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REVIEW ARTICLE

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The En Masse and the Sequential Retraction Procedures

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ABSTRACT

In this article, the authors discuss two preeminent notions in orthodontics; those are the approaches of "En Masse Retraction" and "Sequential Retraction" in orthodontic cases. The "Sequential Retraction" is identified by retraction of canines firstly, forming one group of retracted canine and posterior teeth in the respective side, then retraction of the incisors. Besides, the approach of "En Masse Retraction" is identified by retraction of the six anterior teeth "as one group". Sequential Retraction is called "two-phased retraction", whereas "En Masse Retraction" termed as "one-phased retraction". Sequential Retraction has been justified for its characteristic of upholding anchorage, while En Masse Retraction is beneficial in keeping the alignment of the anterior teeth during treatment. Sequential Retraction has two phases: Firstly, canines are moved posteriorly, then canines are congregated with the posterior units of second premolars and first molars (in addition to second molars if they are banded) to form one group. Secondly, the anterior four incisors are retracted. Sequential Retraction may cause temporary spaces especially in between lateral incisors and canines what are unwelcome sometimes. In addition, in the first phase of sequential retraction, it is recommended that a "stop" on the mesial of the molar tube be placed (Tweed et al), to "maintain the anchorage" by preventing its "burning" (by a potential movement of the first molar mesially) [1]. Nonetheless, this stop has its own reaction on the pertinent incisors, consequently the incisors move anteriorly little bit, in the canine retraction phase, what in turn, increases the burden on the anchorage units, during the "phase-two" of incisors retraction. In other word, the conception that sequential retraction is more "harmless" towards the anchorage units is gradually becoming a debatable issue. Furthermore, an advantage of the "En Masse" retraction in maintaining the "Leveling of Alignment" of anterior teeth should be taken into account by clinician. By applying the "theory of Optimal Force Values", (which depends on using continuous low force, as minimal as available, and simultaneously over the due threshold that is sufficient to cause tooth movement), it is available to achieve canines and incisors "en masse" retracted without such an overload onto anchorage segments. As the standpoint would be to apply optimal forces on the anterior teeth, with least counteracted movements onto anchorage units proposing forces dissipation until be below the sufficient threshold for posterior teeth movement.

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Discussion

Orthodontists had followed sequential Retraction for decades, depending on a hypothesis presumes that two-phased retraction protects more the anchorage.

As anchorage fortification has been always the sought after target, sequential retraction technique has been mistakenly related with such an objective.

On the other hand, a trend in orthodontics starts to float that believes such a correlation in between sequential retraction and anchorage maintenance a sort of "Pathetic Fallacy".

The reasons for revitalization of the notion of "En Masse Retraction" are:

1. The advent of miniscrews and relevant temporary anchorage devices.

2. The perception of "Optimal Forces Application" takes part in giving a new lease of life into the "En Masse Retraction" approach.

3. The application of contemporary biomechanics principia could support "one-phased retraction" approach (Figure1). As translation movement helps (in case of en masse retraction) in conserving the leveling and alignment of anterior teeth and in avoiding the high "moment-values" effects, (High moments may affect the anchorage units, as a reaction, to counteract the moments of the anteriors).

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Nonetheless, En Masse Retraction is not indicated in all cases, nor it is a panacea.

In other world, there is no magic potion in orthodontics, thus contraindication of En Masse Retraction should also be respected.

Contraindication of En Masse Retraction and Indication of Sequential Retraction in Extraction Cases:

1. Severe crowding especially when anterior teeth are severely misaligned and badly leveled.
2. The cases where sectional archwires are indicated (Figure 8).
3. Ectopic eruption of the canine maybe contraindication to one-phased retraction because of difficulty to perform such multiple objectives simultaneously.
4. Cases of severe protrusion when optimal forces are difficult to be reckoned especially when anteriors teeth crowns should be tipped posteriorly and retracted.

