DIGITAL ORTHODONTICS WITH ORTHODONTIC ALIGNERS - CLEARTEK SYSTEM

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ABSTRACT

Currently, most Orthodontic patients would like to be treated with transparent aligners, preferring these to metallic or aesthetic brackets. Thus, it becomes fundamental for orthodontists to master the technique from the initial phases (workflow) to the conduction of cases. Orthodontic treatment with aligners has a number of advantages over conventional ones, as it is more discreet, aesthetic, comfortable, allows easier hygiene and there is no feeding restriction. However, there are some disadvantages such as the need for patient cooperation, and some biomechanical limitations. Some systems have stood out in the market for offering dentists digital planning services and production of orthodontic aligners, making them able to conduct their treatments with aligners more directly and with greater autonomy. Thus, the purpose of this article is to present in a simplified way the Cleartek aligner system and some clinical cases and thus provide subsidies to the orthodontist who intends to use it from planning to clinical follow-up and end of treated cases.

Descriptors: Orthodontic aligners, 3D printer, aesthetic Orthodontics.

INTRODUCTION

Most orthodontic patients would like to be treated by transparent aligners, preferring these to metallic or aesthetic brackets[9]. Although the idea of using plastic aligners for orthodontic treatment emerged in the 1950s[3], only recently the advancement of 3D technology in Dentistry allowed the resources of the CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) system to be used for orthodontic diagnosis, planning and treatment.

Orthodontic treatment with aligners has a number of advantages over conventional ones, as it is more discreet, aesthetic, and comfortable and allows easier hygiene and there is no restriction of feeding. However, there are some disadvantages such as the need for patient cooperation, and some biomechanical limitations.

The EXceed system (Roosikrantsi, Tallinn, Estonia) and its partner in Brazil Cleartek (Aditek, Ribeirão Preto, Brazil) have stood out for offering the services of digital planning and production of orthodontic aligners.

The advantages of using Cleartek begins with the use of a virtual planning system with numerous resources, simple and intuitive and manufactured in Brazil, reducing cost and waiting time, also counting on quality and logistics of a company widely recognized for the quality of services and products used in Orthodontics in Brazil in recent decades.

INDICATIONS

Orthodontic treatment with aligners has some biomechanical limitations, mainly in translation[1], extrusion and rotation movements of rounded teeth[8], closure of extraction spaces, correction of occlusal contacts, and correction of large vertical and anteroposterior discrepancies[7].

Thus, many treatments with aligners aim only anterior alignment, which is the main reason why adult patients seek orthodontic treatment[5] and may even keep the posterior teeth in a position outside the perfect occlusion key.

By the concept of dynamic individual occlusion, if the structures of the masticatory system are functioning efficiently and without pathology, the occlusal configuration is considered physiological and acceptable, regardless of specific dental contacts. Thus, no change in occlusion is indicated[6].

In the case presented here, the patient who was seeking a general aesthetic and rehabilitative treatment presented a Class 2 malocclusion, left subdivision (Figure 1A-F) and previous alignment was planned (Figure 2A-D). A faster, simpler treatment that fulfilled the objectives and maintained the patient's occlusion, considered physiological for him (Figure 3A-F).

