

Warsaw, Poland, 3rd August, 2018

Ewa Czochovska, DDS, PhD
Department of Orthodontics,
Medical University in Warsaw, Poland

Review of the thesis of Elie Amm

„Canine substitution of congenitally missing lateral incisors in Class I and Class III malocclusions using skeletal anchorage”

Congenitally missing lateral incisors represent an important problem in orthodontics because their absence can seriously affect smile esthetics and is easily recognized by a patient and lay-people. This problem is addressed in many indices of orthodontic treatment needs, such as IOTN or NOTN (Norwegian Index of Orthodontic Treatment Needs) which are used to provide refund from social security systems for the expenses of orthodontic treatment. Missing maxillary anterior teeth are in the category of great treatment need for the affected individual. The prevalence of missing lateral incisors is usually estimated as 1,5% in a Caucasian population.

The treatment alternatives for missing maxillary incisors traditionally include two treatment options. The first option is substitution of a missing incisor by prosthodontic solutions such as fixed partial prosthesis or dental implants and the second option includes canine mesialisation to a position of missing lateral incisor. Both options usually require orthodontic treatment using fixed orthodontic appliances. The first option requires orthodontic space opening to achieve adequate space for insertion of tooth replacements and the second option requires orthodontic space closure.

In the last decade the long-term performance of dental implants inserted in the esthetic zone has been reported to be suboptimal due to poor soft tissue esthetics, visibility of metal parts and progressing infraocclusion. Those unfavorable findings are encouraging clinicians to treat agenesis of maxillary lateral incisors using canine mesialisation as it was described in the submitted thesis and is in line with the contemporary approaches for upper lateral incisors agenesis. The use of fixed partial dentures can be an attractive option, but those restorations do not preserve alveolar bone and they are prone to accidental debonding.

Orthodontic space closure reduces arch diameter and this is a serious concern in patients with skeletal class I occlusion and especially in skeletal class III occlusion when maxillary lateral incisors are missing. Traditionally, those patients will require premolar extraction in the mandibular arch or orthognatic surgery in order to achieve a normal occlusion after canine mesialisation. Tooth extractions can negatively affect patient's profile and they are not easily accepted by patients, while orthognatic surgery is a massive surgery within the lower part of a face with possible complications and even less accepted by patients than tooth extractions. Also orthognatic surgery can be performed after the skeletal growth is completed and this can be an important issue in younger patients. The introduction of temporary skeletal anchorage in orthodontics allowed more versatile tooth movements without negative effects associated with the traditional concept of orthodontic anchorage. Those advantages of temporary skeletal anchorage were successfully utilized in the described protocol by dr. Amm and the author should be complimented for the introduction of such protocol for treatment of maxillary incisor agenesis in skeletal class I and class III patients using canine mesialisation to substitute missing incisors. The use of temporary skeletal anchorage to facilitate orthodontic space closure in patients with agenesis of upper lateral incisors is relatively a new approach and the described protocol according to my knowledge has not been described previously and is interesting and clinically valid.

The thesis was written in accordance with accepted requirements regarding such publications. It contains 77 pages and it was divided into general introduction, description of aims, material and methods, summarizing of the results and discussion of the results including comparisons with other existing evidence. The included references are relevant and comprised recently published articles related to the scope of the study. The thesis contains 17 figures, which nicely illustrate the applied treatment mechanics supported by clinical examples. Seven tables divided into sub-tables are included to provide a detailed description of the sample characteristics and the results.

The introduction is clearly and concisely written and provides a summary of the present knowledge related to the topic of the thesis. The study was performed in a consecutive cohort of 30 patients with one or two congenitally missing maxillary lateral incisors and skeletal Class I or mild Class III in whom orthodontic mesialisation of canines to substitute missing incisor was performed using fixed appliances and temporary skeletal anchorage devices. The sample size is adequate to provide reliable evaluation of the treatment protocol.

The author stated, that he designed a randomized clinical prospective trial to validate if orthodontic space closure with protraction of the maxillary dentition using mandibular skeletal anchorage devices is a viable treatment option in patients with congenitally missing maxillary lateral incisors. The study described in submitted thesis does not comprise a randomized clinical trial since no control group was included in the evaluation. This misleading description of the trial design must be corrected during the publication of the results.

Two aims of the study were formulated, however I would like to see a more specific description what was assessed and how this assessment was performed, especially regarding the first aim of the study. The analysis included comparisons between pre- and post treatment cephalometric variables, model analysis using PAR scores and patients' opinion about smile esthetics and the formulated aims are not precisely related to performed evaluation of the treatment outcomes.

The material was precisely described including a detailed description of the clinical protocol. The author provided a detailed characteristic of all patients included which enables the readers to carefully analyze the sample. It would be interesting to provide information about the number of patients with unilateral and bilateral agenesis of lateral incisor. Also, it would be of interest to know, if any changes in the treatment protocol were applied if one or both lateral incisors were missing and report any differences in the results between those two groups, if possible regarding the sample sizes.

The author used sella-nasion line as the reference line for superimposition. The points nasion and sella are changing their position during growth, especially in younger patients. It would be better to use stable structures within the anterior base of a skull, but the evaluated sample included relatively few young patients as the mean ages were 15.4 and 16.9 years for males and females respectively. The authors could also use the superimpositions on the scanned dental models using palatal reggae as those structures were documented to be stable and such superimposition was used in some of the studies evaluating the effectiveness of palatal implants (Sandler et al., Effectiveness of 3 methods of anchorage reinforcement for maximum anchorage in adolescents: A 3-arm multicenter randomized clinical trial *Am J Orthodontic Dentofac Orthoped* 2014)

It is important to address patients' important outcomes for the evaluation of results if any new treatment is introduced. This was interestingly approached in the submitted trial using currently available communicators such as mobile phones. I would like to

stress the importance of the holistic evaluation of the treatment outcomes performed by the author.

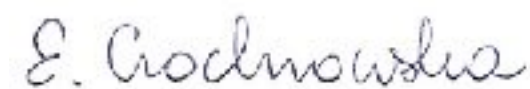
The details of the statistical analysis were provided, however no considerations for the multiple testings were included, which could possibly bias the results increasing the number of statistically significant findings. This could be commented in the discussion and included in the conclusions. Also the clinical relevance of the statistically significant differences could be provided and discussed.

General discussion included discussion of the results in light of the existing knowledge in this field. However is not very clearly written and it would be beneficial to divide it into parts, which could provide a commentary to different aspects of the performed study. I would also like to read a more detailed comparison with similar studies regarding sample characteristics and comparisons of the results. Also a more concise discussion related to other treatment alternatives would be appreciated. I would also suggest to describe the limitations of the study in the discussion part rather than in the conclusions where limitations are provided. I prefer to have conclusions written in accordance to the aims, because it shows more clearly that the described aims were addressed following the results of the study.

The manuscript is clear and well written, but some parts should be re-written during preparation of the manuscript for a publication, because sometimes the author used too extensively the common language, which is appropriate during oral presentations, but is not applied in scientific publications.

In conclusion, I state, that the submitted thesis positively fulfills the requirements described in art. 13 legal act 1 from 14.03.2003 r. on academic degrees and academic title (Załącznik do obwieszczenia Marszałka Sejmu RP z dn. 2 grudnia 2014 r. – Dz. U. Poz. 1852) and therefore I would like to ask the High Medical and Dental Faculty Board of the Medical University of Wrocław with a request for admission of dr. Ellie Amm to the next stages of the doctoral conduct.

Dr hab. n. med. Ewa Czochrowska

A handwritten signature in blue ink, reading "E. Czochrowska". The signature is written in a cursive, flowing style.