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REGINALDO TREVISI ZANELATO

STATE-OF-THE-ART ORTHODONTICS

**SELF-LIGATING APPLIANCES,
MINISCREWS AND
SECOND MOLAR EXTRACTIONS**



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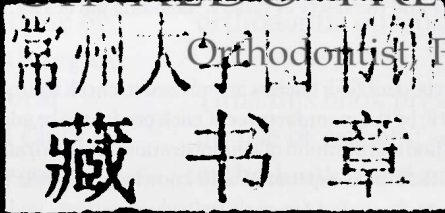
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AND SECOND MOLAR EXTRACTIONS**

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Acknowled Preface

Current technological advances have had a major impact on contemporary orthodontics, allowing the clinician to provide quality treatment with favorable esthetic results in a shorter time period. Indeed, patients are increasingly seeking orthodontic treatment that does not negatively affect the facial esthetics. Thus, clinicians need to have sound scientific knowledge and appropriate technology at hand to be able to offer optimal treatment to each patient.

The use of esthetic, low-friction orthodontic appliances and orthodontic miniscrews allows faster and more efficient treatment with a reduced risk of the side effects of conventional orthodontic mechanics and tissue damage caused by the orthodontic tooth movement. These appliances also address the issue of lack of cooperation on the part of patients with regard to use of headgear and other traditional intraoral anchorage devices, when treating Class II and Class III malocclusions or severe crowding. Both adolescent and adult patients often refuse to wear these appliances as they are not considered esthetic. This book emphasizes the importance of facial esthetics during orthodontic treatment by describing intraoral anchorage systems that help eliminate the requirement for headgear and also diagnosis, treatment planning and orthodontic biomechanics with second molar extractions. All these are key issues

that patients take into consideration when deciding whether or not to undergo orthodontic treatment.

The development of the metal SmartClip™ self-ligating appliance led to the possibility of developing the Clarity™ SL Self-Ligating Appliance. This appliance features the same characteristics as the SmartClip™ self-ligating metal appliance, however, it also fulfills the esthetical needs of patients.

Finally, the book also discusses the concept of second molar extractions in orthodontic treatment. This is a useful option in carefully selected patients in whom the erupting third molars would eventually be a good substitute for the second molars extracted for orthodontic purposes.

Thus this book presents a treatment philosophy based on use of esthetic self-ligating appliances and orthodontic miniscrews for anchorage, and treatment with second molar extraction. All these factors allow the clinician to provide orthodontic treatment with more predictable results and efficient sliding biomechanics with the application of low force levels and more favorable biological responses.

Hugo Trevisi
Reginaldo Trevisi Zanelato

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CHAPTER

1

Low-friction esthetic brackets: the Clarity™ SL Self-Ligating Appliance System



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Introduction

A desire for orthodontic treatment that does not adversely affect facial esthetics, both during and after treatment, is increasingly seen in the orthodontic practice. The first esthetic appliances date back to the 1970s and were manufactured in plastic.¹⁻³

The Clarity™ appliance, which was released in 1996, had distinctly different characteristics from the other appliances available at that time. The polycrystalline ceramic Clarity™ brackets featured a metal slot, and this bracket design provided excellent facial esthetics with very good sliding biomechanics and precise tridimensional control of teeth during orthodontic

treatment. These benefits aimed to fulfill the requirements of an esthetic appliance as could be approved by the orthodontist: that is, it has to allow good torque, tip and rotational control, and be comfortable for the patient. It also has to be easy to place and to remove, exhibit reliable bond strength, and provide a good end result of the orthodontic treatment.

While there are several obvious advantages of esthetic appliances, there are also some disadvantages. One major issue is the change in color of the elastic modules used to hold the archwire in the bracket slot, which is caused by poor oral hygiene or the eating habits of the patient (Figs 1.1, 1.2 & 1.3). The patients



