

Q&A Session-An interview with the inventor of the Carriere LX® Passive Self-Ligating Bracket

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What are the most innovative features of Carriere LX, offered by Ortho Organizers?

Carriere LX Self-Ligating Bracket (SLB) System integrates different design concepts with the primary goal of benefiting the patient and clinicians. The objective is to preserve a patient's periodontal structures without compromising the doctor's precision and control to achieve higher quality in the treatment result.

Carriere LX is a passive self-ligating system meaning that the wire is engaged into the bracket by means of a vestibular slide that holds it in place. The main feature is that the archwire is not pressed or bound to the base of the slot of the bracket preventing excessive pressure. In addition, the archwire is much smaller than the slot allowing the wire to move freely inside the archwire slot.

The brackets are nickel free protecting the nickel sensitive patients. The locking mechanism is in the front making oral hygiene much simpler. They are the same profile of Mini-Twin Brackets and therefore more comfortable for the patient.

For the doctor, the locking mechanism is precision engineered for smooth opening and closing. The cap slides open in the occlusal direction preventing accidental opening of the cap during treatment. Brackets are available with or without gingival hooks. The Metal Injection Molded (MIM) bracket provides maximum precision and strength. Due to the geometry of the slide it can resist a heavy endurance of service for much more time than a treatment interval.

What is the role of friction in the orthodontic treatment and how does it function in a Carriere LX system?

Orthodontically speaking, excessive friction is a major inconvenience that orthodontists have been suffering with traditional mechanics.

Fixed orthodontic appliances of conventional design were tied to the arch wire with metallic or elastomeric ligatures and created internal force vectors of multiple directions that interfere with the original direction of the force.

With the passive approach of self-ligating brackets, friction has been greatly reduced. In recent research done, the Carriere LX SLB offers values of static and kinetic friction below 2 grams, while conventional brackets in the same conditions for the study, present above 500 grams for static and kinetic friction.¹

In the passive SLB system, teeth are treated as independent but interrelated units. Based on how teeth move spontaneously in dental arches orthodontically, they can be displaced in a controlled way with a light force, but it is important that their independence of response is preserved.

The Carriere LX system meets this goal by providing a "freedom of fit" in the bracket and archwire interface. In the body of the bracket, the mesial and distal edges of the slot have been carefully rounded for free sliding. The bracket wire interface has a four-wall design that converts it into a passive system. This, working together with the low force super elastic nickel titanium archwires, provides synergistic action. The reduced physiological orthodontic force on the periodontal structures results in a faster treatment.



What is the role of force in the orthodontic treatment?

Force is the variable that can be controlled from the side of the orthodontist. Our intentions are focused in this direction. Orthodontic force applied with mechanical appliances and the biologic response to them can be analyzed in 3 aspects:

1. From the archwire

In the course of treatment, it is important to find the force that is the closest to the physiology of dental eruption. In the conventional orthodontic brackets archwires are not allowed to be thoroughly expressed.

The new generation of thermal nickel titanium wires have added a type of force that is lighter than in traditional systems. Two new characteristics have been added, superelasticity and selective thermoactive behavior which reacts at the body temperature when placed inside the mouth.

2. Amount of force

Advantages that we get from the side of the new wires can be complemented from the bracket side.

Literature and research conducted on biologic reaction to force has concluded that the most adequate force to move teeth is close to the pressure of blood inside capillary vessels of the periodontal membrane. This is equivalent to 20 to 26 grams of pressure.^{2,3}

Therefore, it is important that the applied forces should have the characteristic not to impede the free natural expression of the most important part which is the periodontal vascular plexus. This represents the need to preserve a free blood circulation avoiding the presence of necrotic tissue. The last is the result of conventional orthodontics which use higher forces and obliterate the capillary vessels by compression.

The consequent undermining resorption resolves the process, however it expresses an interrupted tooth movement. Besides pain, the result is a longer treatment.

3. Vector of force

When archwires are changed too frequently, e.g. every three weeks appointments, a change of directional force is produced. This, in terms of periodontal membrane reaction, represents a histological redirection of cellular changes, with a new situation to be resolved at every appointment.

The ideal is a unidirectional movement with low force deposition. This can be accomplished by the double effect resulting from the new technology wires associated to a self-ligating bracket of passive type. The use of wires with longer activation life makes possible to see patients every 8 to 10 weeks and keep a more uniform direction of movement through less frequent changes of wires.

How is Carriere LX Self-Ligating System different from an active system?

In the Carriere LX system, the bracket wire interface has a four-wall design that converts it into a passive system. The metal-to-metal contact allows the archwire to slide easily inside the Carriere LX with a free but controlled movement. Using progressively different sizes of super-elastic archwires, results in the periodontal supporting tissue having a healthier and faster response to the force.

Less force in only one direction allows a smaller periodontal surface to be used which means less cellular activity there. Treatment time is safely reduced, and orthodontic results are achieved with maximum comfort for the patient. This benefits doctors, their staff, and reduces treatment costs.

Later in the treatment larger rectangular archwires can be used. At this level of treatment, brackets are properly aligned and there is no problem placing larger rectangular, super-elastic archwires in the bracket tunnel. We can do this without losing the original spirit of keeping "free but controlled" contact between the rectangular archwire edges and the bracket walls. This preserves the periodontium without binding and permits free slide, but control and precision of dental movement are increased. In this way, we take advantage of the "loose interplay" that we want between the bracket/wire binomial union.

Our “passive” orthodontic philosophy can become “active” when we are interested in using more force and maximum contact between the wire and the base of the slot.

