

# Comparison of Effectiveness of Corticotomy-assisted Accelerated Orthodontic Treatment and Conventional Orthodontic Treatment: A Systematic Review

Fadia Darwiche<sup>1</sup>, Eyad Khodari<sup>2</sup>, Dareen Aljehani<sup>3</sup>, Anadha N Gujar<sup>4</sup>, Hosam A Baeshen<sup>5</sup>

## ABSTRACT

**Aim:** To systematically review the comparative differences in the performance and timeliness of conventional orthodontic treatment with that of corticotomy-assisted accelerated orthodontic treatment.

**Data sources:** The electronic databases PubMed and Google Scholar were searched from January 2007 to January 2018 in English, with manual searches of reference lists and gray literature. Thirty-six articles were included in the study with inclusion criteria as prospective clinical studies of patients treated with fixed conventional appliance and the intervention was the corticotomy-assisted accelerated orthodontic treatment method.

**Study selection:** Two reviewers assessed independently the eligibility of the included articles. One investigator abstracted study design information, intervention details, and harms data from all included studies into a standardized evidence table. The accuracy of these data was checked by the second investigator. We resolved any disagreements through discussion with other authors.

**Results:** Different aspects of the corticotomy-assisted accelerated orthodontics treatment method were investigated including risk factors, advantages, and disadvantages as compared to that of conventional orthodontic treatment.

**Conclusion:** There is limited available evidence about effectiveness of corticotomy-assisted accelerated orthodontics. Although the current review indicates that the corticotomy-assisted accelerated orthodontic treatment method can fasten the treatment duration by 2.2–3 folds compared to conventional orthodontic treatment, furthermore, the level of evidence needs well-conducted prospective research with big sample size to draw valid conclusions.

**Clinical significance:** Orthodontic treatment is a time-consuming process and due to noncompliance of patients, research has found different methods to accelerate the treatment, thus reducing the total treatment duration. Use of accelerated orthodontic techniques is expected to help clinicians in better treatment decisions for noncompliant patients.

**Keywords:** Accelerated orthodontics, Corticotomy, Dentoalveolar distraction, Fixed orthodontic treatment.

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## INTRODUCTION

The demands for specific treatment objectives and concerns related to facial and dental esthetics, the type of orthodontic appliance, and the duration of treatment have increased due to the increase in the number of adult patients nowadays.<sup>1</sup> The treatment of adult patients has become challenging necessitating special concepts and procedures, such as use of invisible braces, shorter periods of treatment, and more precise tooth movements using lighter forces.<sup>2</sup>

The orthodontic treatment aims to achieve functional occlusion, facial balance, stability, and periodontal integrity. A conventional orthodontic treatment can take 18–36 months, which depends on the distance the teeth need to be moved, treatment goals, the type of techniques employed, and the cooperation of the patient. However, a new method has been developed in 1996 by two brothers, Orthodontist Thomas and Periodontist William Wilcko, called “accelerated orthodontic treatment” or “accelerated osteogenic orthodontics” (AOO), which aims to reduce a 2-year orthodontics treatment to the one that takes from 3 to 6 months.<sup>3</sup>

The development of corticotomy-assisted orthodontic treatment (CAOT) solved the problems that were limiting the orthodontic treatment of adults. The efficiency of orthodontic tooth movement in these patients can be increased by applying well-planned force systems to bony tissues that offer less resistance against the desired movement, which results in faster orthodontic

<sup>1–3</sup>Department of Orthodontics, Batterjee Medical College, Jeddah, Kingdom of Saudi Arabia

<sup>4</sup>Department of Orthodontics and Dentofacial Orthopedics, Sri Rajiv Gandhi College of Dental Sciences, Bengaluru, Karnataka, India

<sup>5</sup>Department of Orthodontics, College of Dentistry, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia

**Corresponding Author:** Hosam A Baeshen, Department of Orthodontics, College of Dentistry, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia, Phone: +966 54600023, e-mail: Habaeshen@kau.edu.sa

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movement, and treatment goals can be achieved in a shorter period, without compromising the results.<sup>3</sup>

However, long treatment time is an obstacle for ideal rehabilitative dental care. Various methods are being used to decrease orthodontic treatment time. One of the approaches

used is decortication. The mechanism of decortication uses bone healing mechanisms in combination with orthodontic loadings to decrease treatment time.<sup>4</sup> When performing decortication also known as Wilcko treatment, this reduces orthodontic treatment time by 60–75%.<sup>5</sup> In this study, we have systematically reviewed the comparative differences in performance and timeliness of conventional orthodontic treatment with that of corticotomy-assisted accelerated orthodontic treatment.