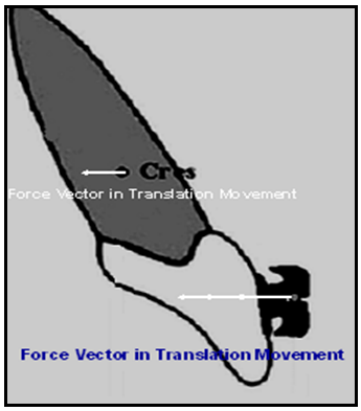

Figure1: the force vectors in case of translation movement of the anterior teeth

Clinician is encouraged to discern in between cases, consequently en masse retraction, maybe applied when:

1. Anterior teeth are in order with good alignment.
2. Crowding is either moderate or mild.
3. Protrusion is either moderate or mild.
4. The arch wire should not be sectional.
5. The least friction and absence of notching is preferable to fiddle with the notion of Optimal Force.
6. The Cases where burning of anchorage forms a part of treatment plan.
7. Cases when Miniscrews are used.

The Optimal Force notion in the en masse retraction approach depends on the ability to apply low forces slightly above the thresholds to retract the anterior teeth, simultaneously such forces are counteracted and dissipated in the posterior teeth without remarkable anchorage loss (Figure 2).

In short: The “optimal force” here: is the “minor force” which is slightly above the “threshold” force, (The threshold force: is least available force to move a tooth).

Figure 2: case of En Masse Retraction in lingual technique.

Figure 3: A case where in mass retraction has been used to retract the anterior teeth depending on increasing anchorage and using optimal force values

Figure 4: A case of “En Masse Retraction”, Using Stainless Steel Retraction Springs to adjust Optimal Forces.

Clinically, En masse retraction is an easy approach, as it is available to be applied when anchor units are the posterior teeth "2nd premolars, 1st molars and second molars if included" (Figure2).

In spite of the belief which most of orthodontists have regarding sequential retraction (as they think that it conservers more the anchorage units in extraction cases), the clinical views show sometimes-contradictory paradigms to such a notion (Figure5).

Figure 5: An example of an anchorage burned in a sequential retraction case, the first molar and 2nd premolar are shifted and inclined mesially, closing and consuming the previous extraction space of the first premolar

Sequential Retraction in Orthodontic Daily Practice:

Sequential Retraction is an indispensable must sometimes, especially when teeth are misaligned, severely protruded and severely crowded (Figure6).

Figure 6: A case of severe crowding, where en masse retraction in not indicated.

Openbites may support also the sequential retraction approach, not only because of teeth protrusion, but because of tongue thrusting that usually accompanies such cases what makes optimal forces adjustment a sort of impossible "Utopian Deed" (Figure 7).

Figure 7: An open bite, ectopic maxillary canines' eruption and severe tongue thrusting case. In such cases "En Masse Retraction" is contraindicated.

Ectopic eruption of canines may lead the orthodontist to follow the sequential retraction; as it impossible to retract the anterior teeth as a group when canines are highly leveled (Figures7, 8).

Figure 8: Sequential Retraction within sectional archwires.

The Canine Retraction NiTi Closed Coil Spring transmits low and continuous forces.

Besides, it is imperative that en masse retraction be avoided when sectional archwires, Utility arches (Figure7) notched archwires and high friction fixed appliances are to be used.

Figure 9: A case with open bite with anterior teeth misaligned.

Figure 10: the same case after extraction and retraction springs are installed

An example of Sequential Retraction.

Figure 11: A retraction NiTi closed coil spring installed

"En Masse Retraction" and "Burning Anchorage" as a part of the treatment plan:

As "Anchorage Preserving" has been the sought after notion that often preoccupies orthodontists, it is recommended that another "Out of Squad" notion be mentioned, that is "Anchorage Burning as a part of treatment plan" (Figure 13).

It is worth to refer to the cases that either need minimum anchorage, or even require burning of anchorage; such cases are available to be seen in clinician's daily practice, especially when posterior teeth have interdental spaces (Figure 12) or when treatment plan requires mesial translation to one or more posterior molar(s).

In such cases, "En Masse Retraction" helps as a facilitation factor, if forces are correctly adjusted to fulfill such intentions (Figure 12).

