

MANUAL OF WIRE BENDING TECHNIQUES

.....
Eiichiro Nakajima, DDS, DMSc

Private Practice

Tokyo, Japan



Quintessence Publishing Co, Inc

Chicago, Berlin, Tokyo, London, Paris, Milan, Barcelona,

Istanbul, São Paulo, New Delhi, Moscow, Prague, and Warsaw

Table of Contents

Preface vii

1 • Mastering the Fourth-Order Bend 1

2 • Trimming Casts 3

3 • Basic Wire Bending 5

Selection of Pliers 6

How to Hold Pliers 8

Wire Bending Procedures 9

 Vertical open loop 9

 Vertical helical closing loop 11

 Horizontal "L" open boot loop 14

 Horizontal "T" open boot loop 17

 Vertical approximated helical closing loop 20

 Helical loop 22

 Straight section (mandibular left) 24

 Retraction section (maxillary left) 28

 Retraction section (mandibular left) 31

 Stabilizing helical section (maxillary left) 31

 Mandibular utility arch 34

 Maxillary closing utility arch 43

 Mandibular ideal arch: Second premolar to second premolar (.016 × .022 wire) 56

 Mandibular ideal arch: First molar to first molar (.016 × .022 wire) 66

 Ideal arch coordination 67

4 • Corrective Techniques: Clinical Cases 69

Rotation of the Mandibular Anterior Teeth 70

Rotation of the Mandibular Right Second Premolar 71

Rotation of the Maxillary Central Incisors 72

Correction of Ectopic Eruption of the Maxillary Canines 74

Treatment of Lateral Open Bite 76

Treatment of First Molar Crossbite 77

Correction of a Step Between the Mandibular Second Premolar and First Molar 78

Correction of Class II, Division 2 Deep Bite in Adults 80

Correction of Class II, Division 2 Deep Bite During the Growth Period 82

Mandibular Dental Arch Expansion for Class II, Division 1 Occlusion 84

Finishing a Case in Class II, Division 1 Occlusion 86

Preface

Many people believe that we are in the age of straight archwires and that wire bending is no longer necessary. However, the straight wire technique, in which a thin elastic straight wire is inserted and replaced by increasingly thicker wires, does not allow adjustments according to the unique skeletal morphology, dysfunction, tooth size, and dentition of each patient as well as the patient's age, sex, and wishes. If such adjustments are not necessary, treatment results should be the same in all cases, but this is not reality. Nevertheless, it is true that recent advances in wire properties have changed clinical techniques, and the development of wire with high resilience has reduced (but not eliminated) the necessity of bending.

Another consideration is bracket design. The force of wire is transmitted to the periodontal tissue and alveolar bone via the brackets attached to the teeth, and the morphology and size of brackets differ according to the developer of each technique and among manufacturers. Though each bracket has torque, angulation, in/out, and morphology based on its original design, it is strange that only one type is used for most techniques, without alteration for the unique needs of each patient. There are only some brackets in which angulation and torque differ depending on whether or not tooth extraction is included in the treatment plan. Setting the skeletal morphology and function of each patient aside, there should be at least some accommodation for different shapes and sizes of the crown and root. In manufacturing, original criteria used in the research and statistical calculation performed by the developers of each technique are used as the basis for the design of brackets. For example, some years ago, brackets marketed as being specially designed for Asian and Hispanic patients became commercially available but were developed based only on samples of Japanese, Korean, Chinese, and Mexican populations. One could reasonably question why these specific nationalities were selected and on what basis these ethnicities were combined.

If a retail store offered shoes or clothing in only one size, no one would shop there. This absurd situation is analogous to the current state of the orthodontic market. Bringing straight wires to market merely to increase sales represents a misplacement of priorities. There are many brackets and straight wire techniques based only on the morphologic statistics of specific population groups without consideration for biology or individual differences.

The author considers any bracket or wire acceptable if it is easy to use, prefers techniques that are as effective and efficient as possible, and uses only biologically compatible wires and brackets. Overly complicated wire bending is not necessary. This book was written with this perspective in mind and for the purpose of serving as a guide for good clinical practice.

Fig 3-159 Mark the offset for the left molar. Grip the molar mark with the second segment of the cylindric beak.