## MATERIALS AND METHODS

### Data Sources and Searches

This study was conducted at Batterjee Medical College, Saudi Arabia. The electronic databases PubMed and Google Scholar were searched from January 2007 to January 2018 in English, with manual searches of reference lists and gray literature. The bibliographies of relevant reviews and meta-analyses were also searched. The keywords used were combinations of the following: “accelerated orthodontics,” “Wilcko treatment,” and “corticotomy-assisted orthodontics.”

### Study Selection

Two investigators independently reviewed each study's abstract against the prespecified inclusion criteria. We included randomized controlled trials (RCTs), controlled clinical trials (CCTs), meta-analysis (MA), and case series (CS) with sample sizes of five or more patients that assessed the effectiveness of corticotomy-assisted accelerated orthodontic treatment as compared to that of conventional orthodontic treatment. Studies on segmental osteotomies and surgically assisted rapid maxillary expansion were excluded. Thirty-six articles were included in the study with inclusion criteria as prospective clinical studies of patients treated with fixed conventional appliance and the intervention was corticotomy-assisted accelerated orthodontic treatment.

### Data Extraction and Quality Assessment

Two reviewers assessed independently eligibility of the included articles. One investigator abstracted study design information, intervention details, and harms data from all included studies into a standardized evidence table. The accuracy of these data was checked by the second investigator. We resolved any disagreements through discussion with other authors. The first assessment included only titles and abstracts. Full-text assessment was then taken for all papers appearing to be relevant and eligible to include or when the title or abstract was vague to help in reaching the final judgment. A summary of the systematic review search strategy is given in Flowchart 1.

We qualitatively described and summarized the evidence.

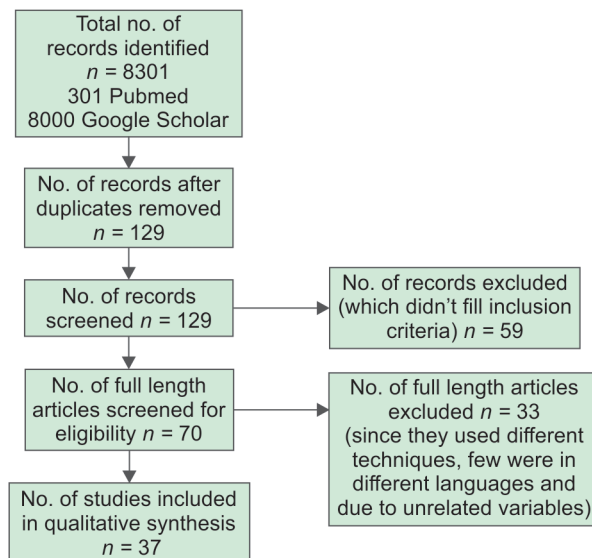
## RESULTS

We screened 8,301 abstracts, from which 8,109 duplicates were removed. A total of 36 out of the remaining 192 studies fulfilled our inclusion and exclusion criteria. These studies investigated different aspects of corticotomy-assisted accelerated orthodontics treatment, including risk factors, advantages, and disadvantages. A summary of all included studies is presented in Table 1.

## DISCUSSION

Fixed orthodontic treatment has been a traditional practice for orthodontists working worldwide, facing the challenge of prolonged treatment duration for a period of 2–3 years. Clinicians

**Flowchart 1:** PRISMA flow diagram of the search strategy used in this systematic review



were in search of advent techniques to enhance tooth movement with minimal risk of external root resorption, periodontal problems, and patient compliance.

