## Dental Traumatology

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# Does mineral trioxide aggregate reinforce the immature roots?

## LETTER TO THE EDITOR

Dear Sir,

I read with great interest the article entitled 'Comparison of fracture resistance in root canals of immature sheep teeth after filling with calcium hydroxide or MTA' by Andreasen et al. (1) published in your esteemed journal. I want to share few of my thoughts regarding this study. I appreciate the great work of the writers; however, in my opinion, this article has some technical errors:

- 1 As mentioned in the discussion, the reduction in fracture strength of teeth by long-term use of calcium hydroxide has been shown in the previous study of the authors (2). Therefore, the primary purpose of the present study was to evaluate the effect of MTA on fracture strength of teeth in comparison with calcium hydroxide. According to Table 1, the teeth in MTA group have greater fracture resistance; however, the small sample size of the study makes the differences statistically insignificant. With proper sample size, MTA may show reinforcing effect on the tooth (3, 4). This study may serve as a pilot for another study with sufficient sample size.
- **2** I have also a question about statistical analysis. The data of the study have been analyzed by the multiple *t*-tests; however, for comparing four groups, one-way analysis of variance (ANOVA) followed by a proper post hoc test such as Tukey test is recommended assuming the normality of the data and homogeneity of variances. Why did the authors select multiple *t*-tests instead of ANOVA? Comparing multiple groups by a series of independent sample *t*-tests is a type of 'multiple testing' (5). In this case, for comparing four groups of the study, a series of six independent samples *t*-tests is needed wherein the alpha (type I error) of 0.05 increases to 0.19

*Table 1.* Mean fracture strength after 100 days treatment period of teeth with the canals filled with either saline, CH, MTA or with CH for 30 days, then with  $MTA^{\textcircled{B}}$  for the rest of the period

Treatment group	п	Fracture strength, MPa (SD)
Saline	9	310.3 (±63.04)
СН	6	225.5 (±78.84)
MTA	7	330.8 (±99.13)
CH + MTA	8	326.7 (±84.03)

(1-(0.95)4). Therefore, the family error rate is much more than the alpha level defined in the statistical analysis (i.e., 0.05) (5). Contrary to the results of the study, ANOVA shows that even the difference between calcium hydroxide and control group is not significant.

I feel that this study can be more refined using sufficient sample size and proper statistical analysis.

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### References

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### Response

The writer of this letter to the editor raises a question about the statistical methods used. The purpose of the study was to analyze whether the use of 1 month Ca(OH)<sub>2</sub> followed by MTA would weaken the tooth in comparison with a control tooth (saline control). The fracture strength for the saline control tooth was  $310.3 \pm 63$  MPa (n = 9) in comparison with  $327 \pm 84$  MPa (n = 8) for Ca(OH)<sub>2</sub> + MTA. The writer suggests that an ANOVA test should have been used, considering that we also had a Ca(OH)<sub>2</sub> group and an MTA included as controls. I agree that ANOVA is the usual way of comparing four patient groups when no a priori knowledge about the interrelations between the groups is known.

We did not, however, consider the  $Ca(OH)_2$  and the MTA groups as test groups in the study, and we had them included as reference groups. As was mentioned we had shown, in a previous study, that long-term exposure to  $Ca(OH)_2$  weakens the tooth. The aim of our study was to determine whether a treatment combination of  $Ca(OH)_2$  with subsequent use of MTA would also weaken the tooth in a similar fashion. The emphasis in the study was therefore to compare the  $Ca(OH)_2 + MTA$  group with the saline group, for which the preferred test is the *t*-test.

The title in Table 2 'Intergroup comparison of difference in fracture strength' does however not reflect that

Table 2. Intergroup comparison of difference in fracture strength

	Saline	СН	MTA
CH MTA CH + MTA	P = 0.03 P = 0.54 P = 0.65	<i>P</i> = 0.07	<i>P</i> = 0.86

distinction between test groups and reference groups and could arguably have been performed with an ANOVA test.

We agree that the study's conclusions are based on an absolute minimum of samples but it still contributes to important information, namely that the  $Ca(OH)_2 + MTA$  combination is not as harmful to the structural strength of the tooth as prolonged  $Ca(OH)_2$  treatment. This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.