REVIEW

by **Assoc. Prof. Dr. Greta Rusanova Yordanova-Kostova, DMD**

of a dissertation for obtaining the scientific degree "Doctor", in the field of higher education 7. Health and sports, professional field 7.2 Dentistry and scientific specialty Orthodontics.

External member of the scientific jury according to order R-1272/31.05.22 of the Rector of Medical University, Plovdiv

Author of the dissertation: Dr. Manoela Mitkova Kalaydzhieva, Assistant Professor in the Department of Orthodontics, Faculty of Dental Medicine, Medical University - Plovdiv

Topic of the dissertation: Retention phase - assessment of the risk factors for relapse and prognosis for stability of the orthodontic treatment result

Supervisors: Assoc. Prof. Dr. Silvia Krasteva, DMD

General presentation of the documentation and the dissertation:

The set of documents provided to me in electronic and paper format meets the requirements of Law on the Academic Staff Development in the Republic of Bulgaria, the Regulations for its implementation, as well as the Regulations on the terms and conditions for obtaining scientific degrees and holding academic positions at the Medical University - Plovdiv.

The presented dissertation on the topic **"Retention phase - assessment of the risk factors for relapse and prognosis for stability of the orthodontic treatment result"** has been developed in a volume of 236 pages. It is illustrated with 90 figures, 46 tables and 4 appendices. The dissertation is structured as follows: literature review (55 pages), aim and tasks, material and methods, results and discussion (135 pages), conclusion, inferences and contributions (6 pages).

The bibliography of the dissertation cites 426 literary sources, of which 9 in Cyrillic and 417 in Latin.

The abstract is written on 60 pages and is appropriately illustrated with tables and figures. In general, it is a summary of the dissertation and contains its main structural components. The overall content of the abstract meets all scientific and legal requirements.

In connection with the dissertation, 3 scientific publications are attached, of which the doctoral candidate is the primary author. Results related to the dissertation have been reported during two participations in scientific forums.

Relevance of the topic

The dissertation is focused on a problem regarding the retention phase of orthodontic treatment and the efficiency of the retention appliances used in this phase. The development of orthodontics as a scientific discipline is due to the technical development of the treatment and retention appliances used in clinical practice. There are two main groups of retention appliances - removable and fixed. The most commonly used removable appliances are the Hawley retainer and the vacuum-formed retainer. In the lower dental arch, orthodontists more often rely on fixed retainers covering the area from canine to canine. The advantages and orthodontists' preferences of different retention appliances cannot be unambiguously determined, because their action depends on the individual characteristics of the patient, the severity of the treated deformity and the compliance of the patient. In this regard, I determine that the doctoral candidate has focused her research on a topic of direct clinical significance. The obtained results and their analysis would be useful not only as scientific data, but also as parameters which orthodontists should take into account in their clinical work. Therefore, I can define the choice of topic as extremely relevant with a strong theoretical and practical focus.

The literature review is extensive and problems regarding retention and the retention period itself are discussed in detail. The material is structured in several topics: Historical development of the problem, Theories of relapse and relapse occurrence, Relapse factors, Types of retention materials, Retention period and assessment indices. The analyzed material covers the most modern trends and methods used in clinical practice, which is a sign that the doctoral candidate knows and follows the trends in the development and the solution of the problem.

The conclusions made from the literature review show the importance of the problem and its inexhaustibility and provide sufficient grounds for conducting this study.

Evaluation of the dissertation

The aim is formulated clearly and concretely. With the present dissertation the author aims to assess the stability of orthodontic treatment and the reliability of the retention appliances used in

patients treated with a fixed appliance without extraction. In connection with the set goal, 5 tasks reflecting the stages of the planned research process have been formulated.

1. To conduct a survey among practicing orthodontists in Bulgaria regarding their preferred retention appliances - Hawley retainer, vacuum-formed retainer and fixed retainer.

2. To monitor changes in the upper and the lower dental arches at the beginning of treatment, at the end of treatment and up to two years in the retention period, during which retention was performed with removable retainers (a Hawley retainer or a vacuum-formed retainer) in the upper jaw and a fixed retainer in the lower jaw.

3. To monitor the change in inclination of the upper and lower incisors on cephalometric radiographs before treatment, after treatment and up to two years in the retention period, during which retention was performed with removable retainers (a Hawley retainer or a vacuum-formed retainer) in the upper jaw and a fixed retainer in the lower jaw.

4. To emphasize the advantages and disadvantages of both types of retention - Hawley retainer in the upper jaw/fixed retainer in the lower jaw and vacuum-formed retainer in the upper jaw/fixed retainer in the lower jaw.

5. To create a prognostic criterion for relapse based on the changes in parameters during the treatment.

The materials and methods for each of the tasks are optimally selected and sufficient to produce representative results. Accurate and clear criteria for inclusion of patients (their plaster models and cephalometric radiographs) for analysis on the topic were used. The questionnaire prepared by the author has questions with unambiguous positive or negative answers, which do not mislead the surveyed orthodontists into choosing an answer. Therefore, the precision in the selection and preparation the of research materials guarantees the doctoral candidate the opportunity to obtain a number of significant qualitative and quantitative results.