The concept of accelerated orthodontics by Thomas and Wilcko has made the world to think of various methods to benefit the patients and to overcome the disadvantages of fixed orthodontic treatment for years.<sup>3</sup> When the practice of accelerated orthodontics started to fasten the treatment compared to conventional methods, many authors have discussed various modalities describing the advantages and disadvantages of the regional acceleratory phenomenon. Lengthy orthodontic treatment poses many patients, especially adults, to either avoid treatment or to seek shorter alternative solutions with compromised results. Recently, the concept has been used to enhance the rate of orthodontic tooth movement to provide an effective treatment plan and to improve patient compliance.

The idea of surgical acceleration came into being after the introduction of regional acceleratory phenomena (RAP) by Frost in 1983. Tomaso Vercellotti et al.<sup>6</sup> described the orthodontic-microsurgical technique that permits new orthodontic movement while lowering the risks of bone resorption and ligament ankylosis that minimized the treatment duration to 60% in mandible and 70% in maxilla. However, the inclusion criteria had not followed a uniform protocol to compare among the patients with traditional treatment. Fischer<sup>7</sup> described a new technique for palatally impacted canines and advocated that corticotomy had minimal clinical signs and swelling associated with the procedure. The periodontal status was good in reducing the treatment time to 28–33% with corticotomy-assisted tooth movement promoting higher tooth movement velocities. However, concepts were new and the sample was small to generalize their observations.

Sanjideh et al.<sup>8</sup> in their split-mouth experimental study showed corticotomy-induced increased tooth movement and the second corticotomy procedure after 4 weeks produced better results. They evaluated the true efficacy and most appropriate time for performing corticotomies that need long RCTs. Hassan et al.<sup>9</sup> observed the advantages of CAOT with faster tooth movement and short-duration expansion of cortical arches; however, CAOT

**Table 1:** Summary of all the included studies in the systematic review

S. no.	Authors	Type of study	Sample considered	Methodology	Results	Conclusion
1	Vercellotti T and Podesta A <sup>6</sup>	Clinical trial	8 patients with malocclusion	Corticotomies were performed around each tooth root with a piezosurgical microsaw.	Rapid distraction of ligament fibers was seen.	Acceleration of orthodontic tooth movement took place.
2	Fischer T <sup>7</sup>	Clinical trial	6 patients with bilateral impacted canines	One canine was surgically exposed with a conventional surgical technique while contralateral canine was exposed using the corticotomy-assisted technique.	Reduction of treatment time of 28–33% for corticotomy-assisted canines.	Corticotomy-assisted surgical technique reduces orthodontic treatment duration.
3	Sanjideh PA, Rossouw PE, Campbell PM <sup>8</sup>	Clinical trial	5 skeletally matured foxhounds of 2 years of age	Corticotomies performed in selective sites in experimental group. Orthodontic force was applied.	Total mandibular tooth movements were significantly greater on the experimental (2.4 mm) than on the control (1.3 mm) side.	Alveolar corticotomy increases orthodontic tooth movement.
4	Hassan AH, Al-Fraidi AA and Al-Saeed SH <sup>9</sup>	Review	52 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with corticotomy were included.	Induction of bone metabolism takes place via decortication lines and points around the teeth to be moved to enhance bone and periodontal turnover, resulting in a transient stage of osteopenia during treatment.	Corticotomy-assisted orthodontics is a promising technique that has many applications in the orthodontic treatment of adults.
5	Kim H-S, Lee Y-J, Park Y-G <sup>10</sup>	Clinical trial	5 Beagle dogs	Maxillary incisors were retracted en masse by applying 500 g orthopedic force against a single palatal mini-plate. Retraction was performed without and with perisegmental corticotomy in groups (control and experimental), respectively.	Retraction was markedly faster and retraction amount greater in experimental groups than in the control group.	Speedy surgical orthodontics is an effective and favorable orthodontic approach for major en masse retraction of the maxillary anterior teeth.
6	Sebaoun J-D, Surmenian J and Dibart S <sup>11</sup>	Review	25 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with piezocision were included.	Treatment duration reduced, periodontium was improved.	Piezocision offered a shorter surgical time, minimal postoperative discomfort, a high tolerance for patients, as well as an improved periodontium.
7	Seifi M, Younessian F and Ameli N <sup>4</sup>	Clinical trial	8 New Zealand male rabbits	Laser corticotomy was performed in anesthetized rabbits.	The amount of orthodontic tooth movement in the experimental group (mean = 1.653 ± 0.34 mm) was significantly ( $p < 0.001$ ) greater than that of the control group (mean = 0.936 ± 0.28 mm).	The innovated method of laser-assisted flapless corticotomy is a useful procedure for reducing treatment time and damage to periodontium. It also eliminates the necessity of more invasive intervention of flap surgery.
8	Abbas IT and Moutamed GM <sup>12</sup>	RCT	8 patients	Group I (corticotomy group) in which alveolar corticotomies were performed. Group II (nonsurgical group) in which nonsurgical standard orthodontics technique was done.	The desired tooth movement for mandibular decrowding was achieved in 74.5 ± 7.7 days in the corticotomy group (group I) and 141.7 ± 21.3 days in the nonsurgical group (group II).	Corticotomy facilitated orthodontic treatment increases orthodontic tooth movement with accepted degrees of pain and discomfort.