Fig. 1.1

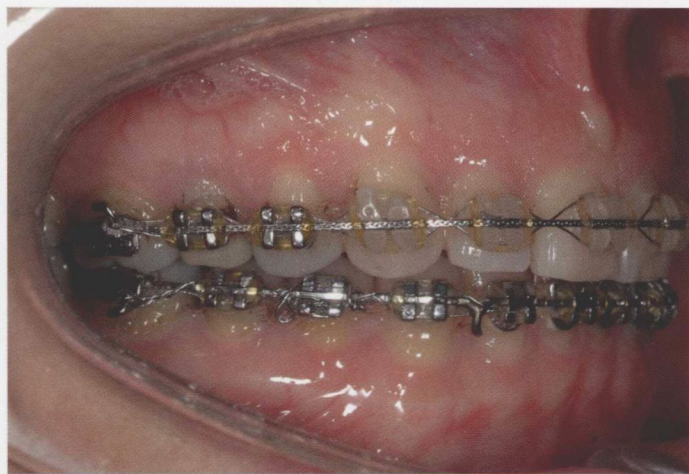


Fig. 1.2

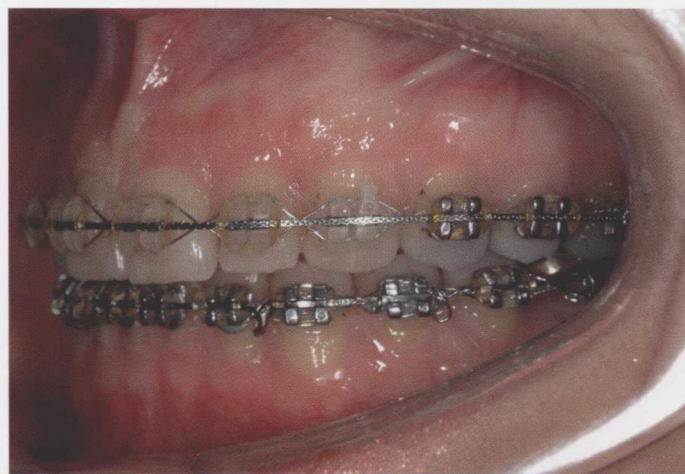


Fig. 1.3

Figs 1.1, 1.2 & 1.3 Change in color of the elastic modules used with conventional appliances, worsening facial esthetics during the course of orthodontic treatment.

who most often experience this problem are those who drink coffee, tea, red wine, etc. on a frequent basis, as well as patients who smoke. These patients have to come back to the office more often simply for new elastic modules in an effort to maintain the esthetics of their appliance.

When the SmartClip™ Self-Ligating Appliance was released in 2004, the possibility of having a Clarity-style appliance featuring the characteristics of a self-ligating appliance became apparent. However, this appliance would not only have to have the same characteristics as the metal⁴ self-ligating appliance, but would also have to address the needs of patients who were looking for a more esthetic smile during the treatment. In 2007, new advances in technology made it possible to manufacture the **Clarity™ SL Self-Ligating Appliance**. It featured the same characteristics as the conventional Clarity™ appliance, e.g. a ceramic bracket with a metal slot and a unique debonding mechanism. The Clarity™ SL Self-Ligating Appliance utilizes the same manufacturing technology as the metal self-ligating appliance, with Nitinol clips on the mesial and the distal bracket wings.

Characteristics of the appliance

The Clarity™ SL Self-Ligating Appliance System, which is based on the original concept of the straight-wire appliance, features mid-size, rhomboidal brackets with twin wings. It is a passive bracket system – the archwire is able to slide freely in the bracket slot, with less binding between the wire and the bracket slot when using undersized wires.

The Clarity™ SL Self-Ligating bracket is composed of three parts that are manufactured separately: the ceramic bracket body, the metal slot and the Nitinol clips (Fig. 1.4). The bracket body is manufactured in

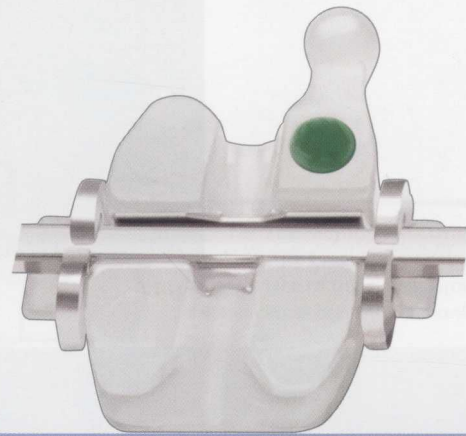


Fig. 1.4 Clarity™ SL Self-Ligating Appliance bracket: note the ceramic bracket body, metal slot and the mesial and distal clips.

ceramics and the bracket slot is produced in metal and inserted in the bracket base. The Nitinol clips are laser cut and pressed onto the mesial and the distal sides of the bracket. The clips are designed to be fatigue resistant while both engaging and removing archwires. As mentioned above, the bracket system offers the same features as the conventional appliance, enabling the use of elastic chains, metal and elastic ligatures and all the other attachments that are usually used with the conventional approach.

