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HIGHLIGHTS CIENTÍFICO
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Especial: Aceleração da Movimentação Ortodôntica

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ORIGINAL ARTICLE CE AJO-DO

Effects of micro-osteoperforations on tooth movement and bone in the beagle maxilla

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Purpose: The purpose of this study was to determine how micro-osteoperforations (MOPs) affect tooth movements, bone turnover, bone density, and bone volume. **Methods:** A split-mouth experimental design with 7 beagle dogs was used to evaluate bone surrounding maxillary second premolars that had been retracted for 7 weeks. One month after the maxillary third premolars were extracted, 8 MOPs (1.5 mm wide and 7 mm deep) were created without flaps with the use of the Propel device (6 were placed 3 mm distal to the second premolar and 2 were placed in the premolar furcation) on one randomly chosen side. The maxillary second premolars were retracted bilaterally with the use of 200 g nickel-titanium closed coil springs. Tooth movements were measured intraorally and radiographically. Microscopic computed tomography was used to evaluate the material density and volume fraction of bone distal to the premolars. Hematoxylin and eosin–stained and fluorescent sections were used to examine the bone remodeling. **Results:** Neither the intraoral ($P = 0.866$) nor radiographic ($P = 0.528$) measures showed statistically significant side differences in tooth movements. There also were no statistically significant differences in the density ($P = 0.237$) or volume fraction ($P = 0.398$) of bone through which the premolars were being moved. Fluorescent and histologic evaluations showed no apparent differences in osteoblasts, osteoclasts, or mineralization of bone near the teeth being moved. Bone healing was evident in and near the MOP sites, which had nearly but not completely healed after 7 weeks. Regions of acellular bone were evident extending ~0.8 mm from the MOP sites. **Conclusions:** MOPs placed 3 mm away from teeth do not increase tooth movements and have limited and transitory effect on bone. (Am J Orthod Dentofacial Orthop 2019;155:681-92)