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S. no.	Authors	Type of study	Sample considered	Methodology	Results	Conclusion
9	Kook Y, Lee W, Kim S <sup>13</sup>	Case Series	3 case reports	3 case reports with CAOT.	All three corticotomy procedures were effective means of orthodontic tooth movement.	Selective alveolar corticotomy can be a feasible treatment modality for adults.
10	Nimeri G, Kau CH, Abou-Kheir NS <sup>14</sup>	Systematic Review	74 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with corticotomy were included.	Faster tooth movement took place. Periodontium was healthy.	Corticotomy is considered one of the best surgical approaches because it poses good periodontal tissue response and excellent esthetic outcome, reducing the treatment duration.
11	Meenakshi Priyanka DJ <sup>15</sup>	Review	32 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with periodontally accelerated osteogenic orthodontics (PAOO) were included.	PAOO results in an increase in alveolar bone width, shorter treatment time, increased posttreatment stability, and decreased amount of apical root resorption.	Tooth movement can be enhanced and cases completed with increased alveolar volume providing for a more intact periodontium.
12	Hoogeveen EJ, Jansma J and Ren Y <sup>16</sup>	Systematic review	18 articles	PubMed, Embase, and Cochrane databases were searched for RCTs, CCTs, and CS with five or more subjects that focused on velocity of tooth movement, reduction of treatment duration, or complications with various surgical protocols.	All publications reported temporarily accelerated tooth movement after surgery. No deleterious effects on the periodontium, no vitality loss, and no severe root resorption were found in any studies.	Surgically facilitated orthodontics seems to be safe for the oral tissues and is characterized by a temporary phase of accelerated tooth movement.
13	Farheen A, Halkai SR, Ansari MAA <sup>17</sup>	Review	7 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with corticotomy were included.	Faster tooth movement took places with good stability postoperatively.	Reduction of treatment time and postorthodontic stability.
14	Al-Naoum F, Al-Sabbagh R and Al-Jundi A <sup>18</sup>	RCT	15 patients	Sample was divided into experimental, which underwent PAOO, and control groups.	The orthodontic treatment in the PAOO group was faster than that in the extraction group throughout the experiment.	Compared with traditional orthodontic treatment, the PAOO procedure provides a safe alternative for patients with moderate to severe crowding who desire the benefits of orthodontic treatment in a relatively short duration.
15	Lee D-Y, Ahn H-W, Herr Y <sup>19</sup>	Randomized split-mouth study	2 male Beagles, aged over 1 year	After buccal corticotomy and deproteinized bovine bone mineral (DBBM) grafting into the decorticated area, absorbable collagen membrane (ACM) was overlaid and orthodontic force applied.	A mean of 79.5 ± 16.0% of the buccal bone wall was replaced by new bone on the control side, and on the test side 78.9 ± 19.5% was replaced. ACM application promoted an even bone surface.	Collagen membrane application in augmented corticotomy using DBBM might stimulate periodontal tissue reestablishment, which is useful for rapid orthodontic treatment or guided bone regeneration.
16	Kim Berna, Dreyer Craig W, and Wayne S <sup>20</sup>	Survey	77 periodontists and 114 orthodontists were surveyed	A questionnaire was formulated and tested.	The number of practitioners who had been involved with at least one corticotomy per annum was low for orthodontists (12%) and periodontists (18%).	The majority of those surveyed believed that more research was required on corticotomy-facilitated OTM.

