

Letters

Facial changes in extraction and nonextraction patients

Much interest was generated by the recent article on the evaluation of extraction and nonextraction patients by Boley et al. (Boley JC, Pontier JP, Smith S, Fulbright M. Facial changes in extraction and nonextraction patients. *Angle Orthod* 1998;68[6]:539-546), and I feel compelled to respond. I found the arguments presented in the report were not balanced and the study appeared to be attended by a personal crusade to prescribe or support one form of treatment against another. Why else would it be surprising to the authors that the profiles of nonextraction patients flattened more than those of patients treated with extractions? It would be pleasing to conclude that if one cannot distinguish between faces produced by either treatment, then criticism of either is invalid. Is there any question here? Should there be? For any trained orthodontist, the answer is known, even without a survey of facial profiles.

For there to be no change, we need to question the presence or absence of growth, extent of the skeletal disharmony, initial complaint, treatment objectives, ethnicity of the patient, ability of the clinician, the mechanics chosen (including presence or absence of planned anchorage and its type), patient compliance, efficacy of the appliance or mechanotherapy, extent of dental crowding...the list is

long. With minimum anchorage, one can produce full faces in extraction patients, or, in the same footing, a flat face with distal movement (where applicable) of buccal segments. Even without these considerations, extraction in some forms of crowding may lead to substitution of space created with malaligned teeth without change of the facial profile. The face produced does not, therefore, depend entirely on whether teeth are extracted, but on the choices made and the efficacy of the methods used to handle those choices.

The material for this study came from a clinician with, as expected of a trained orthodontist, varied treatment objectives. The claim of consistent treatment objectives was wrongly portrayed to mean satisfying them. With expansion, how would the objective of maintaining original archform be satisfied? Some cases required incisor uprighting, and of course this would affect profiles. The sagittal position of anterior teeth was not standardized, and they were treated to the so-called "desired position." I believe what this translates to is any position, back or forward, depending on the analysis used and the list of considerations enumerated above. This is worse than the 50% coin-toss so repeatedly demonized in the study. If this clinician is the only one to treat all future patients, then the conclusions would be valid.

The choice of sample size was also interesting. How did the number

50 come up? Was this the total number of patients treated by the clinician, or the number of suitable choices that would facilitate making the intended point? The age distribution casts a shadow on what we are seeing: effects of growth versus treatment method. We are not told that all the patients had the same malocclusion in every aspect. If they had, then the choice of extraction for some and nonextraction for others, without any prospective intent, would suggest esotericism with no scientific basis at all.

Statistical analysis was purely descriptive without any form of significance testing. Saying there was no significant difference between faces of both treatments wrongly implies that this was mathematically determined and so, by extension, population inferences could be made. The histogram score (Figure 2) shows clustering of correct answers between 52% and 64% and very sparse distribution on either extreme. The number of examiners who made the most errors, and those who made correct answers, were small, but the majority (average) made correct answers. The implication is that it is possible to tell an extraction from a non-extraction face. From these particular pictures, I must commend the visual acuity and abilities of the respondents. Even with the best training, one would need more than luck to tell whether a finished case was treated using edgewise or Begg appliances. The steep curve

indicates a small standard deviation, suggesting that further to giving correct answers, the amount of dispersion was small. Where, then, did the conclusion of no difference come from? Was the null hypothesis tested? The data says something different from the conclusions. The results do not suggest that there was no difference in faces; it seems instead that the conclusions were drawn from information not documented in the report or subjected to statistical analysis.

I feel then, that the issue should remain guarded. Biological factors and factors related to the patients' attitudes toward treatment, the clinician's ability, and errors of perception, particularly by polarized groups of extreme inclinations, besmirch logical conclusions. It would be interesting to see what the opinions of laymen would be with a similar survey. Without the authors defining consistency of how to achieve "the desired normal range," and with shedding light on how consistently space was created for nonextraction patients without affecting some objectives, I find it hard to accept the study's conclusions.

As a final point, I also take issue with the claim in the discussion that this study illustrated that overjet correction automatically flattens the face, regardless of whether extractions were done. It can be misleading to the laity, students, and clinicians, who may rely solely on such literature as the current understanding. Without resurrecting the infamous Edward H. Angle-Calvin Case vendetta, for purposes of balance it is appropriate to point out that the choice depends on the situation. We do not have a universal facial profile that is for every situation. We consider factors that would address problems, attaining lip balance and facial harmony and accommodating teeth in the alveo-

lar housing. The jaw or teeth at fault are moved as diagnosis may dictate or as expedient; the crux is a balanced face as opposed to just a straight one or the means to produce it.

David M. Maina,
BDS, LDS, MS, DOrth
Chicago, Ill

Author's response

I appreciate the opportunity to respond to Dr. Maina's letter. I agree that for a trained orthodontist it seems redundant to conduct a survey of facial profiles to demonstrate that extracting four premolars rarely over-straightens or "dishes" the profile or produces a face significantly different from that of a patient treated non-extraction, when both are properly diagnosed and properly treated. But I dare say every one of our readers has heard some layperson, general dentist, or orthodontist make disparaging remarks about the effect on the face of extracting premolars, and they are not just referring to the obvious instances of the problem being misdiagnosed. If these criticisms are myths or misconceptions, then searching for data to dispel them is a legitimate endeavor.

