



# Corticotomy: historical perspective

## *Corticotomía: perspectiva histórica*

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### ABSTRACT

**Introduction:** An exposition is presented of different techniques and philosophies provided through time for corticotomy procedures from its origin or first listing in 1892 to the present or last modification in 2012. **Method:** Bibliographic search was undertaken on the subject of corticotomy in order to document modifications experienced by their surgical technique and offer evidence which might allow to make decisions based on scientific evidence. **Results:** Presentation of a series of tables where all techniques are recorded, including authors and years of description or proposal. **Conclusions:** Mechanism behind corticotomy procedures can be summarized as the induction of bone metabolism through decortication executed around teeth that are going to be moved to increase bone replacement, this improves and accelerates orthodontic tooth movement.

### RESUMEN

**Introducción:** Se expone la evolución de las diferentes técnicas y filosofías que a través del tiempo ha presentado la corticotomía, desde su origen o primer registro en 1892 hasta el momento presente o última modificación del 2012. **Método:** Se realiza una búsqueda bibliográfica sobre el tema de corticotomía con la finalidad de documentar las modificaciones que ha tenido esta técnica quirúrgica y ofrecer la evidencia que permita la toma de decisiones basadas en una evidencia científica. **Resultados:** Se presenta una serie de cuadros en los cuales se registra cada una de las técnicas, su o sus autores y el año en el que fue descrita o propuesta. **Conclusiones:** El mecanismo detrás de la corticotomía puede resumirse como la inducción del metabolismo óseo mediante la decorticación que se realiza alrededor de los dientes que van a moverse para aumentar el recambio óseo, esto mejora y acelera el movimiento dentario ortodóncico.

**Key words:** Corticotomy, accelerated osteogenic orthodontics (AOO), periodontally accelerated osteogenic orthodontics (PAOO).

**Palabras clave:** Corticotomía, ortodoncia osteogénica acelerada (AOO), ortodoncia osteogénica periodontalmente acelerada (PAOO).

### INTRODUCTION

The present article purports the aim of providing the reader with a historical perspective of corticotomy procedures, as well as exposing the evolution of different techniques and philosophies presented through time for this procedure, from its first recording in 1892 until its latest modification in 2012.

Corticotomy consists in a surgical maneuver where a cut or perforation is undertaken in the cortical portion of the bone. It can be achieved with cutting hand instruments such a high or low speed rotary instruments as well as with electrical hand-pieces, under constant and abundant irrigation. This procedure enables osteoblast and osteoclast activation thus facilitating tooth movement with favorable bone response.<sup>1</sup>

The target of this procedure is to pass cortical bone and touch medullar bone in order to stimulate bone replacement, thus providing easier orthodontic treatment. Corticotomy is characterized by a three to four times decrease of time in orthodontics treatments, additionally decreasing root resorption and achieving

greater stability when compared to conventional orthodontic treatment.<sup>2</sup>

Among advantages achieved with this surgical procedure we can count the following: decrease of treatment time,<sup>3</sup> lesser orthodontic limits, providing thus more extensive movements without periodontally compromising the patient,<sup>3</sup> greater stability after treatment due to the socket's de-mineralization/re-mineralization process in initial circumstances and presence of neo-formed bone once orthodontic movement is completed,<sup>4</sup> decrease of extraction possibility and risk of root resorption,<sup>2</sup> decrease of periodontal ligament hyalinization in alveolar walls

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caused by forceful and extensive movements.<sup>4</sup> It additionally allows correction of depression-shaped vestibular anatomical defects which often accompany narrow alveolar crests.<sup>5</sup>

Disadvantages of this procedure are the following: the fact that just like any surgical procedure, it might elicit pain and inflammation, it is not suitable for all patients, patient selection will depend on their systemic and oral circumstances to determine whether they are candidates for this procedure or not. In order to be able to achieve this procedure, there is a series of indicators such as having a 10 mm bone remnant in apical-crown direction,<sup>5</sup> a 7 mm minimum in vestibular-lingual direction, at least 3 mm thickness of alveolar bone, as well as sufficient amount of medullar bone between cortical bone in order to avoid fractures.<sup>5</sup> Corticotomy is used to undertake intrusion and extrusion movements or open bite closure,<sup>4</sup> as well as to potentiate correction of severe to moderate malocclusions and to achieve more extensive movements in a very short time when compared to conventional orthodontic treatments.<sup>6</sup>

Contraindications for a corticotomy procedure are the following: absence of medullar bone to provide suitable vascularization,<sup>5</sup> active periodontal disease,<sup>4</sup> thin bone crest,<sup>5</sup> inadequately endodontically treated teeth or teeth with periapical reactions previous to surgery,<sup>1</sup> ankylosis or systemic disease such as uncontrolled diabetes, blood dyscrasias or coagulopathies,<sup>4</sup> as well as patients ingesting drugs which change bone metabolism such as bi-phosphonates or non steroid anti inflammatory (NSAIDs) drugs, since these drugs inhibit prostaglandins and thus inhibit osteoclastic activity.<sup>2</sup>

#### DIFFERENT CORTICOTOMY SURGICAL TECHNIQUES

L.C. Bryan in 1892 was the first to report use of corticotomy as an adjuvant for malocclusion correction procedures. He reported cases of American Dental Society at a later date, in 1893, Cunningham

presented the possibility of immediate correction for irregularly placed teeth.<sup>7,8</sup>

#### Bone block technique (Köle 1959)

In 1959 Heinrich Köle introduced the description of a corticotomy technique associated to orthodontic treatment to accelerate dental movement under the theory of bone block movements.<sup>5</sup> He proposed that tooth movement could be achieved in shorter time if interdental and osteotomies cuts were performed, since cortical bone represented greater resistance to tooth movement, and thus, if cortical bone continuity was altered, tooth movements could be achieved in shorter time.<sup>5</sup>

This surgical technique consisted on raising a muco-periosteal flap (from a vestibular and lingual/palatal direction), and conduct osteotomies in inter-radicular and supra-apical sites. Cuts should measure 10 mm and be located above all apexes; a perpendicular (horizontal) cut should be undertaken, achieving thus separation of small-sized bone blocks to provide acceleration of orthodontic movement (*Figure 1*).<sup>4</sup> It is important to point out that most movements described by Köle were movements conducted with orthopedic forces applied through removable devices adapted by adjustable screws. Since this technique was highly invasive it garnered little acceptance.<sup>2,4</sup>

The advantage of this technique was that it provided faster tooth movement in shorter time (approximately 6 to 12 weeks). This procedure was recommended for separation of single or grouped teeth, it was used to achieve distally-oriented movements after an extraction (*Figure 2*).<sup>4</sup>

#### Fast orthodontics (Chung 1975 and 1978)

A new technique called *Fast Orthodontics* was proposed by Chung between 1975 and 1978. This technique combined cuts with orthopedic forces



Figure 1.

Bone block<sup>8</sup> Köle osteotomies.

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