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S. no.	Authors	Type of study	Sample considered	Methodology	Results	Conclusion
17	Bhattacharya P, Bhattacharya H, Anjum A <sup>21</sup>	Cross-sectional clinical study	20 patients (age > 15 years) requiring orthodontic treatment	They were randomized into control and corticotomy groups; each group consisted of 10 subjects.	There was a significant difference in retraction time.	Alveolar corticotomies not only accelerates the orthodontic treatment but also provides the advantage of increased alveolar width to support the teeth and overlying structures.
18	Shetty NJ <sup>5</sup>	Review	14 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with PAOO were included.	Faster tooth movement seen.	The desired outcome of the PAOO as demonstrated by rapid tooth movement was observed in all the cases.
19	Wu J, Jiang J-H, Xu L <sup>22</sup>	RCT	24 Class III surgical patients	Corticotomy was performed in the maxillary alveolar bone.	Duration of treatment in the experimental group was reduced by 6.39 ± 2.00 months.	Corticotomy reduces the surgical orthodontic treatment time for the skeletal Class III surgical patient by more than half a year on average.
20	Maheshwari S, Verma SK, Tariq M <sup>23</sup>	Critical review	21 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with various accelerated orthodontic techniques were included.	There was faster tooth movement with these techniques.	Of the various methods surgical means provide better results but have the drawback of being invasive in nature.
21	Abu-Hussein M, Watted N, Hegedus V <sup>24</sup>	Review	44 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with corticotomy were included.	Temporary reduction of medullar bone density (transitory osteopenia) within a 3–4-month window, which allowed more physiological tooth movement inside the alveolar bone.	Reduction of treatment time and postorthodontic stability is associated with corticotomy-facilitated orthodontics.
22	Zawawi KH <sup>25</sup>	Survey	150 subjects	Adult patients seeking orthodontic treatment were asked to complete two sets of questionnaires.	7.8% selected corticotomy instead of extraction. Fear from the surgery (53.2%) was the most frequent reason for not selecting corticotomy followed by fear from pain (36.9%).	The acceptance of corticotomy-assisted orthodontics as a treatment option was low. Fear from the surgery was the main reason for not selecting it.
23	Hassan AH, Al-Saeed SH, Al-Maghlouth BA <sup>26</sup>	Systematic review	12 articles	Various electronic databases were searched and abstracts were retrieved.	The CAOT was found to accelerate tooth movement by 2–2.5 folds when compared with conventional orthodontic tooth movement.	CAOT should be considered with caution. Long-term randomized clinical trials are still needed.
24	Pavan Kumar Addanki <sup>27</sup>	Case report	1 orthodontic patient	Maxillary and mandibular corticotomy was performed on distal surfaces of extraction spaces.	Extraction spaces closed in 6 months.	The piezoincision technique is a novel technique in PAOO. It is minimal invasive, requires less clinical skills, easy to perform, and the results are comparable with conventional PAOO.

