How to simplify your clinical case management by using a rectangular wire as first wire.

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Foreword:
The tooth movement is carried out through a complex biological system, that begin when light and continuous forces, in a range between 6 and 250 grams, are delivered. The delicate balance, mediated by the periodontal ligament, between osteoclasts that destroy bone in the compression area and balanced by osteoblasts that form new bone in the opposite area under traction, determines the movement of the dental element, protecting the integrity of the alveolus. The "engine" that delivers the required force to move the tooth is, hence, the orthodontic archwire. Its features – material, size and shape – significantly affect the biological and biomechanical effects, and the forces applied during the stages of treatment are fundamental for the effectiveness of the therapy itself.

Clinical problem:
The current Straight-Wire prescriptions recommend an archwires sequence in which the first arches are always round - usually NiTi Thermal - and the force generated, activates the tooth movement mechanism, while the next archwires are often rectangular. In the first stage, however, the system archwire-brakets allows levelling and alignment movements only without delivering the torque information already built into the bracket creating, in this way, the tilt of the crowns buccally, often excessive, reducing the level of the marginal of cortical bone. Torque information is then left to the further steps through the use of rectangular archwires. In short word, in this way we often observe and excessive flaring of the crowns (Fig. A 1).

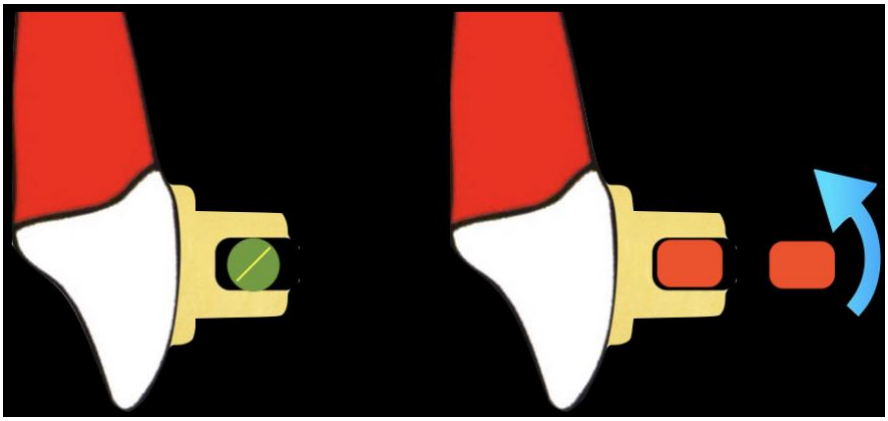


Fig. A 1 – Traditional archwire sequence that may cause an excessive flaring of the crowns

Clinical approach:
Using a rectangular archwire since the initial stages, the phenomenon of the excessive flaring is reduced significantly, preserving the marginal bone and speeding up the therapy due to the reduced number of clinical steps. The features in terms of forces and elasticity of this rectangular archwire, however, has to be compatible to this therapeutic step: very light

and long lasting forces, with a low or not at all traumatic impact on patient. In this clinical case, we have used – as first wire - the innovative archwire called i-Arch - engineered by SIA Orthodontic Manufacturer – whose main features are (Fig. A 2):

- sizes of the two sections inverted compared to conventional archwires available on the market (0,016”x0,014”);
- very light forces (45g), especially in the initial stage of the treatment;
- Copper NiTi Thermal, with activation in the range of 28°- 32° C.

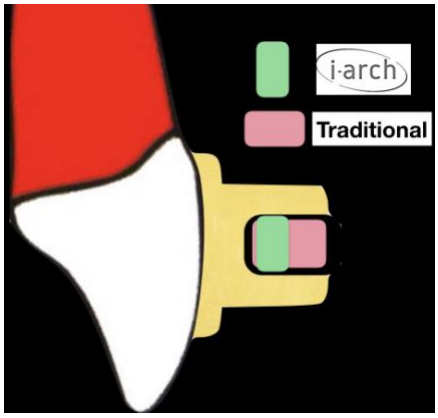


Fig. A 2 – Innovative rectangular i-Arch design (red) versus traditional rectangular archwire (green) to avoid the excessive flaring of the crowns

Clinical case:

In this clinical case, we have a young girl of 11 years old, mesocephalic, a moderate crowding on upper with high canines and a low crowding on lower arch; the group of anterior has torque values almost correct (Figs. B 3/4/5/6/7/8).
Material used: Roth 0,018” bracket, 0.016” X 0.014” Copper Niti Thermal (i-Arch); 0.018” X 0.014” NiTi Superelastic (i-Arch).

Figs. B 3/4/5/6/7/8 – 11 years old girl high cuspids, moderate crowding and on upper jaw, low crowding on lower jaw.

It was decided to start the treatment on the uppers with archwire 0.016” X 0.014”, and after 3 months on the lowers with the same archwire.

As can be seen from the images, was easy to place the archwire since the beginning even if this has a rectangular section (Figs. C 9/10/11 images)

Figs. C 9/10/11 – Placed the rectangular archwire as first wire on the upper. As can be seen the flexibility of this particular archwire allows to engage it even when there are big gaps, without compromising its mechanical features.