Results and discussion are presented for each task, which allows for their clear understanding when reading the material. Each result is presented in a table to verify its statistical significance and is also presented in a graph for better understanding of the changes.

The results from 1 task show that the most commonly used retention appliance in the upper jaw is the vacuum-formed retainer (35.6%), followed by a combination of a fixed and a vacuum-formed retainer, followed by the Hawley retainer (24.4%). The majority of respondents prefer a fixed retainer (66.7%) for a retention appliance in the lower dental arch. The results

obtained are similar to the results of other studies. The data from this task would help for the creation of a more unified program for the activity of orthodontists in the retention phase of orthodontic treatment.

The results from task 2 are voluminous (because the study has a large scope), statistically well-analyzed and well-illustrated. It is clear that there is always dynamics in the retention period despite the retention method used, and this is most observed in the molar and premolar areas. The decision to present the overall picture in two figures, 64 and 70, is a good one. This allows for clear understanding of all the data from the study and from the analysis of the 2nd task. All data obtained were compared with similar studies by other authors in the discussion of this task.

The results from task 3 are well-specified, illustrated with tables and graphs and interpreted with understanding and logic by the author. As a result of the treatment, the inclination of the upper and lower incisors increased significantly in both groups. It was found that at the end of the retention period there is retention of the achieved linear and angular positions of the upper and lower incisors in both types of retention.

I was interested in the *results from task 4* on the advantages and disadvantages of the two retention protocols used. The results show that the group that received a vacuum-formed retainer and a fixed retainer achieved better results (actually less negative results). In both groups of patients, no significant difference in the cephalometric parameters was reported between the two retention methods. A good analysis is made in the discussion on this task, the personal attitude of the doctoral candidate and her in-depth knowledge of the problem are evident.

The statistical analysis of the results from *the 5th task* is very serious. The data obtained once again support the opinion on the stability of the intercanine distance. All these data are for the retention period of up to two years.

In conclusion, after reviewing this chapter of the dissertation, I can say that all the results are presented in detail and are analyzed for each of the tasks separately. The discussion presents a comparison with the results of other authors. Any disagreement with their data or opinions, even a minimal one, is argumented. The conclusions from the tasks are well and clearly defined, the conclusions from the whole research are concrete. On the basis of this complex study, logical recommendations for clinical activity in cases of patients with greater crowding or in cases of patients who need a greater change in the transverse size of the jaws have been derived.

In my review I want to emphasize that the doctoral candidate has made a large number of linear measurements on plaster models and cephalometric radiographs, which shows her knowledge as a clinician and a researcher. I would also like to highlight the comparative analysis of the effectiveness of the two types of retention appliances in the upper jaw. Another important aspect is the presentation of this comparison with an appropriate selection of graphs and comparison tables.

Contributions and significance

The research presented in the dissertation of Dr. M. Kalaydzhieva has both scientific and pronounced practical nature.

1. For the first time in our country a survey is conducted on the retention methods and appliances used after orthodontic treatment.
2. For the first time in our country the changes in the transverse and sagittal parameters of the upper and lower dental arches are monitored over a 2-year retention period, during which removable retention appliances were used in the upper jaw and fixed retention appliances were used in the lower jaw.
3. For the first time in our country the changes in the cephalometric indicators are monitored over a two-year retention period.
4. The advantages and disadvantages of the three types of retainers - vacuum-formed retainer, Hawley retainer and fixed retainer - are emphasized.
5. Prognostic criteria for expected relapse have been established.

The contributions of the dissertation reflect the nature of the analyzed problem and would be relevant to the daily clinical practice of the orthodontist.

Abstract

The abstract attached to the dissertation meets the requirements and summarizes the dissertation. The tables and figures presented in it provide complete information about the conducted research and the obtained results. It includes a list of 3 publications in specialized scientific publications and participation in 2 scientific conferences.

Critical remarks

My recommendation to Dr. Manoela Kalaydzhieva is in her next scientific endevours to develop a scientific and practical guide for organization (planning) of the retention period, the

duration of its monitoring by the orthodontist and practical recommendations for choosing retention appliances according to an assessment scheme for individual characteristics, the severity of the problem being treated, the degree of change in the transverse dimensions of the intercanine, premolar and molar areas, as well as incisor crowding.

Conclusion

The dissertation on the topic *"Retention phase - assessment of the risk factors for relapse and prognosis for stability of the orthodontic treatment result"* by Dr. Manoela Mitkova Kalaydzhieva for the award of the degree "Doctor", is a relevant and useful modern scientific work with scientific and practical significance.

The dissertation meets the requirements for awarding scientific degrees and titles according to the Law on the Academic Staff Development in the Republic of Bulgaria and the Regulations for its implementation.

I give a positive evaluation of the dissertation and its scientific contributions and propose to the esteemed scientific jury to award the degree of "Doctor" to Dr. Manoela Mitkova Kalaydzhieva in the field of higher education 7. Health and Sports, professional field 7.2 Dentistry and scientific specialty Orthodontics.

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