MOLAR CONTROL TECHNIQUES IN LINGUAL ORTHODONTICS

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ABSTRACT

A series of wire bends used to control first molar position in lingual orthodontics is described. The techniques are considered useful in cases without dental extractions, since it is well known that in such cases it is recommended that the second molars be banded to achieve better control during retraction.

Key words: Orthodontics, molar control.

Contrary to what many people believe, the lingual technique is not new. In 1975 Dr Craven Kurz, working in California, reported the use of labial appliances bonded to the lingual surface of the teeth. Ever since that time the number of studies relevant to the field has increased. In 1979 Dr Kinya Fujita of the Dental University of Kanagawa in Japan published an article in which appliances specifically designed for the lingual surface were described. Dr Fujita also described the "mushroom-shaped" wire necessary for the implementation of the lingual technique[1].

The principle value of the lingual technique lies in the fact that it is practically invisible. As expressed by Dr Moody Alexander et al.[2], "there are many patients who would benefit functionally, periodontally and aesthetically if they were to have orthodontic treatment … nevertheless, many of these patients never consider the possibility of implementing this therapy because they do not wish to display unsightly metal …".

The lingual technique requires the elaboration of specific wire arches. Due to the morphological irregularity of the dental arch on the lingual side *(Figure 1),* it is necessary to compensate the wire in order to be able to carry out the required movements.

In addition to these bends, there are other important compensations recommended for the control of molar rotations and/or translations.

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Dr Thomas Mulligan clearly established three possible relations between the wire and the brace[3]. In the first, "stepped" or "parallel", relation *(Figure 2)*, the forces and moments are identical in each of the two braces. In the second, "eccentric", relation *(Figure 3)* the brace closer to the bend presents a greater moment even if the forces are of the same magnitude. The brace further from the bend may experience a clockwise moment, an anticlockwise moment, or zero moment, depending on the location of the bend.

The third, "central bend", relation *(Figure 4)* is equivalent to two eccentric bends with the short sections pointing in the same direction. The moments are of equal magnitude and opposite sense.

The use of these bends permits a greater control of the positions of the first molars. The bends exert sufficient force to correct labial or palatine translations, rotations toward any of the interproximal surfaces, or a combination of two malpositions. Thus modifications to the curves of Wilson and Monson can be made without banding the second molars.

Four types of bends are applied to achieve these corrections, namely:

1. Inward and outward bends for rotations;
2. Outward and inward bends for translations;
3. Stepped bends for rotations and translations; and
4. Central bends for rotations.

The lingual technique represents an excellent alternative for the orthodontic treatment of adults. Cosmetically, it is practically invisible, and thus has become the therapy of choice for those patients who do not wish their treatment to be evident. In cases of deep bite *(Figure 5)* the lingual technique is both effective and comfortable for the patient. Because the braces are bonded to the lingual surface of the inferior teeth, and because the bite planes of the superiors raise the deep bite *(Figure 6)*, dental movements are carried out in an expedited manner and without the risk of dental contact causing detachment of the inferior braces.

In cases involving extractions, fitting bands to the second molars to close spaces is practically inevitable. If dental extractions are not essential *(Figure 7)*, avoiding fitting bands to the second molars should be considered worthwhile. This option is reinforced when we consider that a crossed bite may be more an alteration in the curve of Wilson and/or Monson than a real skeletal discrepancy, and that clinicians often confuse this issue.

The orthodontist may only control the positions of the first molars once two questions have been answered:

1. Is the molar rotated (in any plane)? and
2. Is the molar vestibularly or lingually displaced?

The problems above should always be resolved in the order listed.

It is gratifying for the orthodontist to be able to solve malposition problems by directing the force of the wire exclusively to the affected region and without moving structures unnecessarily. Additionally, the patient is always grateful when a treatment makes use of the least number of appliances in the mouth. Greater comfort and hygiene are welcome consequences.

WIRE DESIGN FOR MOLAR CONTROL IN LINGUAL ORTHODONTICS

Control of molar position is achieved by observing the following rules:

1. Create a zone of resilience by avoiding tying wire from the canine to the mesial face of the first molar, and a zone of rigidity by tying the four anteriors *(Figure 8)*.

2. When there are rotations but no buccal or lingual displacements, elaborate a distal antirotational bend, in the case of mesial rotation, or mesial antirotational bend, in the case of distal rotation *(Figures 9 and 9a)*.

3. When there are no rotations but displacements do exist, elaborate an outward bend, in the case of lingualized molars, or an inward bend, in the case of buccalized molars *(Figure 10)*.

4. In the case of buccal or lingual displacements as well as rotations, elaborate a stepped bend which both contains the inward or outward bend and corrects the rotation *(Figure 11)*.

FIGURAS

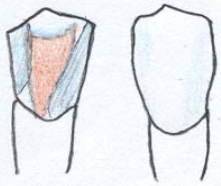


Fig.1:Irregularidades de la cara lingual

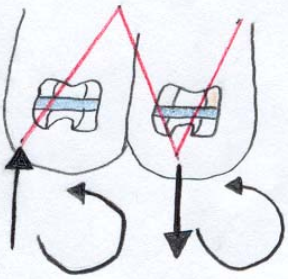


Fig. 2 Relación en escalón: Fuerzas y momentos Idénticos.

