

**UNIVERSITY OF MEDICINE, PHARMACY, SCIENCE AND TECHNOLOGY
„GEORGE EMIL PALADE” FROM TÎRGU MUREŞ**

DOCTORAL STUDIES SCHOOL

DOCTORAL THESIS – SUMMARY

**Clinical-statistical studies on the advantages
and limitations of corticotomy as a mean of
accelerating dental movement in fixed
orthodontic therapy**

PhD candidate : Irinel Panainte

PhD coordinator : Prof. Dr. Mariana Păcurar

Introduction

The addressability of patients to orthodontics has increased significantly in recent decades, particularly in the case of adult patients. The main reason for presenting them to the specialist doctor is represented by the desire for social integration and implicitly to increase the quality of life. In order to satisfy the requirements of a society in constant changing and improvement, in which the external aspect prevails having value in most interpersonal relationships, patients want to wear an orthodontic appliance as little as possible and whose action is exercised as quickly as possible. Thus, in addition to establishing a precise diagnosis and a comprehensive treatment plan, it is also essential to select the type of device that matches the proposed objectives and meets the needs of patients as much as possible, including decreasing the duration of active treatment.

With the growing number of adult patients, achieving the best possible outcome can be challenging and time consuming. This is also because a big proportion of people have a compromised periodontal status, a reduced cellular metabolism, and a poor rate of collagen fiber conversion. To meet the needs of this group of patients, advances have been made in the use of therapeutic methods that can shorten the length of treatment while maximizing aesthetic results and maintaining periodontal tissue health.

The aim of the doctoral study was to observe and evaluate how conventional orthodontic therapy evolves when it is enhanced by the surgical procedure of corticotomy. The idea for this study arose from the observation in daily clinical practice of an increasing interest in orthodontic treatments among adult patients, as well as an openness on the part of both patients and orthodontists to the introduction in current practice of approaches to accelerate the rate of tooth movement and thus decrease the total duration of treatment.

The thesis is structured in six chapters: three chapters in the general part and other three chapters in the personal research part.

In the first chapter of the general part we presented, based on the information taken from the recent literature, a synthesis on the morphological substrate that represents the anatomical basis of dental movements in orthodontic therapy.

The second chapter addresses the issue of forces exerted on the stomatognathic system and the biological response of the body to their action, along with the direction of movement that they can imprint on the dental structures.

In the third chapter of the general part, a review was made of some surgical procedures that can be performed at the level of the maxillary bone bases (surgically assisted maxillary disjunction, mandibular osteodistraction), as well as at the level of the supporting bone tissue of the teeth (corticotomy), in order to create the space necessary to correct dento-maxillary malocclusions with the help of orthodontic therapy

The motivation of the research is presented in the second part - "**Personal Contributions**"-and is related to the need to assess the perception of a group of orthodontists on the introduction of this therapeutic approach - corticotomy-assisted orthodontics - in the usual practice. Furthermore, it was intended to assess the level of understanding of the benefits and limits of utilizing corticotomy, as well as the clinical situations in which it may be considered as a therapeutic option.

The second study was an experimental one performed on an animal model, in collaboration with the University of Agricultural Sciences and Veterinary Medicine in Bucharest. Its purpose was to analyze the degree of tooth displacement, when the usual orthodontic biomechanics was associated with the corticotomy technique. The study included eight Beagle dogs, divided into 2 groups: the control group and the experimental group. In the experimental group, after the extraction of the second premolar was performed

and the orthodontic device was applied, at the level of the third premolar, vertical and horizontal corticotomy lines were performed. The degree of dental displacement was evaluated by measuring the distance between the distal face of the canine and the mesial surface of the third premolar at the moment of corticotomy (T0), one week later (T1), two weeks later (T2), and four weeks later (T4). The results recorded in the study's two groups indicate that the rate of tooth movement was more significant in the group where the corticotomy technique was performed.

The third study aimed to evaluate how the dento-periodontal structures change during the adjuvanted orthodontic treatment of corticotomy. The study included 60 patients of both sexes, treated with a system of self-ligating brackets and in which, based on a CBCT radiological investigation, the thickness of the vestibular cortex was evaluated up to the level of the first premolar in the 4 quadrants. The measurements were recorded in 3 areas: cervical (3 mm from the enamel-cement junction), median (6 mm from the junction) and apical (9 mm from the junction). In addition, the root length of the same teeth was evaluated before the intervention and at the end of the orthodontic treatment. The observations made on the basis of the measurements showed a thickening of the vestibular cortex following the corticotomy intervention, especially at the level of the cervical area. Also, post-orthodontic root resorption has been greatly diminished.

The results of the research were compared with recent data from other studies published in the literature and the clinical relevance of the studies is given by the observations that there was an acceleration of the movement of teeth when conventional orthodontic therapy is combined with corticotomy and a favorable reaction of the dento-periodontal support, which implicitly will lead to a favorable dental displacement as well as to an increased stability of the obtained result.

The originality of this paper consists in evaluating the rhythm of tooth displacement and bone restructuring on animal model at a classical orthodontic treatment compared to a modern one associated with a milling of the vestibular bone plate affecting the biomechanical action.

The general conclusions were formulated in a separate chapter.

In this context, the planning of an orthodontic treatment in a population segment over 20 years old, when the processes of bone growth and remodeling are completed must be corroborated with other modern techniques: corticotomy, intraligamentary injection of vitamin C, ultrasound, which can accelerate the rhythm of bone restructuring, , thus shortening the duration of orthodontic treatment and reducing some side effects due to high-strength dental movements.

The bibliographic references are presented at the end of the thesis, in the order of their citation in the text.