

# Assessment of Root Resorption between Piezocision and Micro-osteoperforation during retraction - A Clinical Study

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**ABSTRACT: Background:** The present study was conducted to compare root resorption between Micro-osteoperforation (MOP) and Piezocision (PzC) assisted orthodontics. **Materials & Methods:** 36 patients requiring orthodontic treatment were divided into two groups of 18 each. Group I was treated using MOP in one side while the other side served as control. Group II was treated with PzC in one side with no intervention done on the other side. Radiographs were obtained before and after canine retraction to calculate amount of RR.

**Results:** Root resorption in experiment side in group I before canine retraction found to be 27.90 mm and after canine retraction was 27.42 mm and on control side pre-operatively was 27.86 mm and post-operatively was 27.36 mm. The difference was non-significant ( $P > 0.05$ ). Root resorption in experiment side in group II pre-operatively found to be 26.76 mm and post-operatively was 26.62 mm and on control side pre-operatively was 27.80 mm and post-operatively was 25.41 mm. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Authors found significant differences in apical RR were observed between the PzC group and the control group after canine retraction. Significant apical RR were observed in the experimental PzC side compared to experimental MOP side postoperatively after canine retraction.

**Key words:** Canine retraction, Micro-osteoperforation, Piezocision

## 1. INTRODUCTION

The duration of orthodontic treatment may vary according to the severity of the case. Decreasing the average 24-month treatment time has become an important area for clinicians and researchers. During the last decade, several strategies for accelerating the orthodontic treatment have been proposed. These included chemical agents, physical stimulants, and surgical procedures. Surgical selective decortication of the alveolar bone to shorten the duration of orthodontic treatment has been used since the 1950s.<sup>1</sup>

An increased risk of complications may contraindicate the orthodontic therapy or influence its objectives, phases and conduct, aspects directly linked with the quality of the final outcome and prognosis.<sup>2</sup> Generally speaking, the consecutive benefits of the medical intervention must overcome any potential damage. Legal regulations on medical conduct emphasizes the patient's right, as participant in treatment decision making, to be informed about the benefits and possible risks that might occur. It is recommended to make for each patient a rigorous risk profile analysis, followed by obtaining a signed informed consent. In case side effects appear, the avoidance of informing the patients about possible complications associated with the medical act may lead to malpractice complaints or even lawsuits.<sup>3</sup>

Apical root resorption (RR) is an undesirable sequelae of orthodontic therapy that may affect the result of treatment in some cases. Orthodontic treatment may be continued, modified or discontinued when RR is detected during treatment. Early detection of RR during orthodontic treatment is important for identifying teeth at risk of severe resorption.<sup>4</sup>

The PzC technique, a novel minimally invasive accelerated orthodontic for TM. This procedure combines micro incisions and local piezoelectric surgery to achieve similar results as decortication, but with minimal trauma. Alikhani et al used MOP clinically for the retraction of canines after first premolar extraction in twenty Class II division 1 patients, and found that MOP increases rate of TM 2.3 fold in the experimental group compared to the control group.<sup>5</sup> The present study was conducted to compare root resorption between Microosteoperforation (MOP) and Piezocision (PzC) assisted orthodontics.

## 2. MATERIALS & METHODS

The present study was conducted in the department of Orthodontics and dentofacial Orthopaedics. It comprised of 36 patients requiring orthodontic treatment of both genders. Ethical approval was obtained from institutional ethical committee. The consent was obtained from parents.

Data such as name, age, gender etc. was recorded. All patients underwent 1st premolars extraction and were indicated for canine retraction. Patients were divided into two groups of 18 each. Group I was treated using MOP in one side while the other side served as control. Group II was treated with PzC in one side with no intervention done on the other side. RVG were obtained before and after canine retraction to calculate amount of RR. Results thus obtained were statistically analyzed. P value less than 0.05 was significant.

Table I Distribution of subjects

Groups	Group I	Group II
Technique	Micro-osteoperforation (MOP)	Piezocision (PzC)
Number	18	18

Table I shows distribution based of technique used.

Table II Assessment of root resorption in group I

Side	Before canine retraction	After canine retraction	P value
Experiment	27.90	27.42	0.14
Control	27.86	27.36	0.20
P value	0.92	0.94	

Table II, graph I shows that root resorption in experiment side in group I before canine retraction found to be 27.90 mm and post- operatively was 27.42 mm and on control side before canine retraction was 27.86 mm and after canine retraction was 27.36 mm. The difference was non- significant ( $P > 0.05$ ).