The Clarity™ SL Self-Ligating Appliance System prescription

As mentioned above, the Clarity™ SL Self-Ligating Appliance System features a bracket designed for sliding mechanics, that is when using a .019/.025

archwire in the .022/.028 bracket slot. This is usually the last archwire to be used in treatment. The basic orthodontic concepts underlying the use of the Clarity™ SL Self-Ligating Appliance System are the same as those for the SmartClip™ Self-Ligating Appliance System (Figs 1.5, 1.6 & 1.7).



Fig. 1.5

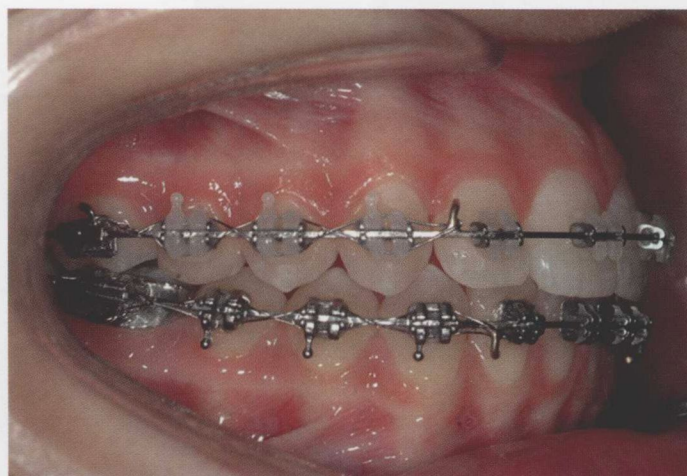


Fig. 1.6

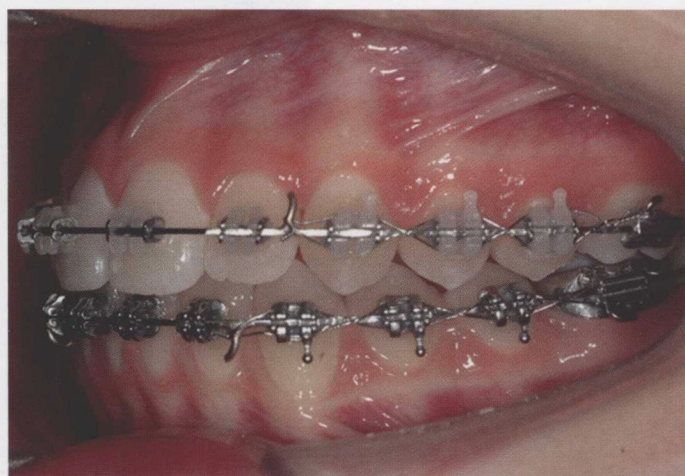


Fig. 1.7

Figs 1.5, 1.6 & 1.7 Clarity™ SL Self-Ligating brackets in the upper arch and the SmartClip™ Self-Ligating Appliance in the lower arch.

Mesiodistal angulation

The basic Clarity™ SL bracket design is the same as the conventional brackets – rhomboidal brackets with built-in angulation. The rhomboidal shape makes bracket positioning easier, along with the use of the individualized bracket positioning system⁴⁻⁶ (Figs 1.8, 1.9 & 1.10).

The rhomboidal bracket system used with the MBT™ Versatile + Appliance System orthodontic prescription

and the individualized bracket positioning system prevents undesirable proclination of the anterior teeth, increased overbite and anchorage loss during the aligning and leveling stages of the orthodontic treatment. The individual bracket positioning system allows positioning of the teeth with due regard to their natural morphology, thus bringing stability to the occlusion that is attained at the end of the treatment.

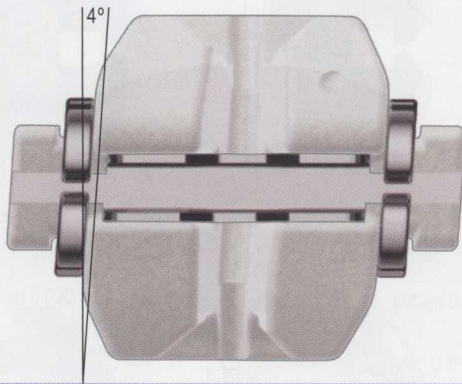


Fig. 1.8 The Clarity™ SL appliance features rhomboidal-shape brackets. This bracket system favors accurate bracket positioning on the facial surface of each tooth.



Fig. 1.9 The rhomboidal Clarity™ SL brackets. The bracket is positioned on the facial surface of the clinical crown using the individual bracket positioning line as a reference.

