A06

Web content

The Invisalign® experts' look at use and predictability of Invisalign® treatments and ClinCheck® software

edited by
Silvia Caruso
Roberto Gatto

Contributors
Sara Caruso, Silvia Caruso, David Couchat
Sam Daher, Chisato Dan, Todd Dickerson
Alessandro Mario Greco, Guido Macchiarelli
Kamy Malekian, Pietro Manzini, Stefano Marini
Simonetta Meuli, Federico Migliori, Alessandro Nota
Kenji Ojima, Matthias Peper, Marcel Pordes
Marco Severino, Simona Tecco, Stefano Zema

Aracne editrice

www.aracneeditrice.it
info@aracneeditrice.it

www.gioacchinoonoratieditore.it
info@gioacchinoonoratieditore.it

via Vittorio Veneto, 20
00020 Canterano (RM)
(06) 45551463

ISBN 978-88-255-0272-5

Ist edition: September 2019

Contents

7 *Preface*
by Guido Macchiarelli

9 *Introduction*
by Sam Daher

11 Invisalign® ClinCheck: Use and Predictability of Movement
Federico Migliori, Matthias Peper

43 Managing open and deep bite treatments with the Invisalign® system
Alessandro Mario Greco

53 Using the Invisalign® system to manage orthodontic treatments before and after Class III surgical approach
Pietro Manzini

71 Using the Invisalign® system to manage Interceptive Orthodontic Treatments
Pietro Manzini

117 The Promise of Light Accelerated Orthodontics with OrthoPulse®
Silvia Caruso, Todd Dickerson, Marcel Pordes

127 Acceleration: Achieving Predictable Results on Bicuspid Extraction Cases with Invisalign® and Photobiomodulation with OrthoPulse®
Kenji Ojima, Chisato Dan

133 Management of impacted canines with the Invisalign® system
David Couchat

147 Class III treatment and lower molar distalization
Kamy Malekian, Silvia Caruso

169 Temporomandibular Joint adaption during the treatment with Invisalign®
Silvia Caruso, Alessandro Nota, Marco Severino, Simona Tecco

187 What is the new iTero Element scanner?
Stefano Marini

205 Accelerated tooth movement by alveolar corticotomy
Sara Caruso, Silvia Caruso, Matthias Peper, Stefano Zema

211 Aligner treatment for growing patients: Invisalign® Teen
Simonetta Meuli, Alessandro Nota, Matthias Peper

219 Authors

The Invisalign® provider's look at use and predictability of Invisalign® treatments and ClinCheck® software
ISBN 978-88-255-0272-5
DOI 10.4399/978882550272 51
pag. 7–8 (september 2019)

Preface

Guido Machiarelli*

This book edited by Prof. Roberto Gatto and Dr.ssa Silvia Caruso, of the University of L'Aquila, has the aim to create a rigorous scientific approach in the use of the orthodontic technique developed by Align-technology: Invisalign technique. In the last decades the digitalization of dentistry has grown and the change from the reactive models used with analogical approach to the proactive model used with new digital techniques has been a revolution in all medicine's fields, especially in Dentistry. University has the mission of creating new protocols and helping doctors in their scientific growth. This book, indeed, is perfectly oriented in this vein. Especially, also thank to its international collocation is able to present at best all related clinical protocols.

In addition, it is a practical guide for the right use of the "ClinCheck" softwares during the diagnosis. This book is something quite new, it represents the effort of putting together all the best practices of appreciated professionals in order to provide an up to date guide for all Doctors firstly approaching or yet using Invisalign technique. This compendium provides clear and exhaustive explanations about main aspects and evolution of these digital protocols that show the centrality of Orthodontist and his crucial role in everyday practice and patient management.

In digital communication era nothing like than Scientific Method and proven results could demonstrate the importance of a correct information that this book aims to provide.

I really think that this an important and original tools that will be of great impact for Doctor formation in this particular, but essential field

* Principal of the Department of Clinical Medicine, Public Health, Life and Environment Science at University of L'Aquila.

of orthodontics. An example of "good practice" for our Odontostomatology Team, that once again serve at the best our Department and our University as well.

The Invisalign® provider's look at use and predictability of Invisalign® treatments and ClinChek® software
ISBN 978-88-255-0272-5
DOI 10.4399/97888255027252
pag. 9–10 (september 2019)

Introduction

Sam Daher*

"Am I a candidate for Invisalign®?" A question commonly asked in dental and orthodontic offices around the world, albeit in different languages, in the last decade. There is no doubt that clear aligner therapy has come a long way in the last two decades; Invisalign®, in particular, has been a pioneer in the field of clear aligner treatment.

Over the last 15 years, I have personally and directly experienced, and contributed, to the advent of the Invisalign® system. I have witnessed the maturation and improvement of this treatment modality, to a point where I can comfortably predict that clear aligner treatment is the future of orthodontics. Period.

Invisalign® is not just an appliance; it is an orthodontic system that can be used to treat full complex cases – with or without the use of adjuncts – and can provide an impeccable finish akin to any fixed appliance orthodontic system. What is required, though, is a good knowledge of the biology and physiology of tooth movement, sound biomechanical principals, and lastly experience with the Invisalign® system, as well as its strengths and weaknesses.