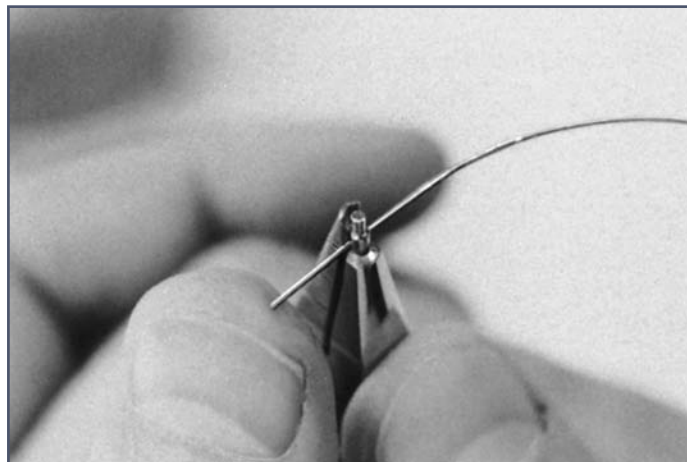


Fig 3-160 Bend the anterior segment around the receiving beak 15 degrees buccally with the left thumb.

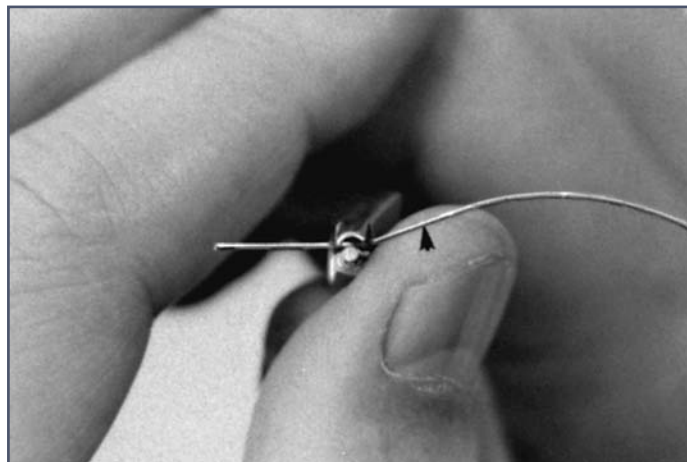
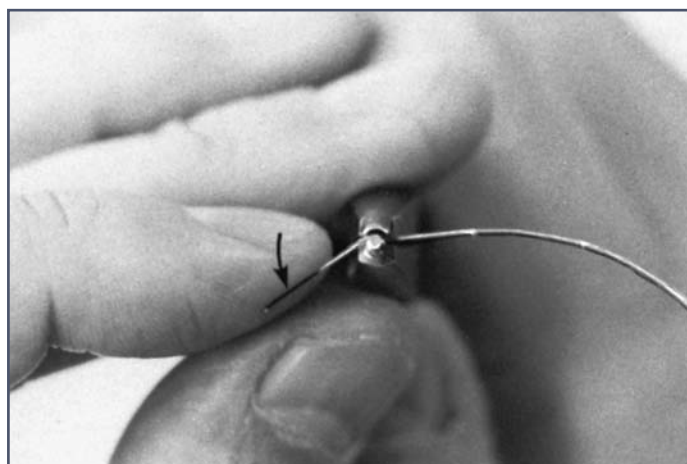


Fig 3-161 Bend the posterior segment 30 degrees lingually with the left index finger.



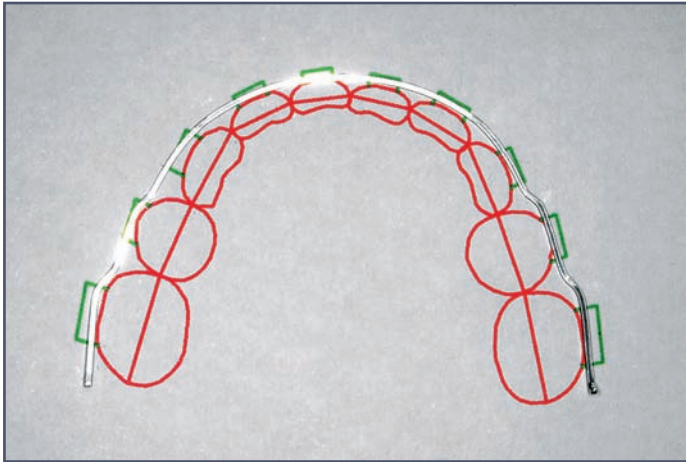


Fig 3-180 Check the thickness of the offset and bayonet bends as well as the symmetry of the arch according to the pretreatment mandibular visual treatment objective (VTO).