After 3 months, we found the arch completely aligned and leveled, incisors with correct torque’s value, and we believe that we also have given torque to the roots of the teeth already in this initial stage (Figs. D 12/13/14 images). As can be seen (Figs. D 12/13/14) there wasn't any increase of overjet, that means we didn't have the flaring of the crowns, which normally happens when using the round archwire as first arch.

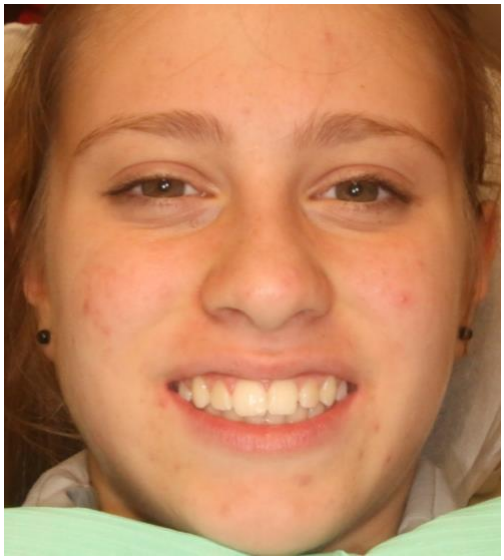
Figs. D 12/13/14 – In the first clinical check after 3 months we observed how the alignment and leveling was completely achieved, without flaring of the crown or overjet increase.

After 8 months from the beginning of the treatment we changed the archwires with NiTi 0,018” X 0,014” on both upper and lower and completed the treatment within 12 months (Figs. D 15/16/17/18/19).

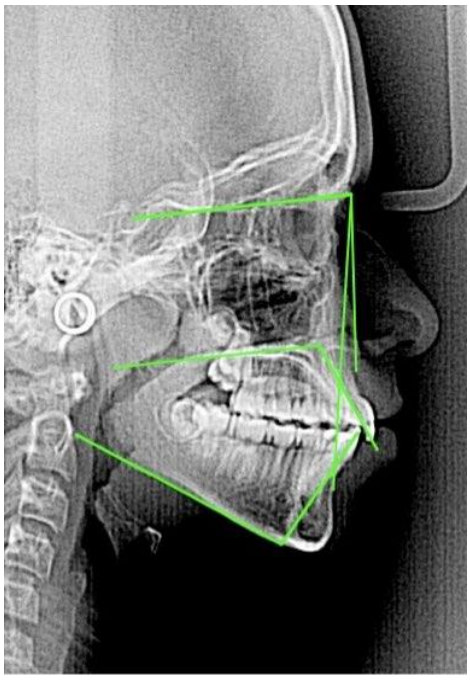
Figs. D 15/16/17/18/19 – After 8 months we have changed the first archwire on upper and lower with 0,018”X 0,014” to stabilize the case.

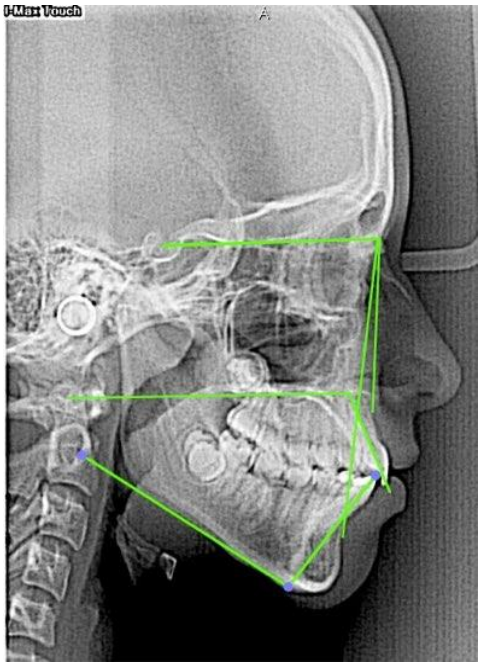
The case was completed in 12 months totally, with the results shown in the pictures below (Figs. E 20/21/22/23/24/25/26/27/28/29)

Figs. E 20/21/22/23/24/25 – Debonding after 12 months.



Figs. E 26/27– Before and after 12 months' treatment.





Figs. E 28/29 – Cephalometric Analysis.
Left - initial values SNA = 85; SNB = 80; i-Max = 113; i-Mand = 97
Right - final values SNA = 85; SNB = 80; i-Max = 109; i-Mand = 98

Furthermore, in this way, we have reduced all those parasitic movements that we would have had with the traditional approach and many procedures that would have been necessary to recover the anchorage, such as Lace-back, Tie-back, are no longer necessary, simplifying then the clinical protocol.

Conclusions

The use as first wire of a rectangular archwire with similar features of the ones used in the above clinical case, allows to obtain several clinical advantages, among which: proper biological action with application of light forces, reduction of unwished forces, reduction of treatment times, saving of chair time.

Bibliography

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