Graph I Assessment of root resorption in group I

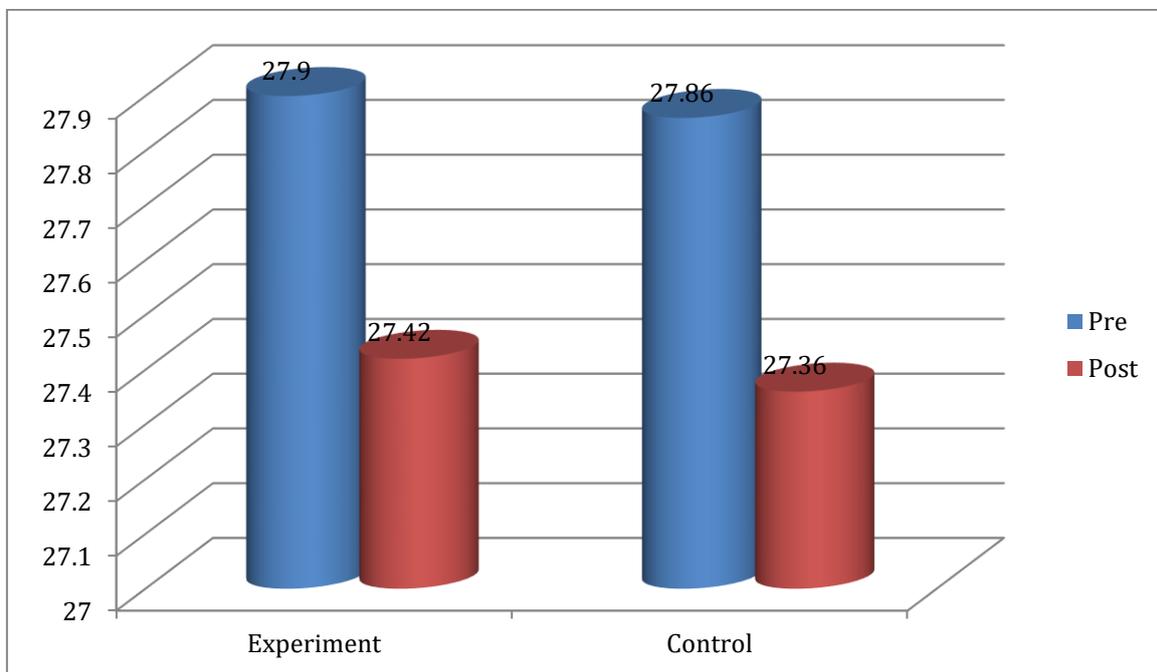
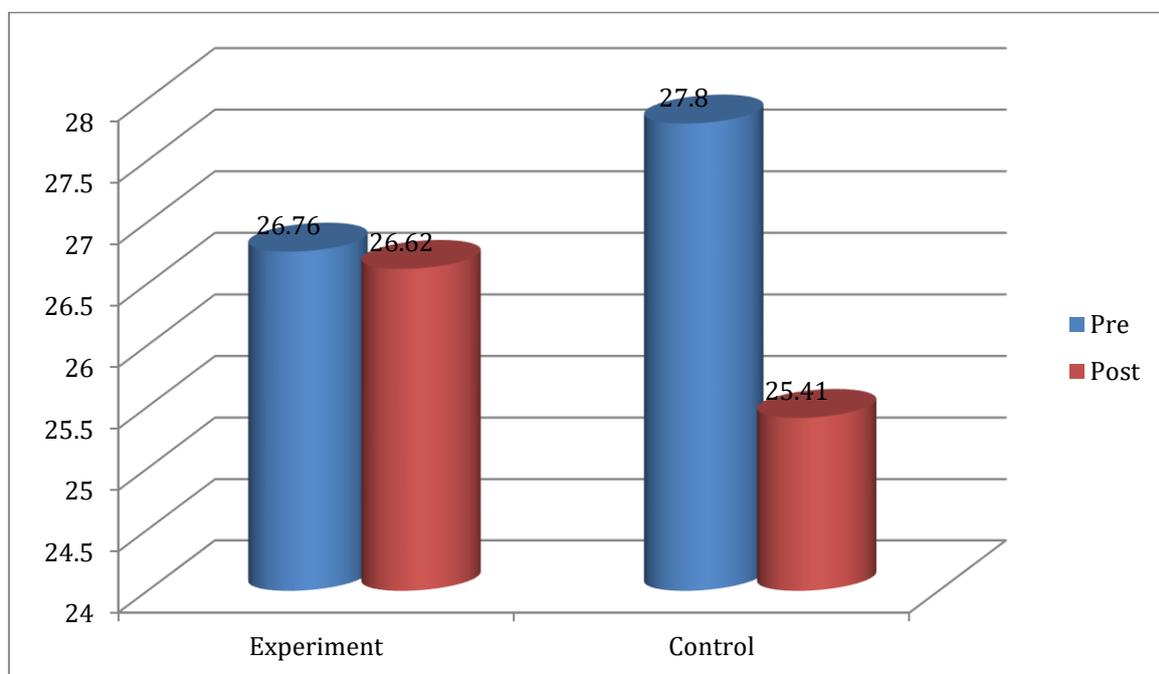