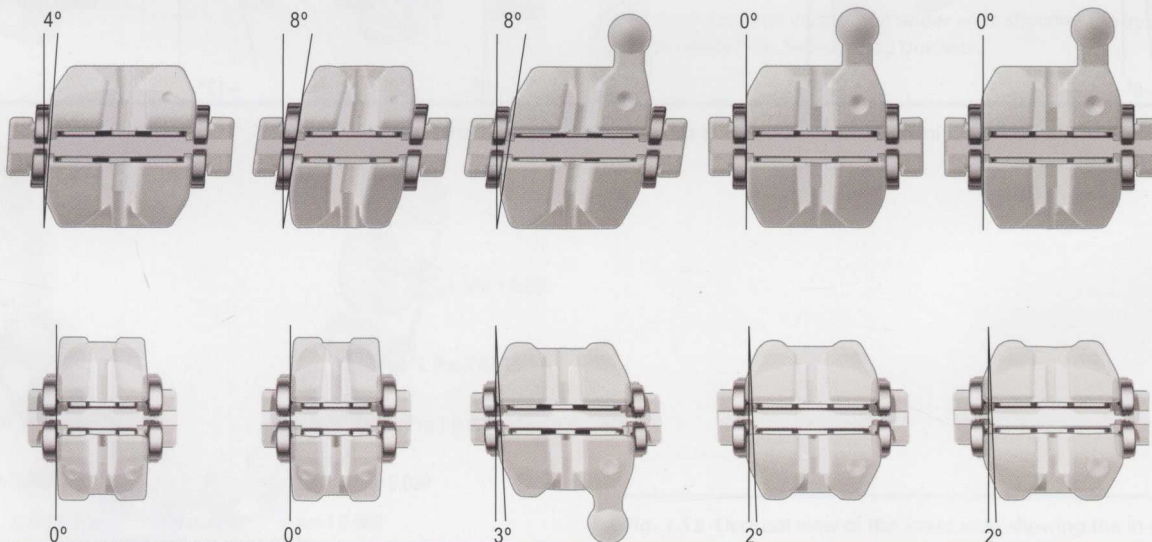


Fig. 1.10 The built-in angulations in the Clarity™ SL Self-Ligating upper and lower brackets.

Inclination (torque)

A highly sophisticated manufacturing process allows the addition of a metal slot into the ceramic bracket body of the Clarity™ SL bracket. The reliability of an orthodontic appliance depends on the degree of expression of the torque that is built into the bracket

base and the bracket slot. A metal slot imparts greater strength to the bracket and allows full torque expression. Furthermore, the metal slot facilitates good sliding of the archwire during the orthodontic treatment by reducing friction.^{7,8} The Clarity™ SL appliance also features built-in torque in the metal slots (Fig. 1.11).

