Alexander Discipline: Concept & Philosophy

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ABSTRACT

Due to the distinctive orthodontic treatment methodology of the Alexander Discipline; thousands of clinicians around the world perform its 20 master principles. An outgrowth of the Tweed technique, these basic principles has been established over many years in author's own practice. This review presents evolution of the appliance, the concept of Vari-Simplex Discipline, as well as Alexander orthodontic philosophy. This paper concisely describes finishing and retention procedures in Alexander Discipline and will be of interest to anyone involved in the study and practice of orthodontics.

Key Words: Alexander Discipline, biomechanics, Vari-Simplex Discipline

INTRODUCTION

Richard G. Wick Alexander designed an appliance to deliver excellent treatment results in an easy organized manner. Simplicity, to encourage cooperation, comfort and control, was his main concern. His major goals include high quality results, patient comfort and reduced chair-side time. He developed an appliance known as Vari-Simplex Discipline, a system of brackets placed on teeth, which is used by orthodontists around the world.[1] In Alexander Discipline; certain number of principles are followed that give this technique its uniqueness.[2]

EVOLUTION OF THE APPLIANCE[3]

It has originally grown from many proven ideas and concepts that have been put together in a unique package (Table 1). In 1977, Alexander described Vari-Simplex Discipline; which includes a specific bracket system used in case treatment.

Although 0.022" brackets can also be used, the advantages of using 0.018" bracket slots and 0.017" wire were: reduced treatment time, improved patient comfort, and enable easy movement of teeth into proper position. Instead of archwire bending; the first, second, and third-order bends placed in the bracket, which simplified archwire fabrication and offer easier ligation and activation with fewer archwire changes.

Tweed to Vari-Simplex[2]

The Discipline maintains many of Tweed technique, and was developed from its principles. It has benefited from growth dynamics while remaining true to its three goals: high quality result, ease and convenience for the patient, and minimized chair-side time.

In Alexander Discipline, the patient ends up with balanced facial proportion consistent with skeletal pattern, which is the key objective to treat the case. Non-extraction therapy is preferable whenever possible.

Vari-Simplex philosophy retains following three fundamentals of Tweed technique:

1. Anchorage preparation (uprighting mandibular molars)
2. Positioning of mandibular incisors over basal bone
3. Orthopedic alteration with headgear

Table 1: Evolution of the appliance

1977	The original appliance was developed and called as Vari-Simplex Discipline.
1985	Generation 2: Mini Wick appliance: In this design, a stronger metal alloy was used, brackets were reduced in size, and the wings were redesigned to be more efficient.
1997	Generation 3: Alexander Signature appliance.

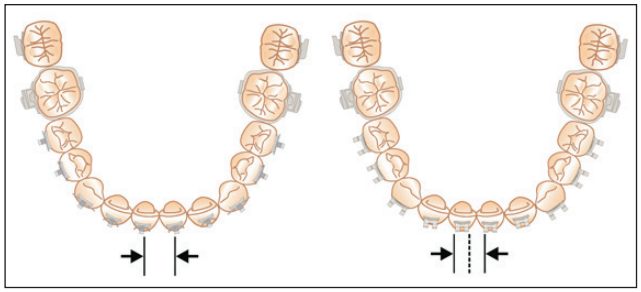

Figure 1: Single brackets create increased inter-bracket space

DIAGNOSIS AND TREATMENT PLANNING[4]

The desired mandibular incisors position is determined, which ascertains the treatment needed to position the maxillary dentition over the desired mandibular arch position, with four goals in mind: Incisor upright over basal bone, cuspids not expanded, curve of Spee level, and non-extraction therapy whenever possible.[4]

Lower incisors position:[5] The best and most stable position for lower incisors is the position in which the patient presents. Lower incisors can be advanced upto 3° and remain stable. Instability is more likely beyond that degree. When the lower incisors are abnormally retroclined (Class II Division 2 and Division I deep-bite cases); they can be advanced beyond this degree. In extraction cases, lower incisors are almost kept uprighted. The position of the mandibular incisors is considered the key to sagittal control; determined by the A-PO line, IMPA (relationship of mandibular incisors to mandibular plane), and the Holdaway ratio.

Other factors affecting diagnosis are: age of patient and diagnostic records.

