

## Genetic and treatment related risk factors associated with external apical root resorption (EARR) concurrent with orthodontia



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Photo: <http://www.smile-mag.com/?pid=artd&artid=12&magid=2>

## Clinical Relevance

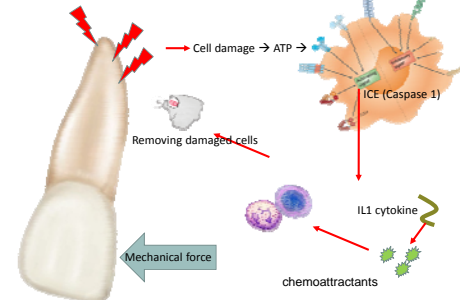
Clinicians should explain to their patients at the time of consenting for orthodontic treatment the possibility of External Apical Root Resorption (EARR) occurrence, as well as when it is occurs. Several risk factors have been discussed in the literature as risk factors for EARR. Understanding how several factors can contribute to EARR will help the clinician to minimize it, and to explain the risk of it to patients.

## Objectives and Hypothesis

**Aim:** is to evaluate some common treatment risk factors and genetic predisposing factors in patients with moderate or severe post orthodontic external apical root resorption to better understand this pathologic phenomenon.

**Design:** Case-control study

## Mechanism of EARR



## Materials and Methods

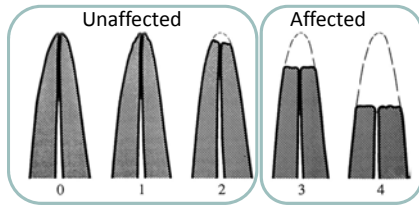
- 134-unrelated, orthodontically-treated Caucasian patients were consented for participation.
- Radiographs from pre- and post- orthodontic treatment and genetic analysis were obtained for all subjects.
- The presence of EARR of the **four permanent maxillary-incisor** was examined using qualitative grading system of **Malmgren**.
- Stepwise logistic regression was utilized to identify the factors significantly associated ( $p < 0.05$ ) with the occurrence of EARR.

## Materials and Methods

Tested risk factors are:

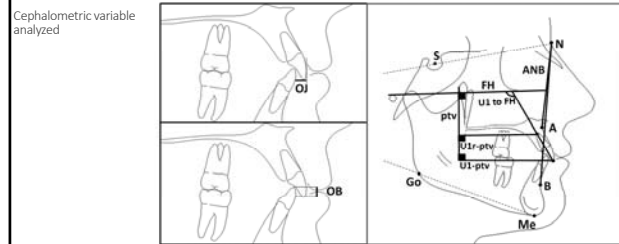
- 1) Treatment duration.
- 2) Extraction of maxillary premolars.
- 3) Numerous cephalometric measurements (pre Tx, post Tx, and the difference pre-post)
- 4) DNA polymorphisms within the interleukin-1beta (IL1B;rs1143634), interleukin-1alpha (IL1A; rs419598), interleukin-1 receptor antagonist (IL1RA; rs419598), and caspase-1 (CASP1; rs530537, rs580253 and rs554344) genes

## Materials and Methods



Malmgren et al., Am J Orthod, 1982, 82(6): p. 487-91

## Materials and Methods



## Results

- Average length of treatment for the case and control groups was 2.5 and 2.1 years, respectively.
- Four of the tested variables were able to explain about 24% of the variation of the EARR among tested sample.
- Long length of treatment was the strongest factor.
- Extraction of Max. first premolars.
- Large change in angulation of Max. incisors during Tx (U1-NA) has shown a statistical significance as well.
- The presence of the GA&AA-genotypes for *IL1B*-SNP rs1143634 showed a significant difference between affected and control groups.

## Conclusion

- It can be concluded that long length of treatment is a risk factor of EARR; it is positively associated with post orthodontic EARR.
- Upper first premolar extraction and the overall net change of upper incisor angulation during treatment are also risk factor for external apical root resorption during orthodontic treatment.
- *IL1B* is associated with EARR.
- EARR is a multifactorial outcome. It is important to look at factors and cofactors; more variation can be explained as factors combine.