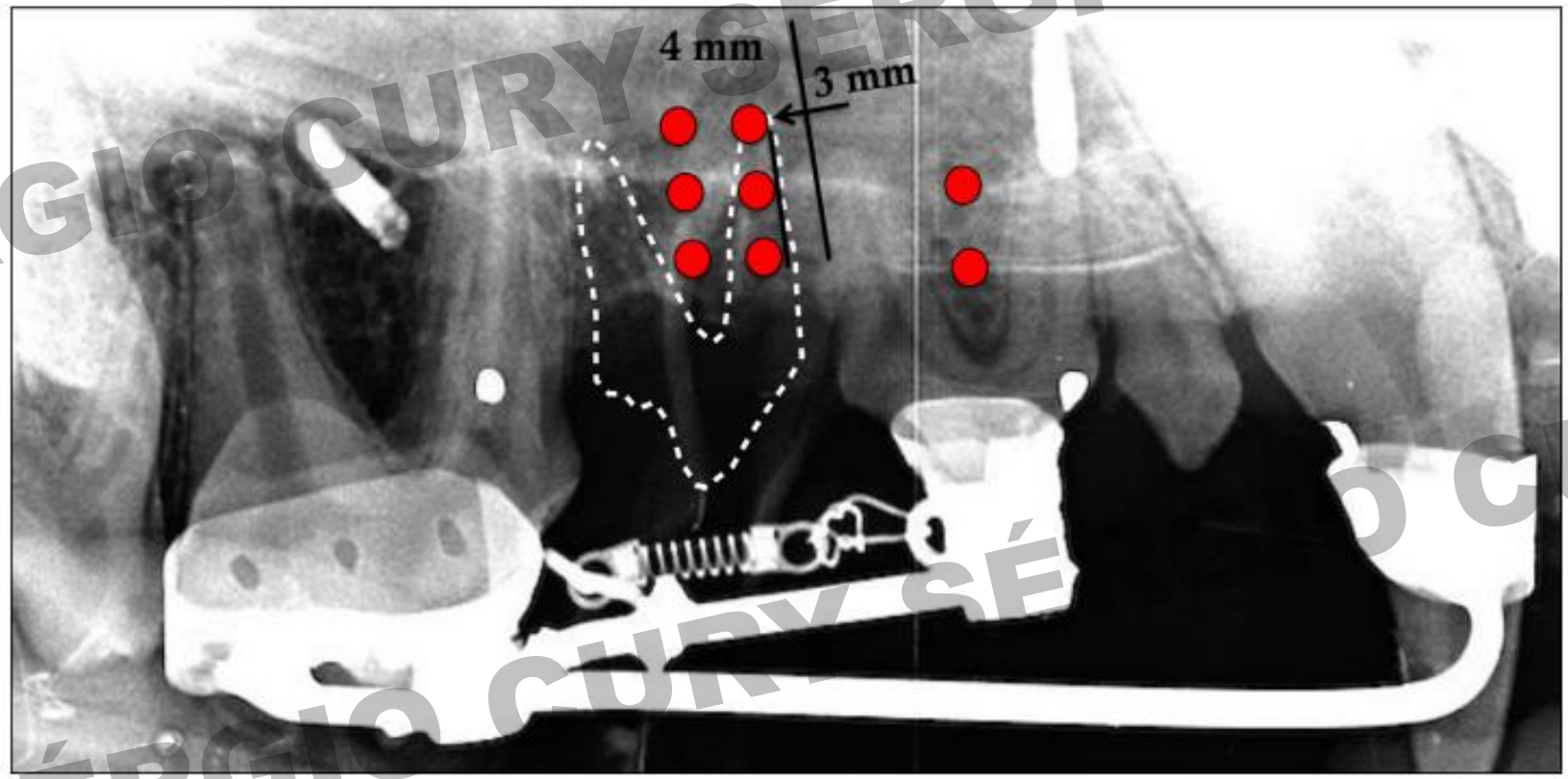

Fig 3. Radiograph showing the approximate locations of the 6 MOPs placed 3-7 mm from tooth root and 2 MOPs placed in the furcation. Red dots represent 1.5-mm-diameter × 7-mm-deep MOPs. Extracted tooth outlined.

ORIGINAL ARTICLE CE AJO-DO

Piezocorticision-assisted orthodontics: Efficiency, safety, and long-term evaluation of the inflammatory process

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Objectives: The aim of this work was to compare the duration of treatment between orthodontic treatment combined with piezocorticision (OT-PC) and conventional orthodontic treatment (COT), as well as to evaluate the safety, inflammatory process, periodontal health, and soft tissue healing in the OT-PC group. **Methods:** Twelve patients were included in each group, and their treatment times were compared for preliminary bracket alignment (PBA) and for overall treatment. In the OT-PC group, the inflammatory process was evaluated by quantifying cytokines in the gingival crevicular fluid. A calibrated examiner measured the probing depth (PD), the distance between the gingival margin and the cementoenamel junction (GM-CEJ), and the clinical attachment level (CAL), before and after OT-PC. The presence of gingival scars was evaluated. Bone and root injuries were assessed with the use of cone-beam computed tomography. **Results:** The treatment time was significantly reduced in the OT-PC group for PBA in both maxilla (45%; $P = 0.001$) and mandible (31%; $P = 0.023$), as well as for overall treatment (52%; $P < 0.0001$). Although not statistically significant, several inflammatory mediators demonstrated peaks at 3-5 and 16 weeks. There were not significant changes in PD and GM-CEJ after OT-PC treatment, unlike CAL (0.09 ± 0.12 mm; $P = 0.024$); 47.5% of piezocorticisions caused gingival scars. Only one patient showed no scars. Four cortical bones did not heal completely, and 2 roots had piezoelectric injuries. **Conclusion:** OT-PC was effective at reducing the orthodontic treatment time. (Am J Orthod Dentofacial Orthop 2019;155:662-9)

Fig 3. Example of gingival or mucosal scars: line (*blue arrow*) and point (*black arrow*).

