Contrary to sensitivity and specificity, diagnostic tests, such as positive predictive values and negative predictive values, perform differently based on the frequency of the targeted event or condition. Calculating the mean accuracy for cervical vertebrae maturation (CVM)3–CVM4 of different age intervals, as the writer suggested, would lead to erroneous interpretations. In addition, the writer focused on the results of CVM3–CVM4 but ignored the findings of CVM2–CVM3, which also included CVM3.

Regarding the lack of discussion of the unpredictable variable duration of each CVM stage, it was because of the variation in the duration of each CVM stage that the amount of growth was evaluated based on annual intervals. CVM stages were described in the article as a "continuum of morphologic and dimensional stages," stressing the findings of a previous study that no sharp or distinct demarcation between CVM stages could be detected.[1] Considering the presence of early, average, and late growth maturers, 3 growth intervals were investigated. A notion about the relationship between the growth types (vertical, average, or horizontal) and rate and timing of peak of mandibular growth was also suggested. In the Conclusion section, the article proposed evaluation of the shape of the CVs alongside the assessment of the CVM stage.

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REFERENCES

1. Baccetti T, Franchi L, McNamara JA Jr. An improved version of the cervical vertebral maturation (CVM) method for the assessment of mandibular growth. Angle Orthod 2002;72:316-23.
2. Perinetti G, Contardo L, Castaldo A, McNamara JA Jr, Franchi L. Diagnostic reliability of the cervical vertebral maturation method and standing height in the identification of the mandibular growth spurt. Angle Orthod 2016;86:599-609.
3. Gray S, Bennani H, Kieser JA, Farella M. Morphometric analysis of cervical vertebrae in relation to mandibular growth. Am J Orthod Dentofacial Orthop 2016;149:92-8.

Autotransplantation and healing

We read with interest the case report, "Autotransplantation of premolars and space closure in a patient with inflamed sinuses," by Nahm et al in the February 2019 issue (Nahm KY, Iskenderoglu NS, Lee JA, Lee JY, Chung KR, Kim SH, Nelson G. Am J Orthod Dentofacial Orthop 2019;155:276-87). We congratulate the authors for their well-planned and well-executed treatment for agenesis of all maxillary premolars, which included autotransplantation of the mandibular second premolars. We would like to comment on 2 issues raised by the authors, with the objective of clarifying some possible misconceptions regarding the process of healing.

The authors indicated that the pulp healing after autotransplantation of 2 immature mandibular premolars was manifested by the presence of pulp obliteration and incomplete apexification. Pulp obliteration is a typical finding after transplantation of immature teeth, and in this case report, pulp obliteration was present at the left transplanted premolar. However, incomplete apexification, as described by the authors and visible at the right transplanted tooth, was in our opinion and in accordance with the definition provided by Andreasen,[1] actually posttraumatic pulp healing called tissue metamorphosis or pulp metaplasia. This occurs when structures such as bone, periodontal ligament (PDL), and cementum invade the apical part of the pulp. It has been reported in experimental studies that partial removal of Hertwig epithelial root sheath, which can occur during ischemic damage or trauma during autotransplantation, may lead to restricted root development and invasion of PDL and bone into the pulp canal.[2] Histologically, this process is manifested by the presence of PDL and bone tissue inside the pulp canal, and therefore, pulp obliteration is limited to the more coronal part of the root. Both pulp canal obliteration and pulp metaplasia were described by Andreasen[1] as pathologic healing events in relation to healing after traumatic dental injuries. However, pulp canal obliteration after transplantation of developing teeth is regarded as a normal healing phenomenon and a sign of pulp revascularization and preservation of pulp vitality. In addition, pulp obliteration does not result in unfavorable prognosis of transplanted teeth with developing roots long term.[3] Pulp metaplasia can be sometimes observed on radiographs after transplantation of immature premolars, but there is no evidence in the literature or from our clinical experience, that this might be a contributing factor for either short-term or long-term loss of a transplanted premolar. Transplantation surgery can

be regarded as a "controlled" tooth trauma, and therefore, pulp obliteration and occasionally pulp metaplasia are observed in transplanted teeth with developing roots.