THE CONCEPT OF VARI-SIMPLEX DISCIPLINE[3]

Following factors make Alexander Discipline different from others:

Unique bracket selection and prescription:

1. Specific bracket designs are created for specific teeth.
2. Single brackets create increased inter-bracket space as compared to twin brackets, which will allow more flexibility with stiffer archwires, resulting in easier engagement and fewer archwire changes (Figure 1).
3. Rotational wings give controlled guidance and direction to the teeth. Wings can be activated or deactivated for increased rotation. The advantage of rotation wings is that the force is exerted on the "active" wing (Figure 2). Using single brackets with wings creates an advantage that is not possible with twin brackets. The prescription allows for controlled and effective mandibular arch leveling, especially in non-extraction cases. This is accomplished by first placing the brackets and ligating each tooth with a rectangular wire.
4. The special prescription of torques and angulations in Alexander discipline makes the resulting straight wire appliance unique. If one believes that control of inter-canine width and mandibular incisor flaring is important, maximum effort should be made to control this area. Possibly the most important unique design elements of this bracket system is expressed in lower mandibular anterior brackets (Figure 3).

The incisors resistance to tipping labially, caused by the minus 5° torque, places a distal force on the first molars angulated at minus 6°, causing them to upright. This can gain 2–3 mm of arch length without flaring the incisors. The unique biomechanical principles of actively tying back a heat-treated, curved, rectangular stainless-steel archwire contributes to successful and stable arch leveling.

Unique arch form:[6,7]

The arch form used in Alexander Discipline was developed as a result of the compilation of hand-bent archwires that provide individualized archforms. This

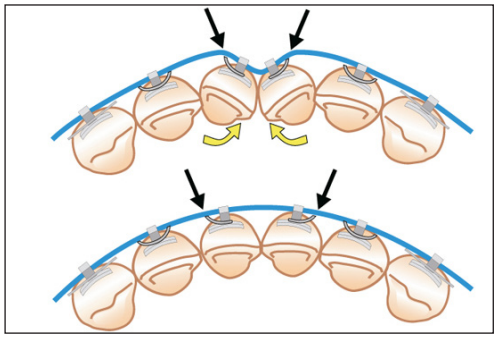

Figure 2: Rotational wings

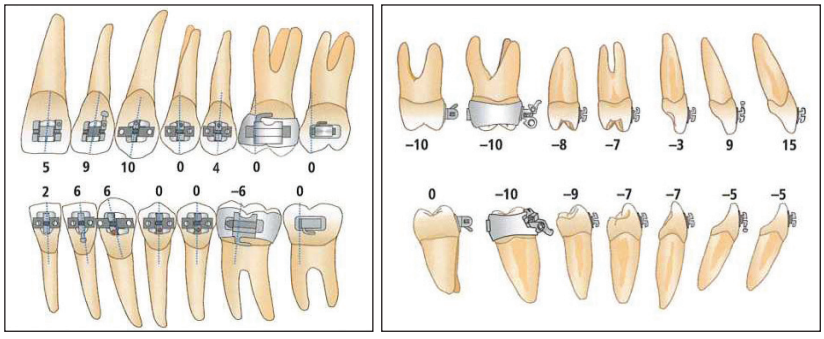

Figure 3: Special prescription of torques and angulations

arch form has been compared to other commercially available arch forms and found to be more stable.

For long term stability of the mandibular anterior; teeth positions are very important. With rare exceptions, inter-canine width must stay within 1 mm of its original position. Mandibular incisors can be advanced not more than 2 mm. Thus the anterior portion of the maxillary and mandibular archforms should be built around the mandibular six anterior teeth.

Regarding the posterior teeth, it is well known that the inter-molar width of ± 36 mm is stable in the long term. When combining these goals, the resulting archform shall be ovoid regardless of the patients' beginning archform.

Treatment mechanics:[8-12]

The Alexander Discipline is much more than a bracket system or arch form. Following specific mechanics were first created or popularized by this technique:

1. Treat maxillary arch before mandibular arch.[8,9]
2. Allow crowded mandibular arch to "drift" before placing brackets; in extraction cases, while maxillary arch is treated "Drifftodontics".
3. The low and average angle skeletal Class II cases corrected orthopedically by a tied-back arch wire attached to a cervical facebow.
4. Rapid palatal expansion and lip bumpers can often be used for gaining space in borderline cases treated without extraction.[11]
5. The -5° torque in the bracket and first rectangular flexible archwire control the flaring of mandibular incisors.12
6. Uprighting mandibular first molars with a -6° tip.
7. Roots of mandibular anterior are spread with precise angulated brackets.
8. Leveling the mandibular arches by using a definite reverse curve in the archwire.
9. The lateral brackets are supplemented with ball hooks for the attachment of elastics.
10. More horizontal vector of force on the arches created by attachment of Class II elastics on lateral incisors rather than canines.
11. Retraction of maxillary canines with 0.016 stainless-steel archwire and power chains.
12. Finalization the posterior occlusion by sectioning particular archwire with elastic attachments.
13. Controlling the post-treatment settling by a unique maxillary wrap-around retainer worn at night only.

