An interview with

Carlos Flores-Mir

- DDS (1995).
- Specialist in Orthodontics (1998).
- MSc in Stomatology (1999).
- PhD in Stomatology (2002).
- Associate Editor of the journal *The Angle Orthodontist.*
- Head of the Orthodontics division and Director of the Orthodontic Graduation Program, University of Alberta, Canada. (Since April 2010).
- Author of more than 100 scientific articles and 2 book chapters.

Despite the recent progress on materials (brackets, wires, skeletal anchorage) and paradigm changes that Orthodontics has been facing, assuredly many already confronted the terminology called "*Evidence-based Orthodontics*". Until the end of the 20th century, the models that supported the education and clinical practice of Dentistry were based on information from textbooks and personal opinions. This scenery was maintained until the digital era sources of knowledge. Today, great part of the orthodontic bibliography is already indexed online. Thus, on the top of the pyramid in level of importance within the health field, Orthodontics based on scientific evidences has been guiding and strongly influencing the orthodontist's life. Over the last decade, it achieved prominent role in congresses and scientific events around the world. In that sense, the systematic reviews and meta-analysis became essential for those who seek relevant and quality information in worldwide literature. Therefore, I have the honor and pleasure to introduce to those who do not know yet, Carlos Flores-Mir, a judicious, systematic, dynamic professional who seeks perfection in everything he does and has been standing out as one of the main researchers today, when it comes to Orthodontics based in evidences. Besides expert researcher and clinician, Flores-Mir is married to Alexa and has two beautiful daughters, Tamara and Tatiana. Today he lives in Edmonton, Alberta, Canada where he leads the Department of Orthodontics of Alberta University and has a private practice. Recently he took on the post of Assistant Editor at Angle Orthodontist journal and was considered one of the best reviewers in 2011 on the American Journal of Orthodontics and Dentofacial Orthopedics. During the last few years, Flores-Mir has dedicated himself to the publication of systematic reviews about all sorts of subjects within orthodontics, for example Class II malocclusion treatment, maxillary expansion, facial esthetics, dental intrusion, skeletal maturation index, craniofacial growth, self-ligating appliances and many other topics. I hope friends and readers are able to appreciate the interview that Flores-Mir gave to this noble journal.

Marcio Rodrigues de Almeida

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

1) You are one of the researchers that publishes most systematic reviews in Orthodontics. What are the main flaws observed in this type of publication and what are the advantages about the primary studies? David Normando

I have published in the past a review about the methodological quality problems of systematic reviews in dentistry and more specifically in orthodontics.[1,2,3] Some of the information is outdated, but luckily a recent review analyzed this until 2011 with a more deep analysis.[4] In summary, there is a trend in improving the methodological quality of systematic reviews in orthodontics, but there still exist limitations. The readers should not blindly believe that, because it is a systematic review, it is perfect. The main problem is that the quality of the systematic review conclusions is closely related to the quality of the available evidence. As we know the quality of the available evidence in dentistry is in general very poor, therefore the systematic reviews do not offer strong conclusions. Even then I do believe systematic reviews do offer nice summaries, less biased than in the past, for clinicians to summarize the current status of the available evidence. This information should help provide better treatment to their patients.

2) What advice would you give a young Brazilian researcher who wishes to start a systematic review? David Normando

To use the available guidelines. The Cochrane Handbook[5] is a nice detailed guideline. I personally like the Egger book.[6] It presents some basic information in an easy to follow format. Finally, get in contact with someone that has done one in the past so that some practical experience is shared.

3) In which situations a systematic review cannot originate a meta-analysis? David Normando

When the selected studies do measure different outcomes or even if the same outcomes are measured differently. Meta-analyses are powerful tools but if misused can generate unsupported data. I do think the most important feature of a meta-analysis is the possibility of exploring publication bias and above all the option of analyzing the sensitivity analysis. Those are powerful tools that provide us with data that is otherwise unavailable. Finally, meta-analysis is a statistical tool and for it to be properly framed it has to be part of a good systematic review.