Later, the authors stated that "autotransplantation to an artificially formed socket during prolonged healing of sinusitis had a risk of ankylosis due to possible absence of a PDL attachment and concern for failure because of the close proximity between the sinus base and the transplanted tooth apex." Andreasen[4] examined the role of the PDL in relation to replantation and transplantation and concluded that the loss of PDL facing the alveolar bone does not prevent its regeneration after replantation and transplantation. In fact, in most cases, the PDL is not present at the recipient site after mechanical preparation of the artificial socket. This, however, is not expected to prevent the formation of normal PDL structures after transplantation because vital PDLs residing on the root surface of the transplanted tooth can proliferate and restore the complete PDL of the transplant. Furthermore, it has bone-inducing capacity[5] and the potential for a complete reformation of the alveolar bone.[6]

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REFERENCES

1. Andreasen JO. Pulp and periodontal tissue repair—Regeneration or tissue metaplasia after dental trauma. A review. Dent Traumatol 2012;28:19-24.
2. Andreasen JO, Kristerson L, Andreasen FM. Damage of the Hertwig's epithelial root sheath: effect upon root growth after autotransplantation of teeth in monkeys. Endod Dent Traumatol 1988;4:145-51.
3. Czochrowska EM, Stenvik A, Bjercke B, Zachrisson BU. Outcome of tooth transplantation: survival and success rates 17-41 years posttreatment. Am J Orthod Dentofacial Orthop 2002;121:110-9: quiz 193.
4. Andreasen JO. Periodontal healing after replantation and autotransplantation of incisors in monkeys. Int J Oral Surg 1981;10:54-61.
5. Lindskog S, Lengheden A, Blomlöf L. Successive removal of periodontal tissues. Marginal healing without plaque control. J Clin Periodontol 1993;20:14-9.
6. Andreasen JO. Interrelation between alveolar bone and periodontal ligament repair after replantation of mature permanent incisors in monkeys. J Periodont Res 1981;16:228-35.

Authors' response

We thank our colleagues for their keen interest in our clinical article and for their comments and suggestions to make it better. We appreciate the explanation on the etiology of pulp obliteration and incomplete apexification. Reading through the reference articles, we learned about the tissue metamorphosis or pulp metaplasia phenomenon. We hope that your in-depth explanation will fill in the gaps in our study.

We believe that your opinion on ankylosis is that an artificially formed socket itself does not affect ankylosis. Although it is not well expressed in our article, we think that damage to the periodontal membrane during surgery or as a result of inflamed sinuses or insufficient bony support can affect ankylosis in a complex way. In "Retrospective study of 100 autotransplanted teeth with complete root formation and subsequent orthodontic treatment" by Kokai et al,[1] 100 autotransplanted teeth in 89 patients were examined over a mean observation period of 5.8 years. Root resorption, ankylosis, mobility, pocket depth, and inflammation at the recipient site were investigated clinically and with radiographs. The survival rate of the autotransplanted teeth was 93.0%. However, 15 of 100 transplanted teeth showed ankylosis alone or ankylosis plus root resorption. In addition, our finding that tooth autotransplantation to the opposite jaw negatively influences the success rate is in agreement with that of a previous study.[2] We once again thank you for your thoughtful advice and sharing knowledge.

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REFERENCES

1. Kokai S, Kanno Z, Koike S, Uesugi S, Takahashi Y, Ono T, et al. Retrospective study of 100 autotransplanted teeth with complete root formation and subsequent orthodontic treatment. Am J Orthod Dentofacial Orthop 2015;148:982-9.
2. Aoyama S, Yoshizawa M, Niimi K, Sugai T, Kitamura N, Saito C. Prognostic factors for autotransplantation of teeth with complete root formation. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;114:S216-28.