THE APPLIANCE DESIGN AND CONSTRUCTION[13]

The system grew around five dynamics related to the brackets; viz: bracket selection, bracket height, bracket angulation, bracket torque and bracket in-out.

Bracket selection: Each tooth has a particular bracket that is most effective.

1. Twin Brackets (Diamond brackets) - Used on large, flat-surfaced teeth i.e. maxillary central and lateral incisors.
2. Lang Brackets - Invented by Howard Lang, used with the Diamond design on large, round-surfaced teeth at the corners of the arch, i.e. maxillary and mandibular cuspids.
3. Lewis Brackets - Used on large, round-surfaced teeth that are not at the curve of the arch i.e. maxillary and mandibular bicuspids and on small flat-surfaced teeth i.e. mandibular incisors.
4. Other Attachments - Twin brackets with convertible sheath are used on maxillary and mandibular first molars, which are usually banded. The convertible sheath is easily removed when second molars are banded, converting the attachment to a bracket.

Bracket height: Brackets are positioned in the center of the tooth mesio-distally at a predetermined position. Placing a bracket higher or lower affects the amount of torque and angulation, and the inciso-gingival position of the tooth. The bracket height will vary to fit the clinical crowns.

Bicuspid bracket height is the key. Its normal height is 4 mm for small crowns; 4.5 mm for average-sized crowns; and 5.0 mm for large crowns (Table 2).

Table 2: Guide to bracket height

	Maxillary Arch	Mandibular Arch
Centrals	X	X - 0.5mm
Laterals	X - 0.5mm	X - 0.5mm
Cuspid	X + 0.5mm	X + 0.5mm
Bicuspid	X	X
1st Molars	X - 0.5mm	X - 0.5mm
2nd Molars	X - 1.0mm	

Table 3: Maxillary and mandibular archwire force systems

Sequence	Purpose	Archwire type	Size (inches) and alloy
Maxillary			
Initial	Eliminate rotations	Flexible round Or rectangular	0.016 NiTi 0.017 x 0.025 CuNiTi[5]
Transitional	Close spaces: Non-extraction Close spaces: extraction	Intermediate round Intermediate rectangular with closing loops	0.016 SS Power chain 0.018 x 0.022 SS 0.017 x 0.025 SS TMA T-loop
Finishing	Final arch form, leveling, torque	Stiff rectangular	0.017 x 0.025 SS
Mandibular			
Initial	Eliminate rotations, control torque	Flexible round Or rectangular	0.016 NiTi 0.017 x 0.025 Turbo CuNiTi, D Rectangular
Transitional	Close spaces: Non-extraction Close spaces: extraction	Intermediate round Intermediate rectangular	0.016 SS Power chain 0.016 x 0.022 SS Closing loops
Finishing	Final arch form, leveling, torque	Stiff rectangular	0.017 x 0.025 SS

Bracket in-out (First order bends): The appliance incorporates a system of interrelated, compensating bracket base thicknesses to replace the usual first-order bends or offsets.

ARCHWIRE SELECTION AND SEQUENCE[7]

Bracket is only a "handle" placed on the tooth. Proper archwire selection and sequence allow the discipline to deliver the desired results. The first step in most cases is the elimination of rotations. This is done by the newer, flexible, more resilient wires i.e. multistranded round and rectangular TMA and Nitinol. Leveling and space closure are accomplished next, usually with TMA or stainless steel rectangular wire. The last step is final leveling and arch form, which are always performed with stainless steel wire (Table 3).

NON-EXTRACTION TREATMENT[14, 15]

Modern technology and materials allow the orthodontist to treat more borderline cases without removing teeth. Non-extraction treatment begins with maxillary arch.

The mandibular arch is the key to non-extraction treatment with Vari-Simplex Discipline. Control lower arch using -5° torque on incisors, -6° tip on first molars and initial flexible rectangular archwire. Crowding of the mandibular arch may however prevent unraveling and uprighting of the lower anteriors. The "slenderizing" is used for the selective interproximal reduction of the enamel.