It is understandable logically that sufficient force be adjusted to retract the anterior teeth, and "protract" the targeted posterior tooth/teeth. As a result clinician is encouraged to analyze the requirements of forces and moments of each case independently, whether to retract the anterior teeth/teeth, protract the posterior tooth/teeth or retract and protract teeth simultaneously.

Figure 12: A case where "Molars Mesialization" forms a part of treatment plan.

First Molars Mesial Stops and their reaction on the anterior teeth:

First Molar Mesial Stops have their reaction on the anterior teeth by slight protrusion, such a reaction may increase the load on the anchorage units, unless one "or more" of the following notions be followed:

1. Slight forces application may decrease the anterior protrusion because of low amount of moments and forces applied on the posterior teeth, what in turn reflexes on decreased reaction on the anterior teeth.
2. Application on such stops distal to the first molars and mesial to the banded second molars lessens their reaction on the anterior teeth because of forces dissipation factor.
3. The reaction of the First Molars Mesial Stops maybe beneficial in case of anterior teeth retrusion, especially in Class II Division 2 cases.
4. The reaction of First Molars Mesial Stops on the anterior teeth maybe included in the treatment plans of such cases where anterior protrusion is must (Figure 13).

Figure 13: A case where the First Molar Mesial Stops protrude the anterior teeth what alleviate the anterior crowding, align anterior teeth in their proper positions and help in enhancing patient's profile

Figure 14: An example when Molars Mesialization "or Burning of Anchorage", is an essential part of treatment plan.

P.S.: left side required retraction of canine and first premolar, whereas right side required only molars mesialization movement.

Conclusion

1. The sequential retraction is not always a time consuming procedure. Besides, the en masse retraction is not always the rapid and "short-cut" approach. The time "required for each treatment" depends on several factors not only on the technique used.

2. When a stop is added on the mesial side of the first molars it may cause a protrusion of the anterior teeth as a reaction "which is in fact a side-effect", unless light forces are applied. Also, it is highly recommended to add the stop on the mesial side of the second molars instead of the first molars, unless the case is class II Division 2 "when the incisors are retruded". In such cases the stop added on the mesial side of the first molars will produce a beneficial reaction onto the incisors.

3. The theory of "optimal force level" has now clinical evidences in a lot of parts of "orthodontic world", where light forces application technique is being applied successfully regardless of whether lingual or labial orthodontic techniques are followed.

4. Consequently, it is necessary to apply such a concept on both techniques: Sequential and En Masse Retraction. Besides, to have a successful retraction, the total amount of roots surface in the anchorage unit must be higher than the total amount of roots surface in the anterior six, if not, other supportive approaches should be sought after "as microimplants, for instance".

5) To apply optimal forces it is highly recommended to use NiTi coils instead of stainless steels coils due the superelastic properties within the NiTi alloys. The forces provided by the stainless steel coils are so much higher than the NiTi coils mainly in the beginning of the coil activation. However, they decrease gradually and progressively, what may incite the clinician either to change or to reactivate the SS coil more frequently.

6) Choosing the appropriate technique depends on the clinical needs of the respective case. In other word, it is not an option that is chosen freely by the practitioner. It is imperative that orthodontist be aware when to use "En Masse Retraction" and when to use "Sequential Retraction" depending on each individual case, per se.

7) It is recommended that all the teeth be bonded "or banded", as to have more control over the teeth and dental movements. Such a recommendation is not conditional whether archwire is continuous or segmental "sectional". The point is that orthodontist should handle properly which tooth/teeth to be the Reaction Unit(s) and which to be moved, on the basis of the objective purpose of treatment plan.

8) Furthermore, anterior tooth/teeth retraction and/or posterior tooth/teeth protraction are not conditional to be symmetric in between right and left sides of the respective case, therefore clinician is encouraged to peruse and scrutinize each tooth and each group of teeth, to determine the best approach for each unit, per se (Figure 14).

Finally, the more orthodontist is aware of biomechanical principles, the more he/she is successful in discerning the best plan of treatment and the best way to harness that plan [2-12].

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