Fig.3:Relación excéntrica:Fuerzas y Momentos diferentes

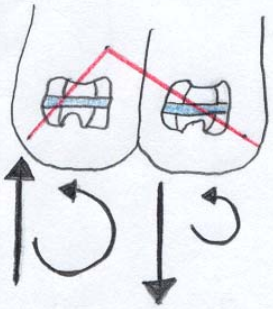
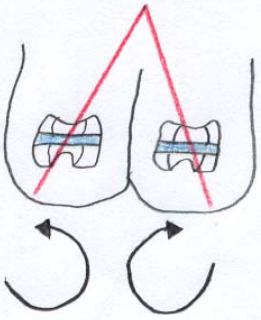


Fig.4:Doblés central: Momentos idénticos En sentido contrario



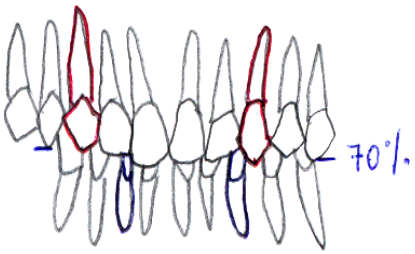


Fig.5

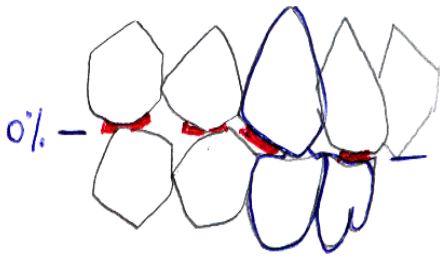


Fig.6 Apertura de mordida

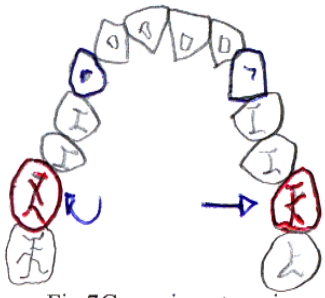


Fig.7Caso sin extracciones.Notese
La posición de los primeros molares

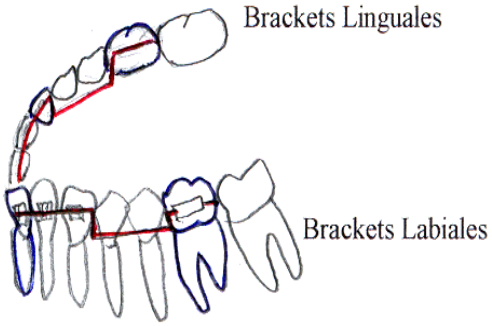


Fig.8Atar los dientes anteriores
y "puentear" los posteriores

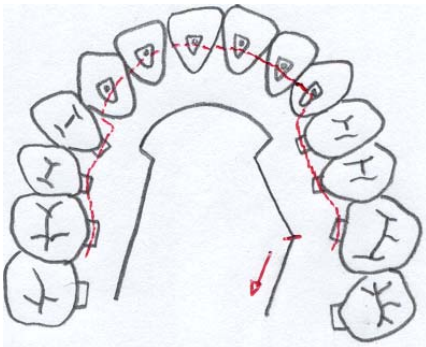


Fig. 9

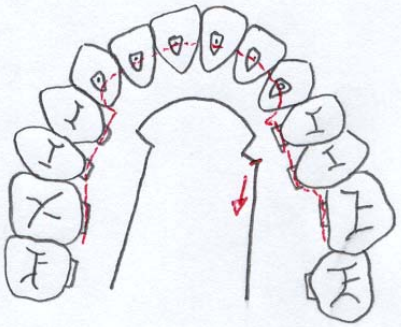


Fig.10

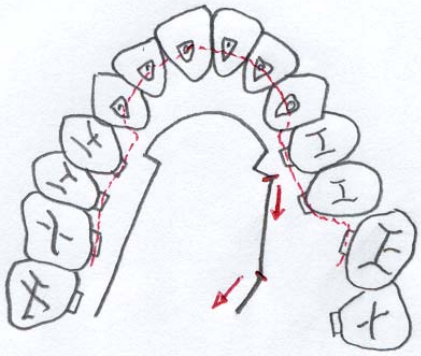


Fig. 11

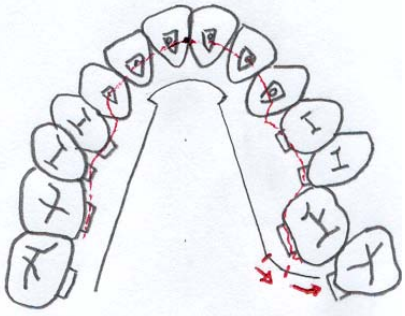
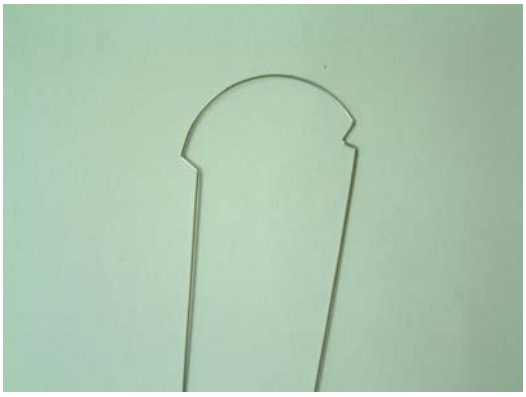
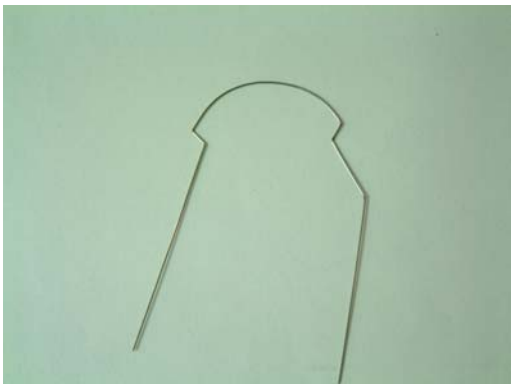
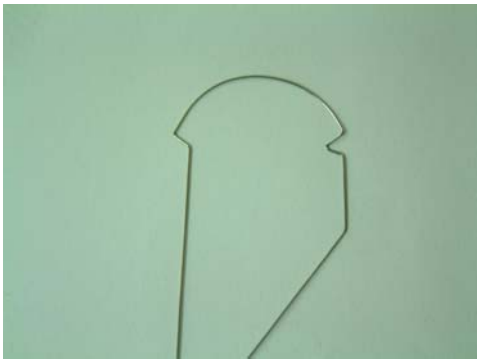
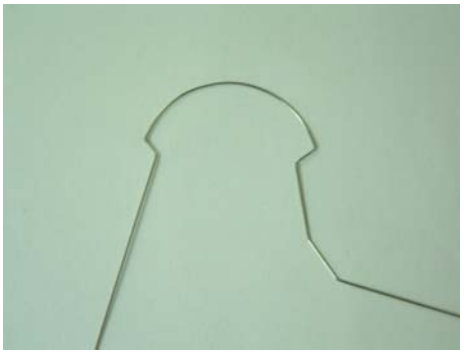


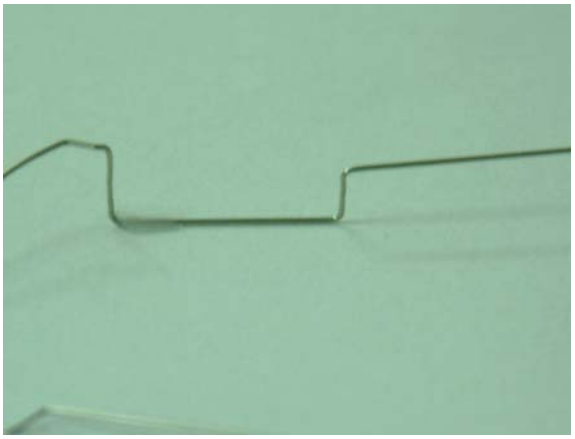
Fig. 9 A











DISCUSSION

The studies concerning molar control published by Dr Mulligan describe an excellent alternative for those cases requiring modifications to the curve of Wilson and/or Monson and in which banding the second molars is not necessary.

Current increases in the number of adult patients have lead to the implementation of various techniques which fulfil both biomechanical and aesthetic requirements. The present study, based on discoveries reported by Dr Mulligan regarding molar control in the labial technique, proposes

that the same discoveries, appropriately modified and incorporated into the lingual technique, represent a viable and attractive alternative, provided that the physical concepts which govern the body's movements are adequately understood and applied.