For over 30 years my main focus has been producing the best results that I can for my patients. Consequently, my paper and my response to the letter come more from the perspective of a clinician than a researcher. However, I do believe the science in our study was sound, and I continue to stand by our findings.

Many of the points Maina made are ones with which I agree and thought our paper supported. In any event, I will try to point out what I believe to be our areas of agreement and clarify or defend the areas of apparent disagreement.

The areas in which I believe we agree are listed below.

Maina: "The face produced does not therefore depend entirely on whether teeth were extracted, but on the choices made and the efficacy of the methods used to handle those choices." This was our major point.

Maina: "We do not have a universal facial profile that is for every situation." Nowhere did we advocate a universal profile.

Maina: "...the crux is a balanced face as opposed to just a straight one or the means to produce it." I definitely agree with this statement; nowhere did we advocate any degree of straightness or fullness for profiles.

Maina is correct in his observation that the impetus for this face study was to determine whether criticism of the face produced in conjunction with the extraction of premolars is justified. At the beginning of this study, I thought that these criticisms were unjustified in most instances. The study strengthened my conviction, even though it seems to have raised concerns with Maina.

No manipulation of study design or data was done with the intent of deception. If our statistics are incorrect, we would welcome correction by a third, neutral party. Maina criticized the patient selection. While randomized selection would be the method of choice, we believed that by arbitrarily choosing 50 consecutively treated nonextraction and extraction patients, bias would be eliminated. Additionally, this method was believed to squelch the "cherry picking" refrain so often heard when good results are shown. As a clinician, I like to see consecutively treated patients used in a study because this should give an accurate picture of what is going on in practice. It should be noted that students with no preconceived prejudices compiled the raw data and calculations.

When a difference of only 0.3 mm in soft tissue profile was revealed by the Holdaway H-line evaluation, we interpreted this as no significant difference. Maina might be able to detect a 0.3 mm difference in the soft tissue profile, but I need no mathematical significance testing to contend that most people cannot. However, in preparing this response, the difference was tested and found to be neither statistically nor clinically significant.

The fact that these highly trained professionals correctly identified only two more patients out of the fifty than would be correctly identified by pure chance led to my conclusion, "in the vast majority of instances, it is not possible to determine if a patient was treated with or without the extraction of premolars by only viewing the finished face." Maina's assertion that our "results do not suggest that there was no difference in faces..." was particularly hard for me to comprehend.

One of the major points that Maina did not get was represented by his comment, "...how 'consistently' space was created for nonextraction patients without affecting some treatment objectives..." I want to make it clear that I did not compromise my treatment objectives in order to treat a patient nonextraction. If there was much of a total discrepancy, i.e., space required to resolve TSALD, properly position the mandibular incisors, and level the curve of Spee, I did not try to "create space," I eliminated tooth structure! By properly selecting which teeth to extract and what mechanics to use to handle varying anchorage requirements, I was able to place the mandibular incisors in a position conducive to facial balance. And in all but 4% of the cases, faces of nonextraction and extraction patients were indistinguishable by highly experienced general dentists and orthodontists.

Rushing¹ and Johnson,² who tested general dentists and lay persons, respectively, reported similar findings.

The straightening of the profile during treatment is another finding that Maina chose to dispute. He writes, "I also take issue with the claim in the discussion that this study illustrated that the overjet correction automatically flattens the face, regardless of whether extractions were done." We simply reported the findings and stand by them. Our study revealed that 18 of 25 extraction patients (72%) and 21 of 25 nonextraction patients (84%) experienced a straightening of the profile. The mean reduction in H-line value was 1.08 mm (S.D. 1.06) and 1.3 mm (S.D. 2.18), respectively. I think most orthodontists would agree that profiles straighten over time, even without treatment.

Maina pointed out that, "the sagittal position of anterior teeth was not standardized, and they were treated to the so-called 'desired position'." I interpret this statement as a criticism of not having a standardized position. I do not advocate a standardized position for the mandibular incisors, indeed, I believe their position should be individualized. He noted that I referred to a so-called desired position and that position could be back or forward. I appreciate him bringing up this point. My determination of the desired position is based largely on the pretreatment facial balance. I do use cephalometric guidelines, such as the Tweed diagnostic triangle, lower incisor to APo, and lower incisor to NB, etc., as guidelines to help me make my final decision. The vast majority of the time, I plan to maintain or upright the mandibular incisors and rarely advance them. In very limited instances, where facial balance seems to dictate proclination of mandibular incisors and it is not to an ex-

tent that is detrimental to the periodontal health, I do so.

Our constant goal should be a search for truths and data upon which to base our treatment decisions. In this way, we can continually increase the benefit our patients derive from our services. I hope this exchange of letters will stimulate the readers to give additional thought to the study of facial esthetics, and maybe even to read or reread the article and evaluate it for themselves.

J.C. Boley, DDS, MS

Richardson, Texas

References

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2. Johnson D, Smith R. Smile esthetics after orthodontic treatment with and without extraction of four first premolars. *Am J Orthod Dentofac Orthop* 1995;108:162-167.