4) With respect to Class II treatment with functional appliances, some researchers believe that functional appliances only anticipate the growth that the patient would have in the future. Others believe that when properly indicated, could actually increase the final size of the mandible. Do you believe that the research conducted to date have provided to answer this question with certainty?
Alexandre Moro

I do believe that we cannot group all the related research that has been published so far without considering some factors that are likely going to influence the performance of the so called "functional" appliances. Besides the obvious point that these types of appliances have to be kept in the mouth for more than 12-18 months before we can argue that any quantifiable, clinically significant skeletal changes can happen other factors such as: Operator experience, growth status in relation to pubertal growth peak, patient compliance and appliance type have to be considered. A meta-analysis considering these factors is dearly needed. Dental available evidence has significant limitations which is almost impossible to have any conclusive statements regarding almost everything we do in Dentistry. Class II treatment with functional appliances does not escape this reality. In summary, I do not believe that we have the answer to your question. We likely have a case of improper synthesis of the limited available evidence (previous systematic reviews have added all available evidence without careful consideration of the abovementioned factors) that may have been misleading us. Based on this, we cannot state if we can or not consistently increase the final size of the mandible.

5) Was it a surprising result that the X-Bow (www.crossboworthodontic.com) and the Forsus together with fixed appliance have the ability to restrict maxillary growth? What are your indications for using these appliances?
Alexandre Moro

I do not expect to have clinically significant changes at the skeletal level when using those appliances.

Use of such appliances for a few months should not be able to produce any craniofacial growth change. An ideal patient for them is either a skeletal Class I and dental Class II patient or, at most, a mildly skeletal Class II and dental Class II patient. In those cases the distalization of the upper dentition with a concurrent mesialization of the lower dentition can solve the dental malocclusion. Limitations to such approaches are obviously already proclined lower incisors. Some of the X-Bow research I have done shows that the amount of proclination with it is not as bad as thought, but that the variability makes it unpredictable. What is clear for me is that poor oral hygiene associated with gingivitis, in cases with gingival recession already present, should not undergo any treatment that could procline the incisors further. Cases that are moderately or severely skeletal Class II should be surgically approached. Any attempt to camouflage them with Class II correctors is risky and would likely raise false expectations for the patients. For me, the key difference is the treatment length. A research that I am going to publish soon shows that the X-Bow followed with full fixed appliances appears to reduce treatment time by 6 months compared to full braces plus Forsus devices. I expect that shorter treatment time will be associated to less root resorption, decalcification and better patient management.

6) What X-Bow design do you use in mixed dentition patients in order to avoid damage to the mucosa of the patient. Do you use this device in hyperdivergent patients for upper molars intrusion and anterior rotation of the mandible? Alexandre Moro

The X-Bow appliance should be understood as a highly adaptable appliance (Figs 1 and 2). Although the basic design principles are clear, the patients should be individually assessed to determine what modifications are required so that patient's comfort is maximized. In the past, the X-Bow had longer Forsus rods, so that direction of force was as horizontal as possible. This implied that the position of the Gurin lock to stop the spring was located around the lower cuspid area. The result was a relative discomfort in the orbicular area in some patients. Bending of the rod helped to reduce this by adjusting the rod activation direction. Later designs have evolved with the Gurin lock being positioned posteriorly in the premolar area, the use of shorter rods and, in some cases, utilization of the older pin-type Forsus. All these modifications would basically position the spring further distal away from the orbicular area into the cheek area with a significant decrease in the associated discomfort. In that sense, younger patients are not ideal because their mouths are smaller. A theoretical side effect would be a more vertical force.

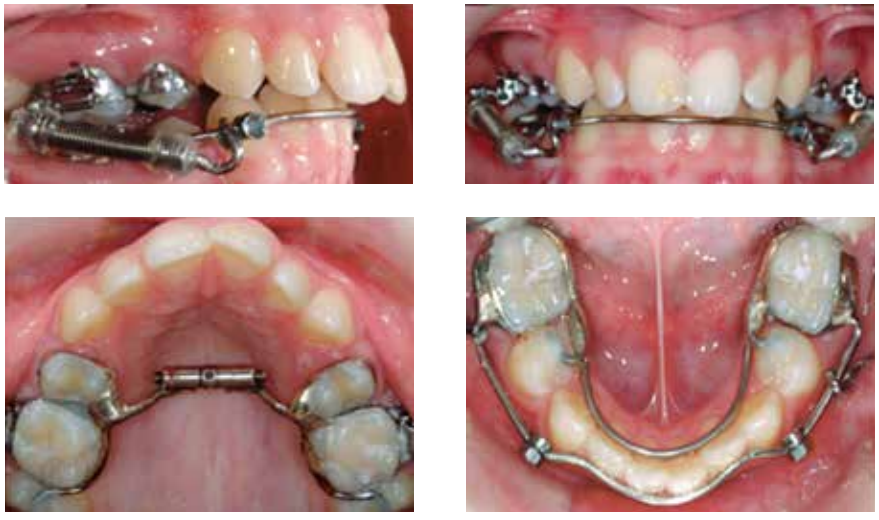

Figure 1 - X-Bow appliance.