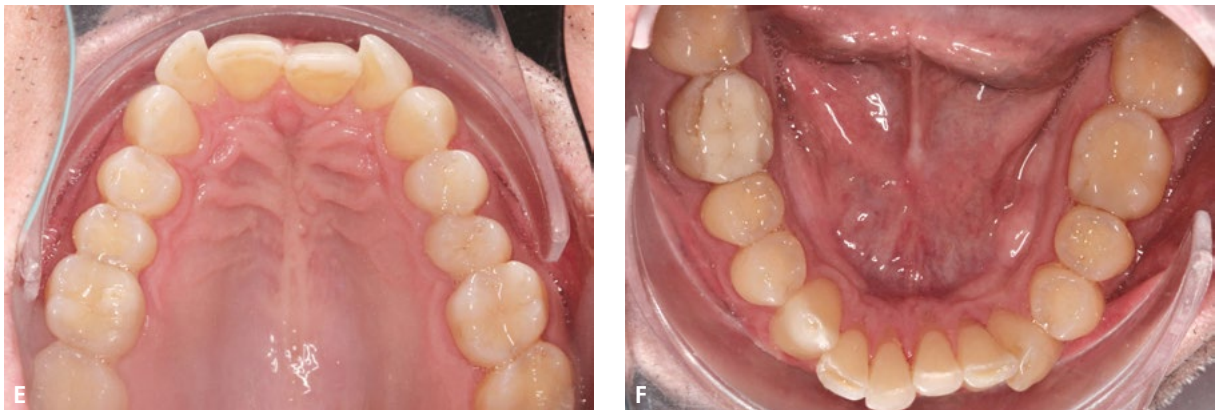


Figure 1 (A-F) – Initial photographs.

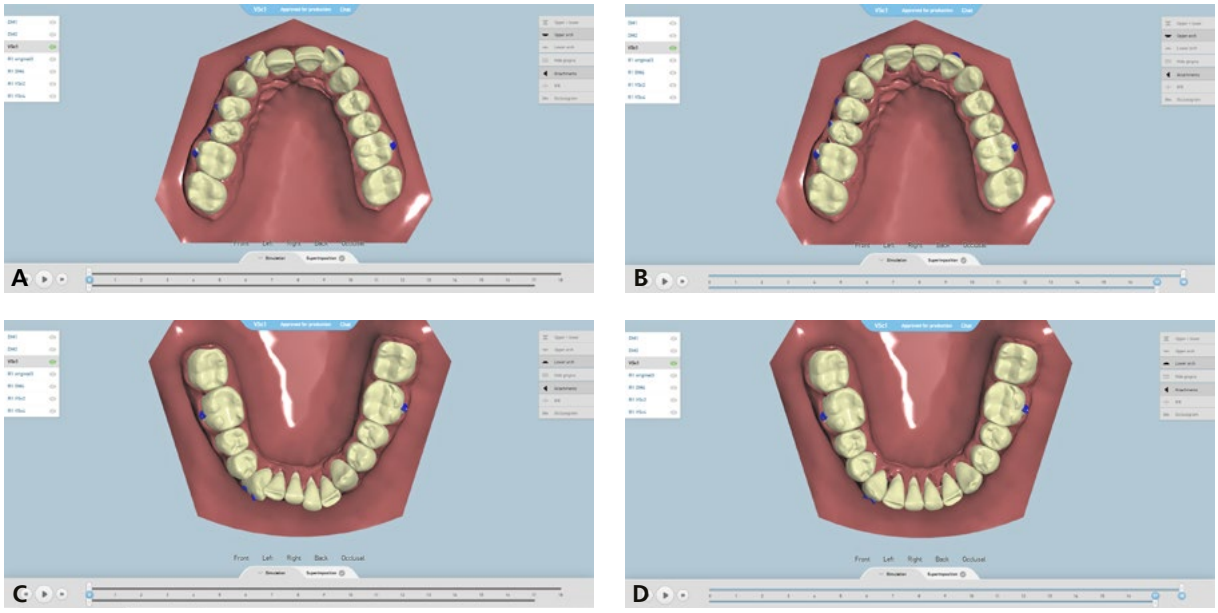


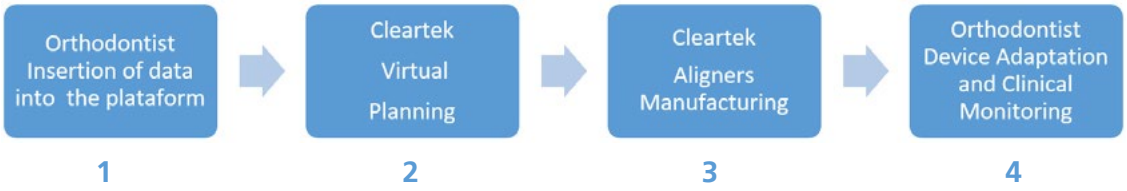
Figure 2 (A-D) – Occlusal view of virtual planning. Planning of 18 aligners in the upper arch and 17 in the lower arch.