Invisalign® remains an orthodontic system, and knowledge limited to its software animation is not merely enough to obtain excellent results. The treating doctor, whether a general practitioner or specialist in orthodontics, will certainly need to gain enough experience to acquire the know–how of the ClinCheck® software, but that is not merely enough to properly diagnose and execute a bespoke treatment plan for a particular malocclusion for a particular patient.

Clear aligners, along with several features such as optimized attachments, Power Ridges, Pressure Points, virtual c–chains, virtual gable bends, anchorage preparation, can certainly provide a force system

* Certified Specialist in Orthodontics and Dentofacial orthopedics.

capable of executing crown and root movement, and create moments and couples sophisticated enough to control tooth movement far beyond simple tipping.

Any type of malocclusion can be treated with Invisalign®, provided that a good diagnosis and the right treatment plan have been formulated to treat the specific malocclusion in question. Compliance remains the main challenge, as is the case with any removable orthodontic appliance. A light, continuous force with multi–point force application can be provided by the aligner to tackle even the most difficult malocclusions.

Compared to braces, the benefits of aligners are obvious and evident: esthetics, comfort, longer visit intervals, absence of "white spots" decalcification, no dietary restrictions, lack of emergency visits, etc...

The demand for clear aligner therapy has become so popular that many "do–it–yourself' companies are on the rise. Unfortunately, these companies are profit–driven, and patient well–being does not top their priority list. The answer to protecting our beloved specialty from these predators and, more importantly, to protect our patients' welfare, it behooves us to understand and properly use the most–advanced clear aligner system, Invisalign®, properly and efficiently to diagnose and treat our patients.

I invite to read this book with an open mind and an open heart. There are always several approaches to treating a malocclusion, and this book will discuss some efficient ways but may not be the only way. It is meant to share experience between colleagues for the betterment of our discipline, and if, along the way, it triggers questions, then the book would have succeeded in reaching its ultimate goal.

The Invisalign® provider's look at use and predictability of Invisalign® treatments and ClinChek® software
ISBN 978-88-255-0272-5
DOI 10.4399/97888255027253
pag. 11–42 (september 2019)

Invisalign® ClinCheck

Use and predictability of movement

Federico Migliori*, Matthias Peper**

1. Introduction

Since its foundation in 1997 by two Stanford University students, Align Technology has revolutionized the way we had been practicing orthodontics by introducing the Invisalign® system, which uses transparent aligners instead of conventional brackets, and a software which allows for digital planning of orthodontic movements and was subsequently given the name of ClinCheck. These two aspects of this technique, however, have played very different roles in this technique's adoption.

In recent years, the aligners have been an increasingly widespread solution for adults and adolescents who expressed the desire to resort to aesthetic and comfortable alternatives to conventional fixed appliances (Rosvall *et al.*, 2009, Walton *et al.*). The use of a removable device has also led to minimizing the adverse effects of traditional orthodontics leading to periodontal diseases by allowing patients to easily perform oral hygiene procedures (Levrini *et al.*, 2013; R.–R. Miethke & Brauner, 2007).

The idea of being able to offer orthodontic treatments to their patients, which is more aesthetic, comfortable and allows for better oral hygiene and periodontal health (Rossini, Parrini, Castroflorio, Deregibus & Debernardi, 2015b) are still the main reasons pushing

* Orthodontist. Clinical Speaker and member of the European Advisory Board for Align Technology.

** Master Dental Technician. Former Clinical Team Manager Central Europe at Align Technology and founder of invisolution dental.

new dentists and orthodontic specialists to approach this technique, and today has more than 54,000 active suppliers around the world (Align Technology, 2017).

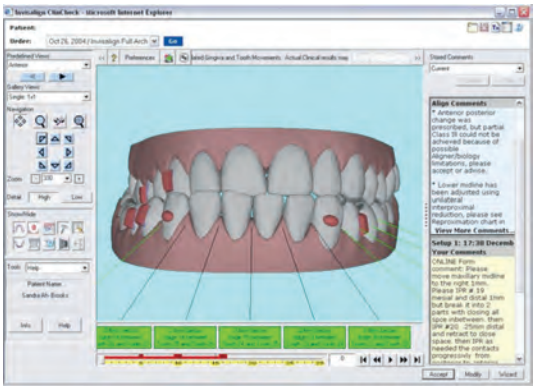

Figure 1.

Obligatory use of the ClinCheck software, however, represents a source of fear for many who first look into this technique; a complete virtual set–up that allows us to program and manage in full autonomy every single aspect of our orthodontic treatment. Align uses PVS impressions from the physician to render a 3–dimensional virtual model (.stl file), but given the increasing spread of intra–oral scanners that directly create this file, this step will tend to disappear in the future. These virtual models are then imported into Align's patented three–dimensional modeling software and a digital simulation of the malocclusion treatment is created. The doctor's prescription is followed to reach the alignment and occlusion required and at that point the dental movements are divided into individual steps, following detailed protocols. After the physician reviews and approves the ClinCheck treatment plan, precise molds of the teeth for each treatment step are built using a process called stereolithography. These models will then produce a complete set of aligners, which, when finished and numbered, are packaged and shipped to the physician's practice (Wong, 2002).