• Mandibular ideal arch: First molar to first molar (.016 × .022 wire)

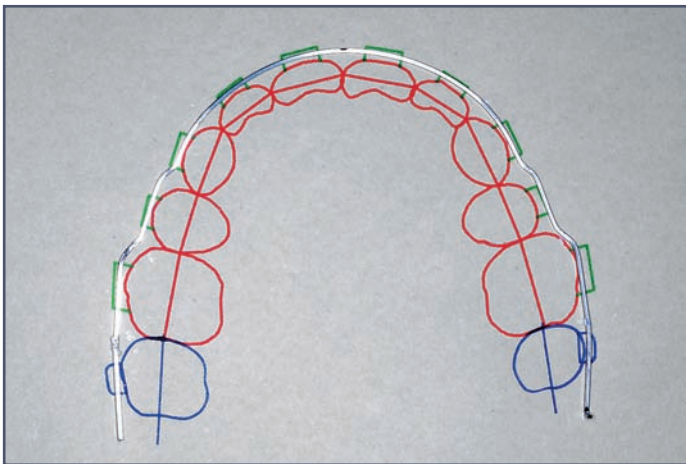


Fig 3-181 Mark on the wire the mesial contact points of the left and right second molars, and curve the wire slightly in the distal direction.

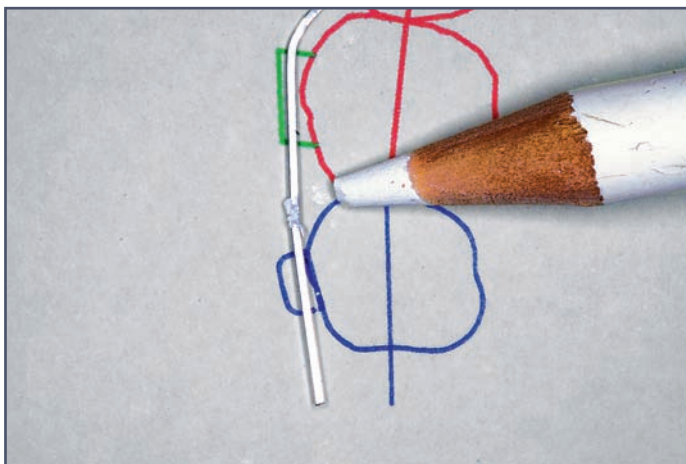


Fig 3-182 Referring to the mandibular VTO produced from the cast, curve the wire distally from the contact points, taking into consideration the difference in buccolingual crown width between the premolars and molars.

Rotation of the Mandibular Anterior Teeth

Always consider the dental arch as a whole. Even in cases such as this one, in which a female patient aged 15 years, 9 months shows extreme rotation of an anterior tooth, it is not appropriate to consider correction of only one tooth. Such conditions should be evaluated as problems of discrepancy in the entire dental arch. Recently, a method in which the anterior teeth are simply reduced in contact areas then aligned has become popular, but this calls the basic purpose of orthodontic treatment into question.

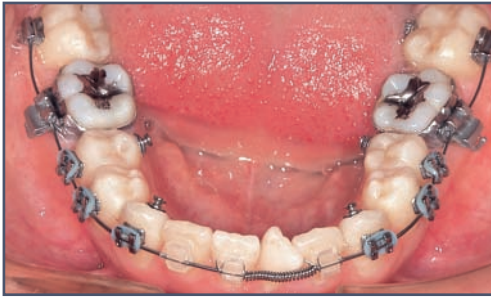


Fig 4-1a To obtain space at the mandibular right central incisor, an open coil spring is inserted between the central and lateral incisors (about 50 g, 2 months).



Fig 4-1b A lingual bracket is attached to the lingual side of the lateral incisor, and chain elastics are applied from the lingual bracket to the surgical hook applied distal to the central incisor. The memory wire (.016 × .016) is firmly placed in the slot of the right central incisor and ligated at a site mesial to the bracket (about 4 months).



