The Tweed-Merrifield Philosophy

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Charles Tweed's concepts have been simplified, enhanced, and expanded by Levern Merrifield. Merrifield's ideas have augmented Tweed's to give orthodontics the Tweed-Merrifield philosophy. Adherence to the philosophy allows the orthodontic specialist to define objectives for the face, the skeletal pattern, and the teeth, to diagnose and treat a malocclusion to efficiently reach these predetermined objectives. (Semin Orthod 1996;2:237-240.) Copyright © 1996 by W.B. Saunders Company

The 1950s were "growing years" for orthodontics in America. Many orthodontists at that time had preceptor training, and graduate programs were just beginning in many areas of the country. Orthodontists were looking for a better way to diagnose and treat their patients. Because of Charles Tweed's lectures and published writings he developed a considerable reputation as a clinical orthodontist. Most American orthodontists, both preceptees and those with university training, went to Tucson to participate in the Tweed Study Course in order to learn how to use the edgewise appliance.

As the Tweed Study Course grew, it became more time consuming for Dr. Tweed. To help him present the material, he selected many of his former students to serve as instructors. A list of these instructors would read like a who's who in orthodontics in the 1950s and 1960s. In the late 1950s Tweed had some health problems so he began to seriously consider the selection of a young person with the desire, talent, and "singleness of purpose" to carry on his work and the Tweed Study Course. He chose Levern Merrifield (Fig 1).

After graduate training at UMKC, Levern Merrifield went to Tucson in 1953 to take Tweed's course. At Tweed's invitation, he immediately joined the teaching staff. In 1960 Tweed named him Tweed Study Course co-director. Merrifield remained co-director until Tweed's death in 1979, at which time he became the director.

Merrifield has enhanced and expanded Tweed's concepts. He has simplified the treatment mechanics. Instead of 12 sets of archwires, as in Tweed's day, each malocclusion correction now requires a maximum of four to five sets of archwires. The manipulation of the appliance is simple and straightforward. The diagnosis is sophisticated and focuses on the area of the dentition with the greatest number of problems.

Merrifield's concepts that have been popularized over the last 35 years are: the fundamental and all-encompassing concept of dimensions of the dentition, 
1 the diagnostic concept of dimensions of the lower face, 
2 the treatment concepts of directional control during treatment, 
3 sequential tooth movement, and sequential anchorage preparation, 
4 Merrifield's concepts have enhanced and augmented Tweed's to give orthodontics the Tweed-Merrifield philosophy. Adherence to the philosophy allows the clinician to define objectives for the face, the skeletal pattern, and the teeth, to diagnose and treat a malocclusion to efficiently reach these predetermined objectives.

The stated objectives of the Tweed-Merrifield philosophy of treatment are: (1) position and arrange the teeth for maximum facial balance and harmony, (2) position and arrange the teeth for maximum health of the teeth, jaws, joints and the surrounding tissues, (3) position and arrange the teeth for maximum functional efficiency, (4) position and arrange the teeth for maximum stability and esthetics, (5) position and arrange the teeth on the immature patient.

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to harmonize the correction with normal growth processes and maximize the compensation for the less than normal pattern, and (6) position the denture and arrange the teeth so that both are in a continual state of maximum environmental harmony. (This objective can be realized only if the first five objectives have been successfully achieved.) (7) These clinical objectives must be pursued in an ethical, moral, and compassionate manner with an overriding concern for the public’s welfare. The all important seventh objective is the crux of the philosophy.

The basic and fundamental diagnostic concept of dimensions of the dentition was Merrifield’s first, and one of his most important contributions to the philosophy. Both the diagnostic and treatment philosophy of the patient has normal muscular balance.

Premise no. 1. There is an anterior limit of the dentition. Teeth should not be pushed forward off basal bone. If the teeth are pushed too far forward, all the objectives of treatment are compromised. Tweed defined the anterior limit with the diagnostic facial triangle.5

Premise no. 2. There is a posterior limit of the dentition. Teeth can be pushed distally off the maxillary tuberosity and impacted into the area behind the mandibular first molar in the lower arch just as easily as they can be pushed too far forward.