Figure 3 (A-F) – Final photographs of the case. It is observed that Class 2 ratio was maintained.

Although the best indications are for simpler cases, aligners allow to treat increasingly complex cases. This will depend on the system used and the professional's experience in relation to the biomechanics field, virtual planning, and the use of ancillary mechanics.

Cleartek Workflow

The workflow in the Cleartek System has 5 phases: Flowchart of system work phases Cleartek.



Step 1 - Inserting a Case into the System

Through the login provided by Cleartek, the orthodontist accesses a platform (Figure 4), where he can enter patient data, photographs, radiographs, treatment plan, digital model files and also put some clinical preferences, such as a method to obtain space (IPR – Interproximal Reduction, Expansion), occlusion which will assist in planning. When it is not possible to have access to patients' arches scan, the physical models can be sent to Cleartek for scanning. It is through this platform that the orthodontist can also track the status of the order.

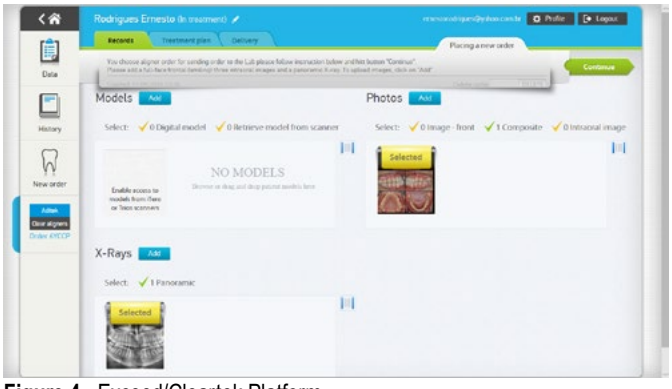


Figure 4 - Exceed/Cleartek Platform.

At the site of the treatment plan, there is an open field in which the orthodontist describes the case planning. This field is important for the communication with the technician who will perform the planning. In addition to this open field, the orthodontist should select the final canine and molar class desired, the presence of implants and prosthesis, as well as the type of aligner trimming and the presence of passive aligners.

Steps 2,3,4 - Virtual Setup, Approval and Production

A few days after entering the data and the case prescription in the system, the orthodontist can through his login in the system access the 3D planning to evaluate the movement, final results, occlusion, overlap, IPR report and number of plates. If he needs to change teeth position, but does not want to use the 3D control (Figure 5), he can request through the chat for the technicians that will make the desired alterations. After patient's setup approval, the aligners will be produced in Brazil by Cleartek and sent to the orthodontist.