Figure 1. Irregularities of the lingual surface.

Figure 2. Stepped relation: identical forces and moments.

Figure 3. Eccentric relation: different forces and moments.

Figure 4. Central bend: moments of identical magnitude and opposite sense.

Figure 5. Deep bite.

Figure 6. Opening the bite.

Figure 7. A case without extractions. Note the positions of the first molars.

Figure 8. Tie the anterior teeth and "bridge" the posteriors.
Wire corresponding to figure 8.
The "bridge" designed by Dr Mulligan produces a zone of rigidity in the anterior region and a zone of resilience at the level of the premolars. In the lingual technique the exit of the compensation should always be at the level of the canines.

Figure 9. Distal antirotational bend.
Wire corresponding to figure 9.
The distal antirotational bend is evident. Correction of rotations.

Figure 9a. Mesial antirotational bend.
Wire corresponding to figure 9a.
Unlike the wire in figure 9, the bend is made in the mesial direction. Correction of rotations.

Figure 10. Buccal antitranslational bend.
Wire corresponding to figure 10.

Lingualized molars require the elaboration of an outward bend, buccalized molars require an inward bend. Correction of displacements (translations).

Figure 11. Stepped bend with both antirotational and antitranslational vectors.
Wire corresponding to figure 11.
In this wire the stepped bend, in which the vector at the level of the canine corrects the translation and that at the level of the molar corrects the rotation, is evident. Correction of rotations and translations.

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