Nonextraction Treatment An Atlas On Cetlin Mechanics

Author: Raffaele Spena

Presentation

Dear Raffaele,

Congratulations on your contributions to Orthodontics. With young fellows of your caliber, the future of Orthodontics is secure.

You are a teacher, researcher and an outstanding clinician. I am very proud of you and I value your friendship.

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Foreword

Dr. Raffaele Spena is to be congratulated for meticulously detailing space gaining in the maxilla and mandible with unparalleled, clear, precise descriptions of the fabrication and use of the palatal bar and the mandibular lip bumper. He clearly presents a sequence of procedures to be followed in this unique non-extraction approach to therapy.

Incredibly illustrated, the text will be a most authorative source regarding all types of malocclusion.

Dr. Spena is truly one of the most gifted clinicians in the specialty. As a scholar, he is always striving to improve the well being of the patients he treats. Over the last decade he has been an invaluable contributor to our Orthodontic Program here at the University of Pennsylvania. His warm personality, optimistic disposition and his passion for orthodontics have made him an exceptionally well received teacher. Our entire faculty and staff congratulate him on this significant contribution to orthodontics.

In this hectic orthodontic world, where non-extraction treatment has become so popular, the "...fallacy of denture expansion as a treatment procedure" was outlined by Robert Strang in 1949.

Many have pointed out that restricting oneself to only one appliance does not provide the most successful treatment for the individual patient. Dr. Spena has outlined a non-extraction approach that can be utilized with any bracket or appliance system.

This book will certainly be helpful to orthodontists, postdoctoral students and those who desire to provide the highest quality of care and sustained excellence for their patients. Dr. Spena has provided essential information that is critical to delivering routine extraordinary non-extraction therapy.

Robert L. Vanarsdall
Professor and Chairman
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Author's Notes

I met Dr. Norman Cetlin in 1984 in Sorrento (Naples, Italy) during a Congress of the Società Italiana di Ortodonzia (Italian Society of Orthodontics). After completing my postgraduate studies at the Department of Orthodontics, School of Dental Medicine at the University of Pennsylvania, we developed a deep and growing clinical and scientific relationship.

I have been lucky to spend a great deal of time with Dr. Cetlin discussing orthodontics and watching him at work in his Newton Center (Boston) office. In turn, he has reciprocated with visits to my Naples office. Dr. Cetlin is an incredible clinician and has wonderful hands.

The nonextraction treatment developed by Dr. Cetlin has certainly influenced modern orthodontics. I believe there is no country where Dr. Cetlin has not been invited. His courses have been attended by hundreds of orthodontists around the world. Unfortunately, little has been written on his therapeutic approach and mechanics.

After using Dr. Cetlin's techniques in treating malocclusions (Class I and II) for sixteen years, then ten years teaching at the Post-graduate Program of Orthodontics at the University of Pennsylvania, and ten years more teaching with Dr. Cetlin, I decided to combine my clinical materials and results into this book. Dr. Cetlin has greatly influenced my professional life and I felt his teachings should not be lost.

My intent has been to create a book for both students and experienced clinicians that is easy to read. I hope this book is appreciated by those who love and practice clinical orthodontics.

I dedicate this book to my family.

I also dedicate this book to Dr. Brainerd "Barny" F. Swain, who recently passed away. He was a true gentleman, a unique teacher and an inspiring clinician and researcher. I will never forget his early morning lectures and doughnuts.

Many thanks to Dr. Robert "Slick" L. Vanarsdall and all the teachers and clinical instructors of the Department Of Orthodontics, School of Dental Medicine, University of Pennsylvania. They taught me a life and a professional principle that has always followed me: "If I can do it, you can do it, too."

Thanks also to my friend and editor, Dr. Gianni Villa. His advice was invaluable. This book would not exist without his help and encouragement.

I wish to acknowledge Mauro Leonardi and the Orteam Group for helping me to publish the first Italian edition. They have accomplished a great deal towards the development of Orthodontics in Italy.