Fig 4-1c The ideal arch (.016 × .022 multiphase wire) is inserted and stabilized (about 4 months). When necessary, overcorrection is added.

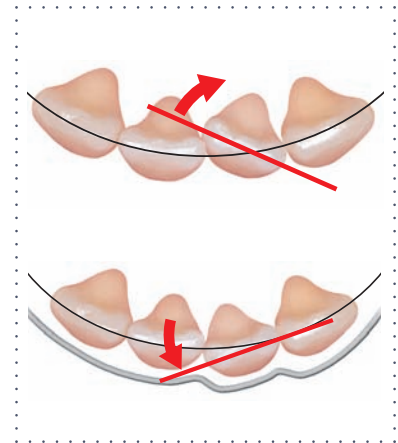


Fig 4-1d Overcorrection. The central incisor is mesially rotated (*top*). Overcorrection is added to the ideal arch so that the central incisor is slightly rotated distally (*bottom*).



Fig 4-1e After treatment. Proper tooth movement was achieved.

Rotation of the Mandibular Right Second Premolar

Be sure to consider anchorage. In this female patient aged 13 years, 4 months, there is space anterior and posterior to the second premolars due to congenitally missing teeth. In general, however, this space is often insufficient for the required movement. When the tooth is rotated around its axis from the buccolingual direction using an elastic, as in other tooth movement procedures, anchorage is important.

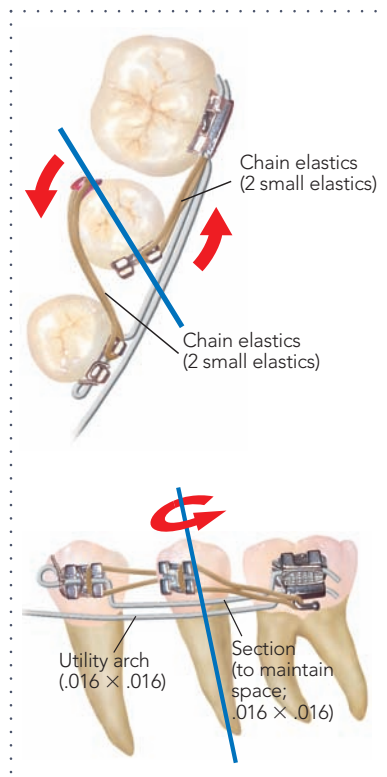


Fig 4-2c Rotation correction on the second premolar.

Fig 4-2a To improve the distal rotation on the second premolar, after banding or bonding, chain elastics are used. To maintain the space between the first premolar and the first molar, as well as anchorage, a section is inserted between the first premolar and first molar (.016 × .016 multiphase wire).

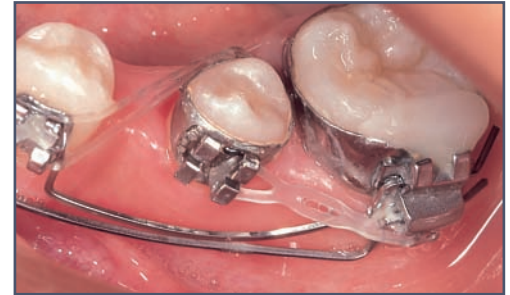


Fig 4-2b After 1 month, rotation has been corrected, but to compensate for possible relapse, the course is maintained for a few months until the tooth is in a slightly over-rotated state.

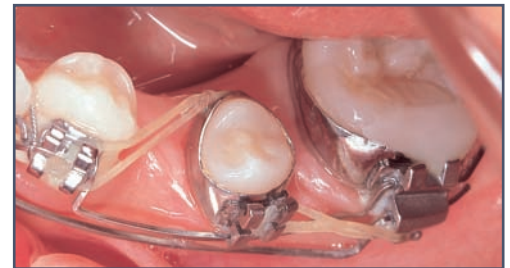


Fig 4-2d To prevent relapse, chain elastics are sometimes used after completion of alignment. (Ideal arch: .016 × .022 multiphase wire.)



Fig 4-2e Immediately after removal of the appliance. To prevent relapse, the occlusal relationship, overcorrection, and design of the retainers are important.