Bonding /banding on the mandibular arch is delayed in non-extraction case for the following reasons:

- It avoids interference of mandibular brackets with maxillary teeth
- If a bite plate is needed, it fits better and is more comfortable after the maxillary arch has been properly aligned
- Total time needed to treat the mandibular arch is 6-9 months
- It allows more time for the second mandibular molars to erupt.

EXTRA ORAL FORCES APPLICATION[16-18]

The posterior transverse dimension is controlled better with the attachment of a retractor to the maxillary first molars and offers successful orthopedic results. When mandibular plane to SN angle is greater than 42°, a high-pull is used, while cervical-pull is used when this angle is equal to or less than 35°, and a combination pull is used when the SN to mandibular plane range from 36-42°.

Depending on the diagnosis, the patient should wear the retractor 8-14 hours per day. 8 hours a day during night if the patient's ANB is less than 3°, 12 hours a day if the ANB is 3-5°, and increase to 14 or more hours a day if the patient's ANB is 5° or more.

LEVEL ARCHES AND OPEN BITE WITH REVERSE CURVE ARCHWIRES

In case of close bite, excess curve of Spee is placed to enhance the opening of the bite. It is necessary to tie this archwire back.[19-21]

CONSOLIDATE ARCHES EARLY IN TREATMENT, THEN TIE BACK[3]

Tying back the archwire is utilized to consolidate the arch to change the archfrom several units to a single unit. It is important for the arch to be in one unit for the extra-oral forces to act orthopedically instead of dentally, and instead of acting on individual teeth, intraoral elastic forces must act on the arch.

There are three methods for tying back; power chain, the traditional Omega stop or ligature wire from molar to molar, and bending the archwire at an angle distal to the molar tube. The Omega stop, set 1-2 mm mesial to the buccal tube, empowers placement of a dynamic tieback force on the archwire.

PROPER TIMING WITH CLASS II ELASTICS[22]

As in most things in life, "timing is everything." Diagnostically, Class II malocclusions can be classified as either skeletal or dental. In Alexander Discipline, treatment of a skeletal Class II case begins with headgear wear 8-10 hours each night. Proper timing for elastic wear is critical during orthodontic treatment in the Alexander Discipline. It is very important that the final archwires in both arches, 17×25 stainless steel in an .018 slot, are fully engaged, tied back and have been in the mouth at least one month before Class II elastics are initiated. It is also important to attach elastics to the appropriate teeth. In Alexander Discipline, Class II elastics are not employed to open the bite. In a case with extreme deepbite, the overbite will be corrected with reverse curve in the lower archwire and box elastics to the bicuspids. After the lower arch has leveled and the bite has opened, Class II elastics will then be employed.

FINISHING AND RETENTION PROCEDURES[23]

By understanding definite verified mechanics and mastering the order of their application for the specific patient, accomplishment of excellent results with long term stability can usually be obtained. When the patient is ready for retention, certain criteria must be met, that include:

- Ideal occlusion: Cuspids protected with centric occlusion and centric relation coincident
- Normal overbite and overjet
- Spread out incisor roots, especially the lower incisor roots
- Correct torque of the upper incisors to allow for a good inter-incisal angle
- Lower incisors balanced over basal bone within 3° of their original position
- Original lower inter-cuspid width must be maintained
- Lower first molars should be upright to maintain a leveled mandibular arch and overbite correction
- Habits should have been eliminated
- Optimal and coinciding midlines.

In addition, two months before removal of the fixed appliance; a circumferential supracrestal fiberotomy is done for adults with severely rotated teeth. A frenectomy also performed for those who have heavy diastema with familial traits.

When all the treatment objectives are achieved and fixed appliance removal time is approaching, four arrangements are made with specific purposes for each appointment (Table 4).

Table 4: The countdown to retention[24]

Appointment 1	Sectioning of wires and finishing elastics
Appointment 2	3 weeks later: Occlusal check and final adjustments, and possible sectioning of the opposing arch wire and removal of molar bands
Appointment 3	3 weeks later: Fixed appliance removal
Appointment 4	2 days later: Seating of the retainers

CONCLUSION

Alexander orthodontic philosophy is a unique orthodontic treatment approach designed to provide excellent outcome results in easy systematized manner. Its uniqueness accomplished through the application of a certain number of principles.

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