

# Common errors observed at the American Board of Orthodontics clinical examination

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The American Board of Orthodontics has developed tools to help examinees select patients to be used for the Board examination. The Case Management Form can be used to evaluate aspects of a patient's treatment that cannot be measured by other tools. The Case Management Form is a structured treatment-neutral assessment of orthodontic objectives and outcomes associated with a patient's treatment. Despite the availability of this form, examiners continue to see problems, including lack of attention to finishing details, inappropriate treatment objectives, excessive proclination of mandibular incisors due to treatment mechanics, excessive expansion of mandibular intercanine width, closing skeletal open bite with extrusion of anterior teeth leading to excessive gingival display, and failure to recognize the importance of controlling the eruption or extrusion of molars during treatment. In addition, some examinees exhibit a lack of understanding of proper cephalometric tracing and superimposition techniques, which lead to improper interpretation of cephalometric data and treatment outcomes. (*Am J Orthod Dentofacial Orthop* 2017;152:139-42)

Throughout its history, the American Board of Orthodontics (ABO) has strived to improve every aspect of the examination process. The tools developed by the ABO were designed to assist examinees in the selection of patients records to be used for the examination and to provide a means of self-assessment for improvement over a lifetime of clinical practice. The introduction of the objective grading system for dental casts and radiographs (now called the Cast-Radiograph Evaluation or C-R Eval) was an attempt to make the clinical examination more objective, fair, and reliable.<sup>1</sup> Additionally, the C-R Eval allows the examinee to evaluate and score his or her occlusal outcomes from the portfolio of treated patients.

The introduction of the Discrepancy Index (DI) enhanced the patient selection process by removing much of the more prescriptive criteria that had previously existed.<sup>2</sup> The DI defined and quantified a number of the parameters that assist in determining the complexity of pretreatment disorders. The ABO's intent

in developing the DI was to provide a broader scope of patients who could qualify for use on the clinical examination and to assist the examinee in that process.

After the development of the C-R Eval and the DI, the ABO developed the Case Management Form (CMF).<sup>3</sup> The CMF was intended to evaluate aspects of a patient's treatment that could not be measured by the C-R Eval. The CMF allows information such as pretreatment and posttreatment cephalometric analyses, facial esthetics evaluation, arch form and arch size, overall quality of case records, written explanation of treatment, evaluation of objectives and outcomes, and overall management of mechanotherapy to be evaluated and scored by both the examinee and the examiner. It is a structured treatment-neutral assessment of orthodontic objectives and outcomes associated with a patient's treatment.

Errors that are found during the ABO clinical examination are not a new phenomenon. The ABO addressed numerous issues with an article published in 2011, yet many of the same problems with treatment management identified then are still common.<sup>4</sup> Some of the more consistent problems observed by examiners include lack of attention to finishing details, inappropriate treatment objectives, excessive proclination of mandibular incisors due to treatment mechanics, excessive expansion of mandibular intercanine width, closing skeletal

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open bites with extrusion of anterior teeth leading to excessive gingival display, and failure to recognize the importance of controlling the eruption or extrusion of molars during treatment. Some examinees exhibit a lack of understanding of proper cephalometric tracing and superimposition techniques; this leads to improper interpretation of cephalometric data and treatment outcomes.

## COMMON PROBLEMS OBSERVED WITH CLINICAL CASE PRESENTATIONS

### Finishing details

The C-R Eval quantifies finishing detail excellence. Rotations, uneven marginal ridges, buccolingual inclinations, and occlusion generally account for the majority of poor scores on the C-R Eval. A progress panoramic radiograph and study casts or an intraoral scan should be taken at the start of the finishing stage of treatment. Thus, the 8 parameters of the C-R Eval can be noted and corrective actions taken before debanding. Bracket repositioning, first, second, and third order adjustments to the archwire, and suitable interarch mechanics may be needed to improve the overall occlusal outcome.

### Inappropriate treatment objectives

Skeletal and dental treatment objectives must be developed to address a patient's diagnostic problems and chief concern. Objectives should be based on evidence when evidence exists. The treatment plan should be designed to meet the treatment objectives. Determining treatment objectives requires an understanding of the evidence regarding skeletal and dental changes with growth, as well as craniofacial and dental norms or ideals. It is common for examiners to notice that the objectives exactly match the results achieved. This can be problematic when the results are unusual or otherwise unexpected based on existing research. This type of error is compounded by improper superimpositions, which lead to an erroneous interpretation of the treatment effect. In these situations, the objectives were clearly not evidence based but were developed directly from the results. Such case reports may become incomplete because of many deductions on the CMF.

### Excessive proclination of mandibular incisors

Excessive proclination and flaring of mandibular incisors are frequently observed by examiners during evaluation of an examinee's records display. Improper mechanics such as excessive or unwarranted use of fixed functional Class II correction appliances, removable Class II correction springs or devices, and Class II elastics

are often used without consideration for other biomechanical safeguards. Significant adverse consequences may occur, such as detrimental long-term effects on periodontal health and protrusion of the lower lip.<sup>5-8</sup> Although mandibular incisor flaring is acceptable in some instances, the examinee must properly identify scenarios where it is appropriate and preferred vs instances where it is detrimental.