Raffaele Spena

Part I

Nonextraction Treatment

Chapter 1
Introduction

Nonextraction orthodontic treatments have been proposed since the early ages. Unfortunately, Angle's experience and similar clinical experience have shown that a certain way to treat cases, (i.e. undiscriminative expansion of the arches) without reducing the number of teeth, is unsuccessful.

The first problem with a nonextraction approach was the extreme instability of the result; teeth would not stay where they were placed with the appliances. Tweed had to re-treat many patients he had previously treated.

A second problem was the unsatisfactory esthetical result. A protrusion resulted as the arches expanded.

As knowledge in the dental and the orthodontic fields improved, other problems arose with nonextraction treatments. Worsening of periodontal health status, functional problems and predisposition to TMJ pathology were all considered consequences of this specific way to treat orthodontic cases.

Unfortunately, these problems can happen in any situation; in nonextraction, as well as in extraction therapies, in surgical or in nonsurgical approaches. It seems that the level of discussion should be different: there are good ways and bad ways to treat cases orthodontically. Today we have more knowledge than pioneer orthodontists in the past such as Angle and Tweed. We should learn from past mistakes and save what was good in their techniques. Several other outstanding researchers and clinicians have given us information about how to improve our diagnostic treatment planning, retention of occlusion and how better to evaluate our patients before, during and after treatment.

Today, we can reach the objectives of better orthodontic treatment:

1. Good dental health
2. Good periodontal health
3. Good facial esthetics
4. Good dental esthetics
5. Good function
6. Stability

Dr. Cetlin was among the first clinicians to demonstrate the non-extraction treatment cases while realizing the above objectives.

What was different in his nonextraction approach compared to previous treatments?

Fifteen years of experience using this technique needs more than an article or a chapter of a book.

This book is a tribute to a very peculiar orthodontic treatment. It encompasses more that merely appliances and therapeutic sequences. Much effort has been made to explain the principles and the reasons why this technique works.

That doesn't mean that we should treat all cases nonextraction. But if we can treat nonextraction, this is certainly the way to do it.

The same principles may be applied to other types of therapy.

Chapter 2
Treatment planning and sequence

Cetlin mechanics are best suited for treating Class I and II malocclusions with upper and lower crowding.

The ideal period to start treatment is late mixed dentition, when second deciduous molars are about to exfoliate. At this time, we can take advantage of the leeway space, growth and generally good cooperation, since younger patients are more cooperative.

If severe crowding or a severe malocclusion is present, treatment may start earlier, as soon as it is possible to band upper and lower first permanent molars. The space-gaining phase may be followed by a period of retention, before starting the second phase with brackets and wires.

With a cooperative patient, treatment generally doesn't last longer than 24-30 months.

Adults may also be treated with Cetlin mechanics. Expected changes are less dramatic, but excellent results are possible even with non-growing cooperative patients.

The nonextraction treatment developed by Dr. Norman Cetlin can be divided in two phases, initial space gaining and a final space utilization.

2.1. SPACE GAINING PHASE

During the ***space gaining phase***, the objective is to change the original malocclusion in a "super Class I" with spacing in both upper and lower arch, eliminating crossbites and flattening the curve of Spee. The possibility of recovering space in the arches depend on several variables: patient's esthetics and function, characteristics of the malocclusion, skeletal pattern of the patient, dental anatomy, patient's age, and patient's cooperation.

Differences between upper and lower arch exist.

A. UPPER ARCH

In the upper arch there are 10 possible areas in which to gain space:

1. Molar rotation
2. Molar uprighting
3. Molar distalization
4. Premolar rotation
5. Leeway space
6. Incisor proclination
7. Modification of arch width
8. Modification of arch form
9. Stripping
10. Extractions

B. LOWER ARCH

In the lower arch, the areas are restricted to 8 possibilities:

1. Molar uprighting
2. Molar rotation
3. Premolar rotation
4. Leeway space
5. Incisor proclination
6. Modification of arch form
7. Stripping
8. Extractions

A description of the possibilities:

1. Molar rotation

In almost every case of crowding and/or protrusion, first and second permanent molars, if erupted, are mesiolingually rotated. Correction of this rotation can be accomplished in many ways and does not necessarily lead to space gaining, because anatomical differences of the crowns, upper molars (trapezoidal) may help to gain more space than the lower molars (rectangular).