Premise no. 3. There is a lateral limit of the dentition. Teeth cannot be pushed laterally into the masseter and buccinator muscles and be expected to remain in place over time.

Premise no. 4. There is a vertical limit of the dentition. Vertical expansion is disastrous to both facial balance and to stability.

In summation, the concept of dimensions of the dentition is the foundation of the Tweed-Merrifield diagnostic and treatment philosophies. Orthodontists should recognize and treat within the dimensions of the dentition if the patient has normal muscular balance.

The Diagnostic Philosophy

The Tweed-Merrifield diagnostic philosophy can be outlined as follows: (1) Recognize and treat within the dimensions of the dentition. Patients who have normal muscular balance should be treated without expansion. (2) Recognize the dimensions of the lower face and treat for maximum facial harmony and balance. (3) Recognize and understand the skeletal pattern. Diagnose and treat in harmony with normal growth and developmental patterns and enhance the less than normal pattern.

The Treatment Philosophy

A treatment philosophy must complement a diagnostic philosophy. Tweed-Merrifield Directional Force technology is simple, straightforward, and modern. It complements the previously described diagnostic philosophy. It is the most contemporary orthodontic technology available today for the orthodontist who desires a controlled orthodontic response.

Throughout the Tweed-Merrifield era, the key to quality individualized orthodontic service has been directionally controlled precision archwire manipulation. Archwire manipulation,
Figure 2. Upward and forward force system.

and not bracket manipulation, enables the clinician to reach his or her objectives by placing the proper force on the proper tooth or teeth at the proper time. There are essentially five concepts which make up the Tweed-Merrifield treatment philosophy. These are: (1) sequential appliance placement; (2) sequential tooth movement; (3) sequential mandibular anchorage preparation; (4) directional force (augments control of the vertical dimension which, in turn, enhances mandibular response); and (5) proper timing of treatment.

Sequential Appliance Placement
Sequential appliance placement allows the operator to start a patient’s treatment with small edgewise archwires. Edgewise archwires enhance control of the teeth from the outset of treatment.

Sequential Tooth Movement
Tooth movement is sequential, not en masse. Teeth are moved rapidly and with precision because they are moved individually or in small units while the remaining teeth in the arch act as stabilizing units.

Sequential Mandibular Anchorage Preparation
Sequential mandibular anchorage preparation was developed by Levern Merrifield as a re-

Figure 3. Maxillary incisor movement must be distal and superior.

sponse to technical problems with en masse anchorage preparation. Mandibular anchorage is prepared quickly and easily by tipping two teeth at a time (one on each side of the arch) to their anchorage prepared positions.

Directional Force
A hallmark of Tweed-Merrifield treatment strategy is a directional force system that controls the mandibular anterior and posterior teeth and the

Figure 4. Mandibular plane, occlusal plane, palatal plane.
maxillary anterior teeth. The resultant vector of all orthodontic forces should be counterclockwise so that the opportunity for a favorable skeletal change is enhanced (Fig 2). Such a force system requires that the mandibular incisors be upright over basal bone so the maxillary incisors can be moved distally and superiorly (Fig 3). For the counterclockwise force system to be a reality, vertical control is critical. To control the vertical dimension, one must control the mandibular plane, the occlusal plane, and the palatal plane (Fig 4). If Point B drops down and back, the face becomes lengthened, the mandibular incisor is tipped forward off basal bone, and the maxillary incisor drops down and back instead of being moved up and back (Fig 5).

Timing

Timing of treatment is an integral part of the treatment philosophy. Treatment should be initiated at a time when predetermined objectives can be most readily accomplished. This might mean interceptive treatment in the mixed dentition, selected extractions in the mixed dentition, or waiting for second molar eruption before initiating active treatment.

References