### Excessive expansion of intercanine width

Excessive mandibular incisor proclination and protrusion can also result when attempts are made to treat significantly crowded mandibular arches with a nonextraction treatment approach. In addition to the aforementioned negative periodontal and profile changes, nonextraction treatment for a significantly crowded mandibular arch can result in significant expansion of intercanine width, which has been reported to be unstable.<sup>9</sup> In all instances, caution is necessary when using mechanics that may result in an excessive mandibular incisor proclination or a significant increase in mandibular intercanine width. The examinee must properly diagnose and treatment plan patients to prevent negative treatment outcomes that result from significant mandibular canine expansion during treatment.

### Inappropriate vertical mechanics to close skeletal anterior open bites

Nonextraction skeletal anterior open-bite closure using extrusive mechanics is becoming a more frequent treatment modality. Although some patients can be successfully treated using this approach, posttreatment stability of skeletal open-bite closure with anterior vertical mechanics can be highly variable.<sup>10-12</sup> In certain patients, extrusion of anterior teeth might be the preferred method of treatment; in other patients, this may result in excessive gingival display. The distinction between dental and skeletal open bite must be reflected in the diagnosis, and the examinee must be able to defend any treatment and biomechanical method that uses extrusion mechanics and to discuss the appropriateness of a particular treatment approach. Although the C-R Eval scores in any inappropriately treated patient may not put the record in the incomplete category, an incorrect diagnosis that results in poor treatment planning and flawed treatment mechanics could cause an unacceptable score on the CMF. This leaves the case being scored as incomplete.

### Poor control of vertical dimension

Vertical molar control (whether using an extraoral appliance, vertical holding appliance, or temporary

skeletal anchorage device) is another important treatment variable that is often overlooked or ignored altogether.<sup>13-16</sup> Patients who require careful attention to vertical control of the maxillary molars and management of other factors that could negatively affect the vertical dimension should have and exhibit treatment mechanics that are attentive to this important detail. Failure to properly diagnose vertical issues and a lack of vertical biomechanical control of the posterior dentition result in treatment effects that negatively impact the patient's profile and occlusal scheme. Even though the C-R Eval score may be in the acceptable range, a significant point loss on the CMF can cause the case to be determined as incomplete. The examinee must properly diagnose any vertical issues and develop a treatment and biomechanical plan that does not cause mandibular backward rotation and excessive lip strain.

### Cephalometric tracings

Cephalometric tracing and superimposition errors are problematic for some examinees. Incorrectly identified landmarks may affect the DI score and cause the case report to fall below the DI requirement. Additionally, accurate identification of stable landmarks in the cranial base (planum sphenoidale, greater wings of the sphenoid, cribriform plate, and ethmoid crest) are extremely important to ensure that the cranial base superimpositions are accurate and provide meaningful information. Regional tracings of the maxilla and the mandible should include the required landmarks to allow accurate superimpositions in order to determine the dental changes over time.<sup>4</sup>

It is common for examinees to present incorrect tracings of cephalometric landmarks and important craniofacial structures. Most commonly, this occurs due to the examinee's reliance on imaging software with digitized points. Imaging programs will not accurately reproduce the desired tracing of a specific structure without customization by the user. Most digitizing softwares use preselected points for common anatomic structures that may not accurately represent the anatomy of a specific patient. All tracings must accurately reflect the anatomic structures. It is the responsibility of the software user to manipulate the tracing to accurately reflect the anatomy. Failure to identify structures accurately can lead to superimposition errors, which result in faulty interpretations of the results. This can result in significant points on the CMF and cause the case report to be incomplete. Proper tracing and superimposition are critical for the orthodontic specialist to be able to identify the effects of growth and treatment for a patient.

Many examinees choose to trace cephalometric radiographs by hand. Hand tracings are held to the same standards of measurement accuracy as those produced by digitized cephalometric imaging software. Some examinees have used large-diameter felt-tipped pens that have a writing tip that creates anatomic tracings and measurement lines that do not elicit accurate cephalometric measurements. Furthermore, superimpositions traced with large-diameter markers make it difficult for both the examinee and the examiner to accurately interpret the changes with orthodontic treatment. Fine-tipped markers (0.5 mm) are required for consistency and accuracy. The ABO Web site provides excellent demonstrations for landmark identification and proper cephalometric tracing techniques using both computer-generated tracings with imaging software and hand tracings.<sup>17</sup>

All cephalometric tracings should exhibit a 1:1 ratio between the radiograph and the tracing. Superimpositions should likewise have a 1:1 ratio. It is common for an examinee to show an appropriate cephalometric tracing with the proper 1:1 ratio for the measured tracing and subsequently show superimpositions that do not match the dimensions of the original tracings. This error most often occurs with digital imaging software. Confirmation of calibrated pretreatment and post-treatment cephalograms is necessary for proper assessment of the examinee's outcomes. The examinee must ensure that all tracings and superimpositions meet the standards of the ABO as shown on its superimposition instruction videos on the Web page.<sup>17-19</sup>

### CONCLUSIONS

It is a goal of the ABO that all examinees challenging the clinical examination process are aware of the issues faced by those who have previously taken the examination. The ABO's Web page is a rich reference source, which provides information to help the examinee prevent many common examination deficiencies. By providing updates about errors and problems frequently observed during the examination, the ABO believes that the success rate will increase, and the number of incomplete examinees will be reduced. Increasing the success rate of the orthodontists taking the ABO clinical examination will improve the level of skill of the orthodontist and enhance the quality of orthodontic treatment provided to our patients.

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