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S. no.	Authors	Type of study	Sample considered	Methodology	Results	Conclusion
25	Maha A Bahammam <sup>28</sup>	Single-masked clinical trial	33 orthodontic patients dividing into three groups	Group I underwent a modified corticotomy technique on the labial side only, whereas group II was treated with the same technique combined with PAOO using a bovine-derived xenograft and group III was treated in the same way but combining PAOO with bioactive glass.	The duration of orthodontic treatment was markedly reduced to an average of $11.4 \pm 0.14$ weeks in all groups.	Combination of orthodontic treatment and periodontal surgery is an effective treatment for adult patients that decreases the duration of active treatment and reduces the risk of root resorption
26	Raja BA, Reddy YM, Sreekanth C, <sup>29</sup>	Case report	1 orthodontic patient	2-mm holes at 3-mm distance from one another were drilled on the buccal as well as the interdental bone.	Quick orthodontic movement of 3 mm was well appreciable over the next 2 months.	Corticotomy-assisted orthodontics has been reported in a few clinical cases and seems to be a promising adjuvant technique.
27	Aksakalli S, Calik B, Kara B <sup>30</sup>	Randomized split-mouth study	20 maxillary canines of 10 patients	Piezocision was performed on the experimental side.	Three-dimensional analysis of the models revealed significant differences in tooth movement.	Piezocision-assisted distalization accelerates tooth movement, decreases the anchorage loss for posterior teeth, and does not induce any maxillary transversal change.
28	Alfawal AM, Hajeer MY, Ajaj MA <sup>31</sup>	Systematic review	4 RCTs (61 patients)	Various electronic databases were searched and abstracts were retrieved. Randomized controlled trials with patients who received minimally invasive surgical procedures combined with fixed orthodontic appliances compared with conventional treatment were included.	Only three RCTs were suitable for quantitative synthesis. A higher tooth movement rate was found with the minimally invasive surgical procedures by a weighted mean difference of 0.65 mm for 1 month of canine retraction (WMD = 0.65; 95% CI (0.54, 0.76), and by a weighted mean difference 1.41 mm for 2 months (WMD = 1.41; 95% CI (0.81, 2.01).	Minimally invasive surgical orthodontics can help in accelerating canine retraction.
29	Tsai C-Y, Yang T-K, Hsieh H-Y <sup>32</sup>	RCT	44 Sprague-Dawley rats	Corticotomy was performed in the experimental group.	Tooth movement was higher in the experimental group.	The tooth movement distance was significantly higher in the experimental group than in the control group. Bone density and bone mineral density decreased in both experimental groups.
30	Donald JF, Machado I, Wilcko MT <sup>33</sup>	RCT	27 patients needing orthodontic treatment	Corticotomy was performed on the experimental group.	Significant decrease in treatment time in the Cort group ( $6.3 \pm 8.0$ vs. $17.4 \pm 20.2$ months).	Results in less root resorption and enhanced alveolar support within a significantly reduced clinical service delivery time frame.
31	Ferguson DJ, Nazarov A, Makki L <sup>34</sup>	RCT	56 orthodontically treated patients	Study casts and panoramic radiographs of patients with and without PAOO (28 subjects each) were selected.	(1) Posttreatment orthodontic outcomes were the same, with or without corticotomy. (2) Posttreatment stability was better in corticotomy groups.	The retention phase was more favorable following corticotomy.

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S. no.	Authors	Type of study	Sample considered	Methodology	Results	Conclusion
32	Jahambakhshi MR, Motamedi AMK, Feizbakhsh M <sup>35</sup>	RCT	15 adult female patients	By use of split-mouth design, buccal corticotomy was performed around the maxillary first premolar, randomly on one side of maxilla, and the other side was reserved as the control side. Canine retraction was performed by use of friction-less mechanic.	The rate of canine retraction was significantly higher on the corticotomy side than the control side by an average of 1.8 mm/month vs 1.1 mm/month in the corticotomy side and control side, respectively.	Buccal corticotomy is a useful adjunct technique for accelerating orthodontic tooth movement.
33	Cheung T, Park J, Lee D <sup>36</sup>	Split mouth	6 rats	Five micro-osteoperforations were placed using automated mini-implant driver on experimental around maxillary molar.	The MOP side exhibited 1.86% increase in rate of tooth movement.	Mini-implant facilitated MOPS accelerated orthodontic tooth movement
34	Shingade M, Maurya R, Mishra H <sup>37</sup>	Review	18 articles	Various electronic databases were searched and abstracts were retrieved. Cases treated with micro-osteoperforations were included.	Treatment duration was reduced.	Micro-osteoperforations have reduced the orthodontic treatment duration.
35	Librizzi Z, Kalajzic Z, Camacho D <sup>38</sup>	Clinical trial	6 male Wistar rats	Corticism was performed in the experimental group.	No statistical difference in amount of orthodontic tooth movement.	No difference in tooth movement.