Table III Assessment of root resorption in group II

Side	Before canine retraction	After canine retraction	P value
Experiment	26.76	26.62	0.05
Control	27.80	25.41	0.02
P value	0.02	0.05	

Table II, graph II shows that root resorption in experiment side in group II before canine retraction found to be 26.76 mm and after canine retraction was 26.62 mm and on control side before canine retraction was 27.80 mm and after canine retraction was 25.41 mm. The difference was significant ( $P < 0.05$ ).

Graph II Assessment of root resorption in group II



### 3. DISCUSSION

Piezocision approach has been the most studied, minimally invasive surgical technique in accelerated orthodontic treatment.<sup>6</sup> Recently, the computer-guided piezocision technique was introduced as a non-invasive and safe technique to accelerate the orthodontic movement. However, the microvibration sound of the piezo tips may cause discomfort in some patients.<sup>7</sup> As there is a certain thickness of the piezosurgery knife, there are also limited indications for use around very close-proximity roots.<sup>8</sup> In addition, piezocision surgery involves the use of a device designed to perform operations on bones and is successfully used in surgical treatments; however, the availability of this device in clinics where only orthodontic patients are treated may be not available for orthodontists making it impractical in daily orthodontic treatments.<sup>9</sup> The present study was conducted to compare root resorption between microosteoperforation (MOP) and piezocision (PzC) assisted orthodontics.

In present study, root resorption in experiment side in group I before canine retraction found to be 27.90 mm and after canine retraction was 27.42 mm and on control side before canine retraction was 27.86 mm and after canine retraction was 27.36 mm. Elkalza et al<sup>10</sup> assessed apical root resorption (RR) following the application of micro-osteoperforation (MOP) and piezocision (PzC) assisted orthodontics for the acceleration of tooth movement (TM). A total number of 16 patients seeking orthodontic therapy were divided into two groups; one was treated using MOP in one side while the other side served as control. In the other group PzC was performed in one side with no intervention done on the other side. In the MOP group, there was no significant difference in canine root length between experimental and control sides. Whereas, in the PzC group, there was a statistically significant decrease in root length in the experimental side compared with the control side. When comparing both groups, the experimental PzC side showed a statistically significant decrease in root length compared to experimental MOP side after canine retraction.

We found that root resorption in experiment side in group II before canine retraction found to be 26.76 mm and after canine retraction was 26.62 mm and on control side before canine retraction was 27.80 mm and after canine retraction was 25.41 mm. Hoogveen et al<sup>11</sup> conducted a systemic review to evaluate the effectiveness of proposed surgically facilitated orthodontic technique on orthodontic TM, including periodontal distraction, dentoalveolar distraction, and corticotomy in addition to minimally invasive methods, which included PzC and MOP. They concluded that there was a low to moderate quality evidence that surgically facilitated orthodontics seemed to be safer for oral tissues and was characterized by a temporary phase of accelerated TM.

Jiang et al<sup>12</sup> studied external apical RR using CBCT because it is an accurate imaging technique and provides reliable results. There are many factors that cause RR, such as the magnitude of orthodontic force applied, treatment technique and method of measuring RR. Controlling these factors was difficult in previous studies because data based on 2D radiographs was used, which can result in errors. Using CBCT to measure external apical RR eliminates the errors produced when 2D radiographs are used. In this study, tooth length was used instead of root length to determine external apical RR and this eliminates the effect of different methods to define the root, as it is generally accepted that crown length does not change during orthodontic treatment.

The shortcoming of the study was small sample size. We used RVG for the study. 3D such as CBCT could have been provided better results.

#### **4. CONCLUSION**

Authors found no significant differences regarding apical RR were observed between the MOP group and the control group after canine retraction. Significant differences in apical RR were observed between the thePzC group and the control group after canine retraction. Significant apical RR were observed in the experimental PzC side compared to experimental MOP side postoperatively after canine retraction.

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