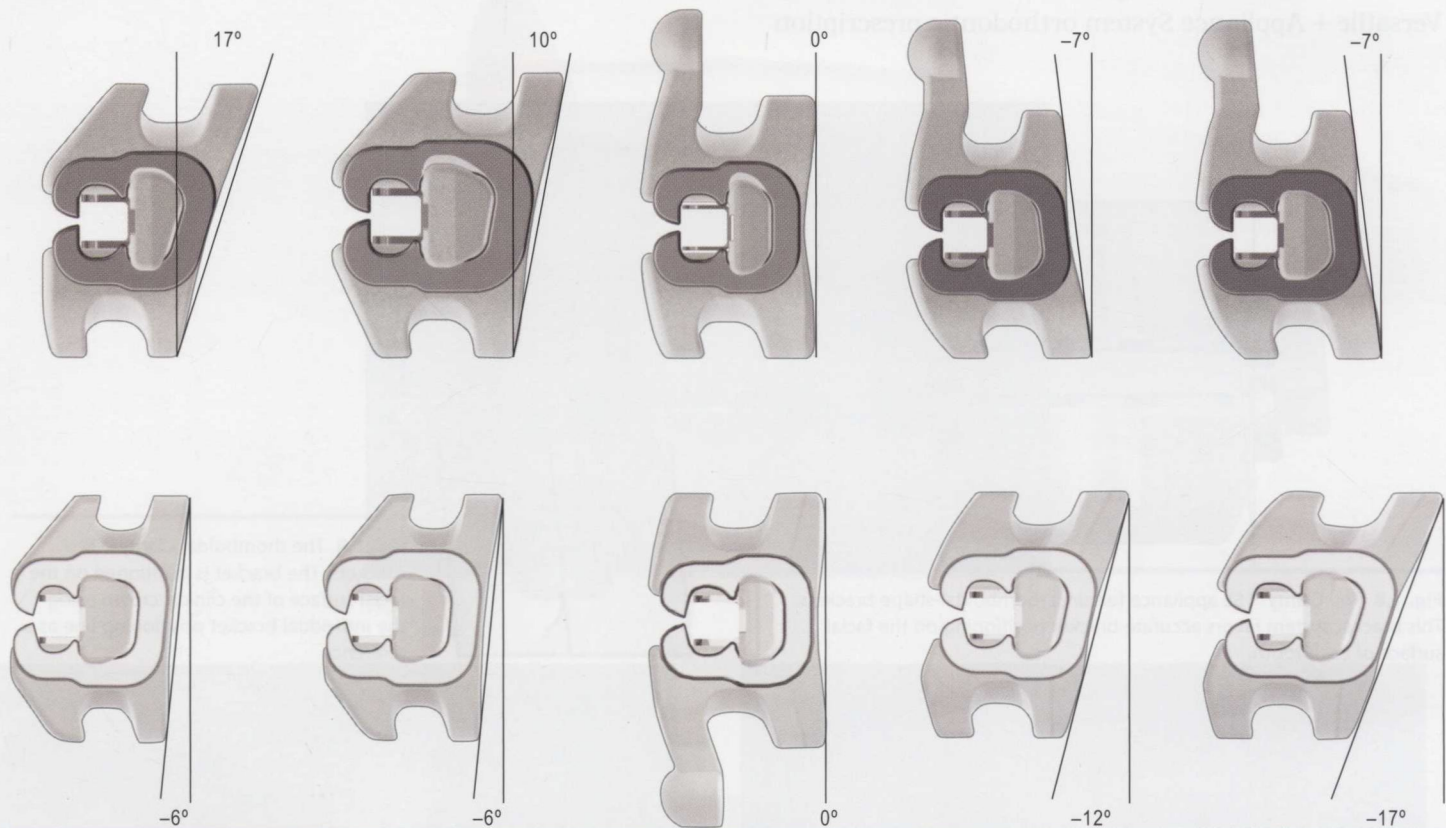


Fig. 1.11 Profile view of the upper and lower Clarity™ SL brackets showing the torque prescriptions.

In-out

From the horizontal aspect, the functional harmony of the orthodontically created occlusion is determined by the in-out built into the appliance, the shapes of the archwires used, and the coordination achieved between the upper and the lower dental arches. The interarch relationships, including the anterior and the canine guidance, and the posterior relationship between the centric cusps and the

buccal-occlusal and lingual-occlusal marginal ridges depends on good coordination between the upper and lower arches,⁵⁻⁸ as well as the in-out prescription of the orthodontic appliance (Figs 1.12 & 1.13). The Clarity™ SL Self-Ligating brackets have been manufactured with this relationship in mind, which allows the simultaneous use of conventional appliances and the SmartClip Self-Ligating appliance in the same patient during orthodontic treatment (see Figs 1.5, 1.6 & 1.7).