At the end of treatment when sliding movement is not necessary, spaces are closed and insertion of rectangular wires of bigger dimension is possible, we have the option to tie them to the Carriere LX with traditional elastic ligatures or metallic ligatures. Since we have implemented true wings in the design, they permit to be used for this purpose. This feature will permit to compress the arch wire against the base of the slot to gain full power to finish final corrections with a solid final control of movement.

How important is the archwire selection during treatment?

Archwire selection is a matter of approaching dental movement in a gradual progression of force application. Wires to be used are different for every status of the correction of the original malposition of teeth.

At the treatment start, round wires are used for a pure leveling stage. Rotations, vertical, and vestibulolingual malpositions are corrected at this stage up to the degree achieved by round thermally activated nickel titanium wires of a smaller diameter. This “wakes-up” the case movement and causes minimal periodontal reaction. After primary crowding is improved, section of round wires is increased. The progression of thermally activated nickel titanium promotes correction of rotations, cross bites, vertical and vestibulolingual movements (bracket alignment).

Next, the rectangular type of a smaller size is used to start in a more controlled movement of teeth to correct final leveling, and rotations, start torque and control spacing in an intermediate process.

Intrusion translation movements and torque are provided by rectangular super elastic nickel titanium archwires. Space closure is done with posted stainless steel archwires. The finishing details are taken care of with soft, rectangular CNA™ Archwires.

As an option, at the end of treatment, to promote better interdigitation, a final settling of the case can be done with a more flexible stainless steel archwire (e.g. Braided or .016 Stainless Archwires).

Can you be more specific in terms of wire size and types?

The selection of size of wires is in the hands of the orthodontist and related to degree of tooth malposition and difficulty of engagement but I will expose the general rule we follow.

WIRES LIST FOR PASSIVE(.022 slot) SELF-LIGATING BRACKETS

Leveling Round Wires:

- .014 Dimpled Bio-Kinetix™ Thermally Activated Nitanium® Archwire
- .016 Dimpled Bio-Kinetix Thermally Activated Nitanium Archwire
- .016 Dimpled Bio-Kinetix Thermally Activated Nitanium Archwire Reverse Curve of Spee (RCS) Archwire

Leveling Rectangular Wires :

- .014 x .025 Dimpled Bio-Kinetix Thermally Activated Nitanium Archwire
- .016 x .025 Dimpled Bio-Kinetix Thermally Activated Nitanium Archwire
- .018 x .025 Bio-Kinetix Thermally Activated Nitanium Reverse Curve of Spee (RCS) Archwire

Posterior Retraction Rectangular Wires :

- .017 x .025 CNA Beta Titanium Archwire, or
- .017 x .025 Bio-Kinetix Thermally Activated Nitanium Reverse Curve of Spee (RCS) Archwire
- .019 x .025 CNA Beta Titanium Archwire, or
- .019 x .025 Bio-Kinetix Thermal Activated Nitanium Reverse curve of Spee (RCS) Archwire

Anterior Retraction Rectangular Wires :

.017 x .025 Stainless Steel Posted Archwire, or
.017 x .025 Stainless Steel Reverse Curve of Spee (RCS) Archwire
.019 x .025 Stainless Steel Posted Archwire

Finishing Rectangular Wire:

.017 x .025 CNA Beta Titanium Archwire
.019 x .025 CNA Beta Titanium Archwire

Settling Round Wire:

.018 x .025 Braided Stainless Steel Archwires

How easy is it to change the archwires with the Carriere LX Brackets?

The design is so simple and precise that the cap can be opened smoothly with a simple explorer and closed with a gloved fingertip. You know that it has closed securely when you hear the “click.” This precise mechanism makes it fast and easy to change archwires saving the doctor and his staff valuable time. For severe rotations or tipping, the use of the Wire Director and Opener Tool is recommended.

How does the treatment time differ with Carriere LX over traditional bracket use?

As discussed earlier, traditional brackets create additional strain on the periodontal structures. The tight binding of a traditional bracket to an archwire causes a “global state of war” in the supporting tissues. Therefore, each time a new archwire is used, the patient experiences pain and discomfort. When the archwire is tightly ligated, it will cause more pain to an area that is already irritated.

Carriere LX applies gentle and consistent force to the teeth’s supporting tissue that produces results, without harming the tissue. Bracket-wire friction is significantly reduced resulting in up to 35% shorter treatment time. This percentage can rise in cases where a positive response is achieved sooner, and there is active patient cooperation.

What impresses you the most about the Carriere LX system?

Cases completed with the Carriere LX exhibit surprisingly fast results with a longer span between appointments. Activations and changing archwires takes a shorter amount of time. Posterior bracket posts make it easy to insert any kind of elastic traction needed for the occasion. Patients tell us that they love the pain-free comfort. This is especially important for our adult patients. It’s very satisfying on a personal level and satisfying to the doctor professionally to be able to deliver a biologically safe and respectful treatment to the patient.

Luis Carriere D.D.S., M.S.D., Ph.D. is the inventor of the Carriere Self-Ligating Bracket (SLB). He received his D.D.S. from the Universidad Complutense in Madrid in 1991 and an M.S.D. in Orthodontics and Dentofacial Orthopedics in Adults and Children from the University of Barcelona, School of Dentistry, in 1994. Some of the prestigious highlights of distinguished career include the Joseph E. Johnson Award from the American Association of Orthodontists in 1995, being a Guest professor in the USA and Italy, and a member of Editorial Review Board for the American Journal of Orthodontics and Dentofacial Orthopedics. He is a member of leading international orthodontics associations, has published influential articles, and he won, The International P/M Design Competition in 2004.

References

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