What is usually not considered is that this mandatory step, along with the great expansion that Invisalign® has had over the last 20 years, has been a major contributor to the transition to Digital Orthodontics.

Since 1997, more than 4.2 million patients (Align Technology, 2017) have been treated by using a virtual set–up, and for many dentists and orthodontists, this has been the first purely digital approach to orthodontic treatment.

Since 2015, with the introduction of ClinCheck Pro and 3D controls, the virtual set–up can be managed directly by the physician, by modifying in detail the position of each tooth. This has revolutionized the way we face and modify our ClinCheck treatment plan, minimizing written communication with the technicians responsible for developing the treatment plan and applying our requests, allowing us to be more precise and quick, while at the same time be more considerate of what we see on the screen.

This chapter will give you an overview on the main features of this software and their application, including tips and tricks to keep in mind when reviewing your treatment plans. In the second part, we will analyze the predictability of individual movements, which is a fundamental aspect to consider when evaluating a ClinCheck treatment plan, with a thorough analysis of literature, which in the last few years has started to give us additional information on this technique.

Figure 2.

2. ClinCheck Pro

The first step in Invisalign® treatments does not differ in any way from that of any other orthodontic treatment. Arriving at a diagnosis and developing an appropriate treatment plan by thoroughly examining our patient and their intra and extraoral photographs and radiographs always represent the starting point.

However, since we have to receive a virtual simulation of programmed movements, the only additional step is to bring Align back to the treatment plan by filling out the appropriate digital prescription to the chosen Invisalign® treatment option (i7, Lite, Full or Teen). Regarding impressions, the precision of the system forces the use of silicones that are more resistant to possible deformations during shipment (Polivinylsiloxane – PVS). The alternative is to directly scan the arches via an intraoral scanner, which undoubtedly represents the future in our profession.

Once the first version of the digital treatment plan has been received, one of the most important steps of this technique begins, which is the revision of the dental movement simulation within the ClinCheck software. It is crucial to dedicate some time to this step. Although the initial indications are made as accurately as possible, it is unlikely that the first version we receive will fully meet our requirements. For this reason, we need to take advantage of the many options that ClinCheck Pro offers us today, both through 3D Controls, that give us the ability to move the individual dental elements directly into the different space planes, and through text comments that create a direct communication line between the doctor and the technician in charge of the changes requested.

3. ClinCheck Pro – Treatment plan review

With increasing experience with this technique, each physician will develop a personal checklist for reviewing their ClinCheck treatment plans. Nevertheless, before moving on to the actual editing of the planned dental movements, it is always good to check some key elements that are essential to get started with our ClinCheck review.

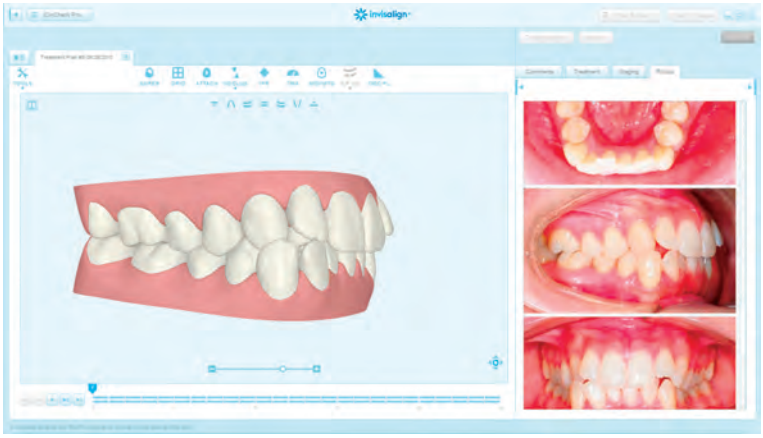

Figure 3.

3.1. *Initial occlusion*

The first and most important aspect at the beginning of a ClinCheck treatment plan review is to compare the virtual model to the patient's actual intra–oral condition (starting point).

Invisalign®'s technicians use the AutoBiteSet software, which creates an ideal occlusion for the digital models of upper and lower arches. Additionally, the occlusion is checked by comparing the models to the photographs sent by the doctor; but despite this double control, there may sometimes be discrepancies between the virtual model and the reality.

One way to improve the accuracy of the system is to send occlusal photographs (upper and lower) that depict occlusal contact points, a factor that allows the software to make the two arches even more precise. However, if inaccuracies are found, it is crucial to communicate this to the technicians and send new photographs to support the changes.

Beginning with a wrong occlusion would mean incorrectly planning all the movements of our orthodontic treatment, risking for example movements being planned insufficiently to reach the desired or sometimes excessive ratio of class. Another useful function, which would lose its full meaning from an incorrect occlusion, is the one that allows us to evaluate all occlusal contacts between the two arches, from the beginning to the end of the treatment.