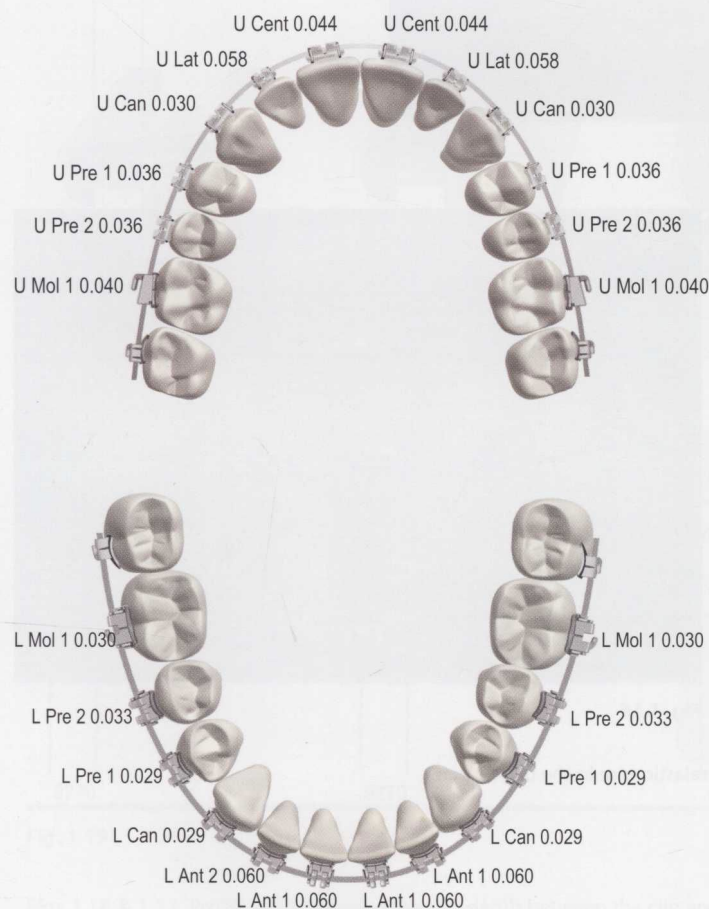


Fig. 1.12 Occlusal view of the upper arch, showing the in-out prescription of the Clarity™ SL Self-Ligating brackets.

Fig. 1.13 Occlusal view of the lower arch, showing the in-out prescription of the Clarity™ SL Self-Ligating brackets.

Slot depth

As mentioned above, the Clarity™ SL Self-Ligating appliance is a passive appliance, that is, the clip does not exert active pressure on the archwire, unless it is required, e.g. to correct rotations. This allows the use of lower forces during the alignment and the leveling

stages of treatment (Figs 1.14, 1.15 & 1.16).^{9,10} These stages are completed when the bracket slot is fully filled by the orthodontic archwire in the horizontal plane. The .019/.025 rectangular archwire (Fig. 1.17) or an .016 archwire overlapping the .014 round Nitinol archwire should be engaged on the same visit (see Figs 1.34, 1.35 & 1.36 below).

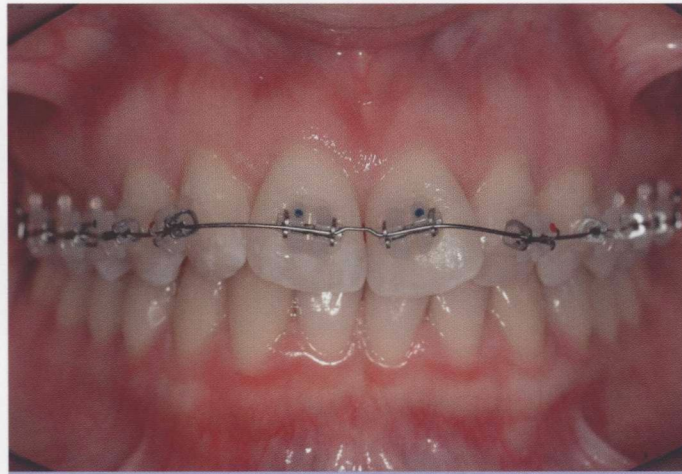


Fig. 1.14

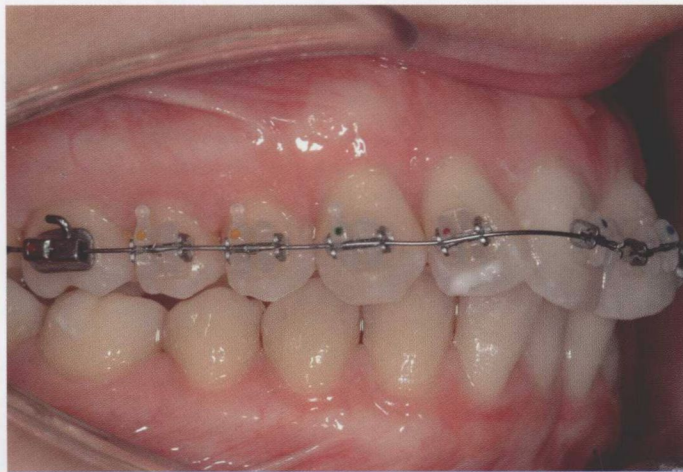


Fig. 1.15

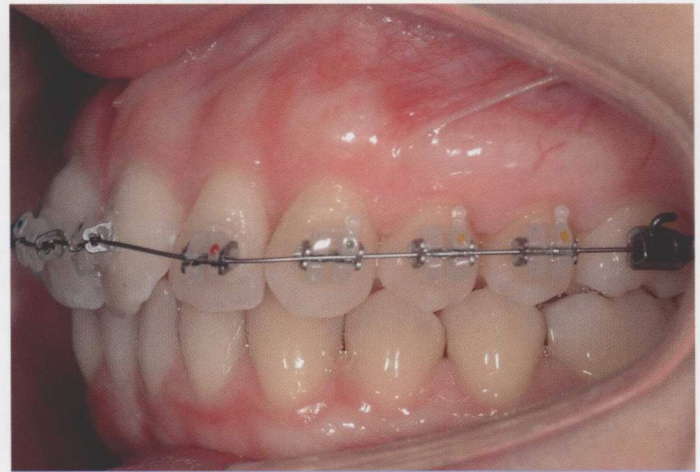


Fig. 1.16

Figs 1.14, 1.15 & 1.16 Initiating the aligning stage with a .014 round Nitinol superelastic wire in the upper arch.