With archwires in a fully or partially bonded arch we may rotate the lingual surface mesially instead of the buccal surface distally, especially if the wire is cinched back to control anterior teeth. Anchorage may be lost as well as space in the arch.

With intermittent forces (any removable appliances) it may be very ineffective and/or painful for the patient.

A fixed activated lingual arch, such as the palatal bar, or the lip bumper with reciprocal anchorage between the two molars, may be more effective for gaining space.

In the upper arch, molar rotation is usually first achieved because it prepares for distalization or change of the arch form. In the lower arch, molars are rotated as they upright or after their uprighting because of their tendency to incline lingually.

2. Molar uprighting

Molars may be somewhat mesially tipped. Upper molars don't tip mesially as much as the lower molars. Space can be gained by tipping them distally and, where possible, without cinching back the archwires as it limits movement and uses anterior anchorage.

3. Molar distalization

Distal drift of the molars is a powerful way to gain space in the upper arch, while not a possibility in the lower arch.

It has to be obtained after rotation and uprighting of the molars for several reasons: a) after rotation, molar roots are in the bone marrow away from the cortex, and teeth will move faster and with less resistance; b) uprighted molars tend to create less premature contacts and, therefore, find less resistance in their distal movement; c) molars that are already moving are easier to move, they offer less resistance and anchorage (the best anchorage in an arch is a tooth that has never been moved); d) after distal rotation of the molars, it may be found that further distalization is not needed.

Gaining distal movement of the molars usually does not require patient cooperation, but little to nothing is said about subsequent therapeutic steps.

The choice of palatal bar and headgear is based upon the following reasons: a) they give three dimensional control of upper molars; b) there is no risk to mesially driving premolars, canines and incisors; thus facing a malocclusion worse than the original one; c) the use of the extraoral force is limited when it follows proper manipulation of upper molars with palatal bars.

Class I and Class II malocclusions are often found in Class II skeletal patterns, where the profile is convex, the mandible is retrusive, the premaxilla (not the maxilla) is protrusive and there are possible vertical skeletal problems. Therefore, correction of molar relationship and space gaining frequently have to be achieved with some distal movement of the upper molars and with mesial growth and/or auto-rotation of the mandible. Freeing the mandible and controlling the vertical are the keywords for a sound correction. Trying to achieve correction with distalization of upper molars alone may have the same poor result of compensating treatment of Class II skeletal malocclusions, where upper first premolars are extracted.

4. Premolar rotation

This is the same as molar rotation, although only elongated premolars may help gain space by correcting their rotation.

5. Leeway space

An excellent area to recuperate space in the arch. The difference between deciduous teeth and permanent teeth is greater in the lower arch than in the upper arch. Control of leeway space may provide up to 4-6 millimeters of available space in the mandibular arch. This is why, as a general rule, late mixed dentition is the best time to begin treatment.

The use of a lingual arch to control lower molars and maintain the leeway space is limiting: a) may limit the movement and the eruption of premolars and canines; b) doesn't allow spontaneous alignment of the frontal teeth; c) doesn't affect arch form, which often needs to be changed; d) may create lingual recession on the incisors; e) can produce lingual inclination of the incisors.

It is safer to deal with extra space instead of just the space needed.

6. Incisor proclination

The anterior area is usually an area where space is needed and not retrievable.

In some situations, however, the incisors may be lingually inclined. If, from our esthetical, periodontal and cephalometrical evaluation they can be proclined, space may be gained in the arch.

The incisors may be moved labially, either changing their inclination, or with bodily movement. The achievement of incisor proclination by the use of labial shields and tongue action is more effective and less risky than mechanical movement. Changes with the shields are, however, a lot slower.

