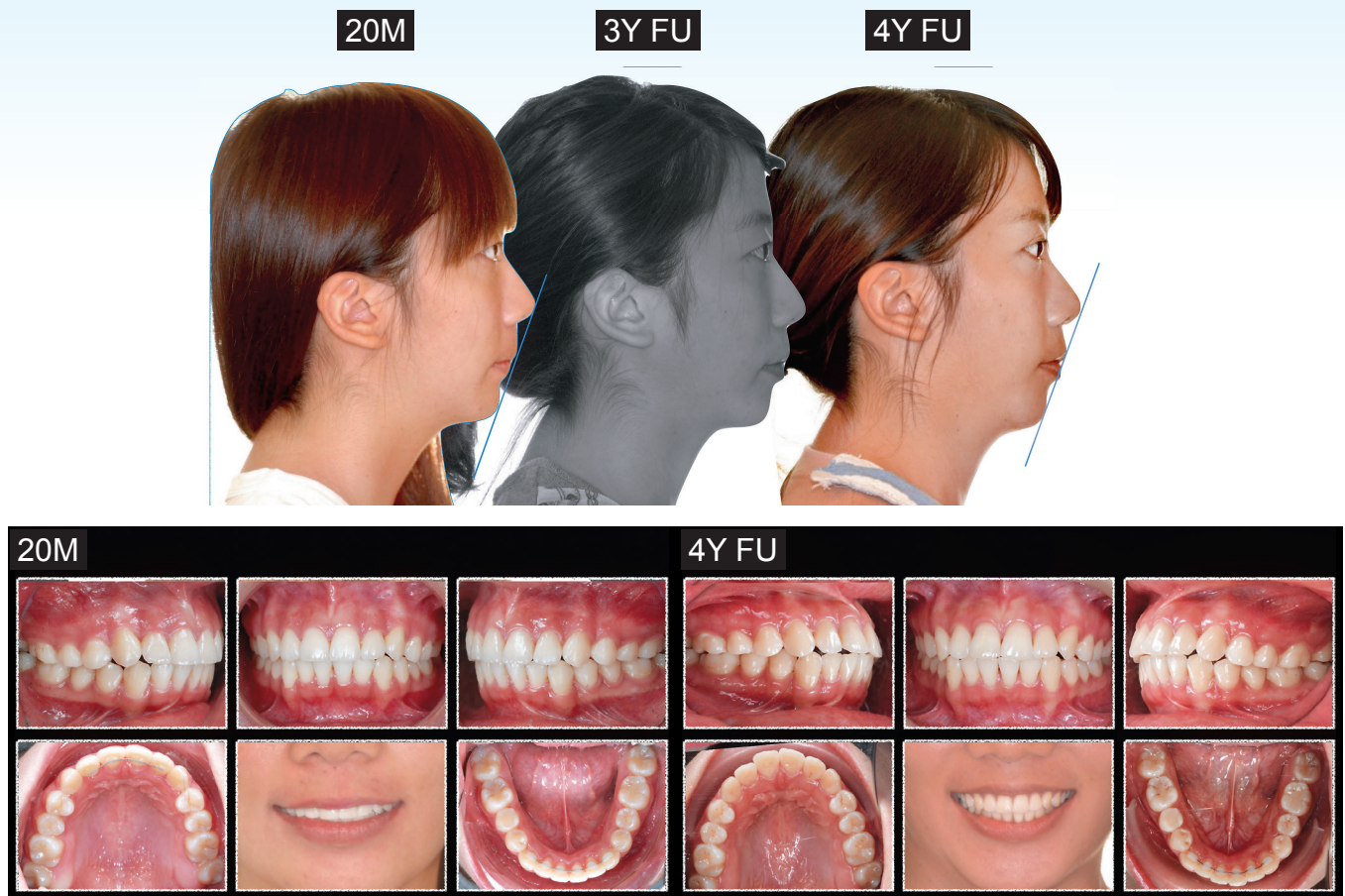
■ Fig. 14:

Five months into treatment, EA-TADs were placed in the infrazygomatic crests and mandibular buccal shelves bilaterally. A lateral cephalometric radiograph (left) shows the positions of the TADs, and bilateral intraoral photographs of the buccal segments show the TAD-anchored mechanics for retracting both arches.



■ Fig. 15:

With TAD anchorage placed in all four posterior quadrants five months (5M) into treatment, both arches were bodily retracted by 15 months (15M) into treatment, and the open bite was closed. Active treatment was completed in 20 months (20M), and both lips were aligned along the E-line (red and blue lines).



■ Fig. 16:

Comparison of the finish at 20 months (20M) to three (3YFU) and four year (4YFU) follow-up reveals a stable dental and facial result to the E-line (blue lines).

Conclusion

Patients prefer to control lip prominence and eliminate crowding with the most efficient approach, which was deemed to be extractions for 65% of the present sample. Extractions were also the treatment of choice for compromised teeth, resolution of asymmetry, and minimizing implants and prosthetics. Utilizing modern technology, most complex malocclusions can be managed without extractions, but the treatment may be complex and lengthy. Patient preference is the major factor for utilizing extractions. In general, patients prefer the most expedient and cost-effective approach, so extractions continue to be a popular option. However, informed consent for the extractions should be based on a thorough discussion of all the treatment options.

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