Figure 2 - Class II malocclusion treatment with the X-Bow appliance, in a mixed dentition a patient with 11 years of age: **A, B, C**) before treatment; **D, E, F**) after X-Bow removal; **G, H, I**) end of treatment, after fixed appliance removal.

Due to the relatively short treatment time duration, the potential negative effects of such approach may not be able to be expressed. In regards to the second question no research has been done so far. There are unique features in different vertical growing patients. In some there is still occlusal contact between most of the teeth. This is completely different to the vertical growing cases that only have occlusal contact in the molar areas. I do not think that they should undergo the same treatment approach. Going back to the X-Bow treatment effects, we know that the upper anchorage molars will intrude. What specifically happens with the lower molars? Will then they further erupt denying any open bite correction potential? Does the occlusal plane direction change significantly? We do not have the answers yet.

7) In Class II treatment with X-Bow philosophy, how do you control vertically your cases to get a good mandibular response, which is essential for these kind of treatments?

Alexandre Bottrel

Research[7] has failed to show so far that the X-Bow is able to produce clinically significant skeletal effects. It basically moves teeth. Part of the reason is the relatively short treatment time (4 to 6 months) that makes it impossible to produce meaningful skeletal changes and also its dental anchorage structure that makes it more of a tooth movement appliance. In essence, careful selection of cases is the key to obtain acceptable results. Cases with significant skeletal underlying origin are not likely going to be significantly benefitted from treatments using X-Bow-type appliances.

8) What do you see as the advantages and disadvantages of the X-Bow Appliance) in the treatment of Class II patient.

Carlos Henrique Guimarães Jr.

Advantages:

» Components (lingual arch, Forsus, RME) are appliances commonly used by orthodontists.

» After a period of adaptation[20] it is a compliance-free appliance that allows patients to have better oral hygiene compared to full braces and a fixed functional appliance.

» Shortens the treatment time by 6 months[21] in comparison to full fixed appliances and Forsus.

» Should have less side effects (root resorption, decalcification) since less time with braces should be required.

Disadvantages:

» Difficult to adjust in smaller mouths.

» It is just a dental movement appliance no skeletal changes expected.

» Teeth move fast. Controls required every month.

9) In your experience, what are the most important factors determining the stability[8-12] of the treatment with fixed Class II correctors? Carlos Henrique Guimarães Jr.

Attain a solid premolar Class I occlusion, and to know the limitations of the Class II correctors regarding the expected magnitude of occlusal change and its relation to the amount of underlying skeletal imbalance.

10) Some studies[8,9,11] have reported no significant difference between the stability of the treatment with fixed Class II correctors with long and short faces. What is your opinion? Carlos Henrique Guimarães Jr.

I think sometimes we do not correctly identify specific Class II malocclusion types and we mixed them all together in studies. This may camouflage some specific limitations that happen in certain types of Class II malocclusions. The same applies to the classification of long and short faces. I would agree for mild short or long faces but I am not so sure for moderate to severe face types. If you add facial skeletal maturation stage the picture gets even muddier.

11) In your systematic review of Herbst appliance[13], some studies found that with Herbst appliance showed that an increase in the effective length of the mandible ranging from 2-3 mm can occur. Despite this change is small, do you agree that the dentoalveolar changes justify the Class II treatment with these appliances? Carlos Henrique Guimarães Jr.