could not be considered in severe posterior crossbite, bimaxillary protrusion, and he advocated long-term research on pulp vitality after rapid tooth movement. Long-term effects of CAOT on root resorption require long-term studies. Perisegmental corticotomies and their biological effects on teeth and periodontal structures were analyzed and no signs of root resorption were observed despite of extensive retraction by Hong-suk-kim,<sup>39</sup> which was in accordance with Sebaoun et al.,<sup>11</sup> where selective tunneling was described, which favored tooth movement three times faster than conventional orthodontic treatment. The combination technique of corticotomy and orthodontic forces in class III malocclusion was described by Kim et al.,<sup>40</sup> which stated that hyalinization was limited to 1st week facilitating faster tooth movement. The application of laser-assisted corticotomies without reflection of the surgical soft tissue and hard tissue by Seifi et al.<sup>4</sup> showed promising results. Innovated laser-assisted corticotomies enhanced the rate of orthodontic tooth movement on the intervention side, significantly. However, low-level laser therapy has shown positive outcome, but with limited application due to its aggressiveness. However, most of the studies on corticotomy included in our criteria haven't described the disadvantages with corticotomy regarding chances of damaging adjacent structures; postoperative infection, pain, and swelling; and low acceptance by the patient.

Sebaoun et al.<sup>11</sup> described piezocision, which offers a shorter surgical time, minimal postoperative discomfort, a high tolerance for patients, as well as an improved periodontium in accordance with studies conducted by Nimeri et al.<sup>14</sup> who considered this technique as one of the best surgical approaches as it poses good periodontal tissue response and better esthetic outcome.

Abbas et al.<sup>12</sup> evaluated pain, discomfort, satisfaction levels, and corticotomy advantages with peizosurgery and noticed 50% reduction in treatment time, two times increase in tooth movement in correlation with studies by Wilcko et al. and results obtained by Vercellotti.<sup>4</sup> Kook et al.<sup>13</sup> described various designs of corticotomy for bodily protraction of lower molars in narrow alveolar ridges to increase three-dimensional control without significant mesial tipping. Priyanka et al.<sup>15</sup> showed that periodontal accelerated osteogenic orthodontics results were stable and long-lasting in accordance with Wilcko. However, the additional grafting material made it expensive, limiting use of the technique.

Hoogveen et al.<sup>16</sup> described corticotomy and dental distraction in adult patients and commented that the level of evidence needs well-conducted prospective research with big sample size to draw valid conclusions. Leethanakul et al.<sup>41</sup> performed interseptal bone reduction in par with other studies. However, movement was not measured on radiographs to quantify the results. Bhaskar et al.<sup>42</sup> discussed the advantages and disadvantages of the corticotomy and highlighted that accelerated orthodontics have reduced rate of relapse, orthodontic pain, and root resorption.

Bhattacharya et al.<sup>21</sup> performed a clinical study corticotomy with CT scans and proved that alveolar width thickness increased with accelerated orthodontics. Ferguson et al.<sup>33</sup> presented a case series that showed advantages in par with other studies. The technique of corticotomy described by Kole was enbloc, whereas Wilcko et al. and Germec et al. showed only buccal corticotomy for best results.<sup>27</sup> Most of the studies described by various authors were on animals and most of the researchers suggested more clinical trials with high level of evidence that needs to be conducted describing the advantages, disadvantages, drawbacks, and limitations of corticotomy. However, new techniques promote new frontiers and advancements that give us a scope to plan the

treatment effectively to provide the best possible orthodontic treatment needs.

## CONCLUSION

There is limited available evidence about effectiveness of corticotomy-assisted accelerated orthodontics. Although the current review indicates that accelerated orthodontic treatment is characterized by a temporary phase of tooth movement that can fasten the treatment duration by 2.2–3 folds compared to conventional orthodontic treatment. But careful treatment planning, early activation of appliances, and short intervals between checkups are recommended. They come with additional advantages such as reduced rates of relapse, reduced orthodontic pain, reduced root resorption, no evidence of tooth vitality loss, and good periodontal condition. This approach has the potential to be the next frontier for orthodontics options. Furthermore, the level of evidence needs well-conducted prospective research with big sample size to draw valid conclusions.

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