recognizing, and measuring images.[1-3] The estimated pixels per 1 mm^2 in the data set, given the parameters of the camera and the setting of the gathering site, was 2450. This value was used to calculate the over-all surface area of the teeth, the demineralized pink areas, and the white or sound areas. The percentage of enamel demineralization was computed by dividing the surface area of the entire maxillary molars and then multiplying the quotient by 100.

We think that color-based image analysis can be more objective, scientific, and reliable in measuring demineralized areas after murexide analysis than scoring the demineralized areas subjectively, as was done in previous studies.[4,5]

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Apical root shortening versus root resorption—Is there a difference?

We write in praise of Mucahid Yildirim and Mehmet Akin for their well done in vivo experiment regarding root resorption (Yildirim M, Akin M. Comparison of root resorption after bone-borne and tooth-borne rapid maxillary expansion evaluated with the use of microtomography. Am J Orthod Dentofacial Orthop 2019;155:182-90.)

In orthodontics, the term "root resorption" is perceived as a threat. Although we are fully aware and understand the comprehensive scale of the process and its effect on the teeth, our hands are shaking every time we look at the posttreatment X-rays of each of our patients. However, is it true that root resorption should be a threat? Absolutely not! Root resorption is a mandatory process in the defense mechanism of the roots. The term that we have and should be troubled about, is apical root shortening (ARS). There is a major difference between those 2 processes. This letter, like several previous ones,[1,2] is trying to convince the authors and the profession that the current article discusses the root resorption process and it has nothing whatsoever to do with ARS. Even the authors, as they express themselves in the discussion part (page 189, left column, lines 17-14 from the end), fully agree with this statement. Again, we would like to state that each time the root surface is exposed to orthodontic pressure, the root and the tissues that surround it react accordingly as they should—they defend themselves. This reaction, in certain force limits, is in direct relation to the applied pressure, as this study proves. Surface resorption, as detected in the publication, is the initial part of this process, that in most of the times and areas ends with cemental apposition. This, as mentioned before, is a necessary or mandatory part of the process we previously named as orthodontitis.[3,4]

Another remark is related to the statement in the discussion part, found at the end of the first paragraph on page 189: This study (at least the part that was published) did not examine the undesirable effects of rapid maxillary expansion, namely the buccal fenestration of the roots etc, and therefore this study cannot confirm (or deny) the hypotheses of other researches. Unfortunately, future studies might refer to this sentence as an actual scientific finding, although it was not.

Again, this study by itself brings new data that should be learned as a part of understanding the complex defense mechanism processes that orthodontics is involved with.

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Authors' response

Thank you for your interest. We are pleased you have shared your experiences with us.

In this study, performed by means of a noninvasive method such as microtomography, it was determined that crater-shaped root resorption may occur less in bone-borne rapid maxillary expansion treatment. It is clear that it is not possible to determine the apical region shortening via microscopic computed tomography. We mentioned this handicap in the discussion. However, changes in the root surfaces were too many to be underestimated in any of the treatment methods. In the literature, there are other studies investigating root resorption in this way.[1-4] In addition, tooth extractions of patients were done after waiting for 3 months in a passive retention period.[5] This retention period is sufficient for the cement apposition.[6] In other words, in those teeth extracted after the cement apposition occurred, it was determined that there was more resorption despite repair as in the studies that you refer to. Even after a period of retention, how was it expected to cement apposition in the tooth that had undergone fixed orthodontic treatment and was actively being applied with orthodontic force when craters had not been repaired yet?

Considering that these craters are insignificant, the first rule taught to us is "primum non nocere." Our primary aim in this study was to bring out and to choose a treatment that minimizes the resorption craters that might occur even if there is an insignificant condition. We think that the treatment method that would minimize the resorption craters on the root surface would be preferred by clinicians. In our study, we found a significant difference between the 2 different methods. Suppose that the resorption craters would be completely repaired by cement apposition in both groups if the retention period had been long enough. However, we extracted these teeth too early to examine that. Even in this case, which one of these 2 treatment methods would be more preferable for clinicians? If we need to explain this by giving a general example, consider this: Liver enzymes would be adversely affected in a patient with liver dysfunction as a result of the use of paracetamol-containing analgesics. There is even a danger of serious liver failure in this patient.[7] As a result of various studies, if a new paracetamol derivation that has significantly similar effect without adverse effects to the liver would be produced, this new drug would be an alternative not only in liver patients but also in healthy people. Researchers will not consider that the liver is healthy and can be repaired anyhow so it does not need a drug that reduces the temporary negative effects. As in this example, minimizing the mandatory process could be a preferable option. Moreover, it should be noted that the orthodontically induced inflammatory root resorption process has many predisposing factors.[8]

The end of the first paragraph on page 189 of our published article should have been written more clearly. Our results could confirm the hypothesis of the mentioned researchers, indirectly. The reason for the reduction of root resorption craters could be the low force applied to the teeth, and the effects on the teeth may be reduced in this way. When we looked at the whole article, we thought that this indirect meaning was clear.

We have no doubt that the authors of this letter have a lot of knowledge about root resorption. We are very pleased that our manuscript was read and criticized by authors who have such experience and knowledge. We will try to improve ourselves by considering the mentioned issues in later studies. We thank them for their contributions.

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