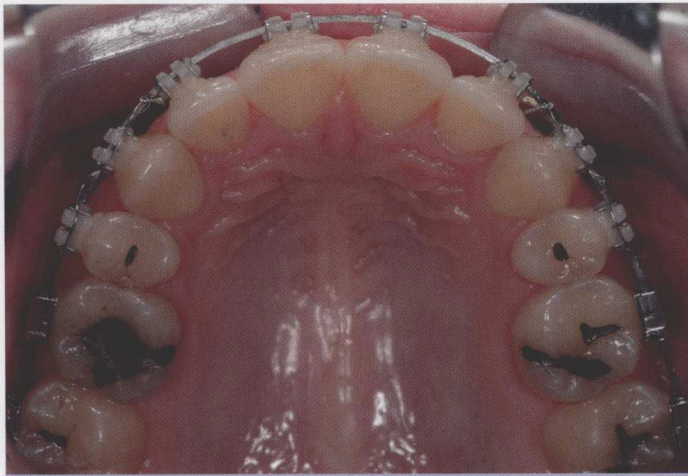


Fig. 1.17 Occlusal view of the upper arch with a .019/.025 rectangular Nitinol archwire in place. Note the good fill of the slot from the horizontal aspect.

The depth of the Clarity™ SL Self-Ligating appliance slot measures .0270 inches between the clip and the bottom of the bracket slot in the lower incisors, and .0275 inches in the remaining teeth. This has been done in order to have improved rotational control at the beginning of treatment (Figs 1.18 & 1.19).