I will have to first say that the 3 mm change is after 18 months of active Herbst use followed up with a so-call "passive" bionator type retainer. So besides the efficacy of the Herbst treatment the concept of psychological burden for the patients and family has to be considered. Besides the biological cost are lengthy treatment times (around 5 years when full braces are considered) justifiable? What about patient's burn out? Lack of collaboration in the final treatment stage? This has not been adequately explored in the literature. Besides this, at which point in a case should we truly only explore a future surgical option? What difference does it really make to convert a 6-8 mm deficient mandible into a 3-5 mm one? Does this really change anything for the future and the real need for surgery? I know our patients want to avoid surgery at any cost but then they need to understand the limitations. In summary, this is an answer that depends on a large list of factors that go beyond how deficient the mandible itself is. The big question is: How much does the quality of life of the patient change with anything we do? Most do believe that we change lives. Do we?

12) Based in your article[14] about layperson's perception on smile features in facial esthetics: Do you think that it may alter the orthodontic planning as to agree with patient opinion? Alexandre Bottrel

I think that the information should be considered. At the end of the day, regardless of how well we finish an orthodontic case, if the patient does not feel that the result is esthetically pleasing he/she will not be happy. The review shows that there is, in some specific esthetic characteristics, a significant difference between the esthetic trigger point between acceptable and unacceptable. Having said this, laypersons are usually a lot less concerned about minor imperfections compared to orthodontists. In summary, the information provided by the systematic reviews makes us understand that we should listen to what the patient wants or accept as a guiding principle for our treatment plan or case finishing.

13) Many authors have been studying a correlation between many growth evaluation methods. We know that it is a very useful tool for our specialty. Do you include in your future plans a systematic study on this important theme? Alexandre Bottrel

I did actually published one, back in 2004.[15] It was my first systematic review published and I am very proud of it. I do think that the basic message from that review is still valid. The point I want to reinforce is as stated in the article: "Skeletal maturity determined by hand-wrist radiographic analysis was

well related to overall facial growth velocity. Maxillary and mandibular growth velocities were related to skeletal maturity, but their relationship was less robust than that for overall facial growth. The available articles have not adequately defined a relationship between cranial base growth velocity and skeletal maturity. "Hand-wrist radiographic assessment of skeletal maturity for use in facial growth prediction should include bones aging as well as ossification events." None of the currently most used cervical vertebrae methods consider bone staging but only ossifications events itself. Also recent research has failed to show that these methods are actually better than taking an educated guess. An interesting systematic review[16], actually coming from Brazil, around the reliability of cervical vertebrae maturation methods supports my comment above.

14) In your systematic study[17] of frictional resistance in self-ligating orthodontic brackets and conventional ligated brackets, you didn't find any statistical difference in friction area and treatment timing, which could bring any benefits to self-ligating brackets use. Do you think that the use of this philosophy in orthodontic treatment should be discouraged based on the high cost of theses appliances and the low benefits in mechanotherapy?
Alexandre Bottrel

Decisions about using self-ligated brackets are more complex than just if they do or not diminish the magnitude of resistance to sliding. The systematic review that you refer to included only *in vitro* studies. There is always the heated argument that the translation from *in vitro* to *in vivo* is not straightforward, with some even arguing that *in vitro* studies conclusions are useless in real life situations. Having said that the review basically concluded that the differences do exist for small dimensional wires in ideal alignment conditions, but was not demonstrable for larger dimensional wires or when teeth misalignment was present. Therefore, even this coming from *in vivo* studies, casts serious doubts that in malocclusion cases the possibility of lower resistance to sliding is clinically nonexistent. A newer systematic review[18] did focus itself in *in vivo* studies and it failed to show any substantive evidence that there are clinical advantages of using self-ligated brackets. The only two potential advantages are less chair time (faster archwire change) and slightly less incisor proclination. A few clinical trials have been published since 2009 (last review search) and all have reinforced these conclusions.

15) What is your opinion on the crisis in the academic area of Orthodontics, where most young professionals have increasingly turned away from universities and preferred to work in private practices? Alexandre Moro

This is a question that can only be answered in detail if it is geared to a specific location. Some of the general concepts are the following: There is a disparity between the private practice and academic income, academic politics, amount of debt incurred when finally graduated, and unrealistic academic requirements for promotion of dental clinicians in universities. I wrote a summary of my opinion regarding this in 2006. I do not believe that the situation has changed significantly. (Readers can access this piece of opinion[19] freely from the JCDA webpage: http://www.jcda.ca/). How much this applies to the Brazilian reality is out of my knowledge.

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