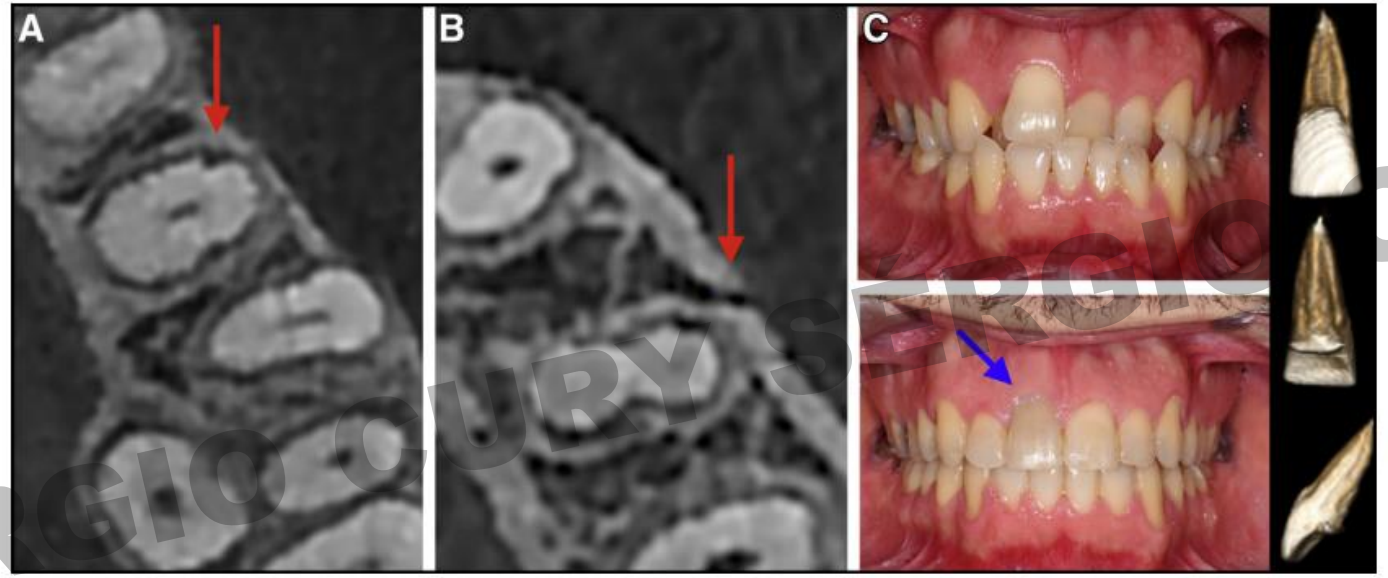

Fig 4. Root and cortical bone injuries. CBCT images illustrating **A,** subtle root damage and **B,** incomplete healing of the cortical plate. **C,** Pulpal necrosis involving the upper right central incisor. The specific causes remain unknown because no piezocorticision-related injury was observed.

ORIGINAL ARTICLE

AJO-DO

Effect of systemic delivery of Substance P on experimental tooth movement in rats

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Introduction: The purpose of this study was to investigate the effect of systemic delivery of Substance P (SP) on experimental tooth movement. **Methods:** Forty-eight adult Sprague-Dawley rats were randomly divided into 2 groups and their maxillary first molars were mesially moved with the use of closed-coil springs. The experiment group received systemic injection of SP and the control group received phosphate-buffered saline solution. Transportation distances of first molars were measured. Hematoxylin and eosin staining, tartrate-resistant acid phosphatase staining, and immunohistochemistry staining were performed to evaluate alveolar bone remodeling. Then the interferon (IFN) γ and tumor necrosis factor (TNF) α concentrations in peripheral blood and local periodontal tissue were measured. Finally, the effects of SP on bone marrow–derived stem cell (BMSC) proliferation and migration were tested in vitro. **Results:** Systemic delivery of SP significantly increased the distance of tooth movement and stimulated both osteoclast and osteoblast activities. The concentrations of IFN-γ and TNF-α increased in peripheral blood at early phases of the experiment and decreased in periodontal tissue at late phases. In vitro, the proliferation and migration of BMSCs were promoted by SP. **Conclusions:** Systemic delivery of SP can accelerate orthodontic tooth movement and promote alveolar bone remodeling potentially through immunomodulation and mobilizing endogenous mesenchymal stem cells. (Am J Orthod Dentofacial Orthop 2019;155:642-9)