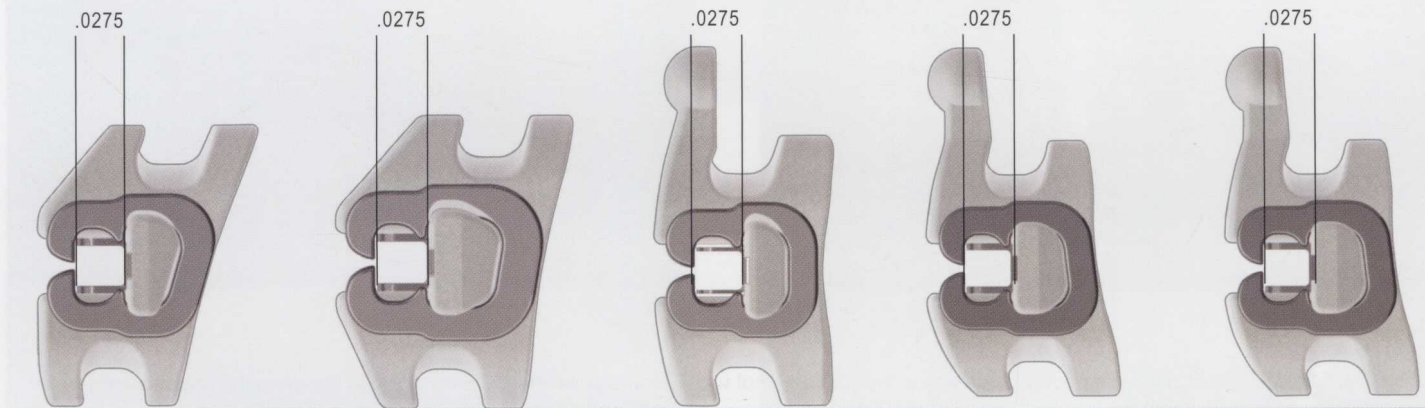


Fig. 1.18

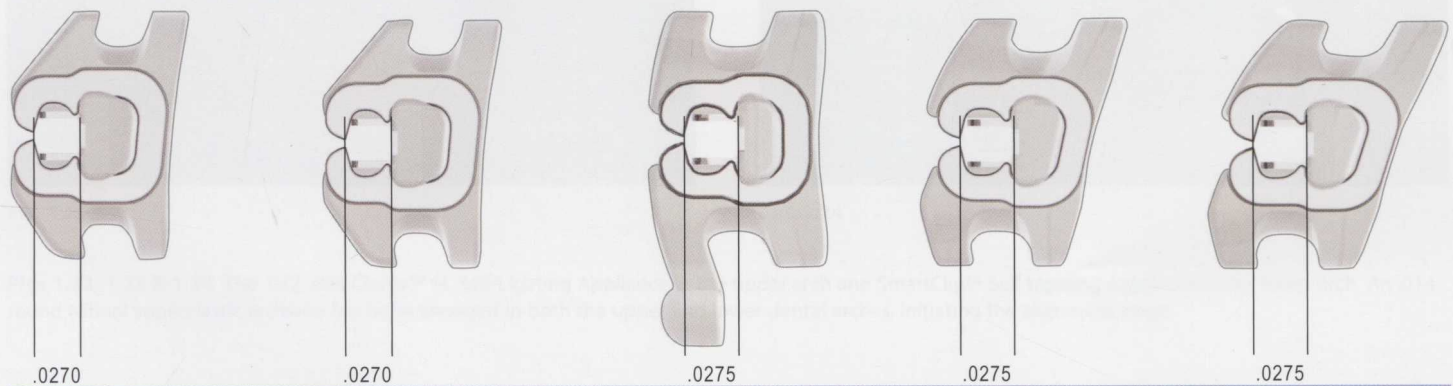


Fig. 1.19

Figs 1.18 & 1.19 Profile views showing the slot-depth between the clip and the bottom of the bracket slot of both upper and lower Clarity™ SL Self-Ligating brackets. Lower incisor brackets have .0270 inch slot depth.

Sliding mechanics with the Clarity™ SL Self-Ligating Appliance

The principle of sliding mechanics^{4,5,11,12} can be applied without any need for compromise when using the Clarity™ SL Self-Ligating brackets. The metal slot allows precise accomplishment of aligning, leveling, space closure, and finishing and detailing.

When the orthodontic archwire is allowed to slide freely within the bracket slot in the aligning stages, the masticatory and the muscle forces work in harmony with the applied biomechanics with low force levels, and thus a favorable biological response (Figs 1.20 & 1.21).

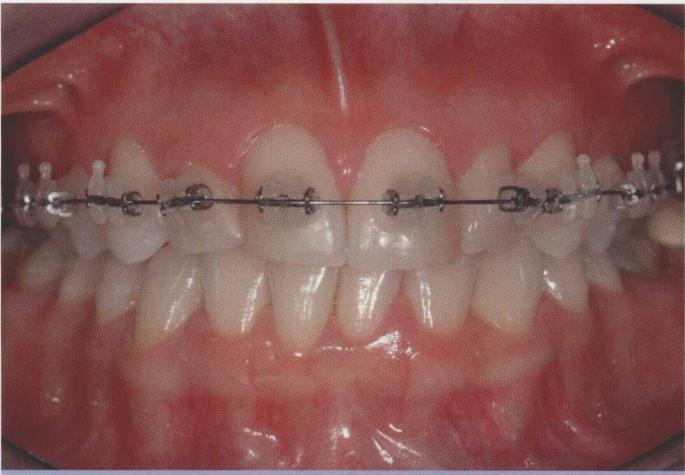


Fig. 1.20

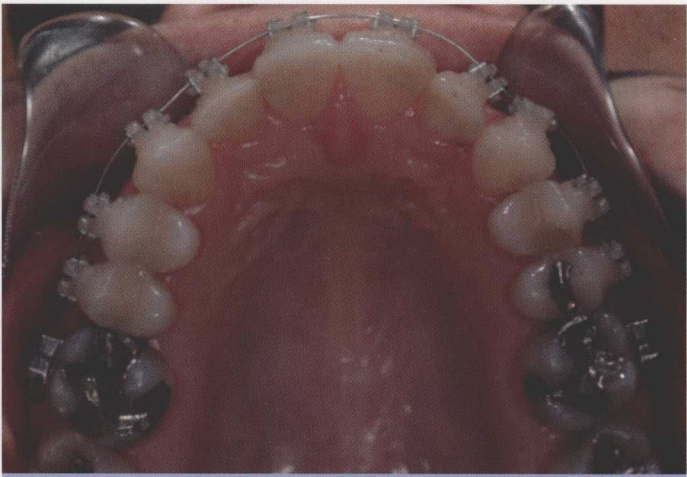


Fig. 1.21

Figs 1.20 & 1.21 Clarity™ SL Self-Ligating Appliance with a .014 round Nitinol superelastic archwire after the initiation of the rotational and the labiolingual corrections.