7. Modification of arch width

An arch may be modified in its dimension in three ways : a) skeletal expansion; b) dental expansion; c) dentoalveolar lateral growth.

In the upper arch, skeletal expansion may be obtained orthopedically or surgically. In the lower arch, skeletal expansion is generally not feasible.

Dental expansion is possible only when premolars and molars are lingually inclined. Buccal inclination of the lateral segments has proved unstable and may create functional as well as periodontal problems.

Last but not least, the dentoalveolar growth may be obtained at any age by changing the equilibrium between tongue and lip and cheeks, as with the use of a vestibular screen. The entire dentoalveolar portion grows laterally under the tongue action. Arches improve their transverse dimension and teeth maintain their proper labiolingual inclination. Clinicians have questioned the stability of these changes. Soo and Moore, using transducers to measure intraoral lip pressure during lip bumper therapy, have found that the initial increased pressure returns to the original values after several months. Muscles adapt to the new situation as long as they are given the chance.

Shields are effective if the lower arch is freed from the constrictive action from the upper arch either by disclusion or modification of the upper arch (i.e. bite opening, change of the arch form and dimension, etc.)

8. Modification of arch form

The arch form has to be changed. It should be considered a pathological aspect of a malocclusion that needs correction, as in a faulty molar relationship. Of course, its change has to be within certain boundaries.

The dental archform has to be coordinated to the apical base archform. The apical portion is a curved area and not a curved line. In some skeletal patterns, this area may be wider than in others. However, different pathways may be described. The arch form that Andrews found in his 120 normals and that Roth described as the best from a functional standpoint, is our objective using a functional screen.

By changing the archform we can obtain space in the arch, especially in the premolar area. The problem is how to change the archform and its relationship to the patient's face. Difference in the spatial position of the teeth will determine the quality and stability of the result.

9. Stripping

This is a possible way to create space in an arch.

First of all, the patient's age and predisposition to caries must be considered. Usually, adults and patients with low caries index are preferred.

Second, areas to strip are evaluated. Approximal amalgams, v-shaped crowns with thick enamel and a dark triangle between teeth where the papilla has receded are examples of where stripping is a possibility.

10. Extractions

This may sometimes be considered as an ultimate solution. Unfortunately, this irreversible way to create space in an arch does not necessarily mean that therapy can be carried out without patient's cooperation, and that treatment will be easier. Several biomechanical problems arise after extractions, such as anchorage control, space closure, as well as finishing and retention problems. Extractions are needed in several situations, but they are not necessarily the perfect solution.

The most frequent sequence of corrections during the space gaining phase is:

Upper arch

- Molar crossbite correction with palatal bar(s)
- Rotation, torque and distalization of upper molar(s) with palatal bar(s)
- Distalization of upper molar(s) with the removable distalizing plate and an appropriate extraoral force
- Realization of a "super Class I" molar relationship
- Modification of the removable distalizing plate to allow spontaneous distal drift of premolars and canines

Lower arch

- Placement of a lip bumper on first or second permanent molars
- Constant remodeling of the lip bumper to allow uprighting of lower molars, lateral dentoalveolar growth, and leveling of the curve of Spee
- Rotation of lower molars with the lip bumper
- Use of Class III elastics from upper first permanent molars to canine hooks on the lip bumper, to increase uprighting distal force on lower molars

2.2. SPACE UTILIZATION PHASE

The objectives of the following ***space utilization phase*** are Andrews' six keys with some modifications (see Chapter 11): we correct the overbite and the overjet and close spaces with a control of the anchorage throughout the treatment. The final goal is a mutually protected occlusion with canine and incisal guidance.

The most frequent treatment sequence use in finishing is as follows:

Upper arch

- Removing distalizing plate
- Setting of posterior anchorage
- Intruding and retracting upper incisors with the appropriate mechanics
- Closing residual spaces
- Detailing of tooth position and occlusion

Lower arch

- Setting of posterior anchorage
- Correcting rotation and tooth position
- Final leveling of the curve of Spee
- Closing residual space
- Detailing of tooth position and occlusion