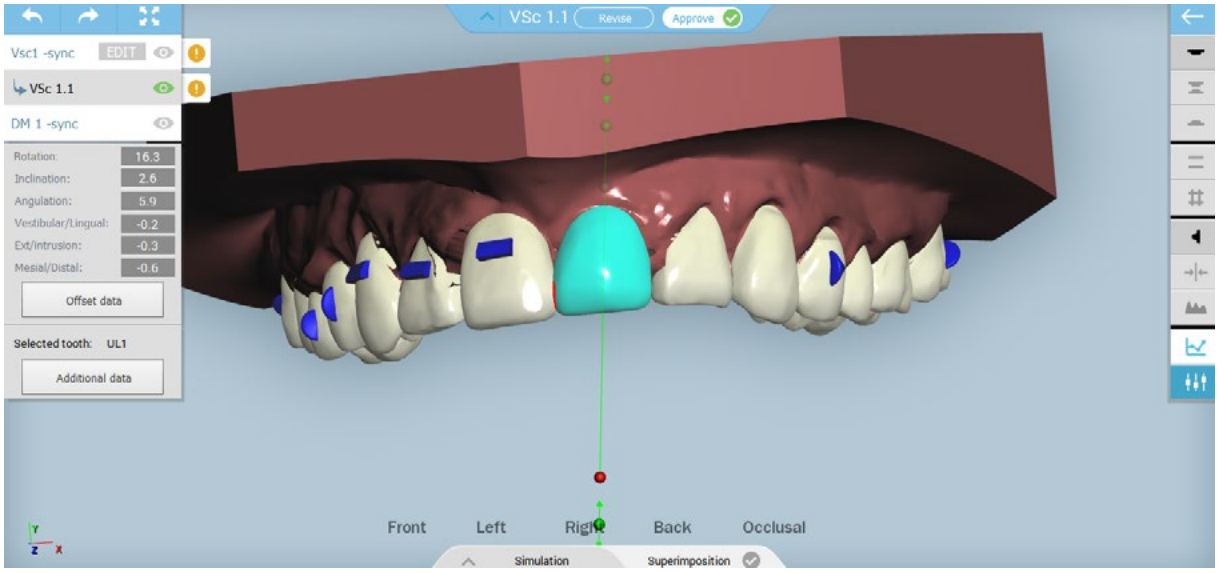


Figure 5 - Editing case through the system.

Step 5 - Clinical Monitoring

The orthodontist receives a box with the treatment material with aligners of each phase and information such as amount and moment of interproximal reduction (IPR) and possible unwanted occlusal contacts. This information can also be consulted in the virtual planning through the platform.

The orthodontist must bond the attachments, adapt the first plate, and deliver the next aligner, performing monthly or at longer intervals follow-up depending on the case. During clinical follow-up, the orthodontist must perform the programmed IPR, check progress, compare with virtual planning and intervene whenever he deems necessary.

Attachments

The aligners exert their force by "pushing" the teeth to the proper position and for this resin accessories (attachments) are bonded to the tooth, providing a force application surface. Attachments can also be used to give more stability to the aligner in the mouth and serve as anchorage for some defined movements.

IPR and Expansion

In orthodontics with aligners, if it is not planned, there will be no arches expansion as an "adverse effect" as it occurs most often with traditional fixed appliances. As teeth are rigid structures and do not deform, there will be no success in teeth movement if there is lack of space. The solution for crowding therefore involves having space for poorly positioned teeth, through arch expansion, interproximal reduction or in more extreme cases even tooth extraction.

In the case treated with aligners (Figure 6A-D) attachments were used and localized IPR was planned to correct the alignment and improve arches midline relationship.

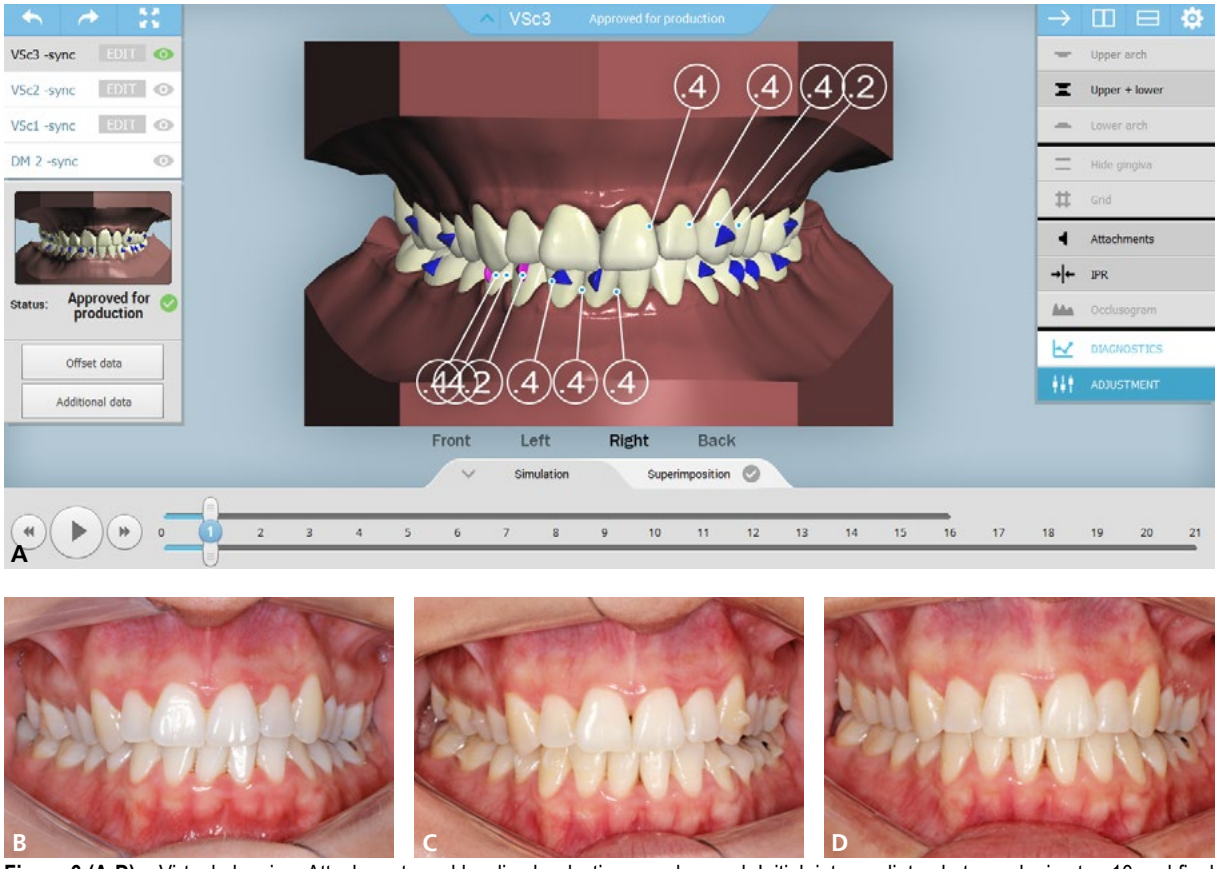


Figure 6 (A-D) – Virtual planning. Attachments and localized reduction are observed. Initial, intermediate photographs in step 10 and final photograph. There is an improvement in the midline.

Ancillary Mechanics

Some movements are less predictable when using orthodontic aligners. To continue with the virtually planned treatment, some ancillary mechanics can and should be used.

Thermo pressure Pliers

The pliers for aligners activation (Figure 7) were developed to perform small movements. They generate bulges that press the tooth in the desired direction. If possible, new aligners must be made to perform activations. In the Cleartek system, the orthodontist receives the printed model of each phase. Thus, using a plasticizer, he is able to produce aligners replacement in the office. The manufacturing of a new aligner implies using a new plastic that has not lost its elastic capacity.

Figure 7- Activation of the aligner with thermo pressure pliers.

Elastics and Skeletal Anchorage

Elastics can be used to assist movements such as extrusion, which have a low success rate with[4] aligners (Figure 8A-B) and even rotation through force torque (Figure 9A-C).

Molar intrusion movements can also be used with the support of orthodontic mini-implants (Figure 10A-B).

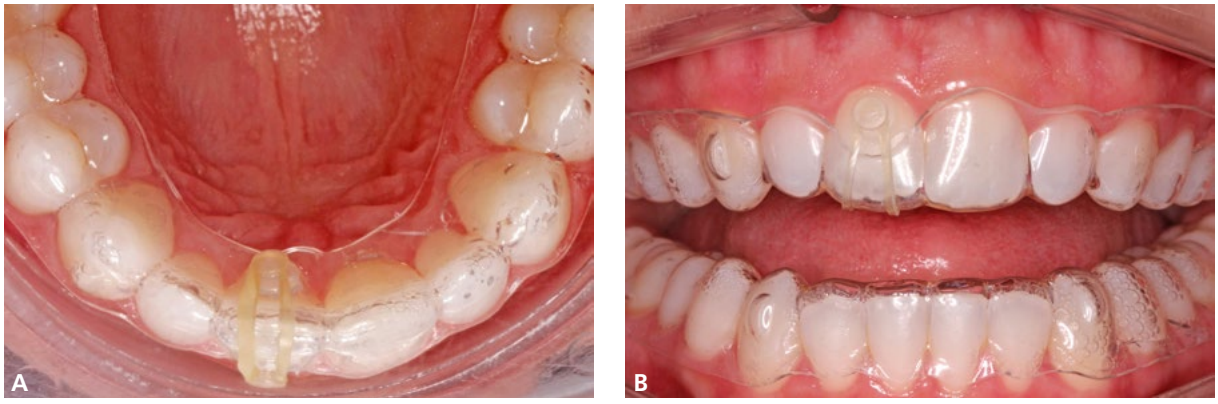


Figure 8 (A-B) – Extrusion of central incisor assisted with elastic and buttons.

Figure 9 (A-C) – Force torque for rotation correction of tooth 43 associated with aligners.

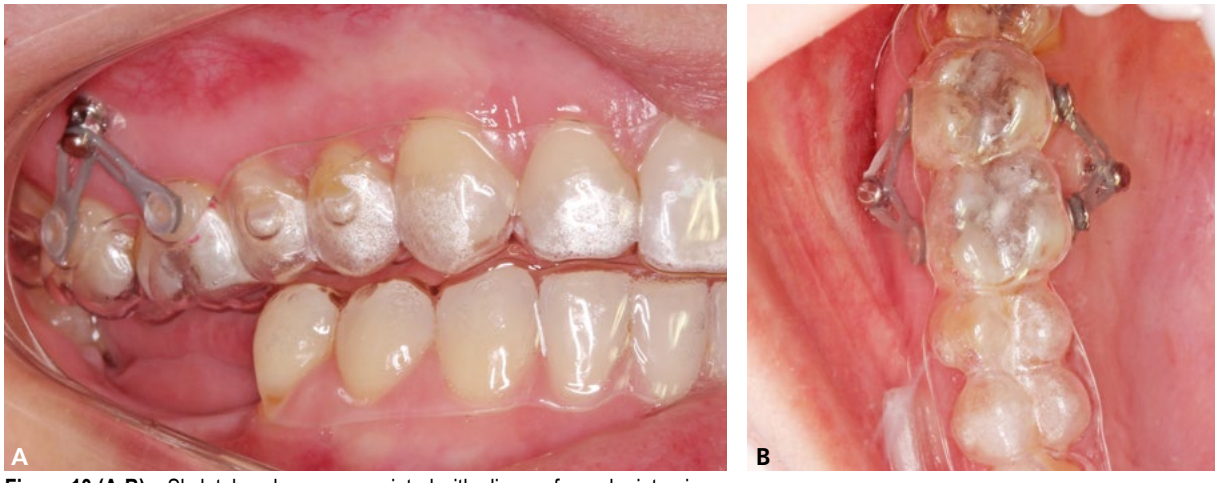


Figure 10 (A-B) – Skeletal anchorage associated with aligners for molar intrusion.

CONCLUSION

The great demand for aesthetic treatments has made orthodontic aligners increasingly an option for treatment in the office. Thus, it becomes fundamental for orthodontists to master the technique from the initial phases (workflow) to the conduction of cases. Like all new technology, one should always be aware of the indications, contraindications, and limitations of treatments. Thus, the use of aligners in the office routine is an efficient and versatile proposal, which when well indicated and used correctly, as in the cases found in this article